

**Designing a policy framework to universalise adequate household sanitation in
Guyana**

By Darren Shako

Submitted in partial fulfilment of the requirements for the degree of
Doctor of Philosophy

School of Civil Engineering and Geosciences,
Newcastle University, UK

July 2018



Abstract

Improving sanitation has been on the agenda of Guyana for over a century, but today almost half the population still lack access to facilities and engage in practices that cannot be classified as being adequate. The absence of a dedicated national public policy for sanitation has been cited as one of the factors responsible for the poor state of sanitation. This thesis examines how such a policy should be designed and implementation for Guyana to create the enabling environment to universalise and sustain an adequate level of household sanitation.

The methodology adopted for this study combined a comprehensive assessment of the historical development of sanitation in Caribbean, a case study analysis of Barbados' approach to sanitation improvement (a country with the highest human development index in the region and with almost universal sanitation coverage), and a systematic analysis of Guyana's sanitation sector. Data was collected using a mixture of methods including desk studies, face-to-face interviews, questionnaires and structural observations.

Findings showed that the existing state of sanitation in Guyana is influenced by crippling institutions formed in its formative years of development; institutions that contemporary developers have failed to effectively reverse or abolish. Sanitation viewed as a private responsibility, poor organisation of sanitation services, lack of standards and security of tenure and lack of sanitation consciousness all lead to inadequate sanitation conditions for many households. The results from Barbados showed that political will and leadership must be the cornerstone of a sanitation improvement strategy. Linking sanitation improvement to wider development objectives proved effective in ensuring sanitation improvement is central of development. In developing the sanitation policy framework for Guyana, four conditions were considered necessary; (1) a clear definition of sanitation, (2) establishment of country-appropriate standards, (3) adopting a collective approach that includes obscure groups such as households within informal settlements, and (4) a national approach that takes into account the varying geo-physical and cultural demography of the country.

Dedication

In loving memory of A.A.H

Acknowledgement

There are several persons and institutions whose generous assistance and support contributed significantly to the completion of this thesis. It is with deepest gratitude I say thank you to my supervisors Dr Jaime Amezaga and Dr Charlotte Paterson for their never-ending support, being a source of knowledge and being very accommodating and understanding to my Caribbean persona. Thank you Jaime for always having that positive attitude and seeing potential where most times there were not, and Charlotte for being the captain of this trio ship, steering us back on course, when we frequently drifted off course. Your guidance and support was overwhelming. I extend gratitude to the Barbados Environmental Protection Department, particularly Mrs Donna Gittens. Many thanks for your assistance and for hosting my fieldwork while in Barbados. To the Guyana Ministry of Communities, particularly the Permanent Secretary, Mr Emil Mcgarrell, thank you for facilitating this research and your support especially you volunteering as a research assistant. To Malini Jaikaran, Kwesi Amsterdam, my colleagues in the CEG and the many others who have provided assistance along the way, your support is deeply appreciated. To my extended family, your support and encouragement have not gone unnoticed. Thank you for providing the calm within the many storms. To my wife, Tamika Shako, thank you for your understanding, patience and love, but mostly for holding the reins and being a single parent in many ways to our daughter Arian over the last year. The overwhelming support was undoubtedly a gift from my heavenly father, whom all praise is due.

Table of Contents

ABSTRACT	II
DEDICATION	IV
ACKNOWLEDGEMENT	VI
LIST OF TABLES	XIV
LIST OF FIGURES	XVI
ABBREVIATIONS	XX
CHAPTER 1. INTRODUCTION	1
1.1 INTRODUCTION	1
1.2 RESEARCH MOTIVATION	1
1.3 WHY SANITATION – GLOBAL CONTEXT	2
1.4 GUYANA’S SANITATION CHALLENGES	4
1.5 RESEARCH AIM AND OBJECTIVES	5
1.5.1 <i>Research Aim</i>	5
1.5.2 <i>Research Objectives</i>	6
1.6 THEORETICAL FRAMEWORK	7
1.7 RESEARCH LIMITATIONS	8
1.8 APPLICATION OF RESEARCH FINDINGS	10
1.9 STRUCTURE OF THESIS	11
1.10 EXPANDED BACKGROUND OF GUYANA	12
1.10.1 <i>Location and history</i>	12
1.10.2 <i>Geography and Demography</i>	12
1.10.3 <i>Governance and Administration</i>	14
CHAPTER 2 – MAIN CHALLENGES TO IMPROVING COUNTRY-LEVEL SANITATION: A CRITICAL REVIEW	17
2.1 INTRODUCTION	17
2.2 EARLY SANITATION CHALLENGES	17
2.3 CURRENT GLOBAL SANITATION EFFORTS, PROGRESS AND CHALLENGES	18
2.4 CLASSIFICATION OF SANITATION CHALLENGES	20
2.4.1 <i>Political Will</i>	24
2.4.2 <i>Inadequate Enabling Environment</i>	25
2.4.3 <i>Weak Institutions</i>	26
2.4.4 <i>Financial constraints</i>	27
2.5 COMPLEXITIES TO SANITATION DEVELOPMENT	28
2.6 NON-MAINSTREAM FACTORS AFFECTING SANITATION DEVELOPMENT	29
2.6.1 <i>Country Specific challenges based on Historical Development Pattern</i>	29
2.6.2 <i>Sanitation Definition</i>	30

2.6.3 Security of Tenure	31
2.6.4 Culture, gender, social and economic factors	32
2.6.5 Sanitation planning approaches	33
2.7 OVERCOMING CHALLENGES TO NATIONAL SANITATION DEVELOPMENT	33
2.7.1 Lack of holistic approach to sanitation development	34
2.7.2 Reconsideration for the Policy Approach	34
2.8 CONCLUSION	35
CHAPTER 3. METHODOLOGY	37
3.1 CHAPTER OVERVIEW	37
3.2 RESEARCH CONCEPTUAL FRAMEWORK	37
3.3 RESEARCH STRATEGY	40
3.4 RESEARCH DESIGN	41
3.5 DATA COLLECTION & ANALYSIS	44
3.5.1 Desktop Review	44
3.5.2 Interviews, Questionnaire, Interactive Group and Observation	44
3.6 SELECTION OF CASE STUDY COUNTRIES	45
3.6.1 Why Barbados	45
3.7 APPROACH TO BARBADOS CASE STUDY	47
3.7.1 Case Study Design	47
3.7.2 Data Collection Methods	47
3.7.3 Identification of Participants and Interview Preparation	48
3.7.4 Data Recording, Analysis and Presentation	48
3.8 APPROACH TO GUYANA CASE STUDY	49
3.8.1 Data Collection Design	50
3.8.2 Sampling Strategy	51
3.8.3 Determining household sample Size	55
3.8.4 Data Collection Methods	58
3.8.5 Data collection, instruments and approach	58
3.8.6 Field Survey collection, analysis and presentation	60
CHAPTER 4. HISTORICAL DEVELOPMENT OF SANITATION IN THE CARIBBEAN – CRITICAL EVENTS BETWEEN 1900 AND 2015.	65
4.1 INTRODUCTION	65
4.2 METHODOLOGY	66
4.3. THE CARIBBEAN REGION AND THE IMPORTANCE OF SANITATION	66
4.3.1 Caribbean Geography and Population	66
4.3.2 Impact of Sanitation and Caribbean Development	68
4.4 SANITATION PROGRESS OF THE CARIBBEAN	69
4.5 EVENTS INFLUENCING SANITATION DEVELOPMENT IN THE CARIBBEAN	71
4.5.1 Rockefeller Foundation–International Health Commission (IHC)	74
4.5.2 The West India Uprising and the Moyne’s Commission 1930-1945	78

4.5.3 Independence from Colonial Rule	82
4.5.4 International Proclamations and Interventions	85
4.6. CONCLUSION	87
CHAPTER 5. ANALYSIS OF BARBADOS SANITATION DEVELOPMENT - CRITICAL LESSONS FOR GUYANA.....	91
5.1 INTRODUCTION.....	91
5.1.1. Assessment Methodology - Conceptual Framework	91
5.2 OVERVIEW OF BARBADOS	93
5.2.1 Political and socio-economic development history	93
5.2.2 Governance Structure	94
5.2.3 Landscape and Hydrogeology.....	94
5.3. IMPLICATIONS OF BARBADOS' HISTORICAL DEVELOPMENT ON HISTORY ON SANITATION DEVELOPMENT	95
5.3.1. Early settlement to slavery	95
5.3.2. Post Emancipation	96
5.3.3 Post-Independence period	97
5.3.4 Barbados Sanitation Drivers – From past and present Drivers for Sanitation Improvement in Barbados.....	98
5.4 SANITATION STATUS	104
5.4.1 How sanitation is defined in Barbados.....	104
5.4.2 Legal Framework Shaping Sanitation Definition.....	106
5.4.3 Coverage and Adequacy of Sanitation Components.....	108
5.4.4 Comparing assessed sanitation status to JMP reported coverage	117
5.4.5 Institutional Framework for Sanitation Management	118
5.5 BARBADIAN APPROACH TO SANITATION – WHAT WORKED	120
5.6 WHAT DID NOT WORK – CHALLENGES IN BARBADOS SANITATION DEVELOPMENT	123
5.6.1 Challenges to advancing sanitation improvement programmes.....	124
5.7 CRITICAL LESSONS FROM BARBADOS APPROACH.....	124
5.7.1 Strong Political Will	124
5.7.2 Early recognition of the Impact of Poor Sanitation to National Development.....	125
5.7.3 Adaptation of a country-appropriate approach	125
5.7.4 Sanitation Improvement Driven by State – Public Good	125
5.7.5 Transferrable Lessons for Policy Development.....	126
5.8 CONCLUSION	126
CHAPTER 6. ASSESSING THE CURRENT STATE OF SANITATION IN GUYANA AND THE LIMITING FACTORS TO UNIVERSALISATION	129
6.1 INTRODUCTION.....	129
6.2 HISTORICAL DEVELOPMENT OF SANITATION IN GUYANA.....	132
6.2.1 Guyana's history, development and sanitation.....	132
6.2.2 Housing Development in Guyana	134

6.2.3 Sanitation development in Guyana.....	136
6.2.4 Linking of Sanitation with Health Care Services.....	140
6.2.5 Evolution of sanitation development.....	141
6.3 SANITATION STATUS	143
6.3.1 Sanitation definition.....	144
6.3.2 Legal Framework, Organisation and Management of Household Sanitation.....	147
6.3.3 Organisation and Management of Sanitation Services.....	150
6.3.4 Coverage of sanitation in Guyana	161
6.3.5 Solid Waste Management	176
6.3.6 Hygiene	180
6.3.7 Drainage.....	182
6.3.8 Vector Control.....	184
6.4 ADEQUACY OF CURRENT SANITATION STATUS	185
6.4.1 Water Supply	185
6.4.2 Excreta Management	186
6.4.3 Factors Limiting Adequacy of Sanitation.....	187
6.5 LIMITING FACTORS TO SANITATION IMPROVEMENT IN GUYANA.....	189
6.5.1 Path Dependence	189
6.5.2 Addressing Path Dependency.....	193
6.5.3 Settlement development practices and inadequate housing.....	194
6.5.4 Proliferation of squatter settlements	195
6.5.5 Quality of Houses.....	196
6.5.6 Low household Income	197
6.5.7 Absence of basic services.....	198
6.5.8 Public Health Organisation and Sanitation.....	198
6.5.9 Lack of Clear Definition and Appropriate Standards.....	199
6.6 CONCLUSION – BRINGING IT ALL TOGETHER.....	199
CHAPTER 7. COMPARATIVE ANALYSIS OF BARBADOS AND GUYANA'S APPROACH AND RESULTS.....	202
7.1 INTRODUCTION.....	202
7.2 COMPARING THE HISTORIC DEVELOPMENTAL PATTERNS	202
7.2.1 Occupation and Identity	204
7.2.2 Settlement Pattern	205
7.2.3 Social Problems – Race, class and division.....	206
7.2.4 Early Awareness, Attitude and Implication of Sanitation.....	207
7.2.5 Path dependence of sanitation service provision	207
7.3 KEY LESSONS THAT CAN BE TRANSFERRED TO GUYANA	209
CHAPTER 8. SANITATION POLICY FRAMEWORK FOR GUYANA.....	214
8.1 INTRODUCTION.....	214
8.2 DIAGNOSIS – STATE OF HOUSEHOLD SANITATION IN GUYANA.....	214

8.3 ADDRESSING SANITATION DEVELOPMENT CHALLENGES	217
8.3.1 Household Sanitation Definition.....	217
8.3.2 Moving from private matter to Public Good	217
8.3.3 Status of Tenure	217
8.3.4 Settlement Pattern (Coastland vs Hinterland)	218
8.4 SANITATION POLICY COMPONENTS	218
8.4.1 Sanitation Vision	218
8.4.2 Sanitation Improvement Goal	219
8.5 BUILDING BLOCKS FOR SANITATION POLICY	219
8.6 DEFINING ADEQUATE HOUSEHOLD SANITATION IN GUYANA.....	220
8.6.1 Water Supply	221
8.6.2 Excreta Management	222
8.6.3 Hygiene	222
8.6.4 Solidwaste Management	223
8.6.5 Drainage	223
8.6.6 Vector Control.....	224
8.7 STANDARD FOR ADEQUATE HOUSEHOLD SANITATION.....	225
8.7.1 Water supply Standard.....	225
8.7.2 Excreta Management	227
8.7.3 Hygiene	231
8.7.4 Solid waste Management	231
8.7.5 Drainage (wastewater management)	233
8.6.6 Vector Control.....	234
8.6.7 Application of Standards	235
8.7 SANITATION RESPONSIBILITY	238
8.7.1 Key Organisations, roles and responsibility	239
8.8 IMPLEMENTATION STRATEGY	243
8.8.1 Political Commitment	244
8.8.2 Policy Formation	244
8.8.3 Legislative Reform	244
8.8.4 Projected Sanitation Development Progress.....	245
CHAPTER 9. CONCLUSIONS, RECOMMENDATIONS AND FUTURE WORK	250
9.1 INTRODUCTION.....	250
9.2 MAIN CONCLUSIONS BASED ON RESEARCH OBJECTIVES.....	250
9.2.1 Objective 1 - Challenges to Country-Level Sanitation Development.....	250
9.2.2 Objective 2 - Influence of Historical Development on sanitation	251
9.2.3 Objective 3 - Barbados Approach to sanitation Development.....	252
9.2.4 Objective 4 - Critical challenges to sanitation development in Guyana	253
9.2.5 Objective 7 - Transferrable lessons from Barbados	254
9.2.6 Objective 8 - Structuring of Sanitation Policy Framework for Guyana.....	254

9.3 WIDER IMPLICATIONS OF FINDINGS TO GLOBAL SANITATION DEVELOPMENT	255
9.4 CONTRIBUTION TO THE BODY OF KNOWLEDGE AND APPLICATION OF FINDINGS	259
9.5 SUGGESTIONS FOR FUTURE WORK	260
REFERENCE	263
APPENDICES	306
APPENDIX A – DATA COLLECTION INSTRUMENT FOR BARBADOS - SEMI-STRUCTURED INTERVIEW SCHEDULE	306
APPENDIX B – METHOD USED IN CALCULATING SAMPLE SIZE FOR GUYANA HOUSEHOLDS SURVEY	309
APPENDIX C – INTERVIEW SCHEDULE: MINISTRY/GOVERNMENT LEVEL - GUYANA.....	313
APPENDIX D – INTERVIEW SCHEDULE: AGENCY/IMPLEMENTATION LEVEL - GUYANA	317
APPENDIX E – HOUSEHOLD QUESTIONNAIRE – DATA COLLECTION INSTRUMENT USED IN GUYANA.....	321
APPENDIX F – SUSTAINABLE SANITATION PLANNING APPROACH	325
APPENDIX G – GUIDELINES FOR THE APPLICATION OF STANDARDS AT THE PROPERTY LEVEL.	327

List of Tables

Table 1-1 Population growth of between the Coastland and the Hinterland	14
Table 2-1. Classification of sanitation challenges	21
Table 3-1 Current Sanitation Geographical and sanitation data for case study Countries	47
Table 3-2 Key actors with responsibility for some aspect of household sanitation in Barbados	48
Table 3-3 Government Ministries with responsibility for Sanitation in Guyana ...	52
Table 3-4 General Classification of Communities commonly found in Guyana ..	55
Table 3-5 Comparison between representative and actual sample size for sample clusters	56
Table 4-1 List of Countries of the Caribbean showing size and population of country	67
Table 4-2 Summary of notable impact of the IHC Hookworm Campaign on individual Countries of the Caribbean	77
Table 5-1 Death rates (per 1000 population) and infant mortality rates (IMR) (per 1000 live births) in Barbados in 1928, 1932 and 1937	97
Table 5-2 Groundwater Zoning Policy of Barbados	102
Table 5-3 Key policy directives that influenced how sanitation is defined in Barbados	106
Table 5-4 Responsibility for agencies involved in sanitation services delivery in Barbados	120
Table 5-5 Legislations that arose during the policy approach period	122
Table 6-1 Interview response for the definition of sanitation	147
Table 6-2 Key legislation governing the sanitation sector	149
Table 6-3 Key roles and programmes of major international agencies operating in Guyana	157
Table 6-4 Comparison of the pros and cons of international organisation involvement in Sanitation Improvement in Guyana	159
Table 6-5 Solid waste management practices recorded in sample Communities	177

Table 6-6 Factors identified as limiting effective solid waste management at households	179
Table 6-7 Main factors affecting the adequacy of household sanitation	188
Table 8-1 Critical characteristics that would have bearing on sanitation development in Guyana	216
Table 8-2 Factor used to measure the adequacy of Water Supply	226
Table 8-3 Recommended standard grades for household water supply	227
Table 8-4 Factor used to measure the adequacy of Excreta Management	228
Table 8-5 Recommended Standard grades for household excreta management	230
Table 8-6 Recommended standard for household hygiene	231
Table 8-7 Recommended standard for solidwaste management at households	232
Table 8-8 Recommended standard for Drainage (wastewater) management at households	233
Table 8-9 Recommended standard for vector control	235
Table 8-10 'Adequate' standards for water supply and excreta management for Coastal and Hinterland communities	236
Table 8-11 Recommended roles and responsibility for key stakeholders	239
Table 8-12 Sanitation legislative reform recommendations	245

List of Figures

Figure 1-1 Theoretical Framework for this research design	9
Figure 1-2 Structure of Thesis Presentation	11
Figure 1-3 Maps showing the location of Guyana	12
Figure 1-4 Coastland and Hinterland divide of Guyana	13
Figure 1-5 Population concentration in Guyana	14
Figure 1-6 A simplified schematic of Guyana's governance structure	15
Figure 1-7 Map of Guyana showing administrative regions divide and their population	16
Figure 2-1 Simplified historical analysis of trends in global sanitation progression	19
Figure 3-1 Theoretical mobilisation in sanitation sector through public policy ...	38
Figure 3-2 Theoretical perspective for the processes required to universalise coverage to as adequate level of sanitation	39
Figure 3-3 Research Design Framework	43
Figure 3-4 Geographic Location of Barbados	47
Figure 3-5 Structure of main actors for sanitation administration in Guyana	51
Figure 3-6 Map of Guyana Showing the coastal zone and concentration of local administration councils	53
Figure 3-7 Population distribution of Guyana per administrative region	53
Figure 3-8 Breakdown of sample frame used for collecting data in Guyana	57
Figure 3-9 Areas where data Collection Instruments were used in Sanitation Sector Assessment	58
Figure 3-10 Framework for assessing secondary data	59
Figure 4-1 Critical Phases in the developmental history in the Caribbean	70
Figure 4-2 Plot of Chronological Events that Influence Sanitation Development in the Caribbean from 1900 – 2015	74

Figure 5-1 Conceptual framework adopted for the assessment of Barbados	94
Figure 5-2 Geographic location of Barbados	95
Figure 5-3 The Governance Structure of Barbados	96
Figure 5-4 Key developmental phases of Barbados' and the chronology of sanitation consideration across the phases	98
Figure 5-5 Period of Influence for main drivers of sanitation improvement in Barbados	100
Figure 5-6 Barbados Groundwater Protection Zones	103
Figure 5-7 The six elements that comprise the way the term sanitation is defined in Barbados	107
Figure 5-8 Water supply coverage in Barbados	110
Figure 5-9 Coverage of excreta management systems used in Barbados	112
Figure 5-10 Typical design of a 'Suck' Well used in Barbados	114
Figure 5-11 Typical design for cesspools used in Barbados	115
Figure 5-12 Typical arrangement of septic tanks use in Barbados	116
Figure 5-13 Early organisation of sanitation services delivery in Barbados	120
Figure 5-14 Arrangement of Sanitation delivery services post-1969	121
Figure 5-15 Current organisation of sanitation services delivery in Barbados	121
Figure 5-16 The various approaches to sanitation improvement	123
Figure 6-1 Conceptual Framework for Sanitation Sector Assessment in Guyana ..	132
Figure 6-2 Guyana's occupation time series	134
Figure 6-3 Aboriginal Indian (Amerindian) Barber in the forest of British Guiana ...	135
Figure 6-4 Squatter houses on marginal lands in a rural a community in Guyana..	136
Figure 6-5 Opening of the Tucville Housing Project in 1970	137
Figure 6-6 Typical Indian indentured plantation settlement housing	139
Figure 6-7 Construction of the sewer system in Georgetown in 1920	144
Figure 6-8 Transition in excreta management facilities use in Guyana	145
Figure 6-9 Original structure of sanitation service delivery under the Public Health Ordinance	153

Figure 6-10 Re-organisation of sanitary delivery system post-independence	154
Figure 6-11 Current sanitation service delivery and management structure in Guyana	156
Figure 6-12 Current sanitation services delivery organisation in Guyana	162
Figure 6-13 Types of water supply sources used in Guyana	164
Figure 6-14 Water supply source used across surveyed settlements	165
Figure 6-15 Water Supply Service times within the eight communities assessed in the survey	166
Figure 6-16 Variations of alternative water storage arrangements used by households in Guyana	167
Figure 6-17 Water supply used at the standpipe level at households	168
Figure 6-18 Pit Latrine with concrete chamber base in the town of Linden	169
Figure 6-19 Various designs of pit latrines that can be found in Guyana	170
Figure 6-20 Types of waterborne facilities commonly used in Guyana	170
Figure 6-21 Excreta management coverage for Guyana	172
Figure 6-22 Excreta management facilities coverage for the coastland region ...	172
Figure 6-23 Coverage of excreta management facilities recorded in sample Communities	173
Figure 6-24 Poor physical state of excreta management facilities found in sample communities	175
Figure 6-25 Problems identified with the operation with the sewer system	176
Figure 6-26 Faecal sludge flow diagram for Guyana based on the existing Practices	178
Figure 6-27 Solid waste pile-up within property of households	181
Figure 6-28 Categorisation of factors that limit effective solid waste management at the households	182
Figure 6-29 Propensity scale for measuring the likelihood of households to practice good hygiene	183
Figure 6-30 A comparison of good hygiene propensity across sample Communities	184
Figure 6-31 Method of grey water disposal within the four community classifications surveyed	186
Figure 6-32 Practices of grey water disposal recorded at households	187

Figure 6-33 Adequacy of existing water supply service for surveyed population	189
Figure 6-34 Adequacy plot of surveyed households	190
Figure 6-35 Five-step process to overcoming path dependence for sanitation in Guyana	196
Figure 6-36 Current settlement types and housing distribution in Guyana	199
Figure 7-1 Comparison of the key phases of development and critical development trends between Barbados and Guyana	206
Figure 8-1 Building blocks for sanitation policy framework	218
Figure 8-2 Components defining adequate household sanitation	219
Figure 8-3. Life-Cycle Excreta Management Processes for adequate Sanitation	227
Figure 8-4 Remodel of organisational arrangement for household sanitation service delivery and management	240

Abbreviations

BWA	–	Barbados Water Authority
CReW	–	Caribbean Regional Fund for Wastewater Management
ECLAC	–	Economic Commission for Latin America and the Caribbean
EPA	–	Guyana Environmental Protection Agency
EPD	–	Barbados Environmental Protection Department
ECLAC	–	Economic Commission for Latin America and Caribbean
FSM	–	Faecal Sludge Management
GoB	–	Government of Barbados
GoG	–	Government of Guyana
GDP	–	Gross Domestic Product
GWI	–	Guyana Water Incorporated
GWRF	–	Guyana Wastewater Revolving Fund
HDI	–	Human Development Index
IDB	–	Inter-American Development Bank
IHC	–	International Health Commission of the Rockefeller Foundation
JMP	–	WHO and UNICEF Joint Monitoring Programme for Water and Sanitation Progress under the MDG
LAC	–	Latin American and the Caribbean
M&CC	–	Georgetown Mayor and City Council
MDGs	–	Millennium Development Goals
MICS	–	Multiple Indicator Cluster Survey
NDCs	–	Neighbourhood Democratic Councils
OAS	–	Organisation of American States
OECD	–	The Organisation for Economic Co-operation and Development
PAHO	–	Pan-American Health Organisation
RF	–	The Rockefeller Foundation

RDC	–	Regional Democratic Council
RDC_B	–	Rural Development Commission of Barbados
UDC_B	–	Urban Development Commission of Barbados
SSA	–	Barbados Sanitation Services Authority
ST	–	Septic Tank
SIDS	–	Small Island Developing States
TCDPO_B	–	Town and Country Development Planning Office of Barbados
UN	–	United Nations
UNDP	–	United Nations Development Programme
UNEP	–	United Nations Environmental programme
UNICEF	–	United Nations Children’s Fund
VC	–	Vector Control
VIP	–	Ventilated Improved Pit (In terms of a pit latrine)
WC	–	Water Closet
WHO	–	World Health Organisation
WSS	–	Water Closet connected to a Sewer System
WST	–	Water Closet connected to a Septic Tank
WW1	–	World War I
WW2	–	World War II

Chapter 1. Introduction

1.1 Introduction

This thesis is a compendium of the rationale, approach and output of the research undertaken to design a policy framework capable of universalising access to an adequate level of sanitation within households across Guyana. It outlines the process that was undertaken, commencing with this introduction, which identifies the motivation for selecting this subject area along with the philosophies that informed the design of this study. This chapter introduces the thesis by providing a synopsis of the background and motivation to this area of study, while providing the global framework within which this research lies. This chapter also outlines the specific aim and objectives, as well as key information to assist the readers in understanding the tenets of this study and basis for the main conclusions derived.

1.2 Research Motivation

This research was derived out of the researcher's interest in identifying the cause(s) of the low public interest in household sanitation development in Guyana and to present a practical solution to meet acceptable sanitation standards. Despite global recognition and consensus on the importance of sanitation to national development, developmental interest, both at the public and private levels, remains alarmingly low in Guyana. Guyana's national focus remains on improving access to water supply, without a corresponding interest in household sanitation improvement. This has resulted in poor sanitary conditions, particularly at the household level; giving rise to a myriad of public health issues (White and Hospedales, 1994; IDB *et al.*, 2013). Given the important link between sanitation and national development, improving sanitation at all level should have been one of the cornerstones of Guyana's national development strategy. Unfortunately, this approach was not adopted in Guyana. The state of sanitation at many households across Guyana creates public health hazards and reduces the quality of life across communities. Sanitation related diseases such as diarrhoea, typhoid, intestinal worms and skin disorders are common to many households. Poor management of wastes has resulted in rapid environmental degradation, reducing the quality of living spaces occupied by a large percentage of

households. Despite the many appeals by local and international actors for improved sanitation, there has been little action at the national level; reflected in, *inter alia*, the non-implementation of the sanitation strategy developed by the Pan-American Health Organisation/WHO in 2008 (PAHO/WHO, 2008a). To date, many of the recommendations outlined in this strategy have not been actioned or implemented. In addition, there has been little public discourse on sanitation and more so, no robust plan to address sanitation improvement in Guyana. The responsibility for sanitation at the household level seems to rest firmly with households, while public sanitation show signs of neglect. Sanitation interventions are usually in the form of internationally funded projects having one-dimensional objectives, such as the rehabilitation of the existing sewer lines undertaken through the Guyana Sanitation Improvement Project (IDB, 2010a).

The researcher hypothesised that the reluctance at the national level to address sanitation issues, despite the global focus, may be linked to more deep-seated socio-cultural factors, rather than competing economic priorities. As such, seeking to understand the cause(s) of the general nonchalant national attitude to sanitation development became one of the main motivations of this research.

Additional motivation for this research also rested in the researcher's desire to devise a solution to stimulate actions towards universal access to an adequate level of sanitation across households in Guyana. Currently no attention is given to ensuring sanitation at the household level is adequate in Guyana's context. The researcher considered the policy approach to be best, given the systemic conditions that exist in Guyana. The need to support international development agenda, via empirical research findings, further motivated the researcher. A research of this nature was considered necessary to identify and explain some of the challenges that must be confronted as countries seek to improve sanitation nationally in support of the on-going United Nations Millennium Development Goals (UN MDGs) global agenda and the forthcoming Sustainable Development Goals (SDGs) targets for sanitation improvement.

1.3 Why Sanitation – Global Context

Studies point to the linkage of poor management of human excreta and other wastes to the contraction and transmission of many infectious and deadly diseases (Hamlin

and Sheard, 1998; Novick and Morrow, 2000; Fewtrell and Bartram, 2001). As such, there have been increased efforts at all levels (global, regional, national, community and even households) directed towards improving sanitary practices. These efforts were tied to the envisaged health benefits. Health protection and improvement have since remained the primary catalyst for sanitation promotion programmes and interventions (WHO, 2004; Mara *et al.*, 2010). In recent years, the ecological impacts of poor sanitary practices joined the health criterion and together they form the main drivers for advocating improved access to sanitation (Kalbermatten, 1999). Many of the 'industrialised' countries capitalised on this newfound knowledge and aggressively embraced the principles of sanitation. Such was the impact of sanitation improvement over time, the BMJ readers in 2007, voted sanitation as the greatest medical advancement since 1840¹ (Ferriman, 2007).

There have been constant efforts and progress in sanitation and public health, although predominantly in the industrialized world, to eliminate human interaction with the wastes they produce (Schertenleib, 2005). However, sanitation improvements in many countries around the globe, particularly the low-income countries, are not on a par with the progress made in the industrialised and higher economy nations where the 'sanitary revolution' has occurred. High volumes of populations are continually plagued by the insanitary conditions and practices, along with the diseases that result from these conditions.

The WHO/UNICEF Joint Monitoring Programme for Water Supply, Sanitation and Hygiene (JMP) in its 2015 report on the performance of sanitation under the UN MDGs estimated that almost 2.4 million people worldwide still do not have access to 'improved'² sanitation facility, with almost 700 million people still practicing open defecation (WHO and UNICEF, 2015). The number of persons without access to improved sanitation has remained somewhat constant in almost 60 years of

¹ A total of 11 341 people voted on the shortlist, which was chosen by a panel of experts from a list nominated by readers. Almost a third of the voters were doctors, while a fifth were members of the general public, and one in seven were students. Another tenth were academic researchers. Almost two fifths of the voters were from the United Kingdom, and a fifth were from the United States.

² For the purposes of the MDG monitoring, the JMP describes an improved sanitation as a facility that hygienically separates human excreta from human contact (WHO and UNICEF, 2015)

international interventions and investments. This is despite aggressive efforts, large investments and extensive studies. The development and introduction of new planning approaches provided some successes, but not sufficient to accelerate the coverage. Recently, there has been diversion of attention to the development of innovative technologies. Though bringing some successes, the progress remains slow and the percentage of un-served population stands at an alarming level. Whilst geographical factors, such as rural-urban migration and cultural norms, often influence sanitation, the complexities surrounding the improvement of sanitation remains challenging (Fry *et al.*, 2008; IWA, 2014).

1.4 Guyana's Sanitation Challenges

Despite global advocacy, national interest in sanitation improvements remains low (Paterson *et al.*, 2005). Both the national and local authorities seem inept or unwilling to take proactive actions to ensure an adequate level of sanitation within households. The situation in Guyana becomes more alarming when compared with fellow countries in the Caribbean that have shared similar historical developmental paths. Many of these countries hold a better sanitation record to Guyana.

The absence of a national direction on household sanitation improvement has resulted in little intervention by responsible authorities. International development agencies over the years such as PAHO and the Red Cross have launched independent sanitation improvement programmes, but many have been short-lived and poor sanitary conditions continue to persist. A national 'will' to improve sanitation is evidently lacking, which raised the following questions,

- Why in the face of high global attention, would there be a disinterest in sanitation development in Guyana, particularly given the associated health, environmental and developmental benefits?
- Does the relatively satisfactory coverage figure reported by the JMP influence this disinterest?
- Do authorities in Guyana consider the current state of sanitation to be adequate?
- Were there earlier steps to improve sanitation and how successful were those efforts?

- Is there a clear understanding at all levels of the impacts of poor sanitation?
- What are the national implications of the existing state of sanitation in Guyana?

In the face of these challenges, an in-depth understanding of the factors at play and adaptation of innovative approaches is necessary. However, based on patterns and lessons from shortcomings of sanitations at both the global and national levels, a number of questions informed the main line of enquiry for this research. The main questions were:

1. Would assessment of a country's development history provide information that would improve understanding of the current state of sanitation and allow for better decision making in the planning process regarding approaches to sanitation improvement?
2. Can lessons on sanitation improvement performance in one country be transferred to another to improve sanitation planning and design?
3. What conditions would reflect 'adequate' sanitation standard for households in Guyana?
4. Would the design and implementation of public policies on sanitation provide the enabling environment for sanitation improvement and sustainability?
5. How can sanitation policies be a platform around which national expenditures, private investments and international development donor resources be mobilized and be principal at informing post-MDG interventions in Guyana and the wider Caribbean?

These questions formed the foundation for the development of the aim and objectives of this research.

1.5 Research Aim and Objectives

1.5.1 Research Aim

The aim of this research was to determine the factors responsible for the state and attitude towards sanitation development in Guyana by examining the historical development influences both regionally and nationally. Critical to this aim is

identifying the systemic conditions critical for sustained improvement in household sanitation in Guyana and exploring the policy approach through the development of a policy framework to serve as the catalyst and sustaining mechanism for sanitation development in Guyana. The output policy framework would provide a replicable model for countries seeking to universalise sanitation, particularly those with shared systemic conditions. Further, it is intended that this research would inform a new holistic view and approach to planning and development of improved household sanitation.

1.5.2 Research Objectives

The objectives of this research were:

1. To critically assess the major challenges to sanitation improvement and sustainability; identifying key concepts that must be considered in effective sanitation planning (**Chapter 2**).
2. To ascertain the impact of the Caribbean's and Guyana's historical development pattern on the existing attitude and state of sanitation (**Chapter 4**).
3. To identify the sanitation improvement model used by Barbados and determine how their approach contributed to the successes in sanitation improvement (**Chapter 5**).
4. To determine the critical challenges to sanitation development in Guyana and the improvements needed to universalise access to an adequate level of sanitation at households (**Chapter 6**).
5. To identify key transferrable lessons from Barbados' approach to sanitation development to inform the design of a public policy for Guyana (**Chapter 7**).
6. To design a policy framework for improving, universalising and sustaining adequate household sanitation in Guyana within 10 years from implementation (**Chapter 8**).
7. To provide clear recommendations on improvements needed in current sanitation planning approaches and to identify steps to overcome current challenges (**Chapter 9**).

1.6 Theoretical Framework

Four theoretical prognoses were made in the design and development of this research. These were based on the ongoing failures of some low-income countries to achieve significant sanitation improvement as registered in the higher income countries, despite global efforts and advancements in the sector. There were:

The policy approach was used successfully in the past – can this approach be effective today? - Understanding why there is a seemingly deviation from the policy approach to sanitation development was one of the foundation theories that informed the research design. It surmised that similar approaches used by the industrialised countries over the years to achieved universalised sanitation country could bring about the same level of improvements in countries plagued with poor sanitation. The primary action during the sanitation revolution that started in England was the introduction of public policies, which provided the foundation for all actions and decisions that followed. It was theorised that since this approach worked then, it can also be effective for countries yet to universalise the coverage. It was also suggested that sustainability is linked to policy.

The history of a country influences the sanitation status and future plans - It was further hypothesised that the information used to design sanitation improvement strategies for a country should go beyond the existing status of sanitation to examine the factors that created the existing conditions. This requires the examination of the historical development pattern of a country to identify critical factors or events that influenced the current state of sanitation and ability to achieve future improvement ambitions.

The definition applied to sanitation will influence the measure of adequacy - As one would imagine, the term sanitation is used to denote a wide range of factors. In recent years, it was attached to the type of sanitation facilities used at the household level. However, sanitation used in the early years represented the general state of the environment. It was suggested that any country aiming to universalise sanitation must first identify a definition that will be applied. Without a clear definition, measurement of adequacy and sustainability would be difficult.

Lessons can be transferred across countries sharing similar critical systemic conditions - Why re-invent the wheel? Some countries have already gone through the hurdles and struggles of improving sanitation. A number of lessons from their failures and successes can be utilised by countries seeking to achieve similar feat. Learning from the mistakes of other countries can lead to avoidance of some approaches, while mirroring their successes can achieve similar results.

A schematic breakdown of the prognoses and the paths through which the research objectives were achieved is shown in the **figure 1-1**.

1.7 Research Limitations

This research was concentrated in the Caribbean sub-region with the aim of demonstrating how the characteristics of a location affected development of sanitation in Guyana. Additionally, this research only focused on sanitation at the household level. This approach was considered practical out of the desire to conduct an in-depth assessment within the limited time and resources available.

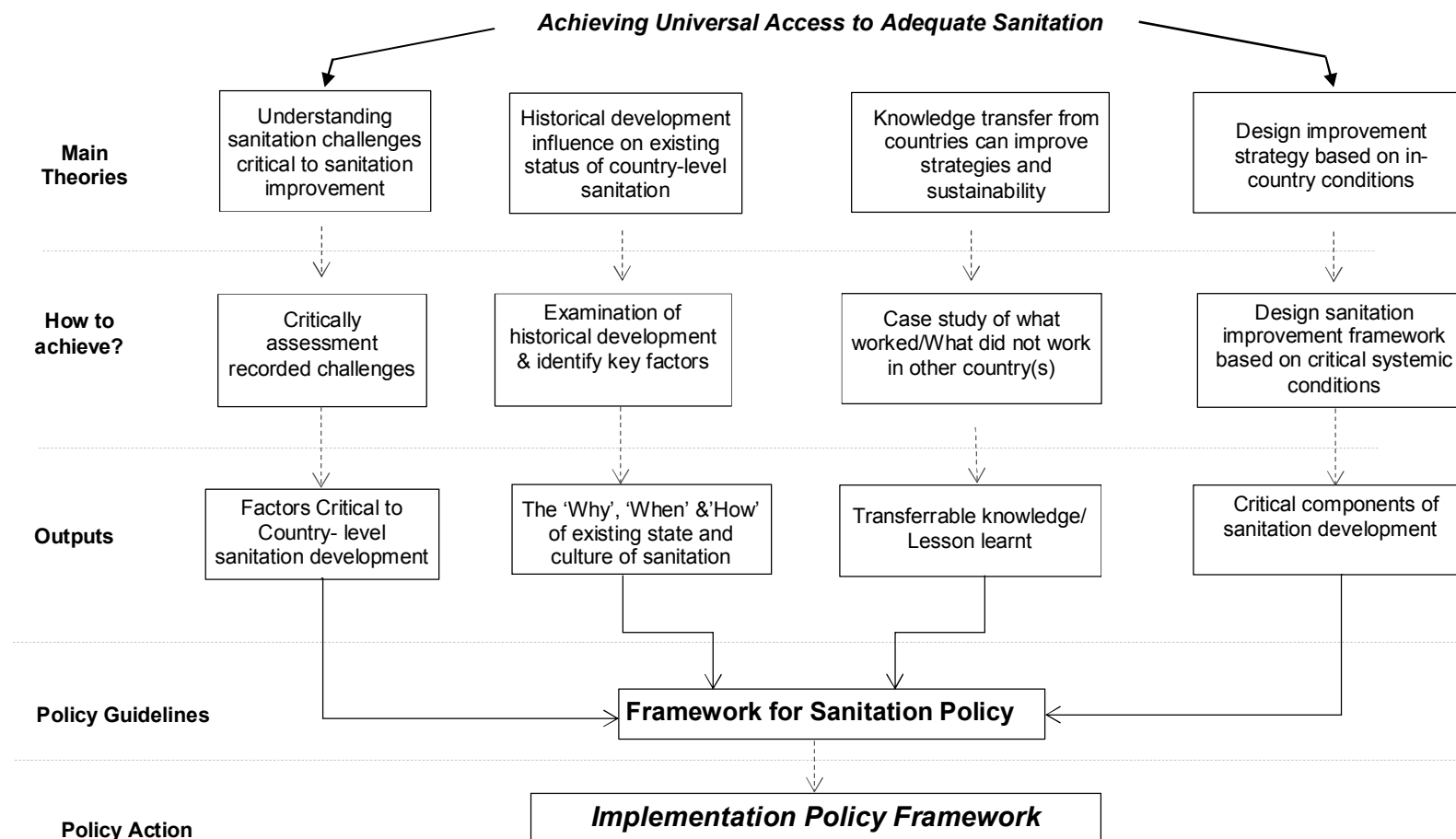


Figure 1-1. Theoretical framework for research design

1.8 Application of Research Findings

Improving public health and curtailing environmental degradation in Guyana requires improvement in sanitation, particularly at the household level. A public policy that guides this development would create an enabling environment that would initiate immediate action and provide the framework for ensuring sustainable sanitary practices. The design and implementation of evidence-based sanitation policies that respond to the systemic conditions that are vital to achieving and maintaining universal sanitation would be effective in catalysing sanitation improvements in Guyana. As such, the output of this research will be a sanitation improvement framework, which will guide the development of a comprehensive public policy capable of initiating and sustaining advancement to achieve universal coverage to an adequate level of sanitation for households. One of the hypotheses of this research posit that clearly designed public policies for sanitation can create the environment that influences the improvement of sanitation beyond the provision of sanitation facilities, and addresses the critical issues of wastewater management, good hygiene practices, solidwaste, and even water supply through a holistic approach.

The public policy approach to sanitation improvement in Guyana has the potential to:

- Provide a holistic approach to ensuring adequate sanitary conditions at the household level, protecting both public health and the environment;
- Ensure the use of appropriate sanitary facilities in flood-prone areas to eliminate human contact with excreta or excreta contaminated wastewaters;
- Eliminate the transmission/outbreaks of faecal-oral diseases that are linked to inadequate sanitation;
- Ensure investments in sanitation achieve intended benefits;
- Allow sanitation to become integral in all aspects of national and household development.

1.9 Structure of Thesis

This thesis is presented in the structure outlined below.



Figure 1-2. Structure of thesis presentation

1.10 Expanded background of Guyana

1.10.1 Location and history

Guyana is located on the northern South American enclave (**figure 1-3**) with a population of 747,625 persons (2012 census estimates) occupying a land area of 214,000 square kilometres. Despite being South American by geographic location, Guyana has been historically considered a part of the Caribbean due to a shared history and culture. Present day Guyana was formally British Guiana, while under British colonial rule which commenced in 1813 and ended in 1966 at the onset of political and economic independence. However, the Dutch were the first and longest European settlers in Guyana (1616-1813), setting up the most notable infrastructures and leaving imprints that are still primary to the way of life of the current population.

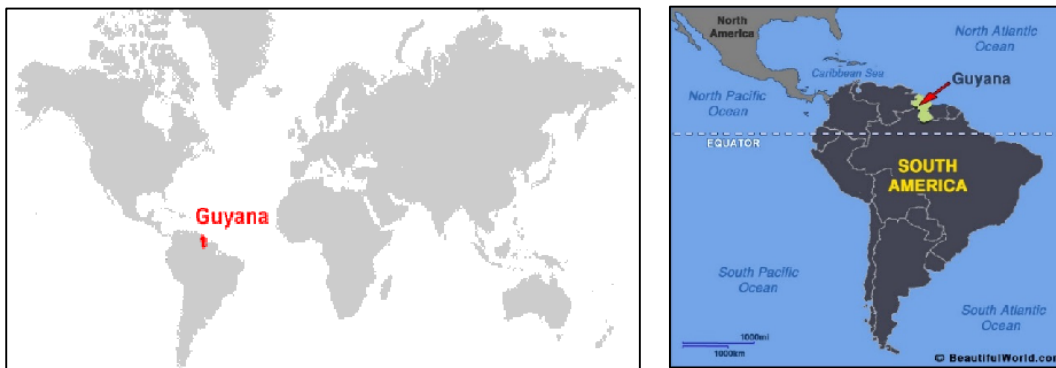


Figure 1-3. Maps showing the location of Guyana

1.10.2 Geography and Demography

Geographically and somewhat administratively, Guyana is divided into two distinct zones: the '*coastland*' and the '*hinterland*'. The coastland is the thin stretch of land on the northern edge of the country interfacing with the Atlantic Ocean and extending from 5 – 25 kilometres inland (approximately 10-15% of landmass). The remaining land area of the country is generally classified as the hinterland, being covered with dense forest, grasslands and mountain ranges (85-90% of landmass) (**figure 1-4**). The coastland has been the primary settlement and economic zone throughout Guyana's existence due to the suitability of the land for agriculture and its proximity to the Atlantic. The hinterland had remained inaccessible throughout the early years of development due to its treacherous arrangements of rivers, forest and mountains. However, with a fluttering agricultural sector, attention moved towards the extractive

sector (gold, diamond and forestry), based primarily in the hinterland. Over the last two decades the extractive sector has expanded to the extent that today it is the primary contributor to the country's GDP.

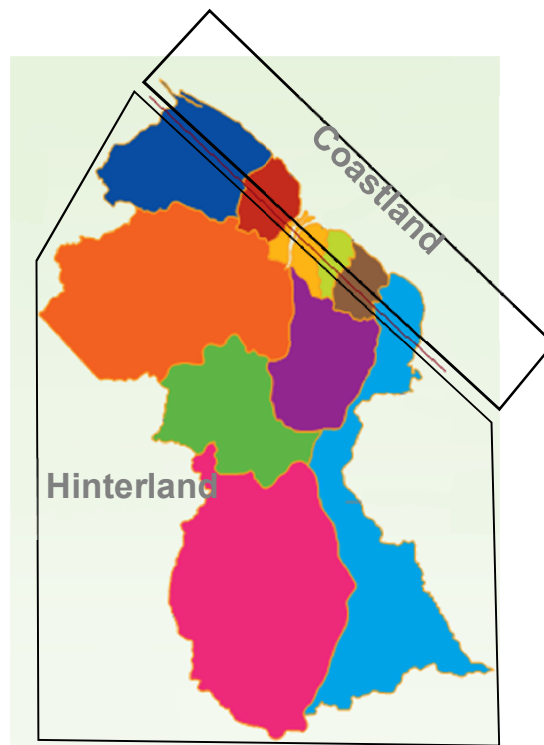
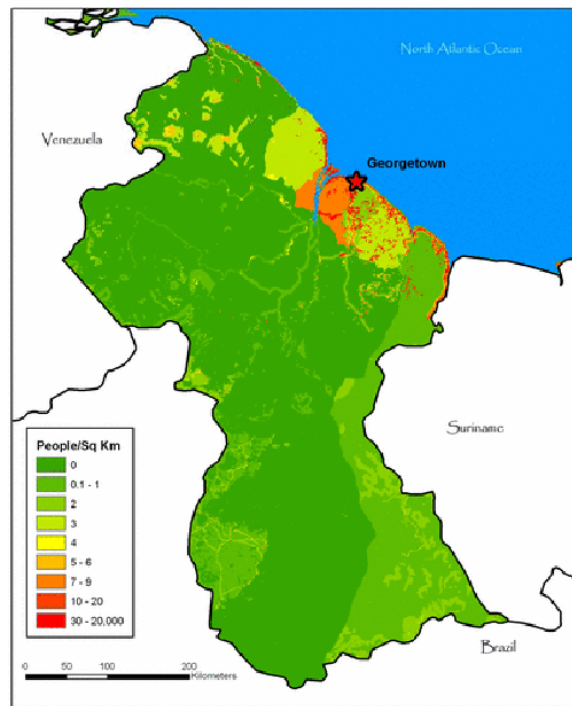


Figure 1-4. Coastland and Hinterland divide of Guyana.

The coastland is now home to the core of Guyana's main commercial activities and population settlements (90% of population) (**figure 1-5**). However, the elevation of much of the coastal areas is below the high-tide sea level and with a drainage system primarily designed to use gravity flow and tidal fluctuations, the coast has always been susceptible to flooding. With annual rainfall averaging 2260mm, storm water management has always been a challenge. However, the expansion of the extractive industry (forestry and mineral mining), is seeing an inward migration of coast landers (some temporary, others permanent). As such, the physical dynamics, population groups and social and economic development of the hinterland has undergone significant changes in recent years (see **Table 1-1**). Population have increased, economic activities have changed and the general community changes have been dynamic leading to the commissioning of three new townships within the hinterland, in early 2016.



Plot based on Lanscan 2002 data (Source: http://s3.amazonaws.com/zanran_storage/www.ascaniobirding.com/PdfImages/43446647.029.png)

Figure 1-5. Population concentration in Guyana.

Table 1-1. Population growth of between the Coastland and the Hinterland

Region	Census Year	Population	% Total Population	Change		Growth Rate
				Number	Percent	
Coastland	1980	709,510	93.4	x	x	x
	1991	669,774	92.6	-39,736	-5.60	-0.51
	2002	679,869	90.5	10,095	1.51	0.13
	2012	666,261	89.1	-13,608	-2.00	-0.20
Hinterland	1980	50,054	6.6	x	x	x
	1991	53,899	7.4	3,845	7.68	0.70
	2002	71,354	9.5	17,455	32.38	2.86
	2012	81,623	10.9	10,269	14.39	1.44

Note: Coastland regions include: Regions 2, 3, 4, 5, 6 and 10, while Hinterland regions include: Regions 1, 7, 8 and 9.

Source: 2012 Housing and Population Census (Guyana Bureau of Statistics, 2016)

1.10.3 Governance and Administration

Guyana is a Co-operative Republic, with a parliamentary system of governance, led by an executive President. There are also the judicial and legislative branches of government (**figure 1-6**). Central governance is dictated by the government of the

day (with elections scheduled for every 5 years), with the main policy organ being the national assembly comprising members of both the ruling political party and the political oppositions based on a proportional representation system. Guyana also adopted a local governance system. The affairs of communities are administered by regional bodies, which comprise of Regional Democratic Councils, municipalities in the townships (urban areas), neighbourhood democratic councils (NDCs) in the rural communities and village councils in the hinterland settlements (**figure 1-6**). To facilitate this local governance system, the country is divided into 10 Administrative Regions as shown in **figure 1-7**. Each region is governed by a Region Democratic Council (RDC) where all administrative power rests. However, critical public services such as housing, electricity and water supply are provided by central public agencies through legislative instruments, which often bypass the local governance authority.

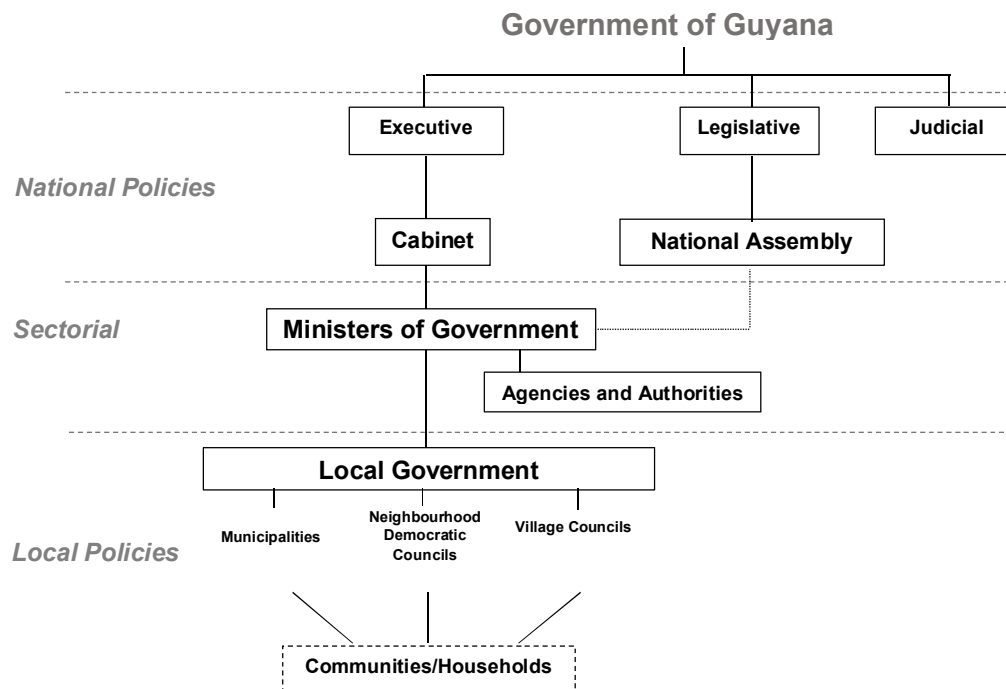
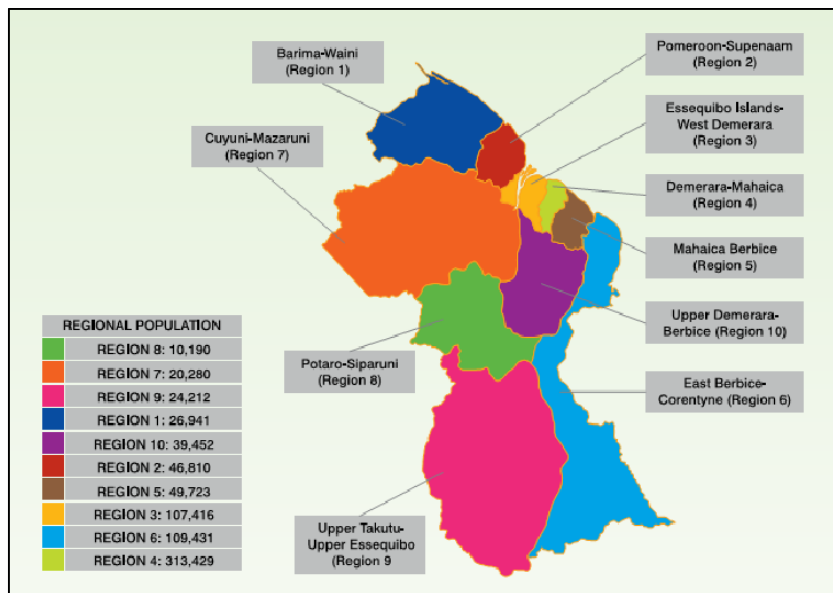


Figure 1-6. A simplified schematic of Guyana's governance structure



Based on 2012 housing and population census (Source: Guyana Bureau of Statistics, 2016)

Figure 1-7. Map of Guyana showing administrative regions divide and their population

Chapter 2 – Main challenges to improving country-level Sanitation: A Critical Review

2.1 Introduction

Sanitation improvement on the global scale has encountered tremendous setbacks, resulting in the number of unserved persons remaining at an alarming level, despite decades of advocacy, engagement and investment (Black and Fawcett, 2008; Neto and Tropp, 2009). The setbacks in the global sanitation progress partly rest on the challenges being faced by national governments to increase and sustain coverage levels (Cairncross *et al.*, 2010). With over 2.4 million persons still without access to an improved sanitation facility, identifying, understanding and addressing the challenges must be primary in sanitation development planning.

Universalising access to adequate sanitation remains a global development priority. However, the failure of many low and middle-income countries to meet the sanitation targets under the MDGs are likely to be repeated under the new Sustainable Development Goals (SDGs) if careful consideration is not given to identifying, understanding and finding new ways to overcome major challenges to sanitation development and sustainability. This paper presents a critical review of existing literature to identify factors that are known impedances to sanitation development. The review also scrutinises several marginal factors that are not widely considered as influencers to sanitation development, but given the changing global landscape calling for adequate levels of sanitation, would provide some obstacles. This review is aimed at identifying key considerations that must be taken in improving and sustaining adequate sanitation coverage at the country level. The reasons for the slow sanitation progress at the country level must be understood before consideration is given to sanitation planning, design and development.

2.2 Early sanitation challenges

Challenges to improving sanitation can be traced back to the early days of the modern sanitary revolution in England and Wales, Europe and North America during the mid-1800s. Fawcett and Black (2008) in discussing some of those early

challenges noted that time was the major challenge in registering the sanitation improvements needed, indicating that it took almost six decades for meaningful changes to be seen from the early sanitation interventions. It was also highlighted that time was needed to install the sanitation infrastructure and to induce the behavioural changes necessary to amend poor practices. There were also lengthy legal, municipal and sanitary reforms in England and Wales, while engineers and reformers were faced with the uphill challenge of initiating U-turns in public policies (Holland and Stewart, 1997). Many of the early diagnoses of causes of poor health had to be adjusted and linking urban public health problems to inadequate sanitary measure had to gain acceptance (Tulchinsky and Varavikova, 2009).

Overcoming the social and class attitudes to enable the design of policies that catered to all the population also proved challenging and delayed the provision of services to improve the physical state of sanitation (Bartelt and Guerrant, 1998). Resistance to new sanitary practices was also a challenge in those early years as many persons resisted the recommended improvements [ibid]. In addition, many, even practitioners, were sceptical of the proposals suggested and sought to discredit the findings of experimental work (Rosen, 1958; Hamlim and Sheard, 1998). By the middle of the 20th century true progress in sanitation development was experienced in much of the industrialised countries (Tulchinsky and Varavikova, 2009).

2.3 Current global sanitation efforts, progress and challenges

International involvement in water and sanitation improvement span over 60 years (figure 2-1). Over the last decade consideration for sanitation was boosted through its link to poverty eradication. This was driven by global advocacy, financial commitment and investment and good the setting of stringent targets (OECD, 2013). The global focus on the issue led to significant increases in coverage. Despite this, the number of unserved persons remains unchanged. With one-third of the global population are still without access to an improved sanitary facility and almost 900 million of this group defecating in the open, underwrite the fact that sanitation development is significantly challenged. Identifying and understanding the challenges faced to improve sanitation over that period is critical to moving the sector forward, particularly for shaping new plans and strategies.

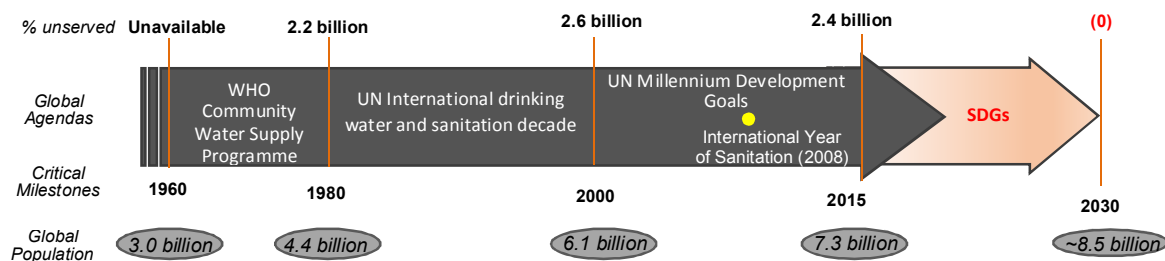


Figure 2-1. Simplified historical analysis of trends in global sanitation progression

Reducing the number of persons without access to an improved sanitation facility has faced many challenges since the international community started advocating improvements in sanitation (Dieterich and Henderson, 1963; Pineo and Subrahmanyam, 1975; Najlis and Edwards, 1991; WHO, 2004; Moe and Rheingans, 2006). Two of the most cited reasons for the missed targets and unserved number remaining high are (1) global population growth and (2) shifting settlement patterns; rural to urban migration and rapid development of peri-urban and urban slums (Norström *et al.*, 2009; Hawkins *et al.*, 2013; Nhapi, 2015). In fact, the global population has increased from 3 billion persons in 1960, when the UN began monitoring, to 7 billion in 2015 (World Bank, 2016). Much of this population growth occurred in the low and middle-income countries already struggling to expand basic services (UN, 2014). Population growth induced pressures on limited resources and community development problems directly affected the installation of acceptable sanitation facilities (Hawkins *et al.*, 2013). Rapid urbanisation has induced pressure on already limited resources to provide adequate services and led to the development of informal settlements and even slum.

A number of assessments concluded that the complexity of sanitation delivery services and the number of interlinked factors have and will continue to retard sanitation development progress if careful attention is not given (Moe and Rheingans, 2006; Lüthi *et al.*, 2009; Nansubuga *et al.*, 2016; Fuller *et al.*, 2016). Other authors have likewise noted that these challenges existed since the interest in global sanitation development began (Bartram, 2014 and Sealey, 2011). The challenges encountered have been the catalyst for much of the innovations in planning, design and implementation within the sanitation sector (See Willetts *et al.*, 2009 and Kennedy-walker *et al.*, 2014).

More so, this demonstrates that the challenges in sanitation improvement extended beyond the formative years of sanitary revolution, where setback are experienced to this day, that significantly impact the rate and sustainability of development. Identifying and understanding those challenges is a primary process in developing any plan to improve national sanitation coverage.

2.4 Classification of Sanitation Challenges

The challenges to sanitation development are wide-ranging and varies based on the perspective and experience, if a holistic approach is to be taken. Many authors have given accounts to the perceived challenges to sanitation development, a fraction of which is summarised in **table 2.1**. The table highlights the major challenges reported for sanitation development on the global, national and household levels from a selection of literature. Many common challenges were identified across levels, such as the absence of political will to tackle sanitation (WHO, 2009 and Cairncross *et al.*, 2010) to the unavailability of national resources to meet the financial demand for sanitation improvement (Fry *et al.*, 2008 and Tilley, 2008). Other authors Vernon and Bongartz (2016) relate that sanitation improvement is impinged by the lack of behavioural change, equity, inclusion and sustainability of interventions. What is apparent however is the challenges to improving sanitation are expanding. The historical challenges are being compounded by modern-day challenges such as globalisation, immigration and climate change, which places additional pressures on already weak systems (Woodward *et al.*, 2001; Azevedo and Johnson, 2011; Gualdieri *et al.*, 2016).

Table 2-1. Classification of sanitation challenges.

Source	Sector	Key challenges to sanitation development
OCED (2001)	Global	Lack of Political Will Sanitation has poor prestige and recognition Poor policies Poor institutional frameworks Inadequate resource allocation Inappropriate approaches and technologies Neglect for customers preference Low public awareness Low involvement of women and children Lack of focus in creating and understanding sanitation demand.
Montgomery and Elimelech (2007)	Global	Lack of Political Will Lack of financial resources Insufficient investment Lack of sustainability in provisions Low prioritization of WS nationally Lack of accountability Corruption & poor management
Fry, L.M., Mihelcic, J.R. and Watkins, D.W. (2008)	Global	Insufficient investment Poor or non-existent sanitation policies Poor governance Inadequate resources Gender disparities Water unavailability.
Black and Fawcett (2008)	Global	Sanitation buried in Euphemism and avoided Rate of sanitation development slower than population grown Cultural appropriateness and adequacy
UNICEF (2007)	Global	Shy from open discussion Crisis swept under carpet Insufficient spotlight
Najlis, P. and Edwards, A. (1991)	National	Fragmented governmental approach Lack of financing Increasing population Unfavourable institutions.
Moe, C.L. and Rheingans, R.D. (2006)	National	Poor water supply Absence of innovation in low-cost systems Inadequate services Disparities in access Absence of financially sustainable systems.
Aertgeerts (2009)	National	Weak national policy/strategies Fragmented governance systems, Inadequate financing Lack of awareness No concerted effort Insufficient attention Sanitation perceived as a private amenity, rather than public responsibility Poverty/Weak finances Rural/Urban disparity Poor consideration for gender
Cairncross, S., Bartram, J.,	National	Lack of political will Low interest in development Poor performance of national interventions.

Source	Sector	Key challenges to sanitation development
Cumming, O. and Brocklehurst, C. (2010)		
Matoso, M., Cummings, C. and Langdown, I. (2016)	National	Fragmented governance arrangements Inadequate financing Local knowledge is overlooked
Tsinda et al., (2013)	Community (Informal Urban)	Unaffordability of suitable technology High cost of sanitation services
Hogrewe, W., Joyce, S.D. and Perez, E.A. (1993)	Community (Peri-Urban)	Poor settlement/housing conditions Unreliable water supply High population density The absence of legal land tenure Non-transference of solutions between rural and urban area.
McGranahan, G.; SHARE; (2013)	Community (Urban Poor)	Inconsistency in improvement approaches Conflict between market-driven vs state-led approach Absence of collective action Lack of universal support for sanitation actions Affordable and acceptable technology.
Okuruta, K. and Charles, K.J. (2014)	Community (Informal Urban)	Low demand for improved sanitation Poor attitude towards sanitation Untailored sanitation programmes Programmes not meeting community needs Poor housing quality.
Naomi Vernon and Petra Bongartz (2016)	Community	Slow behavioural change Lack of equity and inclusion Absence of sustainability Absence of sanitation marketing Lack of monitoring and verification Poor engagement of governments No clear stimulant for progress up the sanitation ladder Isolation of the poorest and marginalized.
Hanchett, S. (2016)	Community (Rural)	No strategy to move up sanitation ladder Accessibility restricts services Incomplete waste treatment [no faecal sludge management] Little consideration given to hygiene Absence of services to squatter settlements.
Jenkins, M.W., Cumming, O., Scott, B. and	Community (Informal)	Lack of critical services Insufficient public investment Limited service options available to informal

Source	Sector	Key challenges to sanitation development
Cairncross, S. (2014)	Settlement)	households.
Mara et al., (2010)	Community	Programmes no meeting those in need Application of technically or culturally inappropriate technology Lack of awareness at households Solutions too expensive for poor Neglected elements of sanitation (disposal of children's faeces) Sanitation not inherently attractive or photogenic No political support The lack of national policies Population growth High population densities in urban and peri-urban areas Economics at household level.
Satterthwaite and McGranahan (2006)	Household	Requires voluntarily changes of habits Technology inconvenience and too costly Technology restrictions due to lack of water supply Cost of technology vs doing nothing.

The challenges identified from the literature and presented in table 2.1 can be grouped into four (4) major categories, for simplicity of categorisation. These categories would be (1) **Political will** (lack of policies, strategies and insufficient high-level attention to sanitation), (2) **Inadequate Enabling environment** (3) **Poor Institutions/Governance structures**, and (4) **Financial Restrictions**, which are further discussed below.

2.4.1 Political Will

The lack of political is repeatedly cited for the slow development of sanitation. Its impacts are felt at the global, national and even at the community level. This is often translated as insufficient high-level support for sanitation reforms needed in countries to make progress possible and sustainable (WHO, 2009 and Cairncross *et al.*, 2010). Others expressed this as the absence of national policies and strategies relating to sanitation development (Fry *et al.*, 2008 and Aertgeerts, 2009). The United Nations (UN) on the precipice of missing the target set from sanitation improvement under the MDGs singled out the absence of adequate public policy and slow sector reforms as the major challenge leading to the missed targets (UN, 2014). The issues of sanitation being buried in euphemism (Black and Fawcett, 2008) and the lack of political support for many sanitation interventions (Mara *et al.*, 2010) are symptoms of the existence of weak political will. Attention, in recent years have turned to improving public policies to ignite the lack of impetus by national governments to introduce systems to improve access to sanitation (Mason *et al.*, 2016). High levels of advocacy has been re-directed to national governments for the creation of public policies to catalyse and sustain sanitation development efforts.

The most notable measure that signifies a lack of political will is the absence of dedicated national policies targeting sanitation improvement in many countries (Montgomery and Elimelech, 2007). This is a critical obstacle particularly in the low-income countries, where limited resources are strained between competing priorities (OCED, 2001). Further, failure to acknowledge sanitation issues on political platforms often allows sanitation issues to continue unnoticed (Matoso *et al.*, 2016). Literature also suggest that the lack of sanitation related policies have resulted in many sanitation interventions failing to achieve the desired outcomes (Moriarty *et al.* (2005); Moe and Rheingansas (2006) and Hueso and Bell (2013). As concluded by Seppälä

(2002), Davis (2004), Cairncross *et al.* (2010), political will and leadership is necessary to achieve and sustain the level of improvements needed for sanitation.

Political will and leadership creates a suitable enabling environment for mobilisation and sustainability of sanitation interventions (Hueso and Bell, 2013 and Perez *et al.* 2012). This have resulted in growing campaigns for increased political will within the global sanitation agenda in the face of the missed MDG target for sanitation. Political will by national governments is viewed as being the critical ingredient to initiating, implementing and sustaining critical sanitation improvement programmes as was found by Kennedy-Walker *at al.*, (2015) in examining the role of politics in a Lusaka case study. The United Nations in a number of its publications have long intimated the importance of political will and strong political leadership in advancing process in sanitation (UN, 2004; UN, 2008; UN, 2013). As such, any sanitation improvement strategy must consider the role and impact of political will. The importance of political will was echoed best by Frieden (2010), when he said that “failure to achieve fundamental societal changes is often not due to shortage of funds but lack of political will”.

2.4.2 Inadequate Enabling Environment

The absence of a strong enabling environment has been cited as a primary challenge for countries to achieve and sustain sanitation development (Lüthi *et al.*, 2011). A strong enabling environment is considered to be essential to agitate interrelated sector functions to positively impact sanitation improving efforts, its effectiveness or sustainability (UNICEF, 2016). WEDC (2015) research findings from their SPLASH urban sanitation research programme expressly noted that technical innovation alone is insufficient to advance urban sanitation. It requires a range and inter-relationships of non-technical elements to support service delivery, which they referred to the existence of an enabling environment. Weak enabling environment have been known to stymied sanitation development efforts, due to unfavourable operating conditions. UNICEF (2007) highlighted that the continuous reluctance of countries to openly discuss the sanitation issues supresses the creation of strong enabling environment to catalyse and sustain sanitation development. Similarly, Vernon and Bongartz (2016) concluded that inadequate conditions at the national level do not promote the interest and systems required for sanitation improvement. In looking the sanitation interventions in themselves, Eawag (2015) lamented that the lack of an enabling

environment is one of the main causes of slow sanitation progress in low and middle-income countries despite billions of dollars in investment. Weak enabling environment has also been linked to issues of poor adaptation and sustainability of infrastructure as interventions fail to serve the population in the long-run. The adaptation of approaches that failed to reach large sections of the populations has also been attributed to the absence of suitable enabling environment.

Strong enabling environment for sanitation development is marked by the presence of new policies and programmatic approaches for sanitation that takes into consideration the system conditions at play (Eawag, 2017). It must also involve developing sector-wide approaches where national governments and wider stakeholders are engaged and empowered to create the necessary systems, either by their action or decisions (UNICEF, 2016). The high frequency of reference signifies the importance of having an enabling environment. However, Amjad *et al.*, (2015) noted that enabling environments are not static features that are a one-size-fits-all for sanitation development. National governments, communities and even households must be able to identify those interrelated conditions that are necessary to move sanitation forward. An enabling environment for sanitation is needed to develop more realistic, cost-effective plans and to avoid the dearth of pragmatic solutions to the need for quick increases in sanitation coverage (Eawag, 2017).

2.4.3 Weak Institutions

Unfavourable Institutions have been long identified as one of the inhibiting factors to improving and sustaining adequate levels of sanitation in many countries (UNICEF, 2016). According to Starkl *et al.* (2013), the failures of many interventions have been as a result of organizational or institutional deficiencies. These institutional deficiencies usually manifest itself through the existence of weak legal frameworks, poor organisation of roles and responsibilities and weak governance structures unable to support the level of advancement needed in sanitation (UNICEF, 2016). The selection of unsuitable models and approaches, poor managerial capacity, poor financial resource allocation, lack of accountability, corruption, and inefficient management, all stem from weak institutions (Okurut *et al.*, 2013). The absence of strong institutional framework is also linked to slow consideration for sanitation as it limits the identification of key drivers (Peters, 2008). In fact, increasingly research are showing that weak, missing or perverse institutions are the leading cause of

underdevelopment in many countries (Shirley, 2002). Translating it in local governance terms, Tsinda (2011) reported that municipal authorities with a strong focus on technical issues often neglects the institutional requirements for successful service delivery. It was also noted that the absence of institutions at all levels of government often lead to the non-establishment of effective sanitation policies, regulations and programs that take into account the specific problems that exist.

To overcome the challenges of sanitation development countries need institutional frameworks that support the delivery and sustainability of programmes (Cotton *et al.*, 2002). Institutions must be complementary to allow interventions to be developed and objectives achieved. Solid institutions should (i) foster the engaging of key stakeholders under a legal framework that would allow them to take action; (ii) government institutions in the sector having clear roles and responsibilities, (iii) Strengthen national systems to deliver quality and sustainable services at scale (UNICEF, 2016). Institutions much support enforcement of laws and imposed conditions. Other higher level institutions include the national constitution, laws governing sanitation, norms that motivate people to abide by laws and governance structures. According to (Bohman, 2010) institutions are what define the rules for development and provide the incentives for changes necessary.

2.4.4 Financial constraints

Globally, nationally and even at community and project levels, the lack of adequate financial resources is cited as a barrier to sanitation progress and sustainability. The financial constraints stretches from the lack of investment in the sanitation sector at the national scale (Jenkins *et al.*, 2014), to households being unable to afford require technologies options (Satterthwaite and McGranahan, 2006). In low-income areas, references are often made to the unavailability of financial resources to afford sanitation services or even to execute the interventions needed to expand critical sanitation services (UN, 2004).

Globally, the call for increase commitment of financial resources to reduce the unserved gap has seen its challenges, as countries continue to allocate limited resources to sanitation sector development (WHO/UNICEF, 2015). The absence of adequate financing continues to restrict the scope of intervention, the service delivery and its sustainability. Tsinda *et al.*, (2013) noted that sanitation development progress is affected by potential beneficiaries being unable to afford suitable

technology or the cost sanitation services delivery too high for the poor. Matoso *et al.*, (2016) and Aertgeerts (2009) also cited insufficient financing as the leading cause for slow progress in sanitation development. The OECD (2011) pointed out that the investment needs for sanitation is two-folds; (1) resources are needed to deliver sustainable sanitation solutions and services, and (2) funds for the operation and maintenance the infrastructure, expand coverage and upgrade service when needed. Issues relating to funding must be addressed in the interest of overcoming this main constraint. Sanitation development comes with a cost. Adequate resources must first be available to deliver services, and households sufficiently empowered to afford and sustain services.

2.5 Complexities to Sanitation Development

The multiplicity of factors identified in this review provides a clear indication as to the scale of factors that can affect sanitation improvement or sustainability. This complex nature of sanitation in itself can be viewed as an inhibiting factor for its development (UN, 2004). Growing discussions urged that sanitation development cannot be consideration in isolation to other develop areas, such as tenure and other aspects of human development (Lüthi, 2009). Although sanitation complexity has not been examined in detailed, a number of investigations have saliently references the complex dynamics of sanitation as one of the retarding factors to improvement (Bartram *et al.*, 2014; Seetharam, 2015). From the early sanitation development efforts, accounts suggest that improving sanitation was a complex phenomenon. Early revolutionaries contended with having to consider behavioural practices, social reforms, sanitation funding arrangement and policy reforms (Rosen, 1958; Mercer, 1990; La Berge. 1992). In more recent times, the dynamics of sanitation relates more to the multiplicity of factors that must be considered, managed and supported to secure and sustain sanitation improvement changes. Seetharam (2015) highlighted that the ambiguity in the tenets of good sanitation contributes to the complexity. He also drew attention to the large number of parties involved in sanitation management (national, international, NGOs, private companies) and the shared responsibilities in the provision of sanitation services. Customs, behaviour, attitude and level of knowledge are all factors that must be considered in cases when developing practical sanitation solutions (*ibid*).

Field experiences such as those presented by Norström et al., (2009) and Isunju (2011) highlighted the complexity of sanitation and confirmed that this complexity cannot be overlooked when considering improving sanitation services. The dynamics surrounding sanitation services improvement and expansion remains a complex phenomenon. To universalise access to improved sanitation and sanitation services, researchers and practitioners continually lament on the impact of this complexity on the success in achieving that goal. Further, with every passing agenda, new challenges arise adding to this complexity.

2.6 Non-mainstream factors affecting sanitation development

In assessing the challenges to sanitation development, attention is always drawn to the mainstream factors that have challenging sanitation progress over time. Often, salient factors that affect sanitation development significantly are overlooked due to their non-traditional status. Countries seeking to improve and sustain sanitation development must be open to considering all factors, common and bespoke, that hinders their sanitation development. A number of such factors are highlighted below. Some have been discussed as evolving challenges, while others have not been explored as inhibitors to country-level sanitation development. How these factors affects or can affect is explored in this section.

2.6.1 Country Specific challenges based on Historical Development Pattern

Neustadt and May (1986) argue that history can be a powerful analytical tool for policymakers and should be used carefully given its ability to inform or misinform current events. They also contend that a look back at history services more than reviewing a chronology of events, but exposes a complex matrix of events and, their causes and impacts, within a societal context and timeline. Should this principle be apply to sanitation development, a clear understanding of the development history of country can highlights the implications on the current sanitation status, whether good or bad. A historical development assessment can identify key events and drivers that contributed to the current state of affairs and associate existing conditions with their root causes. Currently, examination of the historical development of sanitation is not a key process in many, if any, of the sanitation planning approaches/models. For this reason, critical information that can shape the sanitation development approach for increased success and sustainability can be missed. Bohman (2010) found that an

increased understanding of the formative events can result in the re-direction of public policies and selection of approaches that are consistent with in-country systemic conditions. Unfortunately, this is not common in practice and is not advocated in literature for inclusion of this sanitation planning process.

Majority of the unserved population being concentrated in particular regions and countries struggling socio-economically. The influence of their developmental history on their current sanitation can provide valuable lessons for future sanitation development planning as noted by Kennedy-Walker *et al.* (2015). In fact, careful scrutiny of the 2015 sanitation coverage figures published by the JMP showed a significant correlation between countries with notable historical developmental struggles and their current state of sanitation. Countries with known events of disturbances such as war, natural disasters, political unrest, were found to have lower sanitation coverage figures than countries with no such events. Haiti in the Caribbean, Burundi in the Central African districts are notable examples. Understanding the historical context can result in a policy re-direction for sanitation improvement as concluded by Bohman (2010) from this historical assessment of sanitation development in Ghana.

2.6.2 Sanitation Definition

In reviewing the sanitation themes, a notable observation across the various literatures has been the varying term used to define sanitation and the different scope each represents. Terms are used interchangeably to define and describe sanitation, but little studies have been conducted on the impact of the definition conundrum on the potential to achieve an adequate level of sanitation. Some authors have acknowledged the need to develop a clear definition for sanitation (Mazeau *et al.*, 2013; Bartram *et al.*, 2014; Jenkins *et al.*, 2014). Evidence suggests that the term used is based on context of the discussion or intervention. A perusal of literature identified as much as 7 terms for sanitation used under varying context and scope. These include; basic sanitation, environmental sanitation, adequate sanitation, improved sanitation, household sanitation, community sanitation and total sanitation. This can lead to varying standards being adopted for sanitation, which can impinge on achieving the adequacy needs within the existing global development framework.

The impact of the definition applied to sanitation is not a factor widely associated with the challenges to sanitation development. Examination of literature points to areas

where the association and disassociation of key elements of sanitation have altered the perspective of sanitation (Cummings *et al.*, 2014), which may have impinged on progress and sustainability of some sanitation interventions. One such example is in 1950, the WHO adopted definition for sanitation was based given by the Concise Oxford Dictionary in developing their concept for environmental sanitation. This definition considered sanitation to be all conditions that affects health, such as dirt and infection, drainage and disposal of sewage and refuse from houses (WHO, 1992). In presenting their definition for environmental sanitation, the WHO specifically associated community water supplies, excrete and wastewater disposal, refuse disposal, vectors of disease, housing conditions, food supplies and handling, atmospheric conditions, and the safety of the working environment (*ibid*), reshaping the sanitation definition. More recently, the World Bank in discussing progress in Global sanitation referred to basic, safely management and adequate sanitation, highlighting the disparity in the terms used to describe sanitation (World Bank, 2017) The introduction of the concept of improved sanitation to permit global monitoring of sanitation progress, focused on the type of excreta management facility used at a household. The connotations associated with the use of the term ‘sanitation’ could have affected the rate and sustainability of its provision in many countries. Satterthwaite and McGranahan (2006) pointed out that inherently, there is a difference between improved and adequate sanitation. Further, coming out of the 12th UN session, it was widely agreed that sanitation cannot be adequately measured just by the number of latrines built, but requires association with peripheral elements such as hygiene, that were among country’s priorities (UN, 2004).

2.6.3 Security of Tenure

Green and Isley (1988) contends that conventional wisdom would advocate for the nucleation of population into permanent villages as a prerequisite for development programs. Unfortunately, this supposition has not been universally embraced, resulting in settlement and housing challenges in many developing countries. The extent of the impact of security of tenure on sanitation improvement is being slowly brought to the fore with the global population expansion and the rapid formation of informal settlements and bulging peri-urban centres (Mara *et al.*, 2010). Settlement and housing status have longed had a significant challenge to expand coverage, but often overlooked as a mainstream challenge. In 1993, Hogrewe, Joyce and Perez pointed out that that poor settlement and housing conditions was constraining

sanitation development in peri-urban communities. Similarly, Scott et al. (2013) pointed the importance of tenure security when they found that tenure status results in greater disparity in sanitation against other services. They contended that tenure security affects the willingness of households to invest in household sanitation. Increasing sanitation coverage would be hampered if settlement and housing challenges such as poor settlement development, increase in informal settlement and high cost of housing are not significantly address. Current institutions that deny critical public services for informal and marginal communities will continue to prevail if the importance of settlement on sanitation is not widely acknowledged and actions. The link between security of tender and sanitation progress is often not stated clearly in published literature, however Green and Isley (1988) contended that persons working on field implementation project would have encountered the impacts. National government must understand this link. Implementation of sanitation as a human right will call for significant changes to existing legislation related to tenure and illegal occupancy of land (WEDC, 2015).

Sanitation improvement initiatives failing to address the challenges brought on by settlement development patterns will continue to marginalise large groups of persons, often the most vulnerable. Population movement continue to see persons being housed in poor designed or informal settlement, particularly in the face of increased migration, urban growth and an escalating refugees crisis (UN, 2004; Mosello *et al.*, 2016).

2.6.4 Culture, gender, social and economic factors

Sanitation development has historically been a case where the wealthy actors dominate decision-making, giving little regards to race, ethnicity, culture, tradition, religion or individual preferences (Coates, 1999). Culture, gender, race and individual preference have all become developmental issues and must be taken into account for sustainable development (Soetan, 2001). A large percentage of the challenges faced in advancing sanitation have intricate ties to poor consideration for culture, gender, social and economic factors. The roles of culture, gender and the social side of development have been largely ignored to the detriment to many developmental plans (Coates, 1999). Complaint of the non-involvement of women in design of sanitation interventions and its linked to project failures have been referenced in

literature, citing that consideration of gender is key for the success of sanitation projects (Mbugua et al. 2006).

In other cases, users' uptake is at risk due to affordability and cultural sensitivities. Non-consideration of these critical issues can impinge the success and sustainability of sanitation development initiatives. New approaches to sanitation development must give consideration for gender, culture and other socio-economic factors to reduce the challenges encountered in improving country-level sanitation.

2.6.5 Sanitation planning approaches

The successes in sanitation improvement in the industrialized countries often failed to be replicated in the low economic regions, owing mainly to the differing enabling environment for sanitation provision (UN-Habitat, 2003; Castro and Heller, 2009). This has resulted in the metamorphosis of the approach to sanitation planning. Many of the new sanitation planning paradigms were developed in an effort to register to accelerate coverage in the less developed countries (Seppala, 2002). Some authors contend that unsuitable approaches have led to failed initiatives and slothfulness in the delivery of critical sanitation services. The multiplicity of sanitation planning approaches (see Kennedy-Walker *et al.*, 2013), requires careful selection of the appropriate planning approach that would deliver and sustain the changes desired. There is a growing call for collaborative approaches in sanitation development. There's increasing advocacy for national, local and international organisations to work together with urgency to improve sanitation services (Mosello *et al.*, 2016).

2.7 Overcoming Challenges to national Sanitation development

To achieve the progress required for sanitation development, countries must commission direct efforts to overcome the challenges. While challenges experience can be unique, identification and understanding the challenges is the first step to creating appropriate solutions. The approach to overcoming the challenges and fostering sanitation development is critical. Okurut *et al* (2015) in assessing the demand for improved sustainable sanitation in low-income informal settlements in urban areas lamented that resources are often wasted on installing interventions that are not accepted by users as they did not meet the local demand. They argued that the approach must fit the characteristics on this place of intervention.

2.7.1 Lack of holistic approach to sanitation development

Pineo and Subrahmanyam (1975) in reviewing the urban water supply needs in 75 developing countries noted that the piecemeal approach to solving the sanitation problem, has contributed to the ineffectiveness of many interventions. They contended that the issues of sanitation are so multi-faceted as it involves consideration for technology, culture, gender, tenure, finances, water and much more, the requirement for a holistic approach is clear. Mehta (2007) shared similar sentiments on the multifaceted nature of sanitation noting that issues such as perception, technology selection and multiple players.

2.7.2 Reconsideration for the Policy Approach

The policy approach is one of the oldest approaches to sanitation in the modern age. Hamlin and Sheard (1998) noted that public policy introduction via the Public Health Act for England and Wales in 1848 signalled the state's intention to become guardian of public health and was instrumental in the successful revolution that followed. The policy approach was mirrored across Europe and North America in subsequent years and became the cornerstone for sanitation development in many parts of the world. Policy documents offer frameworks, maps, and other information to guide sanitation-related activities of government administrators, union councils, and organizations implementing special projects (Hanchett, 2016). The development of national policies for sanitation seek to overcome institutional weakness to register progress on the ground. Saleth and Dinar (2004) recommended that through the formulation and implementation of sector policies the changes required in the sector can be realised, sentiments that the World Bank embraced when it highlighted only a few countries have dedicated sanitation policies, which are critical in creating the enabling environment for sanitation improvements and sustainability (World Bank, 2013).

The Public Health policies implemented by many of the then industrialised countries in bygone years, though not widely accepted by many sections of the population, provided the foundation for sanitary improvements and the rapid progress to achieving universal access to sanitation (Rosen, 1958, Novick and Morrow, 2008). Through persistence, many of those countries today now vaunt, what is considered 'universal sanitation coverage', where household wastes are adequately removed and managed, thus eliminating interaction with human contact (UN-Habitat, 2003). These successes came via the implementation of stringent legislative frameworks

and the investment of considerable amounts of resources, to record the public health improvements (Wohl, 1983; Holland and Stewart, 1997). Many of these countries, those public health legislative frameworks still existence and form the foundation for many of the control systems for public health.

2.8 Conclusion

The complexity of sanitation and the dynamics involved in its development are the root causes of challenges faced. The complexity was linked to the wide range of factors that affects the improvement and sustainability of sanitation. The factors ranges from available water supply, which limit the type of sanitation technology that can be considered, to the tenure situation of households, which often is a reflection of the economic situation of the household. Other factors found included the level of awareness of good sanitation practices, competing financial needs, availability of local support services and the absence of suitable enabling environment.

The absence of a clear definition for sanitation and the adaptation of incorrect planning approaches for sanitation development were identified as key non-mainstream factors that inhibit sanitation and are consistently overlooked when examining the reason(s) for slow progress of sanitation development. There were no direct findings pointing to the impact of sanitation definition and planning approaches, however, the review found that the fluctuation of terms used to describe sanitation can impact on the level of sanitation service aimed for and achieved and can offset the adequacy of sanitation.

Sanitation improvements efforts are no doubt faced with severe challenges. A number of those challenges are known, some are suspected, while for others there are no established links. Countries desirous of improving and sustaining sanitation coverage must develop a clear understanding of the challenges they are faced. Hastily embracing the commonly accepted challenges to sanitation development would, more than likely, result in poor performance of sanitation development interventions and missed targets. National government must understand that sanitation is complex issue and must be treated that way. The diversity of the challenges must be first accepted to initiate a moving-way from the peace-meal approach that has plague sanitation development activities in some countries.

Overcoming much of the challenges, particularly those that are deep-rooted in the country's development, organisation and operation fabric requires bespoke approaches, tailored to the systemic conditions at play. This means sanitation development planning requires due diligence. Efforts must be directed to understand the existing state of sanitation beyond the current coverage figures. It is imperative that development planning seek to clearly identify systems at play that intimately affect sanitation development and sustainability.

Chapter 3. Methodology

3.1 Chapter Overview

This chapter presents a detailed account of the approaches adopted for this research. These designs and methods drew from research theories across a number of disciplines owing to the intent of the researcher to present a stronger case for radical changes within Guyana's sanitation sector.

3.2 Research Conceptual Framework

Improving Guyana's sanitation status to that of acceptable universal requirements will be an unusual approach. Reports from various sects, including sector development partners have identified the absence of the appropriate regulatory framework for the poor state of sanitation (See PAHO, 2008; IDB, 2010; Riquelme, 2013). This deficiency is also cited for the lack of sustainability in the sector. Similar sentiments were echoed by other countries within the Caribbean region, when it was agreed by country representatives during the Caribbean Sanitation (CARISAN) Conference in 2013 that the absence of clear policies on sanitation in regional countries is one of the major factors has stymied its development (Vassell, 2008).

Improving and sustaining adequate levels of sanitation demands a holistic approach. The approach will require a collective consideration to the needs of the households, communities and the country as a whole. Inherent geo-physical and socio-economical characteristics of the country will play a pivotal role in ensuring solutions are appropriate and adequate. Sanitation improvement system must be sufficiently robust to permit the attainment, maintenance and sustenance the desired standards and services.

The conceptual theory of this research contends that, for household sanitation in Guyana to be adequate and sustainable, conditions must exist where there are complete elimination of human-faeces contact in all forms, and a national commitment to preserving those conditions. Household sanitation is required to go beyond just having access to an improved sanitation facility, but achieving conditions at households where human excreta is effectively contained and managed. Further, the adequacy of household sanitation must consider (a) the acceptability of excreta

management facilities by users (b) the frequency of disruption of the conditions that deem the provisions adequate and (c) the existence of a mechanism that would guarantee the 'adequate' conditions are sustain and can be achieved by future households. Equally, this must all be organised and delivered in an environment that will not inhibit a household desire or ability to achieve a level of sanitation beyond the minimum benchmark for adequacy.

It is hypothesised that to move the development of household sanitation forward in Guyana to achieve and sustain adequate levels, sanitation policies are required to be the catalyst. Given the administration, development and governance arrangement in Guyana, a sanitation policy would facilitate lateral mobilisation and set the enabling environment for action and sustainability as illustrated in figure 3-1. Further, such policy will serve as decentralising mechanism and a regulatory framework by which sanitation decisions and actions will be informed at the local, regional, national and international levels.

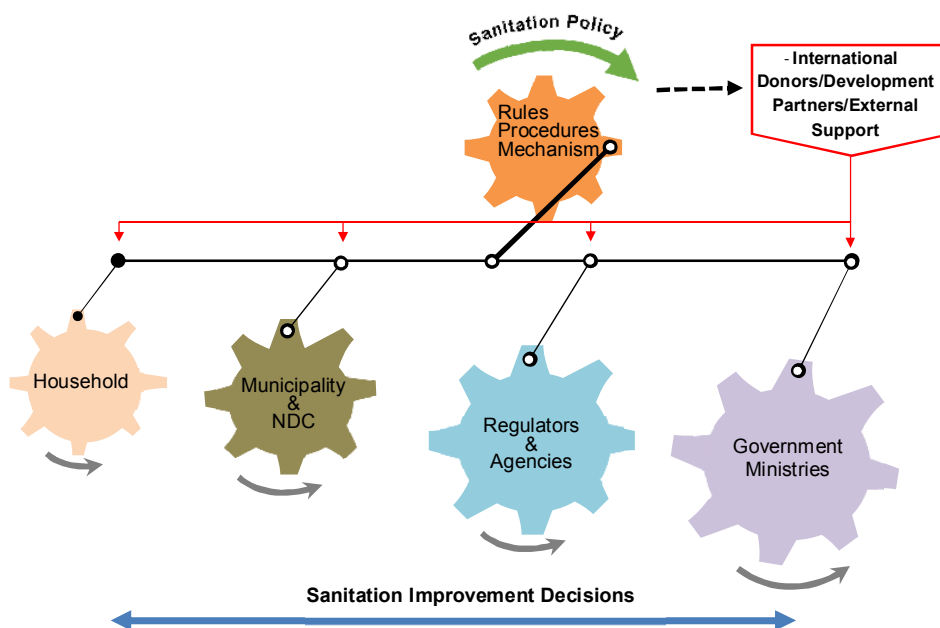


Figure 3-1. Theoretical mobilisation in sanitation sector through public policy.

Investigating the effectiveness of a public policy approach to universalise and sustain adequate sanitation at households in Guyana formed the focal point of this research. The identification of historical lessons, knowledge transfer and bespoke solutions based on inherent characteristics was the focal point of the investigation. As such, it was surmised that the path to universalising household sanitation to an adequate level through public policy must involve five main processes as graphically represented in **Figure 3-2**. The phases comprised of:

1. Developing a definition of adequate household sanitation – (clear and appropriate)
2. Identifying inherent systemic conditions - (Factors critical for sanitation improvement)
3. Identifying enabling environment – (System organisation to achieve and sustain sanitation conditions)
4. Designing approach to improvement – (must be suitable and sustainable)
5. Learning through Knowledge Transfer – (Learn for past experiences)

This study was design around these five (5) processes, utilising it as a framework for testing its feasibility of improving sanitation. Therefore, one of the theories that will be tested in this study is that for any country desirous of attaining and sustaining universal coverage, consideration must be given to the five (5) processes.



Figure 3-2. Theoretical perspective for the processes required to universalise coverage to as adequate level of sanitation.

The interaction of these concepts and how they were used to design a national sanitation policy framework for Guyana is illustrated in **figure 3-2**. This interaction formed the Theoretical Framework for sanitation improvement in Guyana.

3.3 Research Strategy

This research applied both theory and practice. In utilising scientific methods, there was an objective to understand the intricate history of sanitation development that could impact current shortcomings. This was compounded by the need to develop a practical, implementable solution to universalise coverage to an adequate level of sanitation to households across Guyana. To achieve this, it required a research approach that utilises a systematic inquiry, which gives consideration for practical application. This corresponded with the applied-type research as intimated by Saunders et al (2015). The advantage of adopting this strategy over the fundamental or basic type research, which was also explored, is that the applied research allows the use of the data directly for real world application (Robson, 2011).

The objectives of this research required high level of pragmatism, which speaks about a study that is both theoretical and methodological rigorous and at the same time having some practical relevance (Hodgkinson *et al*, 2001). The pragmatic approach permitted the use and combination of methods synonymous with both the qualitative and quantitative approaches to produce credible, reliable, relevant and well-rounded data to provide answers to the research problem (Johnson and Onwuegbuzie, 2006; Morgan, 2007; Kelemen and Rumens, 2008). The pragmatic approach had the advantage of redirecting attention to methodological rigor rather than metaphysical concerns (Morgan, 2007), whilst removing philosophical restrictions and giving researchers the freedom of choice (Creswell, 2003). However, one of the main disadvantages of working with different philosophical positions can lead to the use of multiple research methods, which can prove tedious in forming conclusions (Feilzer, 2010). Nonetheless, given the research objectives, the pragmatic supported the use of a mix-methods research as well as allowing different modes for data analysis. This facilitated a continuous cycle of abductive reasoning to produce socially useful and knowledgeable research outputs. Additionally, theoretical and methodological rigor of this approach increase the reliability and validity of the overall research process, which was critical for long terms application of research findings.

3.4 Research Design

The research design outlines the overall process, integrating the various components of the study in a coherent and logical way to ensure the research problem is effectively address (Saunders *et al.*, 2012). Based on the research objectives and the considerations of a pragmatic approach to this study, a mixed method research was adopted, providing greater flexibility and data validity. This design is considered suitable when undertaking studies aimed at generating knowledge for action (Hakim, 2000) and encourage the adaptation of a wide range of tools for data collection (Van Horn and Monsen, 2008).

As part of the mixed method design, the descriptive research method and the case study research method were adopted. The descriptive method was utilised to establish a strong foundation upon which the public policy were to be justified. It also permitted the chronological context of sanitation development, noted as critical for identify critical systemic conditions that influenced sanitation development in the Caribbean and Guyana specifically.

The case study method, on the other hand, provided in-depth scrutiny that was required to understand the intrinsic in-country systems that influence sanitation improvement. Further, the case study design allowed for a more thorough investigation into the complex and potentially unclear issues that characterise sanitation development within the Caribbean region. The research framework showed the interaction of the research sequence, research design and data collection methods in **figure 3-3**.

The descriptive research design utilised a series of qualitative methods to develop a clear perspective on past and current sanitation development struggle for Guyana, with a Caribbean regional development connotation. The choice of using qualitative methodologies was due to their ability to provide insights into a problem and the uncovering of prevalent trends (Balnaves and Caputi, 2001). The descriptive research design was effective in providing answers to the 'what is' questions, which was identified as one of its advantages by Saunders *et al.* (2016) and capable of utilising elements from both quantitative and qualitative research methodologies (*ibid*).

The case study approach was primary to this investigation. Critical elements of this study relied on the output of the case studies to formulate the necessary conclusions, whereby capitalising on one of its primary advantages of bringing clear

understanding of complex issues (Yin, 2009). The output of the case studies either supported or challenged the findings of the qualitative investigation. Given the need to inform decisions on a national front and embracing the concept of knowledge transfer, the case study design facilitated this inclusion, as there has been much discourse on the capability of transferring knowledge and lesson from countries within the region to aid in the region's development.

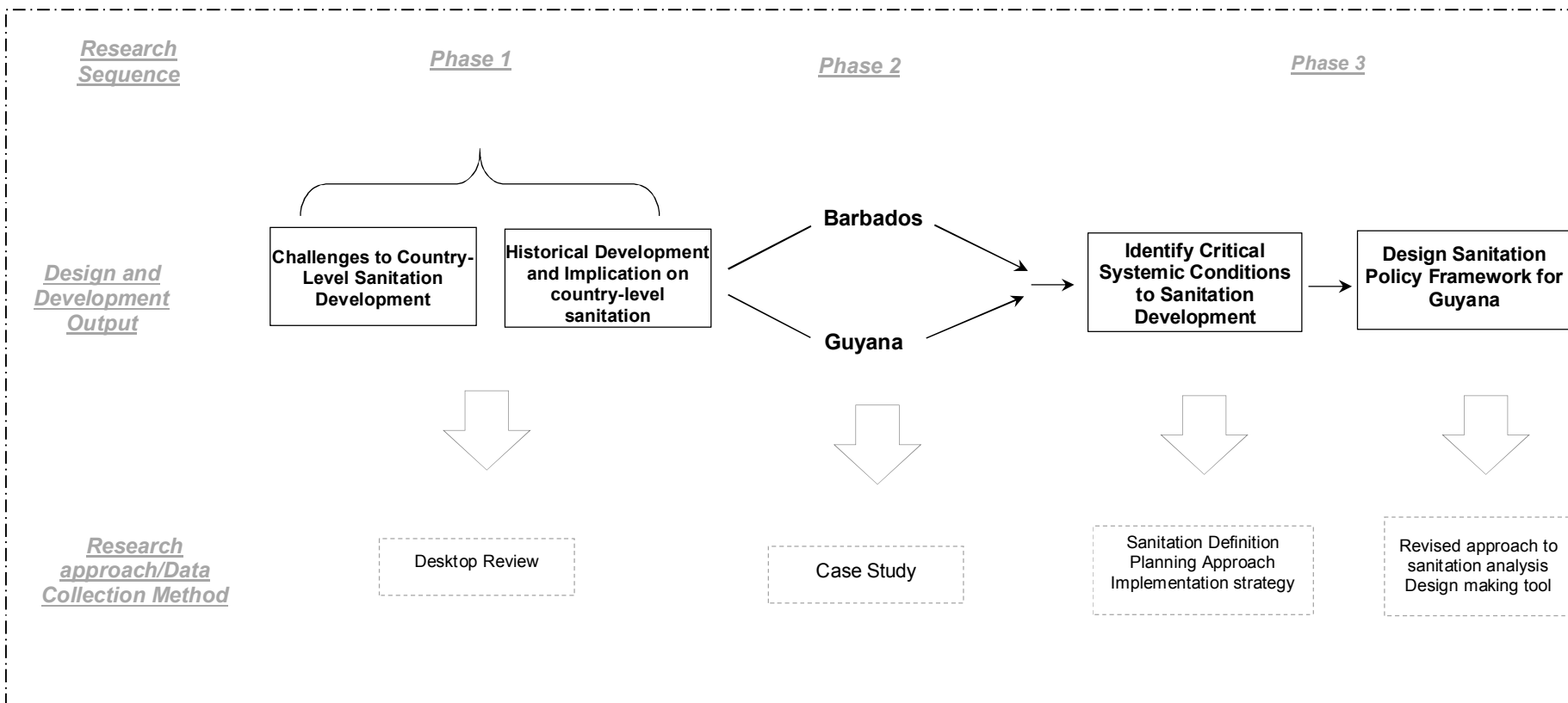


Figure 3-3. Research Design Framework

3.5 Data Collection & Analysis

A mixed-method data collection approach was utilised incorporating the desk review, interview, questionnaires, interactive group and observation as key data collection tools. Both the objectives and design of this investigation demanded the use of multi-sourced data to allow the formulation of strong conclusions to permit the design of a sustainable policy framework for sanitation improvement. This multi-method also allowed for the triangulation of data, providing the screening of data, increasing the validity and reliability. The application of the data collection tools and the implications to the data obtained is further discussed below.

3.5.1 Desktop Review

The extraction of secondary data from existing literature provided significant data via this method as it was deemed best suitable technique to capture a large sect of the data needed. This was based on the premise that the data needed for conducting the historical analysis would have been predominantly in existing literature. Similarly, secondary data sources were viewed as critical to support the primary investigation on the state of sanitation across the respective case study countries. This tool was effective in extracting data to respond to the hypothetical constructs that guided the framing of this research. In fact, the secondary data gained from the literature review informed the design of this research as well as establishing a strong foundation for the conclusions derived.

A structured-systematic approach was used in the review of literature. Published peer-reviewed academic literature formed the core literature consulted. However, due to the historical limited peer-reviewed documentation of sanitation in the Caribbean and Guyana, multiple data sources spanning academic texts, industry reports, and in some cases, local print media were also reviewed. The specific approach in the execution of the desk reviews within

3.5.2 Interviews, Questionnaire, Interactive Group and Observation

The primary data utilised for this research was sourced via a combination of interviews, questionnaires, interactive group and observation. The used of the tools were based on the type of data needed and how such data were to be collected and presented.

3.6 Selection of Case Study Countries

Barbados and Jamaica were initially identified as ideal case study countries to be compared with Guyana given their similar development paths, identical cultures and socio-economic activity, but different sanitation coverage. Understanding their approach would provide insightful comparisons and lessons to compared to the situation in Guyana and be used for the designing of the policy framework. The preference for these case studies were based on the fact Barbados having a superior sanitation coverage of the three countries but has no dedicated sanitation policy.

On the other hand, Jamaica has the worst sanitation coverage of the three countries, but is the only Caribbean country to design a dedicated sanitation policy to drive development in the sector. Guyana on the other hand, has no policy and sanitation coverage and is below Barbados, but above Jamaica. However, following the difficulty in accessing data in both Barbados and Guyana, and the potential for same to occur in Jamaica, in the interest of time Jamaica was excluded and Barbados was used as the case study against which approaches in Guyana will be compared.

3.6.1 Why Barbados

Barbados is the easternmost island in the chain of islands bordering the Caribbean Sea (figure 3-4) and one of the few islands within the Wider Caribbean Region with almost universal sanitation coverage as recorded by the WHO/Unicef Joint Monitoring Programme (JMP). Figures showed that from the inception of the JMP work of collecting and monitoring 'sanitation coverage' in 1990, Barbados recorded 99% coverage and visits to the island showed no visible signs of a wider sanitation problem, hence this figure was assumed to be somewhat accurate at face value.

Barbados has similar historical path, culture and socio-economic to Guyana, but has a far superior sanitation framework. Attention was further focused on Barbados following the findings of an initial assessment, which revealed that the current sanitation status was achieved without the existence of a 'dedicated' policy for sanitation improvement. As such, it was thought that understanding the approaches taken by Barbados within their sanitation sector would serve as a valuable input in developing a sanitation improvement strategy for Guyana to foster achievement of universal access to 'adequate' sanitation as well as a sanitation improvement framework that can be adopted for other countries in the Region seeking to gain improvements in the their sanitation coverage. Critical areas of concern were:

- Barbados and Guyana have a similar historical development history, yet the improvements gain in houses having access to an improved sanitation differs (if not vastly);
- Can the existing status of sanitation coverage or the access households in Barbados have to a sanitation facilities be considered 'adequate'?
- What has Barbados done or is doing that Guyana and other Caribbean territories failed to do?
- Are the strategies implemented by Barbados replicable to other Caribbean Island to achieve similar results?



Figure 3-4. Geographic Location of Barbados

It is hypothesised that given the proximity of the countries, being part of the common regional body, CARICOM and being subjected to a number of regional policies international convention, the lessons learnt from Barbados can provide a more result-based approach to the design of a sanitation policy for Guyana. Additionally, with knowledge of the critical systemic conditions for sanitation improvement in Barbados and the strategy employed to maximise their effectiveness, scrutiny will be made to assess the possibility of adapting similar approaches, if similar conditions are highlighted in Guyana.

Table 3-1 Current Sanitation Geographical and sanitation data for case study Countries

Country	Size (Area) Km ²	Pop.	Overall Improved Sanitation Coverage		Sanitation facilities in Use				National Sanitation Policy
			Urban	Rural	Sewer	Septic Tank	Pit Latrine (other)	None	
Guyana	214,000	751,223	88%	82%	5.1	36.4	56.7	1.8	No Direct Policy
Barbados	430	276,300	100%	100%	4.7	90.3	5.0	0	Sanitation Controlled via Water Management Policy

3.7 Approach to Barbados Case Study

3.7.1 Case Study Design

The Barbados case study was undertaken to identify key lessons from Barbados sanitation development approach that can help shape a policy framework for Guyana. This required an in-depth assessment of sanitation development in Barbados. The assessment followed the conceptual framework as outlined in Chapter 5.

3.7.2 Data Collection Methods

Both primary and secondary data in the form of interviews, structured observations and desktop reviews of appropriate literature were used for data collection. The desktop review of literature facilitated the collection of secondary data to provide answers to the various assessment categories identified in the conceptual framework. The interviews provided quality primary. Combining the findings of the primary and secondary, much of the conclusions were formed.

A thematic approach to the desktop review was taken in like with the criteria and categories in the conceptual framework, while face-to-face interviews was selected to collect the primary as it offered the benefit of flexibility and probing, given the exploratory of this line of enquiry.

The semi-structured approach to the interview was selected over the structured and unstructured, as one of its advantages was that it permitted the interviewer to gain invaluable insight while still offering the flexibility in terms of modifying the questions to target new ideas raised by the interviewees (Robson, 2002). Adopting a semi-structured approach was also beneficial given the varying background, knowledge levels and views that were likely to be encountered. A judgmental sampling (i.e. nonprobability sampling) strategy was used given the fact that only persons involved

in the key institutions with responsibility for sanitation were targeted. This was also chosen because the number of organisation and the total number of persons were not known prior to commencing the data collection.

To examine the clarity of the questions, the length of the interview as well as the ability of the interview to generate the desired data prior to the execution of the survey, the survey instrument was tested at the 2013 Caribbean Water and Wastewater conference attended by the researcher. Sector practitioners were interviewed and adjustments made to the survey instrument where necessary. Assistance in reviewing the instrument was also provided by a survey professional that have been involved in numerous sanitation sector assessment surveys in the Caribbean. A sample of the interview schedule is provided in **Appendix A**

3.7.3 Identification of Participants and Interview Preparation

An initial meeting held with representatives of the Barbados Environmental Protection Department (EPD), where the scope of the investigation was explained. The EPD representatives further recommended additional participants to those identified via the preliminary survey list completed by the researcher, transforming the random sampling method into a snowball approach as described by Valente and Pumpuang (2007). The list of interviewees is shown in **table 3-2**.

Table 3-2. Key actors with responsibility for some aspect of household sanitation in Barbados

Agency	Representative Interviewed
Barbados Environmental Protection Department (EPD)	Senior Environmental Officer
Environmental Health Unit	Chief Environmental Health Officer
	Deputy Environmental Health Officer
Barbados Water Authority	Plant Superintendent
	Plant Engineer
	Industrial Waste Inspector
Town and Country Development Planning Office	Senior Town Planner*
Rural Development Commission	Director*
Urban Development Commission	Director*
Sanitation Services Authority	Deputy Manager*
Pan-American Health Organisation (Barbados)	Environmental Health Advisor

** Email interview*

3.7.4 Data Recording, Analysis and Presentation

The field data collection was conducted between 6th October and 2nd November 2013. Interviews were conducted on an appointment basis, following initial contact either through the representative of the EPD or the researcher directly. Along with the written recording of the responses, when permitted, electronic recordings were made.

Although face-to-face interviews were the preferred, grave difficulty was encountered in the timely scheduling of interviews and the keeping of appointments by participants. This resulted in several appointments being re-scheduled to dates beyond the planned duration of the fieldwork.

In overcoming this constraint, it was agreed that contact will be made via email and the interview schedule be forwarded and responses returned via the same means. To maintain the flexibility as with the face-to-face-interview, participants agreed to email exchanges, if necessary, for areas where further clarification may be required. Four of the eleven interviews were carried out through this format.

Due to the relatively small number of interviews conducted and the qualitative nature of the data, the use of sophisticated software for data analysis was deemed unnecessary. As such, the interview scripts were analysed manually extracting data that can inform the appropriate sections of the conceptual framework. Care was given to present the true responses of the respondents. However, given the open-ended nature of the questions and the fact that some participants were eager to engage in discussion on sanitation in Barbados, it was often a challenge to often time present the responses verbatim. Additionally, given the researcher's professional and personal interest in sanitation improvement in the region, cognisance was taken to ensure “reflexivity”, which in this case refers to having an awareness of the influence the perspective and personal background of the researcher may have on the research process. Self-questioning and self-understanding was done in order to remove interviewer biases, which have been known to affect the interpretation of responses (Denzin and Lincoln, 2003). The researcher sought to ensure the reported responses truly represented the facts, views and opinions given by the interviewees.

3.8 Approach to Guyana Case Study

This case study design was chosen to go beyond the superficially sector scrutiny that is usually adopted when conducting sectorial and situation analysis of the sanitation sector, particularly in project-based situations with external sponsors. The sectorial and situation analysis are in most instances geared towards establishing a baseline for sanitation by measuring the sanitation status at the time of the investigation. They fail to examine conditions that may be created the existing conditions, which can only be determine by looking into the historical development of a country and community. Again, utilising the researcher familiarity with the sector, past experiences of

interacting with the various actors and understanding the need for comprehensive data to inform public policy, the assessment covered all entities of the sector and data recorded without distortion.

The design of data collection and analysis incorporated many of the recommended guidelines from sector authorities and previous sanitation programs (as identified later in this section), cognisance was given to the objectives of this research, which required an understanding of the status of sanitation that goes beyond the existing coverage and systems at play. This also made it critical to undertake an extensive systematic investigation of the sector, from the policy makers at Central Government level to the household level, whose practices and condition provided a picture of the true state of sanitation in Guyana.

The investigation also needed to examine the critical factors, particularly those inherent to Guyana that influence the improvement of sanitation. This included the governance, organisational and administration of the sanitation sector, the roles, responsibilities and perception of the main actors, as well as the system that drives the sector. The sanitation facilities used and the arrangement and delivery of sanitation services at the household level was paramount in understand the state of sanitation.

3.8.1 Data Collection Design

Primary data on sanitation was collected from five (5) main groups of stakeholders that span the spectrum of sanitation provision and management activities in Guyana. These groups as shown in Figure 3.5 comprised the Executive offices (Government Ministries) that constitute the policy makers, the agencies that execute the mandates (Implementing Agencies), the local authority that manages and monitor the day-to-day adherence and compliance and the households themselves. The fifth groups are the international donor/Sponsor/Funding Institutions and NGO, who plays active roles in sanitation provision, improvement and management in Guyana.

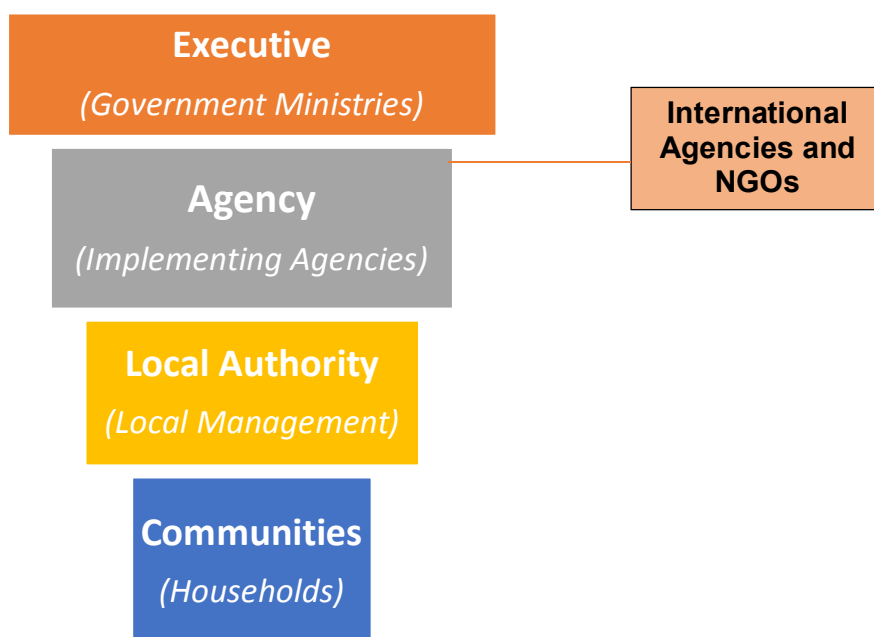


Figure 3-5. Structure of main actors for sanitation administration in Guyana.

These five groups formed a hierarchal governing structure for sanitation provision in Guyana and are responsible for all sanitation activities. These groups were identified based on the researcher's experience of working in Guyana's water and sanitation sector and findings from the preliminary literature review.

3.8.2 Sampling Strategy

At the time of this research, there were 18 government ministries (**table 3-3**), five of which were assessed to bear some responsibility for sanitation services constituting the population for this group. Data was collected for each of the ministries.

The mandate of the ministries are implemented via dedicated agencies that are semi-autonomous or are simply implementing institutions. The five (5) ministries had a total of fifteen (15) agencies. Given the limited number of agencies and the relative concentration of the location within the capital city, representatives from all the agencies were interviewed as part of this study. This corresponded to 100% sampling.

Table 3-3. Government Ministries with responsibility for Sanitation in Guyana

<u>Ministries</u>	<u>Agencies</u>
Min. of Agriculture	XXXXX
Min. of Amerindian Affairs	XXXXX
Min. of Education	XXXXX
Min. of Finance	State Planning Secretariat - Project Cycle Management Division (PCMD)
	Basic Needs Trust Fund
Min. of Foreign Affairs	XXXX
Min. of Health	Public Health Department
Min. of Home Affairs	XXXX
Min. of Housing & Water	Central Housing and Planning Authority
	Guyana Water Incorporated
Min. of Human Services & Social Security	XXXX
Min. of Labour	XXXX
Min. of Legal Affairs	XXXX
Min. of Local Govt. & Regional Development	Regional Development Department
	Solid Waste Management Unit
Min. of Natural Resources & the Environment	Environment Protection Agency
	Guyana Geology and Mines
	Guyana National Bureau of Standards
Min. of Parliamentary Affairs	XXXX
Min. of Public Service Management	XXXX
Min. of Public Works	XXXX
Min. of Tourism, Industry, & Commerce	XXXX
Min. of Culture, Youth, & Sports	XXXX

The local governance system comprises both the regional and local components. Guyana is divided into 10 administrative regions, each managed by a Regional Democratic Council (RDC), and at the local level 6 Municipalities and 65 Neighbourhood democratic councils (NDCs). There are also 75 Amerindian village councils (AVCs) that are concentrated more within the hinterland areas. These local organs are responsible for the provision of services to residents.

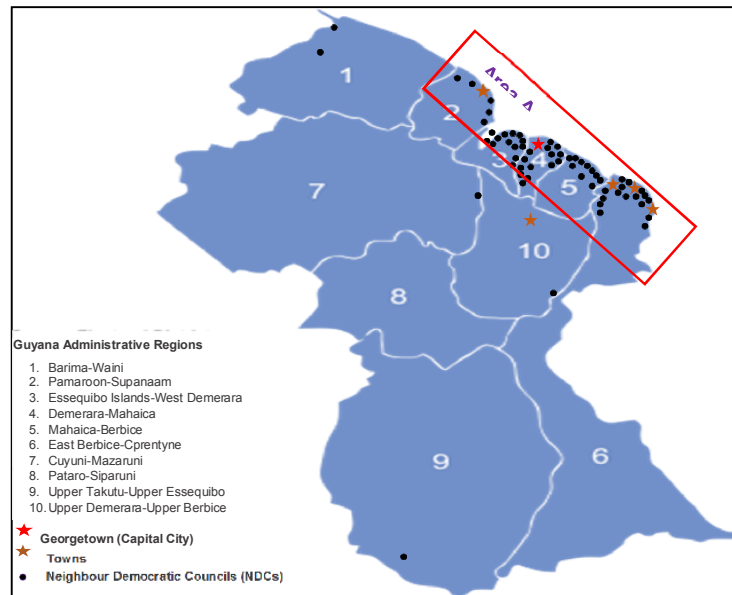


Figure 3-6. Map of Guyana Showing the coastal zone and concentration of local administration councils

Guyana is further divided into two distinct geographical zones: the coastal and the hinterland zones (figure 3-6), with 90% of the population residing within the coastal zone being the administrative centre. Given the difficulty to access the hinterland regions (see limitation of working in the hinterland as explained in section 3.7), only local organs in the (accessible) coastal regions was considered as part of this study. The five (5) administrative regions where the data collection was focused were regions 3, 4, 5, 6 and 10. The community composition and population of each region is shown in table 3.1. In an effort to capture a broad perspective across the regions, interviews were conducted with representatives from the various levels of local governance in each region.

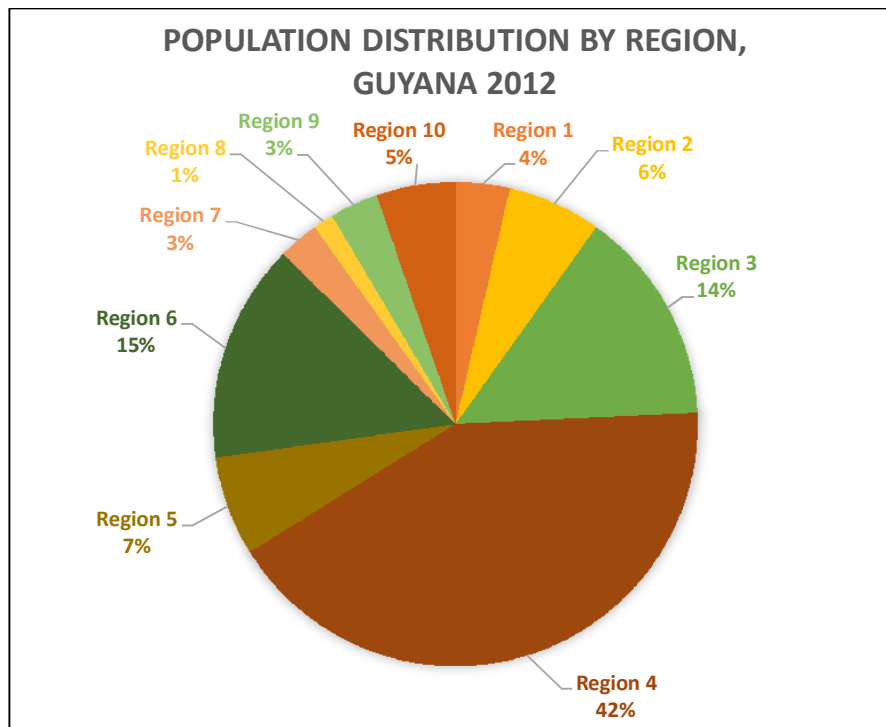


Figure 3-7. Population distribution of Guyana per administrative region
 (Source: Guyana Housing and Population Census 2012)

Household were targeted as a primary source of data. A general overview of Guyana's demographics highlighted five distinct settlement patterns. These were used to develop the sampling frame for the household data. The highlighted settlement patterns were the urban centres, rural settlements, peri-urban silos, new housing developments and squatter (informal) settlements (**table 3-4**). For consistency, the definition for peri-urban settlements adopted for this study is based on that used by UNICEF and similar international agencies, which describes peri-urban areas as those settlements that lies between the consolidated urban centres and the rural districts (Unicef, 2012). New housing developments are described as communities that has been established (either by the government or private developers) within the last 30 years.

Undertaking a random sampling survey across the various communities without taking into consideration the differences in the sociodemographic and administrative distinctions could result in critical systems paramount to a category of community being missed. There is also the likelihood that critical features that are inherent to specific classes of communities that would affect the improvement of sanitation being overlooked. To accommodate for this dynamic, a stratified systematic approach was

adopted to identify the sampling frame. Communities fitting the description of each settlement classification within the 5 selected administrative regions were identified. However, the random spread of communities across the regions and the constraints of time and resources, random households in two (2) communities in each of the settlement categories was completed. The detailed sampling frame adopted for Guyana is shown in figure 3-8.

Table 3-4. General Classification of Communities commonly found in Guyana

Community Classification	Description
<i>Urban</i>	The built-up administrative centres of the City and towns that houses the main administrative departments. [<i>The city of Georgetown and the six (6) towns are the communities that fall within this classification</i>].
<i>Rural</i>	The housing/agricultural (farming) districts away from the urban areas. Administrative functions are exercised by community groups and local government bodies. [<i>These include the farming communities and settlements with limited infrastructure along the coastline and within the river-in areas</i>].
<i>Peri-Urban</i>	Rapidly developing settlements on the periphery of the city and town. Areas not as developed as the urban areas, but supports the over-flow from persons aiming to get to the city. Appears on the fringes of urban areas.
<i>New Housing</i>	New housing developments (either complete with house or land distribution) commissioned by the government or private developers).
<i>Squatter Settlement</i>	Informal-unauthorised settlements which do not fall under the jurisdiction of any formal authority. [e.g. Angoy's Avenue, Region 6, Plastic City, Region 3, Victory Valley, Region 10, Tiger Bay, Region 4]

3.8.3 Determining household sample Size

A simple random sampling approach was adopted within each community cluster. The required sample size was calculated as shown in **appendix B**. The actual samples taken for each cluster is shown in **table 3-5**.

Table 3-5. Comparison between representative and actual sample size for sample clusters

Cluster	Representative Sample	Actual Sample
Urban 1 (Georgetown)	68	70
Urban 2 (Rosehall)	64	65
Peri-Urban 1 – Blueberry Hill	62	65
Peri-Urban 2 – Rosignal	66	65
Rural 1 – Leguan Island	64	65
Rural 2 – Bush Lot (Reg. 5)	64	65
New Housing 1 – Diamond	67	65
New Housing 2 – La Parfaite Harmonie	65	65
Squatter Settlement 1 – Victory Valley	57	65
Squatter Settlement 2 – Angoy's Avenue	64	65

The detailed breakdown of the sampling frame used to collect data in Guyana is shown in **figure 3-8** below.

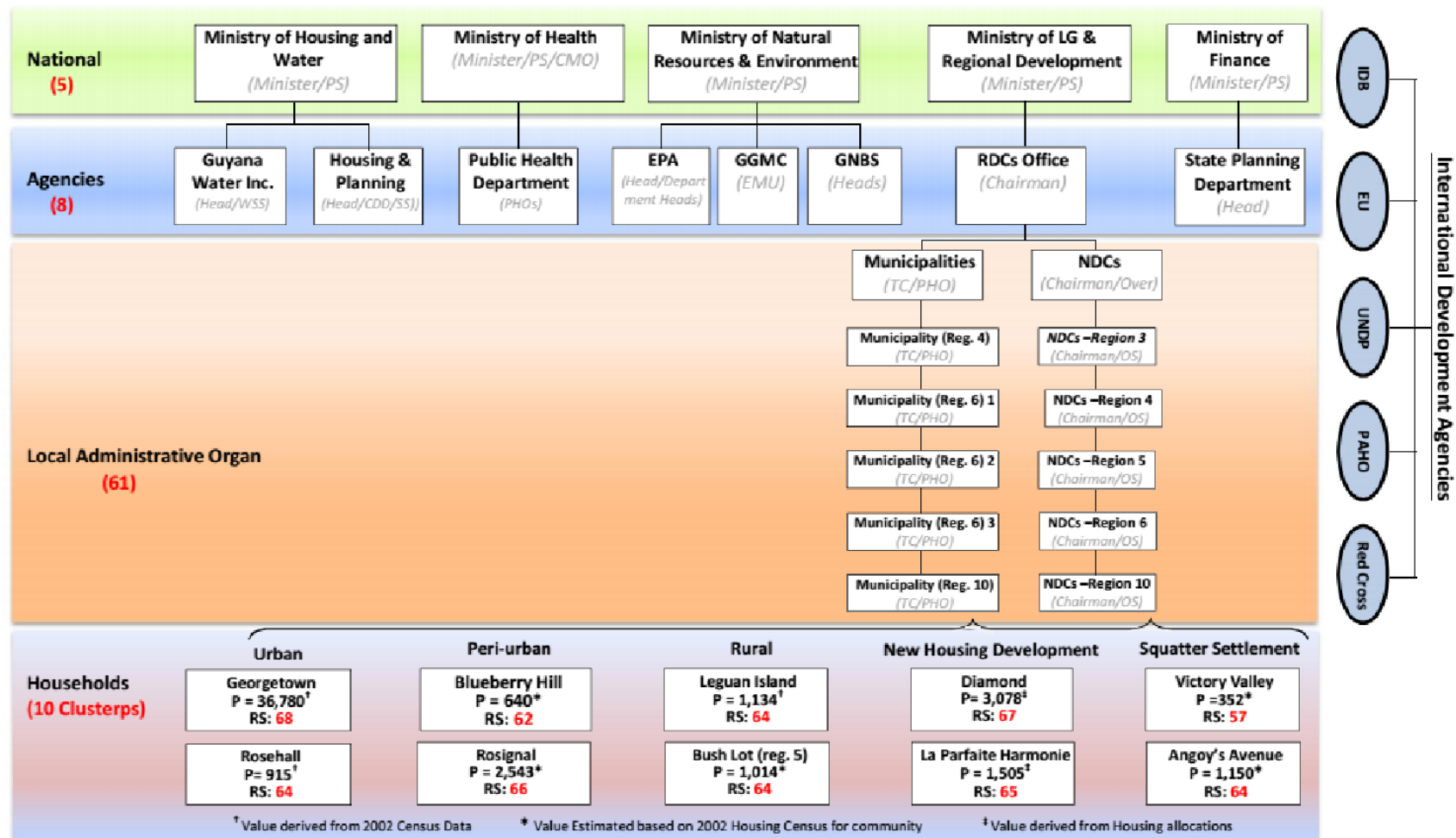


Figure 3-8. Breakdown of sample frame used for collecting data in Guyana.

3.8.4 Data Collection Methods

The data collection method was informed by the conceptual framework design for this case study as outlined in Chapter 6. Both primary and secondary data was required to permit a holistic understanding of sanitation situation in Guyana. In addition, to improve credibility of data used in forming conclusions, the design required incorporating a mixture of methods to collect and analyse the data (Robson, 2011, p. 155). The result was a tailored approach that ensured the investigative process is easily replicated and the data collected is reliable.

3.8.5 Data collection, instruments and approach

The approach taken in the desk study and field survey is illustrated in **figure 3-9**. The desk study was focused on understanding the historical development of sanitation in Guyana and other critical features. The field survey was used to gather perspectives from the main actors on the sector. provision structure.

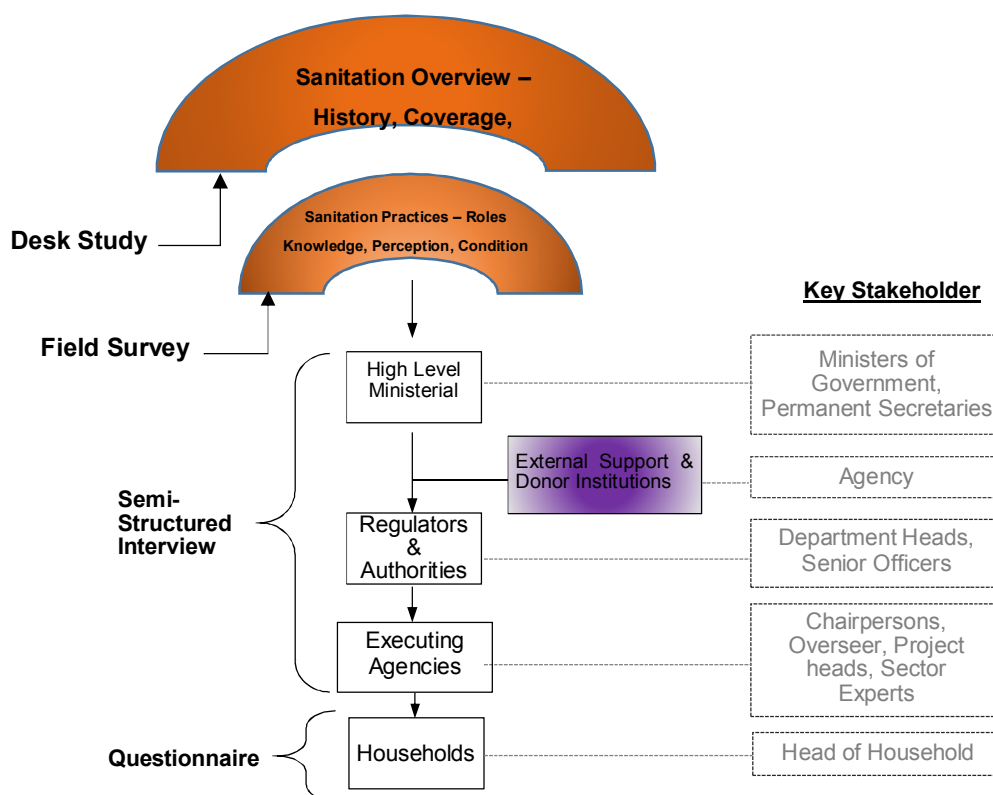


Figure 3-9. Areas where data Collection Instruments were used in Sanitation Sector Assessment

3.8.6 Desk study design and execution process

The use of desk study targeted the extraction of secondary data that would lead to an increased understanding of how past events influenced the shape of the sanitation sector and the status of sanitation in Guyana. Secondary data in the form of academic texts, journal articles, government reports, international development partner's reports, etc., and survey-based secondary data such as the population census, Multiple Indicator Cluster Survey data and similar survey-based secondary data was utilised. The gain an insight into non-governmental official's perception on the state of sanitation in Guyana, particularly those that were not contained in the primary data sample frame, print and online media, interest group forums and similar sources were used to provide critical data. The framework used to collect and assessment of the secondary data is shown in **figure 3-10**.

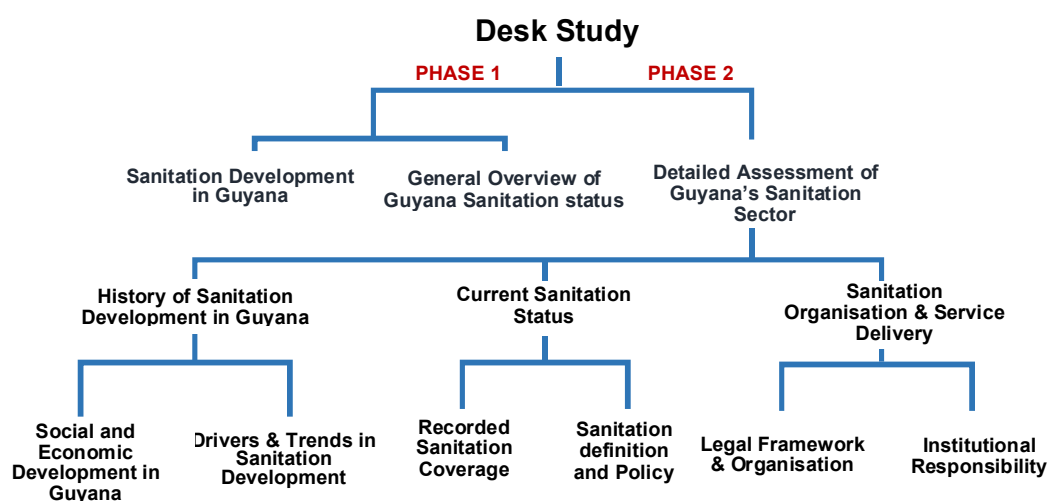


Figure 3-10. Framework for assessing secondary data

The desk study was completed in two phases. The first phase was completed at the inception of the research to develop a background and rationale for the research as well as to inform the drafting of the research questions and designing of the overall approach to the research. During the first phase, the desk study mainly utilised non-electronic and electronic libraries to access document. The absence of academic research and source of materials about sanitation locally and regionally, this limitation was overcome by utilising a combination of organisations and sanitation

sector/project reports, prepared by international partners/donor agencies as a supplement. However, for expediency, the first phase desk study utilised academic texts and other printed material available at the university's library combined with electronic documents recovered using internet sources.

The second phase of the desk study was a systematic approach to uncover a greater understanding of specific elements of sanitation development in Guyana. This is reflected in the conceptual framework for the case study.

3.8.6 Field Survey collection, analysis and presentation

3.8.6.1 Ethical practice

Adherence to good ethical practices was always considered during the design and planning of the research, design and execution of the fieldwork and approved by Newcastle University's Science, Agriculture and Engineering faculty ethical review committee. Names and sensitive information were withheld during interviews, while permission to inspect the sanitation facility and other household surrounding were requested. Prior to administering the questionnaires meetings were held with the governance organ at which the objectives and details of the study were explained and authorisation sought. Before questionnaire, interview or focus group administration had begun, informed consent was received by every participant. The respondents' right to decline to answer any questions and/or withdraw from the questionnaire at any time were explained. The anonymity and confidentiality of respondents was achieved through non-disclosure of personal details.

3.8.6.2 Design of Survey Instruments

The design of the research instruments were carefully considered against undertaking research in Guyana, particularly in the public sector and for the sanitation purpose. As such, the instruments designs for use took into consideration the potential reluctance of persons to participate in the study, the likelihood of data scarcity, and the possibility of needing using multiple data sources to verify the accuracy of data. The design of the data collection instruments was further aided by sanitation sector assessment guidelines and approaches taken on past assessments conducted in Guyana. These included:

- The JMP's Core questions on drinking-water and sanitation for household surveys (WHO/UNICEF, 2006);
- The guidelines developed by the Environmental Health Project (EHP) for assessing sanitation policy assessment (Elledge *et al.*, 2002);
- PAHO guidelines for sanitation sector assessment (WHO/UNICEF, 2009);
- Sanitation assessment completed for Preparing Strategic Plan for Sanitation Sector in Guyana (PAHO, 2008).

With informing policy action being the key output of this investigation, it was imperative that there was a comprehensive understanding of the past actions that inform sanitation improvement in Guyana, the current status and practices, drivers and barriers to sanitation improvement and the links between critical national development objectives and sanitation. The assessment commenced with a complete review of the historical development of sanitation in Guyana, prior to the collection of the primary data, which demonstrated the pluralistic nature of qualitative research (Krefting, 1991).

Semi-structured Interview Schedule design

To aid in the uniformity in data collection across the main stakeholders of the sector, efforts were made to unify the semi-structured interview scheduled. However, given the disparity in the remits of stakeholders across the sanitation administration hierarchy and the potential layering of data (i.e. persons not familiar with data outside of their immediate remit), variants of the interview schedules were necessary. As such, two variants of the semi-structured interview schedule were designed, one specifically for the high-level stakeholders (Government ministers and international agencies) (See **appendix C**) and the other for executions agencies and local administration officials (See **appendix D**). This was also necessary as questions pertaining to public policy for sanitation were mainly directed to the high-level stakeholders while questions relating to the effectiveness of organisation and current practices were better suited for the lower order stakeholders.

To ensure the data collected corresponds to the areas of enquiry, the interview schedules were divided into five sections that contained the appropriate questions that would furnish the needed data. The high-level interview hosted questions that pertained to national sanitation services delivery, including coverage, risks, policy, development and sector involvement. The lower-level interview, however focused on

areas of agency roles and responsibility, the importance of sanitation, the challenges in delivery, together with the adequacy of current coverage and perceptions to improvement approach. The combination of data collected from the two groups offered a concatenation of information that would provide a clear picture on the organisation and delivery of sanitation services in Guyana as well as their perception on the approach to improving sanitation.

Household Questionnaire design

The design of the questionnaires followed a similar thematic pattern as the interview schedules (See **appendix E**). The questionnaire contained questions directed at understanding the sanitation conditions and perceptions at the household level. The questionnaire was also designed to gather data on household characteristics to be used to demonstrate the state of sanitation at the various categories of tenure and housing arrangements. The use of questionnaire provided a standardised approach, which allowed the same questions to be asked to a much larger target group, providing a more effective option than other instruments such as the use of interviews (Bryman, 2008). As such, the questionnaire was divided into three (3) sections, and consisted of both closed and open-ended questions. The first section of the questionnaire sought information about the household's current sanitation provisions, while the second section attempted to document the respondent's knowledge of the sanitation administration in their area. The final section of the questionnaire was design to measure the respondent's knowledge, attitude and perception of sanitation and their inclination to support sanitation improvements. This data collected by this instrument was critical in understanding the current state of sanitation and the factors that can be responsible for the state of sanitation.

3.8.6.3 Collection of Field Data

The field survey in Guyana was completed in two (2) phases. The initial phase was undertaken from November 2013 to March 2014, where both interviews with stakeholder agencies representatives and household surveys were completed. A second phase of data collection was done between December 2014 and April 2015 for unfinished household surveys.

Administration of semi-structured interviews

All stakeholder interviews were completed by the researcher on a face-to-face basis, using a contact-by-appointment approach. The identification of specific persons to be interviewed was done to avoid hosting discussions with persons not familiar with the sector operations and issues or without the authority to pronounce on approaches of the agency. The administration of interviews in the second phase was the same as in the first phase, however, with lessons learnt from the first phase, a lead time of 2 weeks was used to arrange interviews. Approximately 70% of intended contacts were made, with the main defaulters being the representatives from the local authorities.

The interview responses were recorded in writing and when permission was granted, audio recordings were undertaken simultaneously. Interviews were reviewed and transcribed to a standard pre-prepared format on a daily basis and store electronically along with the audio files.

Household Questionnaires

The first phase of the household questionnaires were administered by four research graduates from the university who had previous experience of this nature. Two days of training were done with the research assistants to clarify the aim, objectives, design and rationale for each question, along with basic techniques in face-to-face questionnaire administration.

In administering the questionnaires, each researcher was given a targeted amount to complete within a community. The survey was completed during the hours of 10am and 6pm. Permissions were also sought from participants before photographs were taken of toilet and surrounding facilities.

Interactive Groups

With key stakeholder groups, a multi-media presentation followed by open discussions were done. Information from the multi-media presentation using Microsoft Power Point, were based on the general sanitation assessment in Guyana from the desk study and moved forward to highlighting findings specific to the organisation. The presentation also presented information on the agencies, their objectives and progress to household sanitation.

Key questions were posted to the audience and their responses were recorded. Only two of the four interactive sessions were completed during the second phase of the field exercise.

Chapter 4. Historical development of sanitation in the Caribbean – Critical events between 1900 and 2015.

4.1 Introduction

This chapter is designed to provide a clear picture of events that influenced the development of sanitation in the early years of the Caribbean. Its aim is to identify the critical events that occurred or decisions taken that influenced the existing state and shape of sanitation in the region as a whole.

Integral to this assessment was the identification of institutions that were created and how they would have shaped the way sanitation was viewed and services delivered. This assessment was necessary to understand the wider contributors and inhibitors to improving sanitation in the regions as well as to understand how the systemic conditions introduced by the region may affect the specific country performance of sanitation.

The findings from this assessment were used to compare against the historical development of sanitation in the case study countries, Barbados and Guyana. It was for better understanding of the root cause and challenges to sanitation improvement.

A brief overview of the Caribbean was the starting point, and its progress on development, before evaluating the recorded progress of sanitation in the region as presented by the Joint Monitoring Programme (JMP) of the WHO/UNICEF for water and sanitation monitoring under the Millennium Development Goals (MDGs). The key events over period are then identified individually, and their associated impact to the state of sanitation in the region is evaluated.

Finally, It was argued that the current state of sanitation in the Caribbean is a function of critical events. Those events have not only shaped the current status of sanitation, but also induced institutions into the sanitation sector across the countries of the region that now requires a varied approach if improvements are to go beyond its present status. They will also impact any efforts targeting the universalisation of adequate standards of sanitation for households within the Caribbean region.

4.2 Methodology

This review was completed via a desktop study that adopted an anthropological approach to identify the critical events that impacted sanitation development from the start of the 20th century to present. Given that the sanitation revolution in the west commenced in the latter part of the 19th century (Hamlin and Sheard, 1998; Fawcett and Black, 2008), an understanding of the linkage between the Caribbean and Europe was considered the most impacting of events occurring from the start of the 20th century, thus limiting the of chronological review from 1900 to 2015.

Utilising a descriptive research approach, peer-reviewed literature was also source of information. However, given that the theme of the assessment was designed to investigate the history of the region, academic text and grey literature such as meeting records, project reports, conference proceedings, etc., were used to supplement the deficiencies of content within peer-reviewed materials.

Documents were mainly sourced electronically through the perusal of electronic data bases such as Scopus, Google Scholar and Science Direct.

4.3. The Caribbean Region and the Importance of Sanitation

4.3.1 Caribbean Geography and Population

The Caribbean region comprise of the chain of islands stretching from the Bahamas, located South-East of the United States of America, to Trinidad and Tobago located off the Northern coast of Venezuela, and forming the boundary between the Atlantic Ocean and the Caribbean Sea (Girvan, 2001; Page and Sonnenburg, 2003). However, geopolitically, the continental enclaved countries of Guyana, Suriname, French Guiana and Belize have been considered as being part of the Caribbean (Harrigan, 1974; Laurence, 2011). These non-island countries share a closely related history and whose evolution all followed the same trajectory as with the island nations forming the Caribbean (Knight and Palmer, 1989). With a collective land mass area of 634,000 square kilometres (245,000 square miles) (See Table 4-1), the region is relatively small compared to the geographic giants as North America, Europe or Asia³. The collective population of the region is 44.5 million (2015 estimates), with large population variations across the territories (See Table 4-1).

³ Size of the United States is more than 14 times the size of the collected areas of the Caribbean Countries. Europe is 7 times larger while Asia is more than 70 times larger.

These variations have no strategic patterns, as the largest country in terms of land area, Guyana, has a population of 750,000 persons while Trinidad and Tobago, a country 1:40 the size of Guyana, has population twice of Guyana. The smaller islands such as Monserrat, St. Kitts and Nevis, the islands comprising the former Netherlands Antilles (Curacao, St Maarten, Saab, St. Eustatius and Bonaire) historically have small population sizes, proportional to their geographic area (See Table 4-1). Despite its small size and population the Caribbean region has always served strategic economic functions to global powers that remain intact today (Rose, 2002).

Table 4-1. List of Countries of the Caribbean showing size and population of country

Countries	Population*	Size (Sq. Km)**	Urban Population (%)
Anguilla (UK)	16,373	91	100
Antigua and Barbuda	92,000	440	24
Aruba	104,000	193	42
Bahamas	388,000	13,940	83
Barbados	276,300	430	62.7
Belize	368,310	22,966	45
Bermuda (UK)	64,237	54	100
Bonaire (fr. Netherlands Antilles)	19,000	288	80
British Virgin Islands (UK)	24,000	153.5	42
Cayman Islands (UK)	58,238	262	59
Curacao (fr. Netherlands Antilles)	153,500	444	90
Cuba	11,167,325	109,884	77.1
Dominica	71,293	754	67
Dominican Republic	10,478,756	48,442	79
Grenada	105,539	344	36
Guadeloupe	470,000	1,628	98
Guyana	751,223	214,000	27
Haiti	10,604,000	27,750	56
Jamaica	2,813,000	10,991	54
Martinique	406,000	1,128	89
Montserrat (UK)	6,000	102	15
Puerto Rico (US)	3,548,000	9,104	94
Saba (fr. Netherlands Antilles)	1,824	13	-
Saint Barthelemy	7,367	21	-
St. Eustatius (fr. Netherlands Antilles)	3,900	21	-
St. Kitts & Nevis	56,000	261	32
St. Lucia	185,000	617	19
St. Martin (French)	36,824	53	-
St. Maarten (fr. Netherlands Antilles)	40,917	34	-
St. Vincent	109,000	389	51
Suriname	548,000	163,270	66
Trinidad & Tobago	1,347,000	5,128	11
Turks & Caicos Islands (UK)	41,000	417	95
US Virgin Islands (US)	107,000	346	95
	44,468,926	633,959	
* Figure from most recent Housing and Population Census Report available (or Record from the UN country data), whichever is most recent			
** Extracted from Country Data			

4.3.2 Impact of Sanitation and Caribbean Development

The widely documented history of Caribbean development, includes periods of resource exploitation (Thompson, 2015), slavery (Kiple, 2002), revolutions (Dubois and Garrigus, 2006), indentureship (Higman, 2011), and independence from colonial rule (Lewis, 1968; Lewis and Knight, 2004).

As shown in Figure 4-1 the turbulent periods prior to the Caribbean becoming independent and paving their own developmental destiny has been 9 times longer than the post-independence period. The periods of transition not only shaped the cultural, political and in some cases economic landscape of the region, but also the infrastructural development of many territories, which were subjected to repeated cycles of underdevelopment, neglect and abuses (Page and Sonnenburg, 2003; Potter *et al.*, 2004, p.217; Woodcock, 2009; Mandle, 2010). Further, the subjection of these sparsely inhabited lands to a combination of European, African, Native American and Asian influences abruptly interrupted the historical pattern of development, created new societies, economies and culture of people of diversity race, ethnicity and colour (Lewis, 1968; Rose 2002), which proved disastrous for a number of development features, including sanitation infrastructure (Fay and Morrison, 2007; Theodore-Gandi, and Barclay, 2008). This colourful history (Burns, 1954), coupled with its inherent features of a warm tropical climate, exposed coastal areas, low altitude and fragile environment and infrastructure, which at are forever at the mercies of nature, makes sanitation an important feature of the Caribbean region.

Sanitation in the Caribbean region is rarely discussed on the international scene due to its small size and is often grouped with the Latin American Countries. This often results in a disguise of the real issue of sanitation in the region as focus is primarily placed on the countries with historically poor sanitation reports such as Bolivia and Peru within the Latin America and Caribbean regional grouping. The extreme heterogeneity that is known to exist in the Latin American and Caribbean region (LAC), would make the use of the LAC figures to represent the Caribbean misleading. Nonetheless, sanitation development is still a core infrastructural weakness with the Caribbean due to low investment (ECLAC, 2012).

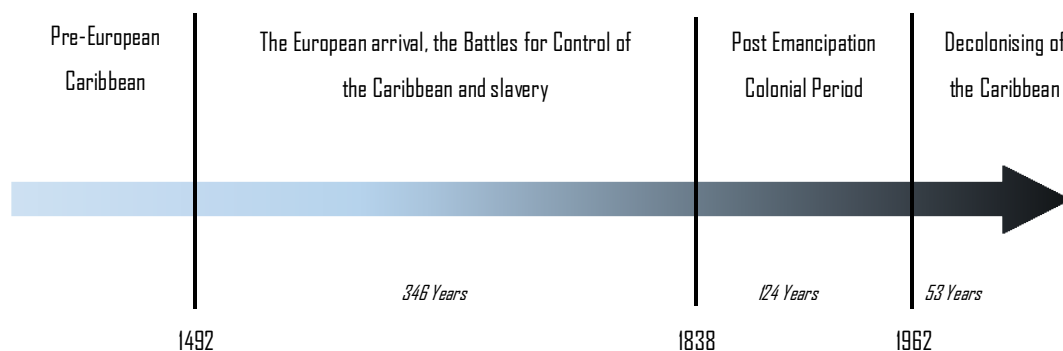


Figure 4-1. Critical Phases in the developmental history in the Caribbean

4.4 Sanitation Progress of the Caribbean

Much of the discourse on sanitation improvement in the Caribbean focuses on improvements that occurred post-1990 when monitoring of the progress of water and sanitation began under the UN Millennium Development Goals (MDGs) (See Garrido and Shechter, 2014). However, as this chapter illustrates, sanitation consciousness and subsequent improvements in the Caribbean territories commenced as early as the start of the 20th century. This led to state of sanitation an increasing number of the population started to construct and use toilet facilities. With increased understanding of the importance of sanitation through raised public health awareness and education programs, proved to be the ignition point for sanitation improvement in the Caribbean region as well (Harrison, 2011). Through successive programmes and interventions spanning a century, the number of persons using toilet facilities are almost universal, except for a few isolated cases in rural communities (WHO/UNICEF, 2015). However, the dynamic historical developments within the region has influences the advancements of existing sanitation infrastructure. While there have been considerable economic and social progress, which resulted in widespread infrastructural development across the region, a large percentage of the sanitation infrastructure still bear resemblance to their pre-independence state, showing little progress to match the development status attributed to the region. As such, over the last 30 years, systematic organized efforts by governments and donor agencies had led to broader coverage of water and sanitation services (PAHO, 2011).

Despite considerable progress, the Caribbean still lack sustainable measures to ensure drinking water and sanitation for all. The Caribbean Region is yet to achieve

universal coverage of an 'adequate' level of sanitation. Some countries forming part of the WHO/Unicef Joint Monitoring Programme (JMP) for the Millennium Development Goals (MDGs) have recorded high percentage coverage of basic sanitation, which correspond to having access to an 'improved' sanitation facility (some 100% as Bahamas, Trinidad and Barbados), other countries continue to struggle to meet current targets set under the MDGs of halving the 1990 figures without access by 2015.

Global monitoring of water and sanitation has grouped the Caribbean with their Latin American counterparts, providing a collective view of progress in the region. The total population of the Caribbean Region is 15% (Figure in Million) that of the LAC group, often shadowing the performance of the Caribbean Region. Adequate sanitation is critical to the social and economic development and sustainability of the Caribbean Region, but has not attracted the seriousness it needs, perhaps, due to the age-old intricacies that this study has revealed. Most governments within the Caribbean do not enforced or prioritise sanitation as the region often evades global scrutiny.

The current sanitation coverage figure shows the region has been performing considerably better than the problematic sub-Saharan Africa and East Asian countries, where much of the unserved populations are concentrated, but not as well as the better performing countries of Europe and North America. Most of the international focus is generally on the poorer performing regions and countries, often side-lining the average performing Caribbean, bar Haiti, where all countries record over 65% coverage of an 'improved' sanitation facility (see figure1). While the reported high levels of sanitation are celebrated by governments at the macro level, the benefits that should accompany this level of reported coverage is not seen at the micro level. The 2015 figures showed that over 3 Million persons in the Caribbean currently do not have access to an improved sanitation facility. 10% of sewage structure covers the region while a large percentage of the population is served by on-site facilities, which are a combination of septic tank and variations of the pit latrine. Additionally, 10% of the 10% collected wastewater is treated, resulting in large volumes of faecal contaminated wastewater being disposed directly into the coastal waters.

The economy of many of the Caribbean territories is dependent on having excellent health ratings and preservation of the environment as tourism, fishery and recreational sports are heavy contributors to their Gross National Product (GNP).

This knowledge have resulted in attention to be given to specific sectors including improving wastewater and solid waste management, however the overall sanitation improvement rates/figure appears to be stagnant, particularly the number of persons having access to an adequate level of sanitation.

Practitioners have noted that this is as a result as the absence of clear national policies with regards to sanitation, with it being noted that no country in the Caribbean currently having a national sanitation policy. Sanitation provisions in most countries are administered and governed by outdated legislations, most enacted pre-independence and are obsolete, disjointed and unclear (WSP, 2007, p. 98) structure to ensure sanitation provisions in the countries are to acceptable standards. The geophysical nature of the Caribbean region demand that adequate and sustainable sanitation facilities and services be provided as (1) the region is continuously under threat from natural disaster such as floods and hurricanes and (2) the geological formations exposes sensitive and essential ground and surface water resources to contamination from land based sources of pollution. The health of the population are also at risk, as interaction with pathogen-laden wastewater are quite common in some countries, particularly as a result flooding in Guyana. Sanitation improvement in the Caribbean must commence at the household level, ensuring that adequate sanitation facilities are promoted and utilised used based local operational and technological demands.

4.5 Events Influencing Sanitation Development in the Caribbean

Sanitary conditions within Caribbean countries at the start of the 20th century was abysmal like much of the countries of the world at that time (figure 4-2). Existing literature is deficient on the status of sanitation in the Caribbean and a similar trend has been recognised for its historical development in what was referred to as the British West Indies (Pemberton, 2003).

However, historical accounts of the sanitation improvement in the West Indies is subsumed in the discourses on the fight for social and economic development in the region. The limited impetus shown by current Caribbean governments to assess the state of sanitation within their countries to heighten the understanding of the sanitation situation and to have data to inform decisions is not new. This practice is synonymous of the colonial and imperial governments of the West Indies throughout the post emancipation periods of the 19th and early 20th century where issues

pertaining to unpleasant social conditions were ignored to the point of outburst, before some action was taken, even though they worried about the high rate of mortality and morbidity in the Region (De Barros, 2003; Pemberton 2003).

Living conditions as well as household sanitation were despicable during both the pre and post emancipation eras, particularly in the slave's dwellings where sanitation was non-existent (Brereton, 1985). Admittedly, during this period, poor sanitation was a problem in many countries, including England, the colonial masters (Metropolitan Working Classes' Association for Improving the Public Health, 1847; Wohl, 1983). In recognition of the impact of poor sanitation on health and the environment, particularly the impact of cholera, sanitary improvements in Britain was rapid (Wohl, 1983; Szreter, 1988). This improvement was not transferred to the British colonies, as improvements in the sanitary conditions trailed that of Britain, remaining abysmal. The abolition of slavery revived new hope of social improvements, as once enslaved persons were able to own properties and earn to contribute to the improvement of their social and economic condition. This did not happen as conditions, particularly those on the plantation remained poor and the introduction of indentured labourers from India added another dimension to the already poor social conditions within the region. The indentured servants brought their inherent poor sanitation culture and practices, and added to the poor pre-existing living conditions, escalated the festering sanitation problems. Limited toilet facilities in the household and the plantations led to indiscriminate open defecation, and with the increasing poor living conditions and environment degradation this gave rise to and allowed easy transmission of diseases. Diseases such as malaria, cholera, dysentery, typhoid, hookworm among many others were prevalent and were all linked to the poor sanitation conditions that prevailed in the countries. Although these unsanitary conditions persisted for several years, little attention was given to improving access to sanitation amongst the masses in the region.

Sanitation coverage in the region eventually improved gradually over the years, where today, the JMP reports that an average of 85% of the population have access to an improved sanitation facility (figure 4-2). This improvement is as a result of a number of interventions in the West Indies (Caribbean), many of which transform the landscape of sanitation in the region and introduce sanitation institutions that still exist today. A chronological review of these critical events and their influence on sanitation improvement in the Caribbean is further discussed.

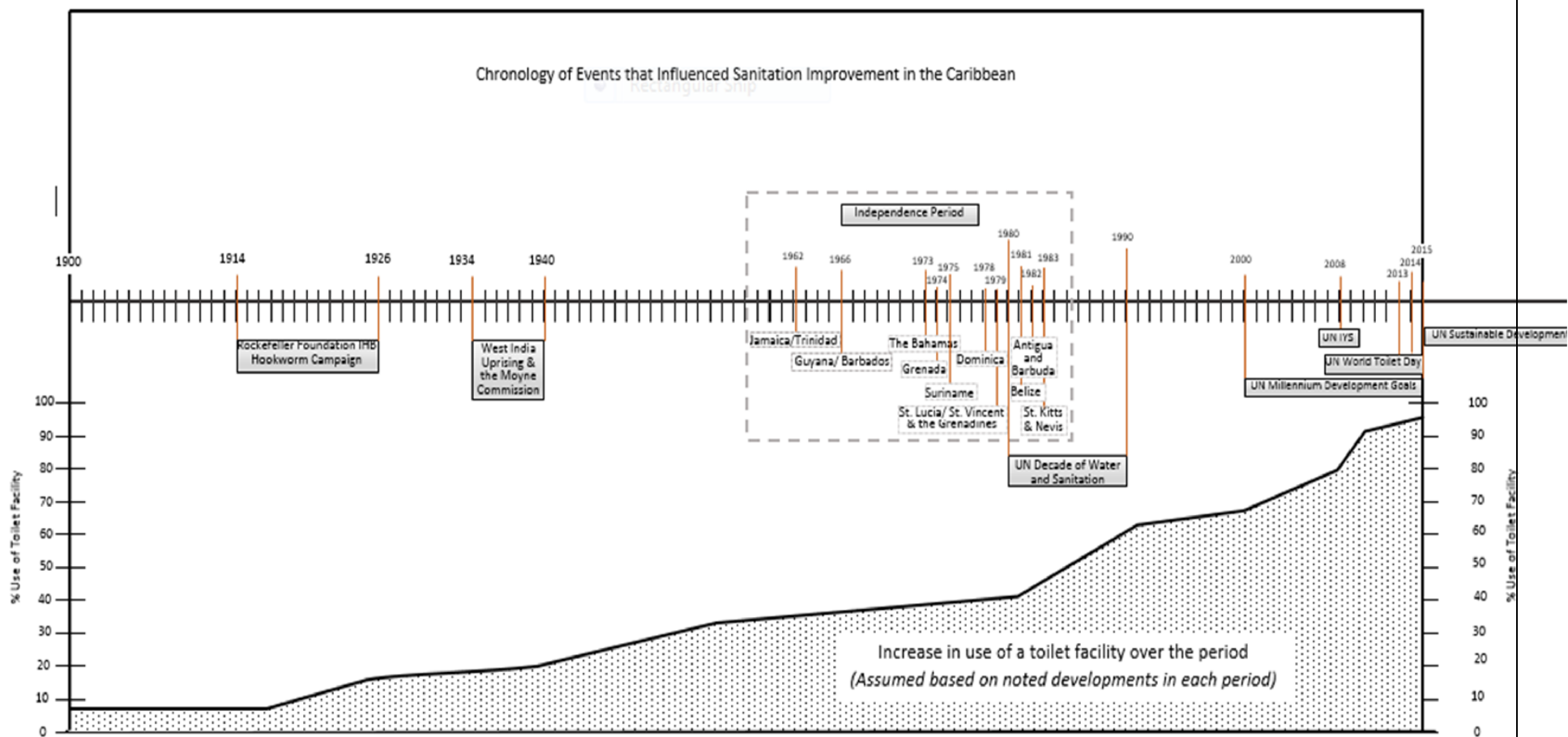


Figure 4-2. Plot of Chronological Events that Influence Sanitation Development in the Caribbean from 1900 - 2015

4.5.1 Rockefeller Foundation–International Health Commission (IHC)

The work of the Rockefeller Foundation in the West Indies between 1914 and 1925 targeted the eradication of the hookworm disease that had been plaguing the population of many countries across the equatorial belt (Farley, 2004; Hoefte, 2014), identified as the ‘Hookworm Belt’ (Pemberton, 2003), which included the colonial population of the West Indies. The Foundation’s approach in controlling the spread of the disease and eradication from communities had proven successful in the south of the United States of America in the early 1900 (Farley, 2004; Dahlquist, 2012), but impressed by the results, set out to promote it on a global scale (Hoefte, 2012). The colonies of the West Indies was their first target. High incidences of the hookworm disease were prevalent in most of the West Indian colonies due to the deplorable sanitary condition within the settlements and on the plantation, with many of the settlements and plantations not having a latrine (RF, 1915). This was compounded by the absence of adequate sanitary facilities, which result in the practice of open defecation. Tikasingh *et al.*, (2011) noted that few household had pit latrines at the time, while some countries had not at all.

The common means of disposal of human faeces was via pail (bucket), content that was dumped into bushes in the proximity of homes (ibid). With the hookworm disease thriving in conditions where human faeces contaminate soil and spreads when persons walk directly barefooted on contaminated soil (a common occurrence in many of the colonies), the hookworm disease was found in a high percentage of the population across the colonies (Pemberton, 2003). The hookworm eradication programme in the West Indies commenced in then British Guiana⁴ in 1915 with the formulation of the International Health Commission the previous year. The IHC had a two-sprung goal for the hookworm campaign; the first being to eradicate and educate about the hookworm disease and the second targeting the improvement in public health systems in the respective countries (Pemberton, 2003; Farley, 2004; Dahlquist, 2012; Hoefte, 2014). To achieve these objectives, the improvement in the sanitary condition by the installation and use of privies, stimulate a change in behavioural practices through education and setting up permanent public health institutions where the tested and proved strategy.

⁴ today it is known Guyana

The Sanitary Division of the IHC commenced a didactic style campaign within the countries of the British West Indies, which also included the then Dutch colony of Suriname, in which an intensive education program on the cause and prevention of the hookworm disease was complemented by a 'purging' of infected persons (Tourtellot, 1964; Tikasingh *et al.*, 2011; Dahlquist, 2012). As the main transmission route of the hookworm disease was walking bare-footed in faeces contaminated soil (RF, 1913; RF, 1926; Pit *et al.*, 1999; Gaze *et al.*, 2015), elements of the campaign promoted the construction and increase use of latrines (Tikasingh *et al.*, 2011). Conditions of the campaign also required governments to maintain conditions and where possible extend the sanitary campaign (Pemberton 2003), which saw the establishment of many public health workers, trained during the work of the IHC as capacity building to maintain and extend the advances after the expiry of the commission's program in the respective countries. The operations of the International Health Commission in the West Indies officially came to an end in 1926 following their work in Jamaica. Many authors have credited the IHC hookworm program as having the greatest influence in catalysing the improvement in sanitation throughout the Caribbean and created a legacy and institutions that are still visible one century on.

4.5.1.1 The IHC and the Hookworm Campaign on Sanitation Improvement in the Caribbean

Before the hookworm eradication intervention by the IHC, there is little evidence of any prior public health and sanitation discourse in the Region (Hoefte, 2014). This was despite an established link between the poor sanitary conditions on the plantations and settlements and the proliferation of diseases amongst the labouring population that affected productivity. There was little public concern and actions to improve the welfare of the labouring population by neither the imperial or colonial government (Pemberton, 2003; Pemberton, 2012), as plantation owners in the colonies treated workers welfare and social development as their private matter. Even though receptive to the hookworm campaign activities by the IHC, the colonial governments of many countries were reluctant to fund sanitary improvements recommendations, not even through coercion by the IHC personnel (Pemberton, 2003; Hoefte, 2014).

Nonetheless, through persistent efforts by the IHC public health and sanitation improvements were introduced to public discourse. The two-stage approach of the IHC hookworm campaign of education and treatment and system introduction/strengthening to reduce hookworm disease re-infections led to (1) an improve awareness amongst the population and governments on the importance to both the individual and the plantation economy, of maintaining a sanitary environment, (2) changes in the way human faeces were disposed, with some countries introducing laws relating to the proper disposal of faeces and latrine construction (3) improved frequency of construction and greater use of latrines, through the design of cheap latrines (4) the establishment or resuscitation of public health units with trained health inspectors with a targeted sanitation mandate within their health administration, and (5) a collective effort between citizens and government in improving the public health situation in countries, through financing and programs (Pemberton, 2003; Tikasingh *et al.*, 2011). Couacaud (2014) has also drawn parallels between the work of the IHC and societal improvements that have come to be associated with urban development such as the regularly wearing of shoes, living in dwellings that has wooden or concrete floors and using toilets connected to a waste disposal system to discard human faeces. These were never before achieved in many of the countries of the Caribbean. Some of the more notable impact of the IHC on the individual countries is summarised in Table 4-2.

Improving sanitation through increasing coverage and use of toilets (latrine) to prevent soil pollution was an integral to eradicating the Hookworm disease. This soon became a pre-condition for local government before the IHC agree to host an intervention in their area. The IHC through it useless to treat persons without first improving the sanitary condition of the settlements through the construction of latrines. Willing authorities in many countries assisting households in the construction of latrines and conducted sanitization exercises (Pemberton 2003), although many demanded that this be funded through the IHC campaign (RF, 1915). The overall successes of the Rockefeller Foundation Hookworm Eradication Campaign triggered the social development of the people of the Caribbean in the early decades of the 20th century by reducing the disease burden through the improvement in sanitation (Pemberton, 2003, p.87; Couacaud, 2014).

Table 4-2 Summary of notable impact of the IHC Hookworm Campaign on individual Countries of the Caribbean

Country	Hookworm Campaign Period	Notable Impact on sanitation Improvement
Antigua	1915-1919	<ul style="list-style-type: none"> Increased construction of Latrine Employment of special sanitary inspector to advance the measures needed for sanitary reform. Commencement of a Latrine Inspection Program
Bahamas	No Survey	<ul style="list-style-type: none"> No Survey carried out by IHC Sanitary Condition
Barbados	-	<ul style="list-style-type: none"> Increased Public Health Education
British Honduras (Belize)	1916	<ul style="list-style-type: none"> Low Incidence of Hookworm IHC conducted a Malaria Campaign
Cayman Islands	1917 (survey only)	<ul style="list-style-type: none"> Low Infection Rate Recorded as a result of: <i>Enforcement of satisfactory regulations governing the disposal of human excrement</i> <i>Teaching hygiene and sanitation in Government Schools</i> Commissioning of sanitary department under central administration. Government Supply of Latrines to Residents.
Dominica	1918-2024	<ul style="list-style-type: none"> Rapid Growth of Public Health Department
Guyana	1914-1923	<ul style="list-style-type: none"> Movement for Improved sanitation - Request made for improved sanitary convenience on plantations and villages Erection and repairs to latrine in communities Public health reform – Establishment of sanitary department
Jamaica	1919-1926	<ul style="list-style-type: none"> Construction and maintenance of latrines in satisfactory condition; Employed full-time medical officers of health for the first time Tackle Sanitation related issues on own initiative
Montserrat	1918	<ul style="list-style-type: none"> Survey Showed low Incidence
Grenada	1914-1917	<ul style="list-style-type: none"> Improved coverage and use of sanitation facility Increased Awareness on the Health Impact of Sanitary Practices
Porto Rico	-	<ul style="list-style-type: none"> island-wide rural sanitation Program Commission of latrine construction units 12,565 new latrines constructed Strengthen and popularise publicity and educational sanitation programs
St. Kitts & Nevis	1924	<ul style="list-style-type: none"> Low Incidence of Hookworm
St. Lucia	1915-1924	<ul style="list-style-type: none"> Re-organise medical services with establishment of sanitation Revision of Sanitary regulations Training of Sanitary Inspectors Improved coverage and use of sanitation facility Introduction of a system of Soil Pollution throughout Island
St. Vincent	1915-1917	<ul style="list-style-type: none"> Faecal Sanitation Received increased attention Regulations Enacted making Police Officers Sanitary Inspectors Increase Aid to population from government to improve sanitation
Suriname (Dutch Guiana)	1915 - 1923	<ul style="list-style-type: none"> Make the importance of sanitation political; Gain appreciation for the advantages of sanitation (Personal cleanliness); Increased construction of latrines; Please public health and sanitation on the political map; Set up local Sanitation Department which continue work after RF. Ankylostome Regulation – Made construction of an approved type of latrine compulsory at all habitable houses
Trinidad	1914-1924	<ul style="list-style-type: none"> New law enacted for soil pollution control; A standardized pit latrine officially approved as the minimum

Country	Hookworm Campaign Period	Notable Impact on sanitation Improvement
&Tobago		<ul style="list-style-type: none"> requirement; Sanitary latrine campaign to improve coverage of approved latrine (Campaign became permanent), Before campaign sanitary Latrines were unknown

Extracted from Pemberton, 2003; Tikasingh et al., 2011; RF, 1915; RF, 2016; RF, 2017; RF, 1924.

However, expected legacy of sanitation and social improvement by the IHB in the colonies of the West Indies through the IHB did not match the successes of the independent Latin American states due to the constricting systems of colonial rule in the region (Wang, 2015).

A subliminal feature of the Rockefeller Foundation's International Health Board (IHB) was to work towards eliminating the global differences in sanitary and social conditions and standards (Dahlquist, 2012). Their design and approach taken for the hookworm eradication intervention significantly improved, not only the existing sanitary condition, but also set standards and shaped the sanitary landscape in most of the countries that embraced the intervention. New design for pit latrines, new regulations for the disposal of human faeces and other offensive matter and a sanitary inspection regime for households were all landmark features that where not part of the post-emancipation West Indies. Countries, such as Guyana, built on the new public health awareness and installed, what has since been their only public sewer network in a section of its only city, Georgetown in 1929. Other countries like St. Lucia introduced their first sanitary regulations under the IHB and still influence the management of sanitation on the island. The organisation of public health administration in many of the countries of the Caribbean today still portray transformation brought on by the Rockefeller Foundation's International Health Board Hookworm Campaign in the region.

4.5.2 The West India Uprising and the Moyne's Commission 1930-1945

The demand for improved economic and social conditions in the post-slavery Caribbean generated isolated acts of dissidence since emancipation in 1838, as oppressive conditions persisted (Moyne, 1940; Crawford, 2015), but never in the magnitude experienced in the early 1930s in the British West Indies (Daniel, 1957, p. 162; La Guerre, 2008). What became known as the West India Uprising, the period is now viewed as a landmark period for the West Indies, with many scholars claiming

the events of the period paved the way for eventual self-determination and independence from British colonial rule (French, 1995; Collier, 2005; La Guerre, 2008). The world economic crisis caused by the early 1930s depression and the reducing sugar prices resulted in widespread economic hardship in the region (Payne, 1993; De Barros and Dumont, 2013). This, coupled with the reluctance of the colonial and imperial governments to invest in social improvement schemes and to give due consideration to the welfare of the population, proved to be the catalyst for the riots that erupted in multiple countries across the Caribbean between 1934 -1938 (Hart, 2002; Doumerc, 2003). The riots and strikes started in St. Kitts in 1935, and over the next four years, moved to Jamaica, Barbados, Trinidad and Guyana (Payne, 1993; Doumerc, 2003).

The riots were of such magnitude that instead of the usual military response to subdue the situation, the imperial government opted to launch an investigation to determine the cause of the protests and riots and to make recommendations for improvements (Moyne, 1940; Alexander, 1997; Munro, 2007). This resulted in the 1938 Royal Commission to the British West Indies, with Lord Moyne being its chairman with responsibility for investigating the causes of the riots and to make recommendations (Alexander, 1997; La Guerre, 2008; Green, 2014). The commission was charged with investigating the economic conditions as well as housing conditions, agriculture, schools, hospitals, prisons, lunatic and leper asylums, factories, and land ownership and make recommendation that would guide British Colonial Policy (French, 1995, p. 121). Following the visits to Barbados, British Guiana (Guyana), British Honduras (Belize), Jamaica, the Leeward Islands, Trinidad and Tobago and the Windward Islands, the commission was completed in 1939 lasting 5 months, after collecting formal evidence through oral and written presentation and a first-hand assessment of the prevailing conditions.

The Commission highlighted a series of unsavoury conditions within the colonies (Hewitt, 2002; Adyanga, 2011; De Barros and Dumont, 2014). According the commission's report, existing conditions were "*devoid of the multifarious institutions, official and unofficial, which characterise British life*" (The Moyne Commission, 1945). The commission recommended that immediate actions be directed at improving both the economic prospect and social welfare of the working population, through structural changes (ECLAC, 1981; Maharaj, 2010). Although much discourse on the commission's recommendations generally focuses on the changes that would have

led to eventual political and economic independence, not a great deal of attention is paid to the recommendations that targeted measures to improve the social welfare of the inhabitants such as housing and sanitation. The commission surmised that the root cause of the 1930s disturbances was a demand for better living conditions (Moyne 1940; Munro, 2007). This led to one of the main recommendations being for the creation of a West Indian Welfare fund, a sum of 1,000,000 pounds to be provided by the imperial office over a 20 year period (Munro, 2003; Huggins, 2004). The fund would finance infrastructure development schemes targeting education improvement, general health services and housing, slum improvement and the provision of social welfare facilities (Moyne, 1945). Action was taken immediate to the completion of the commission, although the full details of the Moyne Commission Report was not made public until after the Second World War in 1945.

Discussions on the extent of social improvements in the region in the decades succeeding the commission, particularly relating to sanitary improvements, is quite limited. However, during this period, and more than any other time in the history of Caribbean under colonial, was attention given as well as resources allocated by the imperial government to improve the social condition and welfare of the working population (Moyne, 1940; McCaw-Binns, 1998; Hewitt 2002).

4.5.2.1 Impact of the Riots and the Moyne's Commission on Sanitation in the Caribbean

Although the work of the IHB increased awareness of the importance of sanitation and the benefits of having adequate toilet facilities, the Moyne Commission found that on many plantations and settlements there were still no toilet facilities and the lack of awareness of the impact of poor sanitary practices in some districts (Moyne, 1945; Sharp, 2014). This was attributed to the refusal of plantation owners and the colonial government in some countries to invest in sanitary improvement or the provision of health care for the labouring population (Pemberton, 2012), as beforehand highlighted by the IHB hookworm campaign in the region. This was compounded by the absence of critical infrastructure such as drainage channels, which contributed to the abysmal conditions in many settlements, which were prone to flooding and vector-borne diseases such as malaria and yellow fever.

The uprisings of the 1930s demonstrated that the Caribbean were serious about their economic and social development (La Guerre, 2008). The exposure of the horrific

conditions under which the labouring population of the British Caribbean lived and worked, brought to bear by the Moyne's Commission, generated not only attention from the imperial government, but the financial resources needed to improve the standard of living of the population. There was significant investment in health care that saw the implementation of a series of health unit system, which took root in the Caribbean circa 1942 (Theodore, 2011). The health care units in those early stages focus its work on improving maternal and infant welfare, sanitation improvement and health education among the population, particularly in rural communities (Sinha, 1988). This brought about what was classed as a new era of health care in the region. Birthed out of the commissions' findings also was the launching of a number of programmes targeting the improvement in social welfare (Girvan, 1997). This was made possible through the Colonial Development and Welfare Acts of 1940 and 1945 (Munro, 2003; Harrison, 2011).

The link between household income and sanitary condition was reinforced through many of the findings of the commission. The commission identified that better housing and sanitation need to be principal elements of preventive health care programmes in the region (Moyne, 1940; ECLAC, 2001). This caused many colonial governments and the imperial government to recant their stand-off approach to health and social development in the colonies, as according to O'Neal (2001), the work of social welfare development in the colonies was left to *"any who were willing to undertake it"*. For the first time, through the uncandid approach by the commission, resources were allocated that sought to address the poor health and living conditions. In Barbados for instance, several programmes were initiated, including the WHO assisted Environmental Sanitation Project, where improved pit latrines were constructed for persons who could not afford to install proper sewage disposal systems in the 1950s (ECLAC, 2001). In 1957, for the first time, a public health bill was also enacted and provided for in Barbados (Chamberlain, 2010). French (1995) noted that the reforms implemented as part of the Moyne's commission recommendations improved the conditions of women, while in British Guiana (now Guyana), the promotion of health care programmes led changes in the administration of public health. One commenter in Jamaica noted that *"the Royal Commission of Enquiry into the Riots of 1938 was the last time Jamaica had a commission that redounded to any foundational improvements to our institutions, social conditions and/or significant benefits/shifts in the lives of the masses"* (Higgins, G, 2015). Other

authors such as Brereton (1989, p. 87) highlights that the period after 1940 saw an increase in the population of the Caribbean due to a reduction in the death rate and birth rates remaining high. The groundwork for social improvement, which hinged on improving sanitation, was also laid in the period following the Moyne's Commission.

4.5.3 Independence from Colonial Rule

Another major period that had an impact on the improvement of sanitation in the region was the achievement of independence from colonial rule for many of the territories. The 1960s was viewed as the independence and internal self-governance period, as the major colonies, Trinidad and Tobago, Jamaica, Barbados and Guyana secured their independence and began paving their own destiny (Theodore, 2011). Prior to this period, only Haiti in the Caribbean gained independence from French rule as early as 1804. However, much of the Caribbean territories under British colonial rule secured their independence between 1962-1983 (See dates in figure 2). Presentations to the Moyne's Commission in 1938/39 had high anti-colonial sentiments (O'Meally, 1938; De Barros and Dumont, 2013) as there were numerous demands for constitutional changes, which will lead to universal adult suffrage and complete self-governance (Page and Sonnenburg, 2003). This was appeased by many of the structural changes recommended by the Moyne Commission, which facilitated progress towards independence (Bryan, 2004). Gaining what was considered political and economic independence meant that countries can better manage their interest, while breaking the cycle of subordination, discrimination and underdevelopment that was status quo in the region (La Guerre, 1982, p.61).

In achieving self-governance and independence, many laws were passed that targeted improving the economic wellbeing of the population of the territories, particularly with the poor gaining access to health care (Byron, nd). Achieving complete independence or internal self-governance meant new governments got the opportunity to move away from old colonial systems, which stifled their development. For instance, England had the oldest and most developed public health systems in the world during this period (RF, 1926), yet neglected to implement the same level of developing within its colonies. The other European colonisers took a similar approach. Nonetheless, as Potter and Barker (2004) noted that in the 20 to 30 years following independence many countries register significant improvement in public health

through revised health care system and a focus on improving environmental sanitation.

4.5.3.1 Impact of political independence on sanitation development in the Caribbean

Potter *et al.*, (2004) noted that there were considerable progress between 1960 and 1980 in relieving the population of many of the diseases and their consequences that plagued the Caribbean region. Theodore (2011) attributed this to the eagerness of the region to throw off the colonial shackles and commission meaningful systems and programmes that will meet the needs of all the entire population. However, there were suggestions that the social development that occurred in the region between the 1960 to 1980 period, which was centred predominantly on public health improvements, was the lagging benefits of the structural changes (Adyanga, 2011) and changes to British Colonial policies (Sokoloff and Engerman, 2000) that took place after 1940, following the Moyne's commission and the initiation of the Colonial Development and Welfare fund (Honychurch, 1995). Some also attributed this improvement to the increased participation of the people in their own governance (Lewis, 1968; Chamberlain, 2010, p. 69), while others (ECLAC, 2001; Jules and Fryer, 2016) drew parallels to the recommendations of the Sir Frank Stockdale Report of 1940-1942 for Health Care improvements in the region. The report proposed the establishment of health unit systems as a means of promoting good health for the entire population, while continuing to adequately care for the sick (Theodore 2011). This resulted in health units being set up in a number of rural communities as a means of expanding the health services and promoting the preventative approach, which focused on improving living conditions and education (Jules and Fryer, 2016). Whatever was the catalyst or inspiration, the sanitation status of many of the Caribbean territories recorded improvements following their independence.

Many of the countries took aggressive approaches to their economic and social welfare development, particularly relating to improving population health, which was dependent on sanitation improvement. Through the Health Units, governments focused primarily on maternal and child welfare, sanitation improvement and health education (Sinha, 1988). For instance, in 1962, following their independence, Jamaica embarked on programmes for improving water supplies, immunization

against communicable diseases and nutrition (ibid). Other governments took a more integrated approach to public health, which looked to meeting health needs of the community, while embarking on strategic actions in reducing critical health indicators such as malnutrition, gastroenteritis and infections (Jules and Fryer, 2016), the latter two were prevalent and highly dependent on existing sanitary conditions (See Henry, 1981; Reid, 1981). These interventions resulted in increase in life expectancy, reduced mortality rates and (Hornchurch, 1995; Hagley, 2005). The Government of Barbados, for instance noted that the post independent era was one that they witness significant improvements in the health status of its people (Government of Barbados, 2003, p. 1). They highlighted that the average life expectancy at birth for a Barbadian increased to 76.8 in the 2000 from the 68.9 figure it was in the 1960s. This was as a result in both the “*qualitative and quantitative*” improvements in the primary health care and environmental sanitation (Potter et al., 2004). Reid (1981) as well as Mitra and Rodriguez-Fernandez (2010) noted that by the 1960s countries within the Latin America and Caribbean Region had an increased awareness of the need for improved water and sanitation services, which coupled with acquiring the much desired status of independence from colonial rule, Theodore (2011) noted that this brought about the burning desire to improve the standard of healthcare and other services that were abandoned or distributed through prejudicially by colonial governments.

However, the social improvements envisaged were, as in times past, curtailed due to the lack of funding brought on by the depressed economic climate during that period (Conway, 1997). While political independence was attained by countries, economic independence was not as smooth as many of the economies continued to rely on external sources for loans and investment capital for critical infrastructure (Beckles and Shepherd, 2006; Conway, 1997). This was the case for implementing water and sanitation development programs. This resulted in no more than the usual trend of sanitation improvements in many of the territories in the region from the 1960s through to the 1980s, with the expected better performing countries such as Barbados recording significant health improvements achieving independence in 1966 (ECLAC, 2001). The trend, however, was not sufficient to bring the sanitation coverage level to a point that would (1) guarantee the protection of public health, (2) foster personal and national sustainable economic development, and (3) protection of the physical environment, all milestone aspirations of the of the impending 21st

century. Sadly, external dependency and fragmented approach remained significant forces that influence system development in the Caribbean (IUCN, 2007).

4.5.4 International Proclamations and Interventions

While the world was united in efforts to work together in the interest of the global population as early as 1945 when the United Nations officially came into existence, International Development Corporation that specifically incorporated sanitation or sanitation related improvements was birthed out of the first United Nations Conference on the Environment in 1972. Prior to this time, the only international effort in combating a problem relating to sanitation was the Hookworm campaign carried out by the Rockefeller Foundation in the early 1900s as discussed in section 5.1. In defining common principles “to guide and inspire” to preserve and enhance the human environment, the 1972 Environmental Conference recognised that poor human excreta management severely undermine efforts to protect the environment in the interest of human health and economic development (UN, 1972). As such, attention was given to the millions of persons globally, particularly in developing countries that continued to live below the minimum levels that was considered decent for human existence (ibid). The conference declaration charged governments to focus on the protection and improvement of the human environment (ibid), for which the improvement of sanitation was identified as one of the basic requirement for decent standard of living and protecting and improving the human environment, as long before established.

Sentiments expressed during this conference (as well as the slow progress of sanitation improvement in many countries, particularly those of low economy) can be said to have paved the way for successive proclamations and declarations to include the need for global sanitation improvements. This led to both the 1976 United Nations Conference on Human Settlements and the subsequent United Nations Water Conference in 1977 speaking of the need to improve access to water and sanitation and recommendations were made to designate the 1981 – 1990 period the International Drinking water and sanitation decade (UN, 1976; UN, 1977; Arreguin and Maravilla, 2012). This was intended to stimulate UN member states to commit to bring about significant improvement in the standard and level of service for water and sanitation by the year 1990 (UN, 1980). The proclamations advocated for the development of policies and the setting of targets that will contribute in the

achievement of targets of the decade. With the progress in sanitation improvement falling behind previous targets, commitments to bring about the needed improvement to sanitation was further enshrined in the UN Millennium Declaration and set as part of the Millennium Development Goals (MDGs), which was launched in 2001 following the United Nations Millennium Summit 2000 (House of Commons, 2013). The MDGs, cited as one of the most compressive and ambitious global effort to reduce extreme poverty globally (Romaine, 2009), targeted the reduction in the number of persons using unsatisfactory sanitation facilities in 1990 by half by the year 2015.

Almost all countries in the Caribbean subscribed to the efforts of the United Nations and its agenda to reduce poverty by protecting the environment and improving nation's economies. The concatenation of proclamation and declaration was the engine that propelled efforts to improve sanitation in the post-independence decades and today, continues as the main catalyst and facilitator for improving sanitation in the region.

4.5.4.1 Impact of international proclamations and interventions on sanitation development in the Caribbean

The international proclamation and declaration came with more than just words. Resources were mobilised to provide the necessary support for weaker nations to meet the targets outlined in the respective proclamations and declaration.. Over the years, countries in the Caribbean region had received developmental support to either or a combination of technical and financial to complement their national programs. This provided the needed resources to overcome the usual constraint of lack of finances for development purposed. This is evident by the magnitude of improvement in sanitation coverage that has occurred over the last 30 - 40 years. The region has made its greatest leap in increasing sanitation within this period, which can be linked to the commitment made under the international development agendas as well as having access to external support and resources in addressing the problems.

The rise of development banks and International Non-governmental Organisations that supported the global development agendas also worked with national governments to contribute positively to sanitation improvements in the region (Latinosan, 2008). Development funding was made available either via grants, loans, or foreign aid to assist national government in progressing their developmental plans.

as records shows that they were instrumental in supporting governmental developmental programs as well as their internal programs that target water and sanitation development in the region. This period also saw a shift in the planning approaches adopted for sanitation improvement, which was considered necessary to overcome the traditional barriers to sanitation development and to accelerate service coverage and define new standards to meet set targets (Kennedy-Walker *et al.*, 2014). The momentum set by the international development agendas catalysed a new desire within countries of the region to improve the state of sanitation coverage, with saw many countries developing their own programs as well as soliciting external support to meet the international development targets.

Sanitation development remains at the forefront of development in the region as the international development agendas continue to promote and encourage countries to establish a coverage of sanitation that is adequate for protecting their public and supports their economic development.

Apart from the physical implication, the publicity, education, awareness and promotions of the international development agendas often generated increase in demand for the services. (Winchester, 2005) noted that during the 1990s, the demand for improved water and sanitation services increased faster than the capacity of much of the existing systems.

Although the progress sanitation has encountered insurmountable challenges in the almost 40 years of international development efforts to universalise access to this critical service, efforts are still afoot. In the new United Nations Sustainable Development Goals that is due to supersede the MDGs, the General Assembly has finally agreed to set a stand-alone goal for water and sanitation (Goal No. 6), “Ensure the availability and sustainable management of water and sanitation for all.” This reflects that water and sanitation has become a key priority for member states (UNDESA, 2015).

4.6. Conclusion

This review showed that the current state of sanitation in the Caribbean did not occur by chance. Significant efforts, spanning a century, were made by a conglomerate of actors to achieve a level of sanitation coverage that resulted in the shifting of priorities by many governments. Each of the influential periods highlighted brought

about some level of increase in the number of persons having access to a toilet facility. This was achieved through a combination of improvements in sanitation education and awareness, implementation of new public health regulations and in some cases the physical installation of a toilet facility. The 'above-average' sanitation coverage levels reported by the JMP for the Caribbean region is a testament, and a result of the influences of the historical events discussed in this paper. However, the sanitation revolution that occurred in the Caribbean over the last century commenced with the installation of pit latrines, being one of the cheapest forms of sanitation facility at the time. The new designs promoted ensured the safe separation of human excreta from further human contact. In subsequent years, in many countries, a large percentage of the population have progressed to the use of septic tanks, cesspools and deep wells, which are the most popular forms of excreta management facility used in the Caribbean. While this coverage level of sanitation in the Caribbean is not considered as giving particular concern, the sanitary revolution that took place in the region is far from complete. The subject of adequacy of the existing types of sanitation facilities used in the Caribbean, given the precarious nature of the vulnerable states, have seldom come up in sanitation discourse. To meet the calls by the global agendas for the achievement of universal access to an adequate level of sanitation, the historical progress made in the region must be advanced to the point where the level of sanitation can guarantee the protection of public, preservation of the environment and now, be compatible with the inherent conditions and development ambitions of the regions. The time has come for the Caribbean Countries to deviation from the numeration of sanitation facilities, and aspire to achieve an 'adequate' level of sanitation, which is, as was in the past, still considered critical for the guaranteeing the quality existence of the Caribbean both socially and economically, especially in the face of new threats such as urbanisation and climate change.

Many of the existing systems that govern the sanitation status and provisions in the Caribbean were shaped by the influences discussed in this paper. The work of the Rockefeller Foundation through the hookworm campaign promoted the increased use of pit latrines and the concept of an integrated public health department, which still constitute the primary institution for sanitation development, provision and management in many Caribbean Countries. The period of the 1930 introduced the concept of external funding for developmental programs, particularly relating to key

services like water and sanitation improvement. The advent of the welfare development fund created a reliance on external support for the delivery of critical programmes, which is still evident in the delivery of services in many countries in the region. Many of the sanitation improvement programmes are delivered through external donor funds or foreign capital investment, a system that can be linked to the early introduction of the welfare development fund by the Imperial Government at the time, to spearhead development in critical sectors, including water and sanitation improvement.

The approach of the newly formed governments of the independent Caribbean nations to sanitation improvement also had a lasting impression on the system. The aggressive approach to problem solving without the contextualising process and the development of strategic plans to delivery long term benefits that marked the period following the 1960s continues to be a key feature in the poor delivery success of water and sanitation programs in the region. Many countries overlooked the creation of long-term plans for the development of sanitation services or even outline public policies that would target the sector. Instead focus was placed on delivering immediate remedies for identified, without due consideration for suitability and sustainability. This approach is still reflected in current governmental approach to sanitation services improvement, which has to this day still lacks sustainability. The international development community has undoubtedly left its impression on the sanitation system in the Caribbean. The adaptation of the new sanitation planning approaches, which focuses on sanitation improvement at the community level and re-classification of sanitation facilities allowed sanitation services authorities and even government to compare their level of service to other countries, which is used as an indicator for action. These key interventions and periods of the last century have all influenced the sanitation status and system in the region.

The target to achieve universal access to an adequate standard of sanitation in the Caribbean, consistent with the global agenda, has been in the process for at least 40 years. It is now set as part of an individual goal, combined with drink water supply as goal 6 of the new Sustainable Development Goals. Trends suggests that the actions taken to date, the existing systems and approaches, which has brought the coverage levels to its current levels would be insufficient to achieve the evasive target, even at the end on the SDGs in 2025. The past and current sanitation improvement efforts as demonstrated in this review focused primarily on the provision of a toilet facility to

eliminate open defecation. The introduction of the classification system (Sanitation Ladder) for sanitation facilities after the year 2000 by the joint monitoring programme for water and sanitation under the MDS, where a facility is classified as either improved or unimproved, shifted the focus away from the need to have adequate sanitation. The initial international proclamation directed at improving sanitation intimated that the standard which determines the adequacy of sanitation should be set by respective governments based on their respective circumstances and this remains intact as the most effective means to creating conditions that would guarantee the protection of human health and the environment from human excreta. The systemic conditions of the Caribbean region demands that the adequacy of sanitation provision go beyond the use of an 'improved' sanitation facility, however this can only be achieved by taking lessons learnt from the past and devise new strategies that be appropriate for individual countries as well as the country as a whole. The approach must be able to overcome the existing challenges, while having a long term perspective the meet the future demand for sanitation sustainability. The past and current sanitation facility focus was successful in improving the coverage, the region now required a comprehensive approach that would meet the need for adequacy as well as sustainability. This must be the target for the Caribbean region if it is to achieve and sustain the Sustainable Development Goal target of universal sanitation coverage of an adequate standard of sanitation.

Chapter 5. Analysis of Barbados sanitation development - Critical lessons for Guyana

5.1 Introduction

This chapter explores sanitation development in Barbados as well as current sanitation practices and the factors that influence these practices.

5.1.1. Assessment Methodology - Conceptual Framework

Documented evidence and primary data sourced from interviews with key stakeholder agencies within the sector were used to provide a critical analysis of what worked and what did not work. The output of this case study was used as an input in the comparative analysis with Guyana that formed Chapter 7, where the key lessons that can be transferred are included in the design of the sanitation policy framework for Guyana, presented in Chapter 8.

The approach to the Barbados case study was based on the conceptual framework outlined in Figure 5-1. The assessment criteria followed the main themes to be investigated, while the assessment categories were derived from the data needs of the case study. The data collection tools adopted for the various investigative elements are also identified. The utilisation of this conceptual framework allowed for a systemic investigation, which provided clarity on how the conclusions were formed. Details of the design, data collection and assessment were presented in Chapter 3.

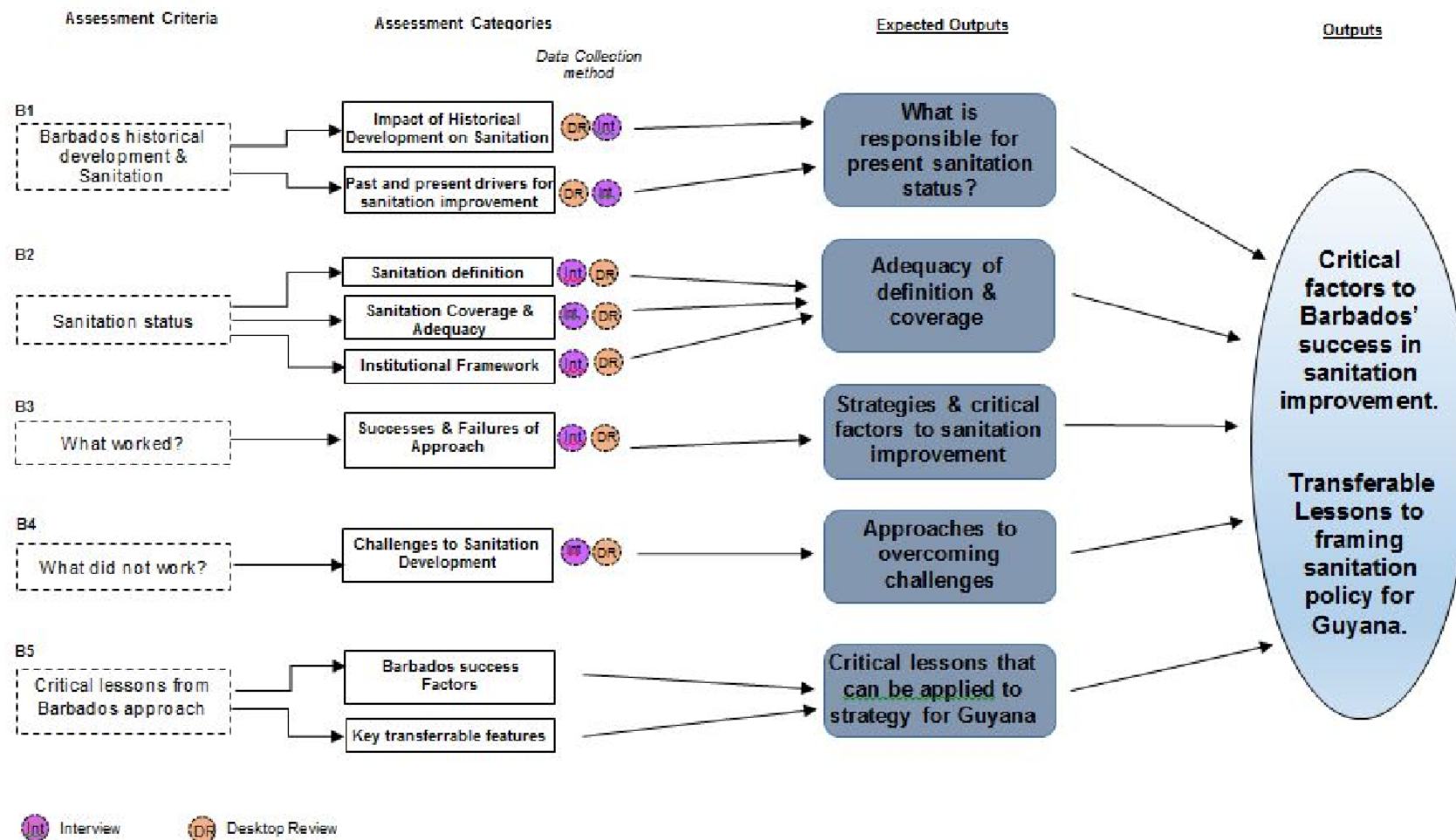


Figure 5-1. Conceptual framework adopted for the assessment of Barbados

5.2 Overview of Barbados

Barbados is the easternmost island of the chain of Caribbean islands (**figure 5-2**), with a land area of 430 square kilometres. It is one of the highest ranked countries in the Caribbean and Latin America region based on the United Nations Human Development Index (HDI) (PAHO, 2012). Barbados and Guyana share a somewhat similar historical development pattern. However, there is considerable disparity in sanitation development between the two countries.



Figure 5-2. Geographic Location of Barbados

5.2.1 Political and socio-economic development history

Barbados, an island with a land mass of only 430 square kilometres is a former British colony that gained its political and economic independence in 1966. Today, while still maintaining the British monarchy as head of state, Barbados has transitioned from its historical plantation economy to one that is built on the tourism and services industries. It is classified as a middle-income country, boasting one of the highest Human Development Index (HDI) in the region as compiled by the United Nations Development Programme (UNDP, 2015). With its small population averaging 287,000 persons and having a stable growing economy and political climate, Barbados has experienced significant economic and developmental growth since its independence when compared with Caribbean counterparts. This was demonstrated in the increase of Barbados real GDP from Bds \$316.1m (US\$ \$158.1m) to Bds \$982.5m (US\$491.3m) between 1960 to 2000 (Downes, 2002).

5.2.2 Governance Structure

Barbados is a parliamentary democratic country, which hosts a bicameral parliamentary system headed by a prime minister and a cabinet and comprises two legislature groups - an elected House of Assembly and an appointed Senate. After independence from Britain in 1966, Barbados constitution provided for the Queen to remain as sovereign and represented by a governor-general on the island (PAHO, 2012). The tripartite governance structure then fall under this hierarchy as shown in figure 5-3.

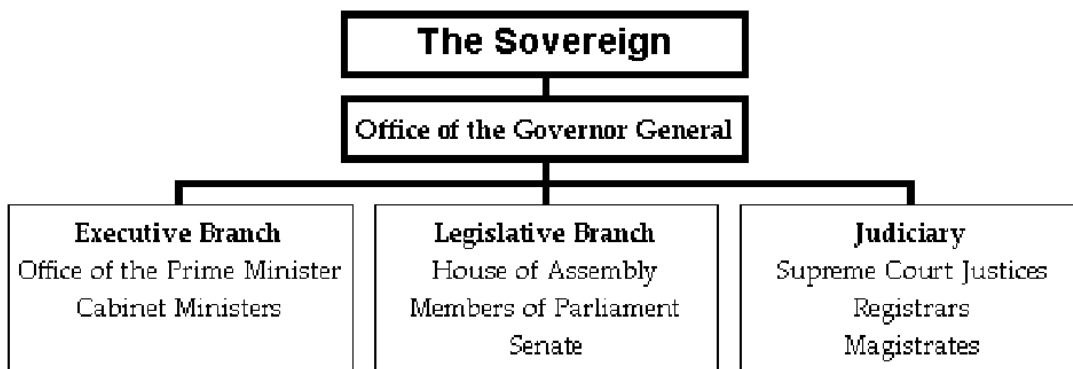


Figure 5-3. The Governance Structure of Barbados

Public services in Barbados was administered via a local government system from as early as 1639 until 1969 when the then government abolished the system of local government. Presently, The Public Service functions are administered by central government through a varied and diverse array of Ministries, Departments, Divisions, Corporations and Boards, which serves as the administrative machinery for implementing government policies based on established legal frameworks and guidelines in keeping with the current Government's political mandate. Barbados is administratively divided into eleven parishes in addition to the capital city of Bridgetown (CLGF, 2015).

5.2.3 Landscape and Hydrogeology

Barbados is generally described as flat and low-lying. It rises from west to east in a series of gentle terraces to its highest point of about 1100 feet at Mount Hillaby in St. Andrew. There is little forest cover, with much of the island covered in limestone formation, and the older clastic sedimentary rocks, siltstones sandstones and clay. A

notable feature of Barbados is the absence of surface waterways in the form of rivers and lakes as much of its water storage and movement are below the ground surface (Jones and Banner, 2003). The topography and geology of Barbados has historically been critical to actions related its development. The limestone formation filters surface water that percolates to an under reservoirs, which is the country's primary source of drinking water for Barbadians. Groundwater is considered Barbados's most prized asset and has been earnestly protected for decades.

5.3. Implications of Barbados' Historical Development on history on sanitation development

This section presents the development pattern and events that influenced sanitation development in Barbados from early settlement to present. It also identifies the key drivers for sanitation over the period. This represents criteria B1 of the conceptual framework (figure 5-1).

5.3.1. Early settlement to slavery

Barbados like many of the other Caribbean territories had a very decorative developmental journey. Although the little island was first seen by the Portuguese who gave it its name, *Los Barbados* translated 'the bearded one', based on evidence of the fig trees (Barbados.org, 2016), most of Barbados' documented history commenced following the inhabitation and colonisation by the English, which commenced in 1627 (figure 5-4). Records indicated that the indigenous population on the island had already left before the English arrived. The activities of the English shaped the island, commencing with tobacco and cotton cultivation, which led to the importation of European indentured labourers and developing the structure of the social class in the society. Divergence of agricultural interest to sugar cultivation in the late 1600s, saw the introduction of Africans to work as slave labour on the sugar plantations. Sugar plantations and slavery dominated the history of Barbados for over 200 years (Schomburgk, 1971; Handler and Corruccini, 1983; Menard, 2006).

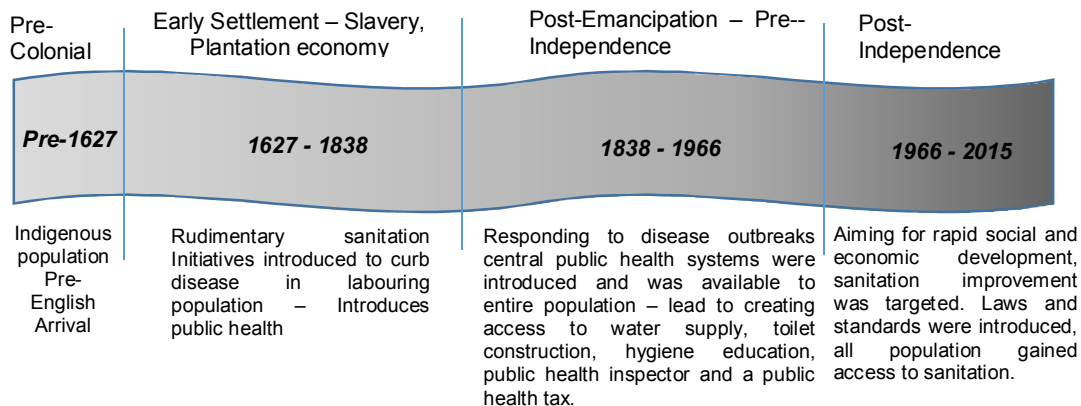


Figure 5-4. Key developmental phases of Barbados' and the chronology of sanitation consideration across the phases

During these years, the lack of sanitation consciousness led to conditions that were injurious to health. Poor sanitation practices dominated the island for much of the 17th and 18th. Many of the diseases and deaths were attributed to poor sanitation, although poor diet and the congested state on the island were also cited (Richardson, 1985).

5.3.2. Post Emancipation

In 1838, slavery was abolished globally, plunging Barbados into an unfamiliar period of development. Despite the high population of English settlers and European labourers who had made the island home, the large population of the now-freed African slaves became the dominant population group. Unlike in many other Caribbean territories, squatting was outlawed in Barbados, therefore, this group found it difficult to foster social and economic development due to the absence of 'Crown land' to inhabit or to cultivate a living (Sokoloff and Engerman, 2000; Harrison, 2011; Green, 2014). Without homes and access to lands, many of the freed African population remained within the plantation, eking off a living (Beckles, 1990). For this very reason, indentured labourers were not brought to Barbados during this period as occurred in many of the other British colonial territories, such as Jamaica, Guyana and Trinidad (Richardson, 1957; Higman, 1986; Pemberton, 2012). The maintenance of the plantation system and continuance of slave conditions throughout much of the post-emancipation period encouraged poor sanitation practices (Beccles, 1990; Harrison, 2011 and Green, 2014).

Moreover, much of the development in post emancipation Barbados favoured the planter elite class as infrastructural development was concentrated within the elite zones to combat the epidemic of diseases (Handler, 2008). With the absence of health services in the non-elite zones, there was high incidence of and death from diseases. The alarming death rate among the African population prompted interest in finding solutions to curb this problem. During the latter years of the 19th century in keeping with the global sanitation revolution, Barbados began to take steps to address sanitation on the national front. Records indicated that Barbados was among the first territory of the Caribbean to consider improved public health measures through increased access to improved public health services. Although poor practices persisted in some sects of Barbados, an 1897 commission examining the conditions on the island recorded that sanitary inspectors were present in parishes. The improvements in sanitation was further highlighted in 1916, when Barbados recorded one of the lowest prevalence of the hookworm disease by the International Health Commission.

Learning from the IHC hookworm campaign in the West Indies, attention was given to the construction and increased use of pit latrines to curb open defecation. Authorities in Barbados bought into this theory of disease control and health preservation, as incidences of hookworm gradually decreased and the use of latrines on the plantation and even within communities became more widespread. Both death rate and infant mortality also significantly reduced over the period of the increase sanitation intervention (table 5-1).

Table 5-1. Death rates (per 1000 population) and infant mortality rates (IMR) (per 1000 live births) in Barbados in 1928, 1932 and 1937.

Territory	Statistics	1928	1932	1937
Barbados	Death rate	30.1	19.0	18.5
	IMR	331.0	198.0	217.0

(Extracted from: Theodore and Edwards-Wescott, 2011)

5.3.3 Post-Independence period

Barbados' sanitation conditions improved steadily during the 20th century. In fact, by the middle of the century, Barbados was considered one of the most advanced British colonies with respect to public health, although being viewed as the filthiest at the start of that century. After World War II and after gaining independence in 1966, aggressive actions for improved sanitation were undertaken to transition the country

from a plantation economy to a tourism economy. According to Potter (1983) and Pattullo (1996), Barbados sought to capitalise on the emerging market of tourism, with the need to find a new revenue generator. Efforts were directed to creating conditions that would attract visitors as well as to ensure the safety of visitors, which included improving sanitary conditions.

One of the shortfalls of this approach however, was the lopsided approach to sanitation advancement. Sanitation improvement efforts mainly focused within the tourist prone areas, while households received the fragments of these interventions, a practice that is evident to this day.

5.3.4 Barbados Sanitation Drivers – From past and present Drivers for Sanitation Improvement in Barbados

Sanitation in Barbados was developed on the account of five key drivers; (1) to protect public health (2) Resource (groundwater) Protection (3) the pursuit of national social and economic development, (4) environmental preservation and (5) fostering of tourism. The effective period of these drivers is illustrated in figure 5-5. How they influenced sanitation development in Barbados is discussed in the sections below.

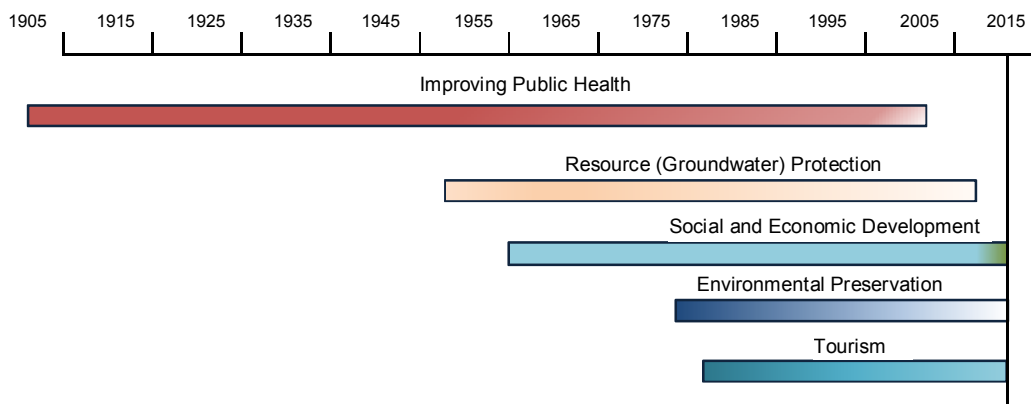


Figure 5-5. Period of Influence for main drivers of sanitation improvement in Barbados.

5.3.4.1 Public Health Driver

Improving public health in the bid to preserve the health of the population was found to be the oldest driver for sanitation improvement in Barbados. Extreme morbidity and mortality were commonplace in the post 19th century Barbados, as was the case

for the entire Caribbean (ECLAC, 2002; Brown, 2002). Although Barbados became one of England's richest colonies as early as the seventeenth century (Corruccini *et al.*, 1982), the life expectancy remained at an all-time low. Diseases impinged on the health and wellbeing of the population, particularly the majority slave population. The 2002 ECLAC report noted that this status existed due to the poor living conditions of the population at that time, together with the absence of "a coherent set of public health policies and legislation" (ibid). Barbados was known to have congested housing, the result of being one of the most densely populated territories in the Caribbean (PAHO, 2008). This led to unsanitary conditions and the proliferation of vector borne and deadly communicable diseases (Reid, 1981). This is believed to have resulted in the devastating cholera epidemic on the Island in 1854, causing the death of 20,000 persons (13% of current Barbadian population. Carter (1990) referred to this cholera outbreak as "a blessing in disguise" for Barbados because it highlighted the poor living conditions persons in the free, but neglected communities, endured, resulting in a positive response from the British Imperial Government. Pemberton (2012) also noted that the impact of the cholera on the British 'possessions' in the Caribbean jolted them into action, recalling:

"They recommended the creation of sanitary administration in the colonies, the introduction of laws with punishments and the appointment of sanitary inspectors with powers to charge offenders in order to ensure compliance with the sanitary regulations". ~ Pemberton (2012, p. 52)

In addition to Cholera, diarrhoea and dysentery were quite prevalent. Records also indicate that vector borne diseases such as malaria, yellow fever and chicken pox claimed the life of many early settlers, especially the Whites. Poor living conditions and the absence of adequate health care facilities triggered violent protests by the working class. This resulted in the introduction of programmes to curb open defecation and the provision of sanitation facilities to improve the public health profile on the plantations. Higman (1995) contended that the need for improved public health drove efforts to improve sanitation in the British Caribbean for much of the 20th Century.

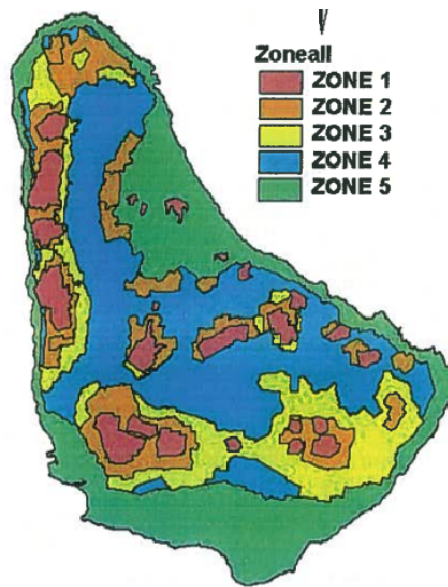
Improving public health was the main focus of sanitary improvements across Barbados for much of its early years. Attention was placed on housing improvement, latrine construction, curbing scavenging and indiscriminate refuse disposal, food preparation and food handling and general improvements in health education

(Handler, 2008; Theodore and Edwards-Wescott, 2011). Improvements also included the installation of a daily water distribution service, as universal piped water was introduced in Bridgetown since 1854 (Carter, 1990; Beckles, 2006; Pemberton, 2012). Laws were crafted to see control of vectors, universal access to medical services and improving sanitary condition of communities. This included the creation of a centralised public health system in 1856 under the Public Health Act of the same year.

Public health protection remained the only sanitation improvement driver for the first half of the 20th century (**figure 5-5**). The Health Services Act (1969) and associated regulations were introduced to curb sanitation practices that can be injurious to health and well-being such as the disposal of nuisances and improving domestic living environment. As public health measures were standardised, other drivers emerged with the advancing development ambitions of Barbados.

5.3.4.2 Resource (Groundwater) Protection

Since habitation of the island was first recorded, population survival hinged on water supply access. Groundwater, found to be a primary source for the island's water supply was strenuous protected throughout Barbados's history (Schmoll *et al.*, 2006). It was viewed as a valuable resource. However, the porous geologic limestone formation, which covers much of Barbados, allowed easy movement of contaminants arising from human activities, such as toilet waste disposal, threatening the of groundwater sources. The first groundwater study conducted in 1946 noted that the continued discharge of domestic and industrial effluents to drainage wells (suck wells) and existing karst sinkholes were potential threats to the groundwater quality of the island (Senn, 1946; OAS, 2009). By 1963, Barbados had a clear policy on groundwater, which aimed to limit the developmental activities within critical groundwater extractions zones. A National Groundwater Protection Zoning Policy was also introduced to protect groundwater from threats of biological contamination from domestic and industrial effluent discharges and contamination from suck wells. The policy divided the island into five zones (zones 1 to 5) (figure 5-6) based on the estimated travel contaminants will take to reach the times of percolated surface water to the groundwater aquifer.



Source: Barbados Water Authority

Figure 5-6. Barbados Groundwater Protection Zones

The policy restricts specific categories of development in sensitive areas and the type of excreta management facilities that can be utilised (**table 5-2**). It was also a catalyst for movement towards the waterborne systems across the island and pushed for sewer systems and treatment plants. Further, standards were developed for domestic excreta systems such as setting well depths and pursuing centralised sewage collection and treatment.

5.3.4.3 Social and Economic Development

Social and economic development became a post-slavery objective of Barbadians, however its influence on sanitation development only emerge in the particularly the freed slaves, seeking to make strides to reduce the development mid-1900s (figure 5-6). This was manifested in frequent dissidences to highlight the poor social and labour conditions. Development focus was further intensified following political independence as Barbados aggressively sought to improve the social and economic development status given their new found status.

Table 5-2. Groundwater Zoning Policy of Barbados

Zone	Boundary Definition	Sanitation Facility Restrictions	Domestic Control Restrictions	Control Mechanism
1	A distance that will permit a 300-day travel time for a bacteria of virus to enter an existing or future well	No Soakaway Pits	No new buildings or water connection; No Changes to existing wastewater disposal system	TCDPO review all plans submitted for compliance with Policy
2	A distance that will permit a 600-day travel time for a bacteria of virus to enter an existing or future well	Soakaway pits no to exceed 6.5 meters (20 feet)	Septic Tank of approved design can be used for waterbourne systems; Discharge can be made to soak away pits; Separate pits to be used for toilet effluent and other domestic wastewaters; No stormwater run-off to sewage soakaway pit; No new petrol fuel or oil tanks.	Coordination with BWA and Ministry of Health Environmental Engineering Department for review of development application (Zone 1);
3	A distance that will permit a 5-6 year travel time for a bacteria of virus to enter an existing or future well	Soakaway pits no to exceed 13 meters (20 feet)	Septic Tank of approved design can be used. Discharge can be made to soak away pits. Separate pits to be used for toilet effluent and other domestic wastewaters. No stormwater run-off to sewage soakaway pit. Petrol fuel or oil tanks permitted, but must be of an approved leak-proof design.	Assessment of Sanitation facility to be completed prior to connection of water supply to property.
4	Extends to all high lands	No Limit to soakaway depth. Soakaway sunk into coral rock until fissure is encountered, wide enough to absorb waste.	No restriction on domestic wastewater disposal; Petrol fuel or oil tanks permitted, but must be of an approved leak-proof design.	
5	Coastline	No Limit to soakaway depth. Soakaway sunk into coral rock until fissure is encountered, wide enough to absorb waste.	No restriction on domestic wastewater disposal; New Petrol fuel or oil tanks need Approval from Barbados Water Authority.	

Authorities in Barbados sought to expand the facilities critical to development such as such improved housing standards, basic infrastructure and the general quality of life, particularly for the poorer class. Extensive welfare programmes were introduced for the poor and elderly, with assistance given in housing, transportation, home care and

free utilities (water and utilities) (ICC, 2003). Social development strategies were also designed to assist households with the installation of sanitation facilities to promote improved hygiene practices and improve solid waste management. The sanitation standard in many households were improved and agencies such as the Urban and Rural Development Commissions were established to ensure the progress achieved are sustained.

Today, improving sanitation is still linked to key national development objectives. Sanitation is often referred to in public discourse on social and economic development in Barbados. Politicians have consistently led the advocacy for improved sanitation on the island and have communicated the need and benefits of a '*sanitary state*'. Sanitation has remained on the country's agenda across governments and changing development thrusts - a premise that has proven effective for the national growth.

5.3.4.4 Environmental Preservation – Protection of Coastal Ecosystem

With the high percentage of population occupying coastal areas and the prolong disposal of wastes in coastal water, sensitive ecosystems such as corals and marine habitats were being destroyed (EEC, 2010; Carter and Singh, 2010). Coastal waters were also polluted and presented a public health risks to swimmers. Recognising the impacts of poor disposal practices and increased international discourse on the preservation of the environment, Barbados' desire to improve and preserve its environment heightened. Since Barbados was transitioning into a tourism economy, a pristine environment would be one of the conditions that championed this cause.

To aid in preserving the environment, Barbados turned its attention once more to improving sanitation. Laws and systems were introduced to, *inter alia*, improve the management of hazardous wastes, reduce the disposal of untreated domestic wastewater onto the coastal zone and improve treatment of industrial and commercial wastewaters (Carter and Singh, 2010). According to Downs (1996), environmental legislations were introduced to address the protection of natural resources, such as Beach Protection and orderly physical development, such as the Prevention of Floods Act and the Town and Country Planning Act. This caused attention to be placed on the monitoring of discharges to the environment, actioned by the establishment of effluent discharge limits. The efficiency of sanitary facilities

was investigated with subsequent recommendations to use improved-type excreta management facilities. Environmental preservation remains a key driver for sanitation improvement both publically and at the household level in Barbados.

5.3.4.5 Tourism

Maintaining its tourism market is today the major driver for many of the policies, decisions and actions by the administration of Barbados. Tourism is the highest contributor to its GDP (ECLAC, 2001; Jackman and Lorde, 2012; PAHO, 2012), therefore, managing and introducing systems to improve its tourism potential is often priority. All sectors that would contribute to maintaining or boosting tourism potential are given attention. The water and sanitation sector is considered important to maintaining good public health status and visitor's safety. For this cause, Barbados sought ways to maintain the integrity of its groundwater and aesthetic environment through the implementation of programmes, policies and legislation to address solid waste management, management of nuisance and excreta management facilities.

5.4 Sanitation Status

This section presents the findings from the evaluation conducted to measure the current state of sanitation in Barbados, corresponding to assessment criteria labelled B2 of the conceptual framework (**figure 5.1**). In keeping with the assessment categories for this criteria, the status assessment was completed based on the definition of sanitation at the household level, the coverage and quality of those components defining sanitation and the general perception of the main stakeholders. A comparison of the *in situ* conditions observed with the figures recorded and presented by the JMP was completed to assess the true extent of the adequacy of household sanitation depicted for Barbados. Using both primary data collected from the interviews with key actors in the sector and secondary data contained in country report, assessments, situational analysis, and other appropriate data sources, the current coverage and condition of sanitation in Barbados was determined. The output of this assessment was intended to highlight the outcomes of Barbados' approach to sanitation development.

5.4.1 How sanitation is defined in Barbados

"Definitions are of fundamental importance. They set out the precise scope and restrictions placed on a concept or idea." – MacArthur (1999, p. 1)

No formal, official definition was found to exist in Barbados for the term ‘sanitation’ or specifically for ‘household sanitation’. The term sanitation is used to describe multiple elements that are intrinsically linked to how public health and environmental protection is organised and managed on the island. It was disclosed that sanitation in Barbados is defined shaped and organised in accordance with the principles set out in the Clay’s Handbook of Environmental Health, first published in 1933.

Further, responses from interviews with key agencies, combined with the output from the assessment completed on the organisation, administration and operationalisation of sanitation related functions in Barbados, found that the term sanitation was used to be represented by a collection of six components. These were (1) toilet facility (2) stormwater control (3) household waste disposal (solid or liquid), (4) water supply (5) offensive and hazardous matter management (liquid or solid) and (6) vector control (**figure 5-7**). In both general discourse and specialist representatives of the various agencies, this distinction was found, representing an unabridged system of sanitation management in Barbados.



Figure 5-7. The six elements that comprise the way the term sanitation is defined in Barbados

Combining the explanations given by the key actors, documented publication and the description of the six components highlighted above, a definition of household sanitation in Barbados was postulated as follows (in order of priority):

1. Access to safe and **reliable water supply** for domestic use.

2. **Toilet facilities** that are safe, convenient and effectively contained both faecal matter and urine and disposal of using a management system approved by the nation's Town and Country Planning Department. This must be complemented by good hygiene practice.
3. All **solid waste** generated by the household is stored and managed in one of the prescribed ways. All offensive matter managed according to the recommended procedures.
4. **Storm water** systems for households installed and maintained to eliminate flooding and erosion, and
5. Ensuring all properties are maintained in a manner that restrict the breeding of **vectors** (rats, flies and mosquitoes).

5.4.2 Legal Framework Shaping Sanitation Definition

The following are the legal and policy interventions that address the six elements of sanitation identified in Barbados.

Table 5-3. Key policy directives that influenced how sanitation is defined in Barbados

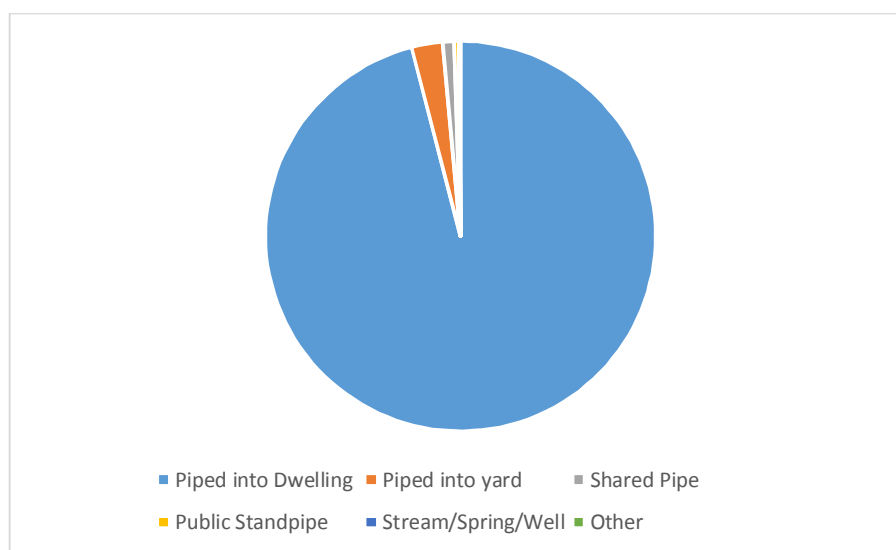
Element of Sanitation	Legal or Policy Intervention
<i>Toilet Facility / Excreta Management</i>	<ul style="list-style-type: none"> • Early Policy that prevented persons from defecating in the open was one of the first steps in modern sanitation improvement approach in Barbados • Assistance to households to construct rudimentary facilities • Support for the installation of adequate facilities
<i>Solid Waste Management [household waste disposal]</i>	<ul style="list-style-type: none"> • Installation of crude garbage dumps in the 1950s to allow residents to dispose of domestic solid waste in an authorised central location. Designed to curb dumping of solid wastes onto vacant land, storm water drains and directly on their parapets as was common; • The Integrated Solid Waste Management Programme (ISWMP) is an infrastructural project commenced in 1993 for the development and implementation of an ISWMP; • Establishment of the Solid Waste and Hazardous Substances Section under the Environment Protection Department in 2005; • Establishment of the Sanitation Service Authority - responsible for collecting municipal solid waste

Element of Sanitation	Legal or Policy Intervention
	<ul style="list-style-type: none"> Health Services Act (Cap. 44), 1969 - "An Act relating to the promotion and preservation of the health of the inhabitants of Barbados" The Health Services (Nuisances) Regulations, 1969 – prohibition of nuisances, including solid waste, that may be disposed of in a manner that may be injurious or dangerous to health. The Health Services (Disposal of Offensive Matter) Regulations, 1969 – requires the disposal of offensive matter at disposal sites that are approved only Municipal Solid Waste Tax Bill, 2014 - An Act to provide for the imposition and collection of a tax to be known as a "municipal solid waste tax"
Offensive matter management (dead animals, septic sludge and other wastes that might be assessed as being offensive)	<ul style="list-style-type: none"> Health Services (Disposal of offensive matter) Regulations in 1969 as part of a series of Health Services legislation enacted to improve the deleterious sanitary conditions that plagued Barbados Offensive Matter regulation – in accordance with this legislation households are required to use prescribed means to manage offensive matter generated by households
<i>Vector Control (mosquitos, rodents, dogs, etc.)</i>	<ul style="list-style-type: none"> Establishment of units to provide vector monitoring services, particularly for mosquitoes Livestock (control of strays) 1991 – "An provided for the seizure and impounding of stray livestock and for related matters."
<i>Stormwater management</i>	<ul style="list-style-type: none"> Provision of stormwater drainage monitoring to households to ensure there is reduced likelihood of flooding
<i>Water Supply</i>	<ul style="list-style-type: none"> Three-Houses Spring Act, 1713; Porey's Spring Act, 1864; The Underground Water Control Act 1953 [Cap. 283] - Underground Water Control Act (1953): provides for the control and use of the underground sources of water supply in the island. It establishes a Water Board for the purpose of this Act. Licenses from the Board are required for the sinking of wells and for the obstruction of underground water. The Soil Conservation (Scotland District) Act, 1959; The Health Services Act and Regulations (1969); The Barbados Water Authority Act, 1980 [Cap.274A]; The Town and Country Planning Development Order, 1972; and The Marine Pollution Control Act, 1998

5.4.3 Coverage and Adequacy of Sanitation Components

5.4.3.1 Water Supply

Based on the responses from the agency representatives during the interviews, there was a collective perception that the existing water supply services at households are adequate, referring to both the quality and reliability of the water supply. There is universal coverage of water supply at households in Barbados (GOB, 2003, BSS, 2013). *“Water supply was one of the first public services to be universalised on the island (EHU, Ministry of Health). Record shows that 98% of households have access to a piped water supply, with 96% of the service being piped into the dwellings and the 2% being at a standpipe level (BSS, 2013) (figure 5-8).* Although, it was stated that the percentage of households having access to piped water supply to their dwelling might now be in the 99-percentile, given recent water service expansion (BWA, 2013). Water distribution networks are available in all areas of the island, which has made the acceleration of coverage possible. The health benefits were highlighted as the primary motivation for water services expansion.



Data source: 2010 Population and Housing Census (BSS, 2013)

Figure 5-8. Water supply coverage in Barbados

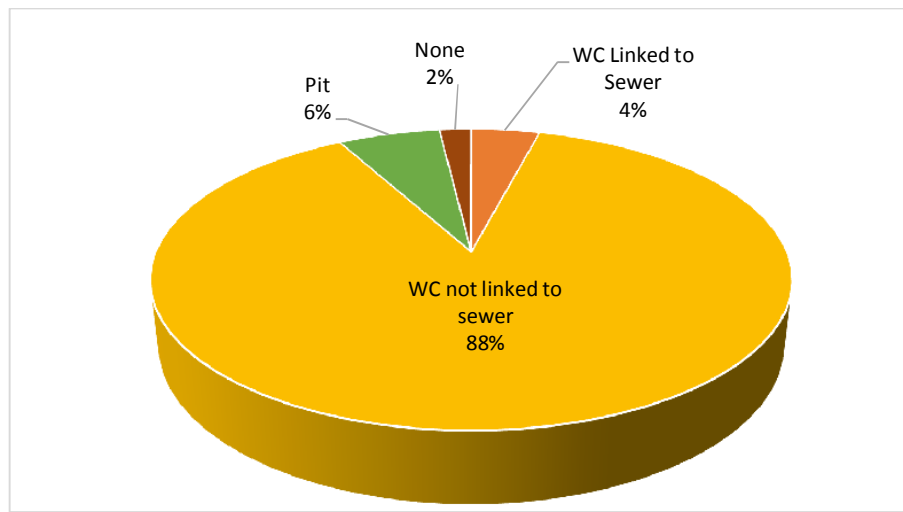
In discussing their approach to achieving and sustaining the universal coverage of household water supply, a BWA representative indicated that both existing and new households are legally required to install piped water supply (if within the service area). *“Households unable to afford the rates for water supply are supported by the*

existing welfare development programme or through special subsidies that are offered to assist new home owners” (BWA).

As mandated by the Health Services Act and given the importance of Barbados’ tourism sector, care is taken to maintain a reliable and high quality water supply. The quality of water supply to households confirms to the WHO standards for drinking water was vehemently endorsed by Barbados Environmental Health Unit Representatives. In keeping with the Health Services Act (1969), the Barbados Water Authority Act, the Barbados Water Authority and Ministry of Health are mandated to ensure the quality of water for consumption does not negatively impact the health of the population. Water quality is monitored at the underground level by the Environment Protection Department and the Barbados Water Authority, while, quality at the distribution level is monitored by Environmental Health Department and the Barbados Water Authority.

5.4.3.2 Excreta Management

The type of excreta management systems used in Barbados can be divided in to two groups: (1) waterborne systems, depicted by the Water Closet (WC)-based facilities, and (2) the non-waterborne facilities in the form of the pit latrine type facilities. A PAHO 2012 report indicates that there is universal coverage for sewerage and excreta disposal facilities in Barbados (PAHO, 2012, p. 72). Waterborne facilities makes up the larger percentage as shown in figure 5-9, aided by a high percentage of households in Barbados having access to piped water supply. However, the census figures also indicated, as at 2010, some 6% of the population utilised “*non-waterborne pit type systems*” and a further 2% had no excreta management system installed at their household (BSS, 2012) (**figure 5-9**). According to the findings of the Multiple Indicator Cluster Survey (MICS), the poorest of households in Barbados do not have access to an excreta management system (BSS, 2014). Their findings also indicated that open defecation, which was prevalent during slavery and post emancipation periods, is now rare. This suggests that excreta facilities, in some cases, may be shared between households. However, the percentage of households sharing facilities was not recorded in either the population census or the MICS survey.



(Data source: 2010 Population and Housing Census (BSS, 2013))

Figure 5-9. Coverage of excreta management systems used in Barbados

Non-waterborne systems

Pit Latrines are the only non-waterborne system and the oldest form of toilet facility used in Barbados. Despite a significant reduction in the use of these systems (from approximately 33% in 1990), present figures stand at (6%), although vehemently discouraged by authorities (SALISES, 2011). Whilst the use of pit latrines is believed to be linked to the unavailability of piped water, their continued use in Barbados, despite advancements in accessibility to piped water, is suggested to be a result of the high installation cost of these facilities and small size of concerned households (EHU). Watson and Potter (2001) in commenting on the use of non-waterborne systems in Barbados also noted that:

“...the high incidence of pit latrine toilets in some areas was indicative of the variations in housing quality and diagnostic of the problems associated with insecurities of tenure.” (p. 61)

Many of the existing latrines are age-old as the installation of new latrines is discouraged and planning applications would not be successful if a household proposed the use of a pit latrine (UDC).

Barbados has implemented several programmes to assist in the eradication of pit latrines. Through those programmes households adjudged to be ‘indigent’ often access free support to improve their dwelling, including replacement of pit latrines with waterborne systems. Despite these extended efforts by Barbadian authorities,

and although reducing in number, pit latrines remain part of the excreta system used in Barbados.

Waterborne Systems

According to historical accounts, the water closet (WC) was introduced to Barbados sometime after 1861 when piped water was first delivered in Bridgetown, the capital city. Today, based on the 2010 population and housing census, it is the predominant toilet facility used by (92%) households. Excreta from Water Closets are managed through sewers and other excreta management systems not linked to a sewer as illustrated in **figure 5-9**.

Water Closets not linked to sewer represents the larger percentage (88%) of waterborne facilities users. These include two main types of waterborne on-site excreta management systems used in Barbados, (1) WC linked to a septic tank and WC linked to a suck well.

The suck well is one of the oldest and most popular (79.6%) forms of household excreta management systems used in Barbados (BSS, 2014). Based on historical accounts, suck wells were introduced in Barbados as an upgrade to the pit latrine (Beckles, 1990; Cumberbatch, 2001; Nurse et al., 2012). The early access to piped water supply could have been the catalyst, where households would convert the pit latrine superstructure to a flush toilet, but excreta disposal continued into a pit in the ground.

The suck well is a circular excavation into the ground up to a depth where a fissure or 'suck' is encountered (**figure 5-10**). It operates under the principle that the fissure or 'suck' funnels the waste to the lower soil strata, which acts as a sieve, separating the solid from the liquid. The liquid percolates through the soil formation and is naturally treated along the way. The size of the suck wells are usually between 1.5 m² to 3 m². The final size is determined by the person constructing the well, which is dependent on when the fissure or a 'suck' in the rock formation is encountered.

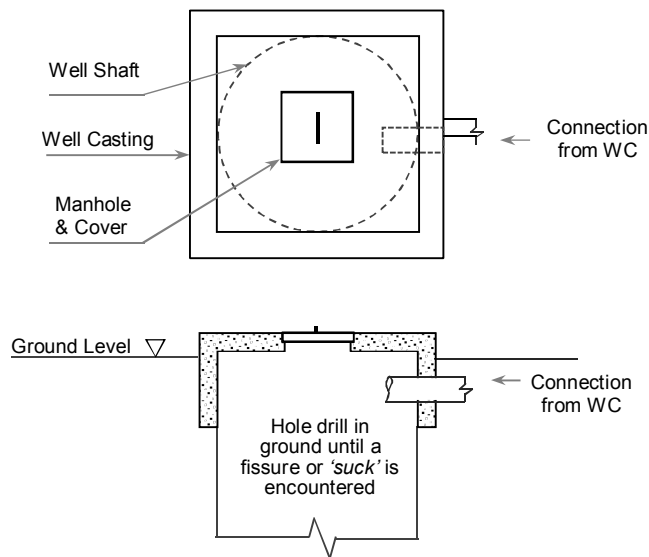
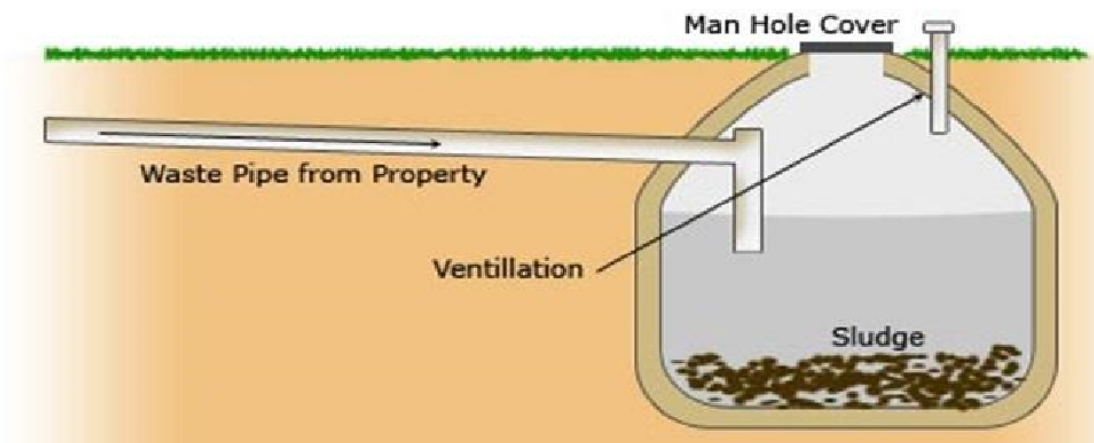


Figure 5-10. Typical design of a 'Suck' Well used in Barbados (*adopted from OAS, 1997*)

The life of a suck well is between 15-25 years (depending on the number of users) before sludge build-up becomes a problem. As the suck well approaches the end of life, the build-up of faecal sludge leads to blockage of the fissure, resulting in the overflowing of the well. When the capacity of the well is exhausted, new wells are dug and the old well covered with the sludge remaining in place. This technology is widely accepted in Barbados as an advanced form of excreta management to the pit latrine. However, there has been increasing concern for the impact of suck wells on the environment and health. The clogging of suck wells, the overflow of systems that are combined with storm water and the proximity to drinking water extraction zones have all been cited as reasons why suck wells are currently being discouraged. Discontinuing the use of suck wells is one of the long-term interventions planned however, the conversion of these systems is anticipated to be a "long and difficult" task as it will require cultural and behavioural changes and huge amounts of investments (EPD and BWA).

Cesspool

Cesspools continue to be a form of excreta management facility used in Barbados is the cesspool. The cesspool, which they described as an impermeable tank serving as a holding chamber for human excreta and is emptied when required by septage haulage services (**figure 5-11**).



Source: www.wplinternational.com (Accessed 5 August 2016)

Figure 5-11. Typical design for cesspools used in Barbados

Cesspits were used as an advancement of the common pit latrines (Davis, 1983; Smith, 2014). Although not widely used today, due to programmes designed to phase them out, some households retain their cesspool systems. The Barbados Auditor General Report 2005 noted that revenue connected by the Sanitation Services Authority (SSA) included those collected from cesspool emptying operations (BAO, 2005). The introduction of public health laws, particularly the Offensive Matter regulations that placed restrictions on handling and disposing of materials considered offensive further encouraged the moving away from cesspools.

Septic Tanks

Septic tanks are not historically popular in Barbados. Nurse, Cashman and Mwansa (2012) highlighted that septic tanks were only introduced to Barbados in the 1970s as the rise in environmental awareness encouraged a moving away from the traditional pit latrines and cesspool systems. Today, septic tanks are increasing in popularity as they are being encouraged by authorities (David *et al.*, 2013). Septic tank is viewed as the system offering a superior alternative to the pit latrines and suck-wells as it offers a higher level of containment.

Septic tank construction in Barbados vary between a fibreglass unit (**figure 5.12a**) or a concrete structure (**figure 5.12b**), with the size varying based on the number of persons being served. Although the 2010 housing and population census did not provide a figure for the coverage of household systems, the Multiple Indicator Cluster Survey completed in 2012 indicated that only 9.7% of households had a septic tank

installed (BSS, 2014). It was suggested that the low expansion of septic tank coverage is a result of the cost of conversion and household customs from the large numbers of traditional pit systems already installed outside sewer areas. Many families opt to avoid the cost of converting to septic tank systems, particularly if their current system is functioning effectively. In the absence of a national policy requiring households to convert to septic-tank systems, conversion is left at the discretion of the households. However, authorities have been using provisions under the Physical Development Plan, the Coastal Zone Management and Marine Pollution Control Act to influence new households to install the septic tank, if outside the sewer area. Additionally, it was further highlighted that in recent years new housing developments have gravitated to the installation of decentralised sewer systems, which would have ideally been septic tank systems. Nonetheless, the WC linked to a septic tank is viewed as the most progressive solution for households not served by the sewer.



(a) Layout of a fibreglass septic tank supplied to the Barbadian Domestic Market

(Source: Fiberpol Inc. (www.fiberpolinc.com))



b) Concrete septic tank construction at a property in Barbados

(Source: Urban Development Commission (www.udc.gov.bb))

Sewerage

The Barbados 2010 census reported that only 4% of the WC used by households are connected to a sewer network. By 2013 this percentage increased to 7% (BWA). The first sewer system and treatment plant was constructed in 1981 to serve Bridgetown, the capital City. A second sewer network and treatment plant was installed along the South Coast in 2003, with the treatment plant only providing primary treatment. It was disclosed that not all households within the sewerage

boundary are connected. Authorities attribute this situation of persons reluctance to pay the sewerage charges that will apply once connected. BWA has been encouraging households to connect to the sewer household within the sewered areas.

5.4.3.3 Stormwater Management

Reducing flooding and destruction due to heavy surface run-off is an environmental health priority in Barbados and considered a key element of the sanitation fabric at households. Traditionally, household stormwaters were disposed via latrines and suck wells used for excreta management (UNEP CEP/RCU, 2010). In later years, independent suck wells were used for stormwaters because of overflowing of combined suck wells created adverse impacts. Today, households in Barbados are encouraged to install surface drains to divert stormwater safely into larger collector drains. New construction, as part of their planning permission, must demonstrate this provision before approval is granted.

Although considered critical to household sanitation, official monitoring of the household stormwater is not currently practised. The Barbados Sanitation Services Authority has the responsibility of managing the quality of drainage within properties, but households are responsible for the installation of the appropriate drainage systems. It was reported that many of the existing stormwater management systems at households continue to be inadequate or fall into disrepair. Combined with heavy rainfall, this result in flash flooding, which continues to be a major problem in some parts of Barbados.

5.4.3.4 Solidwaste Management

Effective management of solid waste in Barbados today acquired as much importance as water supply in the early years of development owing to its implications on environmental aesthetic and human health. The passage of the Health Services (Nuisances) Regulations (1969) commenced the organisation of solid waste management. The policy requires households to collect, contain and appropriately dispose of solid waste generated in a safe and acceptable manner. Currently, through Barbados Sanitation Services Authority (SSA), household solid waste collection services is offered to a large percentage of the communities. It was noted:

“Solid waste collection service is provided for all domestic household wastes, except the bulk waste, which can be collected for an additional fee.” (SSA Representative)

Despite varying across the different parishes, households are provided with at least a weekly household collection service. It was reported that in the commercial zones, particularly the tourist-centric districts, solid waste services are offered more frequently. Extensive advocacy and policy enforcement for good household solid waste management have resulted in many households complying with the need to safe household management. In a number of areas, particularly in the rural areas, poor practices still persist and result in the indiscriminate dumping to domestic refuse. The current national focus for solid waste management is better management strategy, including considerations for increased recycling and reuse. A Solid Waste Management Centre commenced operations in 2009 to encourage recycling of waste (SBRC, 2018). It is anticipated that in the long-term the recycling center could reduce the quantity of waste that is landfilled by 65% (UNEP, 2010).

5.4.3.5 Offensive Matter Management

The interest in the management of offensive matter in Barbados has its root in the early days where bucket (pale) system and cesspools were extensively used to contain human excreta. The contents of these systems, referred to as night soil, were considered offensive in later years, attracting strict control for collection, transport and management. Today, the control of offensive matter remains a major aspect of public health precaution in Barbados. Although, the handling of night soil is not as common as in the past, other elements such as putrescible waste, dead animals and handling of the dead that also falls under the classification of offensive matter, remain areas of concern. There are strict controls on the management of offensive matter, with multiple agencies handling various remits. The Ministry of Health, EHU holds the primary responsibility and enforces the Offensive Matter Regulations (1969) to ensure all offensive matter generated by households are effectively managed.

5.4.3.6 Vector Control

The control of vector in Barbados carries the same importance and is linked to achieving and maintaining an adequate level of sanitation at household and public places. Mosquitoes, flies and rodents are the vectors of most concern to the island

and stringent requirements have been instituted to ensure that the conditions existing at households would limit the breeding of these vectors. The vector control unit of the Ministry of Health is tasked with planning and monitoring of the vector control situation on the island. All households are required to maintain conditions within their property and surroundings that will not encourage vector breeding. For example, households are encouraged not to store water to allow mosquito breeding. Similarly, solid wastes, particularly putrescible wastes are required to be adequately contained in a receptacle and not opened to the environment to attract flies and rodents. Households are also required by law to maintain a level of cleanliness in the households that would not encourage rodents. Some of the vector control requirements include avoidance of stagnant water, using and replenishing rainwater stored in reservoirs and ensuring suck wells, soakaways and pits are well drained.

5.4.4 Comparing assessed sanitation status to JMP reported coverage

One of the critical challenges in comparing the assessed status of sanitation in Barbados to that reported by the JMP is the fact sanitation under the JMP is solely defined by the type of sanitation facilities used by households, whilst the assessed status viewed sanitation as a multi-faceted element. This difference in definition makes it near to impossible to compare, except for comparing the type of excreta management system being used. What is critical to note is household sanitation in Barbados is viewed generally as a household having condition that supports good public health. However, to facilitate a comparison, the excreta management element of household sanitation was compared to the recorded figure issued by JMP. Both results showed some amount of similarity. The JMP uses the sanitation ladder as their measure, where all excreta management facility superior to a pit latrine with slab is considered an improved facility. They also utilise nationally available data for their analysis. According to the 2015 progress reports published by the JMP for water and sanitation 96% of the population of Barbados currently have access to an 'improved' sanitation facility, while 3% utilises a facility that is also considered improved. The JMP report also indicated that no proportion of the population currently utilises a sanitation facility that is considered unimproved. However, it was recorded that close to one percent (1%) of the population do not have access to a sanitation facility and considered to be defecating in the open (WHO/UNICEF, 2015). The 2015 JMP sanitation figures for Barbados was based on the findings of the UNICEF Multiple Indicator Cluster 2012 Survey. The sanitation figures recorded through the MCIS

survey showed little deviation from those recorded in the assessment. One critical element of Barbados excreta management system is that a large percentage of household still rely on natural systems to treat the excreta. This however is not taken into consideration in assessing the national state of sanitation.

5.4.5 Institutional Framework for Sanitation Management

Barbados has continuously re-organised the structure of their public service delivery organs to meet the present needs and national vision. It has been effective in ensuring that national needs are adequately addressed and that the appropriate agency(s), with the available resources holds responsibility for carrying the mandate. Traditionally, sanitation management was administered through the Health Services unit directed by a General Board of Health in the early years post 1960 (**figure 5-13**). With the introduction of the Health Services Act of 1969, and the development of supporting regulations, a new structure and organisation emerged. A new Ministry of Health was formed with responsibility for carrying out the mandates of the Act. Additionally, new sanitation units were formed as the remit was expanded (**figure 5-14**).

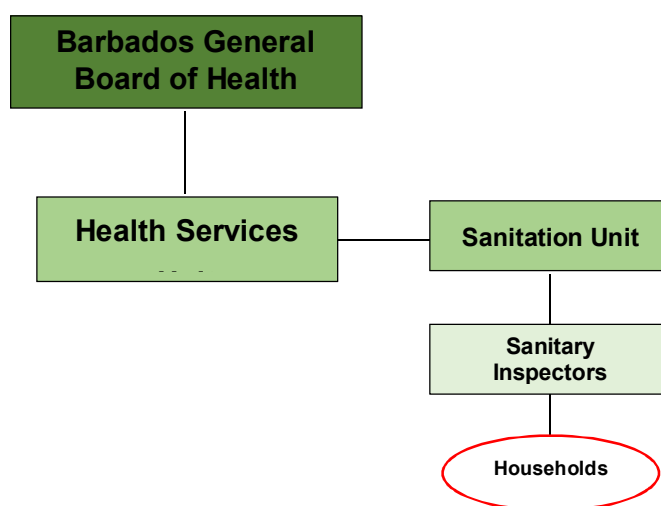


Figure 5-13. Early organisation of sanitation services delivery in Barbados

This re-organisation continued throughout the years in an attempt to optimise service delivery and to expand services in line with changing priority for sanitation and environmental protection. The current arrangement of sanitation services as shown in Figure 5-15, includes the formation of a number of agencies such as the Rural and Urban Development Commissions and the Environmental Protection Department

which play an integral role in sanitation development and management in Barbados. This re-organisation is based on the combined vision of improving social development of Barbadian, while protecting and preserving the environment. The responsibility of the main actors is shown in Table 5-4.

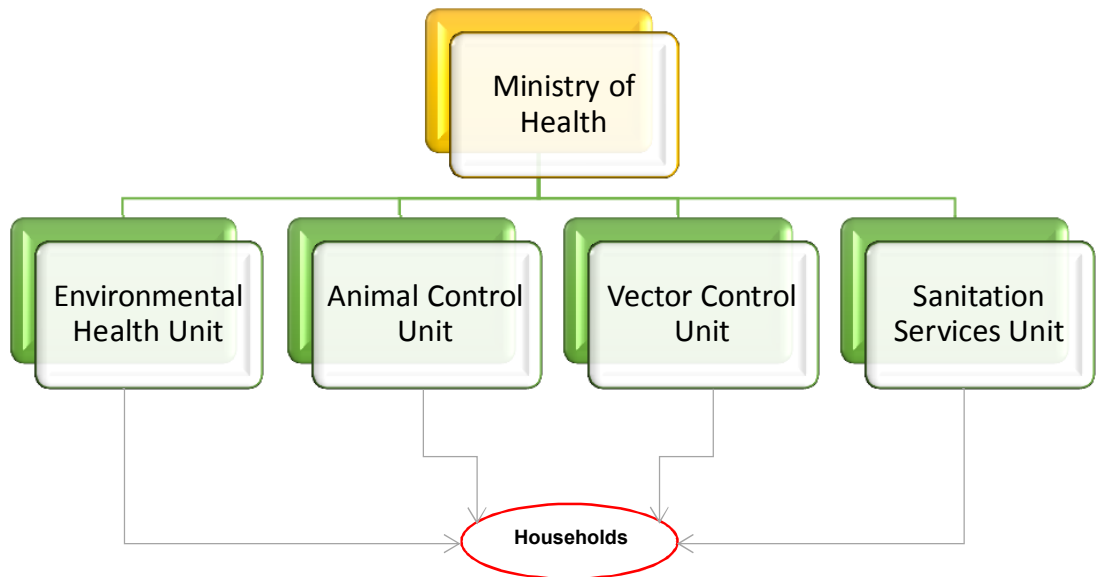


Figure 5-14. Arrangement of Sanitation delivery services post-1969.

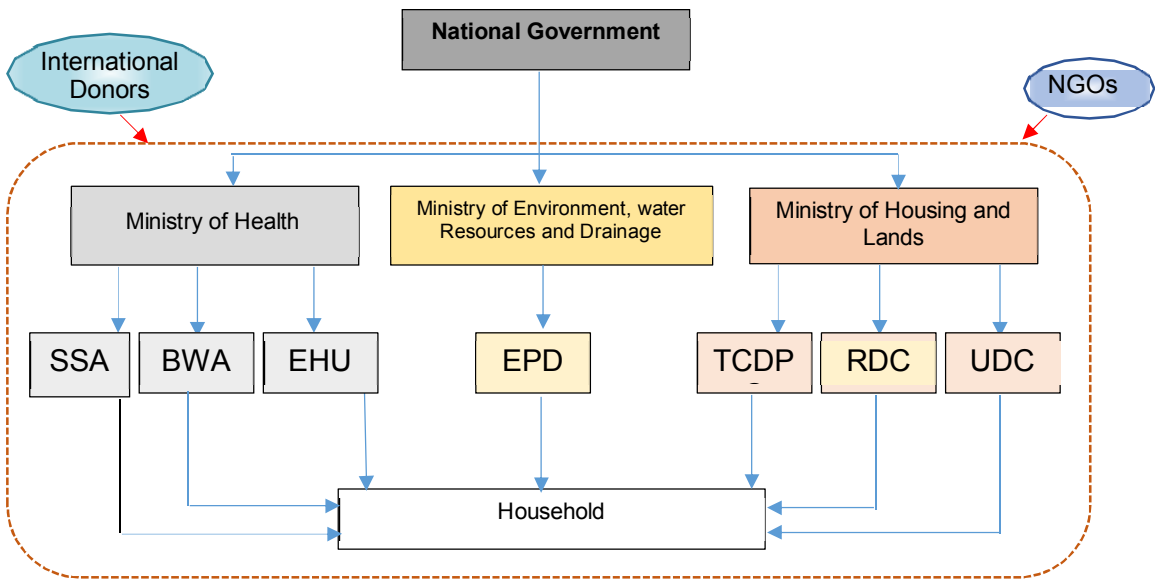


Figure 5-15. Current organisation of sanitation services delivery in Barbados

Table 5-4. Responsibility for agencies involved in sanitation services delivery in Barbados

Agency	Sanitation Services Remit/Responsibilities
<i>BWA – Barbados Water Authority</i>	Responsible for providing water and sewerage services to households and monitoring, managing, controlling and protecting the water resources of Barbados in the interest of the public.
<i>EHU – Environmental Health Unit</i>	Enforce the Health Services regulation in the interest of protecting public health. Ensure sanitary conditions exist at households and public places
<i>EPD – Environmental Protection Department</i>	The EPD was established in 1971 as was formerly the Environmental Engineering Division and is the environmental monitoring and pollution control department of the Barbados Government. It is responsible for monitoring and controlling of conditions that are likely to affect the quality of land, air and water or the general health and environmental well-being of inhabitants.
<i>RDC – Rural Development Commission</i>	Provide development support to households within the urban areas to improve their living conditions. Support includes the supply of building material or installation of sanitation facility.
<i>SSA – Sanitation Services Authority</i>	The Sanitation Service Authority was enacted in 1975 to replace the Sanitation and Cemeteries Board which lasted from 1969 to 1974. Its primary function is to remove refuse from premises, sweep, cleanse and water streets, provide and maintain a suitable place for the deposit, disposal or destruction of refuse and maintenance of cemeteries burial grounds and crematoria.
<i>TCDPO – Town and Country Development Planning Office</i>	Control and organise development in the interest of all. Physical development planning to minimise environmental destruction, protection of valuable natural resources and ensure Barbadian have access to a quality life.
<i>UDC – Urban Development Commission</i>	Provide development support to households within the urban areas to improve their living conditions. Support includes the supply of building material or installation of sanitation facility.

5.5 Barbadian Approach to Sanitation – What Worked

The Barbados approach was not static. Records show that Barbados has modified its approach based on the era, and particularly to achieve its intended results in improving sanitation. While Barbados is now noted to be quite reformist to the public policy approach, initial attempts to improve sanitation were consistent with the socialist methods promoted in early years of public health interventions. When this became ineffective in producing the intended results, Barbados shifted to the organisation approach, which resulted in the commissioning of new functional

departments and the shifting of resources to meet the needs of the critical areas. In a similar fashion, the policy approach replaced the organisational approach, as it was soon realised that there was need for a stronger instrument to effect the changes needed. In later years, Barbados again sought to strengthen the institutional framework for managing sanitation. Governmental agencies were re-organised and new departments created and empowered to effectively enforce policies and legislation that were introduced. As such, Barbados' approach can be divided chronologically into 4 distinctive groups, the social approach; the organisational approach; the legal approach and the legal and organisation approach. How these were achieved is shown in figure 5-16.

	c1900	c1930	c1950	c1965	c1980	2015
Need	Discourage open defecation	Encourage to use toilet facilities to reduce contraction and spreading of diseases	Everyone using toilet facility, maintain satisfactory condition through waste management	Full participation and Compliance with safe health practices	Sustainable health practices and wider social and economic development	
Sanitation related Action	Increase use of Sanitation Facility	Increase latrine construction and usage	<ul style="list-style-type: none"> - Establish to ESU; - Provide communal solid waste receptacles; - Designate area for night soil disposal; 	Health Services Act 1969; Establish Sanitation Services Authority Act 1974 Building Regulations	Separate and Specialised Services Re-organisations of Administration Promote advanced solutions	
Health outcomes	Reduction/Elimination of Diseases	Improve Personal Health	Promote good health behaviour Protection of population health	Enforced good health practices Establish legal framework to achieve targets	Protection of public health, particularly, the visitors	
	Social Approach		Organisational Approach	Legal Approach	Legal and Organisation	

Figure 5-16. The various approaches to sanitation improvement

Under the social approach, advocacy for improvement of sanitation was based on health improvement and longer life. The provision of adequate toilet facility and the maintenance of a good sanitary environment are integrally parts of Barbados' culture and is enshrined in also all aspects of development and service provision. The social approach to sanitation improvement dates back to the Lord Moyne's commission, which is a pre-independence investigation into the uprising within the then British West Indies colonies that was conducted in 1930 following widespread riots protesting the deplorable living conditions to which residents were being subjected.

The policy and institutional framework of Barbados has been a critical factor in the development of social policy emerging in the post-Independence period. Social policy development in this period was generally informed by a philosophy of social reformism in which the state played a central role in the development and delivery of social services and exerted some measure of regulatory control in respect to private initiatives. The overarching political philosophy of democratic socialism with its linchpin of ‘freedom’, ‘equality’, and ‘democracy’ has been evident in the drive by successive governments to maintain and improve the quality of life of Barbadians” (ECLAC, 2001). Barbados enacted a series of legislation during that period (table 5-5), to enforce its commitment to bring about the changes considered necessary.

Table 5-5 Legislations that arose during the policy approach period

Major Legislative Document	Date Enacted	Implementation Agency
Health Services Act	1969	Ministry of Health
- <i>Health Services (Building) Regulations</i>	1969	Ministry of Health, Town & Country Planning
- <i>Health Services (Nuisances) Regulations</i>	1969	Ministry of Health
- <i>Health Services (Disposal of Offensive Matter) Regulations</i>	1969	Ministry of Health
- <i>Collection and Disposal of Refuse Regulations</i>	1969	Ministry of Health
- <i>Control of Mosquito Regulation</i>	1969	Ministry of Health
- <i>Health Services Domestic Animal Keeping Regulations</i>	1969	Ministry of Health
- <i>Health Services Rodent Control</i>	1969	Ministry of Health
- <i>Health Services Offensive Rodent Control</i>	1969	Ministry of Health
Groundwater Protection Policy	1963	Ministry of Housing and Lands
The Town and Country Planning Development Order, 1972	1972	Ministry of Housing and Lands
Barbados Water Authority Act	1980	Ministry of Health
Marine Pollution Control Act	1998	Environmental Engineering Division (Environmental Protection Department)
Coastal Zone Management Act	2000	Environmental Engineering Division (Environmental Protection Department)

Barbados has consistently used the legal and organisational steps to solve many of the developmental challenges. As such, apart from the early efforts of social encouragement and support for improving the state of sanitation on the island, the advanced state of sanitation in Barbados can be attributed to the introduction of legislation and the re-organisation of administration to confront its environmental and resource problems.

5.6 What did not Work – Challenges in Barbados sanitation development

Despite the considerable progress made in sanitation development, Barbados underwent a series of failed approaches to arrive at the ones that were proven effective. One of the earliest approaches was the use of persuasion and appeals to the public as the means of creating public change. However, this approach failed to have the necessary impact as households refused to change their behaviour towards sanitation. There was much resentment pertaining to the link between sanitary condition and health. The early efforts were significantly retarded. Although interventions commenced at the beginning of the 20th century, it was only mid-way through this century that the link between better health and improved sanitation became fully entrenched in Barbadian culture. There was still the habitual regression to poor sanitary practices due to lack of education and persistent poverty coupled with the manifestation of ill practices from other sanitary components, particularly solid waste management, which resulted in sustained threats to the health improvement agenda. The result of this attitude saw an increase in Infant Mortality Rate in the 1930s after the initial decline in the 1920s and a corresponding decline in the death rate of almost 50% that occurred between 1928 and 1932 but, did not continue through to 1937.

The representative from the Environmental Health Unit of the Ministry of health noted that following medical interventions which led to improvements in health, individuals were often re-infected with diseases because of continued poor sanitation practices. This resulted in [Barbadian] authorities refocusing the health improvement strategy from a curative approach to the preventative aspect. This resulted in increased attention to the prevailing sanitary conditions on the island and the initiation of public health reforms with sanitation improvements at the helm.

5.6.1 Challenges to advancing sanitation improvement programmes

It took almost 100 years of advocacy to make the strides that Barbados has experienced. Although their social systems provided incentives for citizens to consider changed behaviour, lack of awareness and education in a number of cases restricted the developmental process. Changing Human Behaviour/Practices was the primary challenge to improving sanitation. On a number of occasions, it was reported that interventions failed because persons refused to change their behaviour and to curb poor practices. Cultural norms and practices were opposing forces to new ways of thinking. Even in the adaptation of the policy approach, tough enforcement followed. However, with sustained advocacy and increase in awareness and education, there was less need for enforcement and improved sanitation became part of the culture.

Financial restriction brought about by the high level of poverty was also a major challenge in the early years of sanitation development and continues to be the same today. Moreover, the lack of financing to make the ambitions strides wanted by successive Barbadian government continues to be a retarder of progress. The expansion of the sewer system in Barbados has been curtailed due to the inability of the government to secure financing - the provision of which would have propelled sanitation in Barbados further.

5.7 Critical Lessons from Barbados Approach

A number of critical lessons were extracted from Barbados' approach. These include:

5.7.1 Strong Political Will

Strong political will drove sanitation development in Barbados from early settlement to modern day. The colonial leaders demonstrated clear will to improve the state of sanitation in the interest of preventing spread of disease setting a clear precedence from post-political independence leaders, who continued their advocacy. The strong political will has kept the subject of sanitation at the forefront of public discourse and within nation building strategies. The interest of sanitation is well represented across successive governments, demonstrating that good sanitation is more of a culture, rather than a passing element. This political interest in sanitation is seemingly recognised by the population resulting in residents supporting the developmental

ambitions of the authorities, despite the challenges of capacity, resources and geographic restrictions.

5.7.2 Early recognition of the Impact of Poor Sanitation to National Development

Another critical lesson was the early recognition of poor sanitation on critical natural resources for development and healthy living. Understanding and embracing the fact that poor sanitation can have adverse implication to critical national developmental systems has propelled Barbados to take action to curb poor practices. This catalysed the requisite policies to be introduced to safeguard systems, linking sanitation as a key factor to development and sustainability.

5.7.3 Adaptation of a country-appropriate approach

Another notable observation is the flexible approach taken by Barbados. Their approach was not static. Barbados utilised a number of approaches and drivers to sanitation improvement based on their need at the particular time. Even in the definition applied to sanitation, Barbados opted to remain with the conventions that best suits their needs, rather than to adopt developing alternatives. Even the excreta management facilities utilised as based on the cultural, financial and environmental constraints within the island. Drivers changed as the need deemed fit, based on the need at the time. This was possible by having a clear idea of the systemic conditions at play in the country.

5.7.4 Sanitation Improvement Driven by State – Public Good

Actions taken toward sanitation have all been driven by the state. Sanitation improvement demand originates from the state, with conditions imposed on the population in the interest of public good. This disposition is linked to path dependence for sanitation improvement. Today sanitation actions are generally viewed and undertaken out of the fact it is a 'public good'. This increases public buy-in and easily justifies the resources need for investing in sanitation improvements, creating an ease for sanitation development initiatives nationally.

5.7.5 Transferrable Lessons for Policy Development

The major lessons considered critical in the designing of a policy framework for Barbados includes:

- The need to identify and clearly understand the role of adequate sanitation play in national social and economic development; Identifying how improving sanitation aid in national development.
- Sanitation improvement cannot occur in isolation to other national development objectives. Sanitation improvement must be considered integrally with other national development issues such as housing improvement, improving health in communities or building climate change resilience.
- Sanitation championing from the top, supported by policy changes and administrative adjustments worked.
- Drive for sanitation improvement must come from in-country for intervention to be appropriate, effective and sustainable.
- Political harmony must be achieved on the issue of sanitation to allow sanitation development momentum to be carried over across successive governments. This can be achieved by establishing the clear link established between sanitation improvement and national development.
- There must be strong social attributes (sense of belonging to country, national pride, strong ownership) attached to sanitation improvement to garner support and sustainability.

5.8 Conclusion

This case study unearthed a number of key lessons that can be transferred to aid the development of an appropriate sanitation improvement framework for Guyana. Sanitation improvement was an influential factor in Barbados' development after it was embraced as a public good very early in Barbados' development. The development sequence of Barbados had both positive and negative impacts on the existing state of sanitation. On the positive, enabling institutions were created from

the early interest in preserving health on the island. The flexible approach by Barbados allowed for the creation of favourable enabling environment for sanitation improvement. Linking of sanitation to key sustainability parameters kept sanitation improvement at the forefront of development. On the negative side, sanitation intervention targeted the mere minimum that would eliminate threats, and often was only initiated when at the point of catastrophe. Investment in sanitation improvement continued to compete with other developmental priorities. However, one of the most notable contributors to Barbados' success was the clarity of their intention for national development. This case study increased understanding on the need for a bespoke approach for national sanitation development and was effective in shaping the design of the sanitation framework for Guyana.

Chapter 6. Assessing the current state of sanitation in Guyana and the limiting factors to universalisation

6.1 Introduction

This chapter presents the main findings from the assessment of sanitation in Guyana, which formed the core dataset required for designing the policy framework. The aim of this analysis was to (1) identify the factors that have influenced and shaped the existing state of sanitation, (2) measure the existing coverage and document the physical condition at households to establish a baseline and (3) to determine the limiting factors to universalising adequate household sanitation. A combination of primary data collected from the field survey and secondary data retrieved from the desktop review of appropriate literature was used. In an attempt to understand all the critical systemic conditions that influenced the existing state of sanitation nationally as well at the community and household levels, the assessment went beyond the typical 'situational analysis' that is widely used for assessing national water and sanitation sectors. It incorporated a comprehensive analysis of the history of sanitation development in Guyana, in addition to analysing the existing coverage, conditions and systems, before identifying those factors that have or will limit efforts to universalised sanitation. The key areas of focus in this assessment were informed by the output of the Barbados case study, coupled with the researchers experience in participating in previous sanitation assessment in Guyana. Insights were also gained from previous sanitation sectorial assessments such as that completed by PAHO in 2008 in preparing a strategic plan for Guyana's sanitation sector. This comprehensive approach was considered necessary to understand the mechanisms that formed and currently informs sanitation decisions and practices, and to produce the data critical to shape an appropriate policy which will create an enabling environment capable of universalising and sustaining an adequate provision of sanitation for households in Guyana. The output of this analysis, supported by the lessons learnt from the successes of Barbados highlighted in Chapter 5, is used for the design of the policy framework presented in Chapter 8. The chapter commenced with this introduction before giving a brief overview of Guyana, highlighting elements

critical to this study. The following section outlines the data collection and analysis methodologies that were employed before presenting the core findings in sections 6.4, 6.5, and 6.6. The main conclusions derived from this analysis are presented in Section 6.7, the final section.

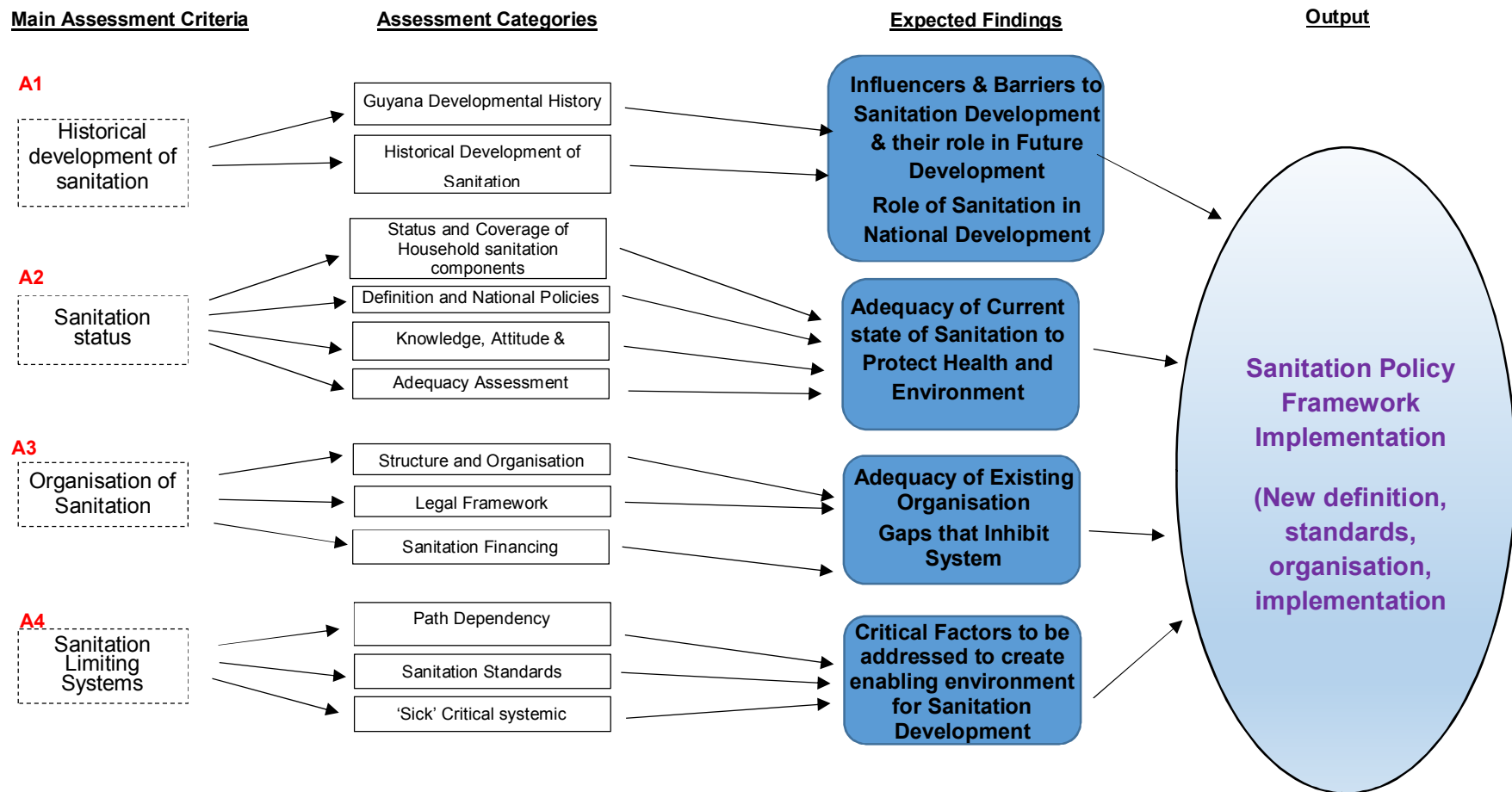


Figure 6-1. Conceptual Framework for Sanitation Sector Assessment in Guyana

6.2 Historical development of sanitation in Guyana

Understanding the historical development patterns of Guyana and events that influenced sanitation was considered critical in identifying the factors responsible for the current state of sanitation and in informing policy direction within the sector. This was the first steps taken is the analysis of Guyana's sanitation situation. These findings are presented as per the assessment categories outlined in column 1 of the conceptual framework shown in **figure 6-1**, and commenced with the review of Guyana's historical development, then followed by identify sanitation development trends in Guyana, as identified from assessment criteria **A1**. The finding of that assessment is presented in this section; first commencing with an overview of Guyana's historical development, then chronicling the events and actions that have shaped the status quo of Guyana Sanitation Sector as denoted by the two (2) assessment categories for the **A1** criteria. The findings from this review were critical in understanding what created many of the institutions and existing systems as well as understanding the linkage between disease, development and sanitation in Guyana.

6.2.1 Guyana's history, development and sanitation

The Dutch was Guyana's first and longest territorial occupiers, which occurred from around 1616 when they established their first settlement following trade with the indigenous population. The indigenous Amerindians population later experienced severe persecutions at the hands of the invaders, which subsequently led to their self-imposed isolation in the dense forest, which they still call home today (**figure 6-2**) (Edwards and Gibson, 1979; Oostindie and Paasman, 1998). The Dutch, during their period of occupation, initiated much of the infrastructural development, organisation and institutions that forms modern-day Guyana, from the plantation economy, to the coastland occupation. They constructed the majority of the major infrastructure, including the intricate coastal drainage system based on systems that were employed in the Netherlands, including the installation of sea defence along the coastal areas. Historians have noted that the Spanish, French and Portuguese also vied for ownership or inhabited some sections of Guyana during the Dutch occupation, (Edwards, Wa and Mensah, 2005; Josiah, 2011; Acemoglu and Robinson, 2012).

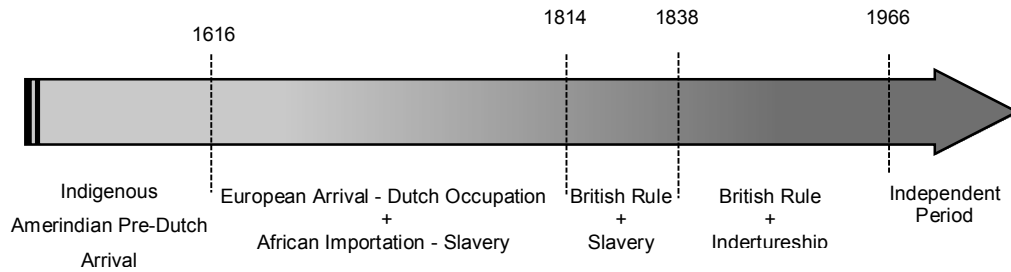


Figure 6-2. Guyana's occupation time series

However, historical accounts reveal that the modern-day Guyana (formally British Guiana) was only conceptualised *circa* 1831, when the British, who took administrative control of the territory from the Dutch settlers, combined its three (3) main geographical blocks; Essequibo, Demerara and Berbice (The Commonwealth, 2015). As illustrated in **figure 6-2**, Guyana continued under British colonial rule from this time until 1966, when it gained political, social and economic independence.

During the Dutch and British rule, sugar plantations form the main economic activity in Guyana. With the indigenous population unable to cope with the harsh work and conditions on the plantations, Africans were imported by the Dutch as part of the on-going European slave labour at the time, to work on the plantations. The British continued this practice until 1838, when slavery was finally abolished and slaves emancipated. Following emancipation, the British imported Indians and smaller numbers of Portuguese, Chinese and Japanese to work as indentured labourers, to compensate for the deficiency in labourers. The human development trajectory was set in motion from this point on, creating both social and economic class systems. The surviving indigenous population remained in the isolated within the desolate forested regions; freed African formed villages, moved to the urban area or remained on the plantation; while the new indentured residents, imported to serve the plantation economy, settled in the plantations that littered the coastal strip. This formed a new heterogeneous population, of varying languages, cultures and aspirations.



Figure 6-3 Aboriginal Indian (Amerindian) Barber in the forest of British Guiana.

6.2.2 Housing Development in Guyana

The majority of the indentured Indians lived and worked on the sugar plantations and the neighbouring environs, while many of the freed Africans formed small farming communities on uncultivated and marginal lands, which introduced new subsistence living/ village-type settlements (Potter, 1993). Freed African slaves also migrated to the towns and city in search for work in other sectors, introducing urban slums, tenement living and squatting to ethos of settlement in Guyana. The lack of basic amenities, most notably water and sanitation created conditions that widened the fragile sanitary conditions that once only existed within the plantations and plantation settlements.

Unable to acquire lands for settlement development due to stringent land laws introduced to retain labour on plantations some ex-slaves and disgruntled indentured labourers (those that were unable to purchase abandon estates and fields) used squatting as a means of gaining some independence from the plantation system (Richardson, 1977; Mohamed, 2008). Limited resources to construct adequate housing, saw the construction of 'mud-trash' houses⁵, which gradually improved to timber structures over time. In later years, with marginal lands decreasing, migrating population, or persons unable to afford increasing rent inhabited government lands and even privately own lands illegally, resorting to the construction of shacks and tenement living in the urban areas (See **figure 6-4**) (Rodney, 1978 and Mohamed

⁵ Mud-trash houses were housing about 20 by 10 feet, built from locally sourced trimmed poles cut from trees, where the walls are wattled and filled with mud, sometimes mixed with cow dropping to be a binding agent, which is then smooth over with liquid mud. Roofing was usually bundled grass or palm leaves (Smith, 1956).

2014). A large percentage of communities in Guyana were formed via this process. Squatting continues to be widely practised in Guyana.



(Copyright BBC Library Service, 2002/2003)

(a) 'Typical Indian People House' of British Guiana 1910 (Source: <http://www.discoveringbristol.org.uk/browse/slavery/category/historic-photographs/P230/>)



(b) A squatter on marginal land in Guyana 2014 (Photo Source: www.signalsfromouterspace.blogspot.co.uk)

Figure 6-4. Squatter houses on marginal lands in a rural a community in Guyana

There have been many attempts to change this approach to housing and community development, especially in the immediate post-independence period, where the national government built houses and in some cases partner with communities to develop communities with adequate housing. With intention of remedying many of the social and economic ills, a national housing programme was commissioned that promoted improved quality living and many of the designs catering for all amenities for healthy living to be included in schemes. The Tucville housing development (**figure 6-5**) is an example of such a project. Completed in 1970, this project initiated by the new government of the independent Guyana demonstrated the intention of the Government to develop complete community solutions. The Tucville Housing development comprised the construction of 668 houses, schools, health centre, improved drainage design; all served by a sewer system and a wastewater treatment plant. This project was the first of its kind in Guyana, but was intended to illustrate the development direction of settlement creation in Guyana. Progressive development in other sectors ensued, including the infrastructure, finance and commerce. However, this housing programme was discontinued in the 1980s.



Figure 6-5 Opening of the Tucville Housing Project in 1970.

The practice of constructing houses with little or no sanitation facilities continues today, even in organised communities. This persistent practice suggests that the enigma from the formative years of development has not been eliminated and the population continue to engage in practices that see the development of poor houses and communities.

6.2.3 Sanitation development in Guyana

Records indicate that in early development years, that is, from initial settlement to the start of the 20th century, there was low sanitary consciousness and ill practices in Guyana. There were limited or no sanitation facilities within plantation and similar conditions existed within settlements. Even within the European quarters, poor sanitary practices were prevalent and remained so until linkages were made between disease, death and sanitation (see Brereton, 1989; Teelucksingh, 2006).

Early sanitation development activities were concentrated in the towns for the benefits of the elites (Pierre, 2004). The plantation system in colonial Guyana, colonial government showed little interest to the social and development needs of their “labour force”, except when ill health or death threatens to reduce their manpower. There were marked differences in the developmental progress between the elite concentrated areas and those occupied by the labouring class. Efforts were

directed to ensure the elite class had access to proper housing, running water, paved roads, sanitation services, etc., while the communities of the labouring population lived in abject poverty, without access to services considered basic for survival. For this very reason, the sewer system was construction only to serve a section of the city, while a number of neighbouring communities continued to use pit latrines.

Plantations populated with indentured labourers and rural / ex-slave settlements had poor housing, the absence of basic amenities, including sanitation facilities and poor waste management practices coupled with inadequate drainage systems created poor sanitary conditions (**figure 6-6**). Similarly, basic amenities in newly created villages, bought and occupied by ex-slaves, were practically non-existent. The ex-slave population in the towns faced similar challenges, as rapid rural-urban migration and limited housing or even the ability to pay for housing resulted in persons living in overcrowded poorly constructed building without any facilities gradually creating unhealthy conditions (See Bolland, 1981; Kyle, 1995). Imperial government, colonial leaders and plantation owners paid little attention to improving conditions. Even within the plantations themselves, as noted by Giglioli (1933), Brereton (1989) and Teelucksingh (2006), the absence of basic amenities such as toilet facilities, led to poor working conditions for labourers and created severe public health crises. Cognisance to the health of the labouring population was only given when sickness and ill health affected the plantations productivity. These conditions continued for much of the 19th and beginning of the 20th century. Diseases were prevalent accompanied by high mortality rates.

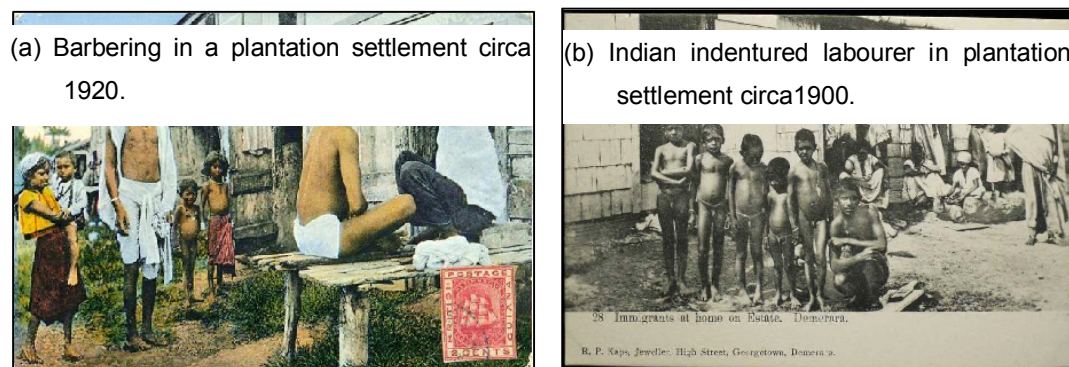


Figure 6-6 Typical Indian indentured plantation settlement housing.

Infrastructure such as sea defence, road network and sea ports that were critical to on-going trade received some attention, while those necessary for wider social and economic development were less paramount. Disease outbreaks, persistent flooding and civil disturbances were the main events that triggered bouts of interest in social and economic improvement and prompted actions to provide relief. Housing development remained slow as economic declines after World Wars I and II reduced the sugar-export economy of Guyana. This led to labour wages being reduced and exaggerated economic hardship and social decline. A number of civil dissidences resulted, which threatened colonial rule (Lewis, 1968; Bolland, 1981; Craton, 1988; DeBarros and Dumont, 2013). The worst of these was the multiple riots in the 1930s that led to the Moyne's Commission, named after the chairman appointed by the Britain to conduct enquiries into the cause of the riots, Lord Moyne. From that point forward, self-determination was firm on the minds of the labouring population and eventually in 1966 the country won its independence from the British with the intention of paving its own developmental destiny.

The primary focus of housing and community development in the early post-independence years was to erect a basic 'shelter'. These would then be expanded as needed to accommodate other basic amenities on improvement in the dwellers economic status (See Cambridge, 2015). Failure to improve their economic status meant dwelling units usually remained the same, often with little consideration to other elements of good household practices, such as proper sanitation. This has become somewhat entrenched in the housing and community development culture of Guyana. In early years, consideration was only given to sanitation when conditions became hazardous to living or infringed on their health (Edin and Thomson, 1913; DeBarros, 2003). However, given that the primary means of excreta management in those early years was open defecation followed by the use of the pale (bucket) system, a practice that continued well into the 20th century post-slavery Caribbean, the importance and value of safe sanitation practices was a relatively new concept and good sanitation practices remained low or non-existent. Even when the installation of a pit latrine became law following the sanitation revolution in the Caribbean region in the 1920s following the hookworm campaign of the IHC, in providing an account of the state of households in British Guiana in circa 1950s Raymond Smith (1956, p.81) wrote:

“The law stipulates that each house must have a pit latrine, and in fact, most housing do have one on the same lot, though some households share a latrine, or use the bush on the outskirts of the village. It is not considered improper to micturate anywhere outside the house, provided one is not seen, and few people would trouble to go to a latrine for this purpose after dark”.

Public planning for sanitation in housing and community development only commenced mid-way through the 20th century in Guyana, although the first sewer system was installed in the 1920s. The post-independence government seeking to change the ad hoc community development practices considered taking a holistic approach to developing new communities, which give early consideration for basic amenities such as water supply, sanitation, electricity, drainage and roads. However, this new culture failed to take root as the dis-interest in sanitation is still evident in housing and community development in Guyana. Today little forward planning is given to sanitation. New housing schemes are developed with little or no consideration for sanitation. In some areas persons construct houses, then on completion or during habitation, give consideration to installing or gaining access to sanitation related services⁶. Even in housing planning, although policies prescribe that plans for sanitation be developed, little attention is given to sanitation planning, and with the absence of effective monitoring, failure to plan for sanitation go unnoticed.

Sanitation continues to be an after-though of development will lead to a sustained condition of sanitation improvement having a low development priority in Guyana. As such, in competing for usually limited government resources, failure to bring sanitation to the forefront of developmental planning will result in curtailment of the needed sector developments brought on by the non-allocation of funds, shifting of resources and little attention being given to the extent and quality of service being provided against what is required. Additionally, no attention may be given to develop sector plans and if developed, those plans can fail to be included in wider national development plans, which can again restrict funding opportunities.

Universalising sanitation at the household level requires a proactive approach, where decisions relating to sanitation are made at the inception of housing and community development activities. Further, it would demand significant investment in the sector,

⁶ Sanitation in this case refers to excreta management, solid waste management, drainage, and other components that constitute sanitation.

which means either having an increased priority on the government agenda or inclusion in development plans, which can be used as a guide for external funding agencies. A continuation of this limiting institution will have an adverse effect on plans to universalise and sustain adequate household sanitation in Guyana.

6.2.4 Linking of Sanitation with Health Care Services

Improving sanitation was first considered in Guyana (then British Guiana) between 1914 and 1916, during the hookworm campaign of the IHC. It was immediately linked to the health services as it was considered as a means of improving the ‘health’ of an ailing labour force (De Barros, 2003; Farley, 2004; Palmer, 2013). In fact, as explained by Steven Palmer, sanitary laws on plantations were instituted by colonial authorities through directives from the wider British Empire to reduce the financial burden brought about by the hookworm disease (Palmer, 2013). Palmer further explained that a report by the British Empire *“recommended laws for the provision of privies on estates, with penalties for those found avoidably defecating in any place where contamination of the soil was a problem”* (Palmer, 2013, p. 44). The laws also instructed that each colony be divided and the appointment of sanitary inspectors and local medical officers to enforce new sanitary regulations. This was the birth of the linkage between sanitation and health services delivery. These laws were confined to the plantation until the 1930s, after which they were expanded to include the wider population, now requiring households to construct privies on their properties, with penalties for those found avoidably defecating in the open. This is despite recommendations and insistence from the IHC on the need for colonial government to invest in the construction of privies (pit latrines) for private homes to combat the hookworm disease. The colonial government evaded this responsibility with the aim of the IHC including this as part of their remit (Farley, 2004). The eventual laws only sought to provide the public with monitoring and advisory services for sanitation improvement and maintenance. Both gave the connotation that the responsibility for sanitation rest with the household, making it a private matter. This attitude may have influenced the shaping of sanitation laws and public services in British Guiana, the remnants of which persists even today.

Sanitation in Guyana is still hinged under the Public Health remit, with mandates identical to those set out in the first pieces of sanitation regulations. A Public health Ordinance was drafted by the colonial Government in 1934, which included

provisions for the installation and management of sanitation at the household level and in public places. This law is still the primary piece of legislation that guides sanitation management in Guyana. Sanitation monitoring and advisory services are still delivered within the health remit, despite reorganisation of the health sector and significant changes in the demands for sanitation services beyond the remit of the services offered by the public health (sanitary) units.

The reluctance to modernise the sanitation services have led to some of the functions within the original organisation, such as the Central Board of Health, becoming obsolete and the transference of some sanitation responsibilities to other public service sectors and agencies.

6.2.5 Evolution of sanitation development

Sanitation improvement in Guyana became the centre of attention at the turn of the 20th century, at the same time the world over because conscious to the ills of living in poor sanitary conditions. Although there were many diseases that plagued Guyana such as the deadly cholera outbreak in 1857, the first action to address sanitation was through international intervention. Guyana's first sanitation intervention came at the hands of the Rockefeller foundation of the United States of America, who launched their campaign to rid regions of the hookworm disease, infamously known as the 'lazy' disease due to its debilitating effects on its host. Guyana was the first country that participated in the hookworm campaign. One of the main themes of the campaign was the need for improved sanitary conditions to prevent the re-occurrence of the disease, as it was found that walking barefooted in faeces contaminated soil was the main cause of contracting and transmitting the disease. Prior to this time, the use of a sanitation facility, even in its rudimentary form was not common practice. Open defecation was the order of the day while working on plantation and even within the housing settlements. Working and living in the areas within the faeces contaminated soils provided the perfect condition for the disease. The successes in reducing the incidence of the disease through the increase use of a toilet facility as opposed to open defecation, led the Hookworm campaign making the construction and utilisation of pit latrines a mandatory requirement for future intervention in communities in Guyana and in other countries. This revelation by the campaign forced plantation owners to install pit latrines and assisted persons and communities to construct their own latrine facility.

In the 1920s the first sewer system was installed in a section of the capital city (**figure 6-7**).

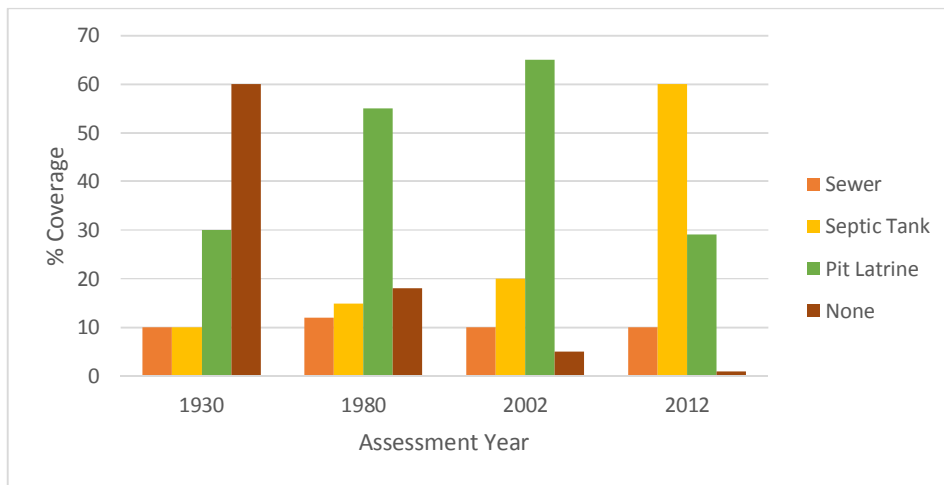


(Source: Overtown Miscellany – overtown.org.uk)

Figure 6-7. Construction of the sewer system in Georgetown in 1920

Additionally, with improvements in the social and economic welfare of the country, and the expansion of critical infrastructure such as water supply, electricity, roads, etc., more households tended towards improving their sanitation facility. However, sanitation infrastructure did not increase as other infrastructures were expanding, resulting in progress in sanitation being stagnated. More recently, there have been interventions through international development agencies and NGOs. This resulted in increased education, awareness, and funding, which reduced the lackadaisical approach that was given to sanitation improvement and saw considerable improvements, particularly reducing the number of persons were not using or without a sanitation facility (**figure 6-8**). However, improvement was slow and in some cases, curtailed by the absence of supporting frameworks such as good organisational arrangements, monitoring and maintenance capacity and technical capability. As

such, many of the excreta management facilities at the household level have failed to evolved over the years. A description of the types of excreta management facilities current in use in Guyana is presented in section 6.4 of this thesis and was undertaken as a prerequisite for evaluating the coverage and status of sanitation. This was particularly critical in determining the adequacy of the facilities used. Data for this description was gathered from documents accounts of sanitation facilities and data collected during the field survey.



(Note: The population dynamics such as change and movement due to rural-urban migration were not taken into consideration)

Figure 6-8. Transition in excreta management facilities use in Guyana

6.3 Sanitation Status

This section presents an in-depth analysis of the current state of sanitation in Guyana. It commences with an examination of how sanitation is defined, both from a national perspective and across the hierarchy of sanitation provision and management. The data used for this assessment were a combination of secondary data retrieved from the desktop review of national documentation and grey literature and primary data retrieved from the interviews of sector practitioners conducted during the field exercise. The second segment of analysis is a critical assessment of the current state of sanitation, which examined the five components of household sanitation previously identified as being critical to achieving and sustaining adequate household sanitation, given Guyana's characteristics. Reviewing the current sanitation practices at the household level formed the penultimate section of this assessment, while the

concluding highlighted the key findings of the assessment and the implications to the design of an improvement strategy and improving sanitation. This assessment of the sanitation status corresponds to element **A3** of the conceptual framework shown in **figure 6-1** and represents a critical element in establishing a baseline from which the requirement for sanitation improvement will be determined.

6.3.1 Sanitation definition

The term ‘sanitation’ is used to describe a number of elements in Guyana. Data from the literature reviewed and responses from the interviews revealed that sanitation is used when referring solid waste management, drainage, toilet facility and any condition relating to the general condition of the environment. The varying context in which the term is used led to the conclusion that there is not an established definition for sanitation used nationally or across the organisations tasked with the delivery and administration of sanitation services.

The review of national documents for an official documented definition of sanitation proved futile as no evidence of a clear definition of sanitation was found. Despite sanitation was referred to in the National Development Strategy (1997) and the Low-carbon Development Strategy (2009) , which outlines the primary development ambitions for the country, it was used in varying context. For example, the National Development Strategy (GoG, 1997), refers to the need to have “*more widespread access to potable water and sanitation services*” across the country. Further, in discussing risks to the health profile of the country, section 19.1.2.3 of the strategy declared,

“Basic sanitation is poor. Sanitary conditions are dismal in squatter areas, many of which have no hygienic means of waste disposal. New housing schemes, factories, commercial institutions and industries have been developed without complying with the existing land development laws. In fact, individual septic tanks and pit latrines are often the only means of sewage disposal and are frequently not constructed at the recommended distance from the water supply” (GoG, 1997, p. 244).

This excerpt asserts that nationally, hygienic waste disposal, excreta management systems and safe water are considered part of basic sanitation. The National Development Strategy further included sanitation as a part of primary health care services, noting that,

“Public resources will be prioritised to highly cost effective services, such as primary health care (services like immunisation, sanitation, vector control, diagnosis and treatment of tuberculosis, malaria, sexually transmitted diseases, the provision of maternal and child care, health education, and public health interventions)”, (ibid, p. 254).

Section 19.I.1.8 of the strategy further asserts that,

“This morbidity profile indicates that it can be improved substantially through enhanced preventive health care, better education on health issues, more widespread access to potable water and sanitation services, and increased access to basic health care of good quality” (ibid, p. 242).

These demonstrated the wide use of the term sanitation, which can be as a result of the absence of a clear definition of the term in the national context to allow homogeneity in its usage. Added to this, a poverty reduction paper prepared by the government in 2005, in attempting to address the apparent deficiencies in sanitation stated:

“With respect to sanitation, the issues identified were inadequate dumpsites; absence of a national policy on garbage disposal; an insanitary environment; and poor maintenance of drains. Underlying these issues was recognition that latrines and burial sites are sometimes too close to rivers, there is little or no desilting of clogged drains, and defogging exercises do not take place on a regular basis” (GoG, 2002, p. 21).

Sanitation is also referred to in many grey literature in including project documents, international organisation country assessments, political party’s manifestos, and in the local media, again under varying context. For instance, the Organisation of American States (OAS) in describing the functions of the Neighbourhood democratic councils (NDCs) in Guyana noted, *“The functions are... to provide efficient services for the residents as stated in the Laws. Services include sanitation, garbage disposal, road/dam maintenance, market facilities, burial grounds, abattoirs, drainage, etc.”* (OAS, 2016 p. 14). In this case, sanitation was considered separate from components of garbage disposal and drainage. In other cases, the Guyana Government Information News Agency (GINA) in examining works undertaken targeting improved sanitation in Guyana, referred to an \$80.3M Solid Waste management project being executed to promote a *“healthier and eco-friendly*

environment”, which showed in this case, solid waste is considered a component of sanitation (GINA, 2016). Country assessment reports on Guyana also makes repeated reference to “*improving access to sanitation*”, and continue to use the term in varying context without a full description of what it constitutes (See World Bank, 2003; Jha, 2005; PAHO, 2012; Ogden *et al.*, 2013). This clearly showed that sanitation is used to represent a number of components, inclusive of excreta management facility, solid waste, good hygiene, drainage, vector control, food safety, wastewater, safe drinking water amongst other.

Findings from the interviews also demonstrated the absence of consistency in what is viewed as ‘sanitation’. Responses were based on their personal perception, noting there was no evidence of an official definition. The international agencies representatives, in most cases, referred to the definition used within the international development context – safe separation of human excreta from human contact. Collectively, the respondents across the hierarchy of sanitation administration in Guyana highlighted eight individual elements they related to defining sanitation. Their frequency of response is shown in **table 6-1**. The responses showed a correlation between the portfolio of the representative and their perspective on how sanitation is defined. For instance, the agencies whose mandate primarily surrounds solid waste management highlighted solid waste management as the key definition for sanitation.

Table 6-1. Interview response for the definition of sanitation

Elements defining sanitation	Frequency of Response
Separating excreta from human contact (Toilet)	38
Garbage (Solid Waste) management	31
Water supply	22
Mosquitoes (Vector)	18
Hand washing	13
Yard drainage	11
Clean physical surroundings in property	7
Trees overgrowth	5

This apparent inconsistency in defining sanitation will have grave implications to any effort aimed at holistically improving sanitation for households in Guyana. It is also clear that an appropriate definition for sanitation must be established. A clear, appropriate definition will unify national perception across stakeholders and allow for the establishment of achievable targets for universalising sanitation. This definition must be the first step in the policy framework process.

Six factors are considered primary to defining sanitation in Guyana given their frequency of association. These are (1) toilets (excreta management facility), (2) garbage (solid waste) disposal, (3) safe and adequate water supply, (4) mosquitoes (vector) control, (5) hand washing (hygiene) and (6) reduced flooding (drainage). The combination of these factors into a holistic definition for sanitation that is appropriate for households in Guyana is evaluated in later sections.

6.3.2 Legal Framework, Organisation and Management of Household Sanitation

Assessment of the legal framework was done through the critical examination of the key legislation that are used in the delivery and management of sanitation for households. The organisational and management arrangements were determined by analysing the roles and services provided by each organisation in the sector.

Public Health Ordinance

Chapter 145 of the Laws of Guyana, The Public Health Ordinance Act of 1934, revised in 1953 and amended in 1976, is the oldest pieces of legislation in Guyana that guides the delivery and management of sanitation services in Guyana. Designed to organise and manage public health services, the Act outlines the organisation of the health delivery system and actions that must be taken to maintain good public health within communities. No evidence of this piece of legislation was presented or observed, however, it remained the most reference legal document used in the sector. A number of subsequent Act such as the Public Health Act 1976 and Ministry of Health Act of 2005 were tailored to reinforce/modernise the provisions of the Public Health Ordinance Act.

The Environmental Protection Act

Environmental Protection Act of 1996 make provisions for protecting public sanitation such as maintaining clean public spaces however, there is no remit that is extended to households. Household sanitation falls outside the remit of this law. This was confirmed by representatives of the Guyana Environmental Protection Agency during an interview. As local authorities have direct responsibility for the sanitary state at the household level, many of the obligations under primary legislation such as the

Municipal and District Councils Act

Public Health Ordinance and the Town and Country Planning Act outline the responsibilities of local authorities for the sanitary state at the household level. The Guyana National Bureau of Standards, with no interconnection with the other primary legislation, is responsible for establishing guidelines and standards nationally, which include those for household sanitation. Currently there are guidelines for design and construction of septic tanks and pit latrines. Whilst there is a wastewater effluent standard for disposal of industrial wastewaters, no guideline or effluent standard for the disposal of domestic wastewater or septic tank effluent exists.

Table 6-2. Key legislation governing the sanitation sector

Item	Law	Application to Household Sanitation
1	<i>Public Health Ordinance 1934 rev. 1953</i>	Outlines how households should manage the various types of waste streams Identify requirement for monitoring and enforcement of good sanitation at households to protect public health
2	<i>Local Government Act</i>	Empower local government organs (NDCs) to provide services to households. Unfortunately, specific references to the services to be provided is not identified. However, it is widely interpreted that all key services to households (solid waste collection, drainage, enforcement of provisions of public health ordinance) are the responsibility of the Agency.
3	<i>Local Democratic Organs Act</i>	Outlines how LDOs should undertake the management and governance of local affairs, including the delivery of critical services to communities and households.
4	<i>Municipal and District Council Act and bylaws</i>	Charge and Empower municipalities to provide services to households – water supply, solid waste collection, drainage. Enforce the provisions of the public health ordinance.
4	<i>Water and Sewerage Act</i>	Empower to provide access to water supply for households; Operate and maintain sewer system; Instruct households to connect to Georgetown sewer systems.
6	<i>Town and Country Planning Act</i>	Impose sanitary construction with respect to building. Providing advisory service for “providing for sanitary conditions”.
7	<i>Guyana National Bureau of Standards Act 1984</i>	Establish standards for all components relating to sanitation - excreta management facilities, effluent standards, etc.

6.3.2.1 Adequacy of Legal Framework for Sanitation Development

Public Health Ordinance is dated and do not adequately address all the issues related to sanitation and places the primary responsible for household sanitation on households. Other legislations do not expressly referred to sanitation. There is a lack of coherence in the legal framework that governs household sanitation. This may have been as a result of the absence of a clear definition for sanitation and each component identified as being critical to sanitation, is considered separately. Also, responsibilities are placed with entities that are incapable of delivering the required services. The exclusion of supporting mechanisms within the laws to enable households to meet the expected performance criteria has also limited the effectiveness of the law. Enforcement is often overlooked (in some cases) due to the inability of households to satisfy the provisions under the law. An example of this is

households refusing to pay for solid waste collection and opting to burn because they are unable to afford the service. Similarly, building plans for houses may highlight that a WC septic tank excreta management facility will be installed within a new household, but the household installs a pit latrine due to financial difficulties or the absence of water supply. Local enforcers often overlook these practices, as they are not equipped with the capacity to influence a change in the output. On the other hand, local enforcers complained that the penalty for defaulting is so low, that defaulters are not deterred from committing an offence. This is coupled with lengthy delays in court proceedings as a result of the absence of a municipal court. The absence of clear definitions and standards enshrined within the law, provide weaknesses that can be exploited by delinquent households unwilling to support the current plans for household sanitation improvement.

An upgraded legal framework that not only enforces, but also supports households in achieving those obligations and one that takes into consideration the critical systems at play within the sanitation sector, is required. This entails the introduction of conditions that meet current needs and a movement away from the age-old notion that household sanitation is a private matter.

6.3.3 Organisation and Management of Sanitation Services

In investigating the organisation and management of sanitation in Guyana, the researcher undertook an analysis of the main organisations within the sector. The analysis included both governmental and non-governmental agencies and examined the efficiency and effectiveness of the current organisation to foster an environment that would promote the universalisation of household sanitation. Key to this analysis was assessment of the distribution of responsibility amongst the multiple players and the financing of sanitation activities. This aim of this analysis was to identify gaps and to measure the suitability of the existing arrangements, to lend to the universalisation of adequate sanitation and the sustaining of such conditions and services. Both secondary data sourced from existing literature and primary data collected via interviews with agency representatives were used in this analysis.

The organisation of sanitation services in Guyana was found to be complex; a complexity not brought on by the number of actors or the multiplicity of the services being offered, but rather, by the disconcerted arrangement of sanitation services and the governing legal framework. There was evidence of the lack of a unified approach

in organising the various components of household sanitation. Household sanitation services are generally organised around the philosophy enacted in the original public ordinances that *“households are to keep their premises in a state that promote the health and well-being of those who dwell therein”* (Public Health Ordinance, 1953, p.). However, although this legislation has now been omitted from the laws of Guyana (Law Revision (Omission) Act, 1997), the original organisational framework established under this law remains, including key organisations, such as the Central Board of Health (**figure 6-9**). Birthed out of the sanitation revolution in the early 1900s, the belief was that good sanitary conditions at households and in communities were critical to protecting health (See Jules and Fryer, 2016).

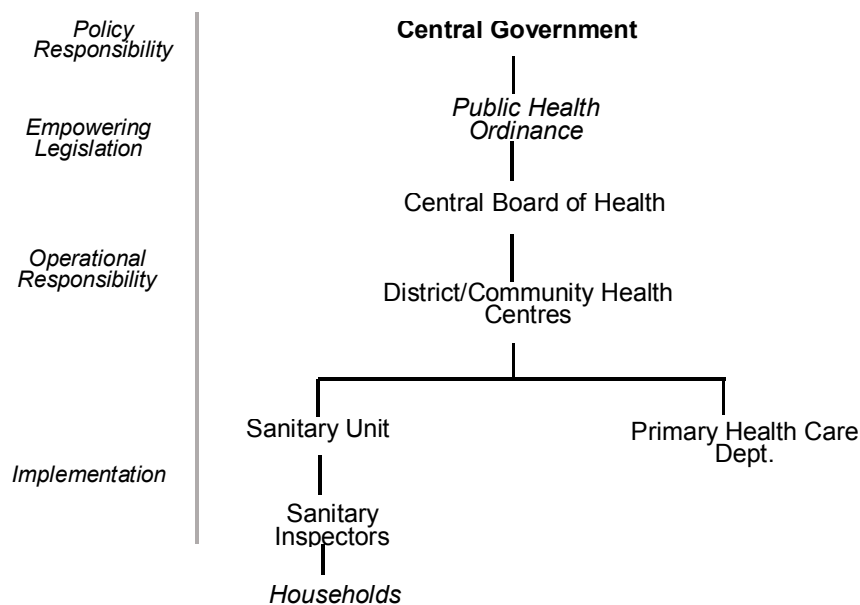


Figure 6-9. Original structure of sanitation service delivery under the Public Health Ordinance

Hitched onto health services delivery, the original mandate for sanitation involved the inspection of households and communities to ensure compliance with laws introduced to ensure persons constructed and utilised pit latrines, while desisting from open defaecation. This system evolved with the modification of the health care delivery system in the mid-1900 and post-independence, where responsibility for sanitation was shared amongst the planning and development office and the new local governance organs that were introduced (**figure 6-10**). Planning for sanitation, particularly excreta management became the responsibility of the Town and country

planners who approved plans for the installations of new facilities. Developers (including households) were required to demonstrate their provisions for proper excreta management prior to approval by the planning office. Provision of alternate services such as solid waste collection and construction and maintenance of drainage, within communities were vested with the local government organs, while inspection and enforcement remained within the created Public Health Unit as part of Primary Health Care Services.

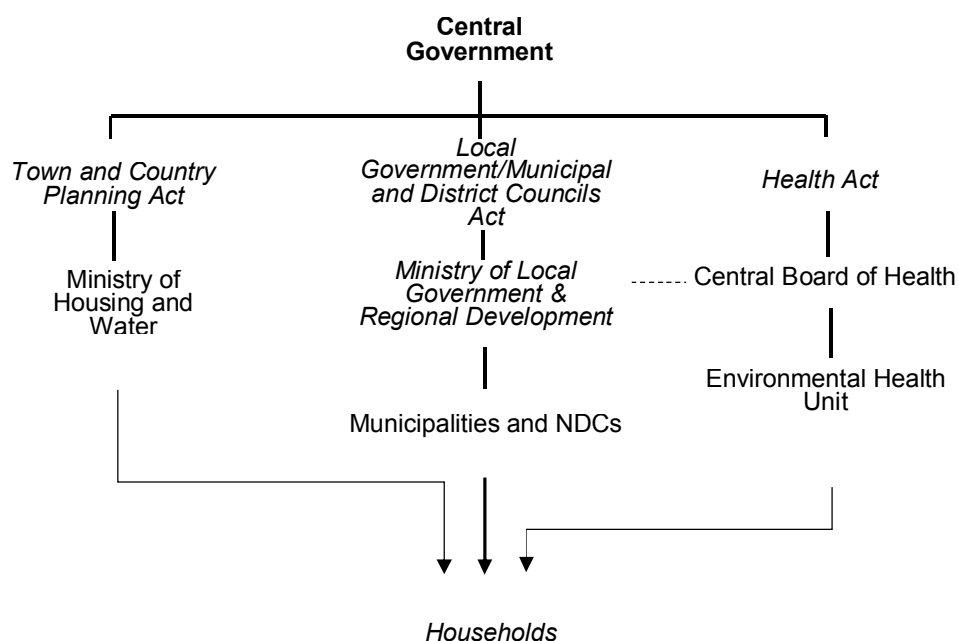


Figure 6-10. Re-organisation of sanitary delivery system post-independence

Today, sanitation services has evolved into a complex network of government, private sector and international donor supporters, all operating under their own interpretation of the Public Health Ordinances and to fill service delivery gaps and in the interest of global development ambitions. Current organisation is shown in **figure 6-11** and the descriptions of the key roles are as discussed below.

6.3.3.1 National Government

There are 3 agencies with official responsibility for sanitation services at the national level; the Environmental Health Department under the Ministry of Health, the Central

Housing and Planning Authority (CHPA) and the Guyana Water Incorporated, both under the Ministry of Housing and Water. .

Ministry of Health – Environment Health Unit

The Environmental Health Unit provides monitoring and inspection services through the local organs, where public health inspectors visit households to assess the physical state of the property. Using an approved checklist (MoH,

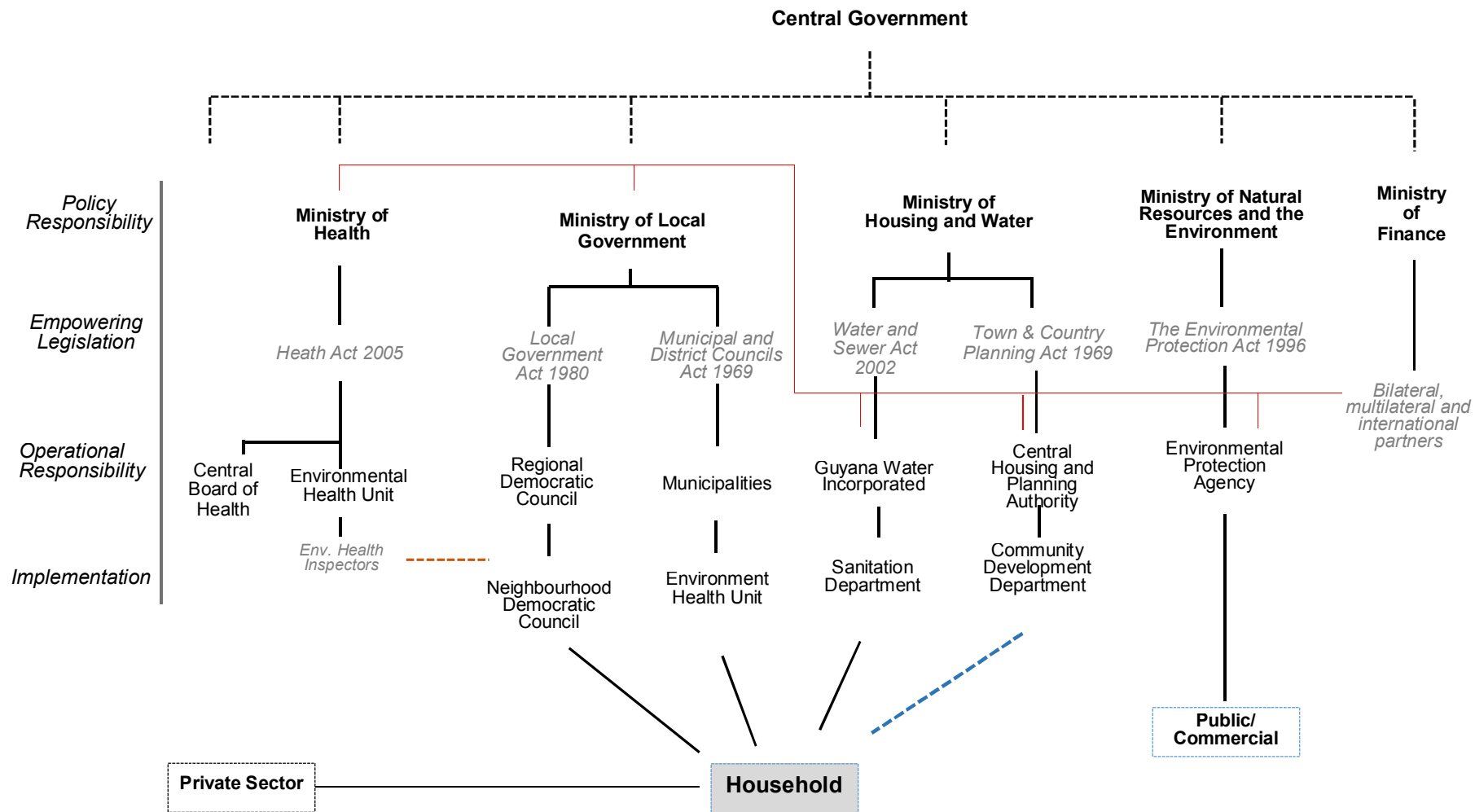


Figure 6-11. Current sanitation service delivery and management structure in Guyana

2010), inspectors undertake monthly visits to assess solid waste management, general cleanliness, vegetative overgrowth, the presence of stagnant water and recommend means of improving, should unsatisfactory conditions be observed.

Central housing and Planning Authority

The CHPA is responsible for the approval of planning applications. Specifically related to sanitations, applicants must indicate as part of their application the proposed excreta management facility prior to approval for construction of the proposed house. Approval of the plan gives permission to the applicant to proceed with development. Procedurally, periodic inspections must be conducted during the construction phase of the development to verify works are proceeding as approved. However, with the absence of local offices, and the overlapping mandate of local organs to provide similar oversight services to household development, the CH&PA surrendered much of this domestic approval to local authorities. However, they have retained their commercial and wider national development planning portfolios.

Guyana Water Incorporated (GWI)

The Guyana Water Incorporated (GWI) was established in 2002 to be the national authority on water supply. The agency is responsible for providing access to water in households throughout Guyana. Guided by the Water and Sewerage Act of 2002, households are required to submit an application for a water supply connection, for which they must demonstrate ownership or permission to occupy the property. This service may be metered or unmetered, with monthly charges applied accordingly. Once ownership or permission can be demonstrated, piped water supply is provided within areas where water supply services are available. GWI also has the responsibility for the 'operation and management' of the Georgetown sewer system. They operate, provide maintenance services, connect new customers and respond to household complaints relating to the sewer system.

Local Government Organs

Local authority organisations have the immediate responsibility for household sanitation management. Empowered through the Local Government Act of 1998,

the Regional Democratic Councils via the Neighbourhood Democratic Councils (NDCs) are legally required to provide sanitation services in rural areas. Similarly, through the Municipal and District Council Act of 1969, sanitation services for the townships are under the purview of municipal councils. However, with decades of deterioration of the local government system in Guyana, and the lack of resources, local government agencies have shelved this responsibility or have downgraded to the provision of basic services, if any. This has resulted in an informal system of sanitation services, where the private sector and non-governmental organisations seek to fill gaps.

6.3.3.2 Households

The Public Health Ordinance and the conditions it purported was based on the historically notion that persons/households were responsible for their own state of sanitation and the state was an agent to ensure households did not engage in actions that would endanger public health. This meant that households bore the primary responsibility for identifying the type of excreta management facility they desired as well as defraying the cost for its implementation. Current practices and indications from household respondents suggest that the arrangements for the other components of sanitation such as wastewater, solid waste and vector control are similar. However, there are cases where sanitation related services are provided by local authorities. This is the case with central Georgetown where legislation was enacted, making it mandatory for properties within sewer areas to connect to that service. In recent years also, solid waste collection has become customary, however, the traditional management method of burning is still widely practiced.

6.3.3.3 International Organisations

International organisations have had active roles in sanitation development in Guyana and records indicate that external financing make up a greater percentage of investments in the water and sanitation sector. As highlighted in Table 6-8, the value of external funding in the water and sanitation sector was significantly more than local investment over the last 20 years. A similar pattern may be traced in other sectors such as infrastructure and transport, attesting to the critical role of international organisations to development financing in Guyana. For this reason, their position and perception of the state of sanitation in Guyana and their potential roles in improving this situation was considered critical to this study. One of the main findings from

engaging representatives from international organisations was their high level of awareness of the sanitation issues facing Guyana. Representatives from both the Inter-American Development Bank and the UNDP noted that interventions in Guyana are based on development priority established by the government, in keeping with their mandate (**table 6-3**). They went on to note that even though they may recognise the need in a particular sector, in this case, the state of sanitation, interventions can only be supported if they are identified as critical areas for their assistance. The EU representative conversely noted that investment financing by their organisation is restricted to the EU designed programme for a development cycle and support for country programmes is based on alignment with that EU programme.

Table 6-3. Key roles and programmes of major international agencies operating in Guyana

International Agencies	Role in Sanitation Management in Guyana
<i>Inter-American Development Bank</i>	<ul style="list-style-type: none"> - Support Government Programs as included in development strategy Documents – request government to identify development priority areas; - Provide financial support for the execution of those plans;
<i>Caribbean Development Bank</i>	<ul style="list-style-type: none"> - Partner with Guyana Government to tackle critical water and sanitation challenges; - Finance improvement projects as part of its regional development programme;
<i>United Nations Development Programme (UNDP)</i>	<ul style="list-style-type: none"> - Supports development plans of the government in-line with UNDP developmental objectives; - Assist
<i>Pan-American Health Organisation (PAHO)</i>	<ul style="list-style-type: none"> - Provide Guidance in identifying solutions to sanitation related problem; - Provide resources and technical expertise in support of Government programmes;
<i>U.S. Agency for International Development</i>	<ul style="list-style-type: none"> - Support country programs focusing on health, economic growth, and democracy and governance; - Implement health programs aimed at strengthening public health systems and working to ensure the availability of comprehensive care;
<i>European Union Commission (EU)</i>	<ul style="list-style-type: none"> - Provide developmental assistance in key areas – based on priority established by the European Commission development objectives for specific periods; - Work with specific sectors to develop capacities to secure key improvement in key development goals;
<i>Guyana Red Cross</i>	<ul style="list-style-type: none"> - Provide training and public awareness
<i>Unicef</i>	<ul style="list-style-type: none"> - No direct role in household sanitation interventions. Focus on supporting the creation of safe school, which includes sanitation.
<i>Global Environment Facility</i>	<ul style="list-style-type: none"> - Support national programmes through programme funding

The involvement of international development organisations in sanitation development in Guyana has had both advantages and disadvantages. Some of the pros and cons are discussed in table 6-4 below.

Table 6-4. Comparison of the pros and cons of international organisation involvement in Sanitation Improvement in Guyana

<u>Positives</u>	<u>Negatives</u>
<ul style="list-style-type: none"> • Agencies provide support based on needs identified by the Government – however development needs must be consistent with overall objectives of the Agency's missions. • Flexibility - Support offered can vary to meet the needs of the national government or agency partner – e.g. loans-technical corporations-grants, etc. • Provides funding for projects that would otherwise be delayed in execution; • Provide access to external expertise and advanced technologies; • Wider regional/global perspective can be useful in guiding national actions 	<ul style="list-style-type: none"> • Agency processes can result in the altering or control of the details of interventions that can lead to deviation from original government intention; • Agency can recognise a critical need requiring intervention, but if it is not within the Government's identified priority no action can be taken; • Influences goes beyond external • Government priorities outside of the Agency's priorities risks being excluded from interventions; • Project outputs do not always meet the needs at the ground level;

- (a) The government and its agencies are not the unitary actor in the sector;
- (b) Legislative changes were not accompanied with effective organisational changes
- (c) Adequate resources were not made available for the effective function of government departments;
- (d) The local system is unable to accommodate the contemporary needs of households.

Sanitation Services are scattered across a number of agencies across Guyana. For instance, the Pan-American Health Organisation (PAHO) in assessing the sanitation situation in Guyana noted that, "there is divided institutional organisation and weak leadership in the sanitation sector" (PAHO, 2008). A similar situation was noted during a review completed by the United Nations Environment Programme in preparing sanitation improvement project documents. This system introduces a number of gaps in the provisions of adequate services. In addition, many of the

services offered are not sufficiently comprehensive to measure adequate. For instance, much of the solid wastes collected across the municipalities are disposed in open dumps, representing an incomplete cycle of waste management. Similarly, many of the households do not practice good faecal sludge management. An organisation with dedicated responsibility for hygiene is not represented in the organisation, which have resulted in a number of gaps within the sanitation delivery system. International organisations in recent years played an increasingly significant role in the sanitation sector. The interests of international organisations in supporting the international development agenda have increased their interests in interventions in the sanitation sector. Some of the pros and cons identified to the increasing involvement of international development organisations are compared in **table 6-10**. The organisation of sanitation must be able to provide efficient services to satisfy all the components that comprise adequate household sanitation. The existing system does not. Some of the major gaps are illustrated in **figure 6-12**. The current structure (laws and practices) of sanitation organisation has semblance to the early sanitation intervention in Guyana and requires critical reorganisation in order to provide adequate support to a policy framework targeting the universalising and sustaining adequate household sanitation.

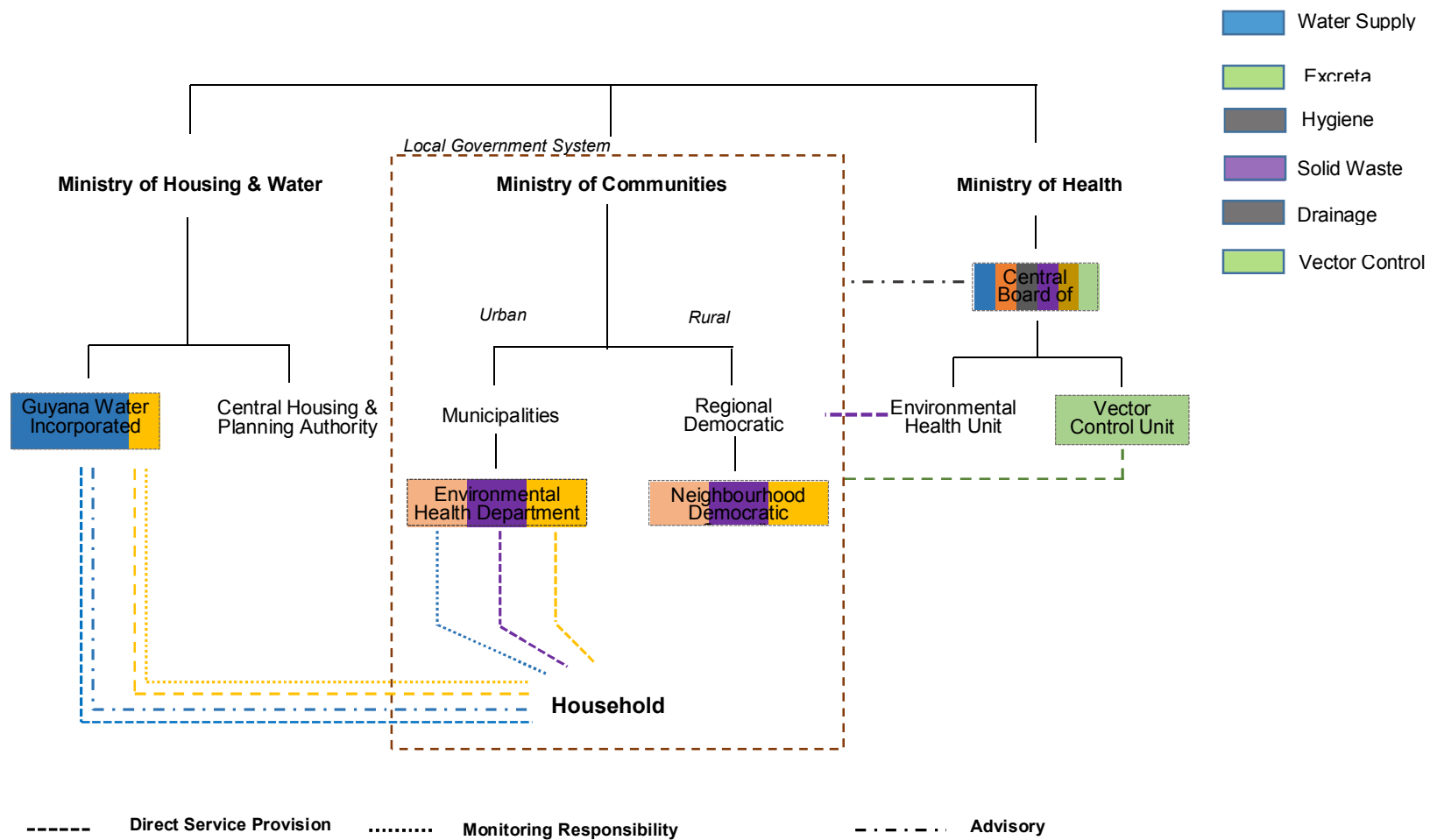


Figure 6-12. Current sanitation services delivery organisation in Guyana

6.3.4 Coverage of sanitation in Guyana

To support the early findings on the elements used to define sanitation in Guyana, this assessment was extended to incorporate the six elements identified. Each element of sanitation is reviewed individually before a summary is given on the overall state of sanitation, which will form the baseline for sanitation development.

6.3.4.1 Water Supply

The 2012 housing and population census reported that all of the 204,625 households enumerated in Guyana at the time had access to some form of water supply. Water supply sources ranged from piped into the dwelling to persons using water from dug wells or boreholes (**figure 6-13**). As shown, more than 70% of water supplied to households is provided by the public supplier, the Guyana Water Incorporated (GWI). The GWI is the only public national water supplier in Guyana and is responsible for water supply throughout Guyana. Seventy percent of households have access to piped water service directly to their household or yard. An additional 3% of households have water services via public standpipe, hand pump or well. This is usually in the hinterland section of Guyana (see section 6.2.3), where water distribution networks may be uneconomical or services are yet to be extended. According to the data, 83% of the population have access to a piped water into their dwelling or at a standpipe level within their property boundary. The remaining 17% of the population is service is piped into the dwelling, while 31% is piped into the yard of the users. A further 8% of users utilised a private supply (personal wells) that is piped into dwelling and 5 % of the population has a private piped supply) being piped into the dwelling. However, this data did not provide any account on the quality or reliability of these sources.

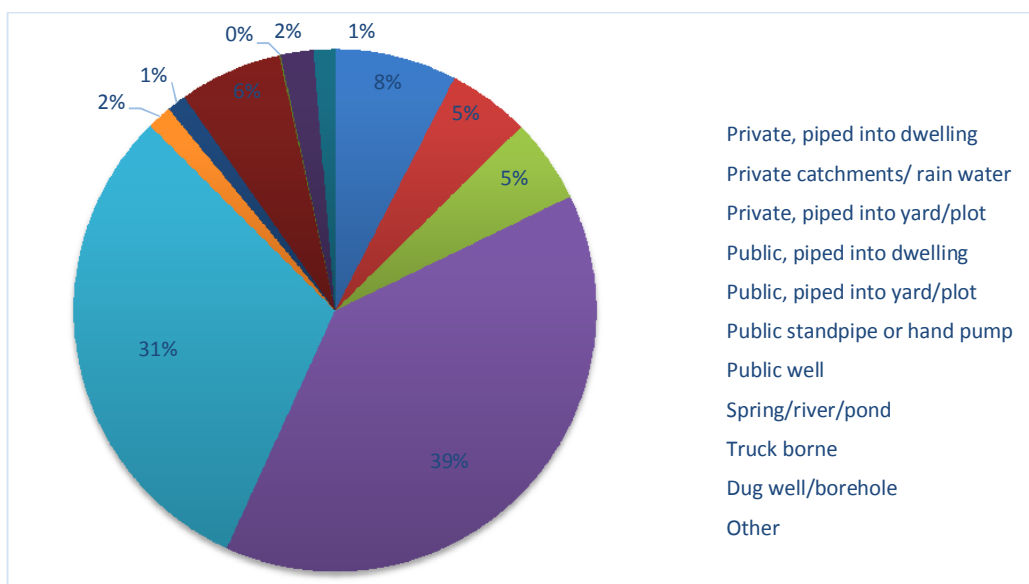


Figure 6-13. Types of water supply sources used in Guyana⁷

Data from the field survey revealed a similar pattern of coverage. The eight communities, representing the four classes of settlements that were sampled in the field survey also recorded high levels of water supply coverage (**figure 6-14**), however their water service provider was mainly the public supplier, either piped to their dwelling or to their yard. Only a limited number of households within the informal settlements recorded 'other' forms of water supply sources, however, when enquired, the other forms of water supply sources were either them sharing neighbour public water supply source, or an illegal water connection to the public water supply source. In only one case, a family utilised a nearly creek as their main source of water supply.

⁷ Data source: 2012 housing and population census provided by the Guyana Bureau of Statistics.

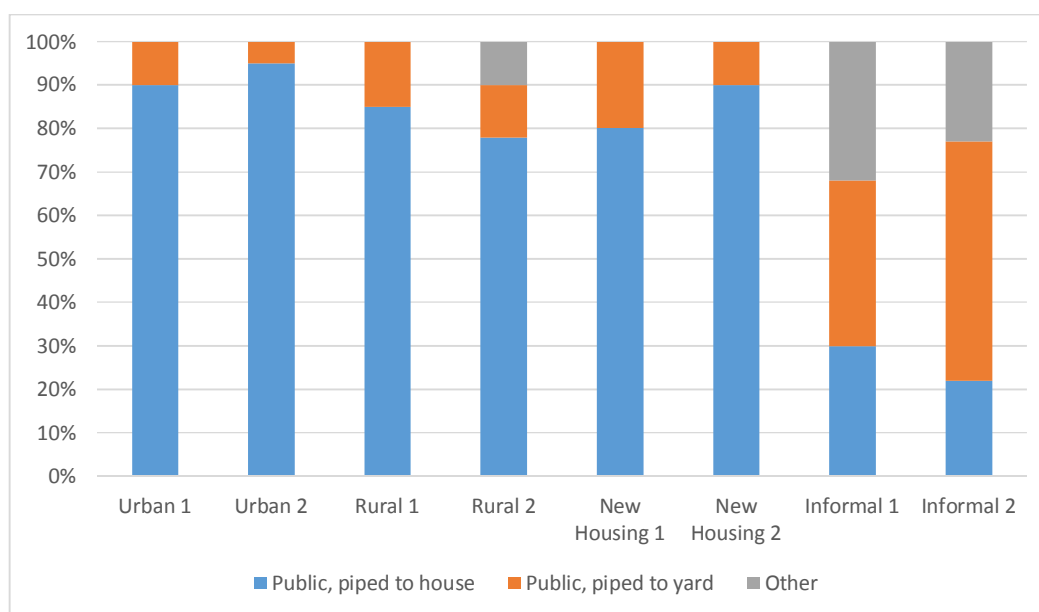


Figure 6-14. Water supply source used across surveyed settlements

The Guyana Water Incorporated (GWI) is the national public water supplier and provides water services to communities throughout Guyana via piped mains in areas main along the coastal zones or via hand pumps in remote areas where water mains are not available (GWI, 2016). A number of communities are served by private water systems, while others rely on water supplied via commercial suppliers such as tankers.

Water Quality and Reliability

In terms of quality and reliability of water supply sources, the official data presented in the housing and population census did not contain information to allow those parameters to be measured. However, many assessments on the status of water supply in Guyana (See PAHO, 2009; IDB, 2014) highlighted that water supply service in Guyana is marked by poor quality and unreliability. PAHO reported that in a household survey completed in 2007 on 14% of contacted households had the minimum WHO requirement for free chlorine of 0.2 mg/litre (PAHO, 2009). This has been linked to operational inefficiencies at the public service authority and the absence of an effective Water Quality Management Plan, sector standards and enforcement. The poor condition of the distribution pipeline has always been cited as a major factor that affects quality as it permits leakage and increase the risk of

microbiological contamination from infiltration of water from the surroundings caused by negative pressure accumulated in the pipelines after interpretation in supply service.

The reliability of water supply in Guyana remains a challenge. At the time of preparing this thesis, 24-hours water supply service was only provided in the central Georgetown area. Areas outside of the city receive water supply ranging from 2 – 18 hours daily, dependent on the service being provided in the areas. In the communities surveyed as part of this assessment, communities received water supply between 4 to 18 hours, with the urban areas receiving the longer water supply (**figure 6-15**). However, there was no further distinction, between water supply services across the other settlement types.

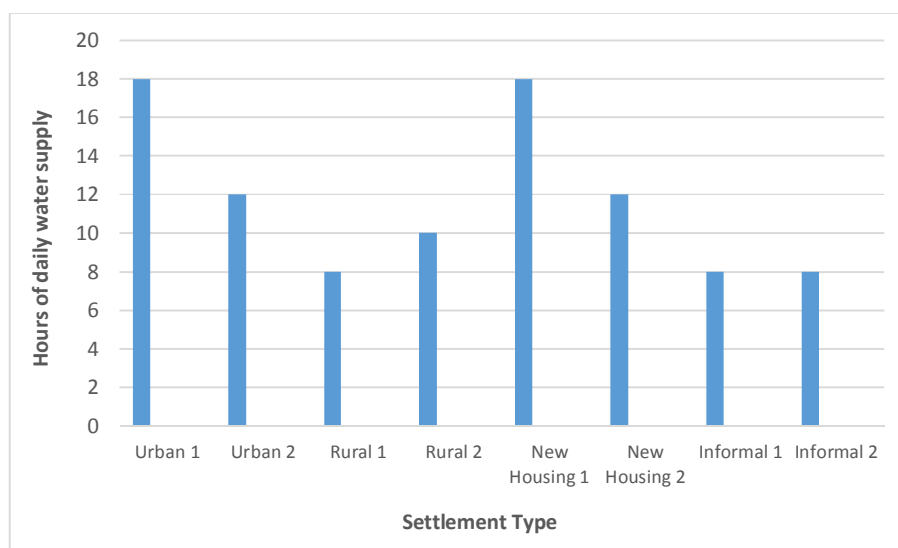


Figure 6-15 Water Supply Service times within the eight communities assessed in the survey

The reliability of water supply can affect the adequacy of sanitation at the household because of the unavailability of water for critical activities such as toilet flushing, hand washing and other personal hygiene practices. To overcome this problem, among many households in the communities surveyed rainwater harvesting and water storage is common (**figure 6-16**). These practices are common across other communities, used to augment water supply during periods of service disruption.



Figure 6-16. Variations of alternative water storage arrangements used by households in Guyana.

Level of Water Supply Service

One of the critical aspects of water supply service provision in Guyana, particularly the service provided by the public authority, is the perception that their remit is only to supply water to the property line, where piped water is provided. As such, household are left with the responsibility of installing internal plumbing if they would like water supplied directly to their houses. This decision is often based on the financial capability of the household. In poor areas, especially in rural settlements, many households can only afford to extend the water service to the standpipe (yard) level in their housing plot. In both the rural and informal settlements that were survey, a large number households (42% average) water supply connections were at the standpipe level (**figure 6-17**), despite having access to water supply service in excess of 10 years. In some cases (a few were found in the informal settlements surveyed), persons were unable to extend the water service into their dwellings because of poor water pressure (head of pressure) provided to households.



Figure 6-17. Water supply used at the standpipe level at households.

6.3.4.2 Excreta Management facilities

The types of excreta management facilities predominantly used in Guyana can be divided into two main categories; waterborne systems and non-waterborne systems. The majority of excreta management facilities used in Guyana falls within either of these two categories. In addition, there are a very limited number of facilities that it may not be possible to classify specifically to either groups such as latrine superstructures overhanging water bodies. These are used in some rural/riverine communities. A similar type of facility is used on gold mining dredges, where excrement is channelled directly to open bodies of water.

Non-waterborne Systems

The most popular and can safely say the only non-waterborne system used in Guyana is the pit latrine. Being one of the first types of excreta management systems introduced to Guyana in efforts to improve sanitation in the early 20th century. Pit latrines are still a widely used excreta management facility in Guyana.

In the absence of standards for what constitute a pit latrine or how it should be constructed, most facilities that accept human excreta directly into the ground was generally considered a pit latrine, for the purpose of this study. Materials used and the design of superstructure vary from location to location however, a hole in the ground with a supporting slab is generally considered a pit latrine. Depending on soil type, pits may be lined or unlined. For instance, in Region 10 where the soil type is sandy, the standard procedure for pit latrine construction is the use of metal casing (used oil storage drums with top and bottom removed) in pits to retain the soil. Within the coastal zone, where clayey soils are predominant, households use unlined pits. In common practice, the pit is dug and the soil material is removed from the pit. The removed material is used to build mounds, upon which the superstructure is situated. This helps to elevate the superstructure from the surrounding ground level and protect the pit from flooding. However, coupled with the high water table in the coastal zone where pit latrine usage is concentrated, heavy rainfall usually results in frequent flooding of pits, making them inaccessible. In the region with sandy soils, retention of pit sides is of greater concern than flooding as the elevation of that zone makes it less susceptible to flooding. Some residents have resorted to using concrete chambers as an innovative excreta containment structure (**figure 6-18**). Considered

a low-cost excreta facility, households utilise available local material for constructing the superstructure to their preference and convenience, as such, various types of pit latrines are found throughout Guyana (see **figure 6-19**). Ventilated Improved Pit (VIP) type latrines are uncommon and are only featured in latrines constructed or promoted via public or international project-based sanitation initiatives, such as the Guyana Red Cross Sanitation project (2013), which aimed to improve sanitation awareness in remote villages through knowledge transfer in the construction of VIP latrine, *inter alia*.



Figure 6-18. Pit Latrine with concrete chamber base in the town of Linden (Region 10)



Figure 6-19. Various designs of pit latrines that can be found in Guyana

Waterborne Systems

Two types of waterborne excreta management systems are used in Guyana, the conventional water closet connected to a sewer network (WC Sewer) and the water closet connected to a septic tank (WC Septic Tank) (**figure 6-20**). These systems

represent, as in most countries, the most advanced systems used in Guyana, having slowly evolved from using widespread open defecation and rudimentary facilities.

The sewer, only used by sections of the population, is not quite popular. In fact, much of the population are not familiar with or even aware that sewer systems exist in Guyana. This is because all of the sewer systems are between 40-90 years old and little work or emphasis has been placed on sewer systems in Guyana.



Sewer



Septic tank

Figure 6-20. Types of waterborne facilities commonly used in Guyana

Although past references have been made to cesspits⁸ in the same frame as septic tanks, there is no evidence of cesspits being used in Guyana and the 2012 census has reflected this as the facilities enumerated in the category was clearly identified as *“water closet (Flush toilet) linked to septic tank/soak-away”*.

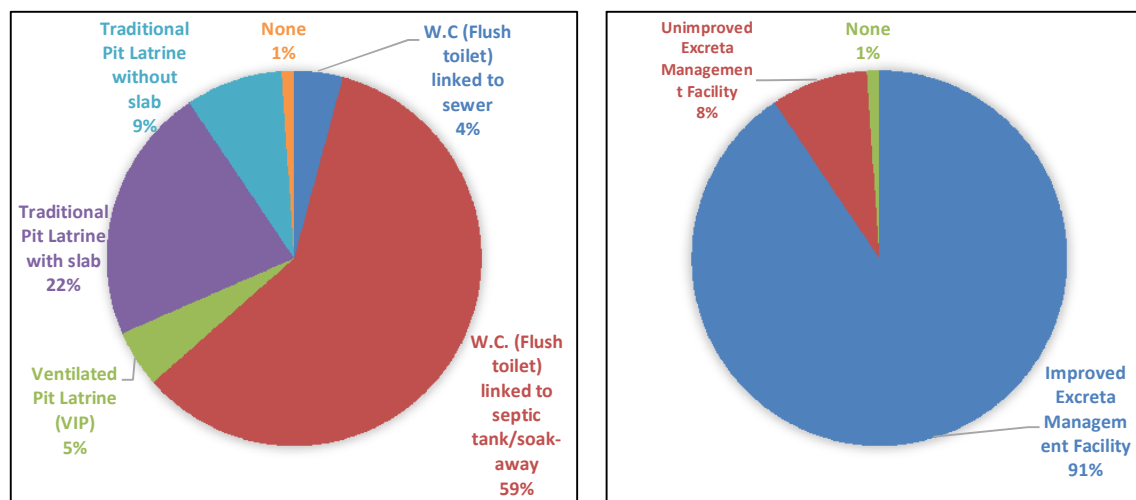
Coverage of excreta management facilities

Coverage was measured by assessing the extent of use for the various types of excreta management facilities used in Guyana. This was derived from the 2012 national housing and population census, being the latest comprehensive data available. However, these coverage figures are compared against the results obtained from the survey within the eight settlements as a means of giving a precise image of the conditions on the ground. The excreta facilities assessment was initially based only the type of facilities used. A comparison with the JMP

⁸ A Cesspit (also referred to as cesspool) is purely a sealed holding tank without an outlet used for the storage of sewage. The cesspit requires emptying regularly, while the septic tank is a considered to be a settlement chamber (or series of chambers), which provides treatment to sewage and drainage waters and the effluent are drained from the tank a soakaway or drainage field. Septic tanks requires desludging intermittently.

improved/unimproved sanitation system classification is made before examining the adequacy of the facilities in the section that follows.

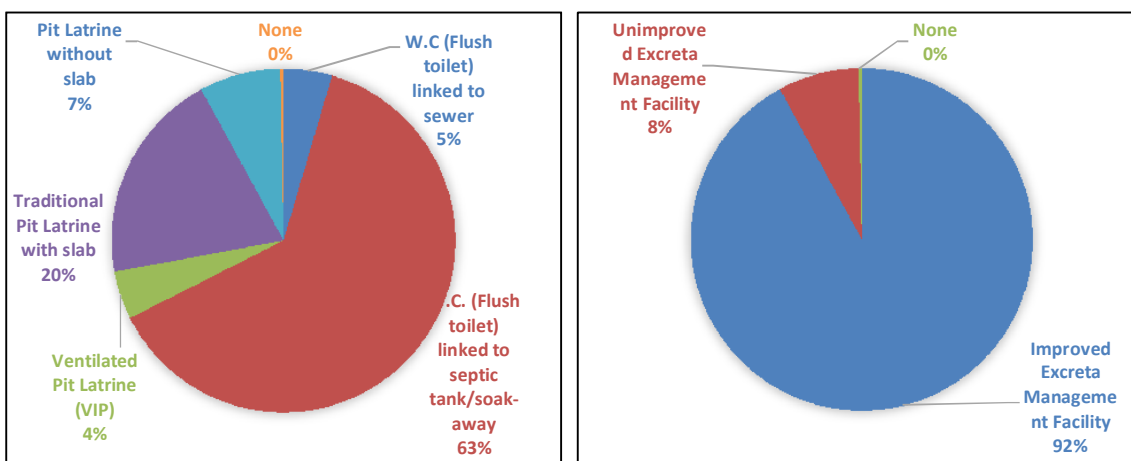
The 2012 housing and population census data indicated that 99% percent of households in Guyana have an excreta management facility installed, while the remaining 1% does not. The WC septic tank facility is the most common facility with 59% of the households utilising it. However, 36% of households used an assortment of pit latrines and 4% are connected to the sewer system. Comparing this coverage to the JMPs classification of improved verses unimproved facilities, 91% of the facilities in use can be classified improved, with 8% being unimproved (**figure 6-21**). The coverage on the coastland shows semblance to that of the entire country, except for a higher percentage of households using WC septic tanks facilities (63%), and a corresponding reduction in pit latrine usage (**figure 6-22**). There is also a notable reduction in the households without an excreta management facility, the number being below one percent. This is in keeping with the observations of the households along the coastland.



(a) Coverage of the excreta management facilities used in Guyana.

(b) Coverage of excreta management facilities used in Guyana compared to the JMPs sanitation ladder classification.

Figure 6-21. Excreta management coverage for Guyana



(a) Coverage of the excreta management facilities used on the Coastland. (b) Coverage on the Coastland compared against the JMP's sanitation ladder classification

Figure 6-22. Excreta management facilities coverage for the coastland region

A settlement type comparison of the coverage data recorded within the eight sample communities surveyed also supports the observation that urban areas have a higher coverage of waterborne facilities, while rural areas utilised predominantly pit latrines (but now by a large margin) (see **figure 6-23**). This is despite the same level of water supply coverage was recorded between the urban and rural communities. The new housing developments also recorded a high use of the WC septic tank system, with a fraction of the households opting for the pit latrine. Persons using pit latrines in the new household development however noted that it was not their preferred facility, but based on the housing or financial situation at that point in time (dwelling in most case under construction – which is done in several phases and take several years – householder occupies prior to construction completion).

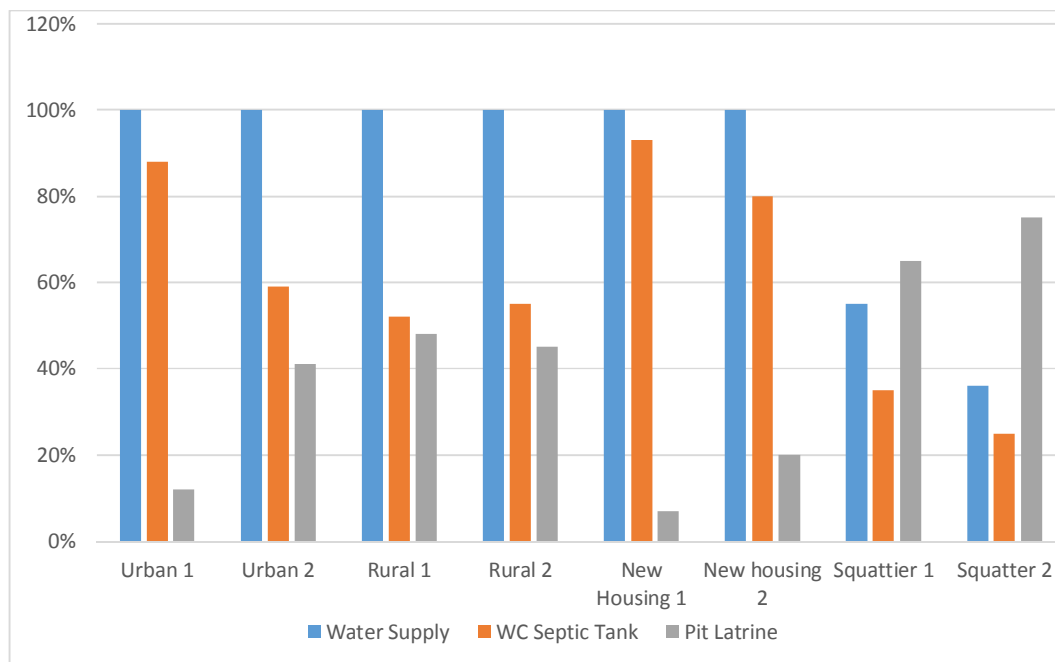


Figure 6-23. Coverage of excreta management facilities recorded in sample communities

Squatter settlements showed different dynamics, dynamics that would require an independent study. Households utilised both WC septic tank (38% avg.) and pit latrines (62% avg.). Some households had access to piped water supply, while others did not, which dictated the choice of excreta management facility. However, the design and the materials used varied widely. Critical to note is that both squatter settlements surveyed were in existence over 40 years, which could have accounted for the better excreta facilities. Commencement of regularisation within one of the squatter settlements meant household were now allowed access to public services. However, this has not significantly influence the type and coverage of excreta management facilities in most cases, as the original facilities installed were still in use. It was also highlighted that due to the poor initial arrangement of houses within these settlements, modification to excreta system is often difficult. However, in the settlements surveyed all households had an excreta management installed, demonstrating that households placed some value on having access to an excreta management facility. However, the quality of some of the facilities and their ability to safely separate faeces and its products from further human contact as well as the disposal of this untreated waste into the environment raised a number of concerns.

6.3.4.3 Effectiveness and Adequacy of Excreta Management Facilities

The physical assessment of the various excreta management systems used by household revealed a high number of unsatisfactory conditions that may not be reflected in the documented data or opinions expressed in the interviews or questionnaire. Likewise, household referred to their facility based on the general description (e.g., pit latrine or septic tank), the suitability, quality or effectiveness of the facility used seemed to be of little significance. In a surprisingly large percentage of cases, the physical condition of the facilities or how they were operated, did not reflect conditions that can be classified as adequate. No standard was applied to the construction of septic tanks and pit latrines, as variation in designs were quite evident across the settlements and even within the communities. This may have been as a result of the notable lack of awareness to appropriate standards for the construction of excreta management facilities as 92% of household representatives expressed they are unfamiliar with any standards or laws associated with the construction of excreta management facilities. Septic tanks were of various sizes even within the new housing settlement and not confirming to guidelines published by the Guyana National Bureau of Standard for septic tanks (**figure 6-24a**). Pit latrine designs vary, with the poorest quality facilities being found in the squatting settlements (**figure 6-24b**).

A wider inspection of the sewer system revealed leaking manholes, overflowing and blocked mains, spilling of excreta matter resulting in faeces being disposed in the public, flooding of building and ground surfaces as well as in storm water drains (**figure 6-25**).

Many of the excreta management facilities examined were prone to flooding, as households further acknowledged that flooding is a common phenomenon. Many septic tank effluents were discharged to internal drains, chambers were opened and elevation was at ground level, well below the flood plain and encouraged vectors such as rats, flies direct access and interaction with faecal matter. Similarly, pit latrines were also located in areas that showed signs of repeated flooding. In hilly topography and sandy soil, as was the case in one of the squatter settlements, pit latrines were located on slopes above dwellings and in close proximity to water sources.



(a) Physical condition and variations in the design and construction of some septic tanks



(b) Physical conditions and variations in the design and construction of pit latrines

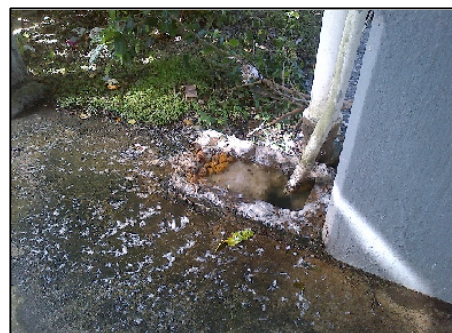
Figure 6-24. Poor physical state of excreta management facilities found in sample communities.



(a) Sewage overflow in a public building in the capital city, Georgetown.



(b) Sewage manhole overflow on to a street after a period of rainfall in the capital city, Georgetown.



(c) Sewage overflow containing faecal matter on to parapet of a public building in the capital city, Georgetown.



(d) Faecal matter in a stormwater drain in the capital city, Georgetown.

Figure 6-25. Problems identified with the operation with the sewer system.

Two worrisome practices were identified from the practice of excreta management were (1) lack of performance measure for excreta management facilities and (2) the non-consideration for effective faecal sludge management. Excreta management facilities, once installed, are operated until it becomes dysfunctional. There is little or no assessment on the performance of the facilities. No household contacted expressed that they have examined the effectiveness of the performance of the septic tank. Local government representatives indicated that they are only notified if there is a complaint. Public health inspectors mainly look into the setting of the septic tank. However, existing planning regulations require that septic tanks be constructed in accordance with guidelines, which is available at another public authority. The lack of department coordination and enforcement result in septic tanks being constructed and operated at the discretion of householders. An identical situation exists with the construction and operation of pit latrines. There is a general lack of awareness relating to pit latrine design and facilities are designed and operated based on household preference.

Faecal sludge management was found to be absent in the communities survey and a wider assessment of the practice nationally, revealed that it is not commonly practiced. This was surprising given the extensive use of on-site excreta management systems. Households using septic tanks expressed that sludge from their septic tank is emptied when a problem arises. The sludge is removed manually by a householder or paid labour within the community and buried within the property. This was viewed as standard practice. Pit latrine users noted that pits are close by covering with soil material produced from digging a new pit and the superstructure relocated. This again was considered standard practice. This practice could not be confirmed as sludge from pit latrines or septic tanks were not being managed at the time of the field surveys.

A wider assessment of faecal sludge management practice in Guyana revealed that the responsibility of faecal sludge management is left to the responsibility of household. Historically, they have used methods that best suit their circumstance, which inevitably was manual emptying and disposal via burial, dumping on vacant plots or in waterways. In recent years, private sector companies began to offer “*septic tank emptying*” services and uses mechanical means (vacuum trucks) to remove sludge from septic tanks. However, these services have very limited reach and are mainly concentrated within the city and its immediate peri-urban areas. A

faecal sludge management service providers recently established operation in one of the recently commission towns in the Hinterland. There is no regulation or monitoring of the management of faecal sludge as noted by both the householders and the representative from the national water company. In fact, the representative from the national water supplier, also with responsibility for managing the Georgetown sewer system pointed out that the '*crude practice*' of the private suppliers had attracted the attention of the agency and notice was given for them to cease the indiscriminate dumping of the faecal sludge. He noted that the companies used surface water drains and even vacant lands within the city as dumping ground for the faecal sludge removed from septic tanks. This created some public health concerns and attracted a number of complaints from residents and other members of the public. It was further expressed that solutions were sought to support, with the first being the modification of the Tucville sewerage treatment works to accommodate the faecal sludge, however after some amount of use, had to be discontinued as the facility was unable to handle the high solid content sludge. The alternative recommendation and still the on-going means of faecal sludge management for the private contractors was the installation of a subsidiary connection to the existing outfall that dispose sewage from the central Georgetown sewage system. As such, today, both raw sewage and faecal sludge from private contractors are disposed untreated into coastal waters.

An assessment completed on the adequacy of excreta management for the entire Guyana, based on the current types and coverage of facilities used, showed that 100% of excreta are unsafely managed (**figure 6-26**).

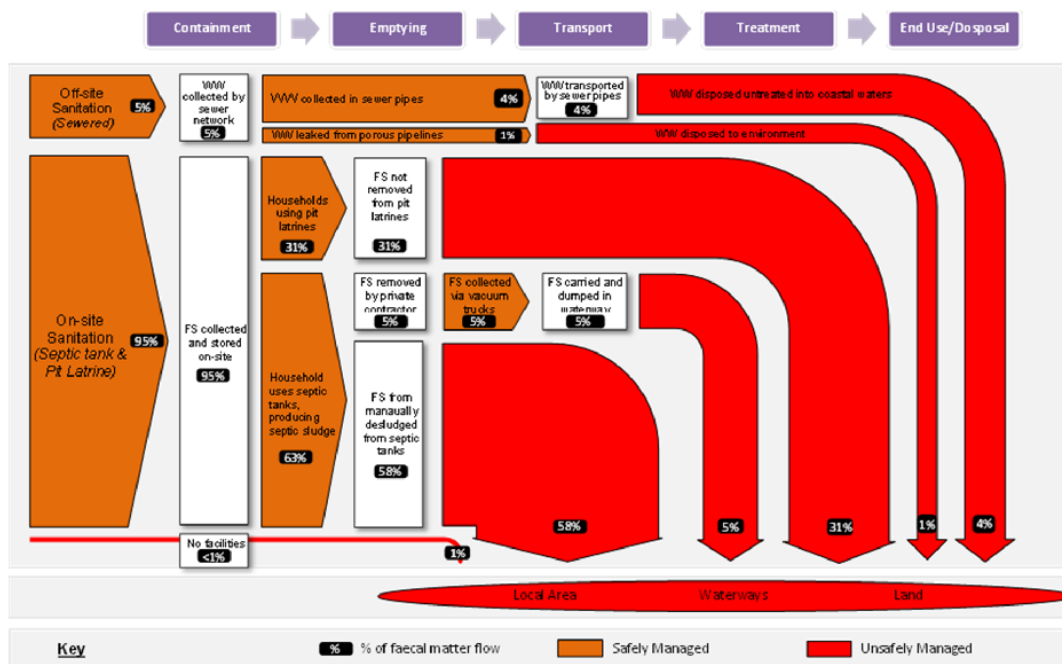


Figure 6-26. Faecal sludge flow diagram for Guyana based on the existing practices.

6.3.5 Solid Waste Management

The management of solid waste was found to be a contentious issue in Guyana, and was the main subject of discussion in many of the interviews conducted. This was because at the time of conducting the fieldwork for this thesis, the unsanitary conditions created by poor management of solid waste had garnered national attention and there was an apparent national outcry for improved solid waste management. There was high public discourse on solid waste management and programmes were being implemented during that time to improve some of the ailing conditions.

Both agency representatives and householders alike considered solid waste management to be primary to their state of sanitation at households. However, the status of solid waste management at a high percent of households surveyed did not meet the standard for adequate services. Despite the high importance placed on solid waste management, public services in all the 8 communities was either absent or inadequate. The local authorities are responsible for collection of solid waste from households in all of the communities except squatting settlements. However, in the six communities where public waste collection service was offered, respondents

noted that it was irregular. Collection was fortnightly in most of the communities with the exception of one urban community where the service was provided weekly. The irregularity of the service result in residents resorting to other forms of solid waste management such as burning as shown in **table 6-5**. Government representatives blamed the lack of resources for the irregular service provided to communities. Local authority representatives also lamented the unwillingness of residents to pay for services offered by private collectors and the inability of the authority to secure funds to improve the service. Most authorities depend on central government subvention to finance critical service provisions. One of the rural communities surveyed indicated that the absence of an appropriate central site within the limits of the community to dispose of collected waste, restricts the collection of solid waste from households. Many households burn waste, while others have resorted to dumping refuse on vacant land, waterways and parapets. Residents noted that waste left in receptacles for extended periods creates unsanitary conditions, particularly foul odour and leakage of leachate as the organic matter in the waste decays. As such, burning for some households is used as the primary alternative for waste collection.

Table 6-5. Solid waste management practices recorded in sample communities

Communities	Solid Waste Management Services						Indiscriminate Dumping observed.
	Public Solid Waste collection services offered.	Frequency of collection	Current means of solid waste management within communities				
		Reg. vs Irreg.	Waste Collected	Burning	Burial	Dumping	
Urban 1	√	Weekly	√	√	x	√	√
Urban 2	√	Fortnightly	√	√	x	√	√
Rural 1	√	Fortnightly	√	√	x	√	√
Rural 2	√	Fortnightly	√	√	x	√	√
New Housing 1	√	Fortnightly	√	√	x	√	√
New Housing 2	√	Fortnightly	√		x	√	√
Squatter 1	X	nil	x	√	√	√	√
Squatter 2	X	nil	x	√	x	√	√

The representative reckoned this was due to their refusal to pay the fees being requested as previous solid waste services provided by the municipality did not attract a direct cost, but is incorporated within the taxes paid by property owners.

Discussions with local authority representatives as well as household indicate that there is some attachment to the traditional and cultural practices of burning or dumping solid waste. Although laws were introduced to curtail the burning of refuse by households, only a limited percentage of households were familiar with this law. Households with knowledge of the law noted that in most cases they have no other option due to the absence or irregularity of the collection services provided by the local authority. Notwithstanding the deficiencies of the local authorities, many households seem inclined to poor solid waste management as there was evidence of open air dumping of solid waste in almost all the communities visited (**see table 6-5**). Even within properties, household solid waste receptacles were absent and solid waste was stored on the ground (see **figure 6-27**). Nonetheless, some key themes were identified as the challenges facing both service providers and households in undertaking good solid waste practices. This were summarised in **table 6-6**. Improving solid waste management at households will require addressing these factors.



(a) Open accumulation of solid waste by a surveyed household . (b) Solid waste dump and vegetative overgrowth within a residential property.

Figure 6-27. Solid waste pile-up within property of households

Table 6-6. Factors identified as limiting effective solid waste management at households

Central/Regional Authority	Local Authority	Households
<ul style="list-style-type: none"> Lack of Awareness at households 	<ul style="list-style-type: none"> No suitable waste collection vehicle 	<ul style="list-style-type: none"> Lack of regular collection
<ul style="list-style-type: none"> Practice influenced by traditional and cultural practices 	<ul style="list-style-type: none"> Poor access to some households (poor roads) 	<ul style="list-style-type: none"> Cost of collection above affordability
<ul style="list-style-type: none"> Lack of enforcement capacity 	<ul style="list-style-type: none"> Lack of maintenance of vehicles 	<ul style="list-style-type: none"> No services provided to community
<ul style="list-style-type: none"> Unwillingness of households to pay for collection services 	<ul style="list-style-type: none"> Unwillingness to pay for effective services 	<ul style="list-style-type: none"> Burning is easier and more convenient
<ul style="list-style-type: none"> Inability of local authorities to generate revenue to finance and sustain services 	<ul style="list-style-type: none"> Non-payment of taxes and revenues 	<ul style="list-style-type: none"> Local authority only offer the collection of domestic waste, non-collection of garden wastes, carcasses construction wastes, etc.
<ul style="list-style-type: none"> Services not offered in squatter settlements - the worst performing areas 	<ul style="list-style-type: none"> Absent of suitable solid waste management facility (no land to landfill, landfill at its capacity) 	<ul style="list-style-type: none"> No solid waste receptacle to store solid waste
<ul style="list-style-type: none"> Lack of required skills within local authorities 	<ul style="list-style-type: none"> Lack of capacity to enforce laws (New litter laws) 	<ul style="list-style-type: none"> Low awareness of the implications of poor practices
<ul style="list-style-type: none"> Solid waste collection is new to some households (lack of info provided by local authority). 	<ul style="list-style-type: none"> Absence of suitable legal framework – laws outdated, fines are fixed at 60 year old values 	<ul style="list-style-type: none"> Traditional practices of burning and dumping remain the go-to solution
<ul style="list-style-type: none"> Household choose the easy and cheapest means (no health and environmental awareness) 	<ul style="list-style-type: none"> Non-support from central Government to effect needed changes (raise taxes and increased subvention) 	<ul style="list-style-type: none"> No implications to household for poor or bad practices

To aid in clearly identifying at which level of the hierarchical structure these issues resided, the factors highlighted were divided into three categories: systemic, administrative and personal to identify the areas requiring greatest attention (**figure 6.28**). The ‘systemic’ classification was used to describe factors requiring national or central government intervention. The limitations instituted by local governance incapacities were defined as ‘administrative’, while those that resulting as a result of the households was grouped within a ‘personal’ category. The grouping showed that limitations extend in almost equal proportion across the three groups, with the systemic factors recording a fraction higher than the administrative and personal factors. This means that improving solid waste management at households will require greater attention to the systemic factors. However, the degree of impact of

the individual factors would need to be considered to determine the degree of influence improving a factor would have if implemented.

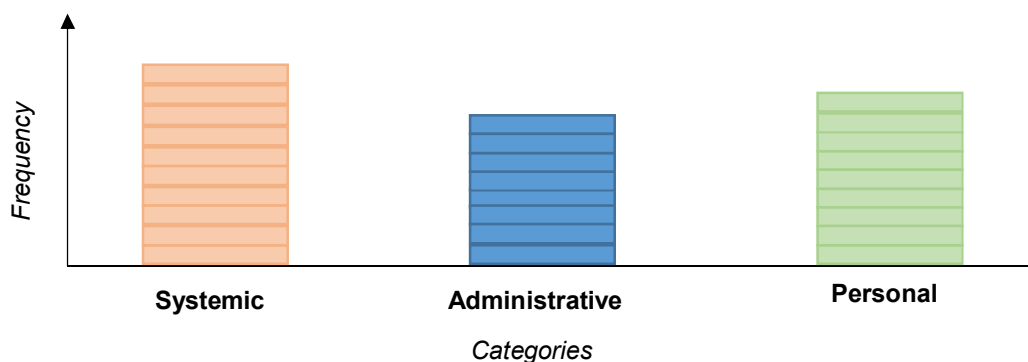
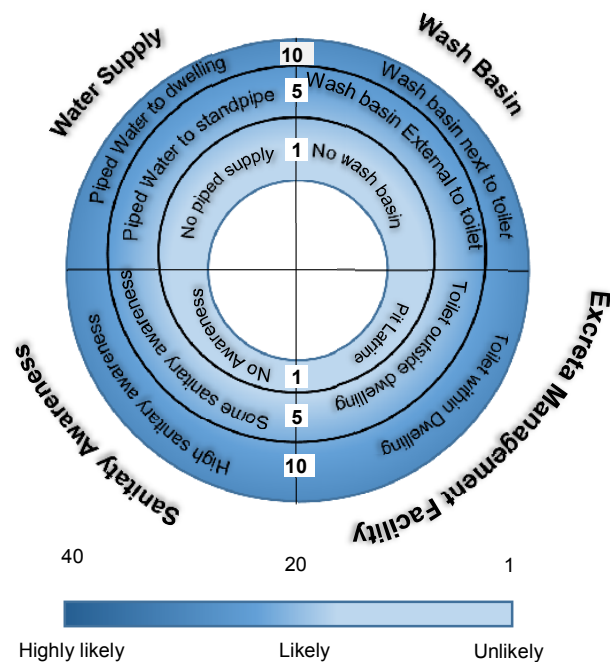


Figure 6-28. Categorisation of factors that limit effective solid waste management at the households

6.3.6 Hygiene

Hygiene can easily be regarded as the least considered of the components of sanitation across households in Guyana. In addition, it was one of the most difficult component to measure. To assess the practice of hygiene at households without being intrusive, households were asked a series of questions that were used to determine their propensity to undertake proper hygiene. This methodology was supported by the researcher's observations.

Using a propensity scale developed from using the factors are most likely to influence good hygiene practice across households in Guyana (**figure 6.29**), the likelihood of households to practice good hygiene was assessed.



Note: Propensity is assessed by assigning a score to the existing condition at household for each of the four categories. Scores are summed to give the level of propensity for households to undertake good hygiene practices. Higher the score, greater the propensity.

Figure 6-29. Propensity scale for measuring the likelihood of households to practice good hygiene.

The propensity assessment of the sample settlements together with their excreta management facility and water supply coverage is shown in **figure 6-30**. Based on the scale, households within urban communities had a higher propensity to practice good hygiene as they all had piped water supply into their dwelling as well as a toilet facility (used WC septic tank facilities), except for a marginal few. Households within squatter settlements had the lowest propensity, given their limited facilities and services. However, as shown within the scale, the level of sanitary awareness is also a factor that determines the likelihood of householders to practice good hygiene. As such, hygiene practices were not solely dependent on the availability of facilities, although the presence of the facilities encouraged good practices.

Fostering good hygiene practices by all members of a household is critical to achieving adequate household sanitation in Guyana. Efforts must be directed to ensure that facilities are available to encourage the practice of good hygiene. With an

equal level of importance, sanitary awareness is also critical to good hygiene and must be improved together with the physical provision of facilities.

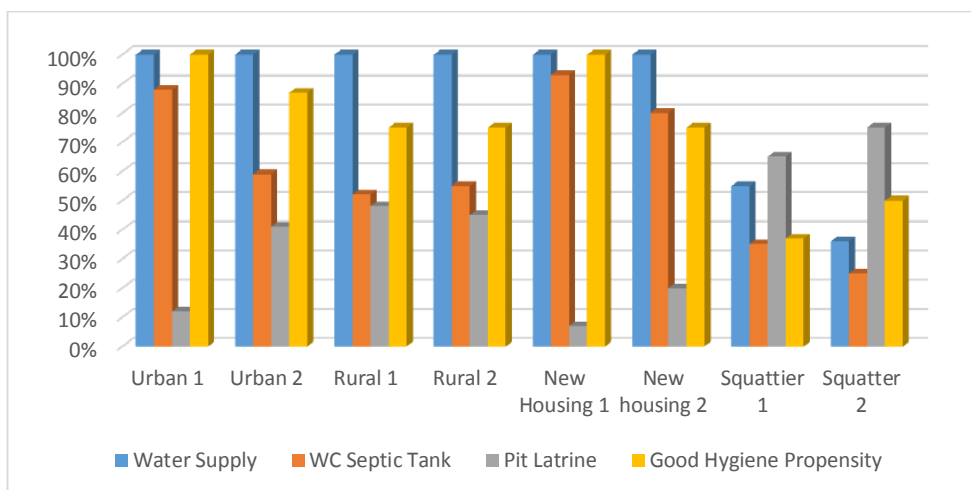


Figure 6-30. A comparison of good hygiene propensity across sample communities.

Although the importance of hygiene to good sanitation practice is widely documented and promoted globally, there were marginal references to hygiene from the actors within the sector. In fact, during the interviews, it was only the representatives from international agencies and those representing the public health related institutions that referenced hygiene as a critical component of sanitation at households in Guyana. This demonstrates a lack of awareness and or priority even amongst the main actors at the national level which may be a deterrent to improving good hygiene practices at household level.

6.3.7 Drainage

The ability of households to safely manage grey⁹ and storm water to reduce the creation of unsanitary conditions and to prevent incidents of flooding was assessed across the eight communities surveyed. This was assessed by the response of households on the management of their wastewaters; visual inspection of pipe outlets and drains; and discussions related to incidents of flooding. As drainage in Guyana is not usually linked to household sanitation, analysing and establishing links to adequate sanitation was one of the outputs of this drainage assessment. Overall, households across the four settlement types used either of two primary options for managing their grey water: (1) disposal into a drain within the property boundary

⁹ Grey water was defined as comprising of kitchen, bath and laundry wastewaters.

(internal drain) or (2) disposal into the storm water drainage canal external to the property (external drain) (**figure 6-31**). Most internal drains however deposit its content into the external drains. As none of the communities surveyed were within a sewer area, this option was not identified. Additionally, no household expressed that they disposed of grey water into pit latrines. However, a small number of households within the urban areas indicated that grey water is discharged into their septic tanks.

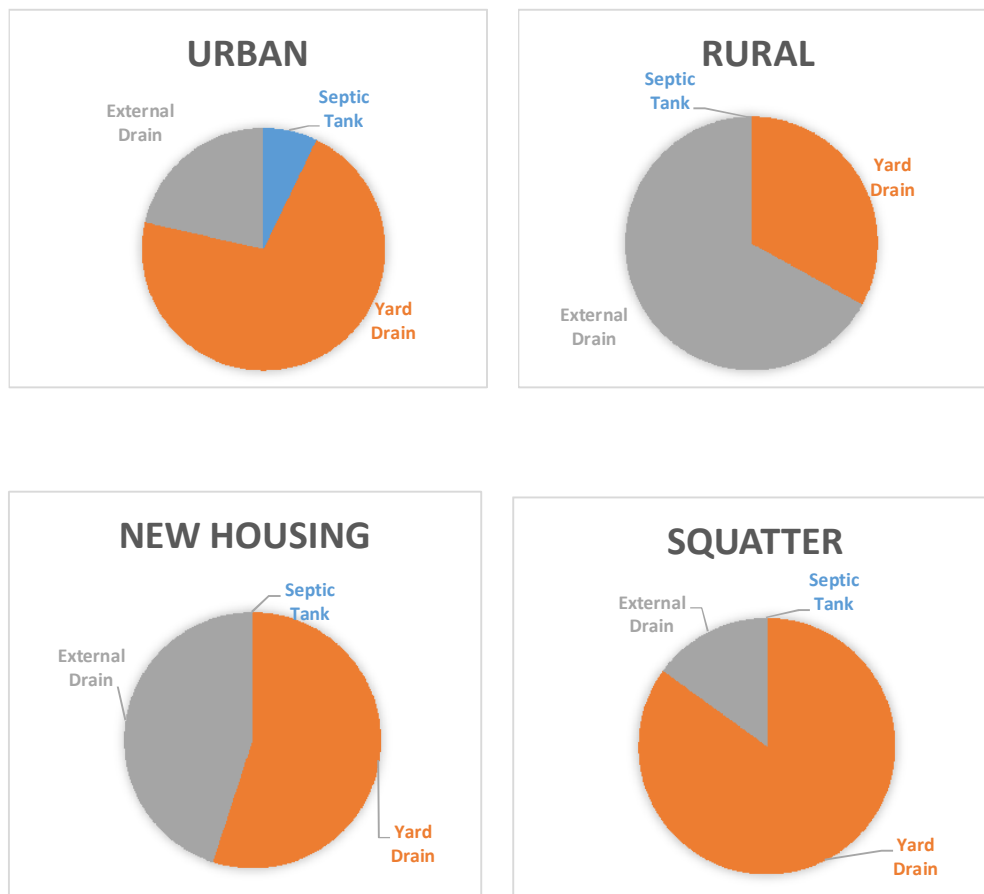


Figure 6-31. Method of grey water disposal within the four community classifications surveyed.

It was observed that several households disposed of grey water directly on the surface of the ground (**figure 6-32**). In other households, drains were not connected to external drains, which led to stagnation of grey and storm water on the property. Food waste along with grey water was observed in internal drains without any mechanism for disposal to external drains. This created unsanitary conditions, which

encourage the presence of vectors such as rats, flies, etc. The examination of some households drains reflected similar conditions, especially non-flowing drains. The poor disposal of grey water containing high organic content resulted in the development of septic conditions in drains and an unpleasant odour.

The management of storm water was similar to grey water management in urban and new housing settlements. Rainwaters from roofs are either harvested or channelled into internal or external drains. However, within rural and squatter settlements, little provision for storm water was provided and evidence showed that rain water from roofs, when not harvested, made its way into internal drains (where available) then to the external drains. However, many storm water drains showed heavy vegetative overgrown and were ill designed as edges were caved in. A high percentage (average 90%) of households across the eight communities surveyed confirmed that they have experienced flooding in the past. However, one of the rural communities noted that their flooding is usually a result of sea defence breaches.



(a) A household disposing grey water onto the ground surface within their yard.



(b) A household disposing grey water on to an external drain within one of the sample communities.

Figure 6-32. Practices of grey water disposal recorded at households.

6.3.8 Vector Control

Provisions for vector control proved difficult to assess due to the inability to measure installed facilities or practices. For the purpose of achieving and maintaining adequate sanitary conditions at households, interest was given to rats, flies, mosquitoes and cockroaches, which are known disease agents. Visual observation was made to identify conditions that would encourage the growth of the identified vector populations and whether appropriate control measures existed.

Almost 100% of the respondents expressed that they have high mosquito infestation. Guyana has been battling to suppress mosquito infestation for over a century according to historical accounts (See Ref). A similar frequency of response was observed for the prevalence of flies. Ninety eight percent of all respondents expressed the presence of flies. Figures for rats and cockroach varied across communities, with the urban and new housing settlements recording a lower positive response for the rats and cockroaches, while the rural and squatter settlements expressing high prevalence (74% rural, 86% squatter) of both rats and cockroaches. Observation at many households revealed conditions that would foster vector breeding. Stagnant water, vegetative overgrowth, non-flowing drains, poor management of food waste and regular flooding, which result in vectors gravitating towards the dwellings. Whilst households expressed that measures are usually taken to reduce the prevalence of vectors such as the use of poisons for rats and cockroaches, they noted that no public service is offered for vector control.

6.4 Adequacy of current sanitation status

Based on the findings across the eight communities surveyed, only a fraction of the households (26% in total) can be deemed to have access to services or the existing facilities that can be considered adequate. This was based on the measure of the adequacy of the six components of sanitation discussed below.

6.4.1 Water Supply

In assessing the existing provision to households based on the MDG goal for water supply, which is to ensure persons have “sustainable access to safe drinking water”, a large percentage of the water supply can be adjudged to be inadequate. First, there was limited ability to assess the safety of the drinking water used. There is an absence of independent monitoring of the quality of water supplied to households. There were no expressed standards used in the supply of water, although there were references to the WHO standard for drinking water. The practice of water storage also poses a problem as the receptacles used for storage are seldom cleaned, which can affect water quality. For this reason, residents opt to purchase drinking water from private water vendors. However, the quality of the drinking water supplied by the private vendors was brought into question by the authorities that cited the use of

unapproved processes and the absence of quality monitoring and testing. In rural areas, many households still harvest rainwater specifically for drinking.

These conditions are what led to the conclusion that the water supply services provided to households are generally inadequate based on international monitoring standards. However, households in the urban areas are more likely to have a greater potential for an adequate water supply as oppose to persons rural and squatting settlements as the service is likely to be better and persons would be more inclined to indulge in good practice (**figure 6-33**).

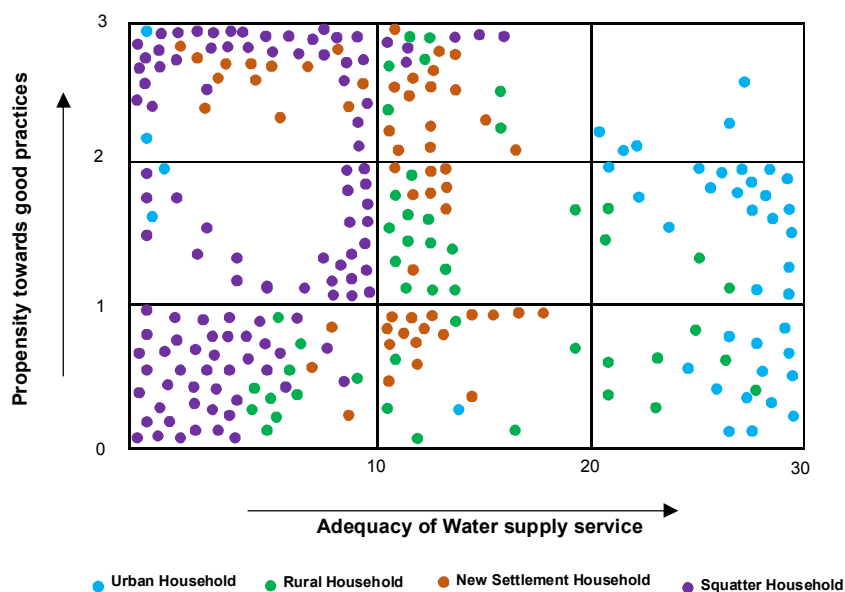


Figure 6-33. Adequacy of existing water supply service for surveyed population

6.4.2 Excreta Management

Approximately 95% of the households surveyed reported use of a sanitation facility that can be considered improved. However, must of the households utilising an improved-type sanitation facility are either located within an urban settlement or within a new household settlement (**figure 6-34**). None of the surveyed households within the rural and squatter settlements achieved scores to deem the existing provisions adequate. This was mainly due to the absence of critical services such as

solid waste collection, poor standard of excreta management facility and absent faecal sludge management and low propensity to practice safe hygiene.

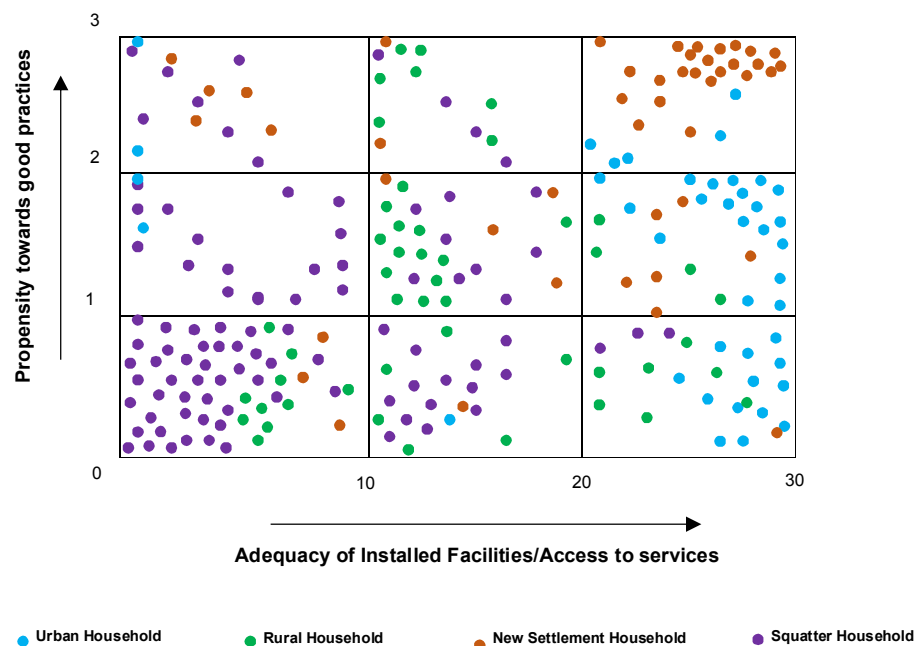


Figure 6-34. Adequacy plot of surveyed households

6.4.3 Factors Limiting Adequacy of Sanitation

Some of the main factors that affected the adequacy of sanitation in households surveyed are listed in **table 6-7**. These factors should be the main targets of any public policy seeking to universalise adequate sanitation at households across Guyana.

Table 6-7. Main factors affecting the adequacy of household sanitation

Sanitation Components	Settlement Types			
	Urban	Rural	New Housing Development	Squatting
Water Supply	Irregular water supply Poor maintenance of water supply	Irregular water supply Poor maintenance of water supply	Irregular water supply Poor maintenance of water supply Poor attitude towards water supply management	No water supply Inadequate water supply Poor attitude towards water supply management Inability to afford services
Excreta Management	Poor design of facilities Lack of maintenance Poor faecal sludge management Lack of standards Cultural resistance	Poor design of facilities Lack of good practices Lack of maintenance Poor faecal sludge management Lack of standards Cultural resistance	Poor design of facilities Lack of good practices Lack of maintenance Poor faecal sludge management	Poor facility design & location Lack of good practices Lack of maintenance Poor faecal sludge management
Solid Waste Management	Irregular collection Poor cultural practice of burning Negative attitude towards good solid waste management	Irregular Collection No services offered Affordability of Services Poor cultural practice of burning & dumping Negative attitude towards good solid waste management	Irregular Collection No services offered Affordability of Services Poor cultural practice of burning, dumping Negative attitude towards good solid waste management	No services offered Alternative not suitable Poor cultural practice of burning, dumping Negative attitude towards good solid waste management
Hygiene	No washbasin Irregular water supply Lack of awareness	No washbasin Washbasin source not convenient Irregular water supply Lack of Awareness	No washbasin Irregular water supply Lack of awareness	No washbasin No/Irregular water supply Lack of Awareness
Drainage	Poor practices Lack of standard Absent of effective public services	Poor practices Lack of standard Absent of effective public services	Poor practices Lack of standard Absent of effective public services	Poor practices Lack of standard No public services
Vector Control	Poor cultural practices Lack of awareness Inefficient public services Lack of enforcement	Poor cultural practices Lack of awareness Inefficient public services Lack of enforcement	Poor cultural practices Lack of awareness Inefficient public services Lack of enforcement	Poor cultural practice Lack of awareness Poor living conditions Absence of services

6.5 Limiting Factors to Sanitation Improvement in Guyana

The current state of sanitation in Guyana was found to be created and sustained by a number of deep-rooted factors. These factors curtailed improvements in sanitation, despite the country recording consistent (although small) social and economic growth over the last 50 years. Identifying these factors is seen as a critical input in the design of a country-appropriate strategy to improve sanitation in Guyana (**shown as assessment criteria A4 of Conceptual Framework in figure 6-1**). Many of the factors will require to be addressed directly in order to achieve and sustain the envisaged universalised access to an adequate level of household sanitation. This section highlights and discuss these factors before proposing recommendations on how they will be addressed.

6.5.1 Path Dependence

The current state of sanitation and its organisation in Guyana has a deep historical genesis and exhibit strong elements of path dependence. Three key areas of path dependence were found, these are:

1. General disinterest in sanitation and sanitation improvement.
2. Improvements and actions targets the elite groups.
3. Heavy reliance on external initiatives and support for sanitation improvement.

Many of the current actions, inactions, poor organisation sector and flawed institutions can be traced back to systems that were introduced intentionally and unintentionally in the formative years of Guyana's development and are explained in the sections below.

6.5.1.1 General disinterest in sanitation and sanitation improvement

The existing disinterest in sanitation and sanitation improvement in modern day Guyana was traced back to the early years of occupancy and settlement development during the plantation system that existed in the 18th and 19th century. The historical review found that early authorities (then plantation owners) paid little attention to sanitation for themselves and that of the labouring population. Sanitation at households (or within the slave/labourer housing) was considered a private matter. In fact, even though sanitation and health became an obsession of Great Britain in the late 19th to early 20th century, this was not extended to the colonies, except for

when the lives of the elites in the colonies began to be threatened. The repressive conditions, poor housing and having little inclination to the adverse impacts of the poor sanitary conditions in Guyana, saw households having a similar disinterest in sanitation. This disinterest continued even as the labouring population moved away from the plantation settlements following the abolition of slavery to form new settlements and new groups of persons (indentured labourers) were introduced to the country. In years to follow, there was a persistent disregard for sanitation at the authority, community and household levels. This continued even as improving sanitation attracted global prominence and Guyana (then British Guiana), became the first testing ground for International Health Commission campaign to eradicate the hookworm disease in the tropics - which was attributed to poor sanitary practices. Although this led to some actions and attempts to promote improved sanitation services or even the introduction of policies to promote good sanitary practices (such as the construction and use of pit latrines), the inherited disinterest from the past was not eroded to allow the cultivation of a new attitude towards sanitation. This could have been as a result of the parsimonious nature of the colonial government (Riley, 2005). However, Palmer (2013) reported that the work of the IHC was abruptly ended after 5 years, despite there were elaborate schemes to expand the public health facilities in Guyana, which included “*buildings new sewage and drainage facilities in areas that had remained out of reach of hookworm eradication efforts*”. (Palmer, 2013, p. 206). Overlooking the potential improvements to sanitation infrastructure in favour to conceited gains demonstrated the low value that was placed on improving sanitation, which, to a large extent, remains the same today.

Again, factors linking to path dependence eroded similar attempts by the new post-independence government to change existing institutions and improve sanitation for the population, particularly the once marginalised masses. The new government, burdened by other developmental priorities, quickly abandoned their desire to change the existing status quo of grave disregard for the physical conditions and general sanitary practices of the mass population. This was attributed to the unavailability of finances. However, existing enforcement regimes and monitoring protocols, which demanded little capital investment, were even overlooked in favour of other sector developments. This contributed to a revert, (although seemingly unintentional), to the old system of practice and sanitation continued to be a private matter.

6.5.1.2 *Inequitable distribution of sanitation services*

A strong element of path dependence was also found in the concentration of development interest, which includes sanitation improvement (whenever, it is shown) in the interest of the elites and affluent in the society. This practice in Guyana was traced back to the early 1920s, which saw colonial powers took actions to protect their health after embracing the relationship between poor sanitation and health effects. As discussed in section 6.2, the first, and the most notable intervention to improve sanitation in Guyana was the construction of the Georgetown sewers system in the 1924 (completed in 1929). According to De Barros (2003) and hinted by Pemberton (2003) and Palmer (2013), it designed to serve the areas occupied by the elites in society at the time. There were no corresponding sanitation improvement interventions that targeted the areas occupied by the poor and labouring masses, despite there were elaborate plans for improve sewage and drainage infrastructure in Guyana. During that time, sanitation at household was still considered their private matter, while the state operated and maintained the installed sewer system. Today, the major investments in the sanitation sector are concentrated within the higher economic areas, such as repair of the system, despite a large percentage of the population had no access to sanitation facilities. Further, public services are still concentrated in the high economic areas, and oftentimes not meeting the poorer areas, which shows strong ties to the early philosophy of development of Guyana (then British Guiana).

Again, the post-independence governments sought to right these noticeable wrongs, by expanding essential services to the unserved, and championing the cause of improved social conditions. Again, the arduous struggles, particularly with domestic politics, racial tension and international allegiances, led to the abandonment of the all-inclusive approach to development and an embracing of service to the elite. This eventually led to a regression of the little progress that was made, and retreating to the pre-independence institutions where public services were focused within the upper-class sect of the community and the poor and marginalised communities being overlooked. Sanitation continued to be considered their private matter. Even as the implications of poor household sanitation became a global concern, and the vulnerability of Guyana's coast threaten public health disasters, the attention given to household sanitation in Guyana remained non-existent.

The current *modus operandi* of the authorities mirrors those of the past, which confirms that sanitation followed a path-dependent process. As such, much of the sanitation landscape in Guyana remains unchanged in almost a century, except for the natural improvements resulting from households improving their social and economic status. The path dependent dynamic is also evident in the organisation of the sanitation sector and community housing development, which remains relatively unchanged. New housing developments are being constructed without any consideration for sanitation services provision. Likewise, communities that were developed over half a century ago have the same levels of sanitation services today as they did when they first developed. In the end, households continue to be responsible for the state of their household sanitation, which is dictated by their personal circumstances.

6.5.1.3 Heavy reliance on external initiatives and support for sanitation improvement

Currently, as much as 90% of interventions in the water and sanitation sector in Guyana have been conceived or financed by foreign resources. There seems to be an over-reliance on external initiatives and resources to move the sector forward. This was traced back and linked to institutions established in the early years of the sector development. As discussed previously, the first notable initiative that targeted improving sanitation, the International Health Commission hookworm eradication campaign, was conceived in the United States of America and funded in its entirety by the foundation. Other decisions in the such as the establishment of the Colonial (West Indian) Development Fund further led to reliance on external support to achieve internal developmental progress. The emergence of the international development organisations, in the mid-1900s and providing low cost financing, grants and technical support, further cemented this dependent institution. At the time of the fieldwork in Guyana, all on-going improvement initiatives within the water and sanitation sector were either initiated or being financed via loans or grants from an external agency. There are elements of path dependency in the seemingly reliance on external support for fostering and financing critical development initiatives in the water and sanitation sector. This can impede the Government's inclination to embrace a proposal of adopting concepts of universalising adequate household

sanitation or weaken commitment if not linked to external foreign catalysts or accompanying external funding options.

6.5.2 Addressing Path Dependency

Breaking the 'old systemic norms' would require defining a 'new paradigm' for sanitation in Guyana. This new paradigm will be the catalyst for shedding past systems, embracing the new and setting a new baseline for household sanitation in Guyana. It must place sanitation at a precipice where the general disregard will no longer be a satisfactory option, thus requiring a divergence from the current path. In light of this understanding, and the findings from the field investigation and the output of the focus groups with key sector stakeholders, a five-step process has been recommended to overcome this path dependence within the sanitation sector in Guyana (see **figure 6-35**).

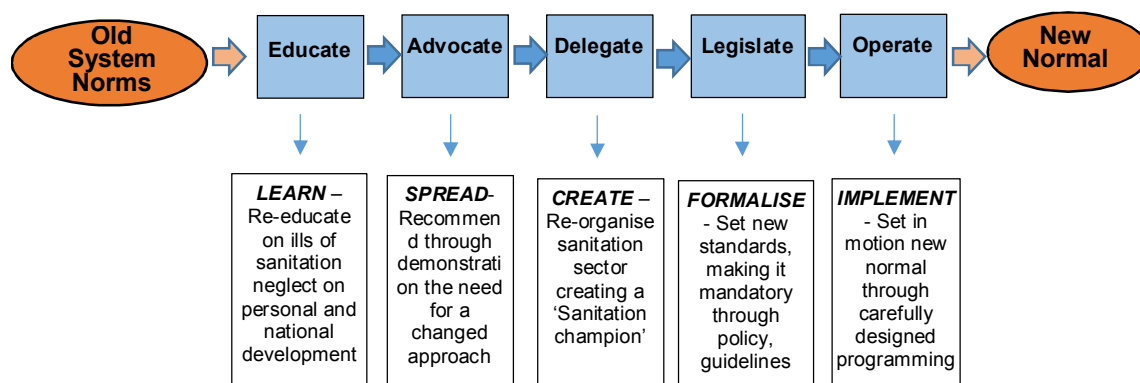


Figure 6-35. Five-step process to overcoming path dependence for sanitation in Guyana.

The first action required is the need to **Educate** or re-educate in some cases, on the critical importance of sanitation. Understanding the impact of the current disregard for sanitation would increase the acceptance of the need for path transformation when it comes to sanitation in Guyana. This must involve demonstration of benefits, highlighting consequences of current actions and critical links to achieving important national and personal development targets. The second stage is the need to **Advocate** for a changed system. Overcoming the old systemic norms will require more than simple communication. There will be the need for intense and sustained advocacy, during which the benefits of the new normal are shared with critical decision maker and key stakeholders. The third stage is to **Delegate** the responsibility to a specific organisation or entity. This must be in the form of creating

an immediate entity to '*champion*' sanitation, holding specific responsibilities of spearheading the process of the change. The fourth stage is the need to **Legislate**. This is the design and development of an instrument(s) to promote and demonstrate the decision to embrace the new normal for sanitation in order to commence the process of path transformation. The fifth and final stage would be the launch of programmes to progress the path transformation process, which is to **Operate** the systems to reflect the new normal.

6.5.3 Settlement development practices and inadequate housing

A positive relationship was found between household sanitation, the type of community as well as physical characteristics of the houses persons occupy. Firstly, although not exclusive, households in formal, well-planned settlements or those that were formalised from squatter settlement were more likely to have access to public services and have better sanitation practices. However, as was found out in the analysis, additional factors such as household income and access to water supply (where the latter also being dependent on the former), are also major factors that affects the level of sanitation at a household. On the other hand, households in squatter (informal) settlements are generally without access to basic public services (water supply, garbage collection, drainage infrastructure, roads, etc.) for extended periods due to the absence of a settlement formalisation process or programme. The existing process demands that squatter settlement make an application for regularisation to the Ministry of Housing and Water, an application that is at the discretion of the subject Minister. In addition, the type of dwelling structure constructed by some household, particularly in the low-income areas, does not encourage sanitation practices. Universalising adequate sanitation for households in Guyana would not be possible if this poor community development persist and dwelling constructed and utilised by household limit their ability to enjoy and practice safe sanitation. Four factors were identified as being potential retardants to any actions targeting improving and sustaining safe levels of sanitation at households in Guyana. These factors are (1) proliferation of squatter settlements, (2) poor quality of housing (3) limited access or absence of basic services and (4) low household income. The implications of these factors of sanitation improvement and means of addressing these limitations are discussed in the section that follows.

6.5.4 Proliferation of squatter settlements

At least 40% of existing communities in Guyana are classified as squatter settlement (**figure 6-36**). However, in recent years, the demography of squatter settlements has changed and now population classes ranging from no-income, low income and middle income can be found to occupy the same community. This is especially common in squatting settlements that have been in existence for an extended period. Given its history in Guyana's, squatting is certainly part of its culture. Although openly discouraged and aggressive attempts by various governments to curb this practice, persons still view squatting as the easiest means of securing low or no-cost property ownership, despite having to endure appalling living conditions. Squatting is another systemic condition in Guyana that shows elements of path dependence, as it is one of the oldest and most utilised forms of settlement development in Guyana. Hence, curbing this practice can be extremely challenging and would require a transformation of the public housing policy, along with changes in the social and economic public services offered. The fact that as much as 80% of existing formal communities were once squatter settlements highlights the deep-root nature of the squatting situation. Added to that, the national housing programmes for decades have consistently failed to meet the demand for low-cost housing. The decision of the government to embrace the allocation of housing plots, instead of complete housing solutions, have further aggravates the community development situation as communities take much longer to assume the shape of a formal community as household move at varying pace in installing dwellings. This in itself gave rise to many sanitation relation issues that were highlighted.

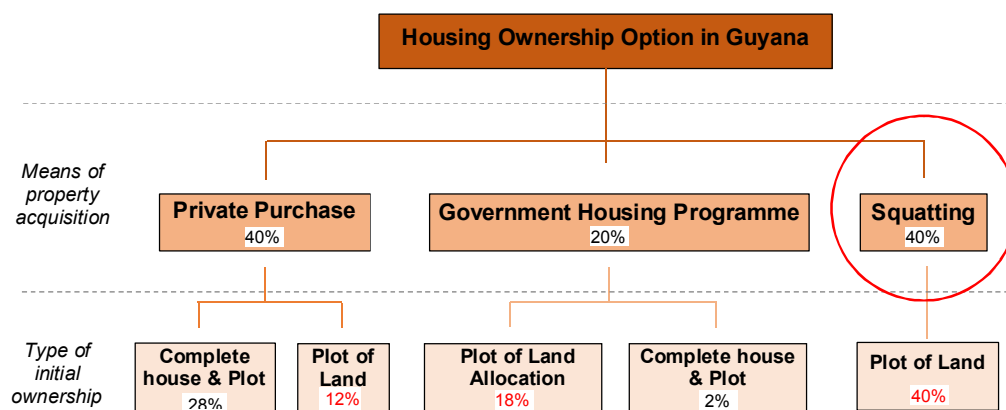


Figure 6-36. Current settlement types and housing distribution in Guyana

Given the general disinterest in sanitation as discussed in **section 6.5.1**, many of the household in squatter settlements have poor sanitation practices. Coupled with the current *modus operandi* of withholding public services from squatter settlements, any attempt to improve sanitation without addressing this settlement development quandary would lead to the marginalisation this critical population group. As such, critical decision will be required to address the pandemic of squatting in Guyana and the treatment of this vulnerable group if adequate household sanitation is to be universalised and sustained.

6.5.5 Quality of Houses

The physical state of the houses constructed by household impact the sanitation improvement potential of the household, particularly relating to the type of excreta management system that can be installed. This is restricted to squatter settlements, and was found to be encouraged by current public housing approach that focus on the allocation of plots instead of complete housing solutions (see percentages in **figure 6-36**). As such, there exist a culture in Guyana where poorer household construct the most economical structure that can be afforded at the inception of acquiring the plot of land. Influenced in part by path dependence and the income status of the household, many of the housing units are only provided with basic accommodation such as for sleeping and dining. All other activities are conducted external to the housing unit, with little consideration given for safe sanitary practices and as reported, is one of the main factors that limit public health enforcement; inspectors taking cognisance of the state of housing and inability of households to improve living conditions.

Piped water into dwelling is often not possible for household with poor dwelling and while the use of excreta management facilities external to the dwelling may encourage better conditions within the dwelling, convenient access becomes a challenge. Other elements of sanitation are also affected by poor housing. This research found a positive correlation between poor housing and poor sanitation practices. Household occupying poor houses were less likely to practice safe sanitation. Pit latrine is often the excreta management system of choice for this type of household, although a large percentage of these types of households have installed septic tank systems external to the building with the increase in the

economic status income. This for some household took as much as 15-20 years. In other cases, households would aspire to have water closet and septic tank excreta management system internal to their housing unit, but their dwelling unit would not permit. Others have extended their property to accommodate a new sanitary block.

This unique housing practice by quite a large section of the population can affect the success of universalising sanitation and ensuring the services are adequate and sustained. The needs of this group will require special consideration, perhaps with the aim of standardising the basic dwelling unit, where provision to achieve a minimum level of sanitation must be provided. The output from the focus group No. 1 recommended a deviation from the provision of housing plots that leave potential householders to dictate the facilities they install. The suggestion was for complete housing solutions. There was also an alternate recommendation for public housing plots to be prepared with basic services, including roads, electricity, piped water supply and excreta management systems before being sold, admitting the current approach places too heavy burden on the household to access and maintained critical services. The quality of housing will no doubt affect a household's ability to achieve and maintained an adequate standard of sanitation, as such, this group must be given careful consideration in the design of the policy framework for improving sanitation.

6.5.6 Low household Income

Poor household income is the root cause of many of the failing conditions at the household level. In fact, in Guyana, the level of household income dictates much of the characteristics of the household. This often determines if squatting will be the only option for property ownership and what services (water supply and electricity) can be afforded. Household income was not considered a critical data set in the initial assessment at the household level as early prognosis purported that actions needed to transcend economic classes if universalisation is to be achieved. However, as shown in the analysis, clear patterns arose pointing to the impact of household income on the location of households in settlements (formal or informal) and the ability of that household to access critical services. The social and economic challenges in Guyana and the absence of an adequate social services system have resulted in a small percentage of the population living in abject poverty, unable to afford basic services. This condition in some cases has created a culture of high theft

of critical services such as electricity and water supply. The low level of household and the corresponding social and economic was also found to be one of the primary reason for the disinterest in safe sanitation practices. Efforts to improve and sustain household sanitation will no doubt be affected by the level of income of the household. Improvement strategies will need to take this into account, in particular, given that there are no immediate signs that level of income of household will improve in the near future. Households' inability to afford critical services, such as safe faecal sludge management, can result in continued poor practices, or even refusal to pay for services, which impact on the options that can be proposed.

6.5.7 Absence of basic services

As can be easily deduced, the three factors discussed above; settlement type, poor dwelling quality and low household income, would have an adverse impact on the services being available and ability of households to afford. Effecting improved household sanitation will demand the availability of a number of essential services such as water supply, garbage collection services, faecal sludge management, etc., to a household. With the limitation of the public services, the cost of accessing those services and the 'survival' culture, where households do 'whatever it takes to get by', many households have opted to use alternative sources or continue with old unfavourable habits. Curbing this practice and bring household along the new path of having adequate household sanitation must overcome this seemingly deep-seated practices. This is not isolated to low income or squatter settlements, but circumvent the economy class. As was shown in the challenges to sanitation improvement, the residents in an urban area refused to pay charges for garbage collection and continue the practice of indiscriminate dumping. Similarly, there are households in the city that refuses to connect to the sewer system, to avoid paying additional sewage charges. Many of the alternative approaches to the basic services are not conducive to moving towards adequate household sanitation. Access to basic services would contribute significantly to efforts directed to improving sanitation and must be considered in designing and developing strategies to improve sanitation.

6.5.8 Public Health Organisation and Sanitation

The poor organisation of sanitation services has long been highlighted as the cause of the notable ineffectiveness of the sector in providing adequate services. With no changes in recent years, the finding of this research found that the existing

organisation does not lend itself to provide adequate services. The organisation of sanitation is outdated, as there has been no significant change since its original design almost a century ago. Without re-organisation, the existing structure will not be able to meet the demands of the current population and satisfy the new thinking being proposed to elevate and sustain sanitation for households.

6.5.9 Lack of Clear Definition and Appropriate Standards

Universalising and sustaining household will require a collective national effort and the outlining of a clear path for improvement. The current variances to how sanitation is defined would not support a collective effort and would stymied the success of any potential national programme for sanitation improvement. A clear and appropriate definition is needed and must form part of the programme to improve sanitation. Likewise, the current absence in standard and the proliferation poor sanitation services and practices will limited elevating to adequate sanitation. Standards must be established for each component of sanitation. Standards that are achieved as well as being able to meeting the measure of adequacy.

6.6 Conclusion – Bringing it all together

The current state of sanitation in Guyana is abysmal. Unearthing a clear explanation as to why this condition exists proved difficult within the limitations this assessment was completed. However, a number of clear associations were established. This includes:

- (1) The institutions induced must be overcome to achieve the success in sanitation improvement. Making sanitation a priority, improving attitude towards sanitation and making sanitation the responsibility of all stakeholders would form a good basis for shedding many of those historical institutions.
- (2) The pattern of settlement development must be revised. Squatting must be outlawed and public sector household must include for good sanitation practices. Household must have the same likelihood of practicing good sanitation practices by having equitable access to sanitation services.
- (3) A clear definition of what constitutes household sanitation would galvanise action and reduce the haphazard approach to improving household sanitation. They will be uniformity across stakeholder and would facilitate more interagency collaboration in solving this complex phenomenon.

- (4) Poor and absent standards hold some responsibility for the current state of sanitation. Setting appropriate standards for sanitation components, including life-cycle consideration would remove much of the limitation taken by household and encourage improved practices. Public services can be re-designed to accommodate the revised standards.
- (5) The current legal framework and organisation of the sanitation sector would not support or encourage efforts to universalise sanitation. There is no sanitation champion and sanitation services are so scattered, there can be no holistic consideration of household sanitation under the existing systems. Re-organisation would be critical to improving and sustain sanitation.
- (6) Dependence on external support can limit the sustainability of improvement as internal capabilities can be short-circuited, giving a false sense of adequacy, which can result in inability to sustain improvement.

This assessment provided a clear and detailed picture of the existing state and organisation of sanitation in Guyana. The deficiencies and significant gaps were identified. Using this present status as a baseline, the policy framework will be design to address these shortcomings and forms Chapter 8 of this thesis. However, to aid in the design of an appropriate policy framework, a comparison between the Guyana approach to that of Barbados found in Chapter 3 was undertaken to identify critical lessons that can be learn to improve the quality of the policy framework and to improve the success of future implementation. The result of this comparative analysis is presented in Chapter 7.

Chapter 7. Comparative analysis of Barbados and Guyana's approach and results

7.1 Introduction

This chapter presented a critical comparison of the main findings of the case studies of Barbados and Guyana presented in Chapters 5 and 6 as a means of clearly identifying differences in approaches between the two countries and the influence of these difference on the state of and trends in sanitation development in the respective countries. At the conclusion of this chapter, the key systems that adversely affected sanitation in Guyana would be identified along with the lessons from Barbados that were useful in shaping the sanitation policy framework for Guyana presented in Chapter 8. For easy of understanding, this analysis followed the same thematic approach of the case studies, where the main factors assessed are compared.

7.2 Comparing the historic developmental patterns

Despite Barbados and Guyana sharing identical historical development trajectories, both with regard to typology and chronology of events, the assessment revealed that varying underlying forces during those periods that influenced development and sanitation differently. The dynamics in Barbados created a number of favourable institutions, such as an inherent drive for health protection and social and economic development. This promoted a focus on factors supported by strategy, for which improving household sanitation was primary. The development dynamics in Guyana, on the other hand, created adverse institutions such as poor settlement development, a nonchalant approach to health protection, and a disregard for household sanitation throughout its history, consciously and unconsciously. A side-by-side comparison of the development trends of both Barbados and Guyana is shown in **figure 7-1** reveal some of the key differences that were unearthed.

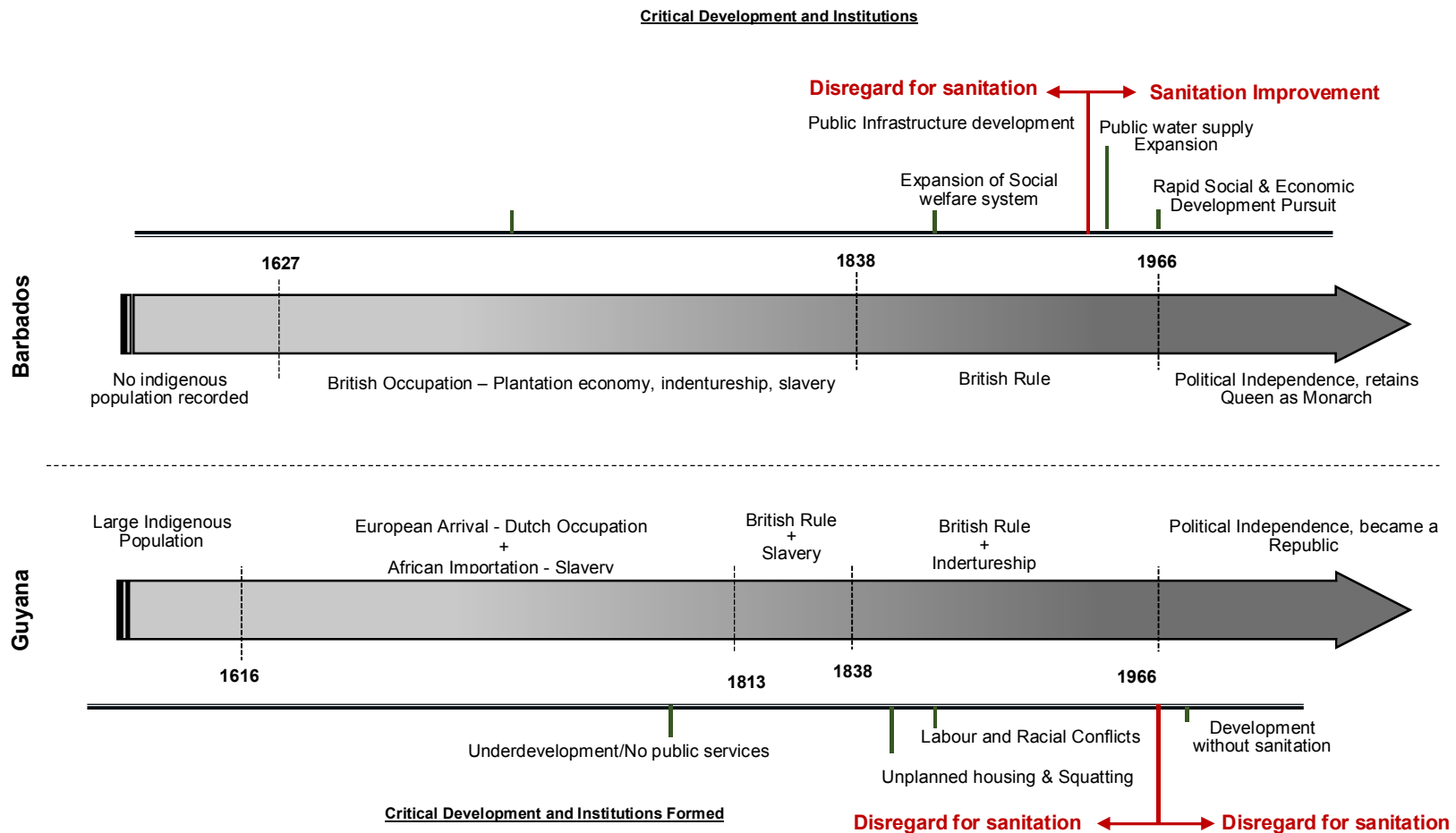


Figure 7-1. Comparison of the key phases of development and critical development trends between Barbados and Guyana

7.2.1 Occupation and Identity

The differences in the period and form of occupancy of the two territories affected economic growth and sanitation development in Barbados and Guyana. Since Barbados was solely inhabited by the English this promoted a sense of ownership by the colonisers, which is still evident from the large English population today. Much of the development and current systems in Barbados were influenced by the English. This resulted in smooth development from the first settlement of the English in 1627 to political independence from Britain in 1966 and even today. In maintaining a link to its English heritage, Barbados even retained the Queen as their monarch. This kinship between the English and Barbados was also demonstrated by the way the labouring population was treated both during the period of slavery and post-slavery. As highlighted in Chapter 5, as early as the mid-19th century, freed slaves were able to access health care services and a welfare system was established to support the poor population on the island, including assisting in the payment of levy for sanitary inspection. This resulted in a more equitable society with a common Barbadian identity. Also owing partially its small physical and population sizes, whatever affects a small section of the population has the potential to affect the entire population as was found with diseases during its development. Karl Watson (2011) in a review of early systems in Barbados intimated:

“From the beginning of the eighteenth century, the majority of Barbadian blacks were born locally. This high percentage of Creole born blacks, as opposed to Africans, contributed to the early development of a Barbadian identity. Also, as was the case in the white population...”

The occupancy of Guyana was switched between the Dutch and English several times, with the Dutch being the longest settlers. The Dutch established most of the initial physical infrastructures, while the English mainly utilised those infrastructure without much further development. Further, the English showed little interest in extending health care to the entire population and development, opposing to their approach in Barbados. A lower identity with Guyana appears to have affected the approach in governance and despite Guyana's size and population are several times that of Barbados, the English population in Barbados vastly out numbers the English

population in Guyana, demonstrating the strong English association with Barbados. The decisions, particularly during disease outbreaks or labour riots, demonstrated this association. During crises, the Colonial Government of Barbados acted in the interest of the population of the country, while in the case of Guyana decisions were geared towards maintaining control while allowing perilous conditions to persist. Little interest was showed by the colonial government in improving sanitation despite being linked to high disease burden in Guyana. In fact, when a high incidence of the hookworm disease was found in Guyana (then British Guiana) in 1914, the reports indicated that low incidence existed in Barbados where sanitary public health measures already existed. In Guyana, the colonial government, were averse in supporting the wider population in improving their sanitation condition through pit latrine construction, as recommended by the International Health Commission (IHC), contrary to what occurred in Barbados. As De Barros highlighted, this may have been the result of the close affiliation between Barbados and England. Barbados was England's oldest colonial possession and often referred to as 'Little England'. In fact, unlike Guyana and much of the other Caribbean territories, most of Barbados' English inhabitants were born there (De Barros, 2014, p.7).

These dynamics laid the foundation for future events in both countries. Barbados continued with its inclusive approach (even if it was out of fear of the ripple effect due to the dense population), for which path dependence allowed subsequent governments to follow and succeed in making significant progress in the sanitation sector. The path dependence of disinterest in sanitation development, particularly for the labouring population continued and is believed to be responsible for the poor development in Guyana's sanitation sector over its short history.

7.2.2 Settlement Pattern

The systems of settlement development between Barbados and Guyana varies distinctively. They showed path dependence of the original processes and significantly influenced the state and development of sanitation in both countries.

In Guyana many of the freed Africans moved away from the plantations and started new communities, some purchased lands and started settlements, while many others

squatted on marginal lands with little consideration for sanitary facilities. Squatting remains one of the main routes to property ownership in Guyana, as almost 90% (by estimation) of existing communities were formed through this process. In addition, ex-slaves flocked to the urban areas, competing with indentured labourers for menial jobs, giving rise to tenement living and further squatting within the built up sections of society. These housing and settlement types aggravated and already deplorable sanitation status, problems that are still being faced by existing communities.

Barbados saw a more orderly community development process, with much of the non-whites eventually moving inland away from the commercial and economic centres, occupying the forested areas. They remained secluded for much of Barbados existence, despite being the dominant population.

Although poor sanitation practices plagued the early settlements in both Barbados and Guyana, the concentration and organisation of the Barbadian settlements, and acknowledgement of the impact of poor sanitation on health, led to their early inclusion into the wider public health services. Today, squatting communities in Guyana still do not have access to public services and their sanitary practices are usually dictated by the circumstances of the households. This results in the poor state of sanitation in most squatting communities.

7.2.3 Social Problems – Race, class and division

Barbados avoided much of the race conflicts and class division that affected Guyana during much of the post-slavery era owing to its dual ethnic composition. With only the planter whites and the ex-slave blacks, the structure of society was set and proceeded in similar stead following the emancipation of slaves. Over in Guyana, the introduction of Indian, Chinese and Portuguese created immense conflicts that retarded much of the social and economic progress. It influenced segregation by race and encouraged practices such as open defecation, which had cultural links. Diseases were linked to particular groups, and authorities took a stand-back approach in dealing with race, class and division. Sanitation development in Guyana suffered as a result. The culture of race-dominated practices and division resulted in little attention being given to communities to improve conditions. The dynamics of

Barbados was easier to manage with its white-black population. Given the potential impact of poor sanitation on the entire population of Barbados, authorities paid attention to conditions, and provided services to protect the interest of the entire population, which included instituting public health measures.

7.2.4 Early Awareness, Attitude and Implication of Sanitation

The detailed public health record of Barbados as compared to Guyana during similar times in history demonstrated that there was greater awareness about sanitation and its impact on wellbeing. Barbados was aggressive in its approach to protect public health, focusing on areas that had been identified as major contributors, such as access to water supply. Understandably, before the sanitary revolution in England at the end of the 19th century, sanitary conditions and practices in Barbados mirrored that in other parts of the British Empire. However, by the first decade of the 20th century, public health efforts in Barbados were more advanced than most of the other Caribbean territories including Guyana. The proliferation of disease was used as the main driver for sanitation improvement in Barbados under the improved public health banner. Despite the same level of effort to raise consciousness in Guyana and Barbados (especially through the work of the Rockefeller Foundation), Barbados moved ahead, while Guyana lagged in advancing public health improvement measures. Authorities in Barbados seemingly demonstrated a greater appreciation for the impact of sanitation on the health and economy of the country, which may have been a result of the susceptibility of Whites to much of the diseases that plagued the island during the early years.

The awareness and responsive attitude of the authorities in Barbados led to proactive actions to improve sanitation, while the indifferent attitude of authorities in Guyana resulted in the propagation of poor practices and sustained conditions that affected their health and environment.

7.2.5 Path dependence of sanitation service provision

Because the linkage between poor sanitary practices and health and wellbeing (in Britain) was not identified until the middle on the 19th century, the attitude and practices of early settlers in both Barbados and Guyana mirrored the poor practices

in Britain. However, although sanitation changes were aggressive in Britain in the latter part of the 19th and early 20th centuries, these changes were not transferred to the colonial settlements overseas. In fact, where sanitation measures were introduced, they only targeted the elites and excluded the ordinary people, such as the early water supply wells in Barbados and the sewer system constructed in Guyana. This was a direct reflection of the *modus operandi* of authorities in Britain during those years. Johan Mackenbach, a professor of public health, in discussing the early development of sanitation in Britain noted the 1834 Poor Law Amendment Act designed by Edwin Chadwick was not motivated primarily by the '*altruistic desire to improve the lot of ordinary people*'. He intimated that their concerns rested in reducing the heavy burden on the public purse caused by the death of male breadwinners from infectious diseases (Mackenbach, 2007). This illustrated a lack of interest in providing basic services to the extended population, targeting only provision of services that benefitted authorities. This was evident in both Barbados and Guyana in its early years however Barbados was forced to adjust this approach as the illness of the ordinary people affected the labour force as well as the elite because of the small size of the territory. In Guyana, there was an ample supply of labour and the forging of competition between ex-slaves and indentured servants, made replacement of labour easy. In addition, because of the vastness of the country and the separate settlement development there was minimal interaction between the elite and labour population in Barbados.

This attitude of neglect for the ordinary people by the authorities was acute and continues to persist in Guyana, as attention is primarily given to upper class communities, while lower classes, such as those in informal settlements, are ignored. A more equal distribution of services was observed in Barbados, which could be as a result of the early divergence from this practice as authorities understood that improving the conditions of the entire population would generate widespread benefits.

Adopting a policy approach to universalising coverage to an adequate level of sanitation for households in Guyana will induce equity and inclusion in the provision of sanitation services as policies will be all-encompassing. Although this has the ability to erode existing path dependencies, the potential challenge of breaking other

path dependencies, such as settlement development pattern, means the policy approach must include components that directly advocate for equity and inclusion. Barbados was successful at achieving this through policy, re-organisation and investment; a lesson that can be adopted.

7.3 Key Lessons that can be transferred to Guyana

The approach of Barbados during its early years highlighted a number of key lessons that can be incorporated into the planning and designing of the sanitation policy framework for Guyana. These are:

Sanitation Improvements was considered early as a means of national interest

– Linking sanitation improvement to national development provided a key impetus for the early authorities in Barbados and allowed decisions to be taken and supported based on this link. Authorities in Barbados found that improving sanitation, improved personal health, which in turn, reduced the economic burden for health care in Barbados and improved the productivity of labourers. This link was never established in Guyana and was responsible for the path dependence of sanitation disregard that was extended from that early period. Identifying national benefits that would be derived from improving household sanitation would increase national priority given to sanitation improvement and encourage the allocation of public resources that would ensure the sustainability of interventions.

Critical Public Services extended to all sections of population to record the needed improvements

Although the dynamics of Barbados, including its size and population density, made the extension of critical services, in the early years, from the elite sections of population to the poorer area, much easier than it would be for Guyana, the initial decision to extend these services is noteworthy and sets the trend for future approaches in public service delivery. The delivery of critical public services remains ad hoc without supporting systems such as regulations and social support services such as the vestries that existed in Barbados. The current arrangement of public services in Guyana is not extended to the worst affected areas, that is, the squatting settlements, which would stymied any national effort of improved household

sanitation. Thus the role of the public sector must include, the creation of mechanisms to support sanitation improvement plans.

Understanding the dynamics and needs of the various population groups within country – Barbados demonstrated they understood the needs of the wider population, particularly, in relation to improving sanitation at households. Although there was a general disregard for sanitation as well as providing services to the poor, particularly the non-whites on the island, with an increased understanding of the implications of withholding critical services, the systems at play in these communities, such as structure and cultural norms and the needs of the population, Barbados took action in that regard. The immediate impact of those actions and the later successes in the improvement of sanitation highlighted the fact that the authorities understood what was needed at that time. This would be a critical factor in designing the sanitation improvement framework for Guyana as an understanding of the dynamics and needs of the communities will ensure such a framework takes into consideration those dynamics and attend to those needs.

Early Drivers Identified and tied to national development objectives – Since the link between improved sanitation and disease eradication was identified authorities used this awareness to drive improvements of sanitation in Barbados. Records even suggested that knowledge was transferred and actions mirrored those that authorities took to improve the sanitary conditions in England. The early identification of key drivers assisted Barbadian authorities to use these to promote sanitation improvement, formulate laws and to source supporting external [funding] resources. A lack of adequate drivers was recorded in Guyana. This contributed significantly to the nonchalant approach of both authorities and citizens to improving household sanitation. Identification of drivers remains a key tool for sanitation improvement and more so, when considering a policy approach. It would be imperative for Guyana to identify key drivers for household sanitation improvement. This would aid in the promotion of improved sanitation and widen acceptance of the need to improve household sanitation and can be used to sustain any developed programmes.

Policy Approach, but not a dedicated Sanitation Policy – public policies formed the cornerstone for actions and interventions relating to sanitation improvement in

Barbados. However, there was no dedicated sanitation policy. The social policies which commenced formation of vestries in the 1800s, to the introduction of the Public Health Act of 1967, and now to the more modern Sustainable Development Policy of 2004, all included household sanitation improvement as a critical policy element. Further, achieving a sanitary state was considered pivotal to the development of Barbados. This policy approach of Barbados demonstrated that policy is critical, whether the policy is dedicated specifically to sanitation or no. When provision of sanitation improvements are considered within such policies, the objectives of sanitation improvements can be achieved and sustained.

Understanding the needs of the country – Barbados understood that a sanitary environment is critical to its developmental ambitions. With their deep-seated desire to achieve elevated social and economic development as a nation, all factors that are touted as critical were embraced by Barbados. For this reason Barbados focused on maintaining a sanitary environment, although critics have noted that attention is biased to areas that generate the most revenue for the country (the tourist districts). Further, Barbados adapted sanitation practices, such as promoting excreta management technologies that are appropriate and that best suited for their (1) economic position, (2) their geo-physical characteristics, and their immediate needs. The mirroring of such an approach by Guyana would definitely allow sanitation to be at the forefront of development and interventions to meet the immediate needs. The importance of sanitation to national development would also be embedded into national development plans and programmes.

Organisation, Re-organisation and Structure is necessary – Barbados organised and re-organised their public service when needed to ensure that the services were adequate to achieve the desired outcomes as it related to improving and sustaining sanitation improvement. Policies were introduced, new organisations commissioned such as the Urban and Rural development Commissions and the Environmental Protection Department, to ensure that the enabling environment was created. This showed a persistence in getting things right and the flexibility in the approaches in achieving the desired outcome. Flexibility in the sanitation framework is important to

meet emerging and constantly changing needs in the sanitation sector as opposed to a rigid unresponsive framework.

Chapter 8. Sanitation Policy Framework for Guyana

8.1 Introduction

This chapter presents the recommended Sanitation Policy Framework for universalising and sustaining adequate household sanitation across Guyana. It first establishes a clear definition that would allow the adequacy of household sanitation to be determined. Further, it outlines a set of appropriate standards for the various elements of household sanitation. Clear legal and organisational arrangements capable of improving and sustaining household sanitation to an adequate level are also provided. To support the implementation, a schedule is provided, based on the desire to secure improvements by 2030 along with appropriate costing for development.

8.2 Diagnosis – State of household sanitation in Guyana

Based on the findings in this study, adequate household sanitation depicts the state at a household that would protect and preserve health and the environment. If the derived definition of adequate household sanitation were applied to the 655 households interviewed as part of this research, only 43% would be classified as having adequate household sanitation. Notwithstanding, 95% of the facilities at these households satisfy the JMP criteria for ‘improved sanitation facility’, based on the sanitation ladder. The quality of water supply at many households, mainly in terms of level of service and reliability do not constitute a standard that can be adjudged adequate. Poor physical structure of excreta management facilities, the lack of treatment of collected wastewater and the ineffective management of faecal sludge have all contributed to much of the poor state of household sanitation. Individual households and communities continue to be threatened by the prolonged dis-interest in sanitary welfare, centred on the general perception that household sanitation is a private matter. There are no established links between sanitation development and any of the national development objectives of Guyana. The current

governance framework for household sanitation is unable to support and sustain the sanitation improvements required.

Findings from this study showed that the absence of adequate sanitation to a large percentage of household (~70%), based on the developed definition for adequate household sanitation in Guyana, pose serious threats to their health and social wellbeing, particularly the vulnerable, including women, children and the elderly. Many of the excreta management systems do not provide for adequate separation of human excreta from human contact or prevention of faecal oral transmission. The soil and waterways of communities are polluted by the discharge of untreated human and solid waste directly onto lands or in open waters, many in close proximity to day-to-day activities of the population. The absence of safe and reliable water supply and facilities to encourage proper hygiene practices prevail in some sections of the population.

The on-going disassociation of the elements of water supply, solid waste management, stormwater management, drainage and vector control from the collective concept of household sanitation, allows the inadequate management of these elements to go unnoticed. The absence of sanitary consciousness amongst a large section of the population and the absence of facilities that encourage good hygiene practices, all exaggerate the potential health hazards.

Improving and sustaining household sanitation in Guyana will be challenged by, *inter alia*: (1) how household sanitation is defined nationally, (2) the perception and placement of responsibility for sanitation services (3) the tenure of households and (4) differences in sanitation requirements in coastal and hinterland areas (settlement classification) (See breakdown in **table 8-1**). These factors, individually and collectively determine the extent of coverage, the impact of any initiative and the sustainability of any system introduced to improve household sanitation. A description of these factors and their implication for sanitation development in Guyana is explained in the sections below.

Table 8-1. – Critical characteristics that would have bearing on sanitation development in Guyana.

Critical Factors to Universalise Household Sanitation	Definition	Individual components Sanitation defined by individual components that vary between locations and through the hierarchy	Vs	Collective Concept Developing a unified definition for household adopted by all stakeholders
	Responsibility	Private Full responsibility for achieving and maintaining adequate sanitation condition shifts from the household	Vs	Public The public assumes partial responsibility for household sanitation by setting standards, increasing access to critical services and providing financial support to households
	Tenure	Regulated Settlements Only households within regulated settlements can legally benefit from public services	Vs	Unregulated Settlements The absence of structure, legality and cooperation results in neglect and widespread social problems
	Geography	Coastal Easily accessible, with defined structure and known legal definitions making provision of services manageable	Vs	Hinterland Isolation and access difficulties; cultural variances and practices create a complex

8.3 Addressing Sanitation Development Challenges

8.3.1 Household Sanitation Definition

Despite the term is widely used in Guyana, there is no clear definition of what constitutes household sanitation. The research found that there was no established definition for sanitation in Guyana and what constitute adequate standards to promote safe and healthy lifestyle ambitions of the country. Improving sanitation in Guyana requires a clear definition, which both authorities and households can use to guide service delivery. Establishing an appropriate and practical definition for adequate household sanitation for communities in Guyana is the first step in designing a strategy for achieving adequate sanitation.

8.3.2 Moving from private matter to Public Good

Households are responsible and dictate the standard and profile of their household sanitation, which primarily depends on the financial resources of the household, *inter alia*. For instance, households access piped water supply based on their ability to afford the service and make decision on the type of excreta management facility installed at households based on resource availability. Currently, the public roles in household sanitation includes monitoring and advising on the conditions that preserve public health, which is restricted to advising on the operation and maintenance of excreta management facility and household waste management. In order for sanitation to move from being a private responsibility, it must be mainstreamed in national development plans, linked to national development agendas and politically embraced through the design of public policies.

8.3.3 Status of Tenure

Public services in Guyana are generally restricted to households that have the legal right to occupy their property. That is, informal (squatting) settlements are not legally entitled to public services. Informal settlements in Guyana must be significantly reduced or national policies amended, if household sanitation is to be universalised. Further, households with poor housing quality also find it difficult to improve sanitary conditions. Poor quality dwellings restrict the type of public services that can be accommodated.

8.3.4 Settlement Pattern (Coastland vs Hinterland)

The coastland-hinterland divide will induce critical challenges to the provision and universalisation of adequate household sanitation services. The added dynamics of rural-urban, riverine and reservation-type settlements induce complexities in service standards and delivery. Each settlement type has its own unique geographical, cultural and social characteristics that must be taken into account in the planning and development of sanitation improvement solutions. The coastal-hinterland divide means that there are wide geo-physical and socio-economic differences in Guyana that must be taken into account and requires an approach that is tailored to suit their specific circumstances.

8.4 Sanitation Policy Components

8.4.1 Sanitation Vision

Universalising access to household sanitary conditions that can be classified as adequate based on Guyana's context, improving convenience and reducing health risks to inhabitants must be critical national focuses. All households, regardless of geographic location or economic status must be able to attain and sustain minimum services at their households that would protect their health, guarantee comfort and increase dignity. It is envisaged that improving household sanitation will lead to improved health for members of the household, which will result in improved productivity; personal development in areas of social welfare and education; and reduction of medical expenditure. This will also reduce the environmental burden caused by pathogenic and nutrient pollutions, thus improving the quality of the natural environment and reducing the destruction of sensitive eco-systems. It is envisaged that all households, regardless of economic status, geographic location or cultural uniqueness, must be able to access sanitation services that meet their needs and developmental ambitions.

8.4.2 Sanitation Improvement Goal

The goals of for National Household Sanitation Improvement Strategy are to:

1. Establish and communicate a clear definition for what constitutes adequate household sanitation. A definition that reflects the physical and climatological status of Guyana and its developmental ambitions;
2. Outline the standards for the various components of household sanitation that would result in household sanitation being adequate;
3. Provide guidance on the approach to universalising adequate household sanitation in Guyana;
4. Provide a framework to catalyse interest in national sanitation development
5. Allow the development of sanitation in Guyana through a system that would allow current and future households to achieve same;
6. Improve the quality of the living environment at households and eliminate sanitation-related communicable diseases;
7. Support the national development mandate of achieving 'a good life for all' in a 'green economy'.

8.5 Building Blocks for Sanitation Policy

Four factors were identified as the building blocks for improving and sustaining an adequate household sanitation in Guyana. These are (1) definition, (2) standards, (3) legal and organisational framework, and (4) strong and sustainable implementation. As graphically represented in **figure 8.1**, establishing a clear definition for household sanitation in Guyana must be the first phase of the policy formation process. A clear definition allows for a focused policy design that will permit the identification and setting of goals and targets. The second building block requires the setting of clear, appropriate and achievable standards for household sanitation. These standards must take into account the critical systemic conditions at play in Guyana, as well as

linked to wider national developmental objectives. The third building block is the need for effective legal framework and organisation to advocate, plan, develop, implement, monitor and enforce sanitation standards. The final element and foundation of the building block is the implementation strategy and costing for implementing the policy framework.

Failure to consider all the building blocks will limit the long-term sustainability of the sanitation improvement interventions.

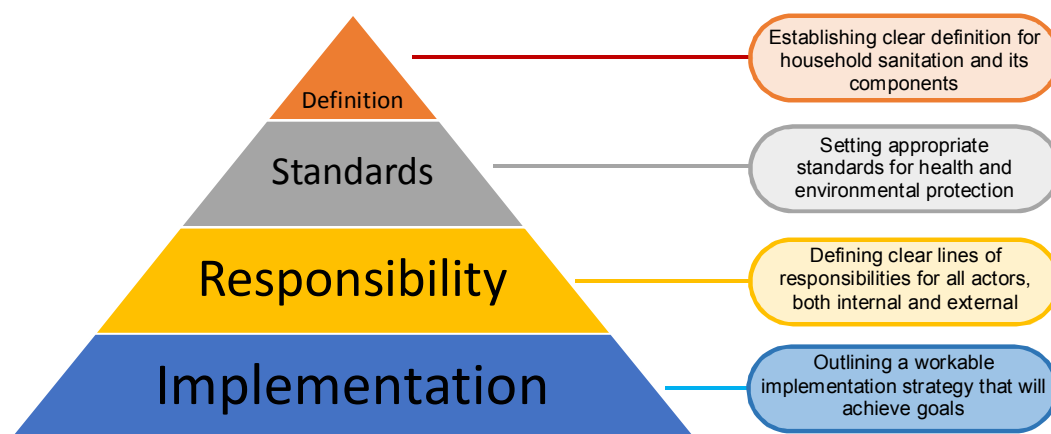


Figure 8-1. Building blocks for sanitation policy framework

8.6 Defining Adequate Household Sanitation in Guyana

The findings of this study and recommended global best practices in improving sanitation, suggests that the simplistic definition of sanitation, referring to “the provision of facilities and services for the safe disposal of human urine and faeces” (WHO, 2011), would not ensure households in Guyana achieve a measure of adequate sanitation. This led to a modified definition, which is considered most appropriate. The definition must include six key elements, based on the findings of this investigation. These are (1) water supply, (2) excreta management, (3) hygiene, (4) solid waste management, (5) drainage and (6) vector control (**figure 8-2**).

The details of how each of the six elements will contribute to household sanitation are discussed below, before presenting a clear definition that incorporates the six elements.

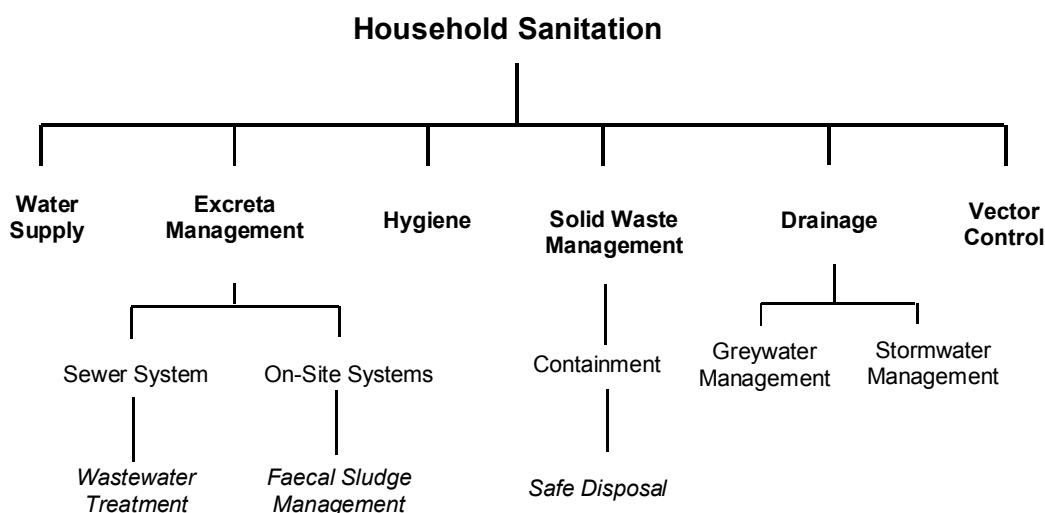


Figure 8-2. Components defining adequate household sanitation

8.6.1 Water Supply

The need for and benefits of households accessing safe drinking water supply have been widely discussed and accepted. However, access to a safe, convenient and reliable source of water for domestic purposes is critical to maintaining safe sanitary conditions at households. The general sanitary welfare of households is dependent on the availability and reliability of water for domestic purposes. Further, availability of water is the foremost consideration when the type of sanitation facility is being considered. The importance of water to good hygiene practice also legitimises the inclusion of water supply in the definition for household sanitation. Households in Guyana will find it difficult to attain a standard of adequate sanitation without the inclusion of water supply as one of the main contributory components. In fact, access

to water supply must be principal in sanitation improvement efforts. The propose definition for water supply is shown in **Box 8.1**.

Box 8.1 – Water Supply Definition

Safe, adequate, reliable water supply for households to facilitate good domestic cleanliness, hand washing for safe hygiene and expand choices for toilet facility.

8.6.2 Excreta Management

Safe management of human excreta must form the bedrock in defining household sanitation for Guyana. Safe excreta management must ensure faeces and urine are collected and removed from the immediate environment, without the potential of being re-introduced into the same environment, in any form, untreated. In this way, faecal-oral transmission of diseases can be reduced and the immediate environment to the household can be protected. The recommended definition of this element of household is as presented in **Box 8.2**.

Box 8.2 – Excreta Management Definition

Safe containment and removal of human excreta (faeces and urine) from the immediate living environment and treatment of human excreta, to eliminate contamination of environment during reuse and disposal

8.6.3 Hygiene

Good hygiene practices by all members of a household were found to be critical to the sanitary state of a household and must form part of any definition of household sanitation. Handwashing (with soap) after use of the toilet has been identified as an effective means to break faecal-oral transmission of diseases. Therefore, this component has been included in the definition of household sanitation and will be incorporated as shown in **Box 8.3**.

Box 8.3 – Hygiene Definition

Households have means (amenity and knowledge) to undertake good hygiene practices marked by practicing hand washing with soap after using toilet facility.

8.6.4 Solidwaste Management

Poor management of solid waste is known to create an equally unhealthy condition as poor excreta management. Safe containment and timely removal of solid waste from households was found to be critical to improving and sustaining sanitary conditions at households. Therefore, the recommended definition that must be applied to this element is the need for households to have adequate facilities installed and be sufficiently knowledgeable on managing all domestic solid wastes produced by the household. The specific definition that should be applied is shown in **Box 8.4**.

Box 8.4 – Solidwaste Management Definition

All solid wastes generated by the household being effectively managed through containment, storage and safe management, preventing the creation of unsanitary conditions.

8.6.5 Drainage

Grey and storm waters mismanagement were found to be responsible for the unsanitary state of many households investigated. Delinquency by households in effectively removing grey and storm water from the immediate surroundings of the living quarters creates malodorous conditions and oftentimes leads to flooding, increasing the interaction between household members and wastewaters, thus creating faecal-oral disease transmissions. For these reasons effective drainage to safely remove wastewaters from dwellings is considered critical for inclusion in defining household sanitation. The specific definition for this element is presented in **Box 8.5**.

Box 8.5 – Drainage Definition

The effective management of all greywater and storm water generated by households;

Adequate household drainage to prevent localised flooding

8.6.6 Vector Control

The control of vectors associated with the transmission of infectious diseases must be included in any definition relating to household sanitation. Elimination of disease transmission routes must be considered when seeking to improve household sanitation. For this reason, vector control was identified as a critical element in defining household sanitation. The proposed definition for vector control element is shown in **Box 8.6**.

Box 8.6 – Vector Control Definition

Promoting sanitary practices that encourages the reduction of the number of vectors within households and immediate surrounding

Putting together the six elements discussed about, the collective definition for adequate household sanitation that is recommended for Guyana is illustrated in **Box 8.7**.

Box 8.7 – Adequate Household Sanitation

Households having access to a water supply source that is safe adequate and reliable; installed excreta management facility that is appropriate for all members of the household, both in terms of ability to use and function; appropriately contained and effectively managed solid wastes; grey and stormwater effectively managed to adequate drainage/reuse systems; promotion of conditions that reduces the presence of vectors; and adoption of practices that promote good hygiene

8.7 Standard for Adequate Household Sanitation

The adequacy of the condition at the household is highly dependent on the established and maintained standards of the critical components of sanitation. In most cases, the mere existence of facilities would not result in the establishment of good or adequate conditions. It must be supported by good practices. Setting standards for each component would not only provide key targets to be achieved, but will also allow for the design of sustainability provisions. Standards will also permit the development of monitoring, control systems for the various elements, and allow for the assignment of responsibilities to appropriate parties.

The recommended standard for each element is presented in the section below. The development of these standards took into considered the national development ambitions to have all Guyanese experience the 'good life', for which a primary contributory factor is the quality of their living environment. Reduction of the impact and spread of faecal-oral diseases by safely separating waste from human contact, and future interaction with popular transmission media of soil and water, also influenced the development of these standards. In the end, these standards would comply with internationally recommended sanitation practices, as well as take into consideration the inherent socio-economic and geo-physical conditions of communities within Guyana. Consideration was given to equity, culture, gender, child friendliness, climate resilience, appropriateness and sustainability.

8.7.1 Water supply Standard

All households, regardless of geographic location, must have access to must have access to a 'safe', 'convenient' and 'reliable' source of water supply for both drinking and hygiene purposes.

For water supply, safe refers to the quality of water. 'Convenient' defines the ease at which household can access the supply and 'reliable' refers to how often the source/service is available to the household (See full breakdown in table 8-2). As a basic standard, all households must have access to a safe, convenient and reliable

source of water supply. The standard across the geographical divide will vary taking into account the settlement type and access to public services. As such, the standard requirement for households will be based on the geographic location of the households and available services in the zone.

Table 8-2. Factor used to measure the adequacy of Water Supply

Water Supply standards definition	
Adequacy Factor	Standard
<i>Safe</i>	Water must meet the minimum national water quality standards or an internationally recognised quality standard for drinking. Water used for other domestic activities such as bathing, flushing, laundry, etc. can be guided by national/regional/global best practices.
<i>Convenient</i>	<p>Each member of household must be able to access the source of water without risk to their safety.</p> <p>Access to water source should not be in a location that induces excess strain and fatigue for collection, transport and use.</p> <ul style="list-style-type: none"> • Source/collection point must be less than 50 m from household/point of use; • All members of household must be able to access water source.
<i>Reliable</i>	Water must be available in quantity that meets the daily domestic needs of each household member.

The recommended general standard for household water supply is provided in table 8.3 below.

Table 8.3 Recommended standard grades for household water supply

Standard grade	Requirements
Advanced	<p>Piped water supply into dwellings</p> <p>24 hours supply of treated water that meets drinking water quality.</p> <p>Source/collection point less than 10 m from household/point of use</p>
Adequate	<p>Piped public/private water supply to household standpipe level</p> <p>12-16 hours of treated water/untreated minimum, meeting drinking water quality</p> <p>Source/collection point less than 50 m from household/point of use</p>
Basic	<p>Piped public/private water supply to household standpipe level</p> <p>minimum of 8 hours treated/untreated water of a safe quality</p> <p>Source/collection point less than 50 m from household/point of use</p>

8.7.2 Excreta Management

Safe management of excreta is defined as the **containment, control, transportation, treatment and reuse or disposal** of human waste in a manner that does not pose risk to the public health and the environment. This system must also prevent waste from contaminating the surrounding environment. **Controlled** speaks

to having a mechanism to limit inhibiting factors to waste treatment and negative external influences that can affect the effectiveness of containment approaches. An example of control for on-site systems is the prevention of infiltration of flood water or solid waste materials into VIP latrine or septic tank, which can result in the overflow of containment facility. For off-site systems, this may translate into access to adequate transport systems to move excreta from the point of collection to where it is being treated. **Treated** refers to reducing the organic, nutrient and pathogenic load of the excreta via some chemical, biological, mechanical or natural means, while excreta being **disposed** alludes to the final destination of the treated waste, which can be either buried, spread to land or more beneficial usages such as fertilisers. The expanded definition is given in table 8-4.

Table 8-4. Factor used to measure the adequacy of Excreta Management

Excreta Management standards definition	
Adequacy Factor	Standard
Safe	All member of the households, including women and children must be able to use toilet facility at their convenience, without fear and when needed.
Convenient	The technology option must be acceptable to households, without imposing on cultural and religious beliefs. The facility must permit comfort of use and meet the needs of all members of the household, including women and children. Facility should not be located more 50m from household/point of use.
Contained	Excreta must be safely contained within a facility that eliminates contamination to surrounding environment, particularly sensitive zones.
Controlled	Excreta management facility must not be as such as it compromise the containment of excreta. Importantly, facility must not be susceptible to flooding or ingress and egress of rodents.
Treated	Facility must provide some form of treatment to excreta, particularly the faecal sludge treatment.
Disposal	Effluent and sludge must be of acceptable quality (based on some national/region/global standard) to qualify for safe disposal directly to the environment.

For excreta management to be considered adequate, the process must be a closed-loop process as shown in **figure 8-2**, where the complete life-cycle of the excreta is taken into account. This approach is critical to guarantee that the expected performance of excreta management is gained. This is necessary to break the disease transmission links.

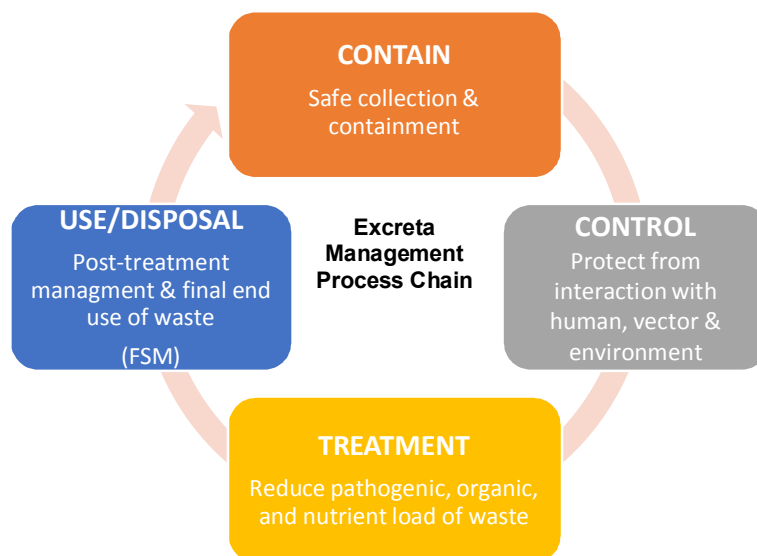


Figure 8-3. Life-Cycle Excreta Management Processes for adequate sanitation

The recommended general standard for household water supply is provided in table 8.5 below.

Table 8-5 Recommended Standard grades for household excreta management

Standard grade	Requirements
Advanced	Household using water closets connected to a sewer system, where sewage is treated to acceptable quality before disposal or water closet connected to a properly designed, constructed and operated septic tank, not susceptible to flooding, producing acceptable effluent quality and faecal sludge removed, treated and consider for reuse or recycled.
Adequate	Households using properly designed, constructed and operated septic tanks, not susceptible to flooding, producing acceptable effluent and faecal sludge removed, treated and disposed safely.
Basic	Households using properly designed, constructed and operated septic tanks, or a properly design, constructed and operated VIP latrine, not susceptible to flooding, where faecal sludge removed, treated and disposed safely.

A number of geographic-specific standards will also apply.

- 1) All households on the coastal zone must use a septic tank system unless specific circumstances prevent them from doing so. Only circumstances that can be considered preventable include:
 - i. Household is located in an area served by a sewer network, in which case the household will be required to connect to the sewer system;

8.7.3 Hygiene

The practice of good hygiene is considered critical for household sanitation. It was found that the absence of facilities compromise the propensity of households to undertake good hygiene practices. Therefore, facilities must be available to encourage good practice. The recommended standard for hygiene is shown in figure 8-6. Critical to the achievement of these standards is (1) household must have access to safe and reliable source of water supply and (2) installed facilities for handwashing in the immediate environs to excreta management facility, and (3) facilities to encourage hand washing with soap.

Table 8-6. Recommended standard for household hygiene

Standard grade	Requirements
Advanced	Households have a face sink/wash basin fitted with piped water supply, installed in same location as excreta management facility, and includes soap receptacle.
Adequate	Households have a face sink/wash basin, with water supply (piped or other) and facilities for soap located within 3m of their excreta management facility.
Basic	Households have a source of water within 3m of excreta management facility, complete with soap for handwashing.

8.7.4 Solid waste Management

Solidwaste at households must be safely contained and effectively managed to remove immediate sanitary risks to households. Safe solid waste management at the household must eliminate potential practices that would lead to a compromise of the sanitary state of the household. Critical also is the elimination of vector breeding and harbouring grounds. Solid waste management standards at the household that meet the above criteria are present in table 8.7.

Table 8-7. Recommended standard for solid waste management at households

Standard grade	Requirements
Advanced	<p>Households to have waste management system that reduces or recycle households waste, reducing the quantity of solid waste considered for disposal</p> <p>Waste for disposal stored in a closed-lid receptacle, preventing access to vectors</p> <p>Waste is managed by a public or private service provider (off-site) through a means approved by authorities.</p> <p>No garbage storage uncontained on-site</p> <p>No on-site management of solid waste via unapproved methods (burning, burial, etc.)</p> <p>No animal interaction with garbage</p>
Adequate	<p>Households have equipment to contain waste within yard to prevent access to vectors and interaction with animals</p> <p>Waste is collected, transported and managed off-site by public and private service provider through a means approved by the authorities.</p>
Basic	<p>Solid waste contained, stored and managed on-site through means approved by the authorities.</p> <p>Storage must prevent access to vectors and interaction with animals.</p> <p>No interaction of waste with floodwaters</p>

It is important, given the conduciveness of the physical environment in Guyana to vector breeding, that care be taken to eliminate the potential for vector agents.

8.7.5 Drainage (wastewater management)

Drainage used in this context refers to the management of all wastewater (except black water) produced by the household. It includes laundry, bath and other domestic wastewater as well as stormwater. Effective drainage is critical to reduce flooding, which contributes significantly to the sanitary state within the household environment. Therefore, it is imperative that grey and storm waters are controlled and adequately managed. The recommended standards for household wastewater management at the average households in Guyana are outlined in table 8-8. Central to these recommendations is that all wastewater generated within the household must be effectively managed in a way that (1) restricts wastewaters and storm waters from being disposed directly to the immediate surroundings of the household, (2) permits the containment and conveyance of wastewaters and storm waters away from immediate environs, and (3) disposal of waste water of adequate quality to avoid environmental contamination.

Table 8-8. Recommended standard for Drainage (wastewater) management at households

Standard grade	Requirements
Advanced	Households collect all grey and storm water, treat to acceptable standard and discharged through a drainage system that effectively conveys water away from household and immediate community. Effluent from household should not contribute or increase risk of localised flooding. No water ponding in yard
Adequate	Wastewater collected and conveyed (untreated) to drainage channels external to the household. No wastewater discharged directly to ground surface. Discharge means does not increase risk of flooding from effluent discharge.

Standard grade	Requirements
	No water ponding in yard
Basic	<p>Untreated wastewaters conveyed to internal drains and channelled to larger drainage system</p> <p>No wastewater from household discharged directly to ground surface</p> <p>Internal drains are adequate to contain and convey wastewater discharge volume</p> <p>No water ponding in yard</p>

8.6.6 Vector Control

A vector-free household is essential to protecting and preserving the sanitary conditions at households. Standards for vector control require the reduction or complete elimination of disease causing/transmitting vectors. The recommended household standards in outlined in table 8-9. The vectors of primary concern to this standard include mosquitos, rodents, cockroaches, flies and bats.

Table 8.9. Recommended standard for vector control

Standard grade	Requirements
Advanced	<p>No vectors within immediate household environment</p> <p>No rodents present within yard and conditions do not encourage the presence of vectors</p> <p>No condition in yard to serve as vector breeding ground or to attract vectors</p> <p>No stagnant water in yard</p>
Adequate	<p>No vectors within immediate household environment</p> <p>No rodents present within yard and conditions do not encourage the presence of vectors</p>
Basic	<p>Limited community-based vectors present (e.g. mosquitoes/flies)</p> <p>No vector breeding ground within household or yard</p>

8.6.7 Application of Standards

The standards outlined in this section are applicable to both coastland and hinterland households. However, the adequacy expectation within each of the four distinctive settlement classifications that exist in Guyana would require that different standards be applied based on propensity of achievement. Additionally, the adequacy will rely on the public service available within the settlement categories. To ensure effectiveness of standards, it is recommended that the above standards be applied as outlined in table 8-10. The application is concentrated on water supply and excreta management, as achievement of these provisions would inherently increase the propensity of achieving the standards of the other elements. Additionally, the achievement of the standards for those elements rests intricately with awareness,

access to resources and attitude towards those standards. A schematic guideline for the application of the standards is reflected **appendix G**.

Table 8-10. 'Adequate' standards for water supply and excreta management for Coastal and Hinterland communities

Geography	Settlement Category	Minimum Service Standards
C Coastal	U Urban (Areas served by Municipality) <ul style="list-style-type: none"> - Anna Regina - Georgetown - New Amsterdam - Rosehall - Corriverton - Linden - Mahdia - Mabaruma 	<u>Water Supply</u> <ul style="list-style-type: none"> - Piped water supply to property and toilet facility <u>Excreta Management</u> <ul style="list-style-type: none"> WST - Water Closet connected to a septic Tank, c/w FSM Plan/agreement; WSS - Areas with sewer networks – water closet connected to sewer, c/w waste treatment; - <u>No pit latrine permitted</u>
	R Rural (Areas served by NDCs) <ul style="list-style-type: none"> - All areas served by NDCs 	<u>Water Supply</u> <ul style="list-style-type: none"> - Piped water supply to property/yard <u>Excreta Management</u> <p><u>Piped water supply to property:</u></p> <ul style="list-style-type: none"> - Water closet connected to septic tank, c/w FSM - No pit latrine permitted <p><u>Piped water supply to standpipe:</u></p> <ul style="list-style-type: none"> - Pour flush water closet connected to septic tank, c/w FSM - No pit Latrine permitted <p><u>No piped water supply to property</u></p> <ul style="list-style-type: none"> - VIP Latrine; standard determined by local conditions, c/w FSM plan and agreement;
	S Riverine/Settlement Communities <ul style="list-style-type: none"> - Villages - Amerindian Settlements 	<u>Water Supply</u> <ul style="list-style-type: none"> - Piped water supply to standpipe in yard <ul style="list-style-type: none"> - <u>Excreta Management</u>

Geography	Settlement Category	Minimum Service Standards
		<u>Piped water to yard:</u> - Pour-flush water closet connected to septic tank, c/w FSM <u>No piped water to yard</u> VIP Latrine; standard determined by local conditions, c/w FSM plan and agreement;
	I Informal/Squatting - All areas without legal permit.	<u>Water Supply</u> - Piped water supply to standpipe in yard <u>Excreta Management</u> <u>Piped water supply to yard:</u> - Water closet connected to septic tank, c/w FSM <u>No piped water to yard:</u> VIP Latrine; standard determined by local conditions, c/w FSM plan and agreement;
H Hinterland	U Urban (Areas served by Municipality) - Mabaruma - Bartica - Madhia - Lethem	<u>Water Supply</u> - Piped water supply to property and toilet facility <u>Excreta Management</u> WC - Water Closet connected to a septic Tank, c/w FSM Plan/agreement; <u>Water Supply</u> - Non-piped water supply <u>Excreta Management</u> PL No Latrine type facilities
	R Rural – Areas outside of township but not settlement communities	<u>Water Supply</u> - Piped water supply to standpipe in yard <u>Excreta Management</u> <u>Piped water supply:</u> WC - Water closet connected to septic tank, c/w FSM <u>Non-piped water supply:</u> VIP Latrine; standard determined by local conditions, c/w FSM plan and agreement;

Geography	Settlement Category	Minimum Service Standards
	(S) Riverine/Settlement Communities <ul style="list-style-type: none"> - Villages - Amerindian Settlements 	<u>Water Supply</u> <ul style="list-style-type: none"> - Piped water supply to standpipe in yard <u>Excreta Management</u> <u>Piped water supply:</u> <ul style="list-style-type: none"> - Water closet connected to septic tank, c/w FSM <u>Non-piped water supply</u> VIP Latrine; standard determined by local conditions, c/w FSM plan and agreement;
	(T) Temporary Settlements <ul style="list-style-type: none"> - Long-term commercial activities - High-population industrial population - Nomadic Settlements 	<u>Water Supply</u> <ul style="list-style-type: none"> - Piped water supply to standpipe in yard - Non-piped/river Source <u>Excreta Management</u> <u>Piped water supply:</u> <ul style="list-style-type: none"> - Water closet connected to septic tank, c/w FSM <u>Non-piped water supply:</u> VIP Latrine; standard determined by local conditions, c/w FSM plan and agreement.

8.7 Sanitation Responsibility

The existing institutional arrangement for sanitation service delivery and management was re-organised to improve the effectiveness and efficiency of service delivery and to create a structure to support the universalisation process. This amended design was based on the following:

- (1) Sanitation is considered a public good;
- (2) The ultimate responsibility for household sanitation can no longer rest with the household;
- (3) Public sector authorities should play the leading role in service delivery and management

- (4) A collaborative approach is needed to advance and sustain sanitation development.

This framework requires public and non-governmental organisations to hold responsibility for key aspects of sanitation service delivery. The main responsibility areas include:

- National Sanitation Policy/development strategy
- Setting Standards
- Monitoring and enforcement of standards
- Sanitation Programme Financing
- Awareness and information programming
- Providing financial support
- Public promotion of good sanitation devising
- Providing sanitation services

8.7.1 Key Organisations, roles and responsibility

The organisations having critical functions to sanitation improvement are listed in table 8-11.

Table 8-11. Recommended roles and responsibility for key stakeholders

Organisation	Old Role & Responsibilities	New Role & Responsibilities
Government of Guyana	Legislative authors; Crafting of laws; Define national development strategy	Enforcement of constitutional commitments; Support policy proposal and legislative changes; Highlighting links between sanitation and national development targets; Advocacy of national development plans; Support public sector funding proposals; Sanitation Champion.
Ministry of Communities	Support community development through strong local governance; Responsible for Housing sector development; Water Supply service delivery	Drive community development through sanitation improvement; Lead Agency for national Sanitation Improvement advocacy – National Sanitation Champion; Crafting and implementing household sanitation improvement policy; Advocacy for improved sanitation; Service delivery for sanitation components through agencies; Global representative for water and sanitation

Organisation	Old Role & Responsibilities	New Role & Responsibilities
		coverage and progress Track progress in water and sanitation improvements; Develop proposals for household sanitation improvement.
Ministry of Finance	Approve budget proposal for state entities; Enter into multilateral agreements for sanitation improvement projects/programmes	Encourage/promote focus of national development objectives; Inclusion of household sanitation development in national budget; Approve budget proposals for state entities; Advocate for multilateral & bilateral support for national sanitation improvement
Ministry of Public health	Monitoring of household sanitary conditions via the Environmental health Unit, recommending improvements to preserve public health.	Monitoring the adequacy of sanitation components at households against standards; Measure and report areas requiring improvements to LDOs; Advocate for improved sanitary behaviour at households; Lobby/make representation to CDC to support household sanitary improvement.
Ministry of Education	No specific role and responsibility in sanitation	Sanitation awareness and training in school curriculum; Targeted sanitation awareness programme
International Development partners	Support national development strategy /programmes	Support national development strategy; Advocate for national WASH development; Provide innovative funding solutions targeting low income households.
NGOs	Support national development strategy /programmes	Support national development strategy; Partner with agencies to support household sanitation development;
Private Sector	Providing limited sanitation services	Provide sanitation services as required by households; Support national development initiatives; Partner with national agencies to improve household sanitation; Conform to standards and conditions outlined in policy;
Guyana Water Incorporated	Water supply & sanitation service provider	Water and Sanitation expanded to all urban centres. Water supply remit remains countrywide. Public awareness for improved KAP; Advocacy for national sanitation improvement.
Central Housing & Planning Authority (CH&PA)	Provide housing solutions; Production and enforcement of building code standards	Provide sustainable housing solutions; Production and enforcement of building code; Include sanitation standards within building codes; Advocate for improved sanitation as part of housing solutions;
Community Development Council		Promote healthy communities and healthy households; Investigate and report unfavourable conditions at households; Recommend households to CDCs. Monitor household sanitation, record and collate data on progress.
Community Development Commission (CDC)	None – New Establishment	A social development support entity, providing assistance to household development;

Organisation	Old Role & Responsibilities	New Role & Responsibilities
		Funding support for household sanitation improvement initiatives. e.g. funding for households wanting to convert pit latrine to septic tank, but unable to afford.
Local Democratic Organs (Municipality & NDCs)	Provide partial sanitation services.	Application and enforcement of national sanitation standards; Delivery of essential sanitation services; Promote good sanitation practices within communities; Guide households to improving and sustaining sanitary conditions; Approval of housing/community development plans; Refer households to CDC for support.

The proposed reorganisation of the responsibilities of key agencies should be accompanied by the implementation or amendment of appropriate legislation to reflect new agency functions. The re-organisation of key stakeholders in a functional system is shown in figure 8-4.

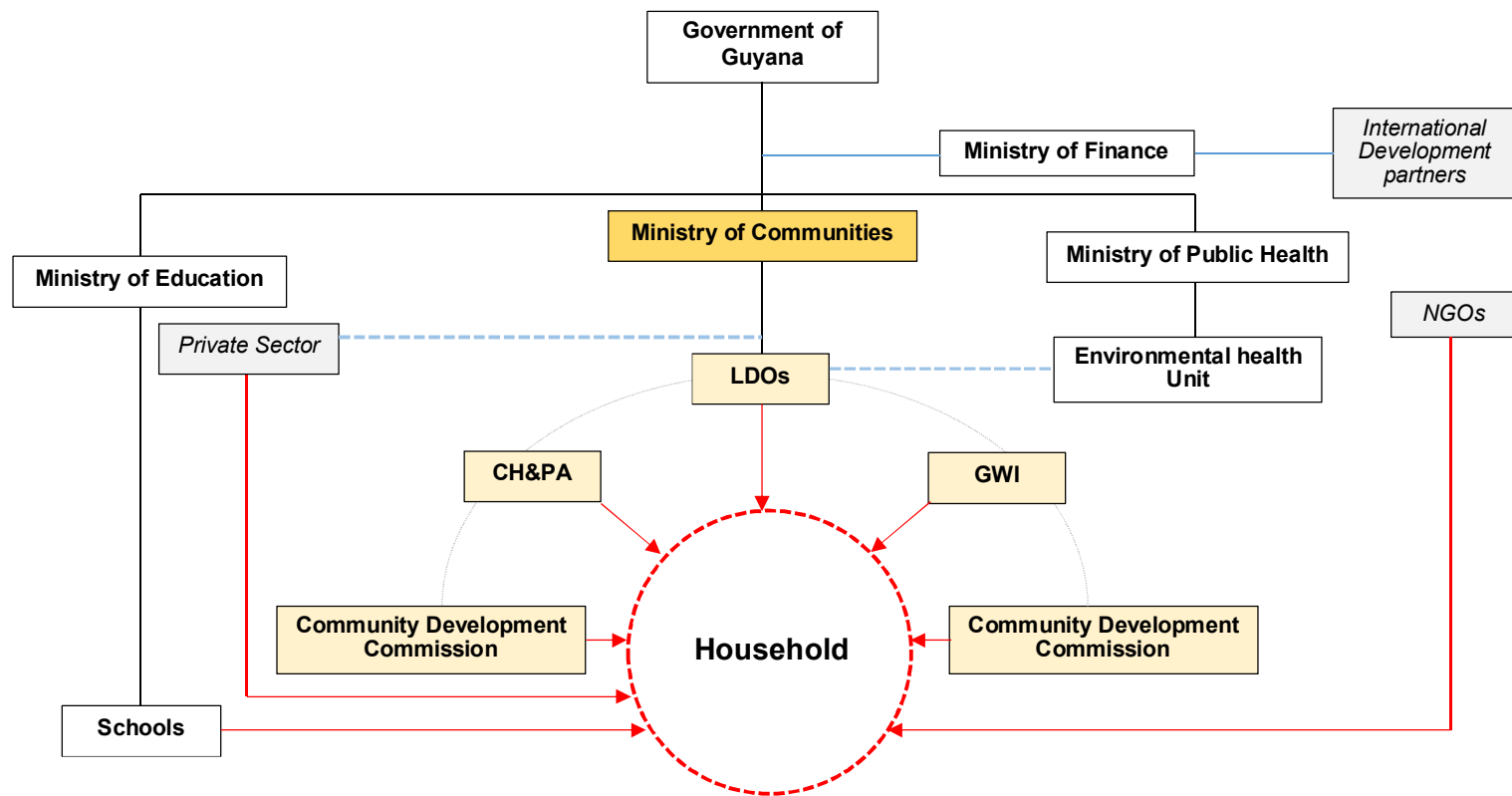


Figure 8-4. Remodel of organisational arrangement for household sanitation service delivery and management

8.8 Implementation Strategy

Achieving the vision of the policy framework critically depends on the implementation of the recommendations. An implementation plan based on the settlement categories in Guyana proved to be the most effective in (1) providing clarity on the areas that require most attention, (2) taking into consideration the characteristics of the settlements, and (3) allowing for progress in monitoring and early identification of problematic areas.

The implementation of the recommendations contained in this strategy is dependent on the political commitment to secure improvement, the household buy-in on the need for advancing sanitation and the level of investment/resources provided to the sector. For these reasons, it is recommended that sanitation improvement activities be implemented in the following chronological stages:

Stage 1 – Political Commitment

Stage 2 – Policy Formulation

Stage 3 – Re-organisation of Public Agencies

Stage 4 – Advocacy

Stage 5 – Implementation

Stage 6 – Monitoring and Evaluation

8.8.1 Political Commitment

To secure political commitment, it is recommended that sanitation improvement be intricately linked to national development strategy. At the time of concluding this research Guyana commenced preparation of a new national development strategy titled “Green State Development Strategy (GSDS)”. This strategy is designed to transition Guyana into a ‘green’ state based on a ‘green’ economy. Linking household sanitation development to the outcome of the objectives of this strategy is guaranteed to secure the political commitment needed. Household sanitation improvement can be linked to two of the three main objectives of the GSDS objectives, which are (1) “Improving Human Wellbeing and Social Security” and (2) “Protecting Our Environment”. Improved household sanitation can significantly contribute to both objectives. This strategy is being prepared with an implementation period from 2017-2030, which can provide the ideal national developmental framework and political commitment to see sustained action taken to improve household sanitation across Guyana. Attaching sanitation policy to this national development strategy can also serve as a key driver for nation sanitation development.

8.8.2 Policy Formation

This framework provides the baseline for the design of an adequate national policy for the improvement of household sanitation. The sanitation policy must be developed to secure the political buy-in and to be the tool and driving force for decision making in the sanitation sector.

8.8.3 Legislative Reform

The enabling legislation for sanitation development in Guyana can no longer rest with the dated Public Health Ordinance. The provisions of this legislation cannot provide the needed legal coverage and support to catalyse action in the sector. With the Water and Sanitation and the Public Health Act providing limited legislative cover for sanitation improvement, there is need for amendment of existing and creation of new legislations to support and sustain sanitation development in Guyana. The recommended legislative reform is outlined in table 8-12.

Table 8-12. Sanitation legislative reform recommendations.

Item	Legislation	Old	New
1	<i>Constitution of Guyana 1980</i>	Provisions are adequate to support household sanitation improvement	None
2	<i>Public Health Ordinance 1934</i>	Dated and provisions does not subscribe to modern consideration for adequate sanitary conditions at households.	Replacement with improved Health Promotion and protection Act
3	<i>Health Promotion and Protection Bill</i>	Designed to replace the Public Health Ordinance. No provisions for sanitation improvement	Improved to include provisions for household sanitation.
4	<i>Water and Sanitation Act 2002</i>	Focuses on water supply. Remit for sanitation unable to encourage or supply household sanitation improvement. Requires significant strengthening.	To be strengthened to include standards for water supply at household. Sanitation regulations expanded to include sanitation service provision to all urban area.
5	<i>Municipal and District Councils Act</i>	Sets out provision for actions required by households to maintain a sanitary environment.	Revised to set clear guidelines on what services should be provided in relation to sanitation.
6	<i>Local Government Act</i>	Applied in limited capacity. No provision for delivery of sanitation services	Amend to include service delivery for sanitation.
7	<i>Local Democratic Organ Act 28:09</i>	Available but not applied or enforced.	Applied legislation across LDOs, improving sections for sanitation improvement.

8.8.4 Projected Sanitation Development Progress

Improving sanitation to a state of universalisation requires a targeted sustained sanitation improvement effort. With this efforts, the various classes of settlements will move at various pace, based on existing status of sanitation and other systemic challenges. The progress expected through the application of this policy framework is shown in the figures below.

Development Zone – Urban (Coastal/Hinterland)

Adequate Standard		Piped water supply. 12-16 hrs/day min. service of treated water/untreated meeting drinking water quality.	Households using appropriately designed, constructed and operated septic tanks, not susceptible to flooding + FSM	Households having a face sink/wash basin, with water supply (piped or other) and facilities for soap located within 3m of their excreta management facility.	Households contain waste within yard. Waste is collected, transported and managed off-site through a means approved by the authorities.	Wastewater and storm water collected and conveyed (untreated) to drainage channels external to the household. No water ponding in yard.	No vectors within household environment; No rodents in yard, Conditions do not encourage vectors.
Target 2030							
2025	100%						
2020							
Baseline 2015							
Progress to 2015	90%						
	80%						
	70%						
	60%						
	50%						
	40%						
	30%						
	20%						
	10%						
Sanitation Components		Water Supply	Excreta Management	Hygiene	Solidwaste Management	Drainage	Vector Control

Development Zone – Rural (Coastal/Hinterland)

Adequate Standard		Piped water supply. 12-16 hrs/day min. service of treated water/untreated meeting drinking water quality.	Households using properly design, constructed and operated septic tanks, not susceptible to flooding + FSM	Households having a face sink/wash basin, with water supply (piped or other) and facilities for soap located within 3m of their excreta management facility.	Households contain waste within yard. Waste collected, transported and managed off-site through a means approved by the authorities.	Wastewater and stormwater collected and conveyed (untreated) to drainage channels external to the household. No water ponding in yard.	No vectors within household environment; No rodents in yard, Conditions do not encourage vectors.
Target 2030							
2025	100%						
2020							
Baseline 2015							
Progress to 2015	90%						
	80%	↑					
	70%						
	60%					↑	↑
	50%		↑				
	40%			↑			
	30%				↑		
	20%						
	10%						
Sanitation Components		Water Supply	Excreta Management	Hygiene	Solidwaste Management	Drainage	Vector Control

Settlement category – Riverine/Temporary (Coastal/Hinterland)

Adequate Standard		Piped water supply. 12-16 hrs/day min. service of treated water/untreated meeting drinking water quality.	Households using properly design, constructed and operated septic tanks, not susceptible to flooding + FSM	Household having a face sink/wash basin, with water supply (piped or other) and facilities for soap located within 3m of their excreta management facility.	Household contain waste within yard, collected, transported and managed off-site through a means approved by the authorities.	Wastewater collected and conveyed (untreated) to drainage channels external to the household. No water ponding in yard.	No vectors within household environment; No rodents in yard, conditions do not encourage vectors.
Target 2030							
2025	100%						
2020							
Baseline 2015							
Progress to 2015	90%						
	80%						
	70%						
	60%						
	50%						
	40%						
	30%						
	20%						
	10%						
Sanitation Components		Water Supply	Excreta Management	Hygiene	Solidwaste Management	Drainage	Vector Control

Settlement Category – Informal Settlements (Coastal/Hinterland)

Adequate Standard		Piped water supply. 12-16 hrs/day min. service of treated water/untreated meeting drinking water quality.	Households using properly design, constructed and operated septic tanks, not susceptible to flooding + FSM	Household having a face sink/wash basin, with water supply (piped or other) and facilities for soap located within 3m of their excreta management facility.	Household contain waste within yard, collected, transported and managed off-site through a means approved by the authorities.	Wastewater collected and conveyed (untreated) to drainage channels external to the household. No water ponding in yard.	No vectors within household environment; No rodents in yard, conditions do not encourage vectors.
Target 2030							
2025	100%						
2020							
Baseline 2015							
Progress to 2015	90%						
	80%						
	70%						
	60%						
	50%						
	40%						
	30%						
	20%						
	10%						
Sanitation Components		Water Supply	Excreta Management	Hygiene	Solidwaste Management	Drainage	Vector Control

Chapter 9. Conclusions, Recommendations and Future Work

9.1 Introduction

This chapter presents the main conclusions that were derived from this study, while showing how the aims and objectives were achieved. This is followed by the presentation of key recommendations for optimising the impact of the findings and advancing future research in this field. Specific guidance is included as to the wider implications of the research findings, before a personal perspective on the impact of the research findings is given.

9.2 Main Conclusions based on research objectives

9.2.1 Objective 1 - Challenges to Country-Level Sanitation Development

The challenges to improve sanitation at the country-level are too many for a piecemeal approach to sanitation development. Multiple factors are linked to sanitation improvement and sustainability, many of which are tied to wider developmental issues. Critical developmental issues such as poor institutions, housing tenure and available finances, *inter alia*, inhibit sanitation progress in countries. However, the leading constraints were found to be low political will, poor enabling environment, limited financial resources and weak institutions. However, the challenges go beyond those factors. Non-mainstream challenges such as sanitation definition and failure to examine the influence of the historical development pattern of a country were found to have possible links to country-level sanitation development. While much attention is given to the known challenges popular challenges, these salient challenges demonstrated potential to influence the rate and sustainability of country level sanitation development. Generally, it can be concluded that for sanitation improvements to be achieved and sustained, sanitation development planning cannot proceed in isolation to these wider development constraints.

9.2.2 Objective 2 - Influence of Historical Development on sanitation

The historical development pattern of a country significantly influences the state, development and attitude toward sanitation within that country. Historical development events shape not only the institutions, but also the perception and attitude towards sanitation. The state of sanitation in the Caribbean, more so, the approach taken by countries, has direct links to events and influences of the development journey of the region. Historical events set the trends that are predominantly in the region today. Slavery and colonialism in the Caribbean shaped critical institutions through which sanitation still relies. Slavery resulted in low consideration and being the after-thought of development. Security of tenure and elevating socially, remained the predominant development ambition. Colonialism laid poor developmental institutions, where public services were only designed to serve specific class groups. An external dependency culture also arose as a result of this developmental period. Political independence brought developmental hope without a clear direction and significant constraints, leaving poor institutions to continue unchanged. Holistic sanitation development was non-existent during those periods, and continues to be same today. Conversely, Barbados historical development events say positive attitudes and perception taken towards sanitation, thus instilling a number of positive institutions. This is evident as those early trends continue today, leading to sanitation improvement being central to development ambitions. Guyana, on the other hand, experienced negative influencers during early years leading to the formation of poor institutions. These have carried on to present-day and continues to pose significant challenges to improve sanitation. These institutions in their current state would not permit the achievement of universal access to adequate household sanitation.

Path Dependence is prevalent and the impact of historical developmental is clearly visible in country-level consideration given to sanitation. This could be a major factors as to why some countries in the Caribbean region, or further afield, are struggling to improve and sustain adequate levels of sanitation, despite widespread global advocacy.

Additionally, it can also be safely concluded that the slow progress in sanitation development in some Caribbean countries may not be the result of lack of effort, but the remnants of their developmental history that they are still yet to shed.

9.2.3 Objective 3 - Barbados Approach to sanitation Development

Good sanitation is considered a public good in Barbados. Barbados understood the importance and benefits of having an improved standard of sanitation and it became enshrined into development discourses and actions. Successful development was hinged on good sanitary practices, which attracted strong political will across its developmental history. Barbados approach was bespoke to the needs of the island. The progress was gradual, but targeted. Policies were introduced, which key driver continuously existed calling for improved sanitation. These were catalysts for resource mobilisation and investment in improving sanitation. Barbados sanitation development was consistent, spanning over a century. One of the critical success factors for Barbados was its flexible approach, adopting strategies that best suit the local situation. Barbados used the social approach, the policy approach, the re-organisation approach and the legal approach, all at different stages in its development. This demonstrated that Barbados understood the needs at the present time and take appropriate action.

Political will and leadership was another hallmark of Barbados' success. Barbados underwent numerous adjustments to drive the vision of a clean and sanitary state for the protection of health. While there was no widespread advocacy, the importance of good sanitary practices was contained in many of the public discourse on health protection and environmental preservation. Barbados knew what they wanted and the standards that was necessary for their developmental objectives. They outlined and maintained clear a definition for what constitutes adequate household sanitation based on their national interest.

Barbados demonstrated a successful model where country-level sanitation can be improved and sustained. Key to this model is having clear objectives of the need for sanitation development and viewing good sanitation as public good.

9.2.4 Objective 4 - Critical challenges to sanitation development in Guyana

One of the foremost challenges facing sanitation development in Guyana is that sanitation is viewed as a private responsibility. Current public services are not designed to improved sanitation, but to facilitate monitoring of conditions to ensure public health conditions are preserved. This position has strong ties to the historical approach to sanitation service in Guyana. Households take full responsibility for their investment and installations in sanitation, based on their preference and financial capability to do so. Security of Tenure can safely be considered as the second prominent challenge to sanitation development in Guyana. With a large percentage of persons dwelling in informal settlements, sanitation improvements are affected by cramped living, poor living conditions and lack of finances.

Factors such as political will not identified as a critical challenge due to the fact that sanitation is not widely linked to any developmental objective, demonstrating a general lack of awareness on the impact of poor sanitation. The other major challenge is the existing organisation of sanitation services, which is wholly inadequate to deliver quality services that would see the improvements needed. The organisation is dated, as well as the legal framework that govern sanitation delivery. Cognisance of the importance of sanitation among development planners not risen above those of the past, where sanitation was not a developmental consideration. This approach is bound in path dependence, which can also be used to explain the general nonchalant attitude towards sanitation development that exist in Guyana.

Unfortunately, much of the existing challenges to sanitation development in Guyana is intricately linked to the historical events and processes of Guyana. The development history created a number of unhealthy institutions that adversely impacted the state and attitude towards sanitation. For Guyana to achieve universal coverage of an adequate standard of household sanitation, there must be a national embrace of a new definition of sanitation, which include the 6 key components of water supply, excreta management, solid waste management, hygiene, household drainage and vector control, given the local conditions. Appropriate standards must be established to achieve and maintain a measure of adequacy. For this to occur

there must be a re-arrangement of the existing structure of sanitation services delivery.

9.2.5 Objective 7 - Transferrable lessons from Barbados

The following were lessons were key lessons identified:

- (1) Linking sanitation development to wider developmental plans. This will clearly identify and establish why sanitation improvement is necessary and how it will contribute to national development.
- (2) Household sanitation must be defined based on the components are play and how they influences the sanitary state of the household.
- (3) Sanitation Development approach must match the needs and in-country conditions. Barbados utilised no direct public policy for sanitation, instead, sanitation was linking to other critical policies such as health promotion and protection, the environmental protection and the tourism policies. These were important to Barbados development, and as such sanitation automatically became important.

Guyana must examine the most effective approach in bringing about the changes necessary. This will depend on the local systemic conditions. Understanding the development vision and goals for Guyana will need to be first step in designing an appropriate sanitation policy framework for Guyana.

9.2.6 Objective 8 - Structuring of Sanitation Policy Framework for Guyana

The design of the policy framework incorporated a new definition for household sanitation, informed by the tenets of household sanitation. Embracing the unique characteristics of settlement types in Guyana, standards were set for each settlement type and comprehensive plans were designed to ensure households are capable of achieving the outlined level of sanitation. The plans involved (1) linking sanitation improvement to national development objectives, (2) set standards appropriate for local conditions, (3) re-organise the sanitation services delivery to optimise and

expand reach of service, and (4) launch campaigns to increase the awareness and knowledge of the implications of poor sanitation practices.

9.3 Wider Implications of findings to Global Sanitation Development

The findings of the research provided a wealth of knowledge that can lead to greater success and sustainability of global sanitation interventions, particularly countries seeking to improve their sanitation profile. Some of the key observations were as follows:

Continued global focus on accessing ‘improved’ sanitation can negatively impact the achievement of long-term household sanitation quality

Sanitation in the global context has evolved to reflect the presence of a suitable facility for safe excreta management. Improved sanitation refers to a slew of technology that would safely separate human excreta from further human contact. Functionality was not widely considered. This research showed that the presence of an improved sanitation facility at the household does not guarantee improvements in the sanitary profile of the household. Conditions such as flooding, vectors and poor management of solid waste, as was found in Guyana, jeopardises the sanitary conditions at household. Additionally, the absence of adequate water supply would lead to the selection of inappropriate technologies that can expose household member to undue risks. Placing attention wholly on technology, while neglecting other critical elements, can see the continuation of conditions at households that are injurious to both health and the environment. Further, sustaining good sanitation at the household level would require more than the installation of an improved sanitation facility; a holistic approach to household sanitation is required.

Public good vs Private Responsibility

Barbados demonstrated that when sanitation is considered a public good, the state takes ownership and much attention is given to ensuring conditions are conducive and adequate. Resources are made available and policies commissioned to support the advancing of conditions. This view serves as a catalyst for sanitation development at a national level, which supporting local initiatives that support the

vision. Maintaining the view that sanitation is a private responsibility suppresses its importance and diverts responsibility, which inhibits developmental progress. Transitioning from the private responsibility to the public good viewpoint, requires a re-examination of the role of sanitation in national development. Encouraging countries to move in this direction would support the global drive for universalising sanitation coverage.

Political Will requires linking sanitation to elements of national development

With the lack of political will emerging as one of the major challenges to country-level sanitation development, generating political will must be considered a priority in sanitation development planning. Lessons from Barbados showed that linking sanitation to key national development programmes increased the visibility of sanitation and caused it to be widely considered in developmental planning. Politicians generate public discourses, they are the law makers and often set the trend for development programmes. As such, having them on board with sanitation development, improvement efforts will be mainstreamed. This can lead to the creation of the enabling environment necessary for improving and sustaining sanitation development.

Modified Sanitation Planning Approach - Looking back to move forward

Historical Development assessment to identify impact on sanitation could be the missing link to effective sanitation planning in low and middle income countries. Understanding the root cause of the critical systemic factors can only be accomplished by looking back through the country's development history to identify the 'why' and 'how' of the current state of sanitation. Many poor existing sanitation problems are a product of a country's historical development pattern and events such as slavery, colonialism, war, natural disaster, settlement issues, religion, national and personal economy, cultural clashes, politics, climate, perception, attitude, practices. Current planning approaches neglect to seek to understanding the impact of these events on the current state and future sustainability of sanitation improvement. This

modified approach recommends a six-steps approach, which commences with an assessment of the country's historical development pattern (See layout in **Appendix F**). The output of the historical assessment presents a clear indication of the critical systemic conditions that must be considered, having identified the 'why' and 'how' of the existing state of sanitation.

This model was successfully used in this research, both in the case study of Barbados and Guyana. The historical review revealed critical conditions that were not visible by a simple recording of the existing sanitary conditions. The assessment offered depth of analysis and unearthed intrinsic features of a country's sanitation landscape that led to the identification of the factors that truly influenced the shape of sanitation. To understand the factors at play in developing sanitation in low and middle-income countries, particularly those having a history of poor sanitation, assessments must go beyond the conventional 'situational analysis'. It requires an approach that takes lessons from the country's history to shape its future. The product of this approach is the design of solutions that meet the needs of the country, increasing the potential of overcoming long-term sanitation inhibitors and increasing the likelihood that sanitation interventions would be sustained in the long-run.

Application of Historical Review to understand Global Sanitation Disparity

There is a stark regional disparity in global sanitation coverage. Majority of the global unserved population resides in the low-income countries, challenged by an array of problems. Using this model to understand their historical background could shed light on the challenges to improve sanitation. It would allow appropriate sanitation planning approaches to be designed that addresses the inhibiting systemic conditions. This can be an effective solution to reduce the regional disparity, and catapult global coverage with new information concerning the real cause(s) of the slowness of sanitation improvement being experienced.

Eroding social and class attitudes to sanitation services delivery

Social and class attitudes were found to be one of the main retarders to expanding critical sanitation services during the late 19th century/early 20th century. Identical

setbacks were recorded in the early years of sanitation development in both Barbados and Guyana. Accounts of the modern day challenges did not register any semblance that social and class attitudes still impede sanitation development progress. However, as found in the case studies, archaic institutions are still the driving force for development in less-developed societies. In societies where social and class attitudes is not linked to critical services would enable the design of policies that catered to all the population also proved challenging.

Countries recognising and embracing the UN declaration of access to water and sanitation as a human right would suppress any potential for social and class attitudes to sway the delivery of essential sanitation services. This would be an important measure to ensure equity and sustainability of services and to universalise coverage.

Importance of International Development Partners in national Sanitation Development

Seeking external financial sources to fund sanitation improvement initiatives can supplement gaps in internal revenue streams, particularly when there are competing priorities. However, with this high external economic dependency, developmental efforts can be limited to conditions set by funding agencies, or delays in implementing needed interventions due to absence of external sources of funds. In the former, the conditions and stringent control impose by some external sources can be a limiting factor for a country seeking to improve sanitation to a level that they considered to be adequate. An example of this is demonstrated in an on-going loan agreement between the Government of Guyana and the Inter-American Development Bank. In the agreement, one of the components targets improving household sanitation facilities – converting pit latrines to a pre-defined water closet and septic tank system, as a direct replacement for the pit latrine (IDB, 2014). Under the terms and conditions for this component, the scope is limited only to installing a water closet and septic tank system external to the dwelling. If households requires a toilet facility within or attached to their dwelling, this is not permitted under the financing agreement. Similarly, external funding parties can dictate where the funds

are directed. This can result in changes to national programmes to match the funding opportunity.

Improving and sustaining sanitation for households in Guyana to a state that is considered adequate will require increased financial investments into the sector that supports this objectives and accommodate the various components that will need to be addressed. Ideally, this should be commissioned with an emphasis as eagerness to provide operation and maintenance financing may be higher when the improvement was conceived, developed and implemented locally, however given the scope of works that may be required, external financing sources may accelerate the commencement of works.

9.4 Contribution to the Body of Knowledge and Application of Findings

The findings of this research can be applied to the improvement of sanitation in Guyana, countries in the wider Caribbean region and to inform decision making in the global sanitation sector. First, the review of the critical challenges to country-level sanitation development unveiled a number of alternate factors, which can significantly influence the success and sustainability of sanitation interventions. Considering the potential role of the non-mainstream factors in the review of country-level challenges can identify the true cause of national sanitation indolence. Similarly, incorporation of the historical development review as a critical part of the planning process can result in greater pragmatism in developed plans and increased sustainability.

The research provides empirical evidence to explain the root causes of the state of sanitation in Guyana, which helped to design an improvement framework that can see the universalisation of sanitation within 15 years with national commitment and investment. The systemic conditions forming the enabling environment for sanitation improvement were identified, which can be strengthened to sustain improvements in sanitation. The wider findings such as the impact of security of tenure, appropriate definition, and sanitation being a public good are transferrable features that can be applied in assessing the challenges to sanitation development in other countries.

A number of findings can also contribute to the advancement of knowledge in the sanitation sector, particularly overcoming the challenges on country-level sanitation development. Some of the new knowledge contribution includes:

- The existing status of sanitation in a country has positive links to historical development events and processes. Historical development either creates positive or negative institutions that would influence sanitation development efforts.
- Universal sanitation cannot be achieved through an isolated focus of ‘needing to expand sanitation coverage’. Holistic consideration is needed, where sanitation development is considered in conjunction with settlement organisation, housing quality improvement, impact awareness, and contribution to national development.
- Inculcating the position that adequate sanitation is a ‘public good’ rather than a ‘private responsibility’ can reduce the deficiency of political will to improve national sanitation.
- A modified planning approach inclusive of a prerequisite historical development assessment of a country would provide the ‘how’ and ‘why’ to current sanitation status to allow for adequate sanitation planning.

9.5 Suggestions for Future Work

This research unravelled a number of key findings in relation to improving country level sanitation. However, it raised questions that would benefit from further research. Some areas that can benefit from expanding this research include:

Quantifying Adequate Household Sanitation – This research found that adequate sanitation for a country or community is a function of local conditions, customs and culture, *inter alia*. The research recommends for countries to undertake the assessment to determine and identify key factors for adequacy. This would make quantification for global assessment and monitoring difficult. Expanding research to establish fixed parameters for adequate household sanitation would aid in pushing global monitoring beyond the numeration of toilet facilities.

Testing of Historical Review Planning Model in alternate environment – The historical development review approach was used in both the Barbados and Guyana case study for this research producing quality data that were instrumental in improving the understanding of the ‘why’ and ‘how’ the existing state of sanitation evolved. An expanded field trial to an alternative country experiencing significant struggles in improving and sustaining sanitation would confirm the effectiveness and reliability of this approach.

Reference

Acemoglu, D., Gallego, F. A. and Robinson, J.A. (2014) *Institutions, Human Capital, and Development*. Annual Review of Economics, 6(1), pp. 875-912.

Adams, N. (2015) *The perennial plague of squatting*, *Guyana Times*, 25 May 2015 [online] Available at: <http://www.guyanatimesgy.com/2015/05/25/the-perennial-plague-of-squatting/> [Accessed 10 May 2016].

Adyanga, O. (2011). *Modes of British Imperial Control of Africa: A Case Study of Uganda, c.1890-1990*. Newcastle upon Tyne: Cambridge Scholars Publishing

Aertgeerts, R. and Studer, P. (2009). *The Antigua and Barbuda Bureau of Standards (ABBS) - ISO standards and the Protocol on Water and Health*, [online] Available at: http://www.abbs.gov.ag/detail_page.php?item=press_releases/2009-June-05.php [Accessed 10 Oct 2015].

Alasuutari, P., Bickman, L. and Brennen, J. (2008) *The SAGE Handbook of Social Research Methods*. London: SAGE Publications Ltd.

Alexander, R. (ed.) (1997). *Presidents, Prime Ministers, and Governors of the English-speaking Caribbean and Puerto Rico – Conversations and Correspondence*. Westport: Praeger Publishers.

Ambrosino, J. (2010) *Signs from outer space: The life and times of Big Gray Community, an ongoing experiment in communal living, now an online community*. [online] Available at: http://signalsfromouterspace.blogspot.co.uk/2010_04_01_archive.html [Accessed 10 April 2016].

Archer, A. (2010) *Response to Regulations for Disposal of Offensive Matter in Barbados, West Indies*, Third International Conference on Environmental Enforcement. [unpublished], pp. 145-149

Arreguin, F. and Maravilla, E. (2012) *'Evolution of Water Management in Mexico'*, in Biswas, A. Tortajada, C. Izquierdo, R. (eds), *Water Quality Management: Present Situations, Challenges and Future Perspectives* (1st ed.), Abingdon: Routledge.

Azevedo, M.J. and Johnson, B.H (2011) *The Impact of Globalization Determinants and the Health of the World's Population, New Knowledge in a New Era of Globalization*, in Pachura, P. (ed.), *In Tech*, DOI: 10.5772/18323.

Balnaves, M. and Caputi, P. (2001) *Introduction to Quantitative Research Methods: An Investigative Approach*. London: SAGE Publications, Ltd.

Barbados Audit Office (BAO) (2005) *Report of the Auditor General for the year 2005* [online] Available at: <http://www.barbadosparliament.com/uploads/document/9a631d0234a3a62e3b9eff7a976fe740.pdf> [Accessed 10 June 2016].

Barbados Water Authority (BWA) (2013) *The Water and Sanitation Systems Upgrade Project*, Bridgetown: Barbados Water Authority.

Barbados Water Authority (BWA) (2013) *Some history of public water supply* [online] Available at: <http://barbadoswaterauthority.com/?p=360> [Accessed 5 August 2014].

Barbados Statistical Service (BSS) (2013) *2010 Population and Housing Census – Volume 1*, [online] Available at: http://www.barstats.gov.bb/files/documents/PHC_2010_Census_Volume_1.pdf. [Accessed 5 May 2016].

Barbados Statistical Service (BSS) (2014) *Barbados Multiple Indicator Cluster Survey 2012: Final Report*, Bridgetown: Barbados Statistical Service.

Barbados.org (2016) *About Barbados: History Of Barbados* [online] Available at: <http://barbados.org/history1.htm#.WBGaM4czXs1> [Accessed 13 May 2016].

Barona, J.L. (2016) *The Rockefeller Foundation, Public Health and International Diplomacy, 1920–1945*. Abingdon: Routledge.

Bartelt, L.A. and Guerrant, R.L. (2013) '*Challenges in Enteric Epidemics: Barometers of Inadequate Water and Sanitation*', in Fong, I. (ed.) *Challenges in Infectious Diseases*. New York: Springer Science and Business Media.

Bartram, J., Brocklehurst, C., Fisher, M.B., Luyendijk, R., Hossain, R., Wardlaw, T. and Gordon, B. (2014) Global Monitoring of Water Supply and Sanitation: History, Methods and Future Challenges. *Int. J. Environ. Res. Public Health*, 11(8), pp. 8137-8165.

Bauman, F. (1982) *Draft environmental profile on Barbados* [online] Available at: http://pdf.usaid.gov/pdf_docs/PNAAL443.pdf [Accessed 19 April 2016].

Beckles, H. (1990) *A History of Barbados*. Cambridge: Cambridge University Press.

Beckles, H. and Shepherd, S. (2006) *Freedoms Won: Caribbean Emancipations, Ethnicities and Nationhood*, Cambridge: Cambridge University Press.

Best-Winfield, G. (2006) *CASE STUDY: Public sector reform, the Barbados experience*, Bridgetown: The Caribbean Centre for Development Administration (CARICAD).

Bickman, L. and Rog, D. (2008) '*Applied Research Design: A Practical Approach*', in Bickman, L. and Rog, D. *The SAGE Handbook of Applied Social Research Methods* (2th edn), London: Sage Publications.

Biggs, B., King, L., Basu, S. and Stuckler, D. (2010) Is wealthier always healthier? The impact of national income level, inequality, and poverty on public health in Latin America, *Social Science & Medicine*, 7(1), pp. 266-273.

Birkland, T. (2011) *An Introduction to the Policy Process – Theories, Concepts and Models of Public Policy Making*, New York: M.E. Sharpe, Inc.

Bishop, M., (2013). *The political economy of Eastern Caribbean development*. London: Palgrave Macmillan.

Bisram, V. (2015) *Impact of Ethnic Conflict on Development: A Case Study of Guyana*. CUNY Academic Works. http://academicworks.cuny.edu/gc_etds/524

Bissio, R. (2004). 'Do the Poor Count?' in Bigg, T. (ed), *Survival for a Small Planet: The Sustainable Development Agenda*, (1st edn), Earthscan: London, p. 269.

Blaikie, N. (2000) *Designing social research: The logic of anticipation*, Cambridge: Polity Press.

Blum, U. (2013) Eastern Germany's economic development revisited: path dependence and economic stagnation before and after reunification, *Post-Communist Economies*, 25(1), pp. 37-58.

Bolland, O. (1981) Systems of Domination after Slavery: The Control of Land and Labor in the British West Indies after 1838, *Comparative Studies in Society and History*, 23(4), pp. 591-619

Brereton, B. (1989) 'Society and Culture in the Caribbean – The British and French West Indies, 1870-1980', in: Knight, F and Palmer, C. (eds). *The Modern Caribbean*. North Carolina: The University of North Carolina Press

Brewster, L. and Mwansa, J.B. (2001) *Integrating Management of Watersheds and Coastal Areas in Small Island Developing States of the Caribbean: The Barbados National Report* [online] Available at: <http://apps.unep.org/redirect.php?file=/publications/pmtdocuments/-Report%20on%20Integrating%20Management%20of%20Watersheds%20and%20Coastal%20Areas%20in%20Small%20Island%20Developing%20States%20of%20the%20Caribbean:%20The%20Barbados%20National%20Report-2001Report%20on%20Integrating%20Management%20of%20Watersheds%20and%20Coastal%20Areas%20-%20Barbados%20National%20Report.pdf> [Accessed 19 June 2016]. ,

Bryman, A. (2008) *Social Research Methods* (3rd edn). New York: Oxford University Press Inc.

Browder, G. (2012) *Is water and sanitation for all possible in Latin America and the Caribbean?* [Online] Available: <http://blogs.worldbank.org/latinamerica/is-water-and-sanitation-for-all-possible-in-latin-america-and-the-caribbean> [Accessed 12 July 2015].

Brown, D. (2002) *Sociodemographic Vulnerability in the Caribbean: An Examination of the social and demographic impediments to equitable development with participatory citizenship in the Caribbean at the dawn of the twenty-first century*, Santiago: ECLAC.

Bryan, P. (2004). 'Proletarian Movements (1940-90)', In: P. Emmer, B. Brereton, and B. Higman, eds., *General History of the Caribbean: The Caribbean in the Twentieth Century*, 1st ed., Paris: UNESCO Publishing.

Bryman, A. and Bell, E. (2011) *Business Research Methods*, Oxford: Oxford University Press.

Bureau of Statistics, Ministry of Health and UNICEF. (2015) *Guyana Multiple Indicator Cluster Survey 2014, Key Findings*. Georgetown: Bureau of Statistics, Ministry of Health and UNICEF.

Burns, A. (1954). *History of the British West Indies*, London: George Allen and Unwin Ltd.

Byron, J. (nd) *Notes on The development of Social Policy in the Caribbean* [online] Available at: <http://eulac-focus.net/assets/dms/Social%20Dimension%20in%20the%20Caribbean.pdf> [Accessed 29 November 2017].

Cairncross, S., Bartram, J., Cumming, O. and Brocklehurst, C. (2010) Hygiene, Sanitation, and Water: What Needs to Be Done? *PLoS Med* 7(11): e1000365. doi:10.1371/journal.pmed.1000365.

Cambridge, V. (2015) *Musical Life in Guyana: History and Politics of Controlling Creativity*, Mississippi: The University Press of Mississippi.

Caribbean Community Climate Change Centre (CCCCC) (2015) *Project background paper: "Toward the development of a Caribbean regional organic waste management subsector", Belmopan: SIDS DOCK Secretariat* [online] Available at: http://sea.sidsdock.org/download/wte_expo_library/background_papers/01-14-16-DRAFT-OT-FOR-CIRCULATION-DRAFT-REGIONAL-WASTE-MANAGEMENT-.pdf [Accessed 12 August 2016].

Caribbean Development Bank (CDB) (2013) *Country Strategy Paper 2013-2017 – Guyana* [online] Available at: http://www.caribank.org/wp-content/uploads/2016/03/BD13_13_CSP_Guyana-2013-2017_FINALwithCORR.pdf [Accessed 15 May 2016].

CARIBSAN, (2008). *Report on Integration of Sanitation Policies in National Development Plans in the Caribbean Region* [online] Available at: <http://esa.un.org/iys/docs/Caribsan%20final%20report.pdf> [Accessed 5 Dec 2015].

Chamberlain, M. (2010) *Empire and Nation-Building in the Caribbean: Barbados, 1937-66*, Manchester: Manchester University Press,

Carter, A. (1990) The 1854 cholera epidemic. *Journal of the Barbados Museum and Historical Society*, 38(4), pp. 378-421.

Carter, S.S and Singh, A. (2010) *National Environment Summary – Barbados 2010*. Panamá: UNEP/ROLAC.

Clouden, F. (1994) *Small Community Wastewater Treatment Systems in the Wider Caribbean*. Kingston: Caribbean Environment Programme.

Collier, M. (2005) *Political Corruption in the Caribbean Basin: Constructing a Theory to Combat Corruption*. New York: Routledge.

Commonwealth Secretariat (2007) *Commonwealth Education Partnerships*. Cambridge: Nexus Strategic Partnerships Ltd.

Commonwealth Local Government Forum (CLGF) (2015) *CLGF 2015 Commonwealth Local Government Handbook 2015/16*. London: CLGF Publications UK.

Commonwealth Secretariat (2006) *Commonwealth Education Partnerships, 2007*. Cambridge: Nexus Strategic Partnership Limited.

Conway, D. (1997) Pursuing an Appropriate Development Model for Caribbean Small Islands: Can Past Experience help Subvert the Neo-Liberal Agenda? Paper presented in the Session ECO 17, 'Neoliberal theory and practice in Latin America and the Caribbean' at the *Latin American Studies Association XX International Congress*, to be held in Guadalajara, Mexico, April 17-19, 1997.

Corruccini, R., Handler, J., Mutaw, R. and Lange, F. (1982) Osteology of a Slave Burial Population from Barbados, West Indies. *American Journal of Physical Anthropology*, 59(1), pp. 443-459.

Couacaud, L. (2014). Hookworm disease and its relationship to capitalism and urban development. *Journal of Political Ecology*, 21 (1), pp. 349-371.

Craton, M. (1988) Continuity not change: The incidence of unrest among ex-slaves in the British West Indies, 1838-1876. *Slavery & Abolition*, 9(2), pp. 144-170.

Crawford, D. (2015). *What really is Universal Adult Suffrage?* [online] Available at: http://www.jamaicaobserver.com/columns/What-really-is-Universal-Adult-Suffrage-_19121764 [Accessed 8 Sept 2015].

Creswell, J. (2003) *Research Design - Qualitative, Quantitative and Mixed Methods Approaches* (2nd edn.). London: SAGE Publications, Inc.

Cumberbatch, L. (2001) *Case study of the folkestone marine park and reserve, Barbados*. Castries: Caribbean Natural Resources Institute (CANARI).

DaCosta, M. (2007) *Colonial Origins, Institutions and Economic Performance in the Caribbean: Guyana and Barbados, IMF Working Paper - WP/07/43*. Washington, DC: International Monetary Fund.

Dalzell, H., Biddlestone, A., Gray, K. and Thurairajan, K. (1987) *Soil Management: Compost Production and Use in Tropical and subtropical environments, Issue 56*. Rome: Food and Agricultural Organisation of the United Nations.

David, K., Hinds, K., Koczerginski, S. and Volmar, C. (2013) *Decentralized Wastewater Treatment in Barbados: Evaluation of Septic Tank Systems*. St. James: McGill University, Bellairs Research Institute.

Davis, K. (1983) *Cross and Crown in Barbados: Caribbean Political Religion in the Late 19th Century*. Eugene: Wipf and Stock Publishers.

Davis, J. (2004) Corruption in Public Service Delivery: Experience from South Asia's Water and Sanitation Sector. *World Development*, 32(1), pp. 53-71.

De Barros, J. (2003) Sanitation and Civilisation in Georgetown, British Guiana. Colonialism and Health in the Tropics. *Caribbean Quarterly*, 49(4), pp. 65-86.

De Barros, J. and Dumont, J. (2014) Crossing colonial boundaries: health and the responses of "colonial mediators" to the crisis of the 1930s in the French and British Caribbean. *Canadian Journal of Latin American and Caribbean Studies/Revue canadienne des études latino-américaines et caraïbes*, 38(2), pp. 220-237.

Department of Emergency Management (DEM) (2014) *Country Document for Disaster Risk Reduction: Barbados, 2014* [online] Available at: <http://dipecholac.net/docs/files/784-documento-pais-barbados-web.pdf> [Accessed 25 May 2016].

Djelic, M. and Quack, S. (2007) Overcoming path dependency: Path generation in open systems. *Theory and Society*, 36(2), pp. 161-186.

Doumerc, E. (2003). *Caribbean Civilisation: The English-speaking Caribbean since Independence*, Toulouse: Presses Universitaires du Mirail.

Downs, A. and Cumberbatch, H. (1996) *Analysis of the Investment Process in Health and the Environment in Barbados*, Santiago: Pan-American Health Organization / World Health Organization

Dieterich, B.H. and Henderson J.M. (1963) *Urban Water Supply Conditions and needs in Seventy-Five Developing Countries*. Geneva: WHO.

Dubois, L. and Garrigus, J. (2006). *Slave Revolution in the Caribbean 1789-1804 - A Brief History with Documents*, New York: St. Martin's Press.

ECLAC (1981) *Social Structural Changes in St. Lucia* [online] Available at: <http://archivo.cepal.org/pdfs/1981/S8100205.pdf> [Accessed 5 Dec 2015].

ECLAC (2001) *An Analysis of Economic and Social Development in Barbados: A Model for Small Island Developing States* [online] Available at: <http://www.cepal.org/publicaciones/xml/2/7812/G0652.html> [Accessed 15 May 2016].

ECLAC (2012) *Development paths in the Caribbean*. 1st ed. [pdf] New York: United Nations. Available at: <http://www.afd.fr/webdav/shared/PORTAILS/PAYS/ALC/pdf/Etude-CEPALC-Development-paths.pdf> [Accessed 2 Jan. 2016].

ECLAC (2015), *Latin America and the Caribbean: looking ahead after the Millennium Development Goals. Regional monitoring report on the Millennium Development Goals in Latin America and the Caribbean, 2015 (LC/G.2646)*. Santiago: United Nations.

Edin, B. and Thomson, D. (1913) Sanitation in the tropics, with special reference to the Panama Canal Zone, Trinidad, and British Guiana, *Transactions of the Royal Society of Tropical Medicine and Hygiene*, 6(6), p. 183-215.

Edwards, W. and Gibson, K. (1979) An Ethnohistory of Amerindians in Guyana, *Ethnohistory*, 26(2), pp. 161-175.

Edwards, R., Wu, S.C. and Mensah, J. (2005) City Profile: Georgetown, Guyana, *Cities*, 22(6), pp. 446-454.

Eisner, E. (1991) *The enlightened eye: Qualitative inquiry and the enhancement of educational practice*. New York: Macmillan Publishing Company.

Elledge, M.F., Rosensweig, F., Warner, D.B., Austin, J.H. and Perez, E.A. (2002) *Environmental health Project – Strategic Report 2: Guidelines for the Assessment of National Sanitation Policies*. Washington: U.S. Agency for International Development.

Emanuel, E. (2012) *Situational Analysis Regional Sectoral Overview of Wastewater Management in the Wider Caribbean Region - CEP Technical Report 66*. Kingston: UNEP CAR/RCU.

Emmer, P. (1995) Scholarship or solidarity? The post-emancipation era in the Caribbean reconsidered. *New West Indian Guide/ Nieuwe West-Indische Gids* 69(3/4), pp. 277-290.

Environmental Engineering Consultants Inc. (EEC) (2010) *Mangrove ecosystem assessment Graeme Hall nature sanctuary Barbados* [online] Available at: [http://www.graemehall.com/press/papers/Graeme%20Hall%20043010%20MEA%20\(report%20only\).pdf](http://www.graemehall.com/press/papers/Graeme%20Hall%20043010%20MEA%20(report%20only).pdf) [Accessed 15 June 2016],

European Commission (EC) (2005) *Emergency Assistance to the Victims of Floods in Guyana* [online] Available at: https://ec.europa.eu/echo/files/funding/decisions/2005/dec_guyana_01000_en.pdf [Accessed 8 May 2016].

FAO (2015) *Regional report: Southern America, Central America and the Caribbean* [Online] Available at: http://www.fao.org/nr/water/aquastat/countries_regions/guy/index.stm [Accessed 12 June 2016].

Farley, R. (1954) The Rise of Peasantry in British Guiana. *Social and Economic Studies*, 2(4), pp. 87-103.

Farley, J. (2004) *To Cast Out Disease: A History of the International Health Division of the Rockefeller Foundation (1913-1951)*. Oxford: Oxford University Press.

Fawcett, B. and Black, M. (2008) *A new global sanitary revolution: lessons from the past, proceedings from the 33rd WEDC International Conference, Accra, Ghana*,

2008 [online] Accessed:
http://wedc.lboro.ac.uk/resources/conference/33/Fawcett_B.pdf [Accessed 12 Jan. 2016].

Fay, M. and Morrison, M. (2007) *Infrastructure in Latin America and the Caribbean: Recent Developments and Key Challenges*. Washington DC: The World Bank.

Ferriman, A. (2007) BMJ readers choose the “sanitary revolution” as greatest medical advance since 1840, *The BMJ*, 334(7585) p. 111.

Fewtrell, T. and Bartram, J. (2001) *Water Quality: Guidelines, Standards and Health – Assessment of Risks and Risk Management for Water Related Infectious Disease*. London: IWA Publishing.

Foddy, W. (1993) *Constructing Questions for Interviews and Questionnaires – Theory and Practice in social Research*. Cambridge: Cambridge University Press.

French, J. (1995) ‘Women and Colonial Policy in Jamaica after the 1938 Uprising’, in Wieringa, S. (ed). *Subversive Women: Historical Experiences of Gender and Resistance*, London: Zed Books Ltd, pp. 121-123.

Frieden, T.R. (2010) A framework for public health action: the health impact pyramid. *American Journal of Public Health*, 100(4), pp. 590-595.

Friis, R. (2012) *Essentials of Environmental Health (Essential Public Health)* (2nd Ed.), Sudbury: Jones and Bartlett Learning, LLC.

Fry, L.M., Mihelcic, J.R. and Watkins, D.W. (2008) Water and Nonwater-related Challenges of Achieving Global Sanitation Coverage. *Environmental Science and Technology*, 42(12), pp. 4298–4304

Fuller, J.A., Goldstick, J., Bartram, J. and Eisenberg, J.N.S. (2016) Tracking progress towards global drinking water and sanitation targets: A within and among country analysis. *Science of the total Environment*, 541(1) pp. 857-864.

Galli, G., Nothomb, C. and Baetings, E. (2014) *Towards systemic change in urban sanitation, IRC Working Paper*. The Hague: IRC.

Garrido, G. and Shechter, M. (2014). *Water for the Americas: Challenges and Opportunities*. Abingdon: Routledge.

Gaze, S., Bueno, L. and Fujiwara, R. (2015). 'Hookworm Infection in Latin America and the Caribbean Region', in Franco-Paredes, C. and Santos-Preciado, J. (eds), *Neglected Tropical Diseases - Latin America and the Caribbean*, 1st ed., New York: Springer, p. 74.

Giglioli, G. (1933) Agglutinins for the Typhoid-Paratyphoid Group in a Random Sample of the Population of British Guiana. *Journal of Hygiene, Epidemiology & Infection*, 33(3), pp. 379-386.

Girvan, N. (2001). 'Reinterpreting the Caribbean', in Lindahl, F. and Meeks, B. (eds), *New Caribbean Thought*, (1st ed). Kingston: UWI Press.

Goolsarran, S.J (2006). *Industrial Relations in the Caribbean: Issues and Perspectives*, Port of Spain, International Labour Office.

Government of Barbados (GOB) (2003). *Barbados Strategic Plan for Health 2002 – 2012*. Bridgetown: Project Design and Implementation Unit, Ministry of Health.

Government of Barbados (GOB) (2009) *National Report to The United Nations Commission for Sustainable Development (UNCSD) Cycle 18/19 (2009/2010)*. Bridgetown: Environment Division Ministry of the Environment, Water Resources and Drainage.

Government Information News Agency (GINA) (2016) *Over \$80M expended on improving sanitation for first half 2016* [online] Available at: <http://gina.gov.gy/over-80m-expended-on-improving-sanitation-for-first-half-2016/> [Accessed June 2016].

Government of Guyana (GoG) *Guyana. 1994. Guyana - National environmental action plan* [online] Available at:

<http://documents.worldbank.org/curated/en/268421468771041163/Guyana-National-environmental-action-plan> [Accessed 12 May 2016].

Government of Guyana, (GoG) (1997) *Guyana National Development Strategy*. Georgetown: Ministry of Finance.

Government of Guyana (GoG) (2002) *The Guyana poverty reduction strategy paper* ([online] Available at: <http://finance.gov.gy/images/uploads/documents/prsp.pdf> [Accessed 6 May 2016].).

Government of Guyana (GoG) (2010) *A low-carbon development strategy - Transforming Guyana's Economy While Combating Climate Change*, Georgetown: Office of the President [online] Available at: <http://finance.gov.gy/images/uploads/documents/lcds.pdf> [Accessed 6 May 2016].

Government of Guyana (GoG) (2012) *Government of Guyana Response to the Request of the OHCHR Special Procedures Branch on information in regards to the Human Right to Safe Drinking Water and Sanitation* [online] Available at: www.ohchr.org/Documents/Issues/Water/ContributionsStigma/states/Guyana.docx [Accessed 5 May 2016].

Government of Guyana (GoG) (2014) *Government of Guyana submission on OHCHR Questionnaire on Human rights and standard of living* [online] Available at: www.ohchr.org/Documents/Issues/Housing/sub-nationalgovernments/Guyana.docx [Accessed 15 May 2016].

Granger, D.A. (2016) *President's Address's to the National Assembly at reconvening of Parliament* [online] Available at: <http://parliament.gov.gy/media-centre/speeches/> [Accessed 14 October 20].

Green, C.A. (2014) The 1938–1939 Moyne Commission in Barbados: investigating the status of children. *Atlantic Studies: Global Currents*, 11(4), pp. 515-535.

Griggs, D., Stafford-Smith, M., Gaffney, O., Rockström, J., Öhman, M., Shyamsundar, P., Steffen, W., Glaser, G., Kanie, N. and Noble, I. (2013) Policy: Sustainable

development goals for people and planet. *Nature*, 495 (1), pp. 305-307. doi: 10.1038/495305a.

Gualdieri , L., Piemonte, M., Alfano, S., Maffei, R., Della Pepa, M., Rinaldi, L., Galdiero, M., Galdiero, M. and Cringoli, G. (2016) Immigrants living in an urban milieu with sanitation in Southern Italy: persistence and transmission of intestinal parasites. *Parasitology Research*, 115(3), pp. 1315-1323.

Gulliford, M.C. (1994) Health and healthcare in the English speaking Caribbean: A British public health physician's view of the Caribbean. *Journal of Public Health Medicine*, 16(3), pp. 263-269.

Guyana Bureau and Statistics (2014) *Guyana Population and Housing Census 2012 – Preliminary Report* [online] Available at: <www.statisticsguyana.gov.gy> [Accessed 8 August 2015].

Hakim, C. (2000) *Research Design – Successful Designs for social and economic research (2nd ed)*, London: Routledge.

Hamlin, C. and Sheard, S. (1998) Revolutions in public health: 1848, and 1998? *BMJ*. 317(7158), pp. 587-591.

Hamel, J., Dufour, S. and Fortin, D. (1993) *Case Study Methods*, London: SAGE Publications, Inc.

Hanchett, S. (2016) 'Sanitation in Bangladesh: revolution, evolution, and new challenges', in Bongartz, P. Vernon, N. and Fox, J. (eds), *Sustainable Sanitation for All - Experiences, challenges, and innovations*. Rugby: Practical Action Publishing Ltd.

Handler, J.S. and Corruccini, R.S. (1983) Plantation Slave Life in Barbados: A Physical Anthropological Analysis. *The Journal of Interdisciplinary History*, 14(1), pp. 65-90.

Handler, J.S. (2008) Diseases and Medical Disabilities of Enslaved Barbadians From the Seventeenth Century to around 1838 Part I. *West Indian Med J*, 57 (6), pp. 605-620.

Hanberger, A. (2001) *What is the Policy Problem? Methodological Challenges in Policy Evaluation*. London: SAGE Publications.

Harrigan, N. (1974). The Legacy of Caribbean History and Tourism, *Annals of Tourism Research*, II(i), pp. 13-25.

Harrison, J. (2011). 'The colonial legacy and social policy in British Caribbean', in Midgley, J. and Piachaud, D. (eds), *Colonialism and Welfare: Social Policy and the British Imperial Legacy*, Cheltenham: Edward Elgar Publishing Limited.

Hart, R. (2002). Labour rebellions of the 1930s in the British Caribbean region colonies, *SHS Occasional Papers* Series No. 15: Caribbean Labour Solidarity and the Socialist History Society.

Haslam, J.F.C. (1929) Some health problems of British Guiana. *Transactions of the Royal Society of Tropical Medicine and Hygiene*, 23(2), pp. 119-146.

Hawkins, P., Blackett, I. and Heymans, C. (2013) *Poor-Inclusive Urban Sanitation: An Overview*. Washington DC: World Bank.

Headley, A. (1998a) 'Country Reports - Domestic and Industrial Wastewater Treatment Techniques in Barbados', in UNEP, *Appropriate Technology for Sewage Pollution Control in the Wider Caribbean Region*, Caribbean Environment Programme Technical Report #43, Kingston: Caribbean Environment Programme.

Headley, A. (1998b) *An overview of Solid waste management in Barbados*, in E. Thomas-Hope, *Solid Waste Management: Critical Issues for Developing Countries*. Kingston: Canoe Press.

Hennis, A., Hambleton, I., Broomes, H., Critchlow, S. and Fraser, H. (2005) *Health, Welfare and Aging in Bridgetown, Barbados: SABE 2000*, Washington D.C.: Pan-American Health Organisation

Henry, F. (1981) Environmental sanitation infection and nutritional status of infants in rural St. Lucia, *West Indies Trans R Soc Trop Med Hyg.*, 75(4), pp. 507-513.

Heuman, G. (2005). *Brief Histories: The Caribbean*. London: Hodder Education.

Heuman, G. (2014). *The Caribbean: A Brief History*. London: Bloomsbury Academic.

Hewitt, H. (2002). *Trailblazers in Nursing Education: A Caribbean Perspective, 1946-1986*. Kingston: Canoe Press.

Higgins, G. (2015). *Jamaica does not need any more 'rubber teeth' commissions of enquiry*, *Jamaica Observer* [online] Available at: http://www.jamaicaobserver.com/columns/Jamaica-does-not-need-any-more--rubber-teeth--commissions-of-enquiry_18274165 [Accessed 2 Jan. 2016].

Higman, B.W. (1986) 'Population and Labor in the British Caribbean in the Early Nineteenth Century', in Engerman, S. and Gallman, R. (eds), Chicago: University of Chicago Press.

Higman, B. (1995) *Slave populations of the British Caribbean, 1807–1834*. Kingston: The University of the West Indies Press.

Higman, B. (2011). *A Concise History of the Caribbean*, Cambridge: Cambridge University Press.

Hillstrom, K. and Hillstrom, L. (2004). *Latin America and the Caribbean: A Continental Overview of Environmental Issues, Volume 5*. Santa Barbara: ABC-CLIO, Inc.

Hintzen, P. (2003) 'Race, Ideology, and International Relations: Sovereignty and the Disciplining of Guyana's Working Class', in Borrow-Giles, C. and Marshall, D. (eds), *Living at the Borderlines: Issues in Caribbean Sovereignty and Development*, Kingston: Ian Randle Publishers.

Hodgkinson, G., Herriot, P. and Anderson, N. (2001) Realigning the stakeholders in management research: Lessons from industrial, work and organizational psychology, *British Journal of Management*, 12(Special Issue), pp. 41-48.

Hoefte, R. (2014). Cleansing the world of the germ of laziness: hygiene, sanitation, and the Javanese population in Suriname, *História, Ciências, Saúde – Manguinhos, Rio de Janeiro*, 21(4), pp. 1437-1455.

Hogrewe, W., Joyce, S.D. and Perez, E.A. (1993) *The unique challenges of improving Peri-urban sanitation, Office of Health Bureau for Research and Development*. Washington, DC: U.S. Agency for International Development.

Holder, A. (2011) *Environmental Health Department Battling Underground Mosquito Breeding Sites* [online] Available at: <http://gisbarbados.gov.bb/blog/environmental-health-department-battling-underground-mosquito-breeding-sites/> [Accessed 13 June 2016].

Holland, W.W. and Stewart, S. (1997) *Public Health: The vision and the challenge*. London: The Nuffield Trust.

Honychurch, L. (1995). *The Caribbean People, Book 3*. Cheltenham: Thomas Nelson and Sons Ltd.

House of Commons (2013) *Post-2015 Development Goals: Eighth Report of Session 2012-13, Volume 1*. London: The Stationary Office.

Huggins, J. (2004). 'West Indies Development and Welfare Organisation', in Frasier, E. and Williams, E. (eds) *The Economic Future of the Caribbean*. Dover: The Majority Press.

Hueso, A. and Bell, B. (2013) An untold story of policy failure: the Total Sanitation Campaign in India. *Water Policy*, 15(6), pp. 1001-1017.

IBP (International Business Publication) (2015). *Caribbean Countries Health Care System Profiles Handbook - Strategic Information, Development and Opportunities*. Washington DC: Global Investment Centre.

ICC (2003) *World of Information – Americas Review 2003/04* (21st ed.). London: Walden Publishing Ltd.

IDB (2010a) *Georgetown Sanitation Improvement Program - Project Profile* Available at: <http://idbdocs.iadb.org/wsdocs/getdocument.aspx?docnum=35172340> [Accessed 12 June 2016].

IDB (2010b) *Drinking Water, Sanitation, and the Millennium Development Goals in Latin America and the Caribbean* [online] Available at: <https://publications.iadb.org/bitstream/handle/11319/5428/Drinking%20Water,%20Sanitation,%20and%20the%20Millennium%20Development%20Goals%20in%20Latin%20America%20and%20the%20Caribbean%20.pdf?sequence=1> [Accessed 12 June 2016].

IDB, GNNTD and PAHO (2013) *Tackling “Big Foot” A Story of Sanitation and Health in Guyana* [online] Available at: https://ntdenvision.org/resource/tackling_big_foot_a_story_of_sanitation_and_health_in_guyana [Accessed 12 March 2014].

Inniss, D.O. (2015) *Commonwealth Health Online: Health in Barbados* [Online] Available at: <http://www.commonwealthhealth.org/americas/barbados/> Accessed 10 November 2015].

Inter-American Development Bank, (2011). *Climate Change’s Impact on the Caribbean’s Ability to Sustain Tourism, Natural Assets, and Livelihoods*, Technical Notes, No. IDB-TN-238. New York: Inter-American Development Bank

Inter-American Development Bank (IDB) (2014) *Water Supply and Sanitation Infrastructure Improvement – Project Profile* [Online] Available at: <http://idbdocs.iadb.org/wsdocs/getdocument.aspx?docnum=38388579> [Accessed 12 July 2016].

International Monetary Fund (IMF) (2006) *Guyana: Poverty Reduction Strategy Paper Progress Report 2005*. Washington DC: International Monetary Fund Publications Services.

International Water Association (IWA) (2014) *Sanitation 21: A planning framework for improving City-wide sanitation services*. London: International Water Association

Isunjua, J.B., Schwartz, K., Schouten, M.A., Johnson, W.P. and van Dijk, M.P. (2011) Socio-economic aspects of improved sanitation in slums: A review, *Public Health*, 125 (6), pp. 368-376.

IUCN (2007). *A Situation Analysis of the Wider Caribbean*, Gland: IUCN International Union for the Conservation of Nature and Natural Resources.

Jabour, A. (1994) Slave Health and Health Care in the British Caribbean: Profits, Racism, and the Failure of Amelioration in Trinidad and British Guiana, 1824-1834. *The Journal of Caribbean History*, 28(1), pp. 1-25.

Jacklin, L. (2009) *British colonial healthcare in a post-emancipation plantation society: creolising public health and medicine in Trinidad, to 1916*. PhD thesis. McMaster University.

Jackman, M. and Lorde, T. (2012) Examination of economic growth and tourism in Barbados: testing the supply-side hypothesis, *Tourism: An International Multidisciplinary Journal of Tourism*, 7(2), pp. 203-215.

Jackson, S. (2009) *Research Methods and Statistics: A Critical Thinking Approach* (3rd edn) Belmont: Wadsworth.

Jenkins, M.W., Cumming, O., Scott, B. and Cairncross, S. (2014) Beyond 'improved' towards 'safe and sustainable' urban sanitation: assessing the design, management and functionality of sanitation in poor communities of Dar es Salaam, Tanzania, *Journal of Water, Sanitation and Hygiene for Development*, 4(1), pp. 131-141.

Jenson, D., Szabo, V., & the Duke FHI Haiti Humanities Laboratory Student Research Team. (2011). Cholera in Haiti and Other Caribbean Regions, 19th Century. *Emerging Infectious Diseases*, 17(11), pp. 2130-2135.

Jensen, N.T. (2012) *For the Health of the Enslaved: Slaves, Medicine and Power in the Danish West Indies 1803 - 1848*. Copenhagen: Museum Tusculanum Press

Jha, A.K. (2005) (ed) *Institutions, Performance, and the Financing of Infrastructure Services in the Caribbean*, Washington D.C: World Bank.

Johnson, B. and Onwuegbuzie, A. (2006) Mixed methods research: A research paradigm whose time has come, *Educational Researcher*, 33(7), pp. 14-26.

Jones, I.C. and Banner, J.L. (2003) Hydrogeologic and climatic influences on spatial and interannual variation of recharge to a tropical karst island aquifer. *Water Resources Research*, 39(9), doi:10.1029/2002WR001543.

Josiah, B. B. (2011) *Migration, Mining, and the African Diaspora: Guyana in the Nineteenth and Twentieth Century*. New York: St. Martin's Press, LLC.

Jules, T.D. and Fryer, L.G. (2016) 'Health Service Reform in the Caribbean: The Rise of New Mutualism'. in Minto-Coy, I. and Berman, E. (eds), *Public Administration and Policy in the Caribbean*, Boca Raton: CRC Press.

Kennedy-Walker, R., Evans, B., Amezaga, J. and Paterson, C. (2014). Challenges for the future of urban sanitation planning: critical analysis of John Kalbermatten's influence, *Journal of Water, Sanitation and Hygiene for Development*, 4 (1), pp. 1-14.

Kennedy-Walker, R., Amezaga, J. and Paterson (2015). The role of power, politics and history in achieving sanitation service provision in informal urban environments: a case study of Lusaka, Zambia, *Environment and Urbanization*, 27(2), pp. 489-504.

Kelemen, M. and Rumens, N. (2008) *An Introduction to Critical Management Research*. London: SAGE Publications, Ltd.

Kiple, K. (2002). *The Caribbean Slave: A Biological History*. Cambridge: Cambridge University Press.

Klitgaard, R. (1998) 'Healing Sick Institutions', in Borner, S. and Paldam, M. (eds). *The Political Dimension of Economic Growth: Proceedings of the IEA Conference held in San Jose, Costa Rica*, (St. Martin's Press, 1998), Chapter 19, p. 335-347

Knight, F. and Palmer, C. (1989). *The Modern Caribbean, Chapel Hill*: The University of North Carolina Press.

Krefting, L. (1991) Rigor in Qualitative Research: The Assessment of Trustworthiness. *The American Journal of Occupational Therapy*, 45(3), pp. 214-222.

Kyle, M. (1995) '*Projecting Identities: Empire and Indentured Labor Migration from India to Trinidad and British Guiana 1936-1885*', in der Veer, P. (ed). *Nation and Migration: The Politics of Space in the South Asian Diaspora*. Philadelphia: University of Pennsylvania Press.

La Berge, A.F. (1992) *Mission and method: The early nineteenth century French public health movement*. Cambridge: Cambridge University Press.

La Guerre, J. (1982). The Moyne Commission and the Jamaican Left, *Social and Economic Studies*, 31(3), pp. 59-94.

Latinosan (2008) *Sanitation for Development - Progress made in 22 countries of Latin America and the Caribbean* (2nd ed.), Mexico City: Latinosan.

Laurence, K. (2011). *Introduction*. In: K. Laurence, (ed.) *General History of the Caribbean: The long Nineteenth Century: Nineteenth-Century Transformations*. Paris: UNESCO Publishing. (Introduction)

Law Revision (Omission) Order (1997) *Section 8*. [online] Available at: <http://legallaaffairs.gov.gy/information/laws-of-guyana/897-chapter-00202-law-revision/file> [Accessed: 15 August 2016].

Lakhan, V.C. (1994) Planning and development experiences in the coastal zone of Guyana, *Ocean & Coastal Management*, 22(1), pp. 169-186.

Lenton, R., Wright, A.M., Lewis, K. (2005) *Health, dignity and development: what will it take?* New York, UNDP.

Levermore, F.E. (n.d) *Sanitation in British Guiana* [online] Available at: <http://journals.sagepub.com/doi/pdf/10.1177/146642402404501006> [Accessed 12 Ma6 2016].

Lewis, G. (1968). *The Growth of the Modern West Indies*. Worcester: The Trinity Press.

Lewis, G. and Knight, F. (2004). *The Growth of the Modern West Indies*. Kingston: Ian Randle Publishers.

Loorbach, D. and Shiroyama, H. (2016) '*The Challenge of Sustainable Urban Development and Transforming Cities*', in Loorbach, D., Wittmayer, J., Shiroyama, H., Fujino, J. and Mizuguchi, S. (eds), *Governance of Urban Sustainability Transitions: European and Asian Experiences*, Tokyo: Springer.

Lowenthal, J. (1957) The Population of Barbados, *Social and Economic Studies*, 6(4), pp. 445-501.

Maharaj, S. (2010). The relationship between healthcare services and the political economy with reference to the Jamaican experience, *West Indian med. j.*, 59(6), pp. 706-708.

Mandle, J. (2010). *Persistent Underdevelopment: Change and Economic Modernization in the West Indies*. Abingdon: Routledge.

Mara D, Lane J, Scott B, Trouba D (2010) Sanitation and Health. *PLoS Med* 7(11): e1000363. doi:10.1371/journal.pmed.1000363

Margat, J. and van der Gun, J. (2013) *Groundwater around the World: A Geographic Synopsis*. Boca Raton, CRC Press.

Martin, N. and Sohail, M. (2005) Can Regional Corporation deliver Private Investments for water and sanitation sector in the Caribbean? *Social and Economic Studies*, 54(4), Pp. 42-69.

Mawby, S. (2012) *Ordering Independence: The End of Empire in the Anglophone Caribbean, 1947-69*. Basingstoke: Palgrave Macmillian.

Mazeau, A., Reed, B., Sansom, K. and Scott, R. (2013) Emerging categories of urban shared sanitation, *Water Environ J*, 28(1), pp. 592-608.

McCaw-Binns, A., Moody, C. and Standard, K. (1998). Forty years. An introduction to the development of a Caribbean public health. *West Indian Med J.*, 47(Suppl. 4), pp. 8-12.

McGranahan, G., and SHARE (2013) *Community-driven sanitation improvement in deprived urban neighbourhoods: meeting the challenges of local collective action, co-production, affordability and a trans-sectoral approach*. Manual: SHARE.

McGranahan, G. (2015) Realizing the Right to Sanitation in Deprived Urban Communities: Meeting the Challenges of Collective Action, Coproduction, Affordability, and Housing Tenure, *World Development*, 68(1), pp. 242-253.

Mehta, L., Marshall, F., Movik, S., Stirling, A., Shah, E., Smith, A. and Thompson, J. (2007) *Liquid Dynamics: challenges for sustainability in water and sanitation*, STEPS Working Paper 6. Brighton: STEPS Centre.

Menard, R.R. (2006) *Sweet Negotiations: Sugar, Slavery, and Plantation Agriculture in Early Barbados, When People Come First: Critical Studies in Global Health*. Charlottesville: University of Virginia Press.

Mercer, A. (1990) *Disease, mortality, and population in transition: epidemiological-demographic change in England since the eighteenth century as part of a global phenomenon*. Leicester: Leicester University Press.

Moe C. and Rheingans, R. (2006) Global challenges in water, sanitation and health, *J Water Health*, 4 Suppl(1), pp. 41-57.

Mohamed, W. (2008) *Frustrated Peasants, Marginalized Workers: Free African Villages in Guyana 1838-1885*. PhD Dissertation, State University of New York, East Eisenhower Parkway: ProQuest LLC.

Mohamed, W. (2014) 'Peasant or Proletarian: Emancipation and the struggle for Freedom in British Guiana in the shadow of the Second Slavery', in Lavina, J. and Seuske, M. (eds), *The Second Slavery: Mass Slavery and Modernity in the Americas and in the Atlantic Basin*, Zurich: LIT Verlag GmbH and Co. KG Wien.

Montgomery, M.A. and Elimelech, M. (2007) Water and Sanitation in Developing Countries: Including Health in the Equation, *Environmental Science & Technology*, pp. 17-24.

Moore, W., Alleyne, F., Alleyne, Y., Balckman, K., Blenman, C., Carter, S., Cashman, A., Cumberbatch, J., Downes, A., Hoyte, H., Mahon, R., Marningi, N., McDonney, P., Pena, M., Roberts, S., Rogers, T., Sealy, S., Sinckler, T. and Singh, A. (2014) *Barbados Green Economy Scoping Study*. Bridgetown: Government of Barbados, University of the West Indies – Cave Hill Campus, United Nations Environment Programme.

Morgan, D. (2007) Paradigms Lost and Pragmatism Regained: Methodological Implications of combining Qualitative and Quantitative Methods. *Journal of Mixed Methods Research*, 1(1), pp. 48-76.

Moriarty, P., Fonseca, C., Smits, S. and Schouten, T. (2005) *Background Paper for the Symposium: Learning Alliances for scaling up innovative approaches in the Water and Sanitation sector*. Delft: International Water and Sanitation Sector.

Moyne, L. (1940). The West Indies in 1939. *The Geographical Journal*, 96(2), pp. 85-92.

Moyne L. (1945). *The West Indian Royal Commission Report*. London: Her Majesty's Stationery Office

Munro, A. (2003). *The improvement of social services in British Guiana, 1939-1946*, Stabroek News, March 20, 2003.

Munro, A. (2007). *The amelioration of social services in British Guiana 1939-1946 Part 1*, Stabroek News, p. 17 [online] Available at: <https://news.google.com/newspapers?nid=2492&dat=20070322&id=8UVaAAAAIBAJ&sjid=CigMAAAIIBAJ&pg=4864,3653075&hl=en> [Accessed 20 Dec. 2015].

Mwanza, B.J. (2001) *Know your water supply, St. Michael: Ministry of Education, Youth Affairs and Sports* [online] Available at:

http://barbadoswaterauthority.com/downloads/Know_Your_Water_Supply_Booklet.pdf [Accessed 16 May 2016].

Najlis, P. and Edwards, A. (1991) The International Drinking Water Supply and Sanitation Decade in retrospect and implications for the future. *Natural Resources Forum*, 15(2), pp. 110-117.

Nansubuga, I., Banadda, N., Verstraete, W. and Rabaey, K. (2016) A review of sustainable sanitation systems in Africa, *Reviews in Environmental Science and Bio/Technology*, 15(3), pp. 465-478.

Naomi Vernon and Petra Bongartz (2016) '*Going beyond open defecation free*', in Bongartz, P., Vernon, N. and Fox, J. (eds.), *Sustainable Sanitation for All - Experiences, challenges, and innovations*. Rugby: Practical Action Publishing Ltd.

Nations News (2014) *Sanitation workers rapped* [online] Available at: <http://www.nationnews.com/nationnews/news/59752/archives-sanitation-workers-rapped> [Accessed 14 May 2016].

Nicol, A. (1999) *A Poverty-Reduction Approach to Water, Sanitation and Hygiene Programmes, A WaterAid Briefing Paper*. London: WaterAid.

Norström, A., Mcconville, J. and Kain, J. (2009) The complexity of water and sanitation provision in peri-urban areas in developing countries: The example of Adenta, Ghana, *Vatten*, 65(1), pp. 237-245.

Novick, L.F. and Morrow, C.B. (2000) '*Defining Public Health: Historical and Contemporary Developments*', in Novick, L., Morrow, C. and Mays, G. *Public Health Administration: Principles for Population-Based Management*. Boston: Jones and Bartlett Publishers.

Nunn, N. (2014) '*Chapter 7 - Historical Development*', in Aghion, P. and Durlauf, S. (eds), *Handbook of Economic Growth (Volume 2)*, Amsterdam: Elsevier.

Nurse, L., Cashman, A. and Mwansa, J. (2012) Confronting the Challenges of Sewerage Management in the Caribbean: A Case Study from the Island of Barbados. *Environment: Science and Policy for Sustainable Development*, 54(2), pp. 30-43

O'Meally, J. (1938). *Why we demand self-government*. New York: Jamaica Progressive League.

O'Neal, E. (2001). *From the Field to the Legislature: A History of Women in the Virgin Islands*. Westport: Greenwood Press.

OAS (1997) *Source book of alternate technologies for freshwater augmentation in Latin America and the Caribbean*. Washington DC: Unit of Sustainable Development and Environment, Organization of American States.

OAS (2009) *Assessment of the Effects of Drainage Wells (Suck Wells) and Karst Sinkholes on the Groundwater Quality of Barbados*. Washington DC: Executive Secretariat for Integral Development (SEDI).

OCED (2001) *International Science and Technology Co-operation Towards Sustainable Development*. Paris: OCED Publications Service.

OECD (2011). *Benefits of Investing in Water and Sanitation: An OECD Perspective*. OECD Publishing. <http://dx.doi.org/10.1787/9789264100817-en>

Ogden, S., Gallo, K., Davis, S., Meyer, E., Addiss, D. and Haddad, D. (2013) *WASH and the Neglected Tropical Diseases: Guyana* [online] Available at: <http://www.washtnds.org/PDF/GUY%20WASH%20NTD%20Manual.pdf> [Accessed May 2016].

Okurut, K. and Charles, K.J. (2014) Household demand for sanitation improvements in low-income informal settlements: A case of East African cities, *Habitat International*, 44(1), pp. 332-338.

Okurut, K., Kulabako, R.N., Chenoweth, J. and Charles, K. (2015), Assessing demand for improved sustainable sanitation in low-income informal settlements of

urban areas: a critical review. *International Journal of Environmental Health Research*, 25(1), pp. 81-95.

Oostindie, G. and Paasman, B. (1998) Dutch Attitudes towards Colonial Empires, Indigenous Cultures, and Slaves. *Eighteenth-Century Studies*, 31(3), pp. 349-355

PAHO (1979) *Caribbean Environment Programme Action Plan – Overview on Environmental Health in the Wider Caribbean Region*. Washington D.C.: UNEP/CEPAL.

PAHO (2001) *Regional Report on the Evaluation 2000 in the Region of the Americas”, water supply and sanitation status and perspectives* [online] Available at: <http://www.bvsde.opsoms.org/bvsaas/e/fulltext/infregio/infregio.pdf> [Accessed 19 May 2016].

PAHO (2008a) *Strategic Plan for the Sanitation Sector in Guyana*. Georgetown: Pan-American Health Organisation.

PAHO/WHO (2008b) *Health systems profile Barbados, monitoring and analysing health systems change/reform*. Washington D.C: Pan-American Health Organization.

PAHO (2011). *Water and sanitation: Evidence for public policies focused on human rights and public health results*. Washington, D.C.: PAHO.

PAHO (2012) *Health in the Americas: Guyana* [online] Available at: http://www.paho.org/hq/index.php?option=com_docman&task=doc_view&gid=25231&Itemid=270 [Accessed May 2016].

PAHO (2012) *Health in the Americas, 2012 Edition: Country Volume – Barbados*. Washington, D.C.: Pan-American Health Organisation.

Page, M. and Sonnenburg, P. (eds.) (2003) *Colonialism: an international, social, cultural, and political Encyclopedia Volume One – A-M*. Santa Barbara: ABC-CLIO, Inc.

Palmer, S. (2013) *Launching Global Health: The Caribbean Odyssey of the Rockefeller Foundation*. Ann Arbor: The University of Michigan Press.

Pemberton, R. (2012). Dirt, disease and death: control, resistance and change in the post-emancipation Caribbean. *História, Ciências, Saúde-Manguinhos*, 19(Suppl. 1), pp. 47-58.

Panaritis, E. and Kostopoulos, A. (2010) *Guyana Property Rights Study*. Washington, D.C: Inter-American Development Bank.

Pande, R. and Udry, C. R. (2005) *Institutions and Development: A View from Below*. Yale University Economic Growth Center Discussion Paper No. 928. Available at SSRN: <http://ssrn.com/abstract=864044>.

Pattullo, P. (1996) *Last Resorts: The Cost of Tourism in the Caribbean*, Kingston: Ian Randle Publishers.

Parekh, H. J. (1999) Subversion in British Guiana: Why and How the Kennedy Administration Got Rid of a Democratic Government, *Monthly Review*, 51(5), pp. 50-55.

Parsons, W. (1995) *Public Policy – An Introduction to the Theory and Practice of Policy Analysis*. Aldershot: Edward Elgar Publishing Limited.

Pelling, M. (1999) 'The Political ecology of flood hazard in urban Guyana', *Geoforum*, 30(1), pp. 249-261.

Pemberton, R. (2003) A Different Intervention: The International Health Commission/Boar, Health, Sanitation in the British Caribbean, 1914 – 1930, *Caribbean Quarterly: Colonialism and Health in the Tropics*, 49(4), pp. 87-103.

Pemberton, R. (2012) Dirt, disease and death: control, resistance and change in the post emancipation Caribbean, *Hist. cienc. saude-Manguinhos*, 19(suppl 1), pp. 47-58.

Perez, E., Cardosi, J., Coombes, Y., Devine, J., Grossman, A., Kullmann, C., Kumar, C.A., Mukherjee, N., Prakash, M., Robiarto, A., Setiwan, D., Singh, U. and Wartono,

D. (2012) *What Does It Take to Scale Up Rural Sanitation?* Washington D.C: Water and Sanitation Programme.

Persuad, S., Mohamed-Rambaran, P., Wilson, A., James, C. and Indar, L. (2013) Determining the Community Prevalence of Acute Gastrointestinal Illness and Gaps in Surveillance of Acute Gastroenteritis and Foodborne Diseases in Guyana, *J Health Popul Nutr.*, 31(4 Suppl 1), pp. 57-68.

Pierre, M. (2004) *'Dr Cheddi Jagan: The Making of a Movement Intellectual'*, in Mars, P. and Young, A. Caribbean Labor and Politics: Legacies of Cheddi Jagan and Michael Manley, Detroit: Wayne State University Press.

Pineo, C.S. and Subrahmanyam, D.V. (1975) *Community Water Supply and Excreta Disposal Situation in the Developing Countries: A Commentary*. Geneva: WHO.

Pit, D., Rijcken, F., Raspoort, E., Baeta, S. and Polderman, A. (1999) Geographic Distribution and Epidemiology of Oesophagostomum Bifurcum and hookworm infections in Humans in Togo. *Am. J. Trop. Med. Hyg.*, 61(6), pp. 951-955.

Potter, R., Barker, D., Conway, D. and Klak, T. (2004). *The Contemporary Caribbean*, Harlow: Pearson Education Limited.

Potter, R. and Lloyd-Evans, A. (2014). *The City in the Developing World*, Abingdon: Routledge.

Potter, R.B (1983) Tourism and Development: the case of Barbados. *West Indies, Geography*, 68(1), pp. 46-50.

Potter, R., Barker, D., Conway, D. and Klak, T. (2014) *The Contemporary Caribbean* Abington: Routledge, p. 246

Potter, R. B. (1993) Urbanization in the Caribbean and trends of global convergence-divergence. *The Geographical Journal*, 159 (Part 1), pp. 1-21.

Ravitch, S. and Riggan, M. (2011) *Reason & Rigor: How Conceptual Frameworks Guide Research*. London: SAGE Publications Ltd.

Reid, R. (1981) Environment and Public Health in the Caribbean, *Ambio The Caribbean*, 10(6), pp. 312-317.

Richardson, B. (1985) *Panama Money in Barbados 1900-1920*, Knoxville: The University of Tennessee Press.

Riquelme, R. (2013) *Regional Overview of Water & Sanitation in Latin America and the Caribbean* [online] Available at: <https://www.houston.org/business/global/pdf/17%20WSS%20Inter-American%20Development%20Bank%20-%20Rodrigo%20Riquelme.pdf> [Accessed 10 June 2016].

Robson, (2011) *Real World Research: A Resource for Users of Social Research Methods in Applied Settings* (3rd ed.), Chichester: John Wiley and Sons, Ltd.

Rockefeller Foundation (RF) (1913). *Annual report 1913-1914*. [online] New York, Rockefeller Foundation, pp. 214–16. Available at: <https://www.rockefellerfoundation.org/app/uploads/Annual-Report-1913-1914.pdf> [Accessed 13 Dec. 2015].

Rockefeller Foundation (RF) (1915). *2015 Annual report-Special Edition 1915*. [online] New York, Rockefeller Foundation, pp. 138-140. Available at: <https://www.rockefellerfoundation.org/app/uploads/RF-Annual-Report-1915.pdf> [Accessed 13 Dec. 2015].

Rockefeller Foundation (RF) (1926), *1926 Annual Report*. New York: Rockefeller Archive Centre, pp. 33-38.

Rockefeller Foundation (RF) (1924), *1924 Annual Report*, New York: Rockefeller Archive Centre, pp. 96-109.

Rockefeller Foundation (RF) (1913) *Wickliffe Rose Diary Notes on Journey to England and the West Indies 1913*. New York: Rockefeller Archive Centre.

Romaine, S. (2009) *Biodiversity, Linguistic Diversity and Poverty: Some Global Patterns and Missing Links*, in Harbert, W., McConnell-Ginet, S., Miller, A. and J. Whitman (eds), *Language and Poverty*. Bristol: Multilingual Matters.

Rose, E. (2002) *Dependency and Socialism in the Modern Caribbean: Superpower Intervention in Guyana, Jamaica and Grenada, 1970-1985*. Lanham: Lexington Books.

Rosen, G. (1958). *A History of Public Health*. New York: MD Publications, Inc.

Sandelowski, M. (1995) Sample Size in Qualitative Research (Focus on Qualitative Methods). *Research in Nursing and Health*, 18(1), pp. 179-183.

Satterthwaite, D. (2016) Missing the Millennium Development Goal targets for water and sanitation in urban areas. *Environment and Urbanization*. 28(1), pp. 99-118.

Saunders, M., Lewis, P. and Thornhill, A. (2016) *Research methods for business students* (7th ed.) Harlow: Pearson Education Limited.

Seetharam, K. (2015) Challenges and Opportunities for Sanitation in Developing Countries. *Journal of Science Policy & Governance*, 7(1), pp. 1-12.

Schmoll, O., Howard, G., Chilton, J. and Chorus, I. (ed.) (2006) *Protecting Groundwater for Health: Managing the Quality of Drinking-water Sources*. London: IWA Publishing, p. 391-400.

Schomburgk, R. (1971) *The History of Barbados: Comprising a Geographical and Statistical*. Abingdon: Routledge.

Senn, A. (1946) *Report on Geological Investigations of the Ground-water Resources of Barbados, B.W.I.* London: Alfred Senn.

Seppälä, O.T. (2002) Effective water and sanitation policy reform implementation: need for systemic approach and stakeholder participation, *Water Policy*, 4(4), pp. 367-388.

Sharp, A. (2014) *Changing Generations: Challenging Power & Oppression in Britain Today*. London: BIS Publishing Services.

Sinha, D. (1988) *Children of the Caribbean 1945-1984: Progress in child survival, its determinants and implications*. Kingston: Caribbean Food and Nutrition Institute.

Smith, L. (2014) *Insanity, Race and Colonialism: Managing Mental Disorder in the Post Emancipation British Caribbean 1838-1914*. Basinstoke: Palgrave Macmillan.

Smith, A. (2012) Interviewed by John Humphries on Today, *BBC Radio 4*, 21 December.

Sokoloff, K. and Engerman, S. (2000) History Lessons: Institutions, Factors Endowments, and Paths of Development in the New World. *The Journal of Economic Perspectives*, 14(3), pp. 217-232.

Solanes, M. and Jouravlev, A. (2006) *Water Governance for Development and Sustainability*. Santiago: CEPAL.

Standard, K. (2002) My journey in public health in the Caribbean. *Rev Panam Salud Publica/Pan Am J Public Health*, 12(4), pp. 223-226.

Starkl, M., Brunner, N. and Stenström, T. (2013) Why Do Water and Sanitation Systems for the Poor Still Fail? Policy Analysis in Economically Advanced Developing Countries, *Environ. Sci. Technol.*, 47(12), pp. 6102-6110.

Szreter, S. (1988) The Importance of Social Intervention in Britain's Mortality Decline c.1850-1914: A Re-interpretation of the role of public health. *Social History of Medicine*, 1(1), pp. 1-37.

The Ministry of the Environment, Water Resources and Drainage, Government of Barbados (2010) *Barbados National Assessment Report of Progress made in addressing Vulnerabilities of SIDS through Implementation of the Mauritius Strategy for Further Implementation(MSI) of the Barbados Programme of Action* [online]

Available at: <http://www.sids2014.org/content/documents/18Barbados-MSI-NAR2010.pdf> [Accessed 10 March 2016].

Theodore-Gandi, B. and Barclay, G. (2008) Protecting and Improving the Health of the Caribbean People. *Am J Public Health*, 98(4), pp. 586-588.

Theodore, K. and Edwards-Wescott, P. (2011) An Assessment of Primary Health Care in the Caribbean Pre and Post Alma Ata Declaration and A way Forward. *International Journal of Humanities and Social Science*, 1(8), pp. 1-10.

The Barbados Advocate (2011) *B'dos not immune to challenges in water and sanitation sector* [Online] Available at: <http://www.barbadosadvocate.com/newsitem.asp?more=sports%20=300&NewsID=40255>

The Rockefeller Foundation (2003) *The Rockefeller Annual Report 1916*, New York: The Rockefeller Foundation.

Thomas, A. (2014) 'Poor sanitation and stunting in Guyana'. *Kaieteur News*. [online] Available at: <http://www.kaieteurnews.com/2014/09/03/poor-sanitation-and-stunting-in-guyana-2/> [Accessed 16 April 2016].

Thompson, K. (2013) Guyana's complex sewage problem - With no wastewater treatment plant, raw effluent is an ever-present hazard. *Jamaica Observer*. [online] Available at: http://www.jamaicaobserver.com/news/Guyana-s-complex-sewage-problem_15535971 Accessed 3 April 2016].

Thomson, M.B. (1913) Sanitation on the Panama Canal Zone, Trinidad and British Guiana. *Annals of Tropical Medicine & Parasitology*, 7(1), pp. 125-152

Thompson, A. (2015). *The Haunting Past: Politics, Economics and Race in Caribbean Life*. London: Routledge.

Tikasingh, E., Chadee, D. and Rawlins, S. (2011). The control of the hookworm disease in Commonwealth Countries, *Acta Tropica*, 120(1), pp. 24-30.

Tilley, E. Lüthi, C., Morel, A., Zurbrügg, C. and Schertenleib, R. (2008) *Compendium of sanitation systems and technologies*. Dübendorf: Swiss Federal Institute of Aquatic Science and Technology (Eawag).

Tourtellot, A. (ed.) (1964). *Toward the Well-Being of Mankind. Fifty Years of the Rockefeller Foundation*. New York, Doubleday and Co., Inc.

Tsinda, A., Abbott, P., Pedley, S., Charles, K., Adogo, J., Okurut, K. and Chenoweth, J. (2013) Challenges to Achieving Sustainable Sanitation in Informal Settlements of Kigali, Rwanda. *Int J Environ Res Public Health*. 10(12), pp. 6939-6954.

Tulchinsky, T. and Varavikova, E. (2009) *The New Public Health* (2nd Ed.). London: Elsevier Academic Press.

UNEP/GPA (2006) *The State of the Marine Environment: Trends and processes*. The Hague: United Nations Environment Programme.

UNICEF (2012) *The State of the World's Children 2012 - Children in an Urban World*, New York: United Nations Children's Fund (UNICEF)

UN (UN) (1972). *Report of the United Nations Conference on the Human Environment, Stockholm, 5-16 June 1972*. New York: United Nations.

UN (1976). *United Nations Conference on Human settlements - Vancouver Declaration of Human Settlements*. New York: United Nations.

UN (1977). *Report of the United Nations Water Conference*. New York: United Nations.

UN (1977). *Report on the United Nations Water Conference, Mar del Plata, 14-25 March 1977* [online] Available at: <ielrc.org/content/e7701.pdf> [Accessed 05 November 2015].

UN (1990). *Report of the Economic and Social Council – Achievement of the International Drinking Water Supply and Sanitation Decade 1981: Report to the Secretary General*. New York: United Nations.

UN (UN) (2004a) *Freshwater Country Profile – Barbados* [online] Available at: <http://www.un.org/esa/agenda21/natlinfo/countr/barbados/freshwater.pdf> [Accessed 15 May 2016].

UN (2004) *Rapid Urban Growth, Lack Of Political Will Hinder Improved Water, Sanitation In Latin America, Western Asia, Sustainable Development Commission Told*, press release [online] Available at: <http://www.un.org/press/en/2004/envdev770.doc.htm> [Accessed 13 July 2015].

UN (2008) *Lack of political will biggest obstacle to improving sanitation – Secretary-General* [online] Available at: <http://www.un.org/apps/news/story.asp?NewsID=26065> [Accessed 18 May 2016].

UN (2013) *Political will key to ensuring water and sanitation for all, says UN-backed report* [online] Available at: <http://www.un.org/apps/news/story.asp?NewsID=45620#.WKJgh4dvjIV> [Accessed 18 May 2016].

UN (2014) *International Decade for Action ‘Water for Life’ 2005-2015* [online] Available at: <http://www.un.org/waterforlifedecade/sanitation.shtml> [Accessed 24 June 2015].

UN (2014) *World Urbanization Prospects: The 2014 Revision*. New York: United Nations.

UN (2016) *Sustainable Development Goal 6: Ensure availability and sustainable management of water and sanitation for all* [online] Available at: <https://sustainabledevelopment.un.org/sdg6> [Accessed 5 August 2016].

UNDP (2015) *Human Development Report 2015 - Work for Human Development*. New York: United Nations Development Programme.

Valente, T.W. and Pumpuang, P. (2007) ‘Identifying Opinion Leaders to Promote Behavior Change. *Health Educ Behav*, 34(6), pp. 881-896.

Van Horn, L. and Monsen, E. (2008) '*Steering Through the Research Continuum*', in Monsen, E. and Van Horn, L. (2008) *Research – Successful Approaches* (3rd edn), US: American Dietary Association.

Vassell, L. (2008) *Caribbean Sanitation Issues: An Overview - Presentation on CSD Panel on Gender Sensitive Sanitation Policies, United Nations, NY, May 14, 2008* [Online] Available at: <https://esa.un.org/iys/docs/Presentation%20to%20CSD-%20May08-Vassell.pdf> [Accessed 2 April 2016].

Vemmen, K. (2014) '*Supply and Sanitation: How are the unserved to be served*', in Garrido, A. and Shechter, M., (ed.) *Water for the Americas: Challenges and Opportunities*, Abingdon: Routledge, pp. 87-99.

Viñas, M.J. (2007) *Failure to meet United Nations global sanitation target could affect millions of the world's poorest, expert warns* [online] Available at: <http://news.stanford.edu/pr/2007/pr-davis-031407.html> [Accessed 13 June 2016].

Vincent, G.E. (2005) *The Rockefeller Foundation, Volume 6*. New York: MCMXX.

Walrond, E. (2001) Health in Barbados in the 20th century, *West Indian Med J.* 50(Suppl 4), pp. 11-4.

Wang, J. (2015) '*Colonial Crossings: Social Science, Social Knowledge, and Americal Power from the Nineteenth Century to the Cold War*', In van Dongen, J. (Ed.) (2015) *Cold War Science and the Transatlantic Circulation of Knowledge*, Leiden: Koninklijke Brill NV.

Watson, M. and Potter, R. (1997) '*Housing Conditions, Vernacular Architecture and State Policy in Barbados*', in Potter, R. and Conway, D. (ed.) *Self-help Housing, the Poor, and the State in the Caribbean*, Tennessee: University of Tennessee Press. p. 40.

Watson, M. and Potter, R. (2001) *Low-cost Housing in Barbados: Evolution or Social Revolution?* Kingston: University of the West Indies Press.

White, F. and Hospedales, C. (1994) Communicable disease control as a Caribbean public health priority. *Bulletin of the Pan American Health Organization*, 28(1), pp. 73-76.

WHO (2004) *The Sanitation Challenge: Turning Commitment into Reality*. Geneva: World Health Organization.

WHO (2009) *The Global Framework for Action on Sanitation and water Supply: Translating political commitments into concrete actions* [online] Available at: http://www.who.int/water_sanitation_health/GF4A_Flyer_18sept09.pdf [Accessed 18 May 2016].

WHO/UNICEF (2006) *Meeting the MDG drinking water and sanitation target: the urban and rural challenge of the decade*. Geneva: World Health Organisation.

WHO/UNICEF (2009) *Water supply and sanitation sector assessments: A guide for country-level action*. Geneva: World Health Organisation.

WHO/UNICEF (2015) *Progress on Sanitation and Drinking Water – 2015 Update and MDG Assessment*. New York: UNICEF and World Health Organization.

Winchester, L. (2005) *Sustainable Human Settlements Development in Latin America and the Caribbean*. Santiago: Cepal.

Wood, B., Gumbs, F. and Headley, J. (2002) Distribution and occurrence of Atrazine, Deethylatrazine, and Ametryne residues in groundwater of the tropical island Barbados. *Communications in Soil Science and Plant Analysis*, 33(15) pp. 3501-3515.

Woodcock, L. (2009) *Islands of Inequality: The Environmental History of Tobago and the Crisis of Development and Globalisation in the Caribbean 1763–2007*. PhD, University of Sussex.

Woodward, D., Drager, N., Beaglehole, R. and Lipson, D. (2001) Globalization and health: a framework for analysis and action, *Bulletin of the World Health Organization*, 79(9), pp. 875-881.

World Bank (2016) *Data: Population* [online] Available at: <http://data.worldbank.org/indicator/SP.POP.TOTL> [Accessed 10 June 2016].

Willetts, J., Wicken, J. and Robinson, A. (2009) *Meeting the Sanitation and Water Challenge in South-East Asia and the Pacific: Synthesis report of the sanitation and water conference 2008*, Brisbane, International Water Centre.

Yin, R. (2009) *Case Study Research – Design and methods* (4th edn), London: SAGE Publications, Inc.

Sir Arthur Lewis Institute of Social and Economic Studies (SALISES) University of the West Indies Cave Hill Campus, Barbados August 2011. Barbados Country Assessment of Living Conditions 2010: Overview Report.

UNEP (2010). NATIONAL ENVIRONMENTAL SUMMARY , BARBADOS

Sustainable Barbados Recycling Centre (SBRC, 2018). Sustainable Barbados Recycling Centre. <http://www.sbrinc.com/>

Aertgeerts, R. (2009) Progress and challenges in water and sanitation. *Desalination* 248(1), pp. 249-255.

Fry, L.M., Mihelcic, J.R. and Watkins, D.W. (2008) Water and Nonwater-related Challenges of Achieving Global Sanitation Coverage. *Environ. Sci. Technol.*, 42 (12), pp. 4298–4304

Matoso, M., Cummings, C. and Langdown, I. (2016) Improving sanitation in Tanzanian cities - What do we know about how progress happens? London: Overseas Development Institute.

World Bank (2005) Guyana: Preliminary Damage and Needs Assessment Following the Intense Flooding of January 2005 [online] Available at: http://siteresources.worldbank.org/INTDISMGMT/Resources/Guyana_needs.pdf [Accessed 25 Hune 2017].

Nhapi I. (2015) Challenges for Water Supply and Sanitation in Developing Countries: Case Studies from Zimbabwe. In: Grafton Q., Daniell K., Nauges C., Rinaudo JD.,

Chan N. (eds) Understanding and Managing Urban Water in Transition. Global Issues in Water Policy, vol 15. Springer, Dordrecht

(Challenges: Primary Globalisation, Urbanisation| Secondary: lack of investment in the water and sanitation sector, inappropriate technologies, ill-defined institutional frameworks, capacity limitations, and neglect of rural areas.)

WHO/UNICEF (2008) Poor sanitation threatens public health [online] Available at: <http://www.who.int/mediacentre/news/releases/2008/pr08/en/> [Accessed 12 March 2015].

Sealey, P.A. (2011) The League of Nations Health Organisation and the Evolution of Transnational Public Health. Doctoral Thesis, Ohio State University. [online] Available at: https://etd.ohiolink.edu/!etd.send_file?accession=osu1306338169&disposition=inline [Accessed 11 June 2017].

Black, M. and Fawcett, B. (2008) The Last Taboo: Opening the Door on the Global Sanitation Crisis.

WHO (1992) A Guide to the Development of on-Site Sanitation [online] Available at: http://apps.who.int/iris/bitstream/handle/10665/39313/9241544430_eng.pdf;jsessionid=6027E049B5CD7A95870007FFEED6D576?sequence=1 [Accessed June 2017]

Satterthwaite, D. and McGranahan, G. (2006) Overview of the Global Sanitation Problem. UNDP [online] Available at: http://hdr.undp.org/sites/default/files/satterthwaite_mcgranahan.pdf [accessed 1 June 2017].

Neto, F. and Tropp, H. (2009) Water supply and sanitation services for all: global progress during the 1990s. |<https://doi.org/10.1111/j.1477-8947.2000.tb00946.x>

Cairncross, S., Bartram, J., Cumming, O. and Brocklehurst, C. (2010) Hygiene, Sanitation, and Water: What Needs to Be Done? PLoS Med., 7(11), e1000365.

World Bank (2017) Understanding Poverty topics – Sanitation [online] Available at: <http://www.worldbank.org/en/topic/sanitation> [Access 15 December 2017].

Ruth Kennedy-Walker, Barbara Evans, Jaime Amezaga, Charlotte Paterson (2014) Challenges for the future of urban sanitation planning: critical analysis of John Kalbermatten's influence. *Journal of Water Sanitation and Hygiene for Development*, 4 (1), pp. 1-14.

Van Minh, H. and Nguyen-Viet, H. (2010) Economic Aspects of Sanitation in Developing Countries. *Environ Health Insights*. 2011; 5: 63–70.

UNICEF (2016) STRENGTHENING ENABLING ENVIRONMENT FOR WATER, SANITATION AND HYGIENE (WASH) - Guidance Note. [Online]. Available at: https://www.unicef.org/wash/files/WASH_guidance_note_draft_10_3_hr.pdf [Accessed 4 May 2017].

WEDC (2015). An enabling environment for Urban Sanitation, SPlaSh Urban Sanitation research briefing note #1. [online] Available at: http://splash-era.net/downloads/SPlash_USrP_bn1_engliSh.pdf. [Accessed 6 July 2017].

Cotton, A. and Franceys, R. (1994) Infrastructure for the urban poor: Policy and planning issues. *Cities*, 11(1), pp. 15-24.

Lüthi, C., Morel, A., Tilley, E. and Ulrich, L. (2011). Community-Led Urban Environmental Sanitation Planning (CLUES). Swiss Federal Institute of Aquatic Science and Technology (Eawag), Dübendorf, Switzerland.

Eawag (2017) Enabling Environment for Sustainable WASH Interventions [online] Available at: <https://www.eawag.ch/en/departement/sandec/projects/sesp/enabling-environment/> [Accessed 10 November 2017].

Lüthi, C., McConville, J., Norström, A., Panesar, A., Ingle, R., Saywell, D. and Schütze, T. (2009) Rethinking sustainable sanitation for the urban environment. The 4th International Conference of the International Forum on Urbanism (IFoU) 2009 Amsterdam/Delft - The New Urban Question – Urbanism beyond Neo-Liberalism, pp. 451-462.

Amjad, U.Q., Ojomo, E., Downs, K., Cronk, R. and Bartram, J. (2015) Rethinking Sustainability, Scaling Up, and Enabling Environment: A Framework for Their Implementation in Drinking Water Supply. *Water*, 7(1), pp. 1497-1514.

UNICEF (2016) Strategy for Water, Sanitation and Hygiene 2016-2030. New York: UNICEF Programme Division.

Peters, D. (2008) Building an Institutional Framework (WS) [online] Available at: <https://www.sswm.info/water-nutrient-cycle/water-sources/softwares/creating-and-enabling-environment/building-an-institutional-framework-%28ws%29> [Accessed 19 November 2017].

Shirley, M. (2002) Institutions and Development, In: Menard, C. and Shirley, M. Handbook of New Institutional Economics. Chevy Chase: Springer.

UN (2004) Obstacles faced by developing countries in meeting water, sanitation needs highlighted in sustainable development commission.

OECD (2011) MEETING THE CHALLENGE OF FINANCING WATER AND SANITATION [online] Available at: <https://www.oecd.org/env/resources/48923826.pdf> [Accessed 19 November 2017].

Seetharam, K. (2015) Challenges and Opportunities for sanitation in Developing Countries. *Journal of Science Policy & Governance*, 7(1), pp. 1-12.

Mason, N., Matoso, N., Hueso, A., Gebremedhin, B.T., Verma, R., Gunaviti Reshvi, I. and Tomo, N. (2016) Making sanitation happen: turning 'political will' into action. London: Overseas Development Institute.

Mosello, B., Matoso, M., Cummings, C. and Doczi, J. (2016) Sanitation under stress: how can urban services respond to acute migration? London: Overseas Development Institute.

Bohman, A. (2010) Framing the Water and Sanitation Challenge A history of urban water supply and sanitation in Ghana 1909-2005. Doctoral Dissertation in Economic History: Umeå University.

Neustadt, R.E. and May, E.R. (1986) Thinking in Time: The uses of history for decision makers. New York: Freedom Press.

Cotton, A., Scott, R. and Venkataraman, V. (2002) 'Sanitation – a problem of scale. Washington: The World Bank [online] Available at: http://siteresources.worldbank.org/INTWDR2004/Resources/22479_cottonetalWDR.pdf [Accessed 19 November 2017].

SCOTT, P., COTTON, A. and SOHAIL KHAN, M., (2013). Tenure security and household investment decisions for urban sanitation: the case of Dakar, Senegal. Habitat International, 40, October 2013, pp. 58-64.

Mooya, M.M. and Cloete, C.E. (2010) Property rights, real estate markets and poverty alleviation in Namibia's urban low income settlements", Habitat International, 34(4), pp. 436-445.

Green, E.C. and Isely, R.C. (1988) The Significance of Settlement Pattern for Community Participation in Health: Lessons from Africa. Human Organization, 47(2), pp. 158-166.

Paterson, C., Mara, D. and Curtis, T. (2005) Pro-poor sanitation technologies. Geoforum, 38(5), 901-907.

Coates, S. (1999) A Gender and Development Approach to Water, Sanitation and Hygiene Programmes. [online] Available at: <https://pdfs.semanticscholar.org/d956/4d61ca2dc134357c888aa90f709ad7114993.pdf> [Accessed 10 November 2017].

Soetan, R.O. (2001) Culture, gender and development - A Report submitted to the African Institute for Economic Development and Planning (IDEP), Dakar, Senegal, October 2001. [Online] Available at: <http://unpan1.un.org/intradoc/groups/public/documents/idep/unpan003342.pdf> [Accessed 20 November 2017].

Appendices

Appendix A – Data Collection Instrument for Barbados - Semi-Structured Interview Schedule

Section 1 – Existing Sanitation System in Barbados

These initial questions seek to develop an idea of the extent of adequate sanitation coverage in Barbados and the steps taken to achieve this.

1. What can you attribute to the status of sanitation recorded in Barbados?

.....

2. Was there a specific strategy or a specific target?

.....

3. Why was this strategy adopted?

.....

4. Would you say the strategy(ies) adopted achieved their intended objectives?

.....

Section 2 – Major Challenges: What did not work?

These questions are aimed at capturing your personal opinion or that of your organization on the role of sanitation in improved wastewater management and health and environmental risks reduction from household in the Caribbean.

5. What were some of the major challenges in improving household access to adequate sanitation?

.....

6. Why these challenges existed and how were they overcome?

.....

Sections 3 – The recognized benefits of Improved Sanitation

This group of questions is designed to gain your thoughts on the role and suitability of national sanitation policies in sanitation improvements in the Caribbean.

7. Are there any recognizable benefits of widespread coverage of adequate sanitation?

.....

8. Would a sanitation improvement guideline governing the entire Caribbean be an effective approach to realize the improvements needed in the poorer performing countries?

.....

.....

Section 4 - Sanitation Improvements and Regional Development

These questions seek to gather your opinions on the role of sanitation in regional development

9. Do you think universal access to adequate sanitation in the Caribbean is achievable within the next decade?

.....
.....

10. What role should sanitation improvements have in the development agenda for the Caribbean?

.....
.....

11. What would you consider as the main barriers to achieving universal access to adequate sanitation and sustainability in its provision throughout the Caribbean Region?

.....
.....

General Questions on Perspective on Sanitation

12. Would you agree that there is universal coverage of adequate sanitation in Barbados?
13. If the definition you just read was adopted as the definition of 'adequate' sanitation, do you think the current system would still register the same performance?

You have come to the end of this interview. Thank you for your participation and cooperation

Appendix B – Method used in calculating Sample size for Guyana households survey

The following information was used in the determination of the minimum sample size:

- Forty percent (40%) of households in Guyana can be considered to have 'adequate' sanitation.
- A rough measure of 'adequacy' of sanitation are households connected to a piped sewer system or a septic tank as well as having a water supply connection within their yard or compound.
- Households using latrines or similar facility (irrespective of the water supply connection) is considered to have 'inadequate' sanitation provisions.
- Data from Guyana's 2002 population census, MCIS 2006 and UNICEF/WHO 2012 Water and Sanitation Progress Report were used.

Selecting the Sample Size

The sample size was chosen so that there will be sufficient data points to allow a representative pronouncement on the relative adequacy of sanitation in the various settlement groups. To allow this, a sample size that is large enough to support claims of informational redundancy or theoretical saturation and small enough to permit deep, case-oriented analysis.

Analysis of sanitation data was particularly complicated due to the difficulty in distinguishing what percentage of the facilities are 'adequate' from those that are "inadequate". As such, for purpose of determining the sample size, households connected to a sewer network or uses a septic tank is classified as adequate, while all other facilities were considered inadequate. The distribution of the type of facilities that exist with the survey areas is shown in Table 3-6.

Method used to calculate Representative Sample Size

$$\text{Sample Size} = \frac{(Z\text{-score})^2 \times \text{StdDev} (1\text{-StdDev})}{\text{margin of error}^2}$$

(margin of error)²

Calculation Parameters:

Population Size: *[No. of Household within Cluster]*

Margin of Error (Confidence Interval): *[Based on the high uncertainty this is taken as 10%]*

Confidence Level: *[90%]*

Standard of Deviation: *[0.5]*

Z-Score: 90% – Z Score = 1.645, 95% – Z Score = 1.96, 99% – Z Score = 2.576

Sample Size Calculation Example: [Cluster: Georgetown]

Population Size : 34,784 Households

Margin of Error (Confidence Interval): 10%

Confidence Level: 90%

Standard of Deviation: 0.5

Z-Score:

•90% – Z Score = 1.645

$$\text{Sample Size} = \frac{(\text{Z-score})^2 \times \text{StdDev} (1-\text{StdDev})}{(\text{margin of error})^2}$$

$$= \frac{1.645^2 \times 0.5 (1-0.5)}{0.1^2}$$

$$= \frac{2.7 \times 0.25}{0.01}$$

$$= 68$$

Table B1 - Sanitation coverage across region in Guyana

Region	Sewer	Septic Tank	Pit Latrine	Other	None	Household
--------	-------	-------------	-------------	-------	------	-----------

Region 1	0	11.58	85.72	0.92	1.79	4145
Region 2	0	23.4	76.28	0.12	0.2	11220
Region 3	0	38.63	70.27	0.36	0.74	25957
Region 4	9.79	49.39	39.94	0.05	0.82	77937
Region 5	0	20.21	78.58	0.02	1.09	12774
Region 6	0	27.82	71.36	0.05	0.77	31469
Region 7	0	21.62	62.89	0.19	15.49	3641
Region 8	0	6.04	66.6	3.47	23.89	1871
Region 9	0	4.6	71.94	0.06	23.4	3543
Region 10	0	47.3	51.21	0.05	1.43	10052
						182609
Average	0.979	25.059	67.479	0.529	6.962	
No. of Households	7630	66182	105223	282	3292	
Proportion of Population	4.2	36.2	57.6	0.2	1.8	
	Adequate Facilities		Inadequate Facilities			
	40		60			

(Source: 2002 Population Census)

The Hypothesis is:

If 40% of the population has 'adequate' sanitation provision, if we were to survey 96 [Sample Size] households, then 90% of the time the findings will show that between 30-50% of the household will have an adequate sanitation provision.

Appendix C – Interview Schedule: Ministry/Government Level - Guyana

Assessing Sanitation in Guyana

Section 1 – Role in Sanitation Provision

These initial questions are geared to record and understand how important sanitation is considered by the key actors.

1. What would you say is the Ministry's role in Household sanitation provision in Guyana?

.....

2. Is this role based on your legal responsibility or evolved responsibility over time?

.....

3. Would you say your Ministry has the primary or a secondary responsibility for ensuring households sanitation provisions are adequate?

.....

4. Do you think the responsibility for sanitation given to your Ministry is well placed?

.....

5. If not, which Ministry do you think the remit for sanitation should rest?

.....

6. What about resources and capacity! Is the Ministry sufficiently resourced to deal with ensuring provision and sustainability of household sanitation?

.....

Section 2 – Importance of Sanitation

If we take a look at Sanitation and its importance.....

7. Is there (or are you aware of) a minimum sanitation standard for household in Guyana?

.....

8. Would you agree there is inadequate sanitation provisions and maintenance in households across Guyana? **(If YES, Continue), If answer No, move to Q11.**

.....

9. How would you rate the level of emphasis and attention placed on households having access to adequate sanitation in Guyana on a scale of 1 to 5? 1 being insufficient, 5 being adequate.

1 ☐

2 ☐

3 ☐

4 ☐

5 ☐

10. Given the current mandate of your office, how important would be rate the need for households to have access to adequate sanitation on a scale of 1 to 5, (1) being not important and (5) being extremely important?

1 ☐

2 ☐

3 ☐

4 ☐

5 ☐

11. What do you think the next step(s) in the sanitation sector should be?

Initiate immediate action ☐

Do nothing, continue as is ☐

Consider Sanitation after more important issues ☐

Investigate ☐

Other:

12. What would you consider as the key benefits to improved households sanitation?

.....

13. Has your ministry taken any action in recent years towards improving household access to adequate sanitation?

Please comment:.....

14. The 2012 update reports from the JMP for the United Nations shows that Guyana has an average of 84% improved sanitation coverage, meaning that 16 percent of households currently inadequate facilities. Do you agree with these figures?

.....

15. If No, what do you think the true figures should be?

.....

16. Is universal household access to adequate sanitation an objective the Government should pursue?

.....

17. We talked quite a lot about sanitation and adequate sanitation. Given you or your ministry's involvement in sanitation provision, what would you consider as the most appropriate definition for household sanitation?

.....

Section 3 - Challenges to Sanitation Provision

18. What would you consider as the major issues affecting the provision, having access to and maintenance of adequate sanitation to household in Guyana?

.....

19. Where are the major sanitation problem areas? Tick appropriate.

Urban Areas

☐

Squatting (unplanned)

☐

All coastal

☐☐

314

☐

Rural Communities Municipalities ☐ Interior location
 Households ☐ Town Centres ☐

Other:.....

20. What would you say are the main household sanitation issues across Guyana?

No toilets facility	<input type="checkbox"/>	Poor Sanitation practices	<input type="checkbox"/>
No water supply	<input type="checkbox"/>	Poor maintenance of facilities	<input type="checkbox"/>
Vandalism of infrastructure	<input type="checkbox"/>	Lack of monitoring and enforcement	<input type="checkbox"/>
No statutory control(s)	<input type="checkbox"/>	Sanitation not a priority	<input type="checkbox"/>

Other:

21. Is improving household sanitation currently on your Ministry's/Agency's agenda?

.....

Sections 4 – Adequate Sanitation for Guyana

The term 'adequate sanitation' is commonly used when referring to appropriateness of sanitation provision...

22. How would you define a household 'having access to adequate sanitation' in Guyana?

.....

23. Is this definition promoted by the ministry or your personal perspective?

.....

Section 5 – Approach to Universal Access to Sanitation in Guyana

24. What would you consider as the best approach to achieving universal access to adequate household sanitation in Guyana?

.....

25. Would you be in favour of a national sanitation policy for Guyana?

.....

26. Do you think Guyana can achieve universal access to adequate household sanitation within the next decade?

.....

27. Where do you think household sanitation improvement falls on the National Development Agenda?

Very High ☐ High ☐ Average ☐ Low ☐ Very Low ☐

28. Where do you think household sanitation improvement should fall on the National Development agenda?

Very High ☐ High ☐ Average ☐ Low ☐ Very Low ☐

29. What would you consider as the main barriers to achieving universal household access to adequate sanitation and sustainability in its provision in Guyana?

.....

Appendix D – Interview Schedule: Agency/Implementation level - Guyana

Sanitation in Guyana

Section 1 – Role in Sanitation Provision

These initial questions are geared to record and understand how important sanitation is considered by the actors.

1. What is your current role in sanitation provision in Guyana? *(If No role, should you have a role?)*

.....

2. Is this role based on your legal responsibility or evolved responsibility over time?

.....

3. Would you say your Agency has primary or a secondary responsibility for ensuring households have access to adequate sanitation?

.....

4. How would you view your Agency's performance in fulfilling its role for sanitation provision?

.....

5. Do you think the responsibility for sanitation given to your Agency is well placed?

.....

6. If not, where would you consider to be the most appropriate Agency to fulfill your functions for sanitation provision and why?

.....

7. What about resource and capacity! Is your Agency sufficiently resourced to deal with the issue relating to sanitation provision and maintenance?

.....

Section 2 - Challenges to Sanitation Provision

8. What are the major challenges you face in the provision of sanitation?

.....

9. Would you say these challenges affects your agency's performance or is mainly responsible for the current sanitation state?

.....

10. Where are the major problem areas?

Households ☐ Unplanned Communities ☐ Planned Communities ☐

Town Centres ☐ Rural communities ☐ Municipalities ☐

Interior Locations ☐ Other:.....

11. What would you say are the main sanitation issues across Guyana?

- | | | | |
|--------------------------|--------------------------|------------------------------------|--------------------------|
| Lack of adequate toilets | <input type="checkbox"/> | Poor Sanitation practices | <input type="checkbox"/> |
| Lack of Water sanitation | <input type="checkbox"/> | Poor maintenance of facilities | <input type="checkbox"/> |
| Vandalism | <input type="checkbox"/> | Lack of monitoring and enforcement | <input type="checkbox"/> |
| No statutory control | <input type="checkbox"/> | Sanitation not priority | <input type="checkbox"/> |
| Other: | | | |

12. What would you consider to be the best approach to overcoming these challenges?

.....

13. Wastewater Management has been given increased attention in recent years; do you think improved wastewater management would effectively address the current sanitation issues in Guyana?

.....

Section 2 – Importance of Sanitation

If we take a look at Sanitation and its importance.....

14. Does your agency promote a minimum sanitation standard for every household?

.....

15. What mandate or standard is used by your agency in executing its role in sanitation provision?

.....

16. Would you agree there is an issue of inadequate sanitation provisions and maintenance affecting _____ households _____ across Guyana?

17. Given the current mandate of your Agency, how important would you rate the need for households to have access to adequate sanitation on the scale below, (1) being not important and (5) being extremely important?

5 ☐ 4 ☐ 3 ☐ 2 ☐ 1 ☐

18. What would you say would be the best approach by authorities to household sanitation provision and maintenance, given its current state?

- | | | | |
|---|--------------------------|----------------------------|--------------------------|
| Initiate immediate action | <input type="checkbox"/> | Do nothing, continue as is | <input type="checkbox"/> |
| Consider Sanitation after more important issues | <input type="checkbox"/> | Investigate | <input type="checkbox"/> |

Other:

19. What would you consider as the number 1 benefits to households for having access to adequate sanitation and sustained provision?

.....

20. The 2012 update reports from the JMP for the United Nations shows that Guyana has an average of 84% sanitation coverage, meaning that 16 percent of households currently used poorly constructed latrines or defecate in the open. Do you agree with these figures?

.....

21. If No, what do you think the true figures should be?

.....

22. Is universal household access to adequate sanitation a notion your Agency would ever seek to attain?

.....

23. We talked quite a lot about sanitation and adequate sanitation. Given you or your Agency's involvement in sanitation, how would you define sanitation?

.....

24. Similarly, what would you considered as 'having access adequate sanitation' for a household?

.....

Sections 4 – Adequate Sanitation for Guyana

The word adequate sanitation is used in the international development arena when measuring global progress and coverage of sanitation provision...

25. How would you define 'having access to adequate sanitation' for households in Guyana?

.....

26. Is this definition based on your personal perspective or that promoted by your Agency?

.....

27. On sheet 1 is the definition given to sanitation and what is considered as 'having access to adequate sanitation. Can such a definition be considered or easily adopted and incorporated by your Agency?

Section 4 – Approach to Universal Access to Sanitation

These questions seek to gather your opinions on how sanitation should be improved in Guyana...

28. Given your role in sanitation provision, what would you consider as the best approach to achieving universal access to adequate sanitation in Guyana?

.....

29. Would you be in favour of a national sanitation policy for Guyana geared toward improving and managing sanitation to attain universal access to adequate sanitation?

.....

30. What instrument would you consider best for the implementation of a national sanitation policy for Guyana?

Laws ☐

Regulations ☐

Economic Incentives ☐

Assignment of Rights and Responsibilities ☐

31. Do you think universal household access to adequate sanitation in Guyana is achievable within the next decade?

32. Where should sanitation improvement fall in the national development agenda for Guyana?

33. What would you consider as the main barriers to achieving universal household access to adequate sanitation and sustainability in its provision in Guyana?


.....

Appendix E – Household Questionnaire – Data Collection Instrument used in Guyana

Household Sanitation condition, provisions and KAP Assessment in Guyana

Questionnaire

Current Provisions

- 
1. How many persons are currently in your household?
0 – 2 ☐ 3 – 5 ☐ 6 – 8 ☐ above 8 ☐
 2. What are the ages of persons in your household?
0 – 5 ☐ 6 – 11 ☐ 16 – 65 ☐ above 65 ☐
 3. What is the housing status?
Own ☐ Rent ☐ Other:
 4. Do you have a sanitation (toilet) facility within your property (yard or house)? **If YES, go the Q19.**
Yes ☐ No ☐
 5. **If No to Question 4**, how do members of your household defecate?
Open Space ☐ Shared Community Toilet ☐ Neighbour's Toilet ☐
Other:.....
 6. What type of sanitation facility (toilet) do you use?
W/C to Sewer ☐ W/C to Septic Tank ☐ W/C to Pit Latrine ☐
Pit Latrine ☐ Other:.....
 7. How many persons would you estimate use this sanitation facility (toilet)?
0 – 5 ☐ 6 – 10 ☐ 11 – 15 ☐ 16 – 20 ☐ Over 21 ☐
 8. Who manages (clean, repair, operate, etc.) this sanitation facility (toilet)?
Local Authority ☐ Community Group ☐ Private Company ☐
Residents ☐ Users ☐ Other:
 9. Are you required to pay to use this sanitation facility (toilet)?
Yes ☐ No ☐ Sometimes ☐
 10. What type of access do you have to this sanitation facility?
24 Hours Access ☐ Day light hours only ☐ Nights only ☐
Other :

11. If access to sanitation facility (toilet) is not available 24 hours, do you have use of an alternative facility during hours where facility is unavailable?
 Yes ☐ No ☐
 Please Expand.....
12. What is the average distance this facility if from your home?
 Less than 50m ☐ Between 50 and 100m ☐
 Between 100 and 200m ☐ More than 200m ☐
13. Is water continuously available for hand washing at this sanitation facility (toilet)?
 Yes ☐ No ☐ Sometimes ☐
14. Do all members of your household find this facility clean, safe and convenient for your use?
 Yes ☐ No ☐ Maybe ☐ Sometimes ☐
15. If No, what are some of the issues faced in using this facility?

16. If you can make changes to this existing sanitation position, what would be your preferred sanitation facility?
Please state:

17. Why you do not currently have this facility?
 Cannot afford it financially ☐ Not permitted by authorities ☐
 Not local customs ☐ No Water to operate ☐
 Other:
18. What do you think will be the benefits to your household if you have the sanitation facility (toilet) of your choice?

Continue from to Q4

19. If Yes to Question 4, how would you describe your current sanitation facility (toilet)?
 W/C to Sewer ☐ W/C to Septic Tank ☐ W/C to P ☐
 Pit Latrine ☐ Open Defecation ☐ ☐
 Other :
20. Has this been the sanitation facility (toilet) from the inception of your occupancy?
 Yes ☐ No ☐
21. If No to Q20, what what the previous sanitation facility (toilet)?
 W/C to Sewer ☐ W/C to Septic Tank ☐ W/C to Pit ☐
 Pit Latrine ☐ Open Defecation ☐ Other:.....

22. If No to Q20, what was responsible for the change in sanitation facility (toilet)?
 Authority Instructions ☐ Ability to afford improvement (Financial) ☐
 Neighbour complaints ☐ Personal concerns (health/environment) ☐
23. Do you currently have any issues with your existing sanitation facility (toilet)? If yes, please outline.

24. Where do all other household wastewater (bath/kitchen/laundry, etc.) drain?
 Sewer ☐ Septic Tank ☐ Pit/Well ☐
 Yard Drains ☐ external drains ☐ Other:.....
25. Has your property (house/yard) currently, or in the past, experience any of the following since your occupancy?
 Flooding ☐ Mosquitoes ☐ Garbage pile-up ☐
 Rodent ☐ High Odour for Sanitation facility ☐
26. Do you have water supply to your house/yard?
 Yes ☐ No ☐
27. If yes, how regular is your water supply?
 24 hours ☐ 10-20 hours daily ☐ 5 – 10 hours daily ☐
 Less than 4 hours daily ☐
28. If no, where do you source water for domestic purposes?
 Community Standpipe ☐ Neighbour ☐ Water supplier ☐
 Other:.....
29. How often is water available for in the toilet facility (i.e. hand washing, flushing, cleaning. Etc.)?
 Always ☐ Often ☐ Sometimes ☐ Never ☐

Responsibility

30. Is there, or are you aware of the agency responsible for ensuring adequate sanitation facility in your home or community?
 Yes ☐ No ☐
31. If Yes, which agency is responsible?

32. Were you ever visited in relation to your sanitation facility in your home or the one you share?
 Yes ☐ No ☐
33. If yes, would you please state reason for visit?

34. Are you aware of any standards for sanitation facility (e.g. sewer system use, septic tank, latrine, etc.) construction and use?

Yes ☐

No ☐

35. Are you familiar with any laws, regulations or guidelines in relation to how to construction, operate and maintain a sanitary facility?

Yes ☐

No ☐

36. Have you ever made a complaint about insanitary condition in your home or community?

Yes ☐

No ☐

37. If Yes, what was the subject of your complaint?

.....

Knowledge, Attitude and Perception

38. How important would you consider having access to an adequate sanitation facility (toilet) on a scale between 1 to 5, with 5 being most important and 1, being the least?

5 ☐

4 ☐

3 ☐

2 ☐

1 ☐

39. Would you consider inadequate sanitation an important issue in Guyana?

Yes ☐

No ☐

40. Would you support any actions taken by the government to improve sanitation in households?

Yes ☐

No ☐

Not sure ☐

Depends ☐

41. Do you think there is an immediate need for actions to improve sanitation in your community?

Yes ☐

No ☐

Not sure ☐

-End of Questionnaire-

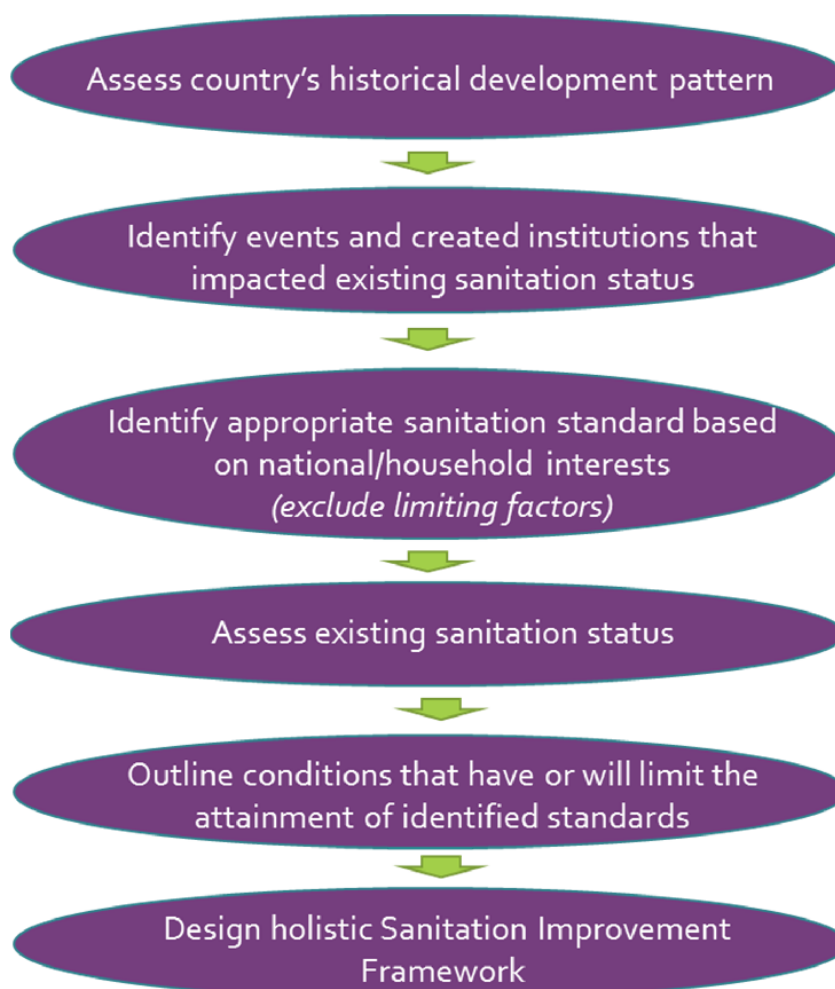
Appendix F – Sustainable Sanitation Planning Approach

Aim of Approach: Overcoming key challenges, identifying elements of enabling environment to development

Benefits of adopting this revised planning approach:

1. Incorporating Historical Development Assessment
2. Identifies critical events in history that affected sanitation
3. Understand the trends in sanitation development.
4. Easily identify institutions that have and will impact the success and sustainability of sanitation interventions.

Key Steps in Sustainable Sanitation Planning Approach



Appendix G – Guidelines for the application of standards at the property level.

