

WOMEN'S EMPOWERMENT IN AGRICULTURE: A CASE
OF NORTHEAST BRAZIL

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Thesis submitted for the degree of
Doctor of Philosophy



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December 2018

This thesis is dedicated to all rural women in Brazilian Northeast, especially to those in the Chapada do Apodi. Their strength and determination were my source of inspiration during the challenges of the PhD journey. This work is also dedicated to my husband, Salvatore, who has been a constant source of emotional support and encouragement during these years. I am truly thankful for having you in my life.

Acknowledgements

First and foremost, I would like to express my special appreciation and thanks for my supervisors Dr Elizabeth Oughton and Guy Garrod for the encouragement and support. I appreciate all their contributions of time, ideas, and experience, which was invaluable and stimulating. Additionally, I would thank Dr Luca Panzone for his time and support provided during the quantitative analysis of this thesis. Also, Dr Carmen Hubbard for the support and guidance in the first year of my PhD journey. Moreover, I would like to offer my sincerest gratitude to Dr Karla Hora (Universidade Federal de Goiás) and Dr Conceição Dantas (Universidade Federal do Rio Grande do Norte) for the time and advice given with regard to my study. I also would like to express my sincerest gratitude to my friend, Ms Ivonilda de Souza, an admirable and strong woman, who was always available to share information. Also, I would like to thank the Centro Feminista 8 de Março (CF8), Sindicato dos Trabalhadores e Trabalhadoras Rurais de Apodi (STRRA), Perfil Pesquisas, and all smallholder farmers of Chapada do Apodi for their collaboration in my fieldwork. In addition, I would like to thank the Researcher Centre for Latin American and Caribbean Studies (Newcastle University) for the CLACS Mobility Fund that support in the fieldwork of this study. I am grateful Prof. Bettina B. Bock (Wageningen University), Prof. Mark Reed and Dr Pattanapong Tiwasing (Newcastle University) for their helpful comments and suggestions in my work. Also, in my daily work I have been blessed with a friendly and cheerful group of fellow students (Anne Huting, Enas Sufar, Essien Antia-Obong, Fanny Pandolfi, Nik Nur Azwanida Binti Zakaria, Nuno Mendonça, Oluwaseun Bolaaji and Pattanapong Tiwasing).

This research was sponsored by the CAPES/CNPq under the Science without Borders Programme (BEX1190513).

Abstract

In rural areas, strategies for promoting women's empowerment should account for periods of drought, since droughts heighten existing gender-based inequalities and place women in an even more socially and economically vulnerable situation. Scores of efforts and resources have been targeted to promote rural women's empowerment, but there is little to no understanding of the elements and conditions associated with this process when it comes to crises stemming from natural hazards. In this mixed-methods research project, I examine the conditions and factors associated with women's empowerment in agriculture during periods of severe drought. In the quantitative element, I examine sex-disaggregated data from 173 households in Chapada do Apodi—a region located within the so-called “drought polygon” in the state of Rio Grande do Norte, Brazilian Northeast. Moreover, the qualitative component of this study aims to provide a better understanding of the regional context. This study's results show that even under the circumstances of severe drought, the women from Chapada do Apodi were empowered in agriculture. The qualitative results suggest two central conditions contributed to this result: (1) the presence of the rural women's policy agency, with its resources and connections to the women's movement; and, (2) the technical assistance and female farmers group-related interventions that were delivered using gender awareness methodologies. Moreover, this study suggests that women's access to credit and technical assistance are associated with empowerment in agriculture, and that membership in women-only farmer groups and access to technical assistance are related to gender parity in agriculture. These results suggest that in drought-prone areas, the institutional conditions and gender awareness methodologies tied to rural development policies could help sustain women's empowerment in agriculture even in the face of prolonged periods of drought.

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List of Abbreviations

A-WEAI	Women's Empowerment in Agriculture Index (abbreviated version)
AEGRE	Special Advisory of Gender and Ethnic-Racial Matters, <i>Assessoria Especial de Gênero, Raça e Etnia</i>
ATER	Technical Assistance and Rural Extension (PRONATER), <i>Assistência Técnica e a Extensão Rural</i>
BSM	National Plan Brazil Without Misery, <i>Plano Nacional Brasil sem Miséria</i>
CEB	Base Ecclesial Communities, <i>Comunidades Eclesiais de Base</i>
CONSEA	National Council on Food and Nutritional Security, <i>Conselho de Segurança Alimentar e Nutricional</i>
CONTAG	Confederation of Agricultural Workers, <i>Confederação Nacional dos Trabalhadores na Agricultura</i>
CPF	Social Insurance Card, <i>Cadastro de Pessoa Físicas</i>
CPT	Pastoral Land Commission, <i>Comissão Pastoral da Terra</i>
CUT	Unified Workers' Central, <i>Central Única dos Trabalhadores</i>
DAP	Declaration of Aptitude for Family Farming, <i>Declaração de Aptidão ao Programa Nacional de Fortalecimento da Agricultura Familiar</i>
DAWN	Development Alternatives with Women for a New Era
DNOCS	National Department of Infrastructure Against Droughts, <i>Departamento Nacional de Obras Contra as Secas</i>
DPMR	Directory of Policy for Rural Women, <i>Diretoria de Políticas Para Mulheres Rurais</i>
EMBRAPA	Brazilian Agricultural Research Corporation, <i>Empresa Brasileira de Pesquisa Agropecuária</i>
GEM	Gender Empowerment Measures
GII	Gender Inequality Index
HDI	Human Development Index
IBGE	Brazilian Institute of Geography and Statistics, <i>Instituto Brasileiro de Geografia e Estatística</i>
ICPD	International Conference on Population and Development

IFPRI	International Food Policy Research Institute
INCRA	Institute for Colonization and Agrarian Reform, <i>Instituto de Colonização e Reforma Agrária</i>
MAB	Movement of Dam-Affected, <i>Movimento dos Atingidos por Barragens</i>
MDA	Ministry of Agrarian Development, <i>Ministério do Desenvolvimento Agrário</i>
MDG	Millennium Development Goals
MDS	Ministry of Social Development and Combat to Hunger, <i>Ministério do Desenvolvimento Social</i>
MMC	Movement of Peasant Women, <i>Movimento de Mulheres Camponesas</i>
MMM	Women World March, <i>Marcha Mundial das Mulheres</i>
MMTR	Rural Women Workers' Movement, <i>Movimentos Mulheres Trabalhadoras Rurais</i>
MPA	Movement of Small Farmers, <i>Movimento dos Pequenos Agricultores</i>
MST	Landless Workers' Movement, <i>Movimento dos Trabalhadores Rurais Sem Terra</i>
OPHI	Oxford Poverty and Human Development Initiative
P1MC	One Million Cisterns Programme, <i>Programa um Milhão de Cisternas</i>
PAA	Food Acquisition Programme, <i>Programa de Aquisição de Alimentos</i>
PNAE	National Programme of Scholar Nourishment, <i>Programa Nacional de Alimentação Escolar</i>
PNDA	National Sample Survey of Households, <i>Pesquisa Nacional por Amostra de Domicílios Contínua</i>
PNDRSS	National Plans of Sustainable and Solidary Rural, <i>Plano Nacional de Desenvolvimento Rural Sustentável e Solidário</i>
PNDTR	National Programme of Documentation for Women Farmers, <i>Programa Nacional de Documentação da Trabalhadora Rural</i>
PNPM	National Plans of Policies for Women, <i>Plano Nacional de Políticas para as Mulheres</i>
PNRA	National Plan of Agrarian Reform, <i>Plano Nacional de Reforma Agrária</i>
POPMR	Programme of Productive Organisation for Rural Women, <i>Programa de Organização Produtiva de Mulheres Rurais</i>
PPIGRE	Programme for the Promotion of Gender and Ethnic-Racial Equality, <i>Programa de Promoção da Igualdade de Gênero, Raça e Etnia</i>
PRONAF	National Programme for the Strengthening of Family Farming, <i>Programa Nacional de Fortalecimento da Agricultura Familiar</i>
PRONAT	National Programme for the Sustainable Development of Rural Territories, <i>Programa Nacional de Desenvolvimento Sustentável dos Territórios Rurais</i>
PRONATER	National Programme of Technical Assistance, <i>Programa Nacional de Assistência Técnica e Extensão Rural</i>

REMTE	Latin American Network of Women Transforming the Economy
SAPs	Structural Adjustments Policies
SDG	Sustainable Development Goals
SIGI	Social Institutions and Gender Index
SPM	Special Secretariat of Policies for Women, <i>Secretaria Especial de Políticas para as Mulheres</i>
STTRA	Rural Workers Union of Apodi, <i>Sindicato de Trabalhadores e Trabalhadoras Rurais de Apodi</i>
UNDP	United Nations Development Programme
UNISDR	United Nations Office for Disaster Risk Reduction
WEAI	Women Empowerment in Agriculture Index
WID	Women in Development
WSF	World Social Forums

Chapter 1

Introduction

Over the last three decades, the inclusion of women in poverty alleviation projects has become central to development discourse. In drought-prone rural areas, strategies that aim to promote women's empowerment need to consider periods of outbreaks and include action plans to sustain the process of women's empowerment during these hazardous periods. In particular, this is because during periods of drought, gender-based inequalities place women in a more socially and economically vulnerable situation. Among the affected population, women are often more economically insecure, face the overburden of work, and are marginalised from political participation significantly (Enarson and Chakrabarti, 2009; Enarson, 2000; Anderson, 1994; Austin and McKinney, 2016). Considerable efforts and resources are targeted to promote women's empowerment, but to date, the impact of drought-prolonged crises on women's empowerment process in rural areas have not been studied in detail.

The purpose of this thesis is to offer an examination of women's empowerment in agriculture under prolonged drought conditions using mixed methods research. To explore this research problem, we used data from Chapada do Apodi, a region located within the so-called drought polygon¹ in the state of Rio Grande do Norte, Brazilian Northeast. Using quantitative methods, we aim to assess the level of women's engagement in agriculture and agency and the factors associated with it. In addition, to examine further the conditions and factors that are underlying in this context, we intend to use qualitative methods to explore the perspectives of activists, policy makers, scholars, community leaders, and rural women from Chapada do Apodi.

This study's results show that even under the circumstances of severe drought, the

¹The drought polygon is a geographic area that experiences varying levels of aridity and is vulnerable to cyclical drought phenomenon that can last for years. This geographic area is recognised by Brazilian authorities and legislation as vulnerable and is therefore entitled to special emergency measures to relieve the effects of droughts.

women from Chapada do Apodi were empowered in agriculture. The qualitative results suggest two central conditions contributed to this result: (1) the presence of the rural women’s policy agency, with its resources and connections to the women’s movement; and, (2) the technical assistance and female farmers group-related interventions that were delivered using gender awareness methodologies. Moreover, this study suggests that women’s access to credit and technical assistance are associated with empowerment in agriculture, and that membership in women-only farmer groups and access to technical assistance are related to gender parity in agriculture. These results suggest that in drought-prone areas, the institutional conditions and gender awareness methodologies tied to rural development policies could help sustain women’s empowerment in agriculture even in the face of prolonged periods of drought.

This chapter is structured as follows: Section 1.1 presents the rationale and context of the thesis; Section 1.2 outlines the objectives, and Section 1.3 introduces the structure.

1.1 Rationale and Research Context

Poverty alleviation through the promotion of women’s empowerment has taken centre stage in the development discourse. While the rationale for empowering women is rooted in the predominant emphasis on basic human rights in development studies, it has also been enthusiastically associated with a range of positive socioeconomic effects typically associated with development goals, including: improved child nutrition, education, agricultural production, food security, and birth control (Smith et al., 2003; Cunningham et al., 2015; Van den Bold et al., 2015). In recent years, there has been a growing interest in the promotion of gender equality among many prominent development institutions as a way of reducing rural poverty and promoting economic growth through the inclusion gender and development elements in the scope of their rural development programmes (World Bank, 2015).

Rural development programmes need to consider the risk of crises in drought-prone rural areas; as droughts are recurring events and are experienced differently across and within societies, classes, and genders. Drought is recognised as having “the largest human toll” compared with any other type of endangering natural hazard occurrence (Enarson, 2000, p. 3). The slow-onset character of an unfolding drought crisis wreaks a progressive impact on agricultural activities and productive assets, leading to irreversible damage in zones prone to cyclical dry spells. It is the most prominent major natural hazard for many countries, and the agriculture sector is the first and most heavily affected by events of this kind (Maybank et al., 1995). On a global scale², droughts typically reduce the national

²Lesk et al. (2016) present an estimation of national cereal production losses across the globe resulting

agricultural production by 10%, and their impact is 11% greater in developing countries than elsewhere (Lesk et al., 2016).

Rural women in developing countries are most adversely hit by droughts (Enarson and Chakrabarti, 2009; Agarwal, 1990). Despite their essential role in agricultural production—women represent approximately half of the total labour force in this sector (FAO, 2011)—they struggle to gain access to land (Deere and León, 1998, 2003; Doss et al., 2014) and other inputs (Peterman et al., 2011). Natural hazards affect women and men differently, due to structural gender inequalities (Enarson, 2012; Anderson, 1994). This inequality aggravates women’s vulnerability in periods of drought crisis because of the depletion of economic resources and productive assets, overburden of work, and absence in political spaces, factors that are responsible for the deterioration of women’s economic status in periods of drought (Anderson, 1994; Austin and McKinney, 2016; Enarson, 2000). To promote women’s empowerment in drought-prone regions, it is critical to include measures to mitigate the “disempowering” effects of drought crises and to not reverse the advances achieved.

Brazil presents a compelling case study regarding the inclusion of rural women in rural development, especially in drought-prone areas. During the twelve years of the Worker’s Party administration, the Brazilian government were focused on reducing poverty and inequalities. Also, during this period rural women received particular attention in programmes aimed to promote rural development in the context of smallholder family farmers (DiSabbato et al., 2009; Hora, 2014). During this period advances were made in the sense that rural women were targeted in public policies, and gained their rights over land access and social security (Deere, 2017). Moreover, rural women’s movements progressed in their agenda, achieving access to interventions from which they had historically been excluded.

When the target is to fight extreme poverty in Brazil the region that is of central concern is the Northeast. According to IBGE (2010), about 16.2 million Brazilian remains below the extreme poverty line and 9.6 million of them live in the Northeast region, and more than 50% of the population in extreme poverty are in the rural areas in the Northeast region. The vulnerability to cyclical drought presents a critical element in the context of any initiative linked to rural development in the region.

Another relevant consideration for this study relates to the term empowerment. To discuss women’s empowerment under drought or any other condition, we first need to define the term and use of empowerment. The diversity of definitions, objectives, and values associated with this concept reflects multiple perspectives, resulting in a lack of clarity, criticisms, and uncertainties about the actual transformative effect of some initiatives on

from reported extreme weather disasters during 1964–2007.

people's lives (Chopra, 2016). Considering the context of the region studied in this paper, we frame empowerment as a process that promotes the expansion of choices for people who had been denied this opportunity (Kabeer, 1999), and achieved by unfolding the process of consciousness raising (Sen and Grown, 1988; Batliwala, 1993; Rowlands, 1997). Likewise, the specific context in which the individuals involved are living is crucial in shaping their understanding and perceptions about empowerment (Narayan-Parker, 2005; Malhotra and Schuler, 2005).

Given the lack of consensus surrounding the elements that constitute women's empowerment, the assessment of empowerment is challenging. In this study, we opted for using mixed method research. Quantitative and qualitative methods combined gives us both, a quantitative assessment of the phenomenon of the targeted area studied and a 'big picture' perspective of gender inequalities in agricultural activities. This complementary strategy brings the strengths of both tools to the analysis while minimising their limitations (Adato and Meinzen-Dick, 2007).

1.2 Thesis Contributions and Objectives

To date, the impact of drought-prolonged crises on women's empowerment process has not been studied in detail. A great deal of effort and resources are targeted at promoting the empowerment of women in agriculture; however, we have little understanding of how this process can be sustained during a period of crisis such as those that follow natural disasters. This information would provide an understanding about this context and valuable insights that are critical to design interventions targeted to rural women's empowerment in drought-prone areas.

This study aims to examine women's empowerment in agriculture in a prolonged drought period. To elaborate this diagnosis, we established five specific research objectives that seek to:

- I. identify theoretical framework with respect to women and development theories, empowerment, and women and disaster and to identify a contextual framework of the case study area;
- II. identify strengths and weaknesses in the process of women's empowerment in agriculture;
- III. identify rural women's perceptions about their agency and the factors that they perceive as enablers in the process of empowerment in agriculture under drought conditions;

- IV. assess women's empowerment in agriculture and the factors that sustain the process of women's empowerment in agriculture under prolonged drought periods;
- V. examine the women's empowerment in agriculture index scores and factors associated with using the qualitative data;

In particular, the first research objective aims to provide the background for this study, and is presented in Chapter 2 and 3. The second and third research objective are the qualitative component of our research. This part of our study is concerned with discerning the perceptions of different actors involved in the process. First, we examine the views of the key informants about the strengths and weaknesses of the political process that recognises the rights of rural women in Brazil. Subsequently, using focus group methodology, we examine rural women's perceptions about their agency and dynamics that enable them to maintain agricultural production and minimise depletion of their assets during drought periods. The fourth research objective is the quantitative study of this thesis. The quantitative methods are applied to assess rural women's empowerment in agriculture and identify the factors that sustain the process of women's empowerment in agriculture in a prolonged drought period. The fifth research objective intends to examine women's empowerment in agriculture in Chapada do Apodi through the integration of quantitative with qualitative findings. Finally, we present reflections and recommendations for policy makers regarding interventions that aim to promote women's empowerment in drought-prone areas.

Moreover, it is reasonable to assume that for an examination of how drought can affect the process of women's empowerment in agriculture, we needed a scenario that included both conditions: a region facing drought spells for an extended period of time and where the rural women within this region had been targeted by rural development program programmes. To this end, Chapada do Apodi, a region situated in the district of Apodi and in the state of Rio Grande do Norte, Brazilian Northeast, comprises the ideal conditions for the development of this research. It was selected first because this region is often affected by cyclical droughts; in fact, during our data collection, the region faced the most severe and prolonged drought in decades, beginning in 2011 and continuing through 2016 (Marengo et al., 2017). Second, the region was selected because women residents in this area were targeted by projects to promote rural women's empowerment and productive inclusion as part of a strategy to eliminate poverty in Brazil.

As mentioned previously, this study is based on a mixed methods research approach. In the quantitative component of this study, we compute an adapted version of the Abbreviated Women's Empowerment in Agriculture Index (A-WEAI)³ and assess the factors

³This multidimensional index is designed to examine the engagement and agency of women in agriculture

associated with women's empowerment in agriculture during periods of severe drought. The qualitative phase is composed of interviews with key informants and focus groups with rural women. The aim of this phase is to present a broader understanding of context by exploring the perceptions that surround the issues of rural women's empowerment in agriculture, where the qualitative findings support the interpretation of the quantitative results (Tashakkori and Teddlie, 2010; Creswell, 2011).

1.3 Structure of the Thesis

The remainder of this thesis is organized to be eight chapters. Chapter 2 provides the theoretical and conceptual background under which this mixed method is conducted. Surveying the influential theories in women and development studies. This chapter discusses the theoretical and conceptual background of this study, presenting some of the most influential perspectives on gender and development. Moreover, it surveys the use of women's empowerment and examines the use of those terms as they pertain to development discourse and practice. The final section presents the core ideas of the recent literature on gender and disaster and the construction of disaster vulnerabilities within a gender perspective. It also examines the particular challenges and aspects that developers face when they attempt to introduce the concept of female empowerment into the discourse of natural hazards and environmental or weather-related disasters.

Chapter 3 provides an overview of the region studied, outlining the historical processes that have shaped the construction of rural women's identities in Brazil. The first section of this chapter presents a historical overview of how social movements struggled to construct rural Brazilian women as a social subject. This section also provides an overview of the role of the rural women's policy agency and the formulation of policies. Section 3.2 provides information about the study area, providing an overview of the impact of drought crisis on the Northeast region of Brazil. This is essential for understanding the background and to the development of rural areas in the Brazilian Northeast. Also, we give an overview of the micro-region of our case study, including its geographic and sociodemographic characteristics and investigate the access that rural women have to interventions in this region.

Chapter 4 focuses on the research design of this thesis. The first section introduces an overview of the mixed methods approach in social research, followed by the rationale for adopting mixed methods in this study. The second section presents the correlational embedded model and how it will be applied in this research. The last section discusses the researcher's attempts to endure reliability and validity.

(Malapit et al., 2017). For more details, see Chapter 6.

Chapter 5 describes the qualitative study of this thesis. This chapter addresses the qualitative component of the study which is used to interpret the quantitative findings. The first section outlines the method, data collection and analysis strategy, providing in detail the procedures used to target and select the participants, the design of the guides used in the data collection, and the process we followed in the data collection. In the same section, we discuss the strategies used to analyse the data at this stage of the present study. The second section presents the results and discussion. In the third, concluding section, we provide a comprehensive picture of the collection process and analysis of the quantitative data. It also summarises the main qualitative findings that are used as supportive data in the interpretation of the quantitative results.

Chapter 6, we explain the methodology used in the quantitative study. The first section describes the methodology used to measure the empowerment in agriculture. We also present the methodology used to calculate the A-WEAI and we describe details of how the indicators were constructed. We also detail the application of the index in the Chapada do Apodi and the construction of the adapted version. The second section outlines the data collection procedures, including the mapping, sampling, questionnaire design and training of the enumerator, and the operationalisation of the fieldwork. The third section explains the computation of the index detailed by each stage, based on the Alkire-Foster methodology of multidimensional indices. The last section presents the empirical specifications used to build the model of women's empowerment in agriculture and gender parity in agriculture along with a description of the model's dependent and independent variables. While in Chapter 7, we discuss the empirical results of the quantitative study. In the first section, we outline the description of the respondent's socioeconomic characteristics and farms (size, agricultural activities, and others). The subsequent section presents the adapted A-WEAI main findings. The final section extends the univariate and multivariate probit analysis that identify the factors that sustain the women's empowerment in agriculture during a drought period in Chapada do Apodi.

Chapter 8 presents the thesis discussion, integrating the quantitative and qualitative findings. The integration of findings is performed by using the correlational embedded model that helped us to expand and contextualise the quantitative outcomes and unpack the components which, possibly, influenced the performance of the index explored. The first section covers the examination of the adapted A-WEAI results, including the integration of the qualitative evidence that suggests the presence of national and regional pre-drought conditions linked to the performance of A-WEAI in the case study area. The following section examines the factors associated with empowerment in agriculture, using rural women's perspectives to expand upon the information uncovered about the enablers of the process through drought events. The last section of this chapter examines rural women's disempowerment in agriculture under drought in Chapada do Apodi.

Chapter 9 concludes the thesis. It summarises the main findings of this study and provides discussions of this study limitation. It discusses the reflections and recommendations made in the light of the findings of this study. In conclusion, we present the study contributions and suggestions for future research.

Chapter 2

Development, Women's Empowerment and Drought

This chapter discusses the theoretical and conceptual background of this study. In the next pages, we intend to outline key elements that provide the ground for the analysis of the problem studied. As such, this chapter first surveys some of the most influential perspectives in feminist and development studies. Second, it outlines the use of empowerment in the development discourse and practice. Thirdly, this chapter examines the particular challenges and aspects that policy makers and practitioners face when they attempt to introduce the concept of women's empowerment into the discourse of natural disasters.

To accomplish these objectives, we divided this chapter into three primary sections. The first section, *Women and Development*, traces the evolution of the field of gender and development from the early feminist narratives to the present decade. Second, the section *Empowerment, Development, and Women* examines a variety of different conceptualizations of the word 'empowerment' found in the literature of feminist studies and selects those that are relevant to the context of this study. Also, this section scrutinizes the conceptual structure of empowerment measurements methods. Finally, the section *Natural Hazard and Women* presents the core ideas of the recent literature in the field of gender and disaster, and the construction of disaster vulnerabilities within a gender perspective.

2.1 Women and Development

The concept of development (as we know it) is relatively recent but burdened by the past (Woolcock et al., 2009 cited in Visvanathan et al., 2011). Development as an area of intellectual inquiry emerged during the period following the second world war. The Marshall Plan (1948) brought to the development arena the aid-based strategic planning, and under

this approach the gap between developed and developing countries would decrease (Visvanathan et al., 2011). In the following years, an international apparatus of agencies of the newly set up United Nation (UN) were built in order to operationalize this idea. Monetary and technical support were channelled through these agencies, counting on the idea that the promotion of economic growth in the developing countries would trickle down to the masses. This approach contributed to the failure of development work of UN during the 1960s, because economic development is one of several components that promote human progress and security (Visvanathan et al., 2011). Afterwards, several theories emerged in the field of international development; this study is restricted to theories of development that include women and gender relations in the process.

2.1.1 Women in the Spotlight: From WID to GAD

Women in Development (WID) was the first development theory that recognised the differences experienced between men and women. WID was initially used in the early 1970s by the Women's Committee of Washington as a result of their overseas development experiences. During this period, the dominant mainstream thinking was that modernisation was a linear process fuelled by industrialism, and that this process would improve the standard of living in the 'newly' modernized countries by trickling down through all layers and groups of these societies. The Women's Committee of Washington pointed out that modernisation affected men and women differently in developing countries. According to Rathgeber (1990, p. 491), "Under the rubric of WID, the recognition that women's experience of development and of societal change differed from that of men was institutionalized and it became legitimate for research to focus specifically on women's experiences and perceptions." The WID theorists provided a liberal feminist critique of gender blindness in development practices, where women were merely treated as passive recipients of welfare policies (Rathgeber, 1990; Rowlands, 1997).

Thus, it was Ester Boserup's book, *Women's Role in Economic Development* in 1970, which brought WID into the spotlight and helped WID begin to permeate academia, development institutions, and governments. In this book, Boserup explores the sexual division of labour and the effect of the modernisation approach on the social structures of developing countries. According to Benería et al. (2015), Boserup's contributions consist primarily of two central claims: first, that sexual division of labour is context-dependent and variable across time, and second, that women do not benefit from the process of development equally to men. Boserup (1970) argued that what appeared to be neutral development interventions benefitted men exclusively, since training, credit lines and land titles were only assigned to men. Boserup concludes that this failure to include women in the process of development actually delays or diminishes development. Thus, the integra-

tion of women into the economy, on an equal footing with men, was key to improve not only women's lives, but also the performance of development.

WID's ties with modernisation theory generated a significant wave of criticism. WID's critics grounded their arguments on the fact that their approach ignored social structures, which were the causes of women's subordination and their exclusion in the development process. Moreover, critics argued that WID's approach, since it was non-confrontational, did not tackle the fundamental 'invisibility' of women (Moser, 1993). Also, this theory was intensely criticised because of its emphasis only the productive and economic efficiency. Considering that women's economic progress should suffice to promote changes in the gender relations, overlooking the role of social and political structures in women's subordination (Visvanathan et al., 2011).

One of the most robust counter theories to WID was the theory of Women and Development (WAD). This theory emerged as a critique of modernisation and was based on Marxist feminism. The WAD also used the framework of dependency theory, which emphasises the importance of women as economic actors, not only by productive work but also because of the essentiality of reproductive work to the maintenance of local and international structures (Deere, 1977; Beneria and Sen, 1982). Rathgeber (1990, p. 493) stated that "the WAD perspective does not give detailed attention to the overriding influence of the ideology of the patriarchy; women's condition is seen primarily within the structure of international and class inequalities."

In the 1980s, the Gender and Development (GAD) perspective emerged in development discourse, shifting the focus from the word women to the social interactions and roles assigned according to gender. According to Moser (1993), the emphasis on gender instead of women brings a more comprehensive view, because it reflects on the construction of the social relationship between men and women, in which women have been systematically subordinated. The term gender shortens a very complex conjunct of factors which translates a dynamic social process of differences and inequalities, dictating the construction of identities in the context of socialisation.

The focus on the process of assignment of roles to women and men also assigned values to these roles, and in particular, undervaluing those assigned to women. According to Rowlands (1997, p. 6): "Gender analysis which takes account of the diversity of people's circumstances, moves beyond the simple dichotomies of public/private, formal/informal, urban/rural, and production/reproduction to include women's physical situations, relationships within the household, health, sexuality, education, means of livelihood and so on, since gender inequalities touch all aspects of women's lives."

The GAD theorists intended to develop a framework for re-examining social structures and institutions (Moser, 1989, 1993; Young, 1997). GAD assigns women the role of 'agent'

in their emancipation process, rather than viewing them as passive recipients of interventions, pointing out to the essentiality of women's organisations to the process of improving women's lives (Rathgeber, 1990; Moser, 1993).

Nevertheless, according to Baden and Goetz (1997), the change of terminology replacing women for gender, also brought some consequences, such as the de-politicisation of women's organisation agendas and the institutionalisation of the term 'gender,' that led to the erasure of the political content of this subject. These authors stated that: "The variety of ways in which gender has come to be institutionalized and operationalized in the development arena presents a contradictory and ironic picture. There is a disjuncture between the feminist intent behind the term and the ways in which it is employed such as to minimize the political and contested character of relations between women and men. A problem with the concept of gender is that it can be used in a very descriptive way and the question of power easily removed." (Baden and Goetz, 1997, p. 10).

In practice, the use of the term gender as an instrument in development programmes does not necessarily converge with gender equality goals, and is even potentially contradictory (Rowlands, 1997; Jackson and Pearson, 2005; Benería et al., 2015). According to Razavi et al. (2012) this mechanism makes gender equality less politically threatening to hegemonic system because isolates it from other forms of social inequalities.

According to Benería et al. (2015), the concerns in the process of incorporating gender in the development agendas are the simplification of gender equality as a matter of resources access and aggregation of the women and men in two categories, ignoring issues of social inequality. In sum, there was significant progress in the inclusion of gender issues in international development theory, but the implementation of programmes promoting gender equality remains full of flaws, which restrict the effective promotion of equality and women's well-being (Porter and Judd, 1999; Visvanathan et al., 2011).

2.1.2 Postmodern Feminism, Development and the Global South

Following the WID and GAD debates, the postmodernist feminist critique on the development process emerged as a manifestation of disappointment and disbelief about its benefits (Visvanathan et al., 2011). This critique was rooted in the biased depiction of the 'third-world' as marginal and homogeneous in the binary paradigm of modern vs. traditional that was so embedded in the underlying concepts of mainstream development ideology (Marchand and Parpart, 2003). The postmodernist critique presented a defiant perspective, proposing discourse beyond that of 'common enemies,' such as 'patriarchy' and 'capitalism,' and the use of general concepts, such as gender division of labour. Also,

earlier postmodern feminist thought questioned the simplification of gender relations and argued that the social construction of gender itself demands a deeper analysis, which includes cultural norms, available symbols and subjective identity (Scott, 1986).

Meanwhile, in the global South, a postcolonialist feminist critique of the western developmentist model emerged, pointing out the failure of these approaches in addressing the issue of women's subordination in the 'third-world' (Mohanty, 1988; Charusheela and Zein-Elabdin, 2003). The lack of understanding of the heterogeneity of non-western societies and the use of generalisation was an 'easy way' to identify problems. This fact led to misrepresentations of 'women from the South,' and ignored contextual complexities – such as social norms, class, ethnicity, nationality, and religion (Parpart, 2003). According to Mohanty (1988, p. 80), "third-world women as a group or category are automatically and necessarily defined as religious (read 'not progressive'), family-oriented (read 'traditional'), legally minors (read 'they-are-still-not-conscious-of-their-rights'), illiterate (read 'ignorant'), domestic (read 'backwards') and sometimes revolutionary (read 'their-country-is-a-state-of-war; they-must-fight!')." This representation reinforces and legitimates the western development model to 'civilize' non-western countries and perpetuate dependence of developing countries (Parpart and Marchand, 2003). However, the complexity of building coalitions among different agendas that potentially undermine the collective action put this framework under sharp critique (Nzomo, 2003; Udayagiri, 2003).

To summarise, the contribution of postmodernist critiques in the period converged to improve representations and provided a better understanding of concrete realities, local knowledge and expertise, paying attention to contextual nuances. These critiques undermined rigid categories of analysis (labour, gender division of labour, etc.), providing for researchers, policy makers and practitioners a practical frame with which to analyse gender inequalities (Benería et al., 2015).

2.1.3 Capability Approach and Empowerment

The social costs of the implementation of the neoliberal agenda in developing countries were criticised, generating an intense production of counter-discourses to the neoliberal approach of the 1970s and 1980s. One of the most influential theoretical frameworks in this context was the capability approach, developed by Amartya Sen. This approach has changed the policy paradigm in development studies, providing a normative outline for assessing the well-being of individuals and the impacts of interventions (Alkire, 2005*a*, 2008). Thus, it was with the Human Development Report (1990) of the United Nations Development Programme (UNDP) that the capability approach was introduced in the mainstream development scenario. In this report, Human Development is defined as an enhancement of people's capabilities, across time and spheres of their lives (economic,

cultural, social and political), establishing the connection with Amartya Sen's core idea of capabilities (Deneulin and Shahani, 2009).

The capability approach is rooted in the three concepts. The first concept is functioning; that is the set of being or doing that people value and have reason to value. Second, the capability is defined as "the various combinations of functionings (beings and doings) that the person can achieve. Capability is, thus, a set of vectors of functionings, reflecting the person's freedom to lead one type of life or another... to choose from possible livings" (Sen, 1992, p. 40). The third concept is agency, defined as a person's ability to pursue goals according to his or her values and motivations. In his book, *Inequality Re-examined*, Sen explains that "a person's capability to achieve functionings that he or she has reason to value provides a general approach to the evaluation of social arrangements, and this yields a particular way of viewing the assessment of equality and inequality" (Sen, 1992, p. 5).

This approach proposed an alternative conceptualization of poverty that rejected the normative assessment based on exclusively income and implemented the idea of multiple functionings and freedoms. This multidimensional view of poverty contrasted with and went beyond the mainstream view of income as the centre of poverty analysis (Alkire, 2005a). Moreover, Sen (1999) argued in a study based on comparative cross-country evidence that higher levels of Gross National Product (GNP) do not suffice to expand the capabilities of the countries' populations. His central claim is that social arrangements (institutional) should be driven by a more distributive goal, such as evaluating the quality of, and access to, education and health, even in low-income countries, because a people-centred perspective is the catalyst of a virtuous circle of development.

Later, Nussbaum (2001, 2003) developed Sen's capability approach into a theory of justice (social and gender), pointing out that it is essential to define which capabilities are critical in the construction of conceptions of justice. Nussbaum's version of capability sets out a list of ten capabilities of universal relevance, although Nussbaum emphasises that the items of the list might differ according to the context. Moreover, the capability approach contributed extensively to feminist economics and gender analysis, overlapping with central themes of feminist economics and philosophy (Agarwal et al., 2003).

Sen's capability approach provides the philosophical basis for the human development paradigm that has been widely used in the field of development. In this approach, people are at the centre of concerns since the purpose of development to expand people's choices and not just their incomes. Also, Sen's capability approach was an influential definition of empowerment, such as Alsop et al. (2006), Alkire (2005b, 2007), Mayoux (2000), Narayan-Parker (2005). Among the definitions associated with the capability approach, undoubtedly the most influential was coined by Kabeer (1999). She defines empowerment

as an expansion in people's abilities to make strategic life choices in a context where this ability was previously denied to them, arguing that empowerment, per essence, entails transformation. Kabeer contends that the ability to exercise choice can be thought of in terms of three inter-related elements: resources (pre-conditions), agency (process) and achievements (outcomes). This approach is the theoretical basis for the development of the Women's Empowerment in Agriculture Index (WEAI), a methodology used in this study to assess empowerment. In the section 2.2.3, we explore how multidimensionality is applied in the context of empowerment.

2.2 Women, Empowerment and Development

Empowerment is an old concept¹, and according to (Batliwala, 2007, p. 558), "acquired a strongly political meaning in the latter half of the twentieth century, when it was adopted by the liberation theology, popular education, black power, feminist and other movements engaged in struggles for more equitable, participatory, and democratic forms of social change and development." One of the most influential publications in the construction of empowerment's concept as we know nowadays is Freire's *Pedagogy of the Oppressed* (1968). Freire advocates for teaching methods that develop a critical consciousness among the masses and consequentially transform the world. Because only through this process can individuals have the instruments needed to make choices in their lives (Freire, 1987). This process should catalyse changes in the status quo between the dominators and the dominated consciousness of the masses.

Moreover, the Black Power movement in the United States also played an important role in the consolidation of the term empowerment. In this context, another influential publication was Solomon's book, *Black Empowerment: Social Work in Oppressed Communities*, which introduced the term empowerment into the political and academic spheres in the United States. In the 1970s, the term empowerment was highlighted by protests and movements in the United States that were mainly focused on giving voice to marginalised groups (Wise, 2005). However, it was the feminist movement in the Global South in the 1980s that gave the term empowerment its notoriety and forced it onto the international development agenda, citing the failure of the 'top-down' orthodox approach and calling for new perspectives. The turning point in this phase was the publication of *Development, Crises and Alternative Visions: Third World Women's Perspectives* (Sen and Grown, 1988). This book compiled feminist thought from different institutions (academia,

¹The term empowerment "can be traced back as early as the Protestant Reformation in Europe and it reverberates through the centuries in Europe and North America through Quakerism, Jeffersonian democracy, early capitalism, and the black-power movement. The concept of empowerment, although expressed in other linguistic equivalents, was embedded in many other historic struggles for social justice." (Gaventa, 2002 cited in Batliwala, 2007, pp. 557-558)

government and social movements) that participated in the network named DAWN (Development Alternatives with Women for a New Era).

The feminist lens of DAWN saw that women would only achieve equality through a transformation that permeated socioeconomic and political structures, pointing out these structures as responsible for the perpetuation of subordination. At its foundational level, the empowerment approach advocated for political mobilisation and education as the core strategies for promoting development and eliminating all forms of oppression based on gender, class, race, or nationality (Sen and Grown, 1988). For example, in the book *Women's Empowerment in South Asia: Concepts and Practices* (1994), Batliwala defines empowerment as a process that transforms power relationships between individuals and social groups. Batliwala argues that power relationships can be changed exclusively through; (1) questioning the ideologies that reinforce and validate inequality (for instance social norms); (2) changing the access and control of resources (economic, intellectual, and natural); (3) renovating the power structures that bolster the oppressing power systems (the state, the market, etc.).

In sum, the empowerment concept emerged as a process to give voice to the impoverished and the marginalized and to encourage them to develop a critical consciousness to stand for their rights. Thus, since the 1960s and 1970s when this term became popular, its interpretations and definitions have been varied, and several times have been in conflict with the fundamental principles of social transformation. In the next sections, we will further discuss the relative definitions of empowerment.

2.2.1 Women's Empowerment in Development Studies

In the last decades, the commitment to enhance gender equality became integral part of development's strategic agenda of the United Nations Millennium Development Goals (MDG3) and Sustainable Development Goals (SDG5), and the World Bank's World Development Report of 2012. Women's empowerment became the 'strategic' and 'smart' alternative to promote international development (Benería et al., 2015). Some of the empowerment's critics argue that empowerment has mutated to fit in the international development agenda, and it has lost the transformative core meaning (Chopra, 2016).

The empowerment approach emerged in the context of development as a critique of the mainstream top-down in the period and was labelled as a radical approach by governments and agencies (Parpart, 2002). The turning point in the use of this term started in 1994, at the United Nation International Conference on Population and Development (ICPD) in Cairo, when it was included in two sections of the Programme of Action. It was the very first time that women's empowerment was included in a United Nations' document

(Halfon, 2007). However, just one year later, in 1995, women's empowerment became an important component in the United Nation discourse as a result of the feminist articulation in the Fourth World Conference on Women in Beijing.

By the late 1990s, women's empowerment became a 'politically correct' and essential element that should be included in all initiatives of international development (Bisilliat, 2000). The term empowerment was also incorporated in the discourse of the World Bank and the IMF, as they integrated goals for women's empowerment in their programmes and policies for poverty reduction. Since then, the term women's empowerment has become pervasive in development discourse and practice and has been employed extensively by governments, bilateral and multilateral agencies. Encouraging women's empowerment is widely accepted and claimed by international agencies as the main promotor of poverty reduction and 'smart' economy (Benería et al., 2015; Chopra, 2016). Kabeer (2001, p. 17) states that the arguments that link women's empowerment and gender equality with a wide set of "desirable multiplier effects, offer policy makers the possibility of achieving familiar and approved goals, albeit by unfamiliar means." She also mentions that this instrumentalist advocacy of this concept is not free of costs. The institutionalisation and instrumentalist use of empowerment led to the co-optation² of this term in the predominant discourse, and triggered intense criticism about the corruption of the initial values of empowerment to make it more palatable, and less conflictive (Cornwall and Brock, 2005; Batliwala, 2007; Cornwall and Sardenberg, 2014).

The widespread interest in including women's empowerment on development agendas is in part due to its effect on poverty reduction. A growing body of evidence points to linkages between women's empowerment and development effectiveness such as reproductive health (Hindin, 2000; Wolff et al., 2000), fertility (Schuler and Hashemi, 1994; Abadian, 1996; Schuler et al., 1996; Mason and Smith, 2000), maternal and children nutrition (Kishor, 2000b; Malapit and Quisumbing, 2015), and food security and household consumption (Quisumbing et al., 1995; Thomas, 1997; Quisumbing and Briere, 2000; Quisumbing and Maluccio, 2000).

The co-option of the term empowerment can be illustrated by the dichotomy of the concepts liberal and liberating empowerment, coined by Ferguson (2009), and expanded by Sardenberg (2008). They define liberal empowerment as a concept based on an individualised process, widely used by several mainstream agencies, and argue that it diminishes the understanding of empowerment as an instrument of achieving development goals. On

²Term devised by Philip Selznick, to refer to a political process found especially in formally democratic or committee-governed organizations and systems, as a way of managing opposition and so preserving stability and the organization. Non-elected outsiders are 'co-opted' by being given formal or informal power on the grounds of their elite status, specialist knowledge, or potential ability to threaten essential commitments or goals. "co-optation." *A Dictionary of Sociology*. Encyclopedia.com. 20 Apr. 2017 <http://www.encyclopedia.com>.

the other hand, presenting liberating empowerment as the process of raising consciousness to promote changes in the power structure through processes that involve individual and collective identity construction and self-determination.

As acknowledged by Rowlands (1997), empowerment cannot be bestowed. In line with this idea, Cornwall and Sardenberg (2014) argues that individual or collective access to resources are not sufficient to produce empowerment because empowerment is a dynamic process of interaction of several elements. They argued that interventions and external players cannot be labelled as those that are 'empowering women' because the main actors in this process are the women themselves. However, the existence of an enabling environment could clear some obstacles for women in the pathway towards empowerment (Cornwall and Sardenberg, 2014, p. 7). These authors draw on Gergen's quote³ an analysis that illustrates the interactions of the factors: "Gergen's notion of 'confluence' provides a useful way of conceiving of the interplay of elements in the process of empowerment. Like the bat and the player in a game of baseball, material resources and the means to make use of them are not in themselves constitutive of empowerment. They only become part of the process of empowerment when they are brought together relationally; when someone uses their material resources and capacities to do something that changes the way they relate to others in her or his social world and the way those others relate to them."

In development literature, women's empowerment has been advocated for two main reasons. Initially, it was advocated for intrinsic reasons, as presented in the feminist agenda, where empowerment unfolds a process of transformation to tackle inequalities in women's lives and in society. Later, however, it began to be advocated for its 'instrumental' effects, since a large body of evidence associated it positively with the advance in developmental goals of promoting poverty reduction, social justice, and human and economic development. But are these two reasons exclusive? According to Alkire et al. (2013), both reasoning for promoting women's empowerment are not mutually exclusives, and the co-existence of initiatives that encourage both can reinforce each other: "Closing the gender gap in assets—allowing women to own and control productive assets—increases both their productivity and their self-esteem. A woman who is empowered to make decisions regarding what to plant and what (and how many) inputs to apply on her plot will be more productive in agriculture." (Alkire et al., 2013, p.1).

³"What we traditionally view as 'independent' elements – the man with the bat, the bags, the men in the field – are not truly independent. They are all mutually defining. . . . Alone they would [all] be virtually without meaning. It is when we bring all these elements into a mutually defining relationship that we can speak about 'playing baseball'. Let us then speak of the baseball game as a confluence, a form of life in this case that is constituted by an array of mutually defining 'entities.'" (Gergen, 2009, p. 54 cited in Cornwall and Edwards, 2014)

2.2.2 Women's Empowerment: How We See it

The term empowerment is commonly associated with terms such as agency, liberation, autonomy, self-direction, self-determination, self-confidence (Narayan-Parker, 2005; Ibrahim and Alkire, 2007). The diversity of definitions, objectives, usage, and values associated with the concept of empowerment reflects multiple perspectives resulting in a lack of clarity, criticisms, and uncertainties about its actual transformative effect on people's lives (Malhotra and Schuler, 2005; Chopra, 2016).

The definition of empowerment is by essence connected to the concept of power. During the 1990s, feminist reflections about power raised the idea that empowerment should not be associated with the concept of domination or to the act of subordinate the 'other' ('power over'). Empowerment, in the view of this group, meant to have decision-making authority ('power to'), and the ability to organise themselves to achieve political participation ('power with'), and (power within) to become self-aware about the way that power operates, so they in turn can change their situations (Williams, 1994; Rowlands, 1997).

In this study, we acknowledge that there are very distinctive elements to consider in the definition of women's empowerment, we opted to focus on empowerment as a process of consciousness-raising and heavily dependent on contextual elements which are expressed differently according to the domains analysed.

First in this study, we consider that empowerment is a process that casts and unfolds the manner of consciousness-raising, which could be individual or collective, and leads to a societal transformation (Sen and Grown, 1988; Batliwala, 1993; Carr, 2003; Kabeer, 1994). Assuming that empowerment is not something that can be bestowed by others; it is about building self-awareness and self-esteem within the minority or oppressed group, and the main platform for achieving this is through collective action (Rowlands, 1997). Gita Sen provided a definition that translated the core idea of this term: "empowerment is, first and foremost, about power; changing power relations in favour of those who previously exercised little power over their own lives." (Sen, 1997 cited in Cornwall, 2014, p.10). In our understanding, empowerment is a process that unleashes changes, the kind that can transform the basis of structural inequalities, and can be only fostered for shifts in consciousness, where women begin to understand their conditions and come together to act to bring about change.

Second, we used in this study the idea of multidimensionality of empowerment. According to Alkire (2005b, 2007), agency and empowerment can be experienced differently across the individual's domains of life, and this domain-specific characteristic needs to be considered in the conceptualization of the term. Furthermore, Kabeer (2008) also discusses the multidimensionality of power. She points out that women could experience the

'power to' in their households, but not necessarily the 'power to' implement their political agendas. She states that: "the conceptualization of empowerment. . . touches on many different aspects of change in women's lives, each important in themselves, but also in their inter-relationships with other aspects. It touches on women's sense of self-worth and social identity; their willingness and ability to question their subordinate status and identity; their capacity to exercise strategic control over their own lives and to renegotiate their relationships with others who matter to them; and their ability to participate on equal terms with men in reshaping the societies in which they live in ways that contribute to a more just and democratic distribution of power and possibilities" (Kabeer, 2008, p. 27 cited in Kabeer et al. (2011).

Third, another central point in defining the term empowerment in this study is the difference between values perceived as constituting empowerment across different contexts—i.e., between countries, regions, or social classes. Naturally, the specific context in which individuals involved are (or have been) living is crucial to shaping their understanding and perceptions about empowerment (Malhotra et al., 2002; Narayan-Parker, 2005). This view of empowerment is correlated by Israel et al. (1994, p. 153) in the statement: "for empowerment to be meaningful concept, distinct from others such as self-esteem and self-efficacy, the cultural, historical, social, economic and political context within which the individual exists must be recognized. It is possible to develop a program aimed at the individual empowerment, but if this does not consider the context in which the individual is embedded. . . there is less likelihood that actual increases in influence and control and concomitant improvement in health and quality of life will occur."

2.2.3 Measuring Women's Empowerment

As mentioned previously, the controversies that surround the term empowerment have not impeded the use of this term extensively in the development agenda. This fact suggests the need for methodologies which aim to provide an assessment of empowerment. The direct rationale behind this requirement is that policy makers have to decide between competing strategies to allocate resources and also for policy evaluation (Razavi, 1997). As Malhotra and Schuler (2005) pointed out, the selection of methodologies to assess 'empowerment' must consider several methodological issues, such as whether or not the aspects will be measured as intrinsic or instrumental, context-specific or universal, at a collective level or an individual level, and whether or not to include psychological elements.

Other issues that need to be evaluated in the selection of diagnostic methodology is the absence or presence of a woman's choice and the subjectivity that might contribute to and eventually determine her choices. Moreover, Kabeer (2001) argues that in situations of basic well-being deprivation the dynamic of power-choice in gender relations can operate

under two mechanisms: the first, more evident, through active discrimination, and the second by the 'voluntary' absence of choice on the part of women. Consequently, both the absence of women's choices and the presence of choices that they make to their detriment but that favour the men in their households are connected to the internalised roles and beliefs that drive women to see themselves as having 'lesser value.' In the following subsections, we will present the literature regarding these methodological issues.

Multidimensionality and Empowerment

The multidimensionality in the status of women emerged in the early 1980s, through Acharya and Bennett (1981) when they associated power with the different roles assigned to men and women. Another important point was raised by Soc (1986) who argued that gender inequality is domain specific because the differences between genders permeate various dimensions (social, economic, political, and psychological).

Another element relevant in this context is that the power experienced in one dimension cannot be experienced in the same way in another dimension (Malhotra and Schuler, 2005). For instance, a woman can experience participation in the decision-making process within the household, but she could be excluded in the political sphere. A large body of literature shows that interventions that improve women's conditions in one dimension will not necessarily promote improvements in other dimensions (Kishor, 1995; Hashemi et al., 1996; Kishor, 2000*b*; Beegle et al., 2001).

Nonetheless, as recommended by Malhotra and Schuler (2005, p. 74), in order to approach the multidimensionality of empowerment through an index, researchers must be careful of the indicators and also the scale variables in their research designs. The incorrect selection of indicators could obscure the effects of interventions on the aspects of empowerment and mask the relationships between the variables on the outcomes. Besides the risk of obscuring some relationships with the combination of multiple indicators, the use of one single indicator is not sufficient indication of even one dimension of empowerment (Malhotra and Schuler, 2005).

Context-Specific or Universal

As acknowledged by Malhotra and Schuler (2005), the deeds and values that are associated with empowerment are strictly connected to the sociocultural context where the individuals belong. For instance, a woman visiting her parent's household without the consent of her partner in the rural areas of the Brazilian Northeast could indicate some degree of autonomy, but this fact might not necessarily have the same significance in urban areas in the same region in Brazil. Moreover, Malhotra and Schuler (2005), mentioned

that empowerment also varies over time. One example given by these authors is the use of contraceptives in rural Bangladesh in the 1990s; studies suggested that women's empowerment was positively associated with the use of contraceptive methods Schuler et al. (1997), but nowadays the use of contraception is the norm in Bangladesh. Thus, once a behaviour becomes a norm, there is little motivation to associate it with any degree of individual empowerment.

The importance of the sociocultural context in the perception of empowerment and consequently in the ways that it is expressed in the development of outcomes has been largely explored through empirical studies (Schuler et al., 1995; Hashemi et al., 1996; Jejeebhoy, 2000; Mason and Smith, 2000). As Malhotra and Schuler (2005) argues that indicators used to compare gender equity across cultures need to be carefully evaluated because they might be appropriated in one context but do not make sense in another. As a possible solution, tackling the issue of context-specificity in empowerment assessment is the use of a tool that not only is constructed based on a consistent conceptual framework, but also a flexible one, allowing the accommodation of variations of (and in) its indicators, according to the context where it will be applied (Schuler et al., 1995; Malhotra and Schuler, 2005). Moreover, Malhotra and Schuler (2005, p. 78) stated: "Any given context at any given point in time can be seen as having behavioural and normative "frontiers," which need to be crossed for women to be empowered along a specific dimension and within a specific arena. Specifying these frontiers helps define the indicators of relevance to that particular context at that particular time."

Measuring Process

As discussed in the previous sections, one of the key features found in the definitions of empowerment is that it is a process. Accordingly, it is very important but also operationally difficult to provide a reliable yardstick with which to approach women's empowerment through a direct measure instead of proxies. A wide body of studies provides evidence that common proxies for women's empowerment, such as education or employment, could be irrelevant depending on the context or misleading interpretations (Mason, 1998; Malhotra and Mather, 1997). Moreover, these proxies could be only relevant in certain geographical regions (Jejeebhoy, 2000), and according to the dimension of interest or even regarding the outcome of interest (Kishor, 2000*a*), or even the empowerment dimension of interest (Malhotra and Mather, 1997). Despite the constraints due to the processual nature of empowerment, the literature offers an alternative that allows us to capture through use of direct measures, by assessing the decision-making, control, and choices of individuals. Likewise, another element that characterizes the processual nature of empowerment is time. Thus, to capture a process evolution data on the phenomenon analysed is required

from at least two points during a period of time (Malhotra and Schuler, 2005).

Quantitative or Qualitative?

The discussion about qualitative vs. quantitative research also is pertinent when analysing a subject as complex and subjective as women's empowerment. While it might be far more attractive for policy makers to use quantitative methods for assessing the process of empowerment, the complexity that this process embodies makes the use of qualitative methods essential to better understand the outcomes (Sen, 1994). Without a qualitative nuance, quantitative methods might not provide significant findings of what these indicators mean in context, especially when diagnosing whether or not the empowerment process is actually occurring (Oxaal and Baden, 1997). The use of qualitative methods is essential not only to detect which indicators are relevant but also which outcomes are subject to interpretation, to be meaningful to the context in which it is applied.

Another element pointed out by Kabeer, is that empowerment assessment is also subjective, highlighting the need to extend the measurement of empowerment to women's interpretations (Kabeer, 1997, 1998). This means that programme's evaluators, rather than relying on their own judgements as to what is of value, should judge the process of empowerment as having occurred if it is self-assessed and validated by women themselves (Behrman et al., 2014; Malhotra and Schuler, 2005). Malhotra and Schuler (2005) argued that qualitative methodologies are important in capturing women's experiences and the evolution of their status under their narratives. Hashemi et al. (1996) argue that laying the initial groundwork through qualitative and exploratory methods, conceptual analysis, and stakeholder consensus achieved through participatory processes is essential to establishing the parameters that define empowerment in specific country and development project contexts.

Women Empowerment Indices: An Overview of Tools

The recognition that well-being is more than income and that aggregations at country level also cover inequalities, and among them, gender ones, created the need for a development of methodologies that account for this. Efforts to create gender-inclusive measures, inspired by the capability approach, were seen in the Human Development Project of UNDP with the Gender-related Development Index (GDI) and Gender Empowerment Measures (GEM). These were pioneer efforts to provide not only measures for gender equality, but also a comparable measure across regions or countries, but these efforts were largely criticised. According to Schüller (2006), these indices were consistently misinterpreted, and this fact brought doubts about their use in the evaluation of policy impact. In response

to critiques on these indices, in the early 1990s, the UNDP introduced a new measure, the Gender Inequality Index (GII), to replace the GDI and GEM. The GII has three main elements: women's reproductive health, empowerment and labour market. However, as argued by Permanyer (2013), this index also presented conceptual problems that often conceal discriminatory practices.

Other institutions' and programmes' agendas developed indices to assess gender inequality and empowerment. For instance, the indicators proposed for tracking MDG3, based on ratios of levels of education, wages, employment and political representation, were useful for characterising progress toward gender equality, but as proxy indicators, did not provide direct measures of individual empowerment outcomes (Alkire et al., 2013). Moreover, the Social Institutions and Gender Index (SIGI) is a measure of gender equality which focuses upon five legal and social institutions and is used to rank countries.

A majority of the indices that propose the assessment of empowerment and gender inequalities rely on methodologies that use aggregate country level data. However, a fairly recent but extensive body of academic research has developed methods to measure empowerment at the individual level, focusing on the assessment of agency (Charmes and Wieringa, 2003; Alsop and Heinsohn, 2005; Malhotra and Schuler, 2005; Alkire, 2008; Kabeer et al., 2011; Alkire et al., 2013). Moreover, in the context of empowerment, multidimensional indices can be a useful way to capture and synthesise results, because the agency can be experienced and applied in different ways and a number of different domains (Hanmer and Klugman, 2016, p. 242).

2.3 Natural Hazard and Women

Cyclical drought is a harsh reality that affects not only the region studied here, but countries across the globe. This study was performed during the most recent drought crisis that began in 2011 and continued through 2016 (Marengo et al., 2017). Therefore, we have included an overview of gender analysis in disaster studies to provide a more consistent theoretical background, as our analysis is performed in the context of a severe drought crisis.

2.3.1 Gender in Disaster: An Overview

To address the issue of gender in disaster studies, we first need to define what disaster means. In the pioneering article, *Taking the Naturalness out of Natural Disasters*, O'Keefe et al. (1976) argued that 'natural disasters' are a social construction, being a consequence of socio-economic inequalities rather than natural factors. Moreover, Quarantelli (2005)

shows that the definition of disaster is not a straightforward concept and there is no unanimity or single answer to define this term, and that the feminist perspective is but one alternative way of analysing these phenomena. The understanding of natural disasters as a condition caused by human activities is predominant in the discourse of disaster studies. Natural hazards only become a disaster if they affect vulnerable people (Varley, 1994).

In this context, another important concept is vulnerability. The definition provided by the United Nations Office for Disaster Risk Reduction (UNISDR), regards vulnerability as a condition that results from physical, social and environmental factors or processes, increasing the susceptibility of an individual or community to the impact of hazards. Anderson (1994) states that there are three categories of vulnerability to consider when considering what constitutes a disaster. The first category is physical vulnerability, and concerns those who live in areas exposed to catastrophe without appropriate resources: for instance, those who have no financial resources to recuperate and recover in crises or no access to water reserves. The second category is social vulnerability, which concerns those who are excluded from the political decision-making process. The third category consists of those who are psychologically vulnerable, those who feel powerless and unable to make decisions for their security.

But does gender represent an important element in a natural hazard event? According to the literature, disasters affect women and men differently (Fothergill, 1996, 1998; Enarson et al., 2007; Ariyabandu, 2009; Enarson and Chakrabarti, 2009; Enarson, 2012; Tierney, 2012). As Enarson (2012, p. 23–24) stated: “like disaster, gender carries a hint of naturalness or inevitability but is, in fact, a social production –all the more powerful for being socially, not biologically, defined, although never divorced from our embodied selves.” Moreover, considering that disaster vulnerability cannot be separated from everyday reality; gender inequality is also present in catastrophic outcomes. Gender blindness in the process of designing measures to deal with disaster (before, during and post) could increase women’s burden of work, increase violence against women, negatively impact women’s health and jeopardise their already politically fragile status (Drolet et al., 2015; Austin and McKinney, 2016). According to Ariyabandu and Fonseca (2006), women who belong to vulnerable groups are the ‘vulnerable within the vulnerables’. Despite the importance of the gender lens in disaster studies, it is a recent approach, because gender relations were largely neglected by disaster theory (Enarson, 1998; Fothergill, 1998; Enarson and Meyreles, 2004; Enarson, 2012).

2.3.2 Women, Drought and Agriculture

Drought is claimed as the largest human toll compared with any other type of natural hazard (Enarson, 2000, p. 3). According to Wilhite (2000), drought events differ from

other natural hazards mainly on three points. First, the difficulty to clearly define a start and end point for this kind of event. Drought's slow-onset and cumulative effects might not be noticed for a long period. Second, the absence of a precise definition of drought. Drought can be described as climatological, meteorological, water management, socio-economic, absolute, partial, dry-spell, serious, severe, multiyear, design, critical, point, or regional (Wilhite, 2000; Boken, 2005). The definition of drought varies largely according to geographical region but usually has two different components: precipitation or impact (Boken, 2005). In practice, the difference between an estimated water demand and an expected water supply in a region is often used as the basis to define a drought for that region (Boken, 2005). The third element is the non-structural impact and the size of the areas affected in comparison with other natural hazards. For instance, a recent drought severely affected at least five countries –Kenya, Ethiopia, Somalia, Uganda and Djibouti–directly affecting over 12.4 million people.

According to Wilhite and Buchanan-Smith (2005) a broad categorization of drought can be found in the literature, regarding meteorological, hydrological, agricultural, or socioeconomic aspects. A meteorological (or climatological) drought occurs when precipitation (seasonal or annual) goes below its normal or average amount. A hydrological drought is an escalation of the meteorological drought, causing a shortage of surface and groundwater in the region. The agricultural drought sets in due to soil-moisture stress that leads to a significant decline in crop yields (production per unit area), while a socioeconomic drought is a manifestation of continued drought of severe intensity that shatters the economy and socio-political situation in a region or country (Boken, 2005).

The first and most heavily affected economic sector during drought events is agriculture (Maybank et al., 1995; Wilhite and Buchanan-Smith, 2005). On a global scale, droughts typically reduce national agricultural production around 7%, and their impact is nearly 11% greater in developing countries than elsewhere (Lesk et al., 2016). In developing countries, women represent more than half of the total labour force in the agriculture sector (FAO, 2011). However, their struggle to gain access to land (Deere and León, 1998, 2003; Doss et al., 2014) and other agricultural inputs (Peterman et al., 2011) increases their vulnerability. Gender-based inequality in access to inputs and assets, among other resources, aggravates women's vulnerability during periods of crisis (Anderson, 1994; Enarson, 2000; Austin and McKinney, 2016). Moreover, Enarson and Chakrabarti (2009) argued that women are less likely to identify themselves as a farmer unless they are actively engaged in agriculture activities, describing their occupation as 'housewife' or declaring themselves as 'not working'. In contrast, men tend to continue to report their main occupation as 'farmer' even when they are not actively engaged in agriculture. As noted by Enarson and Chakrabarti (2009, p. 81): "This self-identification is important, as it may lead to a misrepresentation of who is and who is not actually 'working' after an event and hence

affect post-disaster assistance that misrepresents the economic needs of women and men.”

Anderson and Woodrow (1989) suggests that vulnerabilities preceding disaster and the degree of vulnerability defines the severity of the disaster. Social vulnerabilities also hinder effective disaster response and continue afterwards. In sum, gender inequalities, such as the lack of women's access to resources both pre, during and post disaster, combined with gender blindness of interventions that aim to prepare communities in disaster-prone areas, put women in the position of greatest vulnerability in outbreak periods.

2.3.3 What Role Do Women's Empowerment Play in Face of Disaster?

A large and recent body of literature has investigated how women's vulnerability is aggravated in the face of disaster. For instance, Shah (2012) reports that women have less access to relief assistance and face increased rates of domestic violence and rape in the aftermath period of a natural disaster (Bradshaw, 2013). Additionally, Bradshaw and Fordham (2015) suggest in their study that unplanned pregnancy and sexually transmitted diseases rise significantly in periods of disaster due to a lack of access to sexual and reproductive health. Neumayer and Plumper (2007) observe a lower life expectancy among women in areas affected by disasters. These vulnerability trends reflect the secondary impacts that women and girls suffer in the aftermath, and “these impacts may be the real disaster for women and girls” (Bradshaw and Fordham 2013, p. 13).

Recently, the Sendai Framework for Action recognised the critical role of women in disaster risk capacity-building and their empowerment for preparedness (UNISDR, 2015). However, very little is known about the role of women's empowerment in the context of disaster. A growing body of literature has investigated women's empowerment in areas of high disaster risk as an important strategy to mitigate its effects in direct and indirect ways during periods of crisis. For example, the Dhungel and Ojha (2012) study in Nepal reports that the use of women's empowerment as a key component of disaster risk reduction interventions has a positive effect on the reduction of socio-economic and physical vulnerability and on women's leadership. One of the effects of greater empowerment of women is increased representation of women in decision-making roles. Sen Roy (2018) states that the promotion of women's empowerment in disaster-risk zones is greater when they participate in policy development because it results in more awareness and gender-sensitive policies.

According to Davis (2014), disasters, under certain conditions, can challenge gender relations, but the effects and the duration of them are also unpredictable. For example, in a time of crisis, women can actively participate in committees and lead field operations, but there are no guarantees that after the crisis women will keep participating in decision-

making. However, as Attanapola (2004) stated, there is no change in gender relations without challenging the social norms. In the same vein, Moreno and Shaw (2018) suggested that disasters can trigger long-term changes in gender relations, even in highly patriarchal contexts. Their empirical study shows that gender relations changes can be stimulated by resilience-building programmes using mechanisms that promote female leadership and grassroots women's organizations.

Moreover, in the literature of the gender analysis of disaster, the strength of women's organisations seems to be an essential measure of increasing disaster resilience for the whole community. According to Branco (2009), local NGOs and rural unions have been proven to play an important role in the process of coping with drought and the mitigation of socio and economic effects in northeast Brazil. Moreover, Branco mentions that the mobilisation of rural women slowed a decrease in their vulnerability due to a consciousness-raising process, not only regarding the limitations of their environment, but also by providing information about the political and economic nature of the drought. In rural areas, enhancing women's access to productive resources, such as credit lines and technical assistance, is mandatory before, during, and after a disaster. Enarson (2000) mentioned that women who had access to credit could use it to invest in an irrigation system and to prepare for the drought cycles or to build more resistant houses to prepare for hurricanes.

In this section we intend to argue that under certain conditions, disasters may bring opportunities to reduce women's vulnerability and, certainly, that the approach of women's empowerment as a component of disaster risk programmes can contribute to fostering resilience in drought-prone areas. As Bradshaw (2013, p. 184) notes, disasters are "windows of opportunities" to work towards gender equality as they may disrupt processes that reproduce gender roles, which creates spaces for women's empowerment (Horton, 2012).

2.4 Conclusion

Since Boserup's book, the field of gender and development has passed through an intense process of change. The feminist critique regarding the mainstream economic system and its effect on increasing inequalities across countries has been fuel for the evolution of the field. The fact that Globalisation has so many local ramifications also highlights the importance of taking into account local contextual-specificities in the process of planning and implementing projects that promote gender equality, as well as the importance of including women in the process of development. Critical perspectives to neoliberalism, such as the capability approach, the human rights approach, and feminist economics, emerged to shape policies of development and ensuing programmes that sought to empower the whole community by focusing on woman, young and child. Empowering women became a 'buz-

zword', but the diversity of definitions, objectives, and values associated with this concept reflects multiple perspectives and has resulted in a lack of clarity. This misuse of the term empowerment has disconnected it from its core values and characteristics. Empowerment is a multidimensional process that has as its core purpose the goal of changing power relations in order to promote the expansion of choices for people who have been denied opportunities. Meanings and values associated with empowerment are as intrinsic to the context (cultural, religious, ethnical, etc.) as the individuals subject to the empowerment process itself, and should therefore be examined with local and demographical specificity.

Moreover, to promote empowerment in natural hazard prone areas, policy makers need to take into account that periods of crisis are experienced differently by women and men. Gender-based inequalities place women in a more socially vulnerable situation, and this vulnerability only intensifies in the face of events such as floods, drought, or hurricanes. Since women often are more economically insecure to begin with, during natural hazard events they typically face an even greater overburdening of labour and are even more marginalized from political participation than their male counterparts. Periods of drought, for instance, decrease women's status significantly, and in far greater proportion than they decrease the economic, emotional, and physical condition of men. In the next chapter, we will examine the context-specificity of the case study area, which will show in detail this disparity and discuss ways to alleviate it. The analysis will also provide a more detailed view of how rural Brazilian woman were included in the process of the nation's development and what kinds of institutional apparatuses were present during 2003 to 2015.

Chapter 3

Rural Development and Women in Brazil

While Chapter 2 provided the theoretical and conceptual framework of this study, this chapter introduces its contextual background. This chapter provides not only an overview of the region studied, but also to outline the historical processes that have shaped the construction of rural women's identities in Brazil. The chapter is divided in two major sections. The first section, *Rural Women's Movements, Feminisms, and the Brazilian State*, presents a historical overview of how social movements struggled to construct rural Brazilian women as a social subject. This section also provides an overview of the role that the feminist framework played in the creation of the rural women's policy agency and in the formulation of policies. Moreover, the first section explores women's participation in agricultural activities and interventions designed to promote the productive inclusion of rural women in Brazil during the period from 2003 to 2015.

The second section of the chapter provides information about the study area, providing an overview about the impact of drought crisis on the Northeast region of Brazil. This is essential for understanding the background and to the development of rural areas in the Brazilian Northeast. Also, we provide an overview of the micro-region of our case study, including its geographic and sociodemographic characteristics.

3.1 Rural Women's Movements, Feminisms, and the Brazilian State

Women's movements in Latin America emerged in the 1970s, in the context of repression of civil liberties due to military regimes and intense economic crisis (Alvarez, 1990;

Safa, 1990). During the period after the military regimes, women's organisations in Latin America typically followed three different pathways for mobilisation. The first pathway for mobilisation centered upon human rights and in particular on the struggle for the amnesty of political exiles and prisoners, and the denouncing of the crimes committed by the regimes (Costa, 2005). The second pathway was created by organisations that were specifically feminist and developed by urban women who belonged to the middle class (Alvarez, 1990; Costa, 2005). Finally, influenced by the Base Ecclesial Communities (CEB), the organisation of poor women (urban and rural) put forward demands that focused on improving access to basic public services, such as sewage disposal, public health, food security, and childcare, among others. However, the demands of rural women were focused on increasing their participation in unions and recognition as farmers and rural workers (Deere and León, 2003; Alvarez, 1990; Costa, 2005). This category of activism in the early 90s was known as popular feminism (Costa, 2005).

In Brazil, the emergence of women's organisations followed this trend and started to spin off different women's movements across the country, including rural areas, where there were important female leaders. For example, Alexina Crespo and Elizabeth Teixeira were heavily involved in the struggle for agrarian settlements and the recognition of rural workers' rights, as well as other demands on the rural agenda. Margarida Maria Alves was a leading unionist in Paraíba (Northeast Brazil) and her struggle was for labour rights for rural workers. As a consequence of her militant activities, she received several death threats, and in 1983, she was brutally slain by a professional gunman hired by owners of sugar-cane mills in the region.

Rural women's movements¹ emerged within the atmosphere of re-democratisation and were endorsed by feminist in academia and women's movements in Brazil (Alvarez, 1990; Deere and León, 2003). According to Guivant (2003), the reform of the Constitution in 1988 was a key element in the development of rural women's organisations, because this reform established principles of equality in civil and labour rights. As well as in this enabling environment, there were actions by the CEBs, based on liberalisation theology, which, in the 1970s, organised women and encouraged a "formative experience that led rural women to question social injustice" (Deere and León, 2003, p. 263).

In the rural areas, the main organisational structure was provided by rural unions. During the 1980s, women's participation in rural unions was restricted because the National Confederation of Agricultural Workers (CONTAG) stipulated that only one member

¹Women's movement is diverse and encompasses a wide number of identities, ideas, and purposes. Some of these groups may not self-identify as feminists. Several scholars used the terms women's movements and feminist movements interchangeably (Mazur 2002; Weldon 2002a), others make a clear distinction between these terms (Beckwith 2000, 2005). The Brazilian rural women's movements are evidently feminists (as you will see in this chapter), and guided by the Latin American popular feminist discourse. However, in this study we adopted these terms interchangeably, making punctual distinctions when it is pertinent.

of a household should participate in a union. Additionally, rural women often did not consider themselves to be ‘rural workers’. The struggle for women’s participation in rural unions and access to social security benefits were the central demands of rural women in the 1980s (Deere and León, 2003).

It was at the Fourth Congress of CONTAG in 1985 that rural women’s condition started to be discussed at a national level. This congress established the objective of incorporating women in the unions, not only as members but also in leadership positions. During this period of organisation, several rural women’s movements emerged in Brazil: among them, the Rural Women Workers’ Movement (MMTR), which spread across the national area (Deere and León, 2003).

During this period, rural women’s movements were more significant in the South and Northeast of Brazil. The demands of the movements were focused on women’s land rights; for example, obtaining joint titles for couples and land adjudication for women who were heads of their households. The recognition of women as rural workers and guarantees of social and labour rights were demands that, among others, linked with the feminist agenda (Deere and León, 2003; Siliprandi, 2009, 2011).

The II National Congress of the Unified Workers’ Central (CUT) included a Women’s Commission to address issues related to women workers (rural and urban). During the mid-1980s, actions to give political visibility to rural women increased, such as, for example, meetings with government institutions and the creation of a National Council of Women’s Rights linked to the government. During the 1980s, several events were organised by rural woman movements (Deere and León, 2003). Table 3.1 summarises events for rural women in that period.

All these regional events were milestones in the foundation of the MMTR. The foundation of MMTR emerged from the need for women to affiliate in unions and to create an organisation that would exclusively represent their demands (Deere and León, 2003). Rural women’s organisations across the country were essential to the design of the set of gender-progressive propositions which were presented at the Constitutional Convention in 1988. As a result of the struggle in this period, equal rights for women and men (rural and urban) to hold titles to land distributed by agrarian reform, labour legislation, and social security benefits (paid maternity, retirement, unemployment or disability insurance) were included in the Constitution of 1988.

The participation of women in rural unions and rural social movements increased significantly during the 1980s and 1990s. In addition to women’s participation in organisations called *mistas* (for men and women), the number of rural women’s movements increased. One of the most influential organisations in the period was the MMTR; having arisen during the mid 1980s, almost simultaneously in the Northeast and the South, it spread its

seeds across Brazil.

Table 3.1: Evolution of articulation of rural women's movements

Year	South	Northeast
1982	1 st Congress of Rural Women in Rio Grande do Sul	Mobilisation for Emergency Relief in several States
1983	1 st Meeting of Rural Women's Leaders in Rio Grande do Sul	1 st Meeting of Rural Women's Workers Leaders in Pernambuco
1984	1 st Regional Meeting of Rural Women's Workers in Rio Grande do Sul; 4 st CONTAG Congress; Foundation of Rural Women Worker's Movement (MMTR-PR)	4 st CONTAG Congress
1985	Women Mobilisation for the Constituent Assembly	-
1986	3 rd Feminist Meeting of Latin America and Caribe in Bertioga, São Paulo	1 st Meeting of Rural Women's Leaders in Paraíba; Foundation of Rural Women Worker's Movement (MMTR-NE)
1987	-	Foundation of Rural Women Workers' Movement of Northeast
1989	Foundation of the Rural Women Workers' Movement (MMTR-RS)	-

Source: Table adapted from Heredia and Cintrão (2006)

However, it was not until 1995 that the National Network of Rural Women Workers (ANMTR) emerged in the political arena. This national network was based in São Paulo and brought together women from 17 states. The very first campaign aimed to provide documentation for rural women.² In that year, it was estimated that there were 18.5 million rural women workers and only 16% of them were legally registered, which meant that the remainder did not have access to the benefits to which they were entitled under the Constitution of 1988 (Deere and León, 2003).

The Via Campesina³ was another important movement that emerged in the 1990s in

²According to Deere (2003), a wide range of documents are demanded in Brazil for official transactions, such as birth certificates, marriage certificates, taxpayer cards (CPF), identity cards (RG), voter registration cards, and employment cards. The issue of these documents is dependent on having other cards, which means that you need a birth certificate to have an RG, which in turn is needed for the CPF to be issued, and so on.

³Via Campesina is an international movement which aims to represent peasants, small and medium-size farmers, landless people, women farmers, indigenous people, migrants and agricultural workers from 73

the struggle for gender equality. This is an important peasant movement which struggles for land access and food sovereignty worldwide. One of the main strands of this movement is the strengthening of rural women's movements. In Brazil, this movement acts together with many social movements such as the Landless Workers' Movement (MST), the Brazilian Movement of Dam-Affected (MAB), and the Movement of Small Farmers (MPA). In 2004, the MMTRs around the country, except the MMTR-NE, changed their name to the Movement of Peasant Women (MMC) due to their association with Via Campesina (Siliprandi, 2009). These groups are classified by productive activity (riverine, extractivist, farmer, artisan etc.), by ethnic or traditional background (*quilombolas*, indigenous, etc.).

The struggle for rural women's rights emerged from another important movement called Marcha das Margaridas. This was organised by a pool of organisations, which was coordinated by CONTAG. This movement was aligned with the World March of Women (MMM), and the first Marcha das Margaridas took place in 2000 in Brasília, bringing together 20,000 women. The first Marcha das Margaridas was against hunger, poverty and violence against women. The result of this march was the Resolution n 6, of 22 of February 2001, which established that all policies managed by the Ministry of Agrarian Development (MDA) should be gender mainstreamed.

The II Marcha das Margaridas was in 2003 and united 50,000 women in Brasília. In this march, protesters made a wide range of demands; among them was access to productivity-driven policies for credit, technical assistance, professional training, commercialisation and organisation (Heredia and Cintrão, 2006; Siliprandi, 2009). The following Marchas das Margaridas in 2007 and 2011 brought together 30,000 and 70,000 women, respectively (Heredia and Cintrão, 2006; Siliprandi, 2007). These marches were a landmark in the establishment of important policies, programmes and legal frameworks to provide gender equality in rural areas. Among the achievements were:

- the establishment of a National Programme of Documentation of Rural Women (PNDTR);
- the implementation of mandatory joint adjudication and titling of land for couples;
- the granting of priority to female heads of household for land access, according to the National Programme of Agrarian Reform;
- the inclusion of women in the Declaration of Aptitude for Family Farming (DAP)⁴

countries.

⁴DAP functions as an identification device for family farmers that allows access to public policies such as PRONAF. To get it, the family farmer must go to an agency or entity accredited by MDA, in possession of the CPF and data about his or her production site (area, number of residents, composition of the labour force, income and full address)

- the establishment of a gender-oriented approach to technical assistance.

3.1.1 Rural Women and State Feminism: A Pathway to Recognition in Brazil

The term state feminism was coined in 1987 by Helga Hernes; this term is constructed based on the idea of governments being influenced by the feminist agenda to promote a women-friendly approach to state interventions. In the 1990's a significant body of literature was focused on examining the state's⁵ actions to promote gender equality and identifying actors in the process of gender-specific state actions (McBride and Mazur, 2010). Lovenduski (2005) provided a wider definition, where state feminism is understood as the activities of feminists and femocrats within the structure of governments, the institutionalization of women's agencies, or even the dialogue between state and women's movements, aiming to attend to the demands proposed by the women's movements.

Moreover, McBride and Mazur (2010, loc.121) defines the state feminism as "the degree to which women's policy agencies forge alliances with women's movements and help them gain access to policy arenas and achieve their policy goals." Also, these authors provided a classification of 'types' of state feminism. The first category is the Movement State Feminism that encompasses an alliance between government and women's movement that culminate in the promotion of actions that enhance gender consciousness. The second type is the Transformative State Feminism and it happens when the actions promoted by the state are explicitly feminist, recognising the patriarchy and gender-based hierarchy, and seeking to advance gender equality and change the gender relations. The patterns of agency-movement alliances⁶ regulate the state feminism where: alliances that achieve precisely feminist goals are cases of Transformative State Feminism; those that achieve movement goals more broadly speaking are Movement State Feminism (McBride and Mazur, 2010).

In Brazil, the feminisms have been instrumental in the process of rethinking the legislation and elaboration of policies for promoting gender equity, culminating in new organisations and approaches within government institutions (Sardenberg, 2004; Sardenberg et al., 1999; Costa, 2005). According to Pitanguy (2002), the history of feminism in Brazil divides roughly into three periods, the first of which was the mid-1970s and mid-1980s, when feminism emerged as an important political framework for women's visibility and legitimacy. The second period was in the late 1980s when the feminist agenda started to

⁵Conceptualization and operationalization of the components of the state feminist framework should be read and understood in the context of politics of democratic governments in postindustrial societies.

⁶According to McBride and Mazur (2010, loc. 121): "Agencies also may form partial alliances or fail completely while women's movements are still successful in achieving their goals. The result is women's movement success but not state feminism."

be included in policies and directives. The third was in the nineties, when transnational coalitions were formed to promote an internationalisation of the feminist agenda. Sardenberg and Costa (2014) added a phase to Pitangy's chronology, proposing that a fourth period could be added to this chronology, more specifically, the period occurring in the years 2000s, characterised by the strengthening of state machinery for the promotion of gender equity, and thus, of state feminism.

Sardenberg and Costa (2014) point out some elements that strengthen the process of the creation of state feminism in Brazil. The first was the transnational and international articulation of Brazilian feminisms; this articulation was the central reason for the advances in this process. According to Sardenberg and Costa, the participation in the World Social Forums (WSF) (2001, 2002, and 2003) boosted the integration of the national movements with regional and global movements (e.g. World March of Women) and networks (Conway, 2007, Vargas, 2003, cited in Sardenberg and Costa, 2014). According to Sardenberg and Costa (2014), the transnational articulation of Brazilian feminists in the Beijing Conference in 1995 culminated in the creation of the National Secretary of Women's Rights in 2002.

Consequentially, it was under the first mandate of President Luis Inácio Lula da Silva, in 2003, that the Special Secretariat of Policies for Women (SPM) was created. One year later, the SPM became an institution connected directly to the Presidency of the Republic and was assigned ministry status. The SPM was created to coordinate policies between ministries and other federal bodies, as well as to guarantee the participation of civil society in the process of creation of affirmative actions for women (Butto and Dantas, 2011). Gender Committees were created across the Brazilian ministries to align their actions with the guideline established in National Plan of Policies for Women (PNPM). In 2003 and 2007, the first and II National conferences on Policies for Women aimed to establish a dialogue among and between the primary actors within social movements, academia, and government. According to Avelar (2013), during this period, not only was the interaction between social movements and the state significant, but also the conversations between feminist academics and activists. Also, these professionals migrated to the executive positions in the government.

In 2001, the MDA⁷ set out the first programme addressed to minorities in rural areas, called the Programme of Affirmative Actions. Thus, in 2003, the Programme for the Promotion of Gender and Ethnic-Racial Equality (PPIGRE) was incorporated in the MDA to reinforce citizenship and social justice in rural areas (Heredia and Cintrão, 2006). This programme later became the Special Advisory of Gender and Ethnic-Racial Matters (AE-

⁷In 2016, after the impeachment of Brazilian president Dilma Rousseff and a change in national leadership, the MDA was incorporated into the Ministry of Social Development and the Fight against Hunger. The MDA was replaced by The Special Secretariat for Family Agriculture and Agrarian Development of the Civil House of the Presidency of the Republic (Sead) on May 27, 2016.

GRE). Later, in 2008, the Directory of Policy for Rural Women (DPMR/MDA)⁸ was created as an institution connected to MDA, supported by a federal budget and staff for the management of policies for rural women.

This rural women's policy agency had three main areas of action. The first was the articulation of gender mainstreaming policies within the five national agricultural development plans: the second National Plan of Agrarian Reform; the National Programme for the Strengthening of Family Farming (PRONAF); the National Programme for Sustainable Development in the Territórios Rurais; the Programme Brazil Quilombola; and the National Programme of Technical Assistance (PRONATER) (Butto and Dantas, 2011). The DPMR second area of action was within the development of rural women-specific policies that used a participatory approach and focused on the demands of the rural women's movements; for instance, the National Programme of Documentation for Women Farmers (PNDTR) and the Programme of Productive Organisation for Rural Women (POPMR). The last area of action was in the articulation of gender mainstreaming interventions addressed to rural women in inter-ministerial programmes, such as the National Programme of Scholar Nourishment (PNAE) and the Food Acquisition Programme (PAA) (Butto and Dantas, 2011).

Ferreira (2004) acknowledges that the focus on the individual actions of the 'femocrats' does not suffice to promote the feminist agenda in the government's apparatus. According to this author, the promotion of change demands a more pervasive network of influence, establishing commitment across agents of the state in all spheres of power, and not restricted to executive positions. Moreover, Razavi (2002) claims that this approach might even become a barrier for women to participate in other spheres of power; for instance, in the legislative branch of government. In Brazil, the relationship between feminist movements and the state is more evident at executive level rather than the legislative level.

3.1.2 Rural Women and Economic Participation in Brazil

The role of rural women in Brazil is shaped by patriarchy, where family is conceived as a homogenous unity, and gender division of labour is traditional, with predetermined ideas that relegate rural women to the roles of mother, housewife, and 'helper.' (Faria, 2011). According to Hirata and Kergoat (2007), work activities are generally valued according to the influence of two main ideas. The first idea is that there is a social perception of 'feminine' or 'masculine' activities. The second idea is the value added to these activities, where the activities defined as masculine are more valuable than the activities perceived

⁸This was originally the Directorate for Rural Women and *Quilombola* Policies (DPMRQ), and afterwards the Directorate for Rural Women Policies (DPMR), with the status of Secretary. The DPMR was abolished with the incorporation of the MDA into the MDS structure.

as feminine. Also, it is also important to add an intersectional perspective to this analysis because there is a devaluation of the perception of women's work that is influenced by the class, race, and ethnicities of those who perform it (Hirata and Kergoat, 2007; Kergoat, 2010). The invisibility of women's work is the core of the feminist economic critique.

In this context, the perspective of feminist economics highlighted the need for new methodologies that could include reproductive and care work in economic analysis. The collection of sex-disaggregated data became an essential element for these types of analyses, allowing for the elaboration of and evaluation of women's conditions. According to Hora (2014), this practice was adopted only recently, through international agreement, by the Brazilian statistics agencies, especially regarding data on rural women.

Feminist economics, among other categories of feminist theories, corroborates this necessity for production of sex-disaggregated data to guide the government in the process of planning of public policies targeting gender issues. For instance, Nobre et al. (2016) notes that "national statistics ignore unpaid work, and this fact reinforces the invisibility of women's work and hides the extra burden of women's work." Moreover, as noted by Lambrecht (2016), sex-disaggregated data needs to reflect the circumstances that the questions were answered and how relevant each question was to the context, in order to achieve a reliable conclusion.

According to the Brazilian Institute of Geography and Statistics (IBGE), 48% of rural Brazilian residents are women (IBGE2010a). Historically, rural areas in Brazil have been disproportionately masculinized. Brumer (2009) suggests that the migration of rural women in Brazil might be caused by the gender division of labour that subordinates women and prevents them from retaining their heritage by taking possession of their family's land. Regarding the familial structure, in rural areas there are fewer households headed by women in comparison to urban areas. In urban areas, the percentage of households that had women as a head in 1993 was 15.2% in contrast to 23.1% in 2006. In rural areas, only 11.4% of the households were headed by women, and in 2006⁹ this percentage increase to only 16.2% (Butto and Dantas, 2011).

In rural areas in Brazil, women are typically responsible for food crop production and men for the cash crop. The National Agricultural Census of 2006 shows that 33.7% of women declared they had no monetary income at all, in contrast with 14.2% of men in rural areas. DiSabbato et al. (2009) analysed data from the National Sample Survey of Households (PNDA), and detected that in 1993, women received an average of 49.3% of men's salary; in 1998, this percentage increased to 55.9%, and in 2006, 68.0%. Another study found that 44.0% of rural women who declared waged work in the agricultural

⁹The last Brazilian Agricultural Census was performed in 2006. The next agricultural census will be done in 2017.

sector performed crop activities, followed by 25.5%, who worked with poultry and small animals, and 16.4%, who worked in vegetable production (IBGE, 2006). Rural Brazilian women's work is perceived by society, and by themselves, as an extension of household tasks or merely 'help' that is provided during certain periods of the year, or during specific conditions (Butto and Dantas, 2011; Brumer and Anjos, 2012).

In the PNDA 2010, 54.6% of rural Brazilian women were classified as economically active compared to 75.5% of males. Also, the rate of economic activity is higher among urban Brazilian women, at 56%, as compared to rural Brazilian women, who are 45.5% economically active. According to Bruschini (2006), women's work is invisible also in the national statistics, according to the method of analysis. In these statistics, individuals who are in the working-age range, but do not work doing paid activities are classified as economically 'inactive,' ignoring the economic importance of reproductive work and care activities.

The percentage of the rural population (age 16 or above) in 2014 who declared participation in care and housework was 46.7% of men and 93.1% of women. Regarding the total weekly hours devoted to domestic work, in rural areas in 2014, gender inequality is even more visible: 10.9 hours are spent by men aged 16 or over and 27.6 hours dedicated by women (IPEA, 2016).

3.1.3 Feminist Economics and Solidarity Economy in Rural Areas

Latin American activists and researchers participated intensively in the feminist debates about development that occurred during the 1980s (see Chapter 2). The inclusion of some demands of the feminist agenda in the platform of action in the Fourth World Conference on Women in Beijing (1995) brought to the scenario optimism regarding the advances of women's rights worldwide. However, progress towards women's rights agenda fell apart due to the dominant discourse of neoliberal globalisation in Latin America and the reduction of social policies (Alvarez, 2003).

As counter-discourse for the neoliberal mainstream movement, social movements in Latin America started a process of transnational feminist articulation. This process of articulation emerged as not satisfactorily 'aligned with the hegemonic' discourse of the development mainstream agencies. According to Moreno, "the process of transnational organisation emerged as a denial of the United Nations agenda that uses the 'social' and the fight against poverty as a discourse that legitimises the expansion of the neoliberalism." (Moreno, 2014, p. 31).

Following this process, the Latin American Network of Women Transforming the Econ-

omy (REMTE)¹⁰ was created in 1997 by feminist organisations across the continent. The aim of this network was to provide a southern perspective of the SAP and the hegemonic discourse that guided multilateral institutions and national policies. This organisation played a key role in the process of inclusion of the economics in the feminist agenda and the feminist agenda in the articulation of social movements of resistance of neoliberalism (Moreno, 2014). It was through REMTE's participation and articulation in the World Social Forums and in promotional and training activities that the approach of feminist economics began to spread among Latin American social movements (Nobre and Faria, 2003). In Brazil, feminist economics has been disseminated mainly by the feminist movement, and it is particularly important to frame this movement as it relates to the condition of rural Brazilian women (Moreno, 2014).

In parallel to the emergence of feminist economics, other counter-hegemonic approaches appeared in the Brazilian scenario as alternatives to promote equality; for instance, the solidarity economy. According to Faria (2009), the solidarity economy started to expand in Brazil in the 1990s, under a scenario of systemic unemployment and the shrinkage of the state, with some outcomes developing from a decade spent under structural adjustment policies. Faria noted that the dissemination of solidarity economics presented an alternative to individual entrepreneurship and competition anchored in private gains, introducing another paradigm rooted in solidarity, cooperation and reciprocity. The solidarity economy was an essential framework for the establishment of cooperatives, associations and networks in rural areas, being especially important to those targeted by rural women's organisations (Faria, 2009).

Feminist and solidarity economy principles overlap in their propositions for a wider vision of economy beyond the market. Moreover, according to Hillenkamp et al. (2014), there are several convergences between solidarity economy and the feminist perspective, mainly in terms of the concepts of popular and local feminism. The most significant point of convergence is the emphasis on community and organisation. However, solidarity economy lacks the inclusion of a gender lens in its analysis. According to Faria (2011), the challenge for the solidarity economy is the inclusion of issues such as the questioning of a gender division of labour and the incorporation of reproductive and care work in its pillars.

3.1.4 Gender and Rural Development in Brazil: An Overview 2003-2015

In Brazil, institutions and interventions have only recently begun to support rural women. The inclusion of a gender perspective in rural development policies is a reflection of rural

¹⁰The Brazilian participation in the REMTE is through the Rede Economia e Feminismo (REF), organized by the Sempreviva Organizacao Feminista (SOF).

women's activism, both inside rural movements and organisations, and in rural women's movements (Nobre and Faria, 2003). This process started in the 1960s, with the activism of rural women in the struggle for land and civil rights, and evolved to the demands of the 2000s that were elaborated from the perspective of the feminist economy. However, it was only with the rural women's policy agency in 2003 that the advances towards fulfilling rural women's demands became concrete, partly due to the intense dialogue between rural women's movements and the state (Butto and Dantas, 2011; Hora and Butto, 2014). These interventions also embraced principles of agroecology and solidarity economy, aiming to promote the autonomy of women in rural Brazil (Faria, 2011). Moreover, Butto and Dantas (2011) commented that the concept of feminist economics was used in the design of public policies targeted at rural women and that these designs came to fruition in part due to the influence of the women's movement.

Considering that this study focuses on rural development policies, it is important to mention the National Plan Brazil Without Misery (BSM). This plan was implemented in 2011, and it is the successor of the Programme Zero Hunger. The BSM plan has three main axes of action: The income guarantee axis, which refers to transfers for the immediate relief of extreme poverty (conditional cash transfer programme – Bolsa Família), the productive inclusion axis, which offers job and income opportunities to the target population, and the access to public services axis, for the provision or expansion of actions of citizenship and social welfare (MDS, 2011, p. 6). The affirmative actions that are targeted for rural women are included in the axis of productive inclusion, such as technical assistance (ATER), and governmental food purchase programmes, among others. Besides, the cash transfer is received only by the women in the household.

During the years of 2003 to 2015, the policies designed and implemented by the rural women's policy agency (DPMR) were carried out through a participative approach involving several actors in a consultative process in institutional spaces created for this purpose (see Table 3.2) (Machado, 2016). The emphasis on the participatory approach was also a component in the elaboration of National Plans.¹¹ For instance, the first, second and third National Plan of Policies for Women (PNPM) which were the result of the first, second and third National Conferences for Women Policies (2004, 2007, and 2011). Moreover, the first and second National Plans of Sustainable and Solidary Rural Development (PNDRSS) were outcomes of the National Conferences of Sustainable and Solidary Rural Development that took place in 2008 and 2013.

¹¹The National Plans were: the first, second and third PNPM (2004, 2008, 2012); The second National Plan for Agrarian Reform (PNRA, 2003); Brazil Without Misery Programme (BSM, 2011-2014); National Plan for Food and Nutrition Security (PLANSAN, 2010-2014); National Plan for Agroecology and Organic Production (PLANAPO - 2014-2015); National Plan for Sustainable and Solidary Rural Development (PNDRSS - 2014-2015) (Hora, 2014).

Table 3.2: Participatory approach in the policies targeted for rural women (2003-2013)

Actor	Function
Rural women's movements and organisations (Demands)	To present demands and regional articulation (women's groups organized)
Women's policy agency (Governance)	Design and implementation of the policies; inter-ministerial articulations
Women's committees (Monitoring)	Rural women's movements, networks and organisations articulations; policy monitoring
Territorial women's committee (Monitoring)	Rural women's movements, networks and organisations articulations; policy monitoring; articulation and integration of rural development strategy

Source: Table adapted from Hora (2014)

These national conferences and also the institutions created, such as women's committees, boards and working groups, participated intensively in the process of policy design, implementation, and monitoring. With particular importance, the Working Group on Gender, Sovereignty, and Food and Nutritional Security was a group that integrated the agency of the National Council on Food and Nutritional Security (CONSEA). This group aimed to strengthen the interface between these two areas of government action (Gender and Food Security). Their working guidelines were: (1) to improve women's leading roles in food production and the defence of food sovereignty, (2) to follow up the implementation of the National Food and Security Plan and the priorities identified within the framework of women's policies, (3) to evaluate the productive incorporation of rural women in and their status in regard to the consumption of and access to adequate food (in particular, socially vulnerable women), and (4) to contribute to expanded and improved data and indicators on the relationship between gender and food security.

In Brazil, the agenda of policies targeted at rural women has been advanced in two phases based on two different agendas. First, during the period between 2003 to 2011, the focus was to provide access to citizenship and the productive inclusion of rural women. Secondly, after 2011, the emphasis was on intensifying the struggle against extreme poverty, including gender mainstreaming and increasing the assignment of quotas to rural women (Butto and Dantas, 2011). To access productive inclusion policies, rural women must have the Eligibility Declaration of Family Farming (DAP) and also identify the group to which they belong (since the support is based on the annual household income).

According to Hora (2014), the three areas that guided rural women's policies were: (1) access to documentation; (2) access to land, water, and other natural resources; (3) access to inputs and services and productive inclusion. The implementation and monitoring of

this set of interventions was articulated based on a territorial approach. The governance of these policies was divided between the *Coordination to Access Land and Citizenship and General Coordination of the Productive organisation and Trade*. The policies that each coordination oversaw are specified in Table 3.3.

Table 3.3: Coordination of programmes within the DPMR/MDA

General Coordination to Access Land and Citizenship	General Coordination of the Productive organisation and Trade
National Programme of Documentation for Women Farmers (PNDTR)	Programme of Productive Organisation for Rural Women (POPMPR)
Transversal actions of Brazil Without Misery (BSM)	Technical Assistance and Rural Extension – Ater Women
Mainstreaming of the Programme for the Sustainable Development of Rural Territories (PRONAT)	Transversal actions of the Brazil Without Misery (BSM)
Mainstreaming the National Plan of Agrarian Reform (PNRA)	Gender mainstreaming of National Policy of Technical Assistance and Rural Extension (PNATER)
Partnership with organisation for Rural Women Policies in the states, regional	Gender mainstreaming Food Purchase Programme (PAA) and National Programme of Scholar Nourishment (PNAE); Regional fair Gender mainstreaming National Programme for the Strengthening of Family Farming (PRONAF) Transversal actions in infrastructure policies

Source: DPMR/MDA (2015)

In the next sections, we briefly describe the affirmative actions that were in place until 2015. These “Finalist Actions¹²” are divided across two main characteristics. The first is the gender mainstreamed interventions that are accessed through quotas. The second is the interventions that were rural women-specific, these policies were designed for the specific needs of rural women. It is important to highlight that some national programmes had in their scope these two categories; for instance, the National Policy of Technical Assistance and Rural Extension (PNATER) had two mechanisms of affirmative action, quotas (30%-50%) and women-specific intervention (Ater Women).

¹²Finalistic Action is defined in the Decree n 2829, published on 29 October 1998 in the 1st Paragraph: “It is understood by the finalistic action that provides good or service for direct service to the demands of society”.

3.1.5 Gender Mainstreaming for Policies of Rural Development in Brazil

The II National Plan of Agrarian Reform (PNRA)

In 2004, the federal government designed the PNRA, which aimed to promote production in family farming within agrarian settlements. Moreover, for the very first time in the Brazilian struggle for land, gender relations were recognised as a structural aspect of the process of agrarian reform. The legal framework, Ordinance N 981, published on 2 October 2003, was for mandatory joint adjudication of the title of the land, and in the case of divorce, women who have custody of children are entitled to stay on the farm (Brasil, 2003). In 2003, women represented 24% of the recipients of land reform policies; this percentage increased significantly in 2013, 73% of women held the title to their land, either singly or jointly (Hora, 2014).

The National Policy of Technical Assistance and Rural Extension (PNATER)

In 2003, the PNATER was set out by the MDA in partnership with social movements. This policy is rooted in the principles of sustainable development with agroecologic practices. Additionally, its programme responds to the diversity of Brazilian family farmers and minorities who live in rural areas. The National Programme of Technical Assistance and Rural Extension in Family Agriculture and Agrarian Reform (PRONATER) is a regulatory framework that implements the PNATER, establishing aims and guidelines for the development of technical assistance for family farming, and running transversal to other national programmes. The activities developed in this programme aim to provide continuous non-formal education in the different components of the value chain, starting with production, process, and marketing strategies, and associations of agricultural and non-agricultural products and services.

Technical assistance is gender mainstreamed through the establishment of a minimum quota for women. For instance, the National Plan for Sustainable and Solidary Rural Development established that 50% of the contract should be set aside for women; the National Plan for Agroecology and Organic Production requires 30% of the contracts to attend women, and the ATER Agroecology and Sustainability act specifies 50% of its contracts should be for women (Hora, 2014). The percentage of women accessing technical assistance by quotas was 31.9% in 2011, followed by a significant increase in 2013 to 57.9% of the total contracts (Hora, 2014). Still, under this programme of technical assistance, there is a women-specific segment that will be mentioned further (see Section 3.1.6).

The National Programme for the Strengthening of Family Farming (PRONAF)

In 1996, the PRONAF was created, being the first credit programme targeted at family farms. The main goal of this intervention is to support family farm projects (individual or collective) in order to promote a productive inclusion. This programme has the lowest

interest rate in the market, and the credit line is adapted to different categories of investment or groups in rural areas. In theory, PRONAF was created using the ‘neutrality’ principle for providing access to women and men. However, access was not equal, and in 2001, the MDA identified that only 10% of PRONAF beneficiaries were women. Because of this diagnosis, a quota of 30% of access was established (Ordinance n 121 from 22 May 2001). According to Bicudo (2012), this document was important not only in the establishment of the quota, but also in the mechanisms for delivering this benefit. In 2004, the women-specific credit line was created (PRONAF Women), having specific provisions for attending to the needs of rural women (see Section 3.1.6).

PRONAF Microcredit (Group B)

Besides PRONAF Women, PRONAF microcredit is the credit line most accessed by rural women. This credit line was created in the 2000s, targeting the poorest family farmers to support the implementation and diversification of their productive activities. This credit line could be applied to agricultural and non-agricultural activities. To access this policy, the members of the family farm must receive a gross household income up to R\$ 20,000 and at least 50% of the income must come from activities in the rural setting. This credit line offers up to R\$ 4,000 and there is a timely re-payment bonus, and the interest rate is 0.5% per year.

The Food Acquisition Programme (PAA) and the National Programme of Scholar Nourishment (PNAE)

This programme was launched in 2003 and its main goal is to create (through institutional food procurement programmes) demand for family farmers production and to improve food security. This programme was innovative in substituting a direct and smallholder-friendly procurement mechanism for the traditional mechanisms of public procurement (bidding processes). In 2009, the Brazilian government extended the guidance of PAA to PNAE. PNAE has existed since 1950, although its connection to family farming started later. According to the dictates of this programme, 30% of food for school meals should be purchased directly from local family farmers and rural family entrepreneurs, and within the total amount specified for family farming, 50% should be bought from women or women’s groups.

The Dom Helder Camara Project - International Fund for Agricultural Development (IFAD)

This project was an important partnership between the Brazilian government and IFAD. It is especially relevant for our study area (Chapada do Apodi) because it was included in the targeted region. This project was conceived to address a concern about the lack of opportunities for social development, income generation, and technical assistance

for newly settled farmers and communities in the semi-arid Northeast under the agrarian reform process. The initial project cost was US \$93.0 million, including an IFAD loan of US \$25.0 million (IFAD, 2013). The objectives of the project were to develop a culture of ‘coexistence’ with the semi-arid conditions of Brazil’s northeast region and to ensure that families living in agrarian reform settlements and rural communities could lead dignified lives. The target group consisted of 15,000 families in family farming in selected territories in the states of Ceará, Pernambuco, Paraíba, Rio Grande do Norte, Sergipe and Piauí (IFAD, 2013). This project was implemented in different phases, lasting from 2003 to 2010. Two other projects existed under the umbrella of this project: These were the Sustainable Land Management in the Semi-arid *Sertão* Project, which was financed by the Global Environment Facility (GEF), and the Elo Project, financed by the Syngenta Foundation.

3.1.6 Rural Women Specific Policies

The National Programme of Documentation for Women Farmers (PNDTR)

Rural women in Brazil have historically faced constraints regarding their access to basic legal documents. In Brazil, a large number of documents are required in order to benefit from constitutional rights, such as birth certificates, taxpayer cards (CPF), identity cards (RG), voter registration cards, employment cards, and marriage certificates (when applicable), among others (Deere and León, 2003; Guivant, 2003). A study performed by the MMTR in 1997 pointed out that only 16% of rural women had the necessary documents. In response, rural social movements pressed the government to promote national campaigns to provide documents to rural women. However, it was only in 2004 that the MDA institutionalised the programme of documentation. The aim of the PNDTR is to provide documents (civil, legal and work-related) to rural women to allow them access to the benefits of policies and programmes that consequently strengthen their autonomy. This programme is implemented through task forces developed in different regions of the country. Between 2004 and 2013, the PNDTR provided documents to more than 1.3 million rural women in Brazil (Hora, 2014).

The Programme of Productive Organisation for Rural Women (POPMR)

The POPMR’s main goal is to support rural women and their groups in the production and commercialisation process. The guidelines of the programme are the promotion of equality in gender, race and ethnicity, the use of a framework of solitary economy and feminist economy; and the use of agro-ecological practices. From 2011 to 2014, the main actions developed through the POPMR were the mapping of women’s productive groups, the provision of project development training and support for local feminist and solidarity

economy fairs, and the promotion of training in management and marketing (Hora, 2014). It identified 9,402 women-only productive groups that were engaged in network and social movements (DPMR/MDA, 2015). Between 2008 and 2013, 159 were supported by this programme, benefiting around 64,000 rural women.

The ATER Women

As part of the 30%-50% quota for rural women in the ATER programme, the Brazilian government detected the need for a programme of technical assistance for rural women. ATER Women was designed and implemented in 2004 by the DPMR. The main objective of this intervention is to strengthen women's production through the diffusion of agroecological techniques, as well as to expand women's access to policies. The activities developed by this specific line of technical assistance also include a range of workshops about gender inequality and rural development, the exchange of agro-ecological experiences and knowledge, as well as training about how to access national programmes of institutional purchase. The technical teams are made up of interdisciplinary technicians and preference is given to women. During the period between 2003 and 2014, around 60,000 rural women accessed this policy.

The PRONAF Women

PRONAF Women¹³ supports women farmers in achieving autonomy through agricultural production. This category of credit line offers two kinds of loans to rural women: (1) calculating credit (before 2005) – investments up to R\$10,000 (interest rate 1% per year). From R\$10,000 to R\$30,000 (interest rate 2% per year). (2) Calculating credit (after 2005) – investments up to R\$10,000 (interest rate 1% per year). From R\$10,000 to R\$150,000 (interest rate 2% per year). Between 2003 and 2014, this specific credit line was accessed by approximately 42,000 rural Brazilian women, aggregating to a total of approximately R\$ 360 million.

Other Microcredit Lines Targeted for Women in Agrarian Settlements

Terra Sol Mulheres

The National Institute of Colonisation and Agrarian Reform (Incra) was launched in 2014. The aim of *Terra Sol Mulheres* is to provide support to productive groups of women in agrarian settlements by providing credit for infrastructure projects and training to women in the processes of agricultural production. The main goal of this programme is to strengthen local and regional commercialisation.

Apoio Mulher

This women-specific initiative was launched in 2008 and benefits women's productive

¹³A part of the PRONAF Women, there are other lines of productive microcredit that are set aside for rural women, supported by the MDA, such as the Agroamigo in the Banco do Nordeste (BNB).

groups and associations. This intervention provides each woman who participates in associations with R \$3,000 to invest in assets to support production.

3.2 Family Farming and Drought in the Northeast of Brazil

In 2014, the United Nations reported the removal of Brazil from the World Hunger Map. This fact reflected the investments made in the last decades of social policies and programmes targeted at the elimination of extreme poverty.¹⁴ However, a significant portion of the population (16.2 million inhabitants) remains below the extreme poverty line, and nearly 9.6 million people living in this condition are in the Northeast region. Historically, the rural areas in the Northeast were considered the largest ‘poverty pocket’ in Latin America (Coirolo and Barbosa, 2002). The inequality in the distribution of resources (land, water and infrastructure) is the major factor that led to this situation (Carvalho and Egler, 2003). In 2010, more than 5 million Brazilians in extreme poverty lived in the rural Northeast, and a substantial proportion of this population lived on family farms.

Approximately, 90% of the Northeast region is semiarid.¹⁵ Figure 3.1 illustrates the division of the Northeast region into four geographical zones – Zona da Mata, Agreste, Sertão and Campos Cerrados. In this region, about 89.1% of all farms are classified as family farms, and the average area is 12 hectares. This is lower than the national average, which is 18 hectares (IBGE, 2006). The family farm is predominant in this area, and agricultural production is limited and relies on subsistence and cash crops (maize, beans, rice and manioc), extensive livestock farming and a few non-agricultural activities, such as small community food stores (IBGE, 2006). As in the other regions of Brazil, in the Northeast, patronal farms occupies the fertile and easy-to-mechanise land (Zona da Mata), and family farms occupy the rough land of low fertility, with severe climate conditions (Sabourin, 2009).

¹⁴The value of reference is BRL 70/month (US\$24). Brazil uses different administrative poverty lines, but does not have an official one. The poverty line referred to in the text is calculated by estimating the value of a basic food basket covering.

¹⁵The Ministry of integration in 2005 changed the methodology to define the semiarid area in Brazil using the following criterion: (1) annual rainfall less than 800 mm; (2) aridity index of 0.5 (time series data); (3) More than 60% of risk of drought (time series data). The new methodology expanded the territory to 969,589 km, equivalent to 90% of all the Northeast region.

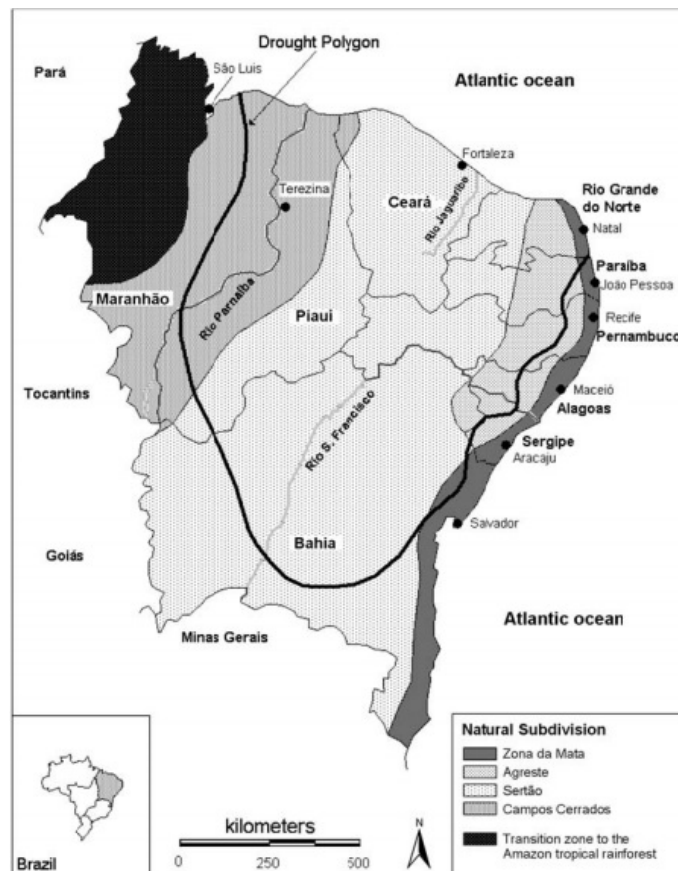


Figure 3.1: Natural subdivision of Northeast Brazil.

Agricultural production in family farms¹⁶ in the Northeast is markedly constrained, not only by the severe climate conditions predominant in the region, but also by the inequitable distribution of resources, such as land, water and infrastructure (Carvalho and Egler, 2003; Sietz et al., 2006; Nelson and Finan, 2009). This limitation is even more dramatic in the drylands due to the regular and severe cyclical droughts.

The difficulty of establishing a strategy for maintaining livelihoods on family farms in the semiarid zones has been the cause of intense migration throughout Brazilian history. There were different waves of migration, of which the most recent was between 1950 and

¹⁶In 2006, the Brazilian government set out a legal framework defining standards to classify family farms, the law 11.326 of 2006. This classification was constructed analysing the characteristics of the labour force and specifying that the production unit must be predominantly administered by family members and comprise the largest part of the household income. The largest part of the household income should be provided by the family farm (the farm could be a farm or a small rural business), and the size of the farm must not exceed four fiscal modules. This measure varies according to the region; for instance in Apodi, it is 55 ha. This legal framework allowed the different 'segments' which are found throughout the rural areas of Brazil to be recognised as family farms. Included in this category are not only small and medium farms but also agrarian reform settlements and traditional rural communities (e.g. extractivists, *quilombolas*, and riverine populations, among others).

1980. The common destination in that period was the southeast region, as migrants were attracted by the intense industrialisation in the region, mainly in the cities of Rio de Janeiro and São Paulo (IBGE, 2011).

3.2.1 Drought and Policies in the Brazilian Semiarid Areas

Cyclical drought is a harsh reality that affects all the states in Northeast Brazil. The last drought crisis started in 2011 and continued through 2016 (Marengo et al., 2017). This event is considered the worst drought spell in the last 100 years (Marengo et al., 2017). Cyclical drought has unquestionably caused great socioeconomic damage in Northeast Brazil. For many years, this phenomenon has been identified as the main cause of poverty, reflecting a discourse that blames nature rather than the structural inequalities that are the primary cause of poverty in this region (Silva, 2003).

To fully understand the impact of drought in this region, we must also consider the role of conflicting human interests. Branco (2009, p.262) effectively captured this linkage: “Whereas there is in the semiarid Northeast Brazil a developed irrigated area devoted to production of fruits and vegetables for export, there is also a drought-prone area which is characterised by severe poverty, located in the same region. The population of this poverty-stricken and drought-prone area serves as a labour reserve to the irrigated, developed and wealthy semiarid area.”

Thus, the major challenge that faces the population in the semiarid area is found not in the droughts themselves, but in the concentration of land that consequently directs the control the water resources from other areas. During Brazilian history, due to constant droughts, the Northeast region has always been the target of government intervention. However, lurking beyond the emphasis on the natural conditions of this region are oligarchic interests in maintaining the historically rooted and systematic inequalities embedded within the political and socioeconomic structure (Oliveira, 1977; Bursztyn, 1984; Carvalho, 1987). According to Diniz (1999), to understand the action of the state in this region, it is necessary to perform a segmented analysis in different periods. The earliest interventions in Brazil were merely based on alleviation, characterized by ‘clientelism’ (Bursztyn, 1984). In this same period, the government adopted a reactionary approach that focused on alleviating only specific areas, in most instances, those working in the interests of large landowners (Diniz, 1999, 2002).

Afterwards, in the 1950s, a different phase was initiated, based on a forward-planning approach, that intended to ‘develop’ the region. This strategy change was a reaction to several social processes which had been observed in the Northeastern rural context during that period (Diniz, 1999). The pressure for change in rural society had increased, and

agrarian reform became the focus of grassroots organisations' agendas. The impetus for change in the land-ownership structure led the Northeastern rural elite to pressurise the state to control this hostile situation. The resulting instability in rural areas, and the imminent agrarian reform, were among of the factors that provoked a military coup in 1964 (Diniz, 2009). Because of this, difficult times began, resulting in the repression of any sort of democratic manifestation and removing the risk of agrarian reform in the terms demanded by the social movements; consequently, these measures brought security to larger landowners.

During the military regime, the model of agricultural boundary expansion was intensified. This model had a partially military characteristic, but economic goals were expected to be achieved through the export of commodities, particularly those resulting from intensive agriculture production (Ianni, 1979; Schallenberger and Schneider, 2010). The discourse of colonisation and the expansion of agricultural boundaries during the military regime was an enactment of the traditional and conservative, Brazilian land-ownership structure (Silva and Velho, 1981; Diniz, 1999, 2009).

Within the Northeast region, the focus was on specific areas where it was possible to maximise agricultural productivity (Diniz, 2009). In this period, the perimeter irrigation programme was presented by the military government as the solution to agricultural modernisation in the Brazilian semiarid region. The modernisation of agriculture and the discourse of colonisation were mechanisms used by the military regime to de-legitimise the claims for land reform presented by social movements. This project was supported by public funds, led by the National Department of Works Against Droughts (DNOCS) which operationalised the expropriation, land concession and management of plots in the irrigated basin of the Northeast (Bursztyn, 1984; Diniz, 1997).

In theory, within the irrigation areas, landownership structure should be compounded by different categories of producer: smallholders, medium holders, agricultural technicians, and companies (Pontes et al., 2013). However, the requirements imposed by DNOCS prevented family farmers from having access to plots in irrigated perimeter areas. These requirements were strict, and demanded that small farmers adopted the scale production model, with cornerstones such as mechanization and intensive use of agricultural inputs. This compelled small farmers to incur debts to follow a productive model, that was by itself, unsustainable to small farms. Afterwards, restrictive access, debts, high competition for resources and markets resulted in widescale displacement of small farmers from areas where the project was installed and its surrounding areas (Pontes et al., 2013).

According to Bursztyn (1984), the discourse used to sustain the irrigation programme was ineffective at producing action or generating reactions, because, in general, the project did not benefit smallholder farmers displaced from the areas where the irrigation project

was implemented, and thus forced those family farmers to migrate.

In 1982, the Brazilian Agricultural Research Corporation (EMBRAPA) published a book titled *The Coexistence with Drought*, which offered a new paradigm for production in the semiarid regions, respecting the ecosystem and coexisting with the climate. In the 1990s, several NGOs created the Articulation of the Semiarid (ASA). However, it was in the Third Session of the United Nations Convention to Combat Desertification (COP3) in 1999 that the ASA launched the Declaration of the Semiarid, affirming that coexistence with the conditions of the semiarid and in particular, with droughts is possible (Malvezzi, 2007). In 2003, the Brazilian government changed their approach and launched several policies designed to reflect the needs of the population that lives in the semiarid.

As our aim in this study is to examine the policies and interventions that are specifically created to benefit rural women, it is relevant to mention the One Million Cisterns Programme (P1MC). This project was created by the Articulation of the Brazilian Semiarid (ASA), unifying more than a thousand NGOs in the region. The Ministry of Social Development and Combat to Hunger (MDS) used participatory process for sustainable development to trigger a collective action among communities for sustainable coexistence with the semiarid ecosystem. Even considering that this programme was not directly connected to rural production, once this cistern's water has been set aside for drinking and cooking, it becomes an important means of sustaining the family and saving rural women time, since gathering water for household consumption has been regarded as a women's activity.

For many years in Brazil, the political discourse was centred on the drought as the cause of poverty in the Northeast, masking the real cause of poverty–inequality. The state measures to solve the issue of 'drought' relied upon 'clientelism' practices and infrastructure projects, such as perimeter-irrigation, that only benefits agribusiness companies in the region. However, a counter-movement has recently emerged in the region that aims to establish the coexistence between the Sertanejo (people that live in the drylands) based on agro ecological practices.

3.2.2 Rural Women in Chapada do Apodi

Chapada do Apodi, located in the West *Potiguar* in the state of Rio Grande do Norte, Brazil. Situated in the north of district of Apodi, this region has a semiarid climate, and caatinga¹⁷ is the primary biome. According to the Brazilian Institute of Geography and Statistics, or IBGE (2010b), the district of Apodi is 1,602 square kilometers in area and has 34,763 inhabitants; 49.0% of the population live in rural areas, and 48.1% of the rural

¹⁷Caatinga is a type of desert vegetation that is predominant in Northeast Brazil.

residents are women. In the last decades, the Human Development Index (HDI) score of this district increased from 0.357 in 1991 to 0.639 in 2010 (PNDU, 2013). Chapada has approximately 800 family farms divided into 55 communities.¹⁸ Figure 3.2 illustrates the four geomorphological areas in the region.

In the last decade, agro-ecological farming system practices adapted to semiarid areas and have spread across the Northeast in Brazil. Simões et al. (2010), demonstrated the possibility of the existence of alternative systems that promote adaptive capacity and inclusive development that respect the environment and local communities. Chapada do Apodi is acknowledged as a successful case of this kind of initiative and a national model of agro-ecological production in a semiarid climate (Moura and Moreno, 2013).

The typical experience of rural women in Chapada do Apodi is similar to that in other rural areas in Northeast Brazil. They usually marry young and are responsible for bearing and rearing children, growing food in their backyards, and making processed products for household consumption or to sell and they work along with men on the family plot. Despite these constraints and their relative lack of resources and political visibility, rural women in Northeast Brazil are neither passive nor vulnerable (Branco, 2009).

In West Potiguar, the growing body of evidence collected regarding the impact of women's organisations has been studied and linked to other social changes ranging from innovation in productive systems to social activism (Alves, 2007; Bezerra, 2013). Among the diverse range of organisations in which women in this zone participate, community-based organisations in agrarian settlements, labour unions, and cooperatives are central. Women's organisations in the area are framed under the rubric of popular feminism¹⁹, having been influenced by a regional feminist Non-Governmental organisation (NGO) called the March 8th Feminist Center (CF8), which was created in the 1990s. Since 2006, this NGO has been an important player in the implementation of rural development programmes for rural women in the region.

¹⁸These data were provided by the Rural Workers Union of Apodi (STTRA)

¹⁹Popular feminism emerged in the 1990s in Brazil. Sardenberg and Costa (2014, p. 59) defined popular feminism as a process through which "women of the popular classes articulated through neighborhood associations, factory workers, national union coalitions, rural workers through their various organizations begin to self-identify themselves with feminism."

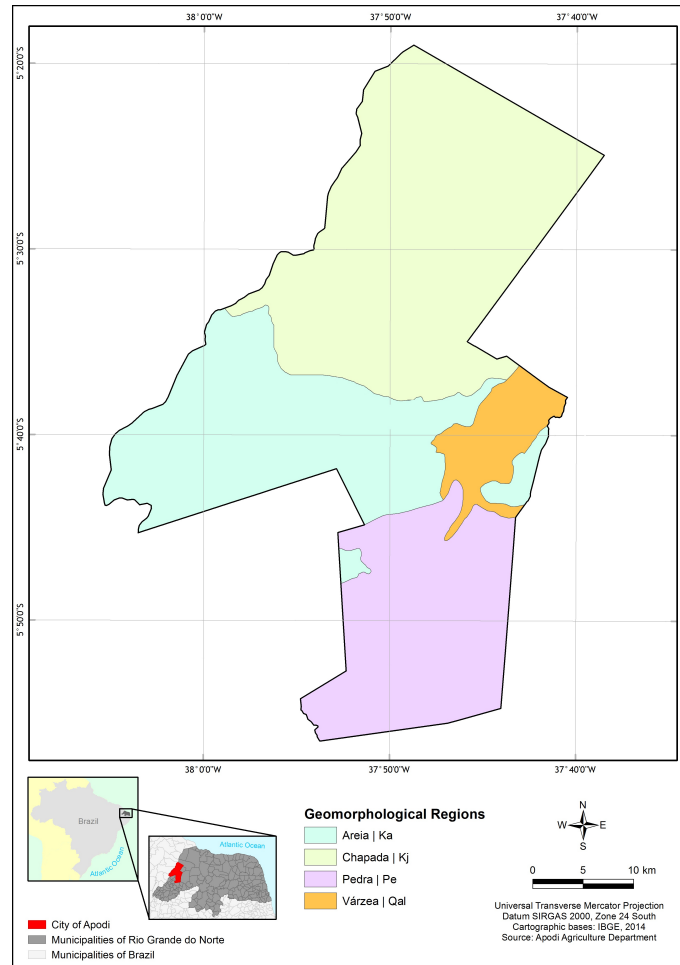


Figure 3.2: Geomorphological regions in Apodi, Rio Grande do Norte, Brazil.

The access of interventions targeted for rural women in this region is above the national average the territories (Alves, 2007; Bezerra, 2013). According to the Bezerra (2013), between 2006 and 2010, it provided 11,911 documents for rural women in the west potiguar, as part of the Programme of Rural Women Documentation (PNDTR). According to this author, the access of the PNDTR in this region was an important step, considering that without personal documentation, it is impossible to access rural development policies.

In the state of Rio Grande do Norte, 12 projects of technical assistance were implemented –ATER Women²⁰– between 2006 and 2013; three of them were implemented in Apodi. Six projects of productive organisation–POPMPR– were developed within between 2008 and 2013 covering the area studied (DPMR/MDA, 2015). As for women’s access to the National Programme to Strengthen Family Farming (PRONAF) in the state of Rio Grande do Norte, about 77,000 contracts named women as direct beneficiaries, and a total

²⁰The data do not include gender-based quotas in larger in mainstream projects.

value of R \$218 million²¹ was accessed from January 2013 to July 2016 (Brasil, 2016) A part of these interventions, the region studied was the target area served by a project implemented by the International Fund for Agricultural Development (IFAD). Chapada do Apodi was thus an ideal place to examine the research questions proposed in this study because: (1) this region is affected by cyclical droughts (and during our data collection, the region was facing the most severe and prolonged drought in decades); (2) local women residents there have been targeted by projects to promote rural women's empowerment.

3.3 Conclusion

In the first section, we showed that the effects of the women's movement were essential to the articulation of civil rights of rural women. Such a transnational articulation of women rights as an essential component of basic human rights strengthened the rights of Brazilian women. However, it was only in the last decade, under the Workers' Party administration, that rural women effectively progressed in their agenda, achieving access to interventions from which they had historically been excluded. Moreover, the creation of a rural women's policy agency in charge of gender-mainstreamed and women-specific policies helped orchestrate this process specifically to address rural women's demands.

The second section provided general information about the region of this case study. The vulnerability of cyclical drought in the area presents an important element in the context of any initiative linked to rural development in the region. The drought is depicted by the political interest as cause of the poverty of this region, hiding the real cause of the poverty in the region, which is that the concentration of land and other resources is tied to biased policies and purposefully obscures the Capital's interests. In Chapada do Apodi, for instance, the region that assimilated many elements of interest for this study, there is a history of women's organisations and access to government policies. Second, while there are feminist organisations in the region that important players in the delivery of policies in the region, unfortunately, the region has faced such a prolonged and severe drought crisis since 2011 that the access to policies has not been as pervasive as was hoped. Thus, the activity of the Feminist organisations in the region and the wounds that have occurred from such a long period of drought allow us to answer the core questions of this study. What could happen with rural women who were in the process of empowerment if the region is devastated by a natural hazard event? What factors could be associated with empowerment in such a situation?

²¹The total amount does not include the Agroamigo microcredit.

Chapter 4

Research Design

Chapter 2 and 3 covered the theoretical framework and the case study context that guided this research. This chapter focuses on the research design of this study. Since the aim of this thesis is to provide an analysis of women's empowerment in agriculture under drought conditions, we chose a mixed methods approach that is quantitative dominant. Using the embedded approach, where the qualitative dataset provides a supportive, secondary role for the interpretation of the results of quantitative dataset. To evaluate women's agency in each domain that influences empowerment in agriculture, the study utilizes quantitative methodologies. Moreover, by using quantitative methods, this study explores the factors that sustain women's empowerment in agriculture during a severe and prolonged drought. The qualitative data supports and assists in the interpretation of the quantitative outcomes; providing views of the actors involved, which is an essential component for placing the research in its underlying context.

While Chapter 5 and 6 will include in-depth details of each method (qualitative and quantitative), as well as data collection and analysis, this chapter focuses on outlining the research design. Section 4.1 introduces an overview of the mixed methods approach in social research, followed by the rationale for adopting the mixed methods in this study. Section 4.2 presents the correlational embedded model and how it was approached in this research. The last section discusses the researcher's attempts to minimise issues of reliability and validity.

4.1 Mixed Methods Brief History

Mixed methods research, the combination of quantitative and qualitative techniques, is chosen by researchers to provide a fuller, better understanding of an issue when the application of a single technique may not suffice (Greene and Caracelli, 1997; Tashakkori

and Teddlie, 1998; Creswell et al., 2010). Mixed methods research is defined by Johnson et al. (2007, p. 123) as “the type of research in which a researcher or team of researchers combines elements of qualitative and quantitative research approaches (e.g. use of qualitative and quantitative viewpoints, data collection, analysis, inference techniques) for the broad purposes of breadth and depth of understanding and corroboration”. Moreover, this approach is presented in the literature as a way of studying an issue holistically, that is as a practical and effective alternative for overcoming the weaknesses of using qualitative and quantitative methodology individually (Onwuegbuzie and Leech, 2004; Creswell et al., 2010; Johnson and Onwuegbuzie, 2004; Johnson et al., 2007).

According to Creswell (2011), the formative period of mixed method research occurred during the 1950s, but it became more popular in the 1980s. The crucial period for the consolidation of this methodology was during the 1970s, because of the intensification of the paradigm debate over whether qualitative and quantitative data could or not be combined (Creswell, 2011). Some researchers argued that these methods were incompatible because they are based on the assumption of opposing paradigms (positivism and phenomenologism) and thus could not be converged. However, this argument was challenged by Bryman et al. (1988), suggesting that there were methodological overlaps between both views. In the heat of this debate emerged the pragmatism perspective (Creswell et al., 2010).

For example, Morgan (2007, p. 73) argues that “the great strength of this pragmatic approach to social science research methodology is its emphasis on the connection between epistemological concerns about the nature of the knowledge that I produce and technical concerns about the methods that I use to generate that knowledge.” Yet Creswell (2013, p. 294) frames the argument as follows: “Pragmatism as a worldview or philosophy arises out of actions, situations, and consequences rather than antecedent conditions (as in post-positivism). There is a concern with applications—what works—and solutions to problems. Instead of focusing on methods, researchers emphasize the research problem and use all approaches available to understand it.”

In the literature of mixed methods, it is possible to find a variety of perspectives about whether this approach is a methodology (refers to the philosophical assumptions) (Van Manen, 1990), a design (plan of actions that is influenced by the philosophical assumptions) (Creswell, 2011), or a method (techniques of data collection and analysis) (Greene et al., 1989). Creswell (2013) contends that the mixed methods approach is a research design which is intrinsically influenced by the researcher’s philosophical assumptions and interpretative framework. Other researchers advocate that mixed methods should be considered a methodology that emphasises the philosophical assumptions of the researcher (Tashakkori and Teddlie, 1998). Moreover, several studies focus on the techniques involved and claim

mixed methods research is a method, focusing on the procedures of data collection and analysis (Greene et al., 1989; Onwuegbuzie and Teddlie, 2010). Mixed method research has been widely disseminated by academics from different areas, such as education, health, psychology, economics, etc., who have consistently adopted approach for their research and thus afforded mixed methods the status of ‘third research paradigm’ (Johnson et al., 2007).

For this study, mixed methods research was a valuable approach to bridge information that satisfies the complexity of gender relations and agriculture informed by interpretive and critical perspectives. Moreover, this study adopts the pragmatism as worldview because it places the research aims as the central axis for the development of all stages of this research. Approaching both deductive and inductive frameworks to achieve a holistic understanding of the phenomenon studied. Since the nature of this study is contextually specific and interdisciplinary, the inclusion of both quantitative elements and qualitative elements is essential because allow us a conclusion using the consistency of ‘numbers’ and providing a wider interpretative spectrum provided by the ‘agents perspectives’.

4.1.1 Mixed Methods Research in this Study: Women and Agriculture

Empowerment is a context-specific process and full of nuances (see Chapter 2). The inclusion of women’s empowerment in development goals sheds light on the need for an appropriate methodology to track its status and progression. The discussion about the qualitative and quantitative methods is relevant in this context, because while policy makers demand consistent data that can be compared across regions and time, practitioners and academics argue that it is critical to evaluate the process of empowerment by paying attention to the context-specific factors that most affect gender equality in the target region (Behrman et al., 2014).

In the area of quantitative research, a relatively recent but extensive body of academic research has developed methodologies to measure empowerment at the individual level, focusing on the assessment of agency, exploring sex-disaggregated data, individual experiences and behaviours across different dimensions (Narayan-Parker, 2005; Alkire, 2007; Alkire et al., 2013). Even though quantitative indicators are essential for evaluating interventions, the intrinsic limitations of quantitative analysis fails to capture the nuances and context-specificity of the data (Behrman et al., 2014).

Women’s roles and deprivations are not homogenous and vary according to the ‘environment’ that constructs them. For instance, to be able to appraise how gender relations affect women’s economic empowerment in rural areas, it is necessary to understand not only the political context, but the institutional, environmental, and social factors that

constrain or enable their autonomy and inclusion in agricultural activities (Quisumbing et al., 2014). Ignoring all these nuances could lead to incorrect interpretations of the quantitative data and the obscuring of important elements that are the cause of gender inequalities in any given context. In this case, qualitative research captures information that enables the researcher to explore the complexities intrinsic specifically to the targeted geographic area (Peterman, 2011; Behrman et al., 2014).

Only a research design that uses both qualitative and quantitative methods gives the researcher both, a ‘big picture’ perspective of gender inequalities in agricultural activities and an assessment of the impact of determined intervention upon a single targeted area. This complementary strategy brings the strengths of both tools to the analysis while minimising their limitations (Adato and Meinzen-Dick, 2007). According to Newman and Benz (1998) qualitative and quantitative approaches are not rigid and exclusive methods; they represent the distinctive ends of an entire research continuum.

Mixed methods research resides in the middle of this continuum because it incorporates elements of both qualitative and quantitative approaches (Creswell, 2013). Understanding that, the combination of approach provides a more convincing examination than an isolated method (Adato and Meinzen-Dick, 2007; Tashakkori and Teddlie, 2010). Bridging the qualitative methods provides a more complete evaluation and convincingly depicts the issue studied. Quisumbing et al. (2014, p. 49) argues that “qualitative studies have illuminated the different priorities of men and women and allowed researchers to better understand the dynamics behind separate men’s and women’s activities as opposed to joint domains of activities. Quantitative analyses of gender relations in agriculture have played an important part in convincing broader audiences about the statistical significance of relationships between gender equality and productivity, poverty reduction, and other development outcomes.” Thus, mixed methods allow one category of research to inform the other, and this connection expands the breadth and depth of the study, and it depicts a more accurate picture of gender relations in agriculture (Quisumbing et al., 2014).

4.1.2 Consideration of Mixed Methods Research

Due to its flexibility and amplitude, mixed methods research helps improve the understanding of gender relations in agriculture and rural development (Quisumbing et al., 2014). However, according to Greene and Caracelli (1997), the flexibility of mixed methods is not without costs. During the last decade, the mixed methods approach has become more and more popular in a variety of fields, and growth has been exponential in the social sciences (Johnson and Onwuegbuzie, 2004; Onwuegbuzie and Leech, 2004; Greene, 2007). However, it is critical to highlight some limitations of this mixed method research; in particular, the reliability and validity of the research and the problems allocating resources

to the study.

Dealing with the reliability

Reliability is concerned with the replicability of a piece of research. In quantitative studies, reliability is built on the consistency of measurement methods, and supported by statistics results (Tashakkori and Teddlie, 2010). On the other hand, the reliability of assessing qualitative research is controversial, meaning that it depends on the philosophical assumption that the study is embedded (Johnson et al., 2007). All the nuances and complexity that underlie human behavior will inevitably and arguably limit the replication of outcomes of a particular study. Kirk and Miller (1986, p. 70) state that “qualitative research conducted as science should complement nonqualitative science.” The central issue to the assessment of the reliability of qualitative methods is that it is not reasoned on cumulative data (Kirk and Miller, 1986). However, in the literature for both research paradigms, the central element to accomplish the reliability condition is the clarity about the research procedures (LeCompte and Goetz, 1982; Kirk and Miller, 1986). The replicability is conditioned by an explicitly and precise description of the strategic plan to collect data and perform analysis (LeCompte and Goetz, 1982). In this study, to minimise the reliability problem, I created a detailed research design, clarifying the methods and objectives assigned to each step of the study (see Table 4.1).

Dealing with the Validity

The second point regards the validity of research when using mixed methods. Validity is the term used to describe the quality of the data along with the outcome of a piece of the investigation (Creswell, 2011). In the literature, we found that there are two main categories of validity; internal and external. The internal validity regards not only the assertiveness of the results inferred in the study but also of the causality or associations between the events or variables within the study (Tashakkori and Teddlie, 1998, 2010). On the other hand, the external validity concerns to what extent research conclusions can be generalised across different contexts, groups, countries and so on (Dellinger and Leech, 2007).

According to Creswell (2013), several situations can threaten the internal and external validity of the study and potentially affect the assessment of the performance of the intervention of interest. Also, Creswell pointed out the need to identify potential threats to the internal validity of a study and develop a plan to restrain or minimise the effect of these threats, so that when they arise, the researcher is prepared. Threats to internal validity are defined by Creswell (2013, p. 223) as “experimental procedures, treatments, or experiences of the participants that threaten the researcher’s ability to draw correct inferences from the data about the population in an experiment.” Likewise, external validity threats occur when a ‘researcher’ draws incorrect inferences from the sample data

and generalises them to a wider context where they are actually not applicable (Creswell et al., 2010; Creswell, 2011).

Dealing with resource allocation

It is important to also note that mixed methods research demands more resources than single method approaches. First, the knowledge of both approaches –quantitative and qualitative– that, according to Greene and Caracelli (1997), may not be a problem, especially if the researcher has sufficient resources and time to pursue the standards with dual rigour. However, it is more common that the researcher needs to divide limited resources between the quantitative and qualitative components. The research capability of mixed methods study is often quite beneficial when performed by multidisciplinary teams or professionals (Onwuegbuzie, 2002; Creswell, 2011), but may be limited when performed by a single researcher. A similar constraint is found during the process of validity and reliability evaluation of the study. A clear idea about the distribution of resources is essential during the research design stage. A lack of resources or an uneven distribution of resources could compromise the rigour of the study because such a lack may lead to the neglect of a crucial piece of research.

Mixed methods research may also prove to be potentially more time consuming than single method research, and this is true as well for the present research. It is more challenging to conduct this kind of the investigation than to conduct a single methodological approach (Johnson and Onwuegbuzie, 2004). Because it implies collecting at minimum two sets of data and performing two different analyses that will be undertaken during various stages of the study. Also, it is a challenge to integrate the outcomes provided by the various data collection points and from different stages (Bogner et al., 2009). In this study, to minimise these challenges, we used an embedded model, as described in more detail in the following section.

4.2 Choosing Mixed Method Design: Embedded Correlational Model

For this study the embedded correlation model was chosen. The main premise of this model is that one dataset does not sufficiently answer the various research objectives proposed in the research, and therefore demands another dataset of a different type to fill in the gaps (Creswell, 2011). As Creswell (2013, p. 44) explains, “an embedded mixed methods design involves as well either the convergent or sequential use of data, but the core idea is that either quantitative or qualitative data is embedded within a larger design . . . and the data sources play a supporting role in the overall design.” In this model, qualitative data helps

explain the mechanisms and underlying context of the quantitative outcomes. Moreover, in an embedded experimental design, the qualitative data may be collected independently of the experiment and used to support or augment the larger design. In general lines, this design is particularly useful when a researcher needs to embed a qualitative component within a quantitative design to attend to specific research aims in a study (Creswell, 2011).

The definition of this model fits the characteristics of the current study, because here we have a study that is predominately quantitative, but requires qualitative data due to the dynamic and nuanced characteristics of gender relations. As stated earlier, the central aim of this study is to provide an examination of women's empowerment in agriculture and the factors associated with it during periods of severe drought. To accomplish this purpose, we used the Women Empowerment in Agriculture Index (WEAI) methodology and the Multivariate Probit model. Thus, the main dataset for this study is quantitative. For a supportive dataset, we gathered qualitative data in two steps, using two different methods (interviews and focus groups) and two different target groups (key informants and women farmers).

4.3 Research Design: Accomplishing Objectives and Ensuring Reliability and Validity

According to the literature on mixed methods research, the quality of mixed method research is defined basically by three components: (1) the clear assignation of research objectives for each stage of the study (Bryman, 2007; Creswell, 2011; Tashakkori and Teddlie, 2010); (2) the explicit and precise description of a strategic plan for data collection and analysis (LeCompte and Goetz, 1982; Kirk and Miller, 1986; Franklin and Ballan, 2001); (3) a structured plan for the possible validity threats in the study (Creswell, 2011; Tashakkori and Teddlie, 2010; Creswell, 2013). Tashakkori and Teddlie (2010) suggest that in mixed methods research there are potentially three different ways of stating research aims. The first way is to assign separate quantitative and qualitative aims, followed by a mixed method objective. The second way is to identify a predominant aim that is only achieved through a mixed method approach, and then divide that aim into separate quantitative and qualitative specific objectives. The third way is to assign different aims for each step of the study.

This study attempts to conduct the second alternative, allocating specific research aims for each phase of the study. This choice was made because using one method for each specific goal allows the processing of different pieces of information, and the relevancy of the collection of different perspectives to examine women empowerment in agriculture under prolonged drought period. In the first step, this study explores the strengths and

weaknesses in the process of women's empowerment in agriculture using the key informants interview technique. The second step is the administering of the survey that ensures the consistent collection of detailed information related to the domains of empowerment in agriculture and the factors associated with empowerment in agriculture under drought. The third step is the formulation of focus groups. In this phase, our aim is to explore the perspectives of women farmers' on their agency and the factors that they perceive as enablers in the process of empowerment in agriculture under drought conditions.

To ensure the reliability of this study, a strategic plan was designed following the steps designed for each aim see Figure 4.1. More detail about the methodology used in each stage will be discussed extensively on Chapter 5 and 6.

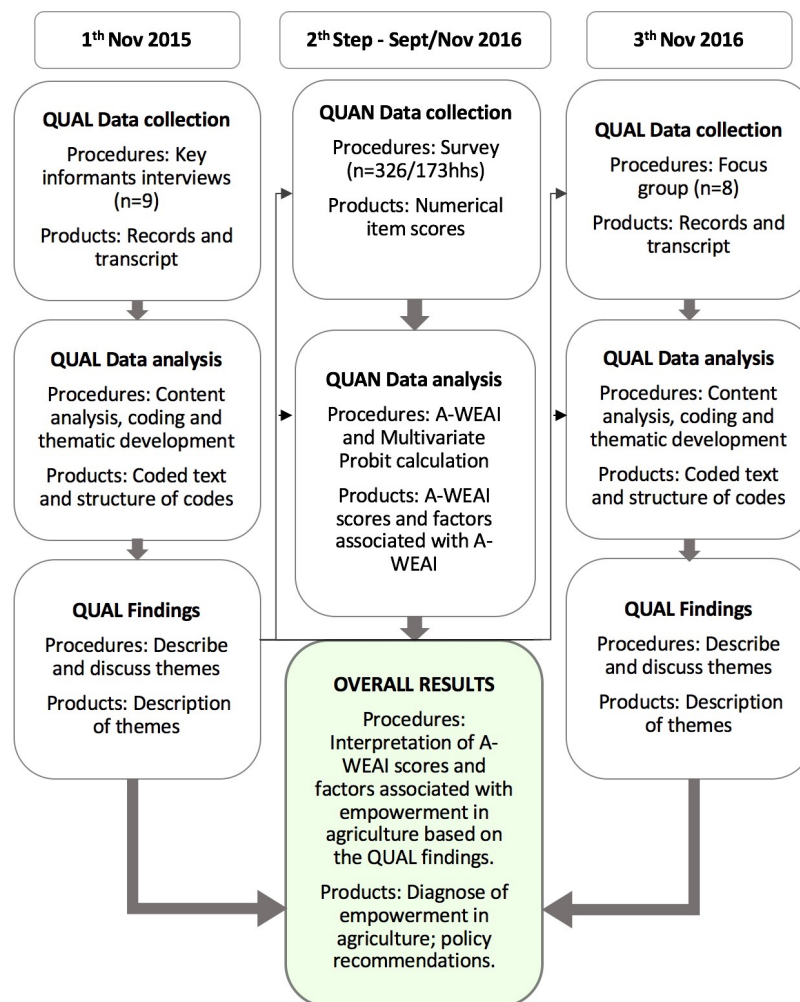


Figure 4.1: Diagram of the procedures used to embed mixed methods research (qual→QUAN) to diagnose women's empowerment in agriculture.

The data collection in the first and third stage was performed using qualitative methods

(interview and focus groups, respectively). However, the targeted groups were different; the first stage targeted key informants and the third stage targeted women farmers. This allowed us to capture the information and perspective of different actors involved in the process of women's empowerment in Brazil (such as policy makers, activists, academics and rural women). The findings of this stage was later combined to support the interpretation of the quantitative results (Creswell, 2011, 2013).

The second stage was based on quantitative methods. The target groups were women and men farmers in the region being studied. The data collection was performed using questionnaires from 173 households. This methodology was chosen for the consistency and objectivity it provided which are a critical components for the elaboration of a diagnosis. The adapted version of the A-WEAI was calculated and then based on the individual scores of the sample; the factors positively associated both with gender parity and women's empowerment in agriculture were estimated. The procedures adopted in this stage were the WEAI methodology to the index calculation and the Multivariate Probit model estimation. The findings derived from this stage were interpreted by the findings collected during the first and third steps.

To avoid potential threats to the validity, we identified some elements that could potentially affect both internal and external validity. In general, the threats to internal validity were based on the translation of the transcription in the qualitative methods and the data collection across all stages. The external validity can be potentially threatened by the sample size of the survey, and the climatological conditions that faced the targeted region during the data collection and before. More detail about each threat is specified in Table 4.1.

Table 4.1: Threats to internal and external validity and actions to mitigate them

Threat	Step	Description of threat	Actions plans
<i>Threats to Internal Validity</i>			
Translation	Interview and Focus group	Because the interviews are conducted in Portuguese, there is a risk of loss in the content and meaning of the material collected.	The coding will be performed in the texts in Portuguese (native language of the researcher), and the structure of themes translated.
Political bias	Interview	Because several key informants are in administrative positions in the Workers' Party, there are a risk of political bias.	We will include some informants from the movements who had never been in executive positions in the government.
Participation	Focus group	Some participants tend to control the discussion and influence the answers of the other participants.	We will approach all participants in each round of questions in an attempt to bring them into the discussion and encouraged them to express their personal opinions and motivations
Data collection	Survey	During the week days, it is difficult to find both women and men within the households.	We will concentrate the research efforts during the weekends to find both individuals at home
Questionnaire time	Survey	The questionnaire is time consuming, taking between 45 minutes to complete.	We will perform trainings with the enumerators and the questions will be adjusted according to the pretest outcome and enumerators' feedback.
Questionnaire complexity	Survey	The questionnaire is complex and due the low literacy of the target groups the respondents struggle to understand the questions	We will adjusted the questionnaire to the 'local vocabulary' and add examples in below the problematic questions.
<i>Threats to External Validity</i>			
Sample size and region	Survey	Because of the budget constraints, this study is limited to a micro-region (case study)	We will restrict the claims to the targeted region and specified that the results cannot be generalized.
Climate conditions	Focus groups and Survey	Because the region is facing a period of severe drought, the dynamic in the households changed. (e.g. Men were working in waged work and women at the farm)	We will restrict claims to the drought crisis scenario and specified that the results cannot be generalized to other conditions

4.4 Conclusion

This chapter discussed the research design options evaluated for this study and provided a rationale for the methods that were chosen. First, we decided to use a mixed method research for the study, because mixed methods approach is the most appropriate methodology for addressing the context specificity that is involved in the issue of gender relations in agriculture. The combination of qualitative and quantitative methods in this study functions as support, with the qualitative method giving interpretation to the quantitative outcomes, mitigating the flaws of a purely quantitative study and providing more robustness to the results.

To address the issues related to the reliability and validity of this study we provide the diagram of procedures describing each step that was taken to accomplish this study. Furthermore, to address the validity threats, we elaborated on the constructed action plan to describe adopted measures for each identified threat. More details about the limitations of this study will be provided in respective chapters.

For this study it was essential that the qualitative stage provide the context for understanding the meanings, processes, and elements that surround the process of women's empowerment in agriculture. These nuances could not be captured by any single quantitative instrument. In the next chapter, we will detail the procedures and results of the qualitative part of the study.

Part I

Qualitative Study

Chapter 5

Understanding Women and Agriculture in Chapada do Apodi

Keeping in mind the research design of this study presented in Chapter 4, this chapter addresses the qualitative component of this study which is used to interpret the quantitative findings. The research objectives examined this chapter are: (1) to identify strengths and weaknesses in the process of women's empowerment in agriculture in Brazil; (2) to examine rural women's perceptions about their agency and the factors that they perceive as enablers in the process of empowerment in agriculture under drought conditions.

To achieve these objectives, this chapter is divided into three sections. The first section outlines the method, data collection and analysis strategy. Providing in detail the procedures used to target and select the participants, the design of the guides used in the data collection, and the process we followed for conducting the data collection. Moreover, in the same section, we discuss the strategies used to analyse the data at this stage of the present study.

The second section presents the results and discussion, divided by each targeted group (key informants and rural women). Moreover, these sub-items are organised using the main themes of the coding process. The last section provides a comprehensive picture of the collection process and analysis of the quantitative data. Besides, a summary of the main qualitative findings, used as supportive data in the interpretation of the quantitative results, is provided.

5.1 Methods, Data Collection and Analysis

This section presents the qualitative methods, data collection and data analysis procedures of the qualitative components of this project.

5.1.1 Interview Approach: Exploring the Subject

In the qualitative components of this mixed methods research, we use two different techniques of interviews a key informant interview and a focus group (or group interview). According to Kvale (2006, p. 481), “in qualitative interviews, social scientists investigate varieties of human experience. They attempt to understand the world from the subjects’ points of view and to unfold the meaning of their lived world. The interviews give voice to common people, allowing them to freely present their life situations in their own words, and open for a close personal interaction between the researchers and their subjects.”

The interview can be conducted with an individual or in a group setting, and there are three major interview categories: The first type is the structured interview; in this methodology, a questionnaire is used and applied without variation to all participants. The second type is the unstructured interview; this method is performed with little or no structure. Finally, the third is the semi-structured interview, where it is used a guideline to provide a guidance about the areas to be explored, but there is not a rigid structure (Flick, 2009). In this mixed method study, we used the semi-structured interview, more details are provided in the next section.

An important discussion regarding the interview approach that is the most relevant for this study regards neutrality. Fontana and Frey’s provocative analysis pointed out that “much of traditional interviewing concentrates on the language of scientific neutrality and the techniques to achieve it. Unfortunately, these goals are largely mythical.” (Fontana and Frey, 2005, p. 696). Several studies note that interviewing is not a merely a neutral exchange of asking questions and getting answers (Holstein and Gubrium, 1995; Scheurich, 1995; Atkinson and Silverman, 1997; Fontana, 2002). Instead, it is an active process where the participants (two or more) are bound by the contextuality of their backgrounds, and that mutually create the narrative of the interview (Holstein and Gubrium, 1995). This perspective provides the social scientist with an enriched tool that expands the rigid “whats (the activities of everyday life)” towards an inclusion of the “hows of people’s lives (the constructive work involved in producing order in everyday life)” (Fontana and Frey, 2005, p. 698, italics in original).

Contextuality is an intrinsic element in this study due to the nature of the central subject researched: empowerment. Thus, this ‘empathetic perspective’ of interview allows us

to collect more elements, not only reporting the ‘whats,’ but also enriching the contextual ‘hows’ for our analytical framework. The purpose of this phase is to provide a wider understanding of the context, exploring the perceptions that surround the issue of women’s empowerment in agriculture in Chapada do Apodi. In the following sub-sections, we explore in detail both techniques of collecting qualitative data used in this mixed methods study, the key informant interview and the focus groups, as well as the procedures and strategies specific to each.

5.1.2 Key Informants Interview: Methods and Data Collection Strategy

In this stage, we approached a face-to-face, semi-structured interview with key informants to identify strengths and weaknesses in the process of women’s empowerment in agriculture in Brazil. In contrast with the characteristics of the data collected from non-key informants, which usually relies only on their feelings, views, and behaviours, data from key informants provides deeper insights and a more thorough critical analysis of the issue being researched (Seidler, 1974). According to the literature, the main reasons for using a key-informant interview are it: (1) helps the researcher collect quality data in short period of time, (2) provides access to information that may be unavailable during other aspects of the research, and (3) aids in a better understanding of the context where the issue is inserted (Crabtree and Miller, 1999; Bogner et al., 2009; Flick, 2009). This method is suggested in the literature as a complementary instrument to a larger study, since the smaller, more concentrated focus afforded by such a contained group is ideal to impart depth and complement multimethod studies (Flick, 2009). The next subsection addresses the process of targeting and selecting participants, the design of the guides, and the procedures used in the conduction of the key informant interview and focus groups.

Targeting and Accessing the Key Informants

The identification of key informants is essential for obtaining quality data by using this approach. According to Marshall (1996), key informants should occupy a position in society that exposes them to the information desired. In this mixed methods research, as criterion we agreed the informant should be involved in or have deep knowledge of the political process which concerns the struggle for rights of rural women in Brazil. She or he could be in different institutions—such as academia, policy makers, and women’s movements or any other form of civil society organisation—but should still have extensive knowledge, regardless of position or the type of institution. In this stage, we followed a four-step protocol: to identify institutions, to contact the appropriate participants, to

arrange interviews, and to confirm the participation. This protocol started in June of 2014 and was finalized October of 2014.

Parallel to the first step of identifying institutions, we performed a literature review to help distinguish the academics who have specific knowledge of the situation of rural women in Brazil. To select members of organised civil society and women's movements an additional criterion was applied—they should operate in the Northeast of Brazil. This requirement was included because the research is targeted in a district in the centre of Northeast region. After searching in publications and institutional websites, we compiled a list of 35 potential key informants.

During the second step of the process, we contacted the 35 potential informants by phone in order to establish the first contact, presenting the study to them, and persuading them to participate. In several cases, the contacts were made with one of the informant's assistants, and he or she was the one who arranged the phone appointments after we sent invitation e-mails with all information (a brief of the study and a description of the institutions involved and how the data would be used and the confidentiality of the material collected).

In the third step, due to budget constraints, the interviews needed be scheduled in the same period. We consistently followed up with the participants (or their assistants) to arrange a date that optimized operational costs. The number of attempts varied from three calls to 16 calls (registered in the follow-up-spreadsheet) to each participant that agreed to participate. As a result, 12 interviews were scheduled for November 2014. Once potential participants agreed to participate in the study, the final step of reminding them and ensuring their participation in this study was performed.

Designing Guide and Conducting the Key Informant Interview

As we mentioned above in this study we used semi-structured interview. To maintain the focus on the subjects that are relevant for our study, we used open question guide (Arksey and Knight, 1999). As the interviewees are experts in the matter, the questions were designed to collect in depth data on their experiences, knowledge and perceptions of the subject area (Seidman et al., 2004).

The questions of the interview guide were designed to obtain data concerning the key informants' perceptions about the process of promoting women's empowerment in agriculture, within the national and regional dimensions of Brazil. Key informants were asked to identify the strengths and weakness in the process (see Appendix A). The pre-test of the interview guide was administered in July 2014 with a policy maker who shared, during a video call, first-hand experience with the women's empowerment in rural areas

in the South region in Brazil.

Of the 12 interviews scheduled, we only managed to perform nine. Some key informants requested to reschedule their appointments for another month, but due to the operational costs, it was not possible. The interviews were performed in November 2014 in the cities of Brasília, Natal and Mossoró. Table 5.1 illustrates the profiles of key informants. It is interesting to highlight that there is a certain fluidity regarding the category of the institution to which the interviewees belonged. For instance, all policy makers interviewed had worked previously in women’s movements, feminist NGOs or in academia. Unfortunately, it was not possible to recruit participants exclusively from academia. It is important to highlight too that the structure of administrative institutions in Brazil changed drastically in 2015, as well the current profile of professionals in the governmental organogram. This fluidity between types of institutions and the inclusion of activists and practitioners in executive positions was a characteristic of the Worker’s Party administration.

Table 5.1: Profile of key informants

Code	Category of Institution	Position	Previous Institutions
PM1	Government	General Director	Academia and Social Movements
PM2	Government	Director	Academia
PM3	Government	Programme Officer	Academia and Social Movements
PM4	Government	Programme Officer	Social Movement
PM5	Government	Deputy Director	Social Movement
SM1	Social Movement	Adm. Officer	-
SM2	Social Movement	Director	Academia and Government
SM3	Social Movement	Director	Academia and Government
SM4	Social Movement	Director	Government

To perform the interview, a protocol was followed carefully during all three phases of the interview process: preparation, conduction and post-interview. The preparation step consisted of testing and recharging the two recording devices used in the interview, printing the consent forms, and checking the stationery needed to take notes. The researcher also studied the interviewee’s profiles (professional trajectory, publications and other relevant information) to establish a respectful and trustful first contact (Easterbay-Smith et al., 2008).

The conduction of the interview was performed in stages. At the beginning of each interview, the researcher introduced herself and the study, the aim of this research, and the use of the information provided. Notes were taken by the researcher during the interviews to spot any irregularity or particularity. After the introduction, the researcher started with the questions in the guide. The guide was used not only to cover the important themes, but also to adhere to consistency in the data collection across key informants (Rubin and

Rubin, 2011). However, the conduction of the interview was flexible, allowing the key informant to introduce new topics even if it was not included in the main questions.

To guide the topics that emerged in the interview, the researcher used follow-up and probing questions (Bryman, 2006; Rubin and Rubin, 2011); for instance, the theme to identify strengths, the women's produce organisations using their networks to combat the violence against women in their communities. Four interviewees mentioned that these networks forced the banishing of aggressors from the local organic-farmer's associations; one of the key informants said that "the plant is not organic if it is free of agro-toxics but wet with women's blood." However, in order to not lose focus of the research a large amount of information was ultimately not used in this study.

At the end of the interview, two copies of the consent form were signed, one copy remaining with the researcher, and the other given to the participant. The length of the interviews varied from participant to participant, but on average lasted around one hour. The post-interview step consisted of an email with the transcription of the interview. In this email, we asked the participant if he or she had any concerns about the content of the interviews. There were only a few comments that were clarified using the audio records.

5.1.3 Focus Group Approach: Method and Data Collection Strategy

Focus groups aim at exploring people's views and experiences regarding subjects that affect their lives. The focus group (or group interview) is a qualitative method of gathering data which consists of "systematic questioning of several individuals simultaneously in a formal or informal setting" (Fontana and Frey, 2005, p.703). The focus group can be used to achieve a large range of objectives, such as exploratory, triangulation of results or phenomenological (Flick, 2009). The cost and flexibility of this methodology is an advantage of this method, but the generalization of the results is risky, to some degree, because the group might be influenced by one participant (Fontana and Frey, 2005).

According to Guest et al. (2017), the literature regarding the number of focus groups needed or number of participants are inconclusive and unsupported by empirical data. Guest's study suggests that more than 80% of all themes are discoverable within two to three focus groups and the most prevalent themes within a dataset with only three focus groups. The following three subsections address the process of participant selection, the design of the guide, and the procedure for conducting the focus groups.

Selection of Focus Group's Participants

The procedure for targeting participants for the two focus groups was more flexible than the interview selection of the key informants. The only criterion for participating in the focus groups was that the women should live in one of the communities wherein the quantitative data was collected and be involved in agricultural activities. First, we invited women to participate in the focus groups during the process of the quantitative data collection; the enumerators collected the phone numbers of the women interested in participating in the focus groups. Afterwards, we made a list of women who had the availability to participate and classified them according to the category of farm (non-land reform and land reform). The initial list included 51 women who mentioned they could participate in the focus groups.

It is important to highlight some of the key differences between these two categories. The first characteristic is that women who are in land reform farms have a strong connection with the participation of social and women's movements (see Section 3.1). This fact gives them an advantage in terms of organisation and is an essential element in terms of the exercise of active citizenship and participation in spaces of political dialogue. Another important difference is that participants from the land reform communities tended to live in houses that were grouped together enhancing the socialisation between them; whereas in the case of the non-agrarian reform households, the houses are far from each other, and such a distance might keep women in this category more isolated.

Once we selected the participants of the focus groups, we contacted the leaders of several communities in an effort to find spaces that could facilitate the group meetings; two of the community leaders offered the use of their association's facilities. Based on the location of the two available facilities, we selected and contacted the participants in those communities and those nearby. Initially, we planned to perform two focus groups with seven participants each and one group from each category of farm (non-land reform and land reform). However, one day before the focus groups, we contacted the community leaders to confirm final arrangements, and the non-land reform community leader informed us that the facility was no longer available and could not be rescheduled in the coming days. This phase of the study could not be extended due to the project's budget and time constraints. As result, we performed only one focus group. Eight women participated in the remaining focus group, all of them from the category of land reform.

Considerations during the Data Collections

To conduct the focus group, we decided to hire a local interviewer. We made this decision because of the political upheaval at the time of the fieldwork. This period was characterised

by regional polarisation (north–south) that escalated with the re-election of President Dilma Rousseff in 2014. The Workers' Party (PT) has held the presidency for the past 12 years, gaining widespread support in the north and northeast for reducing social inequality and promoting development that went beyond social assistance and included investment in infrastructure, new federal universities, rural electricity and water programmes as well as government subsidies to attract new businesses and jobs. Almeida (2018) argues that the political polarisation in Brazil reflects the social inequality present in Brazil. In general, Almeida finds that factors such as the prevalence of the social programme Bolsa Familia, low rates of water provision, and low average education rates all make it more likely that an area will vote for PT and its candidates. According to Almeida this pattern of political preference has a racial component too, with black and pardo (mixed race) Brazilians, who are more heavily concentrated in the northeast, more likely to vote PT than whites. This north-south polarization was evident in the social media where during the post-election period was scenario of assaults against the Northeastern population, using racists and elitist components.

Considering this context, and the fact that fieldwork activities were in the northeast region, the researcher, who is from the south, found it prudent to hire a local interviewer to conduct the focus group to avoid suspicion and reluctance among the participants in sharing their experiences. Indeed, the interviewer's experience and local accent and vocabulary made the participants felt more confident and relaxed. However, even in such a situation, we received a report from one local leader informing us that the second focus group (see section 5.1.3) was cancelled because one of the participants was dismissed from the Bolsa Familia programme, and they associated this fact with the presence of our team in the area a few weeks before.

Designing Guide and Conducting Focus Group

The focus group guide was utilized to track the objectives of this research (Arksey and Knight, 1999). The importance of the guide was addressed in Section 5.1.2. The purpose of the guide was to gather the rural women's perceptions about: (1) the agency they have over agricultural activities, such as decision-making and control over assets, and (2) the factors that enable them to resist during a drought situation (see Appendix A).

To help meet the needs of the participants, as all of them have school aged children at home, the focus group was performed in the morning when children were in school. For the women with children who were not in school, we provided toys in the room to keep the children distracted.

The focus group followed a protocol that was divided into two steps: preparation and

conduction. The preparation step consisted of meetings between the interviewer and the researcher to explain the project and to align the procedures with the focus group. To prepare, we tested and recharged the two recording devices used in the interview, checked the stationery needed to take notes, and bought the toys used to entertain the toddlers. Also, final confirmation calls were made to the participants.

In the beginning of the interview, we offered a breakfast and we socialised with the group to create a positive atmosphere throughout the interview. Afterwards, we started the conduction phase with a brief presentation of project, and we obtained participation consent from all participants. Due to the high level of illiteracy in the region, we considered that obtaining a signed consent form might be a barrier to participation in the study, so we collected the consent of the participants verbally.

During conduction of the focus groups, all participants were invited to answer the questions. The guide was used to keep the focus on the questions relevant to the research (Arksey and Knight, 1999). However, when we noticed important new topics being introduced by participants, we intervened, asking probing follow-up questions to the participant who raised the point, and inviting the others to participate in the discussion (Rubin and Rubin, 2011; Bryman, 2015). The focus group meeting lasted three hours; one hour for breakfast and two hours for the focus group itself. The participants' range of age was from 20 years old to 59 years old. Only one participant lived in a household without a male counterpart. All of the participants had children and/or grandchildren under seven years old in their households and three had children or grandchildren under three years old at home.

Table 5.2: Profile of rural women participants in the focus groups

Code	Category of Farm	Age	Head of household	Children < 3 yrs
LR1	Land Reform	40	No	No
LR2	Land Reform	34	No	Yes
LR3	Land Reform	53	No	No
LR4	Land Reform	47	No	Yes
LR5	Land Reform	20	Yes	Yes
LR6	Land Reform	32	No	No
LR7	Land Reform	36	No	No
LR8	Land Reform	59	No	No

At the end of the focus group, the interviewer read and delivered a document signed by the researcher along with the study information, reminders of how the information would be used, and privacy policy on collection of data. After the interview, I transcribed the focus group and compiled all notes. Overall the focus group development was satisfactory. Despite the setback faced in this phase, we collected valuable information. The next

section addresses the ethical considerations of this process.

5.1.4 Ethical Considerations

The Faculty of Science Agriculture & Engineering Ethics Committee (based on the SAgE Ethics Guidelines¹) reviewed and approved all the stages of data collection for this project. The ethical concerns revolved around two topics: informed consent and the right to privacy. For the key informants, the invitation letter included a briefing that listed the research objective and the institutions and academics involved in the project. At the end of the interview, a form was signed by the interviewer and interviewee as a guarantee of privacy and an assurance that the data would be used solely for academic purposes. For the focus groups, the informed consent was obtained orally; before the start of the group interview, the researcher explained the purpose of the study, the terms of confidentiality, and how the data would be gathered and used. Permission was then received individually and recorded.

5.1.5 Data Analysis Strategy: Content Analysis

To analyse the transcription of the qualitative data, we use content analysis methodology, which extracts information from a large set of data, commonly verbal, using a systematic, replicable, and objective process (Krippendorff, 2012). This methodology allows researchers to reduce a large body of data and transform it into manageable figures through an impartial and reliable procedure (Berelson, 1952; Krippendorff, 2012). Content analysis is commonly used to analyse different methods of communication through the transformation of raw data into a standardized form (Berelson, 1952; Holsti, 1969; Smith, 2000; Babbie, 2015). According to Smith (2000, p. 317), “content analysis is the primary method of obtaining information from responses to unstructured household where there was not a male counterpart participating in the decision-making process or open-ended questions.” Primarily, this methodology was developed with the main purpose of analysing content in the data, both quantitatively and literally (Berelson, 1952). The content analysis could be applied as both quantitative and qualitative approaches (Morgan, 1993; Krippendorff, 2012).

According to Hsieh and Shannon (2005, p.127), qualitative content analysis is a research method “for the subjective interpretation of the content of text data through the systematic classification process of coding and identifying themes or patterns.” Kracauer (1952), argues that content analysis should be not only about quantifying words or pat-

¹Newcastle University ethical code and other guidelines are available at http://www.ncl.ac.uk/res/research/gov-ethics/ethics_procedures/policies/index.htm

terms in the text, but also about providing evidence for context and for possible interpretations. Additionally, Mayring (2002) maintains that qualitative content analysis attempts to overwhelm the limitations of quantitative content analysis through a systematic analytical approach in the text analysis. The overarching umbrella of qualitative content analysis methodology is further broken down into three different interpretative methods of analysing data: conventional, directed and summative (Hsieh and Shannon, 2005).

In this qualitative stage of our mixed method study, the direct approach was applied because of the characteristics of the research questions. As there is a substantial pre-existent theoretical framework about the phenomenon studied, this particular methodology was chosen as the best method for identifying key codes (Potter and Levine-Donnerstein, 1999; Mayring, 2000; Hsieh and Shannon, 2005).

Coding Strategy Used in this Study

All key informants' interviews and the focus group were recorded and completely transcribed in the original language (Portuguese). The analysis of the data was performed separately according to the research objective in this mixed method study; first, we analysed the key informants' interviews and later the focus group. To analyse the qualitative data, we used the software NVIVO version 11. The preliminary structures of codes (interview and focus group) were established based on the guideline questions, according to the recommendation found in the literature (Potter and Levine-Donnerstein, 1999; Mayring, 2000; Hsieh and Shannon, 2005).

The first step of the coding process was the identification of preliminary sub-codes. Hence the preliminary structure of codes and sub-codes were established, we carefully reviewed the code structure. Upon finishing the coding process, all the codes were carefully analysed, and some of the preliminary codes were eliminated whilst others were merged. This stage was needed in order to keep from losing focus on the research aims. The criterion used to define whether the code should be kept, merged or eliminated were: (1) the recurrence of the themes in the narratives; and (2) if the theme attends the research aims. After the definition of the final structure, the codes were translated into English.

5.2 Results and Discussion

This section presents the main results and discussion from the key informants' interview and the rural women's focus group. The perceptions of those involved in the process is helpful for explaining the quantitative results that will be discussed in Chapter 8. The first subsection initially explores the key informants' perceptions about the factors identified as

strengths and/or weakness in the process. In the same subsection, we also examine the interventions that, according to informants' understanding, contributed to the advancement or constraint of their conditions as rural women in the last decade. The second subsection builds on the women's perceptions about their agency and the factors that they perceive as enablers under drought conditions. Table 5.3 and 5.4 present the code structure.

Table 5.3: Key informants interview code structure

Coding structure	Sources	References
Rural women's policy agency	8	16
Integration of policies	7	17
Alliances between movements and state	9	21
Farming household unit	9	16
<i>Total</i>	<i>9</i>	<i>70</i>

Table 5.4: Rural women focus group code structure

Coding structure	Sources	References
Consciousness enhancement	8	20
Decision-making process	7	14
Credit access	6	13
Farmers' organisation	7	14
<i>Total</i>	<i>8</i>	<i>61</i>

The subthemes are integrated in a narrative that tells the informants views and it is supported with corresponding quotes from the participants. Quotes are verbatim, the information in square brackets [xxx] indicates the authors' edition and (. . .) indicates that the text has been removed.

5.2.1 Under the Key Informants Perspectives

The first part of this section critically considers the factors pointed by the key informants as strengths, and weakness for rural women's empowerment in Brazil. The factors perceived as strengthens were the alliances between the women's policy agency and women's movements. On the other hand, the main weakness identified by the key informants was the use of 'family' as the target for rural development policies.

Alliances to Promote Changes: Rural Women's Policy Agency and Women's Movements

The analysis of the qualitative data (step one in Figure 4.1) in this mixed methods research indicates that the most relevant strengths in the process of rural women's empowerment

in the Brazil was the presence of the rural women's policy agency², the Directory of Policy for Rural Women (DPMR) and the alliance forged between this agency and rural women's movements.

The presence of women's policy agency in the rural context was identified as central strength in this process. The milestone of this process was the creation of the Special Secretariat for Women's Policies (2003) which promoted the inclusion the women's movement agenda across the state apparatus using a "participatory state feminism," and including the state as a potential ally in the transformation of the condition of women (Sardenberg and Costa, 2014; Sardenberg et al., 1999). Within this context, the Brazilian government created a rural women's policy agency –the DPMR– in the Ministry of Agrarian Development (MDA).

Our findings suggest that the relevance of the DPMR not only resides in the government recognition of rural women as *agricultora* (farmer) and provision of access to citizenship through policies and statutory laws but also by the establishment of channels to political articulation of the rural women's agenda within the state apparatus. For example, as one informant outlined:

In my opinion, the milestone in this process [rural women's empowerment in Brazil] was the creation of the rural women's policy agency. With the creation of the DPMR, they [rural women] gained visibility and space within the state machinery. This structure provided to use tools to advance in the process but, the pathway was not easy, believe me, the advocacy of rural women's agenda and materialise it in a public policy was not straightforward. The resistance is huge because the patriarchy is everywhere, but at end we've gained space. In my understanding, the relevance of the DPMR is the state recognition of rural women as a constituency of rights. (PM3)

From this extract, it would seem that the presence of the women's policy agency was important for the articulation of the rural women's agenda. Studies suggest that women's policy agencies are an essential component in the promotion of gender equality³ (Woodward, 2003; Hafner-Burton and Pollack, 2009). Also, previous studies show that the creation of women's policy agency can be, in certain way, a form of resistance within state apparatus, and challenge the dominant patterns in these spaces (Weldon, 2002a).

²The first agency intent to incorporate the demands of the rural women's movements was with the Programme 'Promotion of Gender and Ethnic-Racial Equality in 2003. This programme later became the Special Advisory of Gender and Ethnic-Racial Matters (AEGRE) in 2005. Later, in 2008, the Directory of Policy for Rural Women (DPMR) was created as an agency connected to Ministry of Agrarian Development (MDA).

³Studies in European countries.

Moreover, our results suggest that certain characteristics of the DPMP were conducive to the advances in public policies targeted to rural women. As outlined below by one of our key informants:

The creation of rural women's agency with status of secretary, with its own budget, staff was an essential element in the advance of the rural women condition in Brazil (...) these components provided to us [DPMP's staff] certain degree of autonomy. And, it is important to be heard here [Ministry of Agrarian Development]. (PM4)

In fact, this agency had the status of secretary (thus, close to power), policy-making capacity, and administrative resources (administrative divisions, staff, and budget) as mentioned by other researchers (Hora, 2014). This finding is consistent with that of Delgado (2007) who analysed the feminist political participation under the Worker's Party administration⁴ in Brazil; she argues that women's policy agencies located in higher position within the executive organisational structure are more efficient in the political articulations (horizontally and vertically) within the state apparatus. Similarly, previous studies demonstrate that women's policy agencies that have politico-administrative resources tend to be more successful in achieving feminist policy and gender mainstreaming (Rai, 2003; Staudt, 1997; Weldon, 2002*a*; Malloy, 1999). Rai (2003) mentions that there are certain elements that are critical to success of women's policy agency: "(1) location [at a high level] within the decision-making hierarchy [and authority] to influence government policy; (2) clarity of mandate and functional responsibility; (3) links with civil society groups supportive of the advancement of women's rights and enhancement of women's status; (4) human and financial resources; and (5) accountability of the national machinery itself" (p. 26).

Also, our data suggested that although the presence of an autonomous rural women's policy agency is important, it does not guarantee the progress of rural women's conditions. As Weldon (2002) argues, the "representation of women in democratic policy process" is only achieved by the interactions and alliances forged between the women's agency and women's movements (p.1167). The alliance between these political actors is the second central theme that emerged in our qualitative analysis as strengths of the process of empowerment. According to our informants, these alliances were central to the policy process, allowing the design of a portfolio of policies that attends rural women's 'real

⁴The literature about feminist policy suggests that left-wing parties' administration has potential to establish alliance with women's movements (Beckwith, 1985; Norris, 1987). However, some comparative studies suggested that the presence of left-wing government, in certain political contexts (e.g. Scandinavian countries), was not a relevant factor in the incorporation of feminist agenda in the policy outcomes (Mazur, 2002; Weldon, 2002*a*)

needs,' starting from basic access to documents to access to policies of productive inclusion (as described by informant SM2)

I think that the turning point towards the strengthen of rural women in Brazil was when the dialogue between rural women movements and the state begun. I am not saying that it has been always easy, but through the dialogue we managed to participate in the whole policy process. Beginning with the very basic 'access to the documents' programme and evolution to productive inclusion interventions that was a result of a lot of dialogue with the rural women's movement, in a very pro-active construction involving several players. (SM2)

This extract clearly illustrates the participation of the women's movements in policy process and in influencing policy goals. This finding is consistent with recent literature about rural women in Brazil (Heredia and Cintrão, 2012; Hora, 2014; Sardenberg, 2016). For instance, Heredia and Cintrão (2012) confirm that the policy portfolio targeted to rural women in Brazil was, in fact, developed based on the dialogue between the state and the rural women's movements. Several studies indicate that the ability of the women's policy agency to formulate and implement effective policies are dependent on the degree of alliance established with the women's movements (Weldon, 2002*b*; Malloy, 1999, 2003; McBride and Mazur, 1995). Moreover, we identify two components that also contributed to the dialogue in this context. The first was the fact that policy makers in the DPMR worked in women's movements and feminist NGOs. It was indicated as a factor which aided in facilitating dialogue: according to our informants, the connection with grassroots organisations encouraged this relationship, as mentioned by a participant:

I believe that, a huge advantage in our context is that the policy makers involved in this process had background in grassroots movements and this is an advantage because 'we speak the same language'. (SM4)

The second element that contributed to the dialogue was the creation of women's forums, conferences, committees, and other participatory spaces to establish a dialogue between civil society and government –from the municipal through the federal levels (Costa, 2005; Sardenberg and Costa, 2014). Our findings indicated that the creation of consultative spaces was one of the mechanisms used to establish the women's movements participation on the policy process. These spaces proved to be central in the dialogue, as remarked by one of the informants:

We understood that the participation of the civil society groups was essential to progress in the rural women's status. To do it so, in the last twelve years

[2002-2014], we created several channels to foster the dialogue at regional and national level, such as councils, committees, working groups, conferences (...). But, it does not suffice only create spaces of dialogue but make sure that they will be there. At the beginning it was troubled, of course, it was new, but little by little we adjusted, and I am not saying that it is perfect and harmonious, but this relation [state and organised civil society] is central for the advance in the rural women's status in Brazil. (PM1)

The literature related to this theme in Brazil argues that alliances (civil society and state) are fostered through the spaces created for dialogue between the state and the organised civil society groups (e.g. women's committees, working groups, etc.) (Butto and Dantas, 2011; Siliprandi, 2011; Heredia and Cintrão, 2012; Hora, 2014). This fact is also consistent with a range of studies that contend the participation and accountability for all sectors of the civil society should be mandatory to concretise advances in the enhancement of women's conditions (Rai, 2003; Staudt, 1997; Weldon, 2002*a*; Malloy, 1999).

Recognition as Constituency of Rights: Rural Development Policies

The respondents reported their point of view on the role policies play in the empowerment of rural women in agriculture. According to our key informants the policies targeted to rural women function as a support for rural women and their autonomy. As mentioned earlier, the portfolio of policies targeted to rural women is designed based on the rural women's movements agenda. This portfolio covered a wide spectrum such as land ownership rights, access to individual documents, credit, technical assistance, and farmer organisation. This wide coverage aimed to include rural women in all stages in the process of rural development and to allow them to engage in agriculture. As described by one participant:

I think that process of empowerment is a set of actions, it is a system. For example, if the government offer credit for rural women but the land is not theirs this action is not effective, doesn't improve their lives. The same situation of ineffectiveness happens if the government offer land rights and doesn't technical assistance to access credit. It is a system. We need support in all stages to promote their effective empowerment in agriculture. (SM2)

Based on this participant's view, the autonomy and engagement in agriculture are achieved through the access of a set of interventions which guarantee rural women's rights over the land, credit and technical assistance access and farmer's organisation participation. The idea of integrative set of interventions was mentioned by Butto *et al.* (2011) as

a strategy adopted under the Worker's Party administration to overcome inequalities and poverty in Brazil. Even considering the centrality of the policy integrative approach, our informants outlined some specific interventions as crucial in the process, not only because of its functionality but also its symbolic meaning.

The first category of intervention mentioned as critical to the process of women's engagement in agriculture was the technical assistance (such as ATER- Women) not only because it helps women to improve and start new agricultural activities but also because it is a source of information of other policies. The importance of this category of intervention is illustrated by the following statement:

For me, technical assistance is a milestone in the transformation of rural women lives in Brazil. Access to technical assistance, that is not only focused on improve the women's production but also give to the information about other policies and more understanding how to access other intervention. I think that this category of intervention makes them[women] more resilient and empowered. (SM4)

This finding corresponds with recent studies affirming that bolstering knowledge and capacity building, through agricultural extension services, is essential in a strategy of rural poverty reduction and empowerment of rural poor people (Hennink et al., 2012; Johnson et al., 2017). Participants also shared the importance of the technical assistance in providing information about interventions. Hunt and Kasynathan (2001) confirm this observation, reporting that without proper access to technical assistance the information on other interventions is often lost.

The second intervention, present in the informants' narratives, was access to credit (such as PRONAF- Women), an example of which is listed here. The interviewees agreed credit is central for women to invest in their own projects, to improve their production, and to provide them with autonomy in their investments.

In my perception, the credit because this category of intervention contributes to the material and symbolic assets for rural women: they help to provide the sense of enactment of their rights, that the state is supporting them, and their backyard or their chickens are important to the regional and why not say national food security. (PM2)

The association between rural women's access to credit and empowerment has been extensively explored in development studies (Goetz and Gupta, 1996; Hashemi et al., 1996; Kabeer, 2001; Pitt et al., 2006; Mayoux and Hartl, 2009; Garikipati, 2012). In sum, as

mentioned a priori, the availability of an integrated portfolio of intervention was key for the advances. Hence, the informants' perspective confirms the most important interventions in this portfolio were credit and technical assistance, not only because of the direct benefits but also the collateral effects and the recognition as *agricultoras* (women farmers). The next section presents some of the weaknesses in the empowerment process in Brazil.

The Promotion of Rural Women Autonomy is a Threat? To Whom and Why?

Another objective established in step one of in our research design was to identify the weakness in the process of promotion of autonomy and recognition of women in family farms as farmers as well. Despite the many themes which emerged in this analysis, our finding suggests that the approach of family farms as 'nuclear and harmonious' institution, in rural development policies, is a central issue. Traditionally, rural development policies in Brazil were gender-blind and consider the family farm as an organic socio-economic unit.

The idea of a household as a 'unit' is a prominent notion in mainstream economic theories. For instance, the New Household Economics (NHE)⁵ approach promotes the idea that well-being of the collective household is achieved by the 'specialization' of work where the 'altruistic' head (male) is the 'breadwinner' and female is house worker (Becker, 1965, 1981). However, this idea rules out important factors such as intra household conflicts and gender role constructions, shadowing interactions among family's members, or the asymmetry of power within households (Ferber and Nelson, 2003; Sawhill, 1977). In the pioneer study about unitary versus collective models of household, Alderman et al. (1995) provided evidence for the questioning of the assumption of household as a unit of production or consumption. Giving support to more complex views of household structures, which recognizes that choices made and results achieved are influenced by power dynamics and resource allocation among family members.

By definition, family smallholder farm activities intersect (and for rural women overlap) reproductive and productive domains. The idea of unit makes rural women's work invisible, and restricts access to policies (Siliprandi and Cintrão, 2015). When a policy is targeted toward the family, the head of the household (often a man) is the direct beneficiary. The following excerpt illustrates how the use of 'family' as target group in rural development policies can be a constraint. One of our informants, who is also a woman farmer, narrated her experience:

I cannot access credit, because all resources that the land was entitled from

⁵This approach applied key concepts and models of mainstream microeconomics to household production and decision-making.

the government was targeted to the ‘family’. And my ex-husband received everything. I didn’t participate in the decision process. I worked hard in the farm and I could not give my opinion about where invest the credit. Now, I am divorced. He’s left me and I stayed in the farm, but I cannot access public credit. (SM1)

Moreover, according to our informants the policies that aim to promote autonomy for rural women is not easily accepted across other government bodies. Even considering the advances achieved in the last decade, the preservation of patriarchal structure of family and gender division of labour are values that permeate the state apparatus. And, any policy that targets the promotion of women’s empowerment seemed a threat to these values. As demonstrated in this next quote, the idea of family farm as ‘nuclear and harmonious’ unit was central for the resistance to actions that promote autonomy of rural women.

(...) When we [policy makers] advocates the importance of affirmative action for rural women, we find great resistance within other agencies in the government. In the rural development, traditionally, the policies are targeted to the family as one, as unit, homogeneous and harmonious. This resistance translates an ‘institutional fear’ that promote women empowerment could cause ruptures in this ‘harmonic’ household. (PM5)

Here, we see the use of family as target group for rural development policies is instrumental in the maintenance of the patriarchal structure of the family farming in Brazil.

5.2.2 Under the Rural Women’s Perspectives

This section discusses rural women perceptions regarding their agency and the enablers in drought events (step three in Figure 4.1). The focus group data reveals the general perception of the rural women in Chapada do Apodi regarding their agency in agriculture, including thoughts on participation in the decision-making process and the ownership of the land and other assets. Also, this data shows that they were aware of women’s rights and gender division of labour. They associated this process of awareness enhancement with the intervention delivery practice provided by the local feminist NGO. Moreover, this section discusses their perception regarding the factors that support them under drought periods. In discussions on drought periods, the most prominent factors mentioned were the membership in farmer’s organisations and having access to credit. Yet, it is clear that most thought the creation of the women’s group gave them bargaining power from within the organisation that they had never had before.

Raising Consciousness for Liberating Empowerment

Raising consciousness of the poor and oppressed groups is a central and determinant component in the process of empowerment. In our focus group section, we noted participants were aware of themes such as women's rights and gender division of labour. And they reported that several changes had occurred in their lives, associated this enhancement of awareness. One participant reported on the improvement of women's lives in the last decade in the community where she lives:

Our situation [women in the community] has improved 100%. In the past, here, women had no freedom. It started to change through our participation in the meetings [women's group meetings]. By then, we started to be aware that we also have rights. We had no idea. Today many women are freed. I feel free. Because I know my rights. I can go everywhere if I want, even if my partner does not agree. So, I execute my right and I do not let him prevent me anymore. My husband is very 'machista,' but I always say: "your rights stops here, because here is where mine begins." (LR8)

From this quote, we can clearly notice connection between the process of consciousness raising unleashed by the 'meetings' participation. This association was present in the narrative of all focus group participants. These 'meetings' were included activities in projects of technical assistance and women's group organisation delivered by a local feminist NGO – the CF8. This organisation incorporates feminist discourse in their practice, focusing on the promotion of consciousness raising on gender, race, class and ethnic issues (CF8, 2017). As a part of the extension services and training provided, this NGO also organises regular meetings that confronts issues such as violence against women, sexual and reproductive rights, land rights, and gender division of labour. The following quote relays the importance of this NGO to one participant:

I think that much of our advance is owned to the 'girls' from the CF8. They had been supporting us, 'opening our eyes' about our rights. They help us in many things here [community], they provide technical assistance to our backyards, hennery, and vegetable gardens. Another day they arrived here with the idea of process fruits to make homemade jams. We did not know much about it before, after this we were selling jam in the city fair. (LR7)

The CF8 work in consciousness raising of rural women in the region has been reported by studies as Moraes and Rocha (2013) and Alves (2007). For instance, Moraes and Rocha

(2013) affirms that this local feminist NGO was a key element in the transformational process of accessing policies in the region⁶.

Decision-Making and Workload

The participation of women in the decision-making process is widely explored in the literature. The ability to make decisions about agricultural production can bring improvement of women's conditions, children's nutritional status, self-esteem, and other effects (Quisumbing et al., 1995; Quisumbing and Briere, 2000; Smith et al., 2003; Peterman et al., 2011). Among the participants of the focus groups, seven of eight mentioned that they participated in decision-making process in their households and in farms' production. Our qualitative findings suggest that women in land reform share in decisions regarding agricultural activities.

At home, we decide everything together. We decide what to plant in the farm, now with the drought is more difficult because he is working in the Agricola, but before we use to work side by side in the 'roçado' [cash crop]. If we work together we also decide together. (LR2)

Moreover, the narratives collected in this research reveal that the drought changed the routine of work in the family smallholder farms in the Chapada do Apodi. The participants mentioned that the water scarcity pushed the men in the community to work in the Agricola (local agribusiness farm), or in the quarry. This fact may have led to an increase in women's participation in the agriculture activities in the farm, as the following quote attests:

We both participate in the decision about the house stuff. But in regarding to the planting issues I am the one that decides at the moment because he is working outside. He does not have time. So, it is up to me. He helps before to enter in the job and when he arrives, but pretty much I am by myself on the crop production activities. (LR7)

According to this participant, water scarcity increases the work burden of those affected by the drought events. Despite the fact that farming households obtain the household income from multiple sources (Haggblade et al., 2007; Cooper et al., 2008), under a prolonged drought, household members cannot rely on the agricultural production and are forced to look for alternatives to keep livelihood and avoid disposing the farm assets. Social programmes represented an important share of the household income in the region (see Table 7.1). This narrative relays the increase in the labour burden:

⁶This experience was also reported in 'Building Cisterns and Deconstructing Taboos: Women and Water Access' Moura et al. (2006).

My routine has been too hard. I cannot even remember when I take a day off. This is the life of the poor, what we can do? Before was not like that. Nowadays I am the one that clean the house, all the household chores is on me. Also, I take care of my mon and mother in law that live with us. Also, I work as a housemaid (diarista) in the city [urban area Apodi]. Above this, every day before and after the work [waged], I've more work to do, looking after the animals and watering the plants. My husband also works in the farm, but as he has more rigid work times than me. Then I end up working more. I think that I am working too much lately. (LR6)

The participants reported that the search for alternatives to keep the household income and to avoid disposing of the farming assets that is the motivation for the overburden of work. This increase of labour during the drought period is consistent with observations by Sardenberg et al. (1999) where it is suggested that in Northeast of Brazil the migration of the men to other activities or even regions can increase substantially the work burden of the women.

Support under Drought

This sub-section explores rural women perspectives on factors that support them to keep up with the farm activities during the drought period. The enabler identified in our analysis were credit access and farmer's organisation membership.

Credit access

Previous studies found that, during drought periods, people look for access to credit to mitigate the effects of the drought and aid in the recovery process (Enarson and Chakrabarti, 2009; Austin and McKinney, 2016). Six out of eight focus group participants reported having access to different lines of credit is important to them in the period of drought. Five participants had accessed the credit in the last year, the period when the drought started to intensify. Those who accessed credit during the drought reported being able to buy agricultural inputs to support production or in buying feed for the livestock. The access to credit is important to keep from depletion in resources, which is especially important for the aftershock period and a determinant in the recuperation of agricultural activities. The depletion of assets during drought shocks undermines the chances of small-holder farmers to recovery and, in extreme cases, it can end up in permanent migration to urban areas (Agarwal, 1990; Kabeer, 2015).

(...) In the last years, I have been accessing credit every six months to buy forage to feed my goats and cows. My husband always says to me to sell them.

Because how can I buy other animals? Thanks God, I'm having a payback to pay the instalments. I will finish paying the last one [instalment] and I will make another one [loan]. I renew it [loan] every six months because the poor of the animals is not to punished for this drought. (LR2)

Farmer organisation membership

Seven out of eight participants mentioned they participated in an association (mixed groups) and all of them were member of women's groups. They shared that being a part of farmer organisation group is an advantage during the drought period. Through the community association they managed to get credit to buy equipment to cope in period of drought. For example, the respondents mentioned that the association bought new pumps to water the vegetable production and the backyards, and new equipment to cut forage cactus (*Opuntia ficus indica*) to prepare feed of the animals. In times of drought this is the forage available to offer the animals in that region, to feed the cattle and pumps to water the women's vegetable production. The effect between participation in associations and groups was reported previously (Bratton, 2009; Little et al., 2006; Enfors and Gordon, 2008). According to Bratton (2009) participation in farmer organisations is a significant advantage during drought periods: as organisations are able to facilitate access 'packages' (extension service, credits and market access) making it easier for members of associations than farmers would have alone.

Through the association we can get things, it is easy together. It was a bless, last year we managed to get the equipment to prepare the feed to the livestock. Through the credit we managed to buy more ingredients, at least the cattle are not dying. If we did not have this help, we needed to sell our cows and goats, then after [period aftershock] how we will do? The price that they are paying us we do not manage to buy the same number the animals that we have. It is an incredible setback. Few years ago, I was paying all the household bills with the money that I had selling cheese in the fair. (LR5)

Moreover, they mentioned that the creation of the women-only farmer groups inside of the association gave them a voice, inside of the association. For example, they can include demands in the association agenda.

Before nobody listened to us. With the women's group now, we have voice. The men in the association never allowed us to talk in the meeting or to include anything that was to help us [women] to improve our earnings. Now, we approved the use of communitarian plot to do our[women] vegetable production.

In the beginning, they [men] disliked it now they want to participate. But the vegetable is ours. (LR3)

5.3 Conclusion

The analysis in this section examines some factors that support the comprehension of the context that surrounds the women's empowerment in agriculture in Brazil with a close look at the drylands. This phase revealed several elements that support our extended analysis. One important insight from key informants was the creation of an autonomic and resourceful rural women's policy agency that supported the rural women's movement agenda at the national level, using a basis of a participatory approach and feminist economics.

On the other hand, the resistance by other governmental bodies to the promotion of rural women's empowerment was a significant weakness in the process. The resistance to promoting women's empowerment in agriculture resides in the belief this would cause the breakdown of the family unit and production. This barrier is strong inside of the rural development agencies. This was strong and emphatic point highlighting the importance of having an agency that had the power to advocate for rural women's cause.

Furthermore, this study noted that rural women in Chapada do Apodi had high level of agency. Undoubtedly the participation in farmer organisation (mixed-group) seems to be a great advantage in periods of drought. Participants mentioned that their role within the mixed groups only increased because of their membership in the women's groups. The presence of a feminist NGO in the region was key for the process of raising consciousness about their rights, self-esteem, and identity construction among women farmers.

Part II

Quantitative Study

Chapter 6

Methods, Data Collection and Analysis

This chapter presents the methodology, data collection and analysis of the quantitative phase of this study. It examines the procedures used to collect and analyse data in attendance to the following research aims; (1) to assess women's empowerment in agriculture and; (2) to identify factors that sustain the process of women's empowerment in agriculture under prolonged drought period. We conducted the quantitative phase of this study in two steps. First, we assessed women's empowerment in agriculture under drought conditions using the Women's Empowerment in Agriculture Index (WEAI) methodology, where we calculated not only the individual scores of empowerment and gender parity, but also the adapted A-WEAI scores and identified the dimensions of disempowerment in the region. For the second step in the quantitative study, we built a model to check the factors associated with empowerment and gender parity in agriculture under drought conditions.

To better explain the methodology of the study, the first section of this chapter describes the methodology used to measure the empowerment in agriculture of rural women in Chapada do Apodi. This section presents the methodology used to calculate the adapted A-WEAI and describes details about how the indicators are constructed. We also detail the application of the index in the Chapada do Apodi (version used and subsequent adaptations). The second section outlines the data collection procedures, including the mapping, sampling, and training of the enumerator and the operationalisation of the fieldwork. Moreover, this section describes the process of questionnaire design and the ethical considerations of the quantitative data collection. The second subsection ends with an examination of threats to reliability and validity of the data faced during fieldwork as well as the strategies adopted to minimise them. The third section explains the computation of the index detailed by each stage, based on the Alkire-Foster methodology of multidimen-

sional indices. Also, the third section presents the empirical specifications used to build the model of women's empowerment in agriculture and gender parity in agriculture and a description of the model's dependent and independent variables.

6.1 The Women's Empowerment in Agriculture Index

The WEAI is a survey-based index used to measure agency and empowerment of women in agriculture. This methodology was developed by the Oxford Poverty and Human Development Initiative (OPHI) and International Food Policy Research Institute (IFPRI) researcher-team in 2012, initially with the purpose of monitoring changes in women's empowerment status in regions served by the Feed the Future program of the United States Agency for International Development (USAID) (Alkire et al., 2013).

The WEAI methodology is based on studies about agency indicators and individual (or household) domain-specific information (Alsop et al., 2006; Ibrahim and Alkire, 2007; Narayan-Parker, 2005, 2002). To attend to the multidimensionality of the concept of empowerment, this index is built on the Alkire-Foster multidimensional index methodology (Alkire and Foster, 2011*b,a*).

The WEAI is an aggregated index based on the weighted average of two sub-indices: (1) five domains of empowerment in agriculture (5DE) carrying 90% weight and (2) gender parity (GPI) with 10% weight. Although the weights assigned for these sub-indices could be considered rather subjective, the index emphasises women's achievements without ignoring the complex nature of gender equity (Alkire et al., 2012, 2013).

This method relies on individual data collected at the regional or national level, from the primary female and male in the same household (Alkire et al., 2013). In other words, this methodology allows us to access the empowerment in agriculture at the individual level, based on direct information. The process of aggregating such direct information provides us a better understanding of the actual circumstances that the population faces, important for designing and evaluating policies.

The 5DE sub-index determines whether individuals are empowered¹ (or not) based upon the aggregation of information captured in five domains. As explained by Alkire et al. (2013, p.77): "an individual is identified as empowered in 5DE if he or she has adequate achievements in four of the five domains, enjoys adequacy in some combination of the weighted indicators that sum to 80% or more, or has an adequacy score of 80 or greater."

¹At this point, it is important to highlight that the terms "empowerment" or "disempowerment" in the methodology section mean empowerment (or disempowerment) in agriculture, based on the domains measured by the WEAI.

The sub-index thus identifies not only the percentage of women in the sample who meet the criterion for empowerment in agriculture, but also which domains are the most problematic for those who did not meet the criterion. In other words, the WEAI methodology not only identifies the individuals in the sample who are classified as empowered, but also provides information about which domains those classified as disempowered are most deprived. This tool provides information about the domains in which women are most deprived, and this data is valuable for tracking and confronting gender inequality.

In contrast, the second sub-index, the GPI, is based on comparing the individual empowerment scores of women to those of their male counterparts, so as to provide information about the relative inequality between the primary females and males in each household. As Alkire et al. (2012, p.1) observe, “empowerment within a domain means that the person has adequate achievements or has achieved adequacy (that is, surpasses a threshold) for that domain.”

According to Alkire et al. (2013), the five domains of empowerment in agriculture are: *decisions about agricultural production, access to and decision-making power about productive resources, control of and use of income, leadership in the community and time allocation*. The 5DE sub-index is computed based on the individual empowerment scores; these individual scores are calculated according to the respondent’s achievements on the indicators, and compared with the respectively established inadequacy cutoff. It means that each indicator has a cutoff and if the respondent does not reach this cutoff, she or he will be classified as deprived in that respective indicator. Consequently, this fact impacts on the domain once this index is constructed based on aggregation approach.

Since 2014, WEAI has faced a dynamic process of modifications that has generated several versions² (IFPRI, 2016). These adjustments were based on fieldwork experiences and cognitive tests that pointed out some relevant constraints regarding the respondents’ understanding of the questionnaire (Sproule and Kovarik, 2016; Malapit et al., 2017, 2016). Based on this information, the institutions involved in the revision of the WEAI created an abbreviated version (or A-WEAI) (Malapit et al., 2017, 2016).

According to the Instructional Guide to the Abbreviated Women’s Empowerment in Agriculture Index (A-WEAI), the modification reduced the questionnaire time application by 30%. These two versions differ in the number of indicators and, consequently, weights assigned for each indicator (see Table 6.1).

In comparison, both versions (integral and abbreviated) performed similarly in the detection of the most significant constraints domains (Malapit et al., 2017) However, the reduction of indicators restricts the comparison analysis between these versions (Malapit

²The different versions of the index are WEAI (version 1.0, and 1.1), A-WEAI, Pro-WEAI (under development) and Ad-hoc WEAI (IFPRI, 2016).

et al., 2017; IFPRI, 2016).

Table 6.1: Comparison between versions: Indicators and cutoffs

	WEAI (1.0, 1.1)	Weight	A-WEAI	Weight
Production	Input in productive decisions	1/10	Input in productive decisions	1/5
	Autonomy in production	1/10	-	-
Resources	Ownership of assets	1/15	Ownership of assets	2/15
	Purchase, sale, or transfer of assets	1/15	-	-
	Access to and decisions on credit	1/15	Access to and decisions on credit	1/15
Income	Control over use of income	1/5	Control over use of income	1/5
Leadership	Group membership	1/10	Group membership	1/5
	Speaking in public	1/10	-	-
Time	Workload	1/10	Workload	1/5
	Leisure	1/10	-	-

Source: Table adapted from Alkire *et al.* (2013) and Malapit *et al.* (2017).

6.1.1 WEAI Adaptations for the Chapada do Apodi Case Study

In this study, we made two important choices regarding the WEAI's operation. First, we opted for the abbreviated version of the Index (A-WEAI). The main reasons were the reduction in complexity and time of the questionnaire application. The reduction in time application is important because the interviewees became impatient after 40 minutes answering the survey which increased the risk of incomplete questionnaires. Moreover, as mentioned previously the modification applied in the abbreviated version reduces the level of complexity of the questionnaire without significantly impacting on the performance of the index (Malapit et al., 2017).

Second, we adapted the methodology for the case study area by establishing a more conservative inadequacy cutoff for the *ownership of asset* and *group membership* indicators (see Table 6.2). In this study, we used the A-WEAI as a starting point, adapting the methodology to the contextual specificity of the case study area. The adjusts in the indicator *ownership of assets* aimed to capture some of the changes that occurred in Brazil during the last few decades regarding consumption patterns and legislation. For instance, the improvement in the families' incomes led to increased consumption of large consumer durables and cell phones (IBGE, 2010). Likewise, legal instruments potentially affect this indicator; one example is in the establishment of women's land rights. Since 2003, the Brazilian government established³ mandatory joint adjudication and titling of land to both members of a couple who are participating in agrarian reform programmes (Butto and Dantas, 2011).

³Rights enacted by the Ordinance N°981/2003 and the Normative Act N°38/2007.

Table 6.2: Comparison between the original and the adjusted inadequacies cutoffs

Domains	Original	Adjusted
<i>Ownership of Assets</i>		
Resources	Inadequate if household does not own any asset; OR household owns the type of asset BUT the individual does not own any IF not only one small asset*	Inadequate if the household does not own any major asset; OR the individual does not have sole or joint ownership of at least three major assets
<i>Group Membership</i>		
Leadership	Inadequate if the individual is not part of AT LEAST ONE group; inadequate if no groups are reported in the community	Inadequate if the individual is not part of AT LEAST ONE group; restricted to nonreligious groups; inadequate if no groups are reported in the community

Note: Major assets are agricultural or non-agricultural land (pieces or plots); livestock (cattle, sheep, goat, etc.); house or other structure, large consumer durables (refrigerator, TV, etc.); cell phone; mechanized farm equipment; and means of transportation (bicycle, car, motorcycle, etc.)

The increased consumption and guarantee of women’s legal access to land are examples that could directly affect the assets indicator, since these categories (land, large consumer durables, cell phones) are considered to be major assets. In the original inadequacy cutoff with one single major asset, an individual could achieve adequacy. The inadequacy cutoff established in the original methodology does not translate to the case study area context, since it is too low as compared to local asset ownership. Thus, to adjust this indicator, we decided that to achieve adequacy, an individual needed to report joint or sole ownership of at least three major assets.

For the indicator *group membership*, the adjustment was focused on groups in which men and women participated, such as unions or cooperatives. The respondent achieves the status of ‘adequate’ in this indicator if he or she participates in at least one group other than religious groups.

6.1.2 Domains of Empowerment in Agriculture

According to Alkire et al. (2013, p. 73) “domains are based on key elements in the process of empowerment found in the literature.” Moreover, these domains translated the priority areas of the Feed the Future Gender Integration Framework.⁴ This section explores how

⁴A literature review performed by Hillesland (2016, p. 14) suggests that “the empirical literature from agricultural economic and socioeconomic journals that incorporate gender as part of its analysis provides an evidence-based foundation for the FTF Gender Integration Framework.” Although there are no direct links between the WEAI domains and agricultural productivity, the review found linkages between proxies of these domains (for instance, leadership and social, human capital, etc.) and the increase of agricultural productivity.

the domains and their indicators are estimated, and modifications adopted in this study, where applicable.

Production

The production domain examines participation in the decision-making process. According to Alkire et al. (2013), this domain reflects the ability to make choices in the main aspects of agricultural production. The abbreviated version has only one indicator: whether or not the individual contributes to productive decisions.

Indicator Input in Productive Decisions

This indicator aims to identify whether or not the respondents participate in the decision-making process concerning their farming activities. The number of questions used to construct this indicator changes depending upon the versions. Moreover, according to Alkire et al. (2012), it is important to highlight that even if an individual does not participate in an activity per se, he or she may not necessarily be disempowered. In fact, the non-involvement could be caused by his or her lack of interest in that activity. To address this issue, a question was added in the abbreviated version, identifying whether or not an individual could make his or her personal decision over the activity if he or she wanted.

The computation of this indicator is performed individually and in two steps. First, it is created as a sub-indicator for each agricultural activity in which the individual participates. In the abbreviated version, this sub-indicator is calculated across the questions, and adequacy is achieved if the respondent fulfils at least one of these criteria: (1) makes a major decision regarding the activity, (2) has input in at least some decision regarding the activity, (3) feels that they could participate at a medium extent over the activity (Malapit et al., 2017).

Resources

This domain aims to identify if the individual has access and control over productive resources. The number of indicators that comprised this domain also varies according to the index version. This domain is composed of two indicators in the abbreviated version.

Indicator Ownership of Assets

This indicator examines if the individual has access to assets and self-reports ownership. The assets assessed in this indicator are divided into two categories: major and minor assets. The major assets are: agricultural or non-agricultural land (pieces or plots); livestock (cattle, goats, etc.); houses or other structures, large consumer durables (refrig-

erator, TV, etc.); cell phones; mechanized farm equipment; and means of transportation (bicycle, car, motorcycle, etc.). The minor assets are poultry, non-mechanized farm equipment, and small consumer durables (radio, cookware, etc.).

To calculate this indicator, the first step is the creation of a sub-indicator for each asset on the list where an individual achieves adequacy if anyone in the household owns the item. Thus, these sub-indicators are aggregated, generating the sub-indicator ‘household ownership’. This sub-indicator allows us to identify the total of assets present in the household.

The next step in computing this indicator is the identification of items owned by the respondent (solely or jointly). For this, another sub-indicator is created, where an individual achieves adequacy if he or she declares ownership (solely or jointly). Then the sub-indicators for each asset are aggregated, creating a sub-indicator of ‘individual ownership’ which informs the total number of items that the respondent self-reports as owning. In the original version, the respondent is considered adequate according to the indicator *ownership of assets* if he or she self-reported ownership (solely or jointly) of at least one major asset. In the adapted version used in this study, an individual is considered adequate if he or she has sole or joint ownership of at least three major assets. Moreover, the individual is classified as inadequate if he or she lives in a household with none of the assets listed.

Indicator Access to Credit

The indicator access to credit examines whether or not the individual has access to credit and participates in decisions regarding it. The abbreviated index has an additional question that aims to detect if the household members have credit constraints. According to Malapit *et al.* (2017), this question allows for further distinguishing between those who have access to credit and those who face constraints to accessing credit.

There are three steps to compute this indicator. First, a sub-indicator is created for access to credit which identifies whether or not any member of the household has taken credit in the last 12 months by source. Second, for each source of credit⁵ a sub-indicator is created which identifies whether or not the individual participates in any type of decision (to borrow or what to do with it) over each source. Adequacy is achieved if the respondent participates (jointly or alone) in at least one type of decision over the loan. Finally, by aggregating the sub-indicators across the potential sources we generate the indicator.

The respondent only achieves adequacy if he or she: (1) lives in a household where anyone has taken at least one loan in the last 12 months; and (2) participates in at least

⁵The sources are: Governmental programmes, Non-governmental organisations (NGO), informal lenders, formal lenders (bank/financial institution), friends or relatives, group based micro-finance or lending, including VSLAs / SACCOs/ merry-go-rounds

one type of decision.

Income

This domain aims to detect whether or not the respondent has control, and to what extent, over revenues generated from agricultural activities (waged or non-waged), from non-farm economic activities (waged or non-waged), and the control over major or minor household expenditures.

Indicator Control Over Use of Income

The calculation of this indicator is performed in three steps. First, the creation of a sub-indicator for each activity⁶, where the individual achieves adequacy if he or she participates in at least some decision about the use of income generated by that particular activity. Secondly, another sub-indicator is created for major expenditures where the individual is classified as adequate if he or she: (1) makes the decision by himself or herself, or (2) feels that he or she could participate at least somewhat equitably in the decision of whether or not to purchase major goods (land, house, etc.). The final step is the aggregation of these sub-indicators into the indicator labelled *control over use of income*. To be considered adequate, the respondent needs to participate in at least one decision regarding the use of income or need to make a decision (or feels that he or she could make a decision) that affects major asset expenditures.

Leadership

The participation in groups plays an essential role in the building of social and political capital for farmers; such participation includes membership in forums in which farmers can exchange agricultural practices and discuss issues that affect the community (Peterman et al., 2011). In this domain, the objective is to detect whether or not the individual participates in groups and has influence in his or her community. The composition of this domain is based on one indicator; group membership.

Indicator Group Membership

This indicator aims to detect if the individual is an active member of groups within his or her community. To compute this indicator, a sub-indicator is created across the various types of groups, where the individual is adequate if he or she participates in that particular group. The individual is adequate in this indicator if he or she participates in at least one group. If the individual declares that there are no groups in the community,

⁶Such as food crop farming, cash crop farming, livestock raising, fishing or fishpond culture, non-farm economic activity, wages and salary employment

he or she is automatically classified as inadequate. In this study, an individual achieves adequacy in this indicator if he or she participates in at least one group and this group is not a religious group (with exception to CPTs⁷). Also, the individual is classified as inadequate if no groups are reported in his or her community.

Time-use

This domain provides a picture of the respondents' time allocation according to different activities carried out over 24 hours⁸, and the respondent's satisfaction regarding leisure time. This domain has one indicator in the A-WEAI version: workload.

Indicator Workload

This indicator aims to detect if the individual worked for more than 10.5 hours during a period of 24 hours. This threshold was established using the time poverty line methodology (Bardasi and Wodon, 2006). The activities considered work-related are farming (cash, food crops, livestock), waged employment (agricultural and non-agricultural), non-farm owned business, commuting, construction, domestic work (shopping, cooking, cleaning, weaving, etc.), and care work (elderly, children, etc.).

The question used to construct this indicator scrutinised the respondent's activities in 24-hour-intervals broken into 15 minutes.⁹ The respondent needed to report the activities performed step by step since he or she woke up until bed time. This careful accounting of time allowed me to assess the number of hours that the respondent dedicated to domestic and productive work activities.

To compute this indicator, the number of hours spent in activities related to work is aggregated. The individual was considered adequate in this indicator if he or she reported less than 10.5 hours dedicated to work activities.

⁷The Pastoral Land Commission (Comissão Pastoral da Terra—CPTs) is an organ of the Brazilian Catholic Church that deals with the problems of the poor in rural areas. Linked to the progressive sectors of the church, it was officially created in its present form in 1975.

⁸“Kahneman et al.'s (2004) Day Reconstruction Method (DRM) asks respondents to recall their activities from the previous day using a structured self-administered questionnaire. In the DRM, respondents are asked to write a narrative description of the previous day, in which they describe each episode of activity. Following this, they are asked a series of follow-up questions about each episode (e.g., what they were doing, how long they were doing it for, where they were, who they interacted with, and how they felt). By prompting respondents to spend a few minutes reflecting on the previous day, the DRM attempts to stimulate respondents' memories of the previous day prior to actual data collection” ((Seymour, 2017, p. 10)

⁹For more information about the question that is used to calculate this indicator, see Appendix B in the time module on pg.9.

6.2 Data Collection

This section presents the data collection procedures adopted in the quantitative component of this study. First, this section describes preparations for the fieldwork, the sampling technique used and the enumerators' training routine. Section 6.2.2 describes the questionnaire's structure. Finally, this section ends with a discussion of the limitations encountered in this phase of the study. It is important to highlight that to achieve the study's research aims the data were collected during a period of severe and prolonged drought (see Appendix E).

6.2.1 Mapping of, Sampling and Collecting Data from Chapada do Apodi

Data collection was divided into four stages: (1) mapping the communities (number of family farms and their localization) using the categories of land reform and non-land reform, (2) sampling, (3) training the enumerators, and (4) collecting data. The first phase was the mapping process. This stage began in July 2015; we contacted local institutions to gather information on family farms (number, location, agrarian reform or not) in Chapada do Apodi. Despite the extensive information in governmental databases about agrarian reform settlements, there was no information about non-agrarian reform farmers in the studied area. To map the region, we contacted several institutions, such as the National Institute of Colonisation and Agrarian Reform (INCRA), the Secretary of Agriculture of Apodi, and the Rural Workers Union of Apodi (STTRA). All information gathered from these institutions was compiled in a single database.

Based on the mapping process, we sampled the targeted region. The sample was selected randomly, using a cluster-sampling design within the categories—non-land reform and land reform farms. Six communities were randomly selected—three communities in each category. The need to differentiate farms into these two categories is based in two main considerations. The first regards engagement in social movements. Farmers in land reform, in general, participate or had participated in the Landless Movement (MST), one of the largest social movements in Brazil. Farmers who have been involved in social movements maybe more likely to participate in other forms of organisation, such as farmer associations or rural unions. The second aspect is related to the 'socialization' of the women in these communities. Houses in non-land reform farms are often far apart, whereas houses in land reform farms are built in villages in close proximity to each other. The isolation of women in non-land reform farms might therefore adversely affect their participation in women's groups and their access to information about interventions or programmes available to them.

Once the sample was defined, we started the next step: the enumerators' training.

The team members were selected by an experienced local company: Perfil Pesquisas in Natal, Rio Grande do Norte, that supported me in the data collection. The training lasted five days (September 7th to 11th, 2015), resulting in a total of ten hours of classes and exercises.

Following the training, we pre-tested the questionnaire in 20 households in rural areas near the district of Natal. Initially, we included a cognitive test within the chronogram of activities, according to the recommendations given by Malapit et al. (2016) and Johnson and Diego-Rosell (2015). However, because of time and budget constraints, we prioritized the pre-test phase.

After the pre-test, we met with the enumerators and local researchers and discussed potentially problematic questions. The questionnaire was revised and modified based on the meeting and the pre-test analysis. In this process, we detected the need to provide guidance for the enumerators during data collection; thus, phrases were included with examples throughout the questionnaire (see Appendix B).

The final stage was data collection. The data were collected using printed questionnaires. During the period of data collection, we conducted daily meetings with the enumerators' team to check if the questionnaires were applied correctly and there was not missing data. We also discussed strategies with the team aiming to fix any problems and to ensure the quality of data collected. All fieldwork was completed during weekends during months September to November 2015. This was because a large percentage of the men on the family farms were working in non-agricultural and agricultural waged labour during the week. The data collected consists of 326 respondents from 173 households — 153 dual-households and 20 female-only households.

6.2.2 A-WEAI Questionnaire and Adaptations for this Study

The questionnaire used in the fieldwork is an adaptation of the A-WEAI released by IFPRI in 2015. Our adapted version contains the questions used for both analyses: (1) the calculation of the A-WEAI and (2) the modelling of the factors associated with individual scores of empowerment and gender parity in agriculture under drought conditions. The questionnaire is divided into seven modules: four used to construct the index, and three used to collect information about sociodemographic and farming characteristics and to evaluate respondents' access to intervention during the last 12 months. At the beginning of the questionnaire, we obtained oral consent from the participants. The enumerators were trained to read and explain the terms. The questionnaire is available in Appendix B.

The first module was designed to collect the respondents' sociodemographic data. The

questions that composed this module included household and respondent identification, as well as information about the respondents' ages and education levels. We designed the second module to collect data about farms and farming activities, including questions about farm size, production systems (agro-ecological or conventional), types of crops and livestock produced, and access to water. Additionally, in this module, we included a question designed to identify whether or not a woman oversees any of the farming activities.

The following four modules were based on the A-WEAI questionnaire and composed of questions that are used to construct A-WEAI indicators. According to Alkire et al. (2012) and Malapit et al. (2017), the WEAI questionnaire should be adapted to translate the context where the individuals are inserted. Hence, in several items, we adapted the questions to reflect relevant farming activities, sources of credit, and types of groups that are consistent with local and national conditions. For instance, the fishing and fishpond culture was replaced by apiculture, because apiculture was an important farming activity in the region studied and fishing was a non-relevant activity.

The last module aimed to collect data regarding the access of interventions in the last 12 months. This block was divided into two main points: the knowledge of the availability of interventions, and individual direct access to interventions. This module is divided into questions about participation in rural development programmes, access to technical assistance, access to credit, and participation in governmental purchasing programmes. The questions included in the additional modules A, B, and G (see Appendix B) were based on the literature review concerning rural women's empowerment and upon the insights key informants provided during the first qualitative phase (key informant interviews). For instance, agro-ecological practice was a critical factor associated with rural women's empowerment and found in the local literature (Siliprandi, 2009; Butto and Dantas, 2011; Hora, 2014), and also reported by key informants.

To avoid overlapping questions¹⁰ between (1) the variables used in the computation of the A-WEAI modules and (2) the variables used to estimate the econometric models, we took two measures. First, we carefully examined all questions in the questionnaire to identify any potential overlapping points. Second, we adjusted any module that overlaps, taking the methodology and the research aims into account.

In this process, only one A-WEAI module was identified and modified: Module F (group membership). As a result, we restricted the A-WEAI questions to mixed groups (men and women) and we included one question targeted at women, asking if they partici-

¹⁰The credit module was not tackled as a potential issue of overlapping question in this study because the A-WEAI credit access questions refers exclusively to household credit access (restrictions and access) and participation in the decision-making process over the request and use of credit. In contrast, the question of credit access used in the econometric model enquires exclusively about the direct credit access, asking if the respondent was *the recipient (beneficiary)* of credit.

pate in women-only farmer groups. This modification helps to isolate the effect of women's participation in women-only groups and avoids overlapping with the A-WEAI questions.

In this analysis, the questions related to credit access in module G were not considered as a potential issue of overlapping because the A-WEAI credit access questions (module B) refer exclusively to household credit access (restrictions and access) and to participation in the decision-making process over the request for and the use of credit. In contrast, the question concerning credit access used in the econometric model refers exclusively to direct credit access, as it asked if the respondent was the recipient (beneficiary) of credit lines or loans during the past 12 months.

6.2.3 Ethical Considerations

The Faculty of Science Agriculture & Engineering Ethics Committee (SAgE Ethics Committee)¹¹ reviewed and approved this stage of data collection. The ethical concerns revolved around two topics: informed consent and right to privacy. Due to the high level of illiteracy in the region the consent terms were obtained verbally. The enumerators were instructed to read a statement from page one of the questionnaire as mentioned above¹². Moreover, at the end of the survey, the enumerator left each respondent a leaflet about the project which included contact information.

6.2.4 Ensuring Reliability and Validity

Two potential threats to the validity of the survey was identified previously (see Chapter 4): the complexity and the length of the questionnaire. During the fieldwork, the complexity of the questionnaire was a problem not only for the respondent (as expected), but also for the enumerators. We scheduled additional training sessions with the enumerators (for detail see Section 6.2.1). The pre-test was an essential element to reduce the effect of this threat because it allowed the enumerators to get familiarised with the questionnaire and also allowed us to identify the most problematic questions (and expressions). The questions which presented more difficulty to respondents were rewritten to include examples, using local vocabulary to increase understanding.

Moreover, we expected the average time to complete the questionnaire to be between 30 and 45 minutes, but in the pre-test, this range was between 50 and 60 minutes. To avoid the respondents giving up in the middle of the questionnaire, the training sessions were once again relevant, because they helped the enumerators to become faster when administering

¹¹Newcastle University ethical code and other guidelines are available at http://www.ncl.ac.uk/research/gov-ethics/ethics_procedures/policies/index.htm

¹²For more detail see Appendix B (p.1)

the questionnaire. The pre-test and the training of the enumerators were essential to the success of data collection. The average time taken for each questionnaire was around 40 minutes. Apparently, simply adjusting the questionnaire by using local expressions was a way of improving the participants' understanding of the questions and consequently the reliability of the data. However, despite all efforts to simplify the questionnaire, some respondents had difficulty in understanding some questions.

Another unexpected limitation to our analysis was the lack of respondent's knowledge about those programmes where they had been beneficiaries. In the questionnaire (module F) we intended to collect information about access to programmes that were targeted at the studied region. However, many respondents could not provide data because they did not know the name of the programmes they participated in. This restricted the analysis to categories of intervention, and limited the analysis of specific programmes. For example, they reported that they accessed technical assistance, but could not specify from which programme (e.g. Ater-Women, Don Helder, POPMR, and others).

6.2.5 Missing Data

The problem of missing data is common, almost intrinsic, to social science quantitative research (Greene, 2008). According to Greene, the occurrence of missing data can be identified in three situations. First, where the data may be absent, and its occurrence is random. Second, when the missing data is not random, but related to the characteristics of the model. Third, when there is comparable data that can be used in the model.

Malapit et al. (2017) recommend the exclusion of an observation if there is a nonresponse to any indicator. This recommendation is made because the absence of data in any of the indicators limits the calculation of the individual scores that compose the WEAI. Moreover, since this index is calculated at an individual level, accuracy needs to start with the individual scores, which are critical to the accuracy of the index (Alkire et al., 2012; Malapit et al., 2017).

To avoid missing data two measures were adopted in this study. First, the provision of extensive training for the enumerators. During the training period, we identified some constraints and took measures to minimise them. For instance, to facilitate data collection of the module E (time use), we decided to collect only information about the primary activity as recommended by Malapit et al. (2017).

Second, during fieldwork we scheduled meetings every day with the enumerators after the data collection. During these meetings, we checked all completed questionnaires and defined if it was needed to revisit the household to re-apply the module which was missing data. In the first day of fieldwork, we identified five households to revisit, and in the

second day two households. Near the end of the fieldwork, a total of ten households were revisited.

6.3 Data Analysis Strategy

This section provides detail about the quantitative data analysis. The quantitative analysis of this study comprises two steps. The first step is the calculation of the A-WEAI¹³, which assesses the overall scores of the index, the individual scores of empowerment and gender parity and the areas where the respondents were deprived. The second step is the modelling process, using the individual scores of empowerment and gender parity that are achieved by the calculation of the A-WEAI. In the following subsections, we will provide detail about the steps used in the calculation of the A-WEAI and the empirical specification of the model.

6.3.1 WEAI Calculation

This section is based on the methodology described in Alkire et al. (2013). To calculate the A-WEAI, we used the statistical software STATA 13. WEAI is calculated based on the sum of two weighted sub-indices (5DE and GPI)¹⁴ built on individual scores. The 5DE aims to examine the empowerment in agriculture and it has 90% of the index weight. Moreover, the GPI intent to assess the gender parity in agriculture and representing 10% of the index weight, specified as follows:

$$WEAI = 5DE + GPI \quad (6.1)$$

The stages used to calculate the index were¹⁵: (1) the identification of the disempowered; (2) the computation of 5DE; (3) the breaking down of the disempowerment index; (4) the decomposition by population subgroups; and (5) the computation of GPI.

The sub-index 5DE is constructed to focus on disempowerment by using the disempowerment index M_0 across the five domains, and based on the multidimensional poverty measure¹⁶. This sub-index informs the frequency and the intensity of the deprivation faced

¹³The calculation steps of the abbreviated version of the WEAI is the same as the calculation of the integral version.

¹⁴Five domains of empowerment in agriculture sub-index (5DE) and gender parity in agriculture (GPI)

¹⁵The indicators need to be computed before the calculation of the index. This very first step is the estimation of the indicators that was explained in detail in the Section 6.1.2 in this chapter.

¹⁶According to Alkire and Foster (2011a, p. 479); “The methodology $\rho k, M_0$ is based on a dichotomisation of data into deprived and non-deprived states, and so it does not make use of any dimension-specific information on the depth of deprivation. Consequently, it will not satisfy the traditional monotonicity requirement that poverty should increase as a poor person becomes more deprived in any given dimension.”

by the individual in the population analysed. The 5DE¹⁷ can be specified as follows:

$$5DE = (1 - M_0) \quad (6.2)$$

It is also important to highlight that even considering that this index is focused on women's empowerment in agriculture, the sub-index 5DE is estimated identically for men and women because the GPI sub-index is calculated on the basis of the comparison of women and men's 5DE scores. Consequently, the GPI sub-index can only be calculated for women who live in a household where there is a male counterpart.

The GPI is constructed based on two pieces of information. First, the percentage of women who live in a household without gender parity in agriculture, denoted by H_{GPI} . Second, the comparison between the extent of the inequality in empowerment in agriculture experienced by women and their male counterpart as denoted by I_{GPI} . The GPI can be specified as follows:

$$GPI = 1 - (H_{GPI} \times I_{GPI}) \quad (6.3)$$

The following describes all stages used in the calculation of WEAI sub-indices in more detail.

Stage 1: Identification of the Disempowered

The calculation of 5DE is performed in three steps. The first is the codification of adequacies across the indicators. Here, if an individual did not achieve adequacy in an indicator, a value of 1 was assigned, and if he or she achieved adequacy in an indicator, a value of 0 was assigned.

The second step is the estimation of the individual inadequacy score c_i which is calculated by summing all the weighted indicators for each respondent. The value of the inadequacy score c_i lies between 0 and 1, and it is specified as following:

$$c_i = w_1 I_1 + w_2 I_2 + \dots + w_d I_d \quad (6.4)$$

Where $I_i = 1$ indicates that the individual i ($i = 1, \dots, N$) do not achieve the threshold in indicator 1, 0 otherwise. Moreover, w is the weight assigned by each indicator.

After the estimation of inadequacy score, we needed to identify those who would be

¹⁷Alternatively the 5DE "can also be expressed as $5DE = He + Hp \times Ae$, where He is the empowered headcount ratio, which equals $(1Hp - Hp)$; and Ae is the average adequacy score of disempowered individuals, which equals $(1 - Ap)$ " (Alkire et al., 2013c, p. 34)

classified as disempowered. So, in the third step, we established the disempowerment cutoff, which is denoted by k . All individuals that have $c_i \leq k$ will be coded as 0, which means that even if their score was not 0, they still will be classified as empowered. The result of this process is a censored inadequacy score denoted by $c_i(k)$. In summary, $c_i > k$, then $c_i(k) = c_i$, but $c_i \leq k$, then $c_i(k) = 0$ (Alkire et al., 2013, 2012). This strict cutoff was defined based on the censored headcount estimation by the multidimensional poverty index (Alkire and Foster, 2011a).

The authors of the WEAI explored different cutoff values to determine which value could provide the optimum sensitivity point; the value selected was 20%¹⁸(Alkire et al., 2013, 2012). To explore more in depth the methodology used for the assessment of the sensibility of the cutoff in multidimensional index, see Alkire and Foster (2011b,a).

Stage 2: Computing 5DE

As mentioned above, the sub-index 5DE was constructed based on the disempowerment index M_0 (Alkire and Foster, 2011a; Alkire et al., 2013). M_0 is calculated using the formula $M_0 = H_p \times A_p$. H_p is the disempowered headcount and is specified as follows:

$$H_p = \frac{q}{n} \tag{6.5}$$

Where, q is the number of individuals who are disempowered and n is the sample size. A_p uses an average of the inadequacy score to give the intensity of disempowerment. This element is estimated by:

$$A_p = \frac{\sum_{i=1}^n c_i(k)}{q} \tag{6.6}$$

Here $c_i(k)$ is the censored inadequacy score of the individual i ($i = 1, \dots, N$).

Stage 3: Breaking Down Disempowerment in the Sample

This stage consists of profiling the sample's disempowerment. To do so, the M_0 is decomposed allowing the detection of indicators and domains that contribute to disempowerment. The first step is to calculate the indicator-censored headcount ratio (CH) for each

¹⁸According to (Alkire et al., 2013, p. 77): "After exploring the sensitivity of the empowerment classification for different cut-offs, we selected the disempowerment cut-off of 20%. An individual is disempowered if his or her inadequacy score is greater than 20%. This is the same as saying that an individual is identified as empowered in the 5DE if he or she has adequate achievements in four of the five domains, enjoys adequacy in some combination of the weighted indicators that sum to 80% or more, or has an adequacy score of 80 or greater."

indicator is specified as follows:

$$ICH_x = \frac{\sum_{i=1}^n I_x}{n} \quad (6.7)$$

Where $I_x = 1$ indicates that the individual i ($i = 1, \dots, n$) is inadequate in the indicator x ($x = 1, \dots, d$), 0 otherwise. Moreover, the sum of all weighted indicator censored headcount ratio must result in the disempowerment index.

The next step calculates the percentage contribution of each indicator to M_0 , this information allows identification of the main problem areas in the region of interest. This step is specified as following:

$$\text{Contribution of indicator } x \text{ to } M_0 = \frac{CH_x}{M_0} \times 100 \quad (6.8)$$

Stage 4: Decomposing by Population Subgroups

The WEAI can be computed for population subgroups according to the sample design. To decompose the WEAI, we needed to calculate the M_0 of each subgroup in the sample. The decomposition formula is specified as follows:

$$M_0 = \frac{n_\alpha}{n} \times M_{0\alpha} + \dots + \frac{n_\beta}{n} \times M_{0\beta} \quad (6.9)$$

Where n_α is the population of the subgroup α , $M_{0\alpha}$ represents the disempowerment index of the subgroup α , and so on. Although there is no restriction regarding the number of subgroups, the subgroups need to be consistent with the sample techniques applied and should add up to the total of the sample. The contribution of the subgroup to the total disempowerment index can be estimated by the following formula:

$$\text{Contribution of subgroup } a \text{ to } M_0 = \left(\frac{\frac{n_\alpha}{n} \times M_{0\alpha}}{M_0} \right) \quad (6.10)$$

Stage 5: Computing GPI

As mentioned above, GPI is computed based on the percentage of gender parity-inadequate households (H_{GPI}) and average empowerment gap (I_{GPI}). The first step to compute the GPI is comparing the inadequacy scores $c_i(k)$ between the male and female within the same household. To do so, the individuals (men or women) in the sample that have an inadequacy score equal or higher than the cutoff k (20%), will be assigned the value of k . This gender-parity censored inadequacy score is denoted by $c'_i(k)$ to differentiate it from

the censored inadequacy score notation $c_i(k)$. Thus, when $c_i > k$, we have $c'_i(k) = c_i$, but $c_i \leq k$, then $c'_i(k) = k$.

Thus, the first component of the GPI formula is calculated: gender parity-inadequate households H_{GPI} . This indicator identifies the percentage of households in the sample that did not achieved gender parity. This indicator formula is specified as follows:

$$H_{GPI} = \frac{h}{m} \quad (6.11)$$

Here, h represents the number of households in the sample that are inadequate for gender parity in agriculture, and m is the total number of dual households in the sample.

The third step is the calculation of the average empowerment gap I_{GPI} . This measure consists of the gap between the average percentage of women and men's censored inadequacy scores, in households without gender parity. The I_{GPI} formula is as follows:

$$I_{GPI} = \frac{1}{h} \sum_{j=1}^h \frac{c'j(k)^w - c'j(k)^m}{1 - c'j(k)^m} \quad (6.12)$$

Here $c'j(k)$ represents the censored inadequacy scores of woman (w) and men (m) within the same household j ($j = 1, \dots, n$).

6.3.2 Modelling Empowerment in Agriculture

This stage of the analysis is based on models estimated using the individual scores for empowerment and gender parity calculated from the A-WEAI as dependent variables. According to Alkire et al. (2013), women's empowerment in agriculture is not only a process that is individual, but also relational. For this reason, we not only model the individual scores for empowerment in agriculture but also the individual scores for gender parity. The independent variables were identified from the literature and also mentioned by key informants as important factors associated with empowerment during drought periods.

Model Empirical Specifications

Imagine an individual i ($i = 1, \dots, N$) with characteristics d_i . This individual is characterized by empowerment or gender parity status y_i . This status is latent and measured by a binary (dummy) variable y_i^* such that $y_{1i} = 1$ if $y_{1i}^* > 0$ and 0 otherwise. These latent variables are measured using A-WEAI results (empowerment and gender parity individual scores). The vector d_i contains a subset of variables z_i that exogenously explain the

social status of the individual, such as demographic variables (age and education), and agro-ecological production, which the literature suggests as being associated with women's empowerment (Siliprandi, 2009).

Another subset of d_i refers to a vector x_i of variables that endogenously determine empowerment. Recent studies that have investigated women's empowerment indicate a potential endogeneity bias in their analysis (Allendorf, 2007; Garikipati, 2012; Johnston et al., 2015; Malapit et al., 2017; Sraboni et al., 2014). It is reasonable to assume that women who are empowered in agriculture, or belong to a household with gender parity, are more likely to be direct beneficiaries of credit, access technical assistance, and participate in women-only farmer groups. This reverse causality is then the source of endogeneity. Another way to characterise the endogeneity problem is to hypothesise the existence of relevant confounders that are unobservable by the investigator but influence both the individual scores and the endogenous variables, for instance intra-household or extra-household social dynamics.

This framework of a binary variable model with an endogenous binary covariate leads to a recursive multivariate probit model specified as follows:

$$\begin{aligned}y_i^* &= \beta_0 + \beta_1 x_i^* + \beta_2 z_i + \varepsilon_i \\x_i^* &= \alpha_0 + \alpha_1 z_i + u_i\end{aligned}\tag{6.13}$$

The error terms (ε_i, u_i) are multivariate-normally distributed with variance-covariance matrix $\Sigma = \begin{bmatrix} 1 & \rho_{\varepsilon u} \\ \rho_{\varepsilon u} & 1 \end{bmatrix}$, where ρ represents the correlations between the residuals on the system of equations (Cappellari and Jenkins, 2003). In this setting, a test for reverse causality corresponds to testing whether the parameter ρ equals zero or not (Schneider and Schneider, 2006).

This model can be estimated using the traditional two-step procedure applicable to two-stage least squares methods to correct for endogeneity (Bhattacharya et al., 2006; Heckman, 1978). Alternatively, the model can be estimated using two-step maximum likelihood (Murphy and Topel, 2002), instrumental variable probit estimation (Rivers and Vuong, 1988), and generalized two-step simultaneous probit (Amemiya, 1978). However, when both dependent and endogenous variables are binary or categorical, estimates from the two-step probit approach are not consistent because the estimation is based on a mis-specified likelihood function in the second step of the probit regression (Bhattacharya et al., 2006; Freedman and Sekhon, 2010; Arendt and Larsen, 2006; Monfardini and Radice, 2008).

As an alternative, several studies propose the use of a multivariate probit to estimate the system of equations (see Equation 6.13) (Harris, 2009; Arendt and Larsen, 2006; Bhattacharya et al., 2006; Monfardini and Radice, 2008). A multivariate probit approach has the advantage of presenting a more complex integration of variables (observable and unobservable) in the system of equations compared to single-equation estimation and it also solves the endogeneity of the system (Wilde, 2000; Velandia et al., 2009). Several authors note that a recursive simultaneous system of equations removes the need for additional instruments to identify the parameters in the system (Maddala and Lee, 1976; Roodman, 2009).

In this study, the system of equations (see Equation 6.13) is estimated by simulated maximum likelihood (SML) using the Geweke–Hajivassiliour–Keane (GHK) simulator to estimate the multivariate normal distribution using a smooth recursive simulator¹⁹ (Cappellari and Jenkins, 2003, 2006).

To test for endogeneity, we apply the Hausman technique to the binary dependent variable case, which by extension can be applied to multivariate probit models (Knapp and Seaks, 1998). The asymptotic standard error of $\hat{\rho}$ provided in the calculation of the multivariate probit allows the estimation of the statistic $z = \hat{\rho}/s_{\hat{\rho}}$ to test the hypothesis $H_o : \rho = 0$ (exogeneity). The chi-square distribution of the likelihood ratio reflects the square of value z , which has the same limits as those proposed in the Hausman test (Schneider and Schneider, 2006; Knapp and Seaks, 1998). Also, we contrasted the outcomes of the joint estimation of equations (bivariate probit) and the separate estimation of two individual probits controlled by the parameter ρ .

In the following subsections, we specify the equations estimated in this section, explaining the factors associated with empowerment and gender parity in the agricultural sector, and how these are measured. Importantly, results will present estimates using both univariate and multivariate probits.

Model 1: Factors Associated with Women’s Empowerment in Agriculture under Drought Conditions

The first objective is to measure the determinants of women’s empowerment in agriculture. The main equation can be specified as:

¹⁹To estimate the multivariate probit, we used the statistical software Stata 13—command `mvprobit`. The command `mvprobit` estimates M-equation probit models, using the simulated maximum likelihood (SML) methodology. The variance–covariance matrix of the cross-equation error terms presents correlations on the off diagonal and 1 on the main diagonal. To access the M-dimensional normal integrals in the likelihood function `mvprobit`, one can use the Geweke–Hajivassiliou–Keane (GHK) simulator.

$$emp_i = \beta_{01} + \beta_{11}de_i + \beta_{21}agr_i + \beta_{31}g_i + \beta_{41}c_i + \beta_{51}wt_i + \varepsilon_{i1} \quad (6.14)$$

Where $emp_i = 1$ if the woman is empowered in agriculture (0 otherwise), de identifies the vector for demographic characteristics (age and years of education), and agr is a dummy variable that indicates whether the production system on the farm is agro-ecological. The dummy g identifies whether the female respondent participates in a women-only farmer group, c indicates whether the woman has access to credit as a borrower (1 = yes, 0 otherwise), and wt shows whether the female farmer has access to technical assistance (1 = yes, 0 otherwise). In this model women's access to credit and technical assistance are endogenous²⁰, and the multivariate system of equations includes two additional instrumental equations specified as follows.

$$c_i = \beta_{02} + \beta_{12}de_i + \beta_{21}agr_i + \beta_{32}pc_i + \beta_{42}dap_i + \varepsilon_{i2} \quad (6.15)$$

$$wt_i = \beta_{03} + \beta_{13}de_i + \beta_{23}agr_i + \beta_{33}wr_i + \beta_{43}wp_i + \varepsilon_{i3} \quad (6.16)$$

Where $pc = 1$ indicates if the male in the household had access to credit; dap identifies whether the female respondent had the PRONAF²¹ Eligibility Declaration (known as DAP), a document that enables family farmers to access credit through PRONAF (1 = yes, 0 otherwise); wr indicates whether there is a water reservoir on the farm (1= yes, 0 otherwise); and wp is a binary variable identifying whether the primary female describes herself as responsible for any agricultural activity on the farm.

Model 2: Factors Associated with Gender Parity in Agriculture under Drought Conditions

The model estimating gender parity in agriculture (gp) is analogous to model 1 above. The equation of gender parity is given by the following equation:

$$gp_i = \beta_{01} + \beta_{11}de_i + \beta_{21}agr_i + \beta_{31}g_i + \beta_{41}c_i + \beta_{51}wt_i + \varepsilon_{i1} \quad (6.17)$$

To deal with possible endogeneity bias of women-only farmer group membership and

²⁰We tested the recursive multivariate probit model with four equations. We eliminated the exogenous equation. The equation eliminated from the empowerment in agriculture model was the one on women-only group membership ($\text{arho} = 0.733$).

²¹National Programme for Strengthening Family Farming (PRONAF).

technical assistance²², the instrumental equations are specified as follows.

$$g_i = \beta_{02} + \beta_{12}de_i + \beta_{22}agr_i + \beta_{32}dap_i + \beta_{42}in_i + \varepsilon_{i2} \quad (6.18)$$

$$wt_i = \beta_{03} + \beta_{13}de_i + \beta_{23}agr_i + \beta_{33}wr_i + \beta_{43}wp_i + \varepsilon_{i3} \quad (6.19)$$

Where *in* indicates if the respondent reports that the main source of household income is from agricultural activities (1 if yes; 0 otherwise).

6.3.3 Description of Variables

To assess the factors that are associated with women's empowerment in agriculture under prolonged drought conditions we used the A-WEAI individual scores of empowerment and gender equality in agriculture. The questions included in the questionnaire were selected using two criteria; first identification by in the literature associated with empowerment, or second being mentioned by the key informants in the qualitative phase of this study.

Dependent Variables

The dependent variables are the individual scores of A-WEAI –empowerment in agriculture and gender parity.

Empowerment in agriculture (emp)

This variable is a dummy based on the censored inadequacy score that was computed using the A-WEAI adapted version. This variable allows identification of empowered individuals in the sample, allotting a value of 1 to the empowered and 0 otherwise.

Gender parity (gp)

The gender parity variable is an individual score that identifies whether a household achieved gender parity in agricultural domains between the primary female and her counterpart: 1 to individuals that are in a household with gender parity and 0, otherwise.

Key Independent Variables

The following explanations describe the predictor variables that were significantly associated with the dependent variables. All variables used as predictors are either categorical or binary.

Woman's access to technical assistance (wt)

²²We tested recursive multivariate probit model with four equations. We eliminated the exogenous equation. The equation eliminated from the gender parity in agriculture model was on women's access to credit (artho = 0.852).

This variable is a dummy, 1 for women who had access to technical assistance and 0 otherwise. This variable was designed to detect whether the woman has received orientation from agricultural technicians regarding her agricultural production (either individually or collectively) in the last year.

Woman's access to credit (c)

In contrast to the credit access indicator used in the index methodology, which identifies household credit access and decision-making power on using credit, this variable indicates whether the respondent was the direct beneficiary of a loan (1 if the woman has had access to credit as the beneficiary in the last year, 0 otherwise).

Women-only productive group (g)

This variable indicates whether the female respondent participated in a women-only farmer group. The A-WEAI group membership module was adapted to collect information about participation in mixed groups, and specific questions were designed to identify whether the female respondent participated in women-only farmer groups or trade associations in the last year.

Demographic variables (de)

The demographic variables of interest were age (a categorical variable divided into three ranges: 15–30 years, 31–60 years, and 61 or older) and education (a dummy variable coded as 1 for more than four years, and 0 otherwise).

Agro-ecological production (agr)

This dummy variable identifies whether or not the farm has adopted an agro-ecological farming system (1 = yes, 0 otherwise).

Key Instrumental Variables

Finally, we collected information on several instrumental variables, which were used in both models as explained above in the estimation of the endogenous dependent variables.

Partner access to credit (pc)

Whether the spouse has accessed credit could influence a woman's access to credit. This dummy variable identifies whether the male counterpart had access to credit lines (1 = yes, 0 otherwise).

Woman's DAP (dap)

As noted above, the PRONAF Eligibility Declaration (DAP) is a document that enables family farmers to access credit lines targeted at rural development. This variable indicates whether the female farmer has this document (1 = yes, 0 otherwise).

Access to water reservoir (wr)

This variable is a dummy to identify whether or not the female farmer has access to any form of water reservoir (1 = yes, 0 otherwise).

Woman's agricultural production (wp)

This variable identifies whether or not the woman recognises herself as the person in charge of some agricultural activity developed on the family farm or communitarian plots (1 = yes, 0 otherwise).

Agriculture as source of income (in)

This variable identifies whether or not the main source of household income is from agricultural activities (1 = yes, 0 = government assistance or non-agricultural work).

6.4 Conclusions

This chapter has detailed the procedures of how the quantitative data were collected and analysed. In this study, we adopted the abbreviated version of the WEAI because it reduces time and complexity in the application of the questionnaire. The time taken to complete the questionnaire is an important factor for the quality of the data. Moreover, the use of the abbreviated version was relevant because three more modules were added to the questionnaire. The use of the WEAI integral version could substantially increase the time required to complete the questionnaire.

Another relevant methodological choice was the adjustment of the indicator group membership and ownership of assets' inadequacy cutoff. This adaptation translated more accurately to the context of the study area and avoided overlapping of questions

Moreover, the data collection strategies that we adopted in this study to minimise the threats identified in Section 4.3 proved to be appropriate. The enumerators' training and the pre-test helped identify flaws in the questionnaire. Based on the information obtained in this process, we adapted the questions, and this enhanced the understanding of both enumerators and respondents. Additionally, the practical knowledge and engagement of the enumerators were key elements of data collection. Daily meetings were exhausting, but helped in the identification of constraints and missing data. These measures significantly improved the quality of the data.

The data analysis used in this quantitative phase aimed to identify the areas of disempowerment and the factors associated with empowerment and gender parity in this case study. In our data analysis strategy, we aim to deal with the endogeneity bias by applying the multivariate probit model which allows us to identify and correct the endogeneity effect. Moreover, we performed the selection of the independent variables using both material collected from the literature review and information gleaned from the key

informants' interview. In the next chapter, the results of the A-WEAI and the models are tested to provide a measurement of rural Brazilian women's empowerment during a prolonged drought.

Chapter 7

Adapted A-WEAI and Models Results

Chapter 6 reported the methods, data collection and analysis of the quantitative component of this project. This chapter presents the main findings from the quantitative phase with the following research aims: (1) to assess women's empowerment in agriculture; and (2) to identify factors that sustain the process of women's empowerment in agriculture during a period of drought.

As has been discussed in the previous chapter, evidence was based on sex- disaggregated data collected from households in the studied area. The quantitative data was analysed in two stages: First, the calculation of the adapted A-WEAI where the overall scores (A-WEAI, 5DE and GPI) and the identification of the domains where rural women in Chapada do Apodi are deprived. Second, the estimation of the univariate probit and multivariate probit models which examine the factors associated with empowerment and gender parity during a period of drought.

This chapter is structured as follows. Section 7.1 outlines the description of the respondent's socioeconomic characteristics and farms (size, agricultural activities, etc.). The following section presents the adapted A-WEAI main findings. This section provides the findings not only from the total sample but also by the analysis divided by non-land reform and land reform categories of farms. The final section extends the univariate and multivariate probit analysis that identify the factors that sustain the process of empowerment during a drought period in Chapada do Apodi.

7.1 Description of the Sample

Table 7.1 summarizes descriptive statistics for the variables used in the quantitative analysis. The mean values presented in Table 7.1 are mathematically equivalent to the percentage; this because all variables in this study are binary. In the sample, a large proportion of the respondents were between 31 and 60 years of age in both categories: 69.9% of women and 71.2% of men. Only 14% of the sample were older than 61 years of age, indicating a high percentage of working-age population in the area. Regarding years of education, 21.2%¹ of women in the sample had more than four years of education compared with only 9.8% of men; no respondents had completed secondary education. Eighty-eight percent of the sample had a primary female and male living in the household (dual-households). However, 9 out of 20 female-only households in the sample actually mentioned that they had partners that were not ‘formally’² living in the household, but somehow participated in household decisions. It is not clear how this could influence the decision-making process within the household dynamic. This element caused bias in the isolated analysis of female-only households. This is because the WEAI is mainly focused on the decision-making process within the household; by adding a partner in this setting, it is unclear how they could influence the choices of female respondents.

Despite cautiously including in our sampling the two categories of farms present in the region, the difficulty of accessing non-land reform farms resulted in a difference of more than ten percent in the land reform category in the sample. Regarding the economic activities in the households, it was found that almost all respondents in the study population had some agricultural activity in their plots, even considering the prolonged period of drought. However, the significant shortfall of water in the region, and the lack of investment in infrastructure to support family farms, farm activities had decreased in importance in terms of their contribution to household income. Fifty-eight percent of women in the sample reported that the most substantial element of household income was from government assistance (social programmes and pensions). In contrast, the male respondents reported waged work as their main source of income (35.5%). Only 15.3% of women and 23.7% of men reported agricultural activities on their farms as the main source of income. The monthly household income reported by approximately 40% of both groups was between R\$ 501 to R\$ 1.000 (approximately US\$ 135 to US\$ 270).

¹According to IBGE (2014) in 2010 the illiteracy rate in the northeast region was 20.4% and 16.9%, respectively for women and men.

²During the fieldwork, we identified that some of the female-headed households was not de facto female-headed households because there were partners who did not permanently reside in the household, but influence larger decisions. These partners were identified as boyfriends and when asked to one woman that self-declared is the head of house, she mentioned that her boyfriend participate in several decisions within the household.

Table 7.1: Distribution of sample characteristics (n=173 households)

Variables	Women (n = 173)		Men (n = 153)	
	Mean	Std. Dev.	Mean	Std. Dev.
Age group				
21 - 30 years	0.144	0.353	0.111	0.315
31 - 60 years	0.699	0.460	0.712	0.454
≥ 61 years	0.127	0.334	0.156	0.364
Years of education (1 = more than four years)	0.214	0.411	0.098	0.291
Type of household (1 = dual households)	0.884	0.321		
Category of farm (1 = land reform)	0.618	0.487	0.640	0.481
Main source of income				
Agriculture	0.156	0.364	0.237	0.427
Waged work	0.214	0.411	0.355	0.480
Governmental	0.584	0.494	0.283	0.452
Household income value				
R\$501 - R\$1.000	0.424	0.496	0.454	0.499
R\$1.001 - R\$2.000	0.165	0.372	0.211	0.410
≥R\$2.001	0.024	0.152	0.053	0.224
Farm size				
12 - 20 ha	0.420	0.496	0.367	0.484
21 - 50 ha	0.109	0.313	0.137	0.345
≥51 ha	0.067	0.251	0.122	0.329
Production system (1 = agro-ecological)	0.881	0.325	0.843	0.365
Farming activities diversified (>5 activities)	0.249	0.433	0.353	0.479
Farm productive activities				
Poultry	0.699	0.460	0.680	0.468
Maize	0.642	0.481	0.732	0.444
Beans	0.613	0.489	0.660	0.475
Fruit	0.601	0.491	0.536	0.500
Goat and sheep	0.370	0.484	0.386	0.488
Bovine	0.353	0.479	0.412	0.494
Vegetable	0.301	0.460	0.229	0.421
Forage	0.231	0.423	0.301	0.460
Swine	0.179	0.385	0.209	0.408
Honey	0.075	0.264	0.118	0.323
Cassava	0.035	0.184	0.046	0.210
Potato	0.023	0.151	0.046	0.210
Rice	0.000	0.000	0.007	0.081
Woman's agricultural production (1 = yes)	0.687	0.465		
Access to water (1 = yes)	0.850	0.358	0.856	0.352
Woman's DAP (1 = yes)	0.641	0.481		
Farm access to technical assistance (1 = yes)	0.587	0.494	0.608	0.490
Women's access to technical assistance (1 = yes)	0.190	0.394		
Beneficiary of credit (1 = yes)	0.339	0.475	0.503	0.502
Women-only farmer group (1 = yes)	0.358	0.481		

The agro-ecological system was declared as the predominant production scheme for

both groups: 88.1% of women and 84.3% of men. In terms of production diversification, 24.9% of women and 35.3% of men in the sample reported more than five different agricultural activities on their farms. A significant majority of respondents reported that their farms had poultry, maize, beans and fruit. Moreover, 68.7% of women in the sample said that they were the person in charge of some of the food crops and/or cash crops. Eighty-five percent of women and men reported that they had access to water. The percentage of access to water is relatively high considering the severity of the dry spell that affects the area. However, respondents mentioned that access to the water reservoir is restricted to household consumption such as cooking.

In our sample, 20.7% of men and 23.1%³ of women did not declare land ownership. This could be influenced by the fact that 61.8% of our sample were from recent land reform settlements, and as the respondents did not have land deeds, they did not declare ownership. In the dual-households with land ownership, 80.3% of men and 79.7% of women declared joint or sole ownership of the land. This data reflects the measures taken by the Brazilian government to enforce the joint titling of land (Deere, 2017). Regarding access to the three categories of interventions analysed, the study findings were: 19.1% of women had received technical assistance compared to 60.8% of men; 33.9%⁴ of women declared themselves to be a beneficiary of credit in the last year compared with 50.3% of men. Finally, 35.8% of women participated in women-only farmer groups. Despite all efforts to increase the availability of interventions for rural women in Brazil, our sample shows that men still have more access to these categories of interventions. Additionally, this data further supports the idea of women having less access to resources in disaster settings (Anderson, 1994; Enarson, 2000; Austin and McKinney, 2016).

7.2 Assessing Women's Empowerment in Agriculture during Drought

This section presents the findings of the adapted version of the A-WEAI. This section is divided into three subsections. The first item presents the adapted A-WEAI results of the total sample: the identification of the percentage of the women and men who were disempowered, and the overall scores and indicators where they are disempowered. Secondly, this section presents the adapted A-WEAI results by the subgroups: non-land reform and land reform communities, presenting the differences found between these two groups.

³Data obtained from the module D: Access to Productive Capital.

⁴Initially our intention was collect information strictly for credit lines connected to credit for agricultural production, but the differentiation from other available credit lines was not clear to the respondents. Thus, we collected the information from access to credit in general.

The adapted A-WEAI allows us to identify who in the sample achieved empowerment and gender parity in agriculture. This information is used in to investigate the linkages between individual scores for empowerment and gender parity in agriculture and individual and farm's characteristics, credit, technical assistance and women-only group membership under prolonged drought.

7.2.1 Adapted A-WEAI Results

The overall adapted A-WEAI score was 0.867. This result suggests that even under severe and prolonged drought, women in Chapada do Apodi achieved high scores in the A-WEAI. According to a recent baseline report estimated WEAI scores from 13 countries, the score is high (> 0.85), medium (0.85 to 0.75), or low (< 0.75) (Malapit et al., 2014). It was estimated based on the weighted computation of the sub-indices: 5DE (0.862) and GPI (0.919), as explained Section 6.3.1. According to the 80% cutoff used by Alkire et al. (2013), 64.7% of women in the sample would be considered empowered in agriculture. Those who did not achieve empowerment presented inadequacy in 39.2% of domains on average. This value represents the intensity of disempowerment. In other words, from the six indicators assessed, the women in the sample classified as disempowered (35.3%) did not achieve the minimum threshold in more than two indicators. These results are presented in Table 7.2. The percentage of households with gender parity in agriculture was 69.3%, which means that almost 30.7% of women in our sample (in dual households) did not achieve the same score – or were better – compared with their male counterparts. Thus, the average empowerment gap between women and men in dual-households was 26.3%.

The modification performed in the inadequacy cutoff (*group membership* and *ownership of assets* indicators) has a bigger impact on women than men (see more detail in Appendix C). Using the original A-WEAI inadequacy cutoffs 6.4% more women and 2.6% more men were classified as empowered in agriculture. This result suggests the importance of adapting this tool to the applicable context because neglecting this step would leave behind individuals that are, in fact, disempowered in a given context. Appendix C provides more detail about the A-WEAI results for the original inadequacy cutoffs.

Table 7.2: Results of Adapted A-WEAI

	Women	Men
5DE Index (1-M0)	0.862	0.904
Disempowerment Index (M0)	0.138	0.096
% Empowered Headcount (1-H)	64.74	72.55
% Disempowered Headcount (H)	35.26	27.45
Average Inadequacy Score (A)	0.392	0.349
No. of observations	173	153
% of Data used	100	100
<i>GPI (1-HGPIxIGPI)</i>	0.919	
% of women with gender parity (1-HGPI)	69.28	
% of women with no gender parity (HGPI)	30.72	
Average Empowerment Gap (IGPI)	0.263	
No. of women in dual households	153	
% of Data Used	100	
<i>A-WEAI</i>	0.867	

Note: Formulas are described in Section 6.3.1

Table 7.3 presents the decomposition of the disempowerment index by gender. The step-by-step of the calculation are presented in Section 6.3.1. Based on this information is possible to assess the areas (and intensity) of the respondent's deprivation. The item *% Contribution* in Table 7.3 shows the contribution of each indicator to the total of the disempowerment index. It shows how important each indicator is for the disempowerment of those who were not classified as empowered.

The most significant indicator for women's disempowerment was *input in productive decision* at 23.4% of the total women's disempowerment index. Mahmud et al. (2012) note that a crucial element of empowerment relates to access to and control of material, human and social resources. According to Alkire et al. (2013), when defining agricultural empowerment, it is important to consider the ability to make decisions as well as the material and social resources needed to carry out those decisions. Our results show that the ability to participate in the decision-making process is one of the most significant barriers to empowerment in periods of drought.

The indicator *group membership* represented 21.7% and *workload* accounted for 20.1% of the total score. Comparing these results with those in the original version of A-WEAI (see Appendix C), we noted that changes in inadequacy cutoffs placed group membership as the second most important indicator for women's disempowerment in the studied area. In other words, to these women who were classified by A-WEAI as disempowered, not participating in any kind of farmer's organisation was the second most important factor

for their disempowerment. As explained in Section 6.1.1, we found it appropriate to make this adaptation to better translate the reality of this study. Moreover, the result shows that the indicator *control over use of income* account for 16.7% of the women's disempowerment in the area. Finally, both indicators *access to and decisions on credit* and *ownership assets* accounted for 18.1%.

Table 7.3: Results of *Adapted A-WEAI* decomposed by dimension and indicator

	Production	Resources		Income	Leadership	Time
	Input	Ownership	Access	Control	Groupmember	Workload
<i>Women</i>						
Censored headcount	0.162	0.046	0.283	0.116	0.150	0.139
% Contribution	23.40	4.46	13.65	16.71	21.73	20.06
Contribution	0.032	0.006	0.019	0.023	0.030	0.028
% Contr. by dimension	23.40	18.11		16.71	21.73	20.06
<i>Men</i>						
Censored headcount	0.085	0.046	0.209	0.013	0.111	0.170
% Contribution	17.73	6.36	14.55	2.73	23.18	35.45
Contribution	0.017	0.006	0.014	0.003	0.022	0.034
% Contr. by dimension	17.73	20.91		2.73	23.18	35.45

Note: Formulas are described in Section 6.3.1

Men's areas of deprivation are different compared to women (Figure 7.1). The indicator *workload* is the main factor for men's disempowerment at 35.5%, followed by the *group membership* at 23.2% of the contribution to men's disempowerment. Regarding the indicator *access to and decisions on credit*, female respondents were slightly at an advantage in comparison to male respondents (see Figure 7.1). However, male respondents had significant advantages regarding the indicator *control over use of income*.

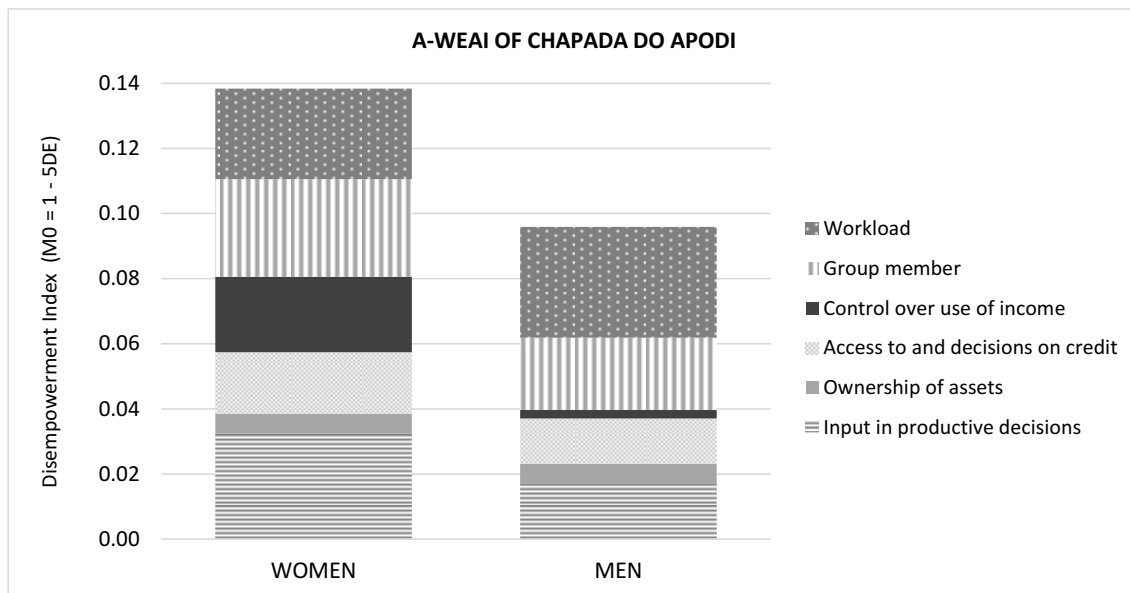


Figure 7.1: Contribution of each indicator to disempowerment.

7.2.2 Adapted A-WEAI Results by Category of Farms

The adapted A-WEAI score for the non-land reform farms was 0.845, and for land reform farms 0.881. By decomposing the A-WEAI by population subgroups, our results show differences between the scores of land reform women and non-land reform women, in which the former are more empowered. Table 7.4 reports the 5DE scores for these two categories as 0.838 (non-land reform) and 0.876 (land reform). The GPI values were 0.908 for non-land reform and 0.926 for land reform. Moreover, the percentage of women empowered in agriculture was 59.1% for non-land reform households and 68.2% for land reform households. The percentage of women that achieved gender parity in agriculture was, 69.1% for non-land reform households and 69.4% in land reform households. In addition, the average empowerment gap between women and men in dual-households in the non-land reform farms was largest at 29.8%.

Table 7.4: Results of *Adapted A-WEAI* by farm categories

	Non-Land Reform		Land Reform	
	Women	Men	Women	Men
<i>5DE</i> Index (<i>1-M0</i>)	0.838	0.869	0.876	0.924
Disempowerment Index (<i>M0</i>)	0.162	0.131	0.124	0.076
%Empowered Headcount (<i>1-H</i>)	59.09	63.64	68.22	77.55
%Disempowered Headcount (<i>H</i>)	40.91	36.36	31.78	22.45
Average Inadequacy Score (<i>A</i>)	0.395	0.360	0.390	0.339
No. of observations	66	55	107	98
% of Data used	100	100	100	100
<i>GPI</i> (<i>1-HGPI X IGPI</i>)	0.908		0.926	
% of women with gender parity (<i>1-HGPI</i>)	69.09		69.39	
% of women with no gender parity (<i>HGPI</i>)	30.91		30.61	
Average Empowerment Gap (<i>IGPI</i>)	0.298		0.243	
No. of women in dual households	55		98	
% of Data Used	100		100	
<i>A-WEAI</i>	0.845		0.881	

Note: Formulas are described in Section 6.3.1

Table 7.5 shows the decomposition of the disempowerment index. The indicator that assesses participation in decision-making regarding agricultural production was the most significant for women's disempowerment in both groups, responsible for 24.4% in non-land reform farms and 22.6% in land reform farms. In the land reform farms, the indicator *workload* performed similarly to the indicator *input in productive decisions*—22.6%. While in non-land reform farms the indicator *workload* represented 16.9%. Moreover, the findings show that the indicator *group membership* was similar for both categories of farms (22.5% and 21.1% respectively).

Table 7.5: Results of *Adapted A-WEAI* decomposed by dimension and indicator

	Production	Resources	Income	Leadership	Time	
	Input	Ownership	Access	Control	Groupmember	Workload
Land reform						
<i>Women</i>						
Censored headcount	0.140	0.037	0.271	0.093	0.131	0.140
% Contribution	22.61	4.02	14.57	15.08	21.11	22.61
Contribution	0.028	0.005	0.018	0.019	0.026	0.028
% Contr. by dimension	22.61	18.59		15.08	21.11	22.61
<i>Men</i>						
Censored headcount	0.061	0.020	0.184	0.010	0.071	0.163
% Contribution	16.07	3.57	16.07	2.68	18.75	42.86
Contribution	0.012	0.003	0.012	0.002	0.014	0.033
% Contr. by dimension	16.07	19.64		2.68	18.75	42.86
Non-land reform						
<i>Women</i>						
Censored headcount	0.197	0.061	0.303	0.152	0.182	0.136
% Contribution	24.38	5.00	12.50	18.75	22.50	16.88
Contribution	0.039	0.008	0.020	0.030	0.036	0.027
% Contr. by dimension	24.38	17.50		18.75	22.50	16.88
<i>Men</i>						
Censored headcount	0.127	0.091	0.255	0.018	0.182	0.182
% Contribution	19.44	9.26	12.96	2.78	27.78	27.78
Contribution	0.025	0.012	0.017	0.004	0.036	0.036
% Contr. by dimension	19.44	22.22		2.78	27.78	27.78

Note: Formulas are described in Section 6.3.1

The indicator *control over use of income* accounted for around 18.8% for non-land reform farms and 15.1% for land reform farms. The last indicators in the ranking of importance for women disempowerment were access to and decisions on credit for non-land reform farms with 12.5% and 14.6% for land reform farms. Lastly, the indicator *ownership of assets* represented around 5.0% in both categories.

The configuration of men's deprivation is considerably different not only in comparison with the women's disempowerment index in the same category but also across the men's disempowerment index between the farm categories (see Figure 7.2).

The indicator *workload* is the main factor contributing to men's disempowerment for the land reform category with 42.9%. This domain was also as important for men's disempowerment in the non-land reform category—27.8%. Moreover, the indicator *group membership* accounted for 27.8% of the men's disempowerment in non-land reform farms and 18.8% otherwise. Moreover, male's respondents in both categories had a significant advantage over their counterparts in terms of the indicator *control over use of income*. The results suggested that the most empowered group was men from land reform farms

(77.5%) and the least empowered group was women from non-land reform farms (59.1%). The results show that men from non-land reform farms are less empowered in agriculture than women from land reform farms. However, in the two-way analysis, we did not find any association between empowerment and farm category (see Appendix D).

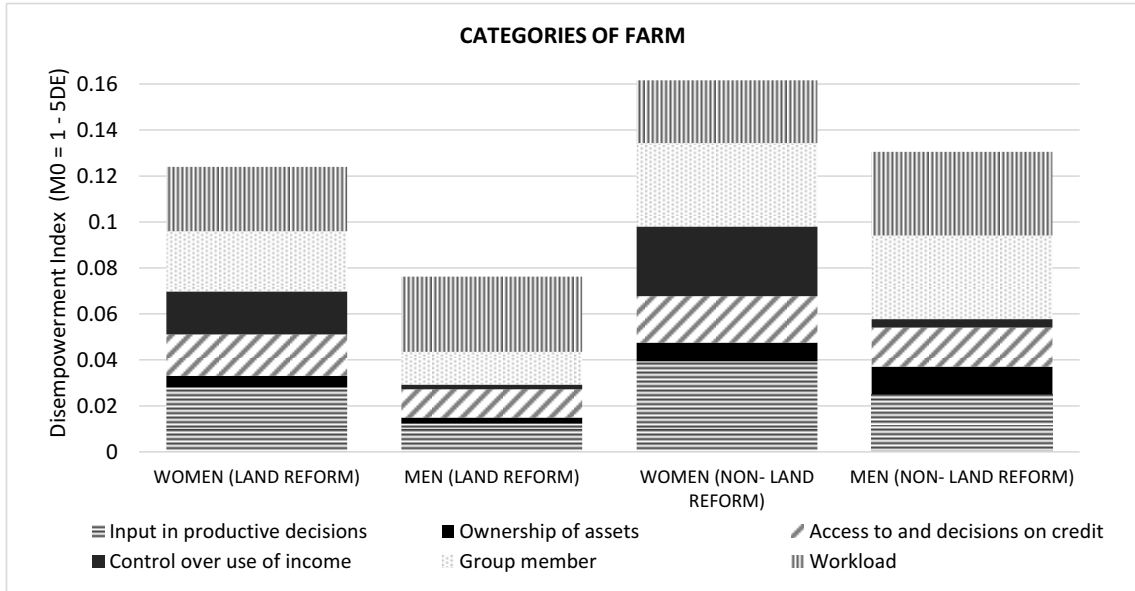


Figure 7.2: Contribution of each indicator to disempowerment by farm categories.

7.3 Modelling Individual Scores of Empowerment and Gender Parity

The previous section presented the results of the adapted A-WEAI, which was crucial to identify women in the study sample who are empowered in agriculture and have achieved gender parity in agriculture. Thus, this section presents the results that were obtained using both: univariate and multivariate probit models. In Chapter 6 we presented the empirical specification of the models and described the variables. In the Appendix D, we examined the correlations between the dependent variables and the potential independent variables of our model.

In this phase of the quantitative analysis we used only the data from women in dual-households. This decision was taken for two reasons. First because the sample size of women in female-only households was too small to perform the analysis proposed. The second reason was that we identified that some of the female respondents who declared themselves be living in a household without a male counterpart, had in fact a partner who was not formally living in the household, but to certain degree influenced household

decisions. To avoid the unknown effect of this informal male presence in the household, we decided to drop these observations from this stage of the analysis. The table with the distribution of the sample without the female headed households is in Appendix D.

7.3.1 Factors Associated with Women's Empowerment in Agriculture under Severe Drought Conditions

Tables 7.6 and 7.7 (column a) present univariate and recursive multivariate probit model estimation results, respectively. The model empirical specifications are explained in detail in Section 6.3.2. These are used to detect factors associated with women's empowerment in agriculture. Both methodologies were significant overall on Wald's chi-square test ($P \rightarrow 0$). It means that the explanatory variables used in this model are significant. To put it differently, the variables add to the model. The null hypothesis of exogeneity was rejected by means of the joint significance test by likelihood ratio (chi-square) in the recursive multivariate model. In other words, our assumption that women who are empowered in agriculture are more likely to be direct beneficiaries of interventions was accurate. This reverse causality is a source of endogeneity. These results are consistent with those of recent studies that have investigated women's empowerment and that indicate a potential endogeneity bias in their analyses (Allendorf, 2007; Garikipati, 2012; Johnston et al., 2015; Malapit et al., 2017; Sraboni et al., 2014).

These estimates showed no statistically significant associations between the variables for age, education, agro-ecological farming system, or women-only farmer group membership and the individual empowerment in agriculture score. This result is contrary to those of previous studies that found women's empowerment is associated with age (Kishor and Subaiya, 2008; Rahman et al., 2009), education (Duo, 2012; Kishor and Subaiya, 2008; Hanmer and Klugman, 2016; Mahmud et al., 2012) and agro-ecological production (Siliprandi, 2009). More discussion about these results will be provided in Chapter 8. The independent variable for women's access to credit was positively associated with both estimations (univariate and multivariate) at a statistically significant level, providing evidence of association with empowerment in the agricultural sector. Our findings are consistent with those from previous studies suggesting that access to credit in high-risk drought areas helps mitigate the effects of drought (Enarson and Chakrabarti, 2009; Austin and McKinney, 2016).

However, the marginal effect⁵ estimation presented different outcomes. With regard to the women's profile⁶ established in the model, the univariate approach suggested that this

⁵To estimate the marginal effect of univariate probit, the command "mfx" was applied in the Stata 13 software. The estimation of marginal effects in the multivariate probit was performed manually.

⁶This value is a reference to an individual's profile, which has the same characteristics as established in

variable increased by 18.5% the odds that a woman would be empowered in agriculture. However, the marginal effect calculated in the multivariate probit model was considerably higher at 36.0%. These results suggest that both methodologies (univariate and multivariate) present similar positive statistically significant outcomes. However, neglecting the endogeneity bias in the analysis of intervention effects could lead to a misinterpretation of performance. Moreover, it may underestimate the impact of particular interventions that could boost empowerment during a period of crisis.

Likewise, the outcomes estimated using both techniques showed that the variable for technical assistance had a statistically significant positive association with the individual empowerment in agriculture score. The estimation by the univariate model implied a positive effect of 39.7% and the multivariate model suggested an effect of 17.8% on the odds that a woman who accessed technical assistance in Chapada do Apodi would be in the empowered group. Other interesting findings from the multivariate model involved the estimation of factors associated with the endogenous regressors. With regard to access to credit (see Equation 6.15), we found positive, statistically significant impact for three independent variables: years of education and partner access to credit. These results show that women's education was not a variable directly associated to empowerment but seems to play a role in credit access. Moreover, our analysis shows that women's access to credit was strongly associated with that of their partner's. This result must be interpreted with caution because in Brazil there are special credit lines for women and quota-based policies that protected and guaranteed a share of available credit to women. In the absence of these conditions, these relationships may not be observed. With regard to women's access to technical assistance, positively associated factors were access to a water reservoir and the female farmer's claim to be responsible for at least one agricultural activity on the farm. We provide a detailed discussion about the findings in Chapter 8, where these results are integrated to the qualitative study.

the model.

Table 7.6: Summary of univariate probit estimation: Factors associated with empowerment and gender parity in agriculture in Chapada do Apodi

	(a) Empowerment	(b) Gender Parity
	Coeff.(SE)	Coeff.(SE)
> 4 yrs of education	-0.143 (0.289)	0.0856 (0.306)
Aged 31– 60 yrs	0.402 (0.263)	0.446* (0.267)
Aged over 61 yrs	0.208 (0.349)	-0.059 (0.348)
Agro-ecological production	0.432 (0.284)	0.797*** (0.275)
women-only farmer group	0.177 (0.259)	0.649** (0.284)
Access to credit	0.548** (0.252)	0.393 (0.259)
Access to technical assistance	1.455*** (0.375)	1.143*** (0.374)
Constant	-0.622** (0.297)	-0.899*** (0.305)
Observations	152	152
Wald test, chi square	24.44***	27.79***
Log likelihood	-79.89	-75.14
Pseudo- R^2	0.201	0.230

Note:*Coeff.(SE) Robust standard errors in parentheses ***p < 0.01, **p < 0.05, *p < 0.10.

Table 7.7: Summary of multivariate probit estimation: Factors associated with empowerment and gender parity in agriculture in Chapada do Apodi.

Variables	(a) Empowerment in agriculture			(b) Gender parity in agriculture		
	Coeff. (SE)			Coeff. (SE)		
	(1) Main	(2) Credit	(3) Technical	(1) Main	(2) Groups	(3) Technical
> 4 yrs of education	-0.256 (0.264)	0.556** (0.262)	-0.468 (0.302)	0.0797 (0.281)	0.171 (0.273)	-0.442 (0.305)
Aged 31– 60 yrs	0.168 (0.237)	0.144 (0.220)	-0.008 (0.252)	0.243 (0.252)	0.443* (0.244)	0.022 (0.262)
Aged over 61 yrs	0.311 (0.273)	-0.448 (0.334)	-0.396 (0.389)	0.0615 (0.355)	-0.246 (0.395)	-0.344 (0.380)
Agro-ecological production	0.252 (0.257)	0.301 (0.245)	-0.063 (0.311)	0.43 (0.284)	0.946*** (0.327)	-0.127 (0.315)
Women-only group	0.064 (0.177)			1.551*** (0.409)		
Access to credit	1.690*** (0.198)			0.280 (0.239)		
Access to technical assistance	1.368*** (0.321)			1.284*** (0.437)		
Partner's access to credit		0.605*** (0.181)				
Woman's DAP		0.876*** (0.188)			0.798*** (0.274)	
Access to water			1.416*** (0.455)			1.386*** (0.427)
Woman's production			0.738*** (0.239)			0.806*** (0.284)
Agricultural income					0.442** (0.221)	
Constant	-0.824*** (0.268)	-1.509*** (0.265)	-2.214*** (0.525)	-0.930*** (0.278)	-1.962*** (0.337)	-2.184*** (0.553)
<i>Statistics</i>						
Observations	152	152	152	152	152	152
Artho ₂₁	-1.438*** (0.312)	-1.438*** (0.312)	-1.438*** (0.312)	-0.784*** (0.394)	-0.784*** (0.394)	-0.784*** (0.394)
Artho ₃₁	-0.282 (0.181)	-0.282 (0.181)	-0.282 (0.181)	-0.362 (0.289)	-0.362 (0.289)	-0.362 (0.289)
Artho ₃₂	0.112 (0.238)	0.112 (0.238)	0.112 (0.238)	0.223 (0.196)	0.223 (0.196)	0.223 (0.196)
Likelihood ratio test chi2	25.22***	25.23***	25.23***	15.97***	15.97***	15.97***
Wald test, chi square	154.67***	154.67***	154.67***	128.11***	128.11***	128.11***
Log-pseudo likelihood	-233.4	-233.4	-233.4	-231.7	-231.7	-231.7

Note: *Coeff.(SE) Robust standard errors in parentheses ***p < 0.01, **p < 0.05, *p < 0.10.

7.3.2 Factors Associated with Gender Parity in Agriculture under Severe Drought Conditions

Tables 7.6 and 7.7 (column b) show the results of univariate and multivariate probit models for gender parity in the agricultural sector. The model empirical specifications are explained in detail in Section 6.3.2. The variance–covariance matrix of the cross-equation error terms indicates the rejection of the null hypothesis of exogeneity, which means the system of equations detected, and simultaneously corrected, the effect of endogeneity. Similar to empowerment in the agricultural model, endogeneity is found in the gender parity recursive multivariate model: This fact corroborates the use of a multivariate probit instead of a univariate model.

In contrast with the empowerment model results, there were several asymmetries between the results estimated by the univariate and the multivariate probit models. First, the variable for age (specifically, the 31–60 age range) had positive statistical significance in the univariate model but no statistical significance in the multivariate model. Second, the univariate probit model indicated that the variable for implementing an agro-ecological farming system was positively associated with gender equity in agriculture, but this variable was not statistically significant in the multivariate estimation.

Both methodologies corroborated the relationship between the women-only farmer group membership variable and gender parity in agriculture. This result is in line with those of several studies that have shown that women’s group membership positively affects empowerment (Narayan-Parker, 2005; Quisumbing and Kumar, 2011) by enhancing women’s self-confidence and their involvement in economic activities (Evans and Nambiar, 2013; Baden, 2013). However, the marginal effects showed different results. The univariate estimation suggested that this variable increased by 20.7% the odds that a woman would be in a household with gender parity in agriculture; the multivariate probit marginal effect demonstrated a comparable increase of 12.6% in the odds of belonging to this category. Similarly to the empowerment models, the variable for technical assistance had a statistically significant positive association with gender parity in agriculture. The single probit model estimation implied that this variable increased the odds that a woman would experience gender parity in agriculture by 31.6%; however, the multivariate probit model estimated this variable’s effect as only 6.1%. Once again, our results suggest that ignoring the endogeneity of the equation could lead to an inaccurate assessment of the results. We will provide a detailed discussion about the findings in Chapter 8, where these results are incorporated into the qualitative study.

Moving on to the factors associated with the endogenous regressors (see Table 7.7), the findings show that participation in a women-only farmer group was positively and significantly correlated with several factors: agro-ecological farming, woman’s DAP, and

agriculture as the main source of income. These results also indicate that endogeneity bias could provide inaccurate interpretations of factors that are statistically significant, as well as their marginal effects.

7.4 Conclusion

This chapter presented the main findings from the quantitative phase, which had the following research specific aims: (1) to assess women's empowerment in agriculture and (2) to identify factors that sustain rural women's empowerment under drought conditions. To pursue these research aims, we divided this phase into two steps: the assessment of the empowerment in the region and the identification of individuals who achieved empowerment and the estimation of a model of the factors associated with empowerment under a prolonged drought.

First, this section outlines the adapted A-WEAI results where men's overall scores was higher than women's, as expected, and consequently more men are considered empowered in agriculture in the total sample. The findings also reveal that the modification in the inadequacy cutoffs impacted more in the women's adapted A-WEAI scores results than in the male outcomes in the sample. These results suggest that adjustments in the WEAI inadequacy cutoffs is relevant to identify disempowerment in the local context where the study was conducted.

Moreover, regarding the adjusted A-WEAI analysis we found that the indicators that women in the sample were most deprived were: *input in productive decision*, followed by *group membership* and *workload*, respectively. Conversely, the indicators that men were most deprived are: *workload*, followed by *group membership* and *input in productive decision*. Also, the analysis by farm subgroups provided valuable insights. The adapted A-WEAI scores suggested that the non-land reform farmers are less empowered than land reform farmers, as we expected. Moreover, the results show that men from non-land reform farms are less empowered in agriculture than women from land reform farms. However, in the two-way analysis we did not find any association between empowerment and the category of farm.

The results show that even under circumstances of severe drought, women's access to credit and technical assistance are associated with empowerment in agriculture and that membership in a women-only farmer group and women's access to technical assistance are related to gender parity in agriculture. This suggests that during prolonged periods of drought crisis, access to interventions that sustain agricultural production and productive inclusion are positively associated with the process of women's empowerment in agriculture. The discussion and policy recommendation of this result will be presented in the

following chapters.

Chapter 8

Examining Women's Empowerment in Agriculture in Chapada do Apodi

The previous chapter presented the main findings of the adapted A-WEAI and the multivariate probit estimation. Considering that we used mixed-method research in this thesis, the purpose of this chapter is to integrate the findings in Chapters 5 and 7 and, by so doing, examine the empowerment of rural women in agriculture under drought conditions. The purpose of this chapter is to integrate the findings presented in Chapters 5 and 7, by so doing, examine the empowerment of rural women in agriculture under drought conditions.

The results of the quantitative study show that even under severe drought, women from Chapada do Apodi are empowered in agriculture. Moreover, the multivariate probit estimation suggests that women's credit access and technical assistance are associated with empowerment in agriculture, and that membership in women-only farmer groups and access to technical assistance are related to gender parity in agriculture. Our qualitative results suggest that the creation of an autonomic and resourceful rural women's policy agency supporting women's movement agenda at the national level was mentioned by key informants as most significant strengthen in the context of rural women in Brazil. Another important finding from the qualitative phase was the use of gender-awareness methodology for delivering technical assistance and supporting women-only farmer groups, which, according to women farmers, enhanced their consciousness and self-esteem.

In this chapter, we integrate our findings from different methodologies by using a correlational embedded model. We intend to expand and contextualise the quantitative outcomes and unpack the components that may influence the performance of the index explored here. The chapter is organised as follows. Section 8.1 examines the adapted A-

WEAI results, including the integration of qualitative evidence that suggests the presence of national and regional pre-drought conditions linked to the performance of the A-WEAI in the case study area. In Section 8.2, we examine the factors associated with empowerment in agriculture, using rural women's perspectives to expand our understanding of the enablers for this process under drought conditions. In the final section we examine which domains those classified as disempowered are most deprived in Chapada do Apodi.

8.1 Pathway for Resilience: Feminism, Alliance and Practice

As stated previously, one of the research objectives of this study was the assessment of women's empowerment in agriculture in the case study area. Our quantitative findings show that Chapada do Apodi has a high A-WEAI score¹ in both versions: original (0.894) (see Appendix C) and adapted (0.867). As this study uses a cross-sectional data, we cannot determine if the A-WEAI score of the region had improved or not or was even maintained at similar levels under other conditions. The only assumption we can make, based on this piece of information, is that even under prolonged drought, women from Chapada do Apodi are empowered. These findings are contradictory since a large body of literature suggests that women's vulnerability is aggravated in the face of disaster (Shah, 2012; Bradshaw, 2013; Bradshaw and Fordham, 2015; Neumayer and Plumper, 2007; Drolet et al., 2015; Austin and McKinney, 2016), in particular the adverse effects of drought to rural women in developing countries (Agarwal, 1990; Enarson and Chakrabarti, 2009; Maybank et al., 1995; Wilhite and Buchanan-Smith, 2005). We expected that long periods of drought would increase women's vulnerability. This is because they are reliant on agriculture for their livelihood, bear disproportionate work burden and have relative lack of control over productive assets. Another factor that we expected to significantly lower the scores from the adapted version, was the conservative inadequacy cutoff adopted in the indicators *ownership of assets* and *group membership*, which could greatly restrict respondents' access to an empowerment status in agriculture (for details of the inadequacy cutoffs Table 6.2).

In the face of such unexpected results, the use of a mixed methods approach was argued to be appropriate because it allowed for an examination of the index scores using the qualitative findings, providing a better understanding of the study's context and more accurate interpretations of results. Indeed, the qualitative data provided intriguing insights. Through these findings, we could identify a particular combination of 'pre-and

¹This study uses the WEAI classification provided by a recent baseline report that estimates scores from 13 countries, categorizing the scores as: high (> 0.85), medium (0.85 to 0.75), or low (< 0.75) (Malapit et al., 2014). For instance, in that report, Bangladesh and Cambodia were placed at the two extremes of the ranking, the former with a score of 0.66 and the latter with a score of 0.98.

during drought' conditions that, potentially, influenced the index performance in the case study area. The first condition observed was at the national level and emerged from the analysis of the key informant interviews. The qualitative outcomes suggested that advances achieved during the Worker's Party administration were linked to the presence of an autonomic rural women's policy agency and the alliances created between this agency and rural women's movements. The second favourable condition related to the influence of CF8 (a local feminist NGO) in the case study region, achieved through the provision of technical assistance for rural women and the organisation of women's farmer groups. There is a growing body of literature that examines how capacity-building initiatives targeting women in disaster-prone areas can promote change in gender relations (Moreno and Shaw, 2018; Dhungel and Ojha, 2012; Horton, 2012). For example, Moreno and Shaw (2018) suggest that women's participation in grassroots women's organisations, in the context of building disaster resilience, can promote changes in gender relations even in highly patriarchal contexts. Moreover, Dhungel and Ojha's (2012) study in Nepal reports that the use of women's empowerment as a key component of disaster risk-reduction programmes, reduce women's socio-economic and physical vulnerability and encourage leadership among them.

This study suggests that both national and regional conditions contributed to strengthening the process of empowering women in agriculture in the region. The following subsections provide a detailed analysis of these favourable national and regional conditions.

8.1.1 Favourable National Condition

At the national level, data from key informants was used to explore the conditions that favoured the empowerment of women in agriculture. Our qualitative results suggest that the most important components in strengthening the process of rural women's empowerment in Brazil were: (1) the presence and autonomy of the rural women's policy agency; and (2) the establishment of an alliance between this agency and rural women's movements (see Section 3.1 for more detail).

The presence of a favourable institutional environment as one of the prerequisites to sustaining empowerment has been identified in previous studies such as Alsop et al. (2006) and McBride and Mazur (2010). According to Alsop et al. (2006) the analysis of the interaction between the agency of individuals and the opportunity structure² can

²Note that in this study, the emphasis is on formal institutions. Alsop (2006 p.13) defines two categories of institutions; "Formal institutions include the sets of rules, laws, and regulatory frameworks that govern the operation of political processes, public services, private organizations, and markets. Informal institutions include the" unofficial" rules that structure incentives and govern relationships within organizations such as bureaucracies, firms, or industries, as well as the informal cultural practices, value systems, and norms of behavior that operate in households or among social groups or communities."

determine the degree of empowerment that a target group possesses. Also, the authors argue that the process of empowerment could only be successful when the local opportunity structure endorses and sustains actions for the promotion of equality and the expansion of people's rights. However, the context of our study demonstrates that the process of rural women's empowerment in Brazil goes further than the establishment of national women's machinery³ and navigates towards the expansion of state feminism. As mentioned in 3.1.1, state feminism is defined as the advocacy of the agenda of the women's movement within the state and sustained through alliances between the women's policy agency and women's movements (Lovenduski, 2005; McBride and Mazur, 2010).

Our qualitative findings suggest that during the Worker's Party administration the design of the policy portfolio that targeted rural women was in fact based on the agendas of rural women movements. Mechanisms were created to promote the participation of rural women's movements and other forms of civil society organisation from the policy design to the evaluation phase of the policy process. Other studies offer evidence that the design of policies targeted at rural women in Brazil were based on the rural women's movement agenda, especially during the Worker's Party administration (Aguilar, 2016; Hora, 2014; Avelar, 2013; Butto and Dantas, 2011). For example, a recent study argues that in response to the demands of rural women's movements, the Brazilian government have not only guaranteed the joint titling of land but, in the case of female-headed households, have also received priority in the concession of land in agrarian reform settlements, being the most redistributory examples in Latin America (Deere, 2017). The influence of rural women's movements on rural development policies was also observed in other studies (Hora, 2014; Butto and Dantas, 2011; DiSabbato et al., 2009). According to Alcantara and Sardenberg (2012), Brazilian state feminism⁴ is based on a strong participatory approach throughout the policy process, creating a regional and national mechanism to promote dialogue between the state and civil society. Several studies suggest that between 2003 and 2015, the alliances that were created allowed rural women's movements to achieve both of the following⁵: (1) procedural access – meaning the inclusion and active participation of representatives of the women's movement until the end of the policy process; and (2)

³The term National Women's Machineries is defined as: "the central policy-coordinating unit inside government. Its main task is to support government-wide mainstreaming of a gender-equality perspective in all policy areas" (Beijing Declaration and Platform for Action, 1995, Para. 203).

⁴The discussion about the existence of state feminism in Brazil is controversial. In this study it is based on certain findings relevant to the Brazilian context that emerged from our qualitative study. Undoubtedly the creation of the Special Secretariat of Policies for Women (SPM) that had ministerial status, policy-making powers, administrative capacity, a left-wing administration, and strong connections with feminist movements and other grassroots organisations provided elements that suggested an expansion of state feminism in Brazil during 2003 to 2015. However, it is important to note that the current study is limited to the context of rural women and the rural development policy arena.

⁵This criterion was based on McBride and Mazur (2010)'s study framework to evaluate the success of state and women's movement alliances.

policy content – which is the degree to which the demands of women's movements are incorporated in the policies' goals. However, more studies need to be performed to better understand the mechanisms and the degree of the participation of women's movements in these matters during the Worker's Party administration.

These points were the factors that from the perspective of the informants, as well as in the literature, were strengths in the process of empowering rural women. The existence of a state able to respond to the needs of rural women and to design policies that meet those needs, is an essential aid to the resilience of rural women at a time of crisis.

8.1.2 Favourable Regional Conditions

At the regional level, we used the qualitative findings from the focus groups of rural women to identify the conditions that supported the empowerment of women in agriculture. These findings show that rural women were aware of their rights, had decision-making autonomy and knowledge about rights of ownership of assets. The respondents associated the enhancement of their awareness about their rights with a local feminist NGO (CF8), which was responsible for delivery interventions targeted at rural women.

Associations between feminist NGOs and the state were harshly criticized during the 90s in Latin America (Alvarez, 1999, 1998; Silliman, 1999). For instance, Alvarez (1999) warned that the subcontracting of feminist NGOs as advisors or implementers of interventions, could jeopardise the NGO's ability to monitor policy critically and advocate changes based on the feminist agenda. However, ten years later, Alvarez re-examined her critique and offered reflections that can be applied to the context of this study. Among other points, (Alvarez, 2009) argues that the NGOs became "mainstays of feminist fields" in Latin America, by producing feminist studies, disseminating the feminist discourse, and connecting actors to multiple forms of feminist (and sometimes non-feminist) organisations. In this case study, we observe that the CF8 incorporated popular feminist discourse into practice and connected local rural women to other social movements, networks and organisations.

A central point to be analysed here is the intervention delivery function. Since 2006, the CF8 has been responsible for delivering interventions that provided technical assistance and encouraged the organisation of women's farmer groups in the study area. We argue that the transformative element resides not only in rural women's access to technical support and training, but also in the use of feminist discourses to inform their practice. Our focus group participants reported that through the CF8's workshops, meetings, and seminars they developed awareness about women's constitutional rights, violence against women, sexual and reproductive rights, and gender division of labour and its impacts on

the local economy. The experience of the inclusion of feminist practices in the process of delivering interventions in Brazil has been reported in other studies such as Ckagnazaroff et al. (2006) and Sardenberg et al. (1999).

Moreover, positive results of the CF8's actions in promoting the empowerment of women in the region have been reported in previous studies (e.g. Moraes and Rocha, 2013; Alves, 2007; Dantas, 2013). For example, in a qualitative study, Moraes and Rocha (2013) present findings on the participation of rural women in the Brazilian programme for rainwater harvesting called One Million Cisterns (P1MC). Here CF8 were essential in the process of articulation and in the mobilisation of local women. The authors argue that the inclusion of gender awareness methodology was a catalyst for the transformative process in the region. Changes occurred not only due to improved access to water (the primary goal of the policy) but also because local women acquired new roles and spaces, which were traditionally assigned to men. These included activities such as membership in the water management groups, representing their communities in meetings, or even building cisterns. Additionally, this transformative effect was reported by (Phillips and Cole, 2009) when they reported that this NGO promoted rural women in the development of organisational and leadership skills. The women's organisation guarantees not only that women meet their everyday needs (e.g. for water), but also helps in overturning the gendered division of labour by moving women out of domestic work into activities that are typically assigned to men.

Besides the incorporation of feminist discourse into the activity programme for technical assistance or in the organisation of the group, the CF8 also plays a significant role in the mobilisation of local women to participate in feminist movements. This includes encouraging rural women to participate in transnational women's movements such as the World March of Women, the Latin American Network of Women Transforming the Economy (REMTE), and non-feminist social movements such as the Landless Movement (MST), Unified Workers Central (CUT), and the Brazilian Forum on the Solidarity Economy (Phillips and Cole, 2009; Beaulieu, 2007). According to Beaulieu (2007), the CF8 activity drove the expansion of the World March of Women in the Rio Grande do Norte, which became one of the most active territories for this feminist movement in Brazil.

8.2 Sustaining Women's Empowerment in Agriculture under Prolonged Drought

A great deal of effort and resources are targeted at promoting the empowerment of women in agriculture; however, we have little understanding of how this process can be sustained during a period of crisis such as those that follow natural disasters. In this section, we

seek to identify some of the factors associated with empowerment in agriculture under conditions of crisis such as those being experienced in Chapada do Apodi.

Our quantitative findings suggest that women's access to credit as direct beneficiaries is strongly associated with their empowerment in agriculture during a severe and prolonged drought. The association between women's access to credit and empowerment has been extensively explored in feminist and development studies (Hashemi et al., 1996; Pitt et al., 2006; Goetz and Gupta, 1996; Mayoux and Hartl, 2009; Garikipati, 2012; Kabeer, 2001). Most of these studies argue that rural women's access to credit is beneficial for two reasons: (1) it enhances women's productive capacity and as consequence has a positive impact on production; (2) it improves women's bargaining power and as a consequence leads, among other things, to a more efficient allocation of resources and better nutrition.

Qualitative findings from the rural women's focus group provided insights that support this interpretation. According to these, access to credit during a time of crisis helped women to maintain not only their personal enterprises (e.g. vegetable production and hennery) but also the agricultural activities of their farms, as well as helping them to avoid the need to dispose of their assets. Rural women in this case study reported that the credit that they received was used to buy fodder for livestock and to invest in alternate irrigation systems. Our qualitative findings are consistent with those from previous studies that suggested that access to credit in high-risk drought areas helps to mitigate the effects of drought and improves people's ability to recover from its effects (Enarson and Chakrabarti, 2009; Austin and McKinney, 2016). Access to credit is an essential component in a strategy to deal with a drought crisis because it has a slow-onset and cumulative effect that can lead to a progressive elimination of farmers' assets, undermining the chances of agricultural recovery and increasing the likelihood of permanent migration (Kabeer, 2015; Agarwal, 1990).

Surprisingly, the association between access to credit and gender parity individual score was not significant. However, our analysis shows that women's access to credit was strongly associated with their partner's access to credit (see Table 7.7). This result must be interpreted with caution because in Brazil there were special credit lines for women and quota-based policies that protected and guaranteed a share of the available credit to women. In the absence of these conditions, these relationships may not be observed.

Another significant finding was the positive association of technical assistance with both individual scores —empowerment and gender parity in agriculture. The literature suggests that technical assistance is an essential element in the process of women's empowerment (Cornwall et al., 1993; Ragasa, 2014) but is also critical to building resilience by facilitating the diffusion of technology that can help farmers to cope and mitigate against unfavourable climate conditions (Enarson, 2012).

Our findings suggested that technical assistance is also essential during periods of crisis. This result may be explained by the fact that technical support plays a vital role in finding ways to minimise losses during a drought. However, our key informants revealed that the importance of technical assistance goes further than this and is an important part of the process of capacity building around better production practices. Access to technical assistance can also be a pathway through which rural women access other interventions. For instance, Bezerra (2013) presented evidence of an NGO providing technical assistance to rural women in the West Potiguar that was crucial to enabling their access to support from other policies. According to this author, the extension workers informed local women about programmes in which they could participate and provided support to enable access credit and other interventions (such as PAA or PNAE). It is important to bear in mind that the role of technical assistance in accessing other support is, as yet, not fully understood. Further research should be undertaken to explore the relationships between technical assistance and access to other interventions.

Our findings also suggest that the participation of women in farmer's groups is associated with gender parity in agriculture. Several studies have shown that women's group membership has a positive impact on empowerment (Narayan-Parker, 2005; Quisumbing and Kumar, 2011) by enhancing women's self-confidence and their involvement in economic activities (Evans and Nambiar, 2013; Baden, 2013). For example, Holvoet (2005) suggests that women's group membership significantly shifts overall decision-making patterns from norm-guided behaviour and male decision-making to more joint and female decision-making. Longer-term group membership, more intensive training and attendance at group meetings strengthen changes in social patterns (Holvoet, 2005). Under circumstances of severe and prolonged droughts, our analysis suggests that participation in women-only producer groups is positively associated with the individual scores for gender parity but not significantly associated with individual empowerment scores. Presumably, the upheavals in local agricultural production caused by such a prolonged dry spell have had a substantial economic impact on all farmers, so that the economic effect of farmer-group membership have been negated in this context.

Our qualitative results suggest that participation of rural women in women-only farmer groups strengthened their participation in the mixed (men and women) farmers' organisations. Rural women reported that their active participation in local associations and the rural union was essential in order to access producer inputs. In addition, participation in the decision-making process was referred to as essential to surviving and minimising loss during the period of drought. This may be because it enabled rural women to include issues pertinent to their productive activities in decisions and to access productive inputs at lower costs, which allowed them to maintain production and preventing the depletion of family assets. Another important factor to consider is the CF8 technical assistance such

as ATER-Women (technical assistance) and POPMR (women-only producer group support). In our study, both the literature review and the qualitative findings suggested that the performance of these two categories of interventions can be associated with the use of gender awareness methodologies in the process, as discussed previously. Several studies have shown that in the context of the Brazilian drylands, NGOs delivering interventions have been responsible for promoting consciousness raising not only about the limitations of their environment and drought but also to promote social changes (Branco, 2009; Bezerra, 2013; Moraes and Rocha, 2013). According to Yonder et al. (2009), in drought-prone areas the mobilisation of grassroots groups can promote a “critical mass of actors”. According to the authors, in an environment where women’s grassroots’ organisations inform other women’s groups, the results can be transformative. Through such organisations women can acquire non-traditional skills that are considered male roles and can assume active leadership positions in the rebuilding process. Also, another outcome observed was the reduction of the economic vulnerability of women and their families, which is an important objective in strategies to mitigate risks in future droughts (Yonder et al., 2009).

As acknowledged by Kabeer (2017), the quantitative relationships, suggested in several women’s empowerment studies, need to “be taken as suggestive, rather than definitive” and placed within a setting. The quantitative results do not necessarily increase understanding of ‘how’ these associations work. To overcome this issue, we incorporate essential insights from the qualitative phase in the discussion of our findings. The national and regional conditions discussed previously are intrinsically connected to the quantitative findings examined in this section. It is important to bear in mind that setting conditions that allow women’s movements to participate in the political process were central in achieving positive associations between the interventions assessed in this study and the empowerment of women in agriculture. Another vital component is the use of intersectional feminist practice focusing on raising consciousness to overcome oppressive social structures.

As the context of our study is quite specific, in that it is based on a small sample and under atypical conditions (following four years of drought), any findings need to be interpreted cautiously.

8.2.1 Education, Age, and Agro-ecology

Somewhat surprisingly, the research findings did not find direct evidence of any association between age and either women’s empowerment or gender parity in agriculture. This result is contrary to previous studies that found that women’s empowerment is associated with age (Kishor and Subaiya, 2008; Rahman et al., 2009). Education is another variable frequently linked with empowerment (Duflo, 2012; Kishor and Subaiya, 2008; Hanmer and Klugman, 2016; Mahmud et al., 2012). In contrast to these earlier findings, our results do

not provide evidence of a direct relation between education and either empowerment or gender parity in agriculture. A possible explanation for the variable related to education not being significant in our analysis might reflect the low levels of education observed in our sample; for example, more than 80% of women in our sample cannot read (declaring less than four years of formal education). This uses the local classification to describe educational status: “cannot read”, “can read”, and “*estudado(a)*” (individuals that have finished secondary school and more). Although the education variable was not associated with individual empowerment or gender parity in agriculture, it was positively associated with women's access to credit, as also observed in a study by Rahman et al. (2009).

Several studies, both international and local, have indicated a positive connection between agro-ecological production and women's empowerment (Siliprandi, 2009). Moreover, during the key informant interviews, the promotion of agro-ecological practices was identified as a component of the rural development policy portfolio, including those targeted at women. Nevertheless, we did not find evidence of a link between agro-ecological practices and either empowerment or gender parity in agriculture during a period of severe drought. Possibly, this outcome is affected by the fact that our data collection took place after several years of drought and the damage caused by this extended dry spell may have neutralized the effects of choice of production system on empowerment in agriculture. Despite this, our results suggested that the empowerment and gender parity links were significantly linked to participation in a women's farmer group. The factors identified in this study as being associated with empowerment in agriculture cannot be extrapolated to other areas, or even to the same area under different conditions, for example to a period without drought.

8.3 The Face of Women's Disempowerment in Agriculture under Drought Event

Droughts are recurring events and are experienced differently across and within societies, classes, and genders. It has been claimed that drought has “the largest human toll” when compared with other natural disasters (Enarson, 2000). The use of the WEAI approach in this study made it possible to acquire a snapshot of critical areas, where those classified as disempowered in agriculture are most deprived. Because this methodology not only identify the individuals in the sample who are classified as empowered, but also provides information about which domains those classified as disempowered are most deprived. This subsection discusses our findings in reference to the main areas of rural women disempowerment in agriculture under drought in Chapada do Apodi. The findings of the adapted version suggest that *input in productive decision*, *group membership*, and *workload*

were the indicators that were most significant for those women classified as disempowered.

The importance of these indicators vary between the A-WEAI versions (for more detail about the comparison of indicators between A-WEAI versions see Figure C.1). While the indicator *input in productive decision* was the most significant in both versions (original and adapted), the indicator *group membership* moved from the last but one position (original version) to the second position in the adapted version. The elimination of religious groups (except for CPTs) had an impact on the performance of the indicator *group membership*. Moreover, the *workload* indicator, in second place using the original cutoff, dropped to third place in the rankings. One unexpected finding in this comparative analysis was that changes in the inadequacy cutoff of the indicator *ownership of assets*—from one to three major assets—was not relevant in any of our versions. This might be influenced by the increase in consumption and access to housing to low-income families that is associated to social programmes during the Worker's Party period (such as the Zero Hunger, and the housing programme “My House, My Life” among others). These comparative findings confirm that disregarding the contextual-specificity of the area studied could provide misleading policy recommendations. In our case, we found that the original A-WEAI results suggested that group membership was not a major concern in the area. Conversely, using our adapted version (no religious groups, except for CPTs) showed that this indicator was the second most important.

The use of the abbreviated version of the WEAI had some limitations when it came to discussing our findings, due to the fact that this approach is relatively new and has only been used in a few studies, with the majority of previous studies based on the full version. According to Malapit et al. (2017), the abbreviated version is not a perfect proxy for the full version of the WEAI, because of the loss of data (the full version has ten indicators and the abbreviated has only six). Malapit's study also suggested that the absence of indicators in the abbreviated version resulted in subtly higher rates of disempowerment being estimated for both women and men in Uganda, in comparison to the results obtained from the full version. However, the opposite effect was observed in Bangladesh, where the A-WEAI suggested slightly higher rates of empowerment among women (Malapit et al., 2017).

Unfortunately, the qualitative findings from this study do not provide the means to interpret the breakdown of the disempowerment index. This may be due to the data being collected from only one focus group, composed of participants with similar characteristics (empowered rural women in land reform farms) meaning that our interpretation of findings could only be applied to a relatively narrow group. Our qualitative data did not, therefore, represent disempowered rural women and as a consequence it has limited value in helping us to understand what constrains women's engagement and agency in agricultural

activities.

8.3.1 Factor One: Decision Making in Agriculture

Our findings suggest that the indicator *input in productive decisions* contributes most to women's disempowerment in agriculture in the case study area. Several studies have demonstrated that the enhancement of women's participation in household decisions can improve child nutrition, education, food security and birth control (Smith et al., 2003; Cunningham et al., 2015; Van den Bold et al., 2015; Malapit et al., 2017). Our result not only indicates that some women do not participate in decisions regarding the farm's activities but that, in addition, they could not be involved even if they tried. For instance, any farm decisions about which crops to grow or animals to raise, or about investment in irrigation system, are all influenced not only by the availability of household assets but also by which family member participated in the decision-making process.

Having a voice in household decision-making is considered one of the most significant dimensions of the process of women's empowerment, and it is usually considered in the literature as a proxy for women's agency. During a drought crisis household resources are limited, which makes it more challenging for women to take part in the decision-making process. Several studies indicate that women's participation in coping and recovery design strategies minimise the effect of disasters on household assets and household well-being (Reinsch, 2009; Kinsey et al., 1998; Dhungel and Ojha, 2012; Alston and Kent, 2014; Drolet et al., 2015).

The constraints on women's participation in decision-making in agriculture that have been identified in this study, were not only influenced by gender roles and intra-household bargaining power but were also significantly affected by the prolonged drought conditions. The shortage of available water resources moved local farmers away from agricultural production and this may have led both female and male farmers to register as inadequate for this indicator. This is because the indicator *input in productive decisions* is restricted to agricultural activities and as a consequence respondents who have not engaged in agriculture are automatically classified as deprived.

Regarding the differences across farm categories, Figure 7.2 shows that, based on this indicator, both women and men in non-land reform farms were more deprived than those in land reform farms. It is possible that these differences may be influenced by the fact that farmers from non-land reform farms have less access to measures available under rural development policies than their counterparts (as discussed in the literature review in Chapter 3).

8.3.2 Factor Two: Women's Participation in Groups

The indicator *input in productive decisions* is the second most important for determining women's disempowerment in agriculture. When religious groups (e.g. prayer groups, church fund-raising groups, etc.) are excluded, the indicator *group membership* moved from last but one to second place in the rankings of importance in the disempowerment index. This suggests that more disempowered individuals are less likely to participate in social movements or in farmer's groups (such as rural union, cooperatives and associations). In this part of our analysis we maintained a focus on participation in mixed groups to enable us to subsequently isolate the effect of participation in women-only farmer groups.

There is a large body of literature demonstrating the importance of farmer organisations for smallholders. Acting collectively, family farmers can have better access to technologies, reduce the costs of inputs, add value to their production through processing, and improve their access to markets (Stockbridge et al., 2003). Moreover, participation in other forms of civil society organisations, such as social movements, is critical for those who wish to become involved in decision-making in the political sphere.

This finding also may be influenced by the drought spell because during the period of the data collection local cooperatives, such as the Apodi Cooperative of Family Farmers (COOAFAP) and the Potiguar Cooperative of Apiculture (COOPAPI), were inactive due to the lack of agricultural production in the region. Despite the impact of the drought on local cooperatives, the community-based organisations prominent in land reform areas, maintained their activities. This observation may be the cause of some significant differences between categories of farms. Both, men and women in non-land reform farms were found to be similarly deprived in terms of the group membership indicator. However, our findings suggest that women in land reform areas are more deprived in this domain than their counterparts. Figure 7.2 illustrates the indicator *group membership* gap between land reform category and non-land reform category.

8.3.3 Factor Three: Workload

Based on the adapted A-WEAI, the indicator *workload* appears as the third most important in terms of its contribution to women's disempowerment score. This indicator aimed to identify those respondents that worked more than 10.5 hours per day. According to Seymour (2017), time-use indicators have the potential to put in evidence inequality in the workload burden because it is an indicator that shows the distribution of the labour in the family farm households. The literature on time-use has confirmed the concept of women's time poverty, providing evidence that there is a gap between female and male

labour time (Hirway, 2010; Jackson and Palmer-Jones, 1998). Our findings indicated that male farmers have a higher workload burden in comparison to female farmers for the period studied. While the indicator *workload* was significant in the disempowerment index for women (among the three more-important indicators), it contributed more to the male disempowerment index (35.5%). Under conditions of prolonged and severe drought and the lack of access to water resources, male farmers in Chapada do Apodi were compelled to pursue waged employment in local agribusinesses farms or quarries, leaving the majority of on-farm tasks to women.

The increase in waged employment among males might also be reflected in the indicator *control over use of income*. Figures 7.1 and 7.2 illustrate that the most prominent gap between men and women is in this indicator, suggesting that the increase in waged employment among men may have led to an increase in their control over household income. It is important to emphasise that these findings may be somewhat limited by the fact that we only collected data about primary activities. As explained in Section 6.2.5, we made this choice because of the difficulties involved in collecting information about all activities undertaken during a 24-hour period. This decision may have led us to under-estimate women's workloads because there is evidence from other studies that women participate in multiple activities (Floro and Pichetpongsa, 2010; Floro and Miles, 2003). However, Malapit et al. (2017) argue that while only collecting data on primary activities can result in estimating a lower average workload, those individuals, who according to the *workload* indicator (only primary activity) are time-poor, are still deprived whether or not other activities are included.

8.4 Conclusions

This chapter discussed the adapted A-WEAI scores and the factors associated with women's empowerment and gender parity in agriculture, using the qualitative findings to provide an understanding of the context that surrounds these issues. In this study, we found that rural women in Chapada do Apodi were highly empowered. During the twelve years of the Worker's Party administration, rural women were a priority of national programmes aimed at tackling poverty. As a result they were targeted by several agricultural development interventions and had their rights over land access and social security recognised. However, besides political will and institutional support, our analysis suggests that the use of gender awareness methodology in the implementation of interventions was central to the process of empowering women. The qualitative strand of this study allowed us to place our quantitative outcomes within the Brazilian and Northeastern context. We identified that, for our case study, the promotion of rural women's engagement and agency

in agriculture was a systemic and participatory process, involving not only the creation of resourceful women's policy agencies and the political will to achieve this, but the active participation of women's movements and other grassroots organisations.

Our results highlight the importance of rural development programmes during drought periods. Nonetheless, reflections on these outcomes cannot be separated from the context reported here. Access to interventions alone, is not sufficient to produce a transformative effect on societal patterns but channelling these enabling factors through local organisations that apply gender awareness methodologies has considerable potential to create pathways to empowerment.

Moreover, in this study we not only assessed the extent of women's empowerment in agriculture under severe drought conditions but also identified the indicators that are most significant to those that were characterized as disempowered. By decomposing the adapted A-WEAI, we discovered that the indicators *input in production decisions* and *group membership* provide useful insights for the design of policy interventions to assist rural women during a drought crisis. Our analysis also showed that the indicator that showed the biggest differences between men and women was *control over use of income*. Likewise, our analysis indicated that there was difference between non-land reform households and land reform households, suggesting that former are less empowered in agriculture, with the most deprived group being women in non-land reform households. Unfortunately, this study did not provide qualitative evidence about which factors may have led to these differences. The final chapter of this study presents conclusions and policy implications.

Chapter 9

Women and Rural Development Policies & Practice: A Pathway

As stated throughout, this thesis is an empirical and mixed methods study that investigates women's empowerment in agriculture under a period of prolonged drought. As discussed in Chapter 4, we used quantitative methods—an adapted version of the A-WEAI and multivariate probit model—and qualitative methods—key informants interview and focus groups. Furthermore, to elaborate this diagnosis, we established five specific research objectives that seek to:

- I. identify theoretical framework with respect to women and development theories, empowerment, and women and disaster and to identify a contextual framework of the case study area;
- II. identify strengths and weaknesses in the process of women's empowerment in agriculture;
- III. identify rural women's perceptions about their agency and the factors that they perceive as enablers in the process of empowerment in agriculture under drought conditions;
- IV. assess women's empowerment in agriculture and the factors that sustain the process of women's empowerment in agriculture under prolonged drought periods;
- V. examine the women's empowerment in agriculture index scores and factors associated with using the qualitative data;

The first research objective aimed to provide the background for this study and is detailed in Chapters 2 and 3. The second and third research objective is the qualita-

tive component of our research that comprises step one and step three of this study, as specified in Figure 4.1. This part of our study is concerned with understanding the perceptions of different actors involved in the process. First, we considered the views of the key informants about the strengths and weaknesses of the political process that recognises the rights of rural women in Brazil. Subsequently, the focus group examined rural women's perception about their agency and factors that enable them to keep their agricultural production and minimise depletion of their assets during drought periods. The fourth research objective aimed to assess rural women's empowerment in agriculture and the factors that sustain the process of women's empowerment in agriculture through a prolonged drought period. The fifth research objective examined women's empowerment in agriculture in Chapada do Apodi through the integration of qualitative findings. By accomplishing these research objectives, this study provided a comprehensive picture of women empowerment in agriculture under drought conditions. This study's results show that even under the circumstances of severe drought, the women from Chapada do Apodi were empowered in agriculture. This study suggests that women's access to credit and technical assistance are associated with empowerment in agriculture, and that membership in women-only farmer groups and access to technical assistance are related to gender parity in agriculture. The qualitative results suggest two central conditions contributed to this result: (1) the presence of the rural women's policy agency, with its resources and connections to the women's movement; and, (2) the technical assistance and female farmers group-related interventions that were delivered using gender awareness methodologies. These results suggest that in drought-prone areas, the institutional conditions and gender awareness methodologies tied to rural development policies could help sustain women's empowerment in agriculture even in the face of prolonged periods of drought.

This final chapter is organised as follows. Section 9.1 presents a summary of the empirical results, in light of the research questions. Section 9.2 presents the policy implications of the main research findings. Section 9.4 outlines the limitations of this thesis. Finally, Section 9.5 shows the contribution of this study and directions for future research.

9.1 Summary of Empirical Results

This section summarises the main results of this mixed method study that was presented in Chapters 5, 7 and 8. They comprise the examination of the second to fifth research objectives.

9.1.1 Understanding Women's Empowerment in Agriculture

The outcomes of the qualitative study afforded a better understanding of the context that surrounds the women's empowerment in agriculture in Brazil (see Chapter 5). By capturing the perspectives of those who participated in this process, we were able to offer an in-depth analysis of the high scores of A-WEAI during a prolonged period of severe drought. Here we present the summary of the main qualitative findings.

The first stage of our qualitative work was targeted to key informants that belonged to policy agencies, civil society organisation and academia. Our results suggested the factors that contributed to promoting advances on rural women's empowerment in Brazil (even under drought conditions) were the autonomy of the rural women's policy agency and the alliance forged between this agency and rural women's movements. These influences were essential elements for the recognition of the role of rural women in family farming and advancement in their civil rights. Moreover, this study suggested that the central barrier identified is the 'idea' of certain sectors involved in the rural development in Brazil that the promotion of empowerment of rural women could cause the 'breakdown' of the smallholder family farming households in Brazil.

The second stage of the qualitative study was performed with rural women in Chapada do Apodi. The study showed that rural women in the Chapada do Apodi were aware of the gender division of labour and women's rights and participate in the decision-making process in their households. They associated their awareness enhancement process with the action of intervention delivery of a local feminist NGO. Moreover, rural women in Chapada do Apodi associate their participation in local farmer's organisations as a factor that helps them to minimise losses during periods of drought and keep the agricultural production in drought periods. It is important to highlight that the participation in women-only farmer's groups strengthens their involvement and leadership in the mixed farmer's organisations (associations, cooperatives, and the local rural union).

9.1.2 Measuring Women's Empowerment in Agriculture under Drought Conditions in Chapada do Apodi

This subsection presents the summary of the quantitative findings. As mentioned in Chapter 7, this mixed method research is quantitative dominant. This strand of our study set out to assess (1) women's empowerment in agriculture under drought conditions, and (2) the factors that sustain rural women's empowerment under drought conditions.

The findings clearly indicate that even under severe and prolonged drought women in Chapada do Apodi achieved high scores in the A-WEAI (original and adjusted versions). Also, our findings reveal that the modification in the inadequacy cutoffs impacted more

in the women's scores than in the men's scores. These results suggest that adjustments in the index inadequacy cutoffs are relevant to identify disempowerment in the local context where the study was conducted. Moreover, the A-WEAI outcomes indicate that among the rural women identified as disempowered in agriculture the indicators that contribute most to their status are the *input in productive decisions*, followed by *group membership* and *workload*, respectively. Conversely, the indicators that men were most deprived related to: *workload*, followed by *group membership*, and *input in productive decisions*. Also, the analysis by farm subgroups provided valuable insights. The A-WEAI scores suggested that non-land reform farmers are less empowered than land reform farmers. However, in the two-way analysis, we did not find any association between empowerment individual scores and the category of farm.

Regarding the factors associated with empowerment, this study found that under circumstances of severe drought, women's access to credit and technical assistance were positively associated with empowerment in agriculture. Additionally, the membership in the women-only farmer's group and women's access to technical assistance, are in turn associated with gender parity in agriculture. This suggests that during prolonged periods of drought crisis, access to interventions that promote agricultural production and productive inclusion are positively associated with the women's empowerment in agriculture. Therefore, the comparison of models (univariate and multivariate probit) suggest that neglecting the endogeneity bias in this analysis could lead to a misinterpretation of factors associated to the dependent variables. For instance, the univariate estimation of gender parity model identified *age* and *agro-ecological production* as significant independent variables; however, the multivariate estimation showed that these independent variables were not statistically significant.

9.1.3 Examining Women's Empowerment in Agriculture under Drought Conditions in Chapada do Apodi

Previous sections recounted the main findings of the quantitative and qualitative methods separately. In this subsection, we summarise insights on the integration of these findings. The qualitative findings allowed us to place our quantitative outcomes within the case study context. By integrating our findings, we were able to take into account contextual differences between groups. We found that high scores of A-WEAI may be influenced by certain favourable conditions at the national and regional level, historical tactics that impacted present levels of empowerment, and specific strategies that contributed to women's current status.

Nationally, the presence of a rural women's policy agency with secretary status (close to power), policy-making capacity, and administrative resources (administrative divisions,

staff, and budget) and the alliances forged between this agency and rural women's movements were central to interventions that supported the autonomy and engagement in agriculture of rural women in Brazil. As discussed in Section 3.1, during the twelve years of the Worker's Party administration, rural women were a priority of national programmes aimed at tackling poverty. They were targeted by several agricultural development interventions, including land access and social security recognition. The participatory approach adopted during the Worker's Party period was central to the inclusion of the rural women's movements agenda and procedural access in the policy process targeted to this group. In line with previous studies, the results offer evidence that the policies that targeted rural women in Brazil were designed based on the rural women's movement agenda, especially during the Worker's Party administration (Aguiar, 2016; Hora, 2014; Avelar, 2013; Butto and Dantas, 2011). Another interesting aspect found in the Brazilian women's policy agencies (SPM and DPMP) was the use explicit of feminist theoretical background, with emphasis for the rural context to the Feminist Economics. These tactics comprise characteristics of what McBride and Mazur (2010) called 'Transformative State Feminism' because the actions supported by the Brazilian state were explicitly feminist. The agencies recognised the patriarchy and gender-based hierarchy and sought to advance gender equality and change the gender relations. Without such overt work to promote gender equity, empowerment of rural women in our case study may not have been achieved. An alliance between rural women's movements and rural women's policy agencies in the formulation of policy platform is crucial to achieve transformative and resilient empowerment in agriculture. Such alliances enable collaboration, transparency, and sensitivity in the design of policies that targeted rural women.

At the regional level, we identified that beyond political will and institutional support, the intervention methodology was central to the performance of the high A-WEAI in the region. Our case study provided evidence that the inclusion of a gender awareness component in intervention delivery was central to the rural women consciousness enhancement. Thus, the participation of feminist NGO in the intervention delivery was essential to the performance found in the case study. The resources provided by the NGO provided perspectives and frameworks that were otherwise unavailable in the region. The inclusion of gender awareness practices to the intervention delivery process was crucial for the consciousness raising regarding gender relations and the rights of local women because it enabled them to identify disparities, understand historical and sociocultural context, and make more informed decisions.

Likewise, this study examined the factors that could sustain women's empowerment and gender parity in agriculture under severe and prolonged drought conditions. Our results highlight the importance of rural development policies during drought periods by supporting women to keep their livestock and crops and giving them a voice to advocate

for their interests in local farmer organisations. Reflections on these outcomes cannot be disassociated from the context. Although access to interventions by itself is not sufficient to produce a transformative effect on societal patterns, channelling these enabling factors through local organisations that apply gender awareness methodologies have an enormous potential to enable pathways of empowerment (Cornwall and Edwards, 2016; Kabeer, 2017). This information could provide policy makers with effective direction to promote resilient programmes that facilitate rural women's empowerment.

In this study, we not only assessed the extent of women's empowerment in agriculture under severe drought conditions but also identified the indicators that are most significant to those who were not empowered. By decomposing the adapted A-WEAI, we ascertained that mechanisms that increase rural women participation in agricultural activities and women-only farmer's groups are promising areas for policy intervention targeting rural women in Northeast Brazil, especially under drought crisis periods. Moreover, the analysis indicated that there was a difference between non-land reform households and land reform households. The results suggest that non-land reform farmers are less empowered in agriculture and showing the most deprived group were women in non-land reform households. Unfortunately, this study did not find qualitative evidence about which factors contributed to the difference between these two categories. Further studies may help enlighten us to the driving factors behind these differences.

9.2 Methodological and Study Limitations

Having summarised the findings of the study in the previous section, this section addresses the limitations of this mixed methods study. Chapter 4 discusses the fundamental issues related to the quality of mixed methods research in terms of reliability and validity (Collingridge and Gantt, 2008). For this study, we designed an action plan presented in Section 4.3, in an effort to cover the threats to reliability and validity in this case study. We divided this section into two subsections which address the limitations presented by the different methodological components of this thesis.

9.2.1 Limitation of the Qualitative Study

During the phases of this study, almost all threats to internal and external validity that we anticipated in Section 4.3 were covered. Nonetheless, some of the practical barriers could not be anticipated, and these did impose a few constraints to the external validity of the qualitative data. The qualitative study has some limitations in the data collection stage with regards to the focus group component. Initially, we planned to perform two

focus groups with two sets of rural women, one from each of the two farming categories.

According to Guest et al. (2017), two to three rounds of focus groups covers more than 80% of potential themes. However, the cancellation of one focus group at such short notice (see Subsection 5.1.3) did not leave us time for organising another round. As a result, the data collected represented only the category land reform. Another unpredicted point was that the remaining participants, of the only focus groups that we managed to organise, were classified as empowered in agriculture. Thus, the focus group data solely represented the perspectives of women from land reform farms and individuals identified as empowered using the A-WEAI methodology. This fact brought limitations in the representability of our analysis because we did not manage to explore the potential factors associated to those that belong in the category non-land reform farms and those that had not been classified as empowered in the region. Ultimately, this resulted in a potential limitation for the external validity because did not include the perspective of one group targeted in this case study.

Another point to be considered in the qualitative component of this thesis is the potential bias of the worldviews of the researcher and, relevant to this study, gender identity that may influence the data collection and analysis (Bryman, 2015; Rubin, 2016). To reduce the bias, we implemented a consistent action plan along the stages of data collection and analysis that involved carefully transcribing all interviews and focus group discussions. In this process, we validated the material with the interviewees to certify that the material represents their views accurately. Besides, the transcriptions were coded following a systematic coding process, and its outcomes were discussed with the thesis supervisors.

9.2.2 Limitation of the Quantitative Study

The use of the WEAI methodology in this study allowed us to measure the women's engagement in agriculture in one of the most impoverished areas in Brazil. Using this tool, allowed us to explore at an individual level and aggregated level of engagement in agriculture during a drought period in the case study area. However, it was the most challenging component of this thesis, demanding a considerable amount of financial resources and time. Despite all efforts to enhance the available resources, we managed to collect a relatively small sample size (173 households). This fact limits the precision of the measured outcomes. For instance, the indicators that compound the WEAI tend to noise (e.g. those that involve decision-making) and demand larger sample sizes to detect changes and, ideally, data collect in different periods (time-series). To minimise this limitation, we restricted our study in a specific region (Chapada) within solely one district (Apodi) in the northeast of Brazil. Moreover, to reiterate, the multivariate probit model

outcomes should not be understood as evidence of a causal relationship between access of the individual scores (empowerment and gender parity) and the interventions (credit, technical assistance, women's group), given the cross-sectional nature of the data analysed.

Additionally, another of WEAI's limitation is that women may not be engaged in agriculture or rather are engaged in non-agricultural activity may cause them to appear as 'disempowered', because of their lack of participation in decision making in activities related to the farm's production (Alkire, 2012). This fact could lead us to a mistaken conclusion. Under such prolonged and severe conditions of drought, agricultural production declined, and, consequently, the local farmers look for diversification in managing their livelihood strategy.

Besides, the WEAI does not contemplate social programmes, pensions and others income resources. In our case study are almost all respondents were beneficiary of one of the social programmes or pensions. Unfortunately, we could not include specific questions about these programmes in our questionnaire due to the political turmoil that Brazil was facing during the period of data collection (after 2015 election). The respondents were suspicious of revealing details about the source and value of their income because they were afraid that somehow it could affect their access to the benefits. Also, it is important to highlight here that in our analysis we restricted the access to the interventions for one year before the date of the data collection. This means that as the data was collected in October 2015, the respondents were requested to disclose which interventions they accessed from October 2014 to October 2015. We adopted this parameter because if we use long periods, it could be difficult for the respondent to recall interventions that they accessed, resulting in less accuracy. Consequently, this study is not able to identify the 'residual effect' of the access to interventions before this period.

Likewise, the use of an abbreviated version of WEAI potentially led to several limitations in this study. Malapit et al. (2017) argue that the abbreviated version is not a perfect proxy for the full version of WEAI, because the loss of data (full version has ten indicators and abbreviated has six indicators). For instance, in Malapit's study, it was identified that using the A-WEAI there was a subtle higher rate of disempowerment amid women and men in Uganda in comparison to the results obtained by WEAI full version. Conversely, in Bangladesh, the results were opposite, the A-WEAI presented slighter lower rates of disempowerment among women (Malapit et al., 2017). This limited the comparison of our analysis with other studies. Furthermore, the modifications in the inadequacy cutoff limited the discussion with results in the literature.

Furthermore, the characteristic of the quantitative data collected in this study also, in a certain way, could be a limitation. The fact that both dependent and endogenous variables were binary or categorical limited the use of methodologies used to correct the

endogeneity of the model. For instance, the two-step probit approach could not be used in this estimation because it can result in a mis-specified likelihood function in the second step of the probit regression. Finally, like any other case study, the findings of this study are restricted to the case study area and applied to a specific climate condition, and are not trying to be generalised to other settings. Notwithstanding the limitations presented in this section, this work offers valuable empirical insights that guide the exploration of conditions and factors that are associated with empowerment of women in dry-land farming households under drought conditions.

WEAI: Empowerment or Engagement?

During the last few decades, several methodologies were developed in the attempt to provide an accurate tool to measure women's empowerment. In this scenario that the WEAI methodology was developed and since 2013, it has been used with widely different aims, such as comparative analysis among different countries, assessment of programmes and diagnosis of women's empowerment in agriculture. This methodology is mainly supported by the view of empowerment as one's ability to make choices (Kabeer, 1999; Alsop et al., 2006). However, as Kabeer stated in the same paper: "Disembedded from their context, indicators can lend themselves to a variety of different, and contradictory, meanings." In this study we noted that despite the WEAI to be a comprehensive tool, it lacks in the ability to capture contextual nuances. To properly address this issue, we find that a critical step is the inclusion of rural women from the studied in the process, so researchers could explore which dimensions and indicators are relevant for empowerment in their context. This critical step brings the study participants into the discussion on what empowerment means or looks like to them in their specific setting. Without the inclusion of local women on what empowerment in agriculture means to them, we argue that the WEAI became more of an index that assessed engagement in agriculture as opposed to a tool that measured agency and empowerment.

Unfortunately, due to lack of resources we were not able to include this step in our study. To minimize this problem, we adopted two measures. First, and intrinsic to the design of this study, we adopted the mixed method approach because we considered the limitation of a strictly quantitative methodology. The inclusion of qualitative methods provides a better understanding of context and social norms. Specifically, it helps validate quantitative outcomes and 'give meaning' to the numbers (Behrman et al., 2014; Adato and Meinzen-Dick, 2007; Peterman et al., 2011). The second measure adopted in this study to address this issue was the adjustment of the inadequacy cutoff in the index. To decide which indicators to adapt, we used the qualitative data from the key informants and information from the literature (for more detail see Subsection 6.1.1).

9.3 Theoretical Contributions

In this case study, we not only provide empirical evidence that applies a fairly new methodology to assess women's empowerment in agriculture and associated factors, but also provide a contextual analysis using narratives of key actors (policy makers, activists, local leaders and women farmers). This mixed methods study provides several contributions to the literature on women empowerment in agriculture and gender and disaster.

First, this study extends the literature of women's empowerment and provides evidence of the transformative effect of the inclusion of gender awareness practices in the context of drought-prone areas. In this study, empowerment is examined as a process that promotes consciousness-raising (Sen and Grown, 1988; Batliwala, 1993; Carr, 2003; Kabeer, 1994). This study shows it is critical to include methodologies that develop women's critical thinking and enhance their awareness of women's rights and gender inequalities to promote empowerment in disaster-prone areas. Additionally, the study confirms the importance of women's grassroots organisations, showing that these organisations are an essential component of the process of awareness raising and capacity building of women in drought-prone areas as demonstrated in previous studies (e.g. Branco, 2009; Moreno and Shaw, 2018; Horton, 2012). This study shows that the participation in women's groups was critical to the women in the region, providing them with the confidence to advocate for their interests inside of the rural union and cooperatives and to assess resources to cope with the drought in the region.

Second, this thesis extends the literature that approaches empowerment as a multidimensional phenomenon. Several authors have recognised empowerment as a multidimensional and complex process which can be understood in different ways (e.g. Kabeer, 1999; Malhotra and Schuler, 2005; Mosedale, n.d.). Therefore, any programme that aims to promote empowerment of women needs to include dimensions that have positive and significant impacts on women's lives (Kabeer, 1999; Mayoux and Hartl, 2009). This study demonstrates an application of the multidimensional approach. For example, by using the WEAI methodology, we proposed a holistic theory about areas where women in Chapada do Apodi were (dis)empowered, and this idea was validated by qualitative evidence.

However, as we explained in Section 6.1.1, to determine which dimensions are relevant to the empowerment of women in the area studied, it is necessary to consider the group's context. Despite widespread agreement on the women's empowerment as a phenomenon that has a multidimensional nature, there is increasing need for adaptable indicators that can be applied to project-specific domains of interest.

Because the influence of the sociocultural context in the perception of empowerment and consequently in the ways it is expressed has been largely explored through empirical

studies (Schuler et al., 1995; Hashemi et al., 1996; Jejeebhoy, 2000; Mason and Smith, 2000). Malhotra and Schuler (2005) argue that indicators used to compare gender equity across cultures need to be carefully evaluated because they might be appropriate in one context but not make sense in another. This study adds to the field of women's empowerment by quantitatively showing the importance of considering the specific context of the studied area. Here we modify the A-WEAI methodology to translate the reality that women from Chapada do Apodi. We changed the inadequacy cutoff established in the original method which does not translate to the case study area context, since it is not appropriate for the local socioeconomic setting. These changes helped us make the indicators more significant for empowerment in Chapada do Apodi. It is important to highlight here that without attending to the context-specificity of empowerment, the WEAI became a tool that merely identified engagement in agriculture as opposed to identifying agency and empowerment as mentioned in previous sections.

Finally, this thesis also contributes to the literature on gender and disaster by offering an empirical study of women's empowerment in agriculture in zones of disaster risk. A large body of research has investigated how women's vulnerability is aggravated in the face of disaster (e.g. Shah, 2012; Bradshaw, 2013; Bradshaw and Fordham, 2015; Enarson, 2012). However, this study has shown that an alternative truth is possible. Through both qualitative and quantitative methodologies, this study provides evidence that rural women in Chapada do Apodi were empowered in face of prolonged drought crisis. This study adds to the discussion of gender and disaster by showing that the promotion of women's empowerment in drought-prone areas is a long-term commitment that involves not only access to resources but also the incorporation of gender awareness education.

9.4 Reflexions and Recommendations

Since 2003, the Brazilian Government has embraced the fight against poverty, and has used productive inclusion and rural development as one of the axes is to eliminate poverty in Brazil. Initiatives that include rural women's engagement and autonomy in agriculture has been prominent in the portfolio of the national policies during 2003 until 2015. The Northeast is the primary target in the fight against poverty in Brazil, as nearly 60% of the poor population in Brazil are concentrated in this region, and more than half of them live in semi-arid rural areas. Studies that provide evidence for policy makers about the effect of programmes in such challenging areas and the resilience of the programmes' results in the face of disaster conditions, have an essential function in assisting future decisions. The benefit of a study like ours is in examining and identifying the singularities of such a complex region (and climate conditions) and contribute to the advance in the

understanding of better practices in the promotion of rural women's empowerment in smallholder's family farmers in the Northeast in Brazil. Even considering its specificities regarding the limitation of representability of the sample and the specific context of this study, we can clearly identify three points flowing from the evidence presented here.

First, an alliance between rural women's movements and rural women's policy agencies in the formulation of policy platform are crucial to achieve a sustainable and resilient programme of women's empowerment in agriculture. Alliances that allow rural women's movements to participate in the policy process and influence the policy content are essential to achieve programmes that translate the real needs of rural women. It appears that the adoption of participatory mechanisms at community and regional level results in a policy portfolio that address not only the barriers that constrains the inclusion of rural women in the process of rural development in given context, but also contribute to the guarantee of their rights as a constituency.

Second, to address the 'empowerment' of rural women in programmes it is reasonable to assume that to such goal could not be achieving without include methodologies that develop a critical thinking and enhance awareness about issues such as violence against women, sexual and reproductive rights, land rights, and gender division of labour considering the condition in the given context. Because to achieve gender equality, it is necessary eliminate the gaps existent between women and men, and this is only achieved through women's empowerment. To be clear, in here, we are talking about the "liberating empowerment" (as defined by Ferguson, 2004 and Sardemberg 2008), a definition of 'empowerment' that brings the understanding between the asymmetries of power in the relations of gender, class, race and social.

Another interesting aspect found in the Brazilian women's policy agencies (SPM and DPMP) was the use explicit of feminist theoretical background, with emphasis for the rural context to the Feminist Economics. Moreover, this concept permeates until the delivery practices that is translated in a popular feminism that transform women's understanding about their conditions and offer alternatives to change it. In our case study, we found that the inclusion of gender awareness component in the intervention delivery was central to the rural women consciousness enhancement.

Lastly, we recommend the inclusion of drought preparedness components in the rural development interventions targeted to rural women in the semi-arid areas, along with boosting the access of interventions during the drought crisis. The design of a robust and sustained programme must include mechanisms that provide continued rural development and commitment to minimise the impact of drop in agricultural production and avoid the depletion of the smallholder farmers' assets (women and men). According to our findings strengthening women-only farmer's groups during drought periods is important

to consolidate their presence in the mixed farmers' groups and include the rural women's interest in the agenda of these organisations.

Notwithstanding, there is a need for investment in infrastructure to facilitate the small-holder farmers to access electricity at low-cost and water, which would enable them to irrigate their crops. These infrastructural investments could potentially impact the process of empowerment positively, not only of rural women in semi-arid regions but also men and result in better quality of their family lives during period of crisis.

Also, it is important to highlight here that this study was performed in a conclusive period of a distinctive political era in Brazilian history, marked by a vigorous struggle against poverty and the promotion of social change. During this period, several previously invisible and marginalised identities emerged in the political scenario, among which rural women were one. But the political turmoil that shook Brazil during 2016, culminating in the impeachment of President Dilma Rousseff, has made the future of social and rural development programmes uncertain. The elimination of the Ministry of Agrarian Development, among other actions, may indicate that Brazil's government will move in new directions that would make monitoring the status of rural women all the more crucial.

To conclude, this thesis subscribes to the Rowlands's claim that empowerment is not merely something that can be done on other people's behalf (Rowlands, 1997). However, building their critical view about their position as oppressed and giving them access to enabling elements, especially in times of crisis, can keep them marching on the empowerment pathway. Cornwall and Sardenberg (2014, p. 7) stated "The work of external actors and interventions, then, may be conceived not as 'empowering women' . . . but as clearing some of the obstacles from the path, providing signposts, stiles, bridges, sustenance and company for those making these journeys."

9.5 Directions for Future Research

Many efforts and resources are targeted to promote women's empowerment, but to date, the impact of prolonged drought-crises on women's empowerment process in rural areas has not been studied in detail. Although this study contributes to the literature of rural women's empowerment in agriculture, especially under drought condition, and to better understand dynamics and conditions associated with it, future research should look into women's empowerment in agriculture in aftershock periods. An examination through the recovery process should help policy makers identify elements and dynamics to better understand the factors that emerge in the recovery process. Also, as mentioned before, due to the lack of understanding of the process of empowerment in the face of drought, it could be interesting to use mixed methods approach in studying the dry-land areas

of other countries. Methodologically, for further studies, it could be interesting to use a new version of WEAI (currently in development) that assesses WEAI at the project-level (pro-WEAI) and that entails a more flexible and adaptive set of the core indicators of women's empowerment in agriculture.

A further research opportunity that emerged from this study is that of comparative exploration of the transformative effect of the inclusion of gender awareness practice during rural women's access to agricultural development programmes. In addition, how such access could improve women's living standards, and enhance their gender and citizenship awareness could help offer better understanding for the empowerment of rural women in agriculture in drylands in Brazil.

Appendix A

Qualitative Fieldwork Material



GUIDE: FOCUS GROUPS WITH KEY INFORMANTS

1. O (a) senhor (a) poderia fazer um resumo de sua experiência com políticas públicas para mulheres rurais? *Could you tell me your professional experience with women's empowerment in agriculture in Brazil?*
2. Em sua opinião, quais são as maiores vantagens, fortalezas para promoção do empoderamento das mulheres rurais no Brasil? *In your opinion, what are the most significant advantages or strengths that, in your analysis, foster the promotion of rural women's empowerment in agriculture in Brazil?*
3. Em sua opinião, quais os pontos fortes e fracos dos mecanismos utilizados na implantação de políticas públicas para mulheres rurais? *In your opinion, what are the strengths and weaknesses of the mechanisms used in the implementation of public policies for rural women in Brazil?*
4. Em sua opinião, quais são as maiores desvantagens, no processo brasileiro de promoção do empoderamento das mulheres rurais no Brasil? *In your opinion, what are the biggest disadvantages or weakness in the promotion of rural women in Brazil?*
5. Em sua opinião, quais seriam os principais políticas publicas para promover o empoderamento das mulheres rurais no Brasil? *In your opinion, what would be the most important interventions to the promotion of rural women's empowerment in agriculture in Brazil?*
6. Existe alguma informação que gostaria de adicionar? *Is there any other information that you would like to add?*



INFORMED CONSENT FORM FOR KEY INFORMANTS

Aceito participar da pesquisa sobre A AUTONOMIA DAS MULHERES RURAIS: IMPACTO NA SUSTENTABILIDADE DA AGRICULTURA FAMILIAR. O estudo tem como objetivo analisar os impactos das políticas públicas elaboradas para mulheres rurais em termos de sustentabilidade da agricultura familiar sendo orientado pelo Prof. Guy Garrod e a Prof. Dra. Carmen Hubbard. O projeto é parte do Programa de Doutorado em Agricultura (8010F) da Universidade de Newcastle, sita na cidade de Newcastle upon Tyne, Inglaterra. *I agree to participate in the research on RURAL WOMEN AUTONOMY: IMPACT ON THE SUSTAINABILITY OF FAMILY AGRICULTURE. The study aims to diagnose the women's empowerment in agriculture in Brazil. This study is supervised by Mr Guy Garrod and Dr Carmen Hubbard. The project is part of the PhD Programme in Agriculture (8010F) of Newcastle University, located in the city of Newcastle upon Tyne, England.*

A pesquisa utiliza diferentes procedimentos para coleta de dados, sendo de especial importância a entrevista em profundidade com decisores políticos e informantes-chave envolvidos no processo de elaboração e execução de políticas públicas para mulheres do meio rural. O material oriundo das entrevistas será posteriormente tabulado e analisado, sendo garantido o sigilo absoluto e resguardando-se os nomes dos participantes, bem como a identificação do local da coleta de dados. *This study uses mixed method research approach, being especially relevant to the contextualization of thematic of the study proposed the interview with key informants involved in the process of elaboration and execution of public policies for rural women. The material coming from the interviews will be tabulated and analysed, guaranteeing the absolute privacy of all information and names of the participants, as well as the identification of any information that could lead to identifying the interviewees.*

A divulgação dos resultados terá finalidade acadêmica e será feita, por meio da publicação da tese doutoral, em artigos científicos e comunicações em congressos e eventos científicos. Uma cópia do estudo será posteriormente enviada em formato pdf a cada participante. *The dissemination of the results of the study mentioned will be of academic purpose and will be made, through the publication of the doctoral thesis, in scientific articles and communications in congresses and scientific events*

Como participante da pesquisa declaro que concordo em ser entrevistado pela pesquisadora em local e duração previamente ajustados, () permitindo/() não permitindo a gravação da entrevista. A pesquisadora providenciará uma cópia da transcrição da entrevista para meu conhecimento. *I declare that I agree to be interviewed by the researcher, allowing the recording of the interview. The researcher will provide a copy of the transcript of the interview.*

_____, ____ de _____ de 2014.

Assinatura e nome do(a) entrevistado(a)

Assinatura da pesquisadora



GUIDE: FOCUS GROUPS WITH RURAL WOMEN

Agência

- 1- As senhoras se sentem como donas da propriedade em que as senhoras vivem, tanto da casa, roça e quintal, como também dos bens que existem nela (Ex. casa, animais, máquinas e etc.)? As senhoras poderiam vender qualquer dos itens da propriedade ou até mesmo a propriedade, caso quisessem? Por quê?
- 2- As senhoras participam nas decisões sobre a produção do seu sítio? As senhoras acreditam que poderiam decidir que tipo de roça plantar, que plantas cultivar no quintal, quais animais criar e as técnicas de produção que deve ser usada (ex. orgânico/convencional)? Quais seriam os impedimentos para que as senhoras participarem mais sobre a produção do seu sítio?
- 3- Quem geralmente é responsável em vender a produção do seu sítio? Quem controla o dinheiro que entra na casa? Por quê?

Ajuda na seca

- 1- Na sua opinião, de onde vem a principal fonte de ajuda em período de seca? Gostaria que as senhoras diferenciasssem ajuda para as coisas da 'casa' e para manter a produção do sítio? Gostaria de as senhoras me dessem exemplos.
- 2- Como as senhoras acessam essas ajudas? O que as senhoras acham que são as maiores dificuldades para melhorar acessar essas ajudas? As senhoras poderiam dar exemplos dos últimos anos?

Appendix B

Questionnaire

RESPONDENT'S CODE

PROJECT APODI - 2015

Instructions to the enumerator: The questionnaire should be applied separately to both; primary male and primary female of household. In the case of the temporary unavailability of one of the partners or adults responsible, we recommend further attempts or even schedule future appointment using the 'schedule form'. The questionnaire should not be applied if **there is no adult female**. The interviewer should read all the alternatives to the interviewed, following instructions of each question. In general, you should mark only one alternative for each question, but there are some exceptions where there may be more than one alternative, will have the message "MARK ALL OPTIONS APPLICABLE".

It is mandatory to read the text below to the participant. This in order to provide information about the study and obtain their VERBAL consent to participate.

Good morning / afternoon, (my name is and I am working for.....)

We would like to invite you and your wife/husband to participate in this study which is about family farming in Apodi. The purpose of this research is to evaluate the impact of some government programs in decision-making processes, access to credit and property, participation in organizations and producer groups and the use of time members of the family farm. This research is part of the Doctoral Program at the Newcastle University in England. The information provided by you will be treated as confidential material. We would like to point out that the participation in this project is not compulsory and if you decide to participate, you can decide on stop at any time, there is no problem.

The dissemination of results will be made within the academic environment. The objective of this project is provide about the expression of the rural development policies existing in your community.

Do you accept participate in this study? () YES () NO;

Please double check to ensure:

- You have **completed the section about identification of household questionnaire** to identify the correct primary and/or secondary respondent(s);
- You have **gained verbal consent** for the individual in the household questionnaire;
- You have sought to interview the individual in private or where other members of the household cannot overhear or contribute answers.
- Do not attempt to make responses between the primary male decision maker and the primary female decision maker the same—**it is ok for them to be different.**

NAME OF ENUMERATOR: _____

NAME OF COORDINATOR: _____

Enumerator: To begin our interview I would like to make some questions about yourself and your farm.

A1. TYPE OF HOUSEHOLD:	MALE AND FEMALE ADULT:1 } FEMALE ADULT ONLY:2 } PROCEED WITH THE INTERVIEW NO FEMALE ADULT:DO NOT INTERVIEW
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RESPONDENT'S CODE

MODULE A: INDIVIDUAL IDENTIFICATION

DATE (DD/MM/YY):		D	D	M	M	Y	Y
INTERVIEWED INFORMATION		CODE					
A2. DID YOU ACQUIRE YOUR FARM THROUGH LAND REFORM?		YES.....1 NO.....2					
A3.01. HOUSEHOLD IDENTIFICATION:		A3.02. HOUSEHOLD CODE:					
NAME OF COMMUNITY/SETTLEMENT: _____		EXAMPLE: Settlement Aparecida (AP), Plot 21. Code: AP21.					
STREET NAME: _____ N ° (PLOT OR HOUSE): _____		A4.02. RESPONDENT CODE:					
A4.01. NAME OF RESPONDENT (FIRST NAME): _____		EXAMPLE: Maria, Settlement Aparecida (AP), Plot 21. RESPONDENT'S CODE: Household code + sex (1 MALE, 2 FEMALE): AP212					
A5. SEX OF RESPONDENT:		MALE.....1 FEMALE.....2					
A6. EDUCATION LEVEL OF RESPONDENT:		BASIC INCOMPLETE.....1 BASIC COMPLETE.....2 SECONDARY INCOMPLETE.....3 SECONDARY COMPLETE.....4 TECHNICIAN COURSE.....5 HIGHER EDUCATION.....6 NEVER HAVE BEEN AT SCHOOL.....7 ALONE.....1 WITH ADULT FEMALES PRESENT.....2 WITH ADULT MALES PRESENT.....3 WITH ADULTS MIXED SEX PRESENT.....4 WITH CHILDREN PRESENT.....5 WITH ADULTS MIXED SEX AND CHILDREN PRESENT.....6					
A7. ABILITY TO BE INTERVIEWED ALONE:		15 TO 20.....1 21 TO 30.....2 31 TO 40.....3 41 TO 50.....4 51 TO 60.....5 ABOVE 61.....6					
A8. AGE OF RESPONDENT:		15 TO 20.....1 21 TO 30.....2 31 TO 40.....3 41 TO 50.....4 51 TO 60.....5 ABOVE 61.....6					

RESPONDENT'S CODE

MODULE B: AGRICULTURAL PRODUCTION

QNO.	QUESTION	CODE	QNO.	QUESTION	CODE
B1.	Could you tell me how many hectare is your farm/plot?	UNTIL 11 HA..... 1 BETWEEN 12 E 20 HA..... 2 BETWEEN 21 E 50 HA..... 3 MORE THAN 50 HA..... 4 I DON'T KNOW..... 97	B6.	Is there cisterna or other form of water reservoir in your farm/plot?	YES..... 1 NO..... 2
B2.	What kind of production system do you use in your farm/plot?	AGROECOLOGY..... 1 CONVENCIONAL..... 2 AGROECOLOGY AND CONVENCIONAL..... 3 I DON'T KNOW..... 97	B7.	Which one is the main income source in your household? (The source which provide money to pay the household bills)	AGRICULTURE..... 1 WAGED WORK..... 2 OWN BUSINESS..... 3 GOVERNMENT (social programs, pension , etc)..... 4
B3.	Which animal production di you have in your farm/plot? MARK ALL OPTIONS APPLICABLE	BOVINE..... 1 SWINE..... 2 GOAT/SHEEP..... 3 POULTRY..... 4 NOT APPLICABLE..... 98 (if you marked 98 skip to B6)	B8.	Qual é o valor da renda mensal da sua família? (*) Valor aproximado dos últimos 12 meses	Até R\$ 500..... 1 Entre R\$ 500 - R\$1.000..... 2 Entre R\$1.001 - R\$ 2.000..... 3 Entre R\$2.001 - R\$3.000..... 4 Entre R\$3.001 – R\$4.000..... 5 Entre R\$4.001 – R\$5.000..... 6 Acima de R\$5.001..... 7 Não sei informar..... 97
B4.	How many animals in the list do you have? MARK ALL OPTIONS APPLICABLE	BOVINE(1) SWINE(2) GOAT/SHEEP(3) POULTRY(4)	B9.	<u>Only for woman</u> Could you say that there is some productive activity developed in your farm/plot that you consider yours? I mean you are the one which are in charge of it? (to mention examples bellow)	YES..... 1 NO..... 2 → SKIP TO THE MODULE G2
B5.	Which productive activities do you have in your farm/plot? MARK ALL OPTIONS APPLICABLE (*) Processed products: cheese, fruit pulp, cake, manioc flour, bread , etc	MAIZE..... 1 MANIOC..... 2 POTATO..... 3 BEENS..... 4 RICE..... 5 FRUIT..... 6 MILK..... 7 MEAT..... 8 HONEY..... 9 EGGS..... 10 PROCESSED PRODUCTS*..... 11 OTHERS..... 98 SPECIFY:	B10.	<u>Only for woman</u> Could you please specify which ones do you consider yours? MARK ALL OPTIONS APPLICABLE	MAIZE..... 1 MANIOC..... 2 POTATO..... 3 BEENS..... 4 RICE..... 5 FRUIT..... 6 MILK..... 7 MEAT..... 8 HONEY..... 9 EGGS..... 10 PROCESSED PRODUCTS*..... 11 OTHERS..... 98 SPECIFY:

¹ Este tipo de agricultura é caracterizado pelo cultivo intensivo do solo, plantio de monoculturas, aplicação de fertilizantes inorgânicos (adubação química), utilização de agrotóxicos para controle químico de espécies indesejadas (pragas e patógenos) e manipulação genética das espécies cultivadas.

RESPONDENT'S CODE

MODULE C: ROLE IN HOUSEHOLD DECISION-MAKING AROUND PRODUCTION AND INCOME GENERATION

ACTIVITY CODE	ACTIVITY DESCRIPTION	C1	C2	C3	C4	C5
A	Food farming (Crops and animals that are grown primarily for household food consumption)	Did you yourself participate in [ACTIVITY] in the last years? (To specify that it is when it rains, or have water available to produce)	When decisions are made regarding [ACTIVITY], who is it that normally takes the decision? Ex. (A, B) - What crop to plant? When? What inputs use? (C) - What feed give your animals? How to handle your animals? CIRCLE ALL APPLICABLE	How much input did you have in making decisions about [ACTIVITY]? Ex. (A, B) - What crop to plant? When? What inputs use? (C) - What feed give your animals? How to handle your animals?	To what extent do you feel you can make your own personal decisions regarding [ACTIVITY] if you want(ed) to?	How much input did you have in decisions on the use of income generated from [ACTIVITY]? Ex. What to buy with the income? Do you participate in the decision about how expend the money from the [ACTIVITY]? IF RESPONDENT PARTICIPATE TOGETHER IN ALL DECISIONS (50%) - MARK OPTION 3
		YES1 NO2 → ACTIVITY B	SELF1 → SKIP TO C5 SPOUSE2 OTHER HH MEMBER3 OTHER NON-HH MEMBER4 NOT APPLICABLE98 → NEXT ACTIVITY	NO INPUT OR INPUT IN FEW DECISIONS1 INPUT INTO SOME DECISIONS2 INPUT INTO MOST OR ALL DECISIONS3 NO DECISION MADE98 → ACTIVITY	NOT AT ALL1 SMALL EXTENT2 MEDIUM EXTENT3 TO A HIGH EXTENT4	DOMESTIC PRODUCTION SURPLUS (PINGADO, VENDA IMEDIATA) NO INPUT OR INPUT IN FEW DECISIONS1 INPUT INTO SOME DECISIONS2 INPUT INTO MOST OR ALL DECISIONS3 NO DECISION MADE98 → ACTIVITY
B	Cash crop farming (Crops that are grown primarily for sale in the market)	YES1 NO2 → ACTIVITY C	SELF1 → SKIP TO C5 SPOUSE2 OTHER HH MEMBER3 OTHER NON-HH MEMBER4 NOT APPLICABLE98 → NEXT ACTIVITY	NO INPUT OR INPUT IN FEW DECISIONS1 INPUT INTO SOME DECISIONS2 INPUT INTO MOST OR ALL DECISIONS3 NO DECISION MADE98 → ACTIVITY	NOT AT ALL1 SMALL EXTENT2 MEDIUM EXTENT3 TO A HIGH EXTENT4	NO INPUT OR INPUT IN FEW DECISIONS1 INPUT INTO SOME DECISIONS2 INPUT INTO MOST OR ALL DECISIONS3 NO DECISION MADE98 → ACTIVITY
C	Livestock raising (Animals raising for sale in the market – ex. animal em pé, milk, eggs, meat)	YES1 NO2 → ACTIVITY D	SELF1 → SKIP TO C5 SPOUSE2 OTHER HH MEMBER3 OTHER NON-HH MEMBER4 NOT APPLICABLE98 → NEXT ACTIVITY	NO INPUT OR INPUT IN FEW DECISIONS1 INPUT INTO SOME DECISIONS2 INPUT INTO MOST OR ALL DECISIONS3 NO DECISION MADE98 → ACTIVITY	NOT AT ALL1 SMALL EXTENT2 MEDIUM EXTENT3 TO A HIGH EXTENT4	NO INPUT OR INPUT IN FEW DECISIONS1 INPUT INTO SOME DECISIONS2 INPUT INTO MOST OR ALL DECISIONS3 NO DECISION MADE98 → ACTIVITY
D	Non-farm activities (Small family business as vendinha, self-employment, diarista, sell food - ex. Selgadinho, etc)	YES1 NO2 → ACTIVITY E	SELF1 → SKIP TO C5 SPOUSE2 OTHER HH MEMBER3 OTHER NON-HH MEMBER4 NOT APPLICABLE98 → NEXT ACTIVITY	NO INPUT OR INPUT IN FEW DECISIONS1 INPUT INTO SOME DECISIONS2 INPUT INTO MOST OR ALL DECISIONS3 NO DECISION MADE98 → ACTIVITY	NOT AT ALL1 SMALL EXTENT2 MEDIUM EXTENT3 TO A HIGH EXTENT4	NO INPUT OR INPUT IN FEW DECISIONS1 INPUT INTO SOME DECISIONS2 INPUT INTO MOST OR ALL DECISIONS3 NO DECISION MADE98 → ACTIVITY

ACTIVITY CODE	ACTIVITY DESCRIPTION	RESPONDENT'S CODE				
		C1	C2	C3	C4	C5
E	Waged and salary employment (Labour that is paid for in cash or in-kind, including both agriculture and other wage work. Ex. Work on <i>Pedreira</i> and <i>Agricola</i>)	YES1 NO2 → ACTIVITY F				NO INPUT OR INPUT IN FEW DECISIONS.....1 INPUT INTO SOME DECISIONS.....2 INPUT INTO MOST OR ALL DECISIONS.....3 NO DECISION MADE98 → NEXT ACTIVITY
F	Apiculture (exclude piscicultura e renomear f-g e g-h)	YES1 NO2 → ACTIVITY G	SELF1 → SKIP TO C5 SPOUSE2 OTHER HH MEMBER3 OTHER NON-HH MEMBER4 NOT APPLICABLE98 → NEXT ACTIVITY	NO INPUT OR INPUT IN FEW DECISIONS.....1 INPUT INTO SOME DECISIONS.....2 INPUT INTO MOST OR ALL DECISIONS.....3 NO DECISION MADE98 → NEXT ACTIVITY	NOT AT ALL1 SMALL EXTENT2 MEDIUM EXTENT3 TO A HIGH EXTENT4	NO INPUT OR INPUT IN FEW DECISIONS.....1 INPUT INTO SOME DECISIONS.....2 INPUT INTO MOST OR ALL DECISIONS.....3 NO DECISION MADE98 → NEXT ACTIVITY
G	Major household expenditures (Such as land, freezer, oven, TV, motorcycle, mobile , etc)		SELF1 → SKIP TO C5 SPOUSE2 OTHER HH MEMBER3 OTHER NON-HH MEMBER4 NOT APPLICABLE98 → NEXT ACTIVITY	NO INPUT OR INPUT IN FEW DECISIONS.....1 INPUT INTO SOME DECISIONS.....2 INPUT INTO MOST OR ALL DECISIONS.....3 NO DECISION MADE98 → NEXT ACTIVITY	NOT AT ALL1 SMALL EXTENT2 MEDIUM EXTENT3 TO A HIGH EXTENT4	
H	Minor household expenditures (Such as food – supermarket, clothes, household items, tools , etc)		SELF1 → SKIP TO C5 SPOUSE2 OTHER HH MEMBER3 OTHER NON-HH MEMBER4 NOT APPLICABLE98 → NEXT ACTIVITY	NO INPUT OR INPUT IN FEW DECISIONS.....1 INPUT INTO SOME DECISIONS.....2 INPUT INTO MOST OR ALL DECISIONS.....3 NO DECISION MADE98 → NEXT MODULE	NOT AT ALL1 SMALL EXTENT2 MEDIUM EXTENT3 TO A HIGH EXTENT4	

RESPONDENT'S CODE

CONTINUATION

MODULE D (A): ACCESS TO PRODUCTIVE CAPITAL

"Now I'd like to ask you about your household's access to and ownership of a number of items that could be used to generate income."	Does anyone in your household currently have any [ITEM]?	Do you own any of the item?	
		D1	D2
A Agricultural Land Ex. land, farms, <i>sifios</i> / <i>tiacaras</i> , plots, etc	YES...1 NO...2 → ITEM B	YES, SOLELY1 YES, JOINTLY2 NO3	YES, SOLELY1 YES, JOINTLY2 NO3
B Large livestock Ex. bovine, horse, mule and donkey.	YES...1 NO...2 → ITEM C	YES, SOLELY1 YES, JOINTLY2 NO3	YES, SOLELY1 YES, JOINTLY2 NO3
C Small Animals Ex. goat, sheep, swine.	YES...1 NO...2 → ITEM D	YES, SOLELY1 YES, JOINTLY2 NO3	YES, SOLELY1 YES, JOINTLY2 NO3
D Poultry Ex. chicken in any development phase.	YES...1 NO...2 → ITEM E	YES, SOLELY1 YES, JOINTLY2 NO3	YES, SOLELY1 YES, JOINTLY2 NO3
E Apilary Ex. Bees boxes	YES...1 NO...2 → ITEM F	YES, SOLELY1 YES, JOINTLY2 NO3	YES, SOLELY1 YES, JOINTLY2 NO3
F Farm equipment Ex. non-mechanized: hand tools, animal-drawn plough.	YES...1 NO...2 → ITEM G	YES, SOLELY1 YES, JOINTLY2 NO3	YES, SOLELY1 YES, JOINTLY2 NO3
G Farm equipment Ex. mechanized: tractor-plough, electric pump, milking machine, chaff cutter, forage cutter.	YES...1 NO...2 → SKIP TO THE NEXT COLUMN	YES, SOLELY1 YES, JOINTLY2 NO3	YES, SOLELY1 YES, JOINTLY2 NO3

PRODUCTIVE CAPITAL	D1	D2
H Nonfarm business equipment Ex. sewing machine, industrial food machinery-ex. to make fruit pulp, cakes or other processed products that you or your community/group sell.	YES...1 NO...2 → ITEM I	YES, SOLELY1 YES, JOINTLY2 NO3
I House or other structures Ex. house in the city, other construction in your farm/plot.	YES...1 NO...2 → ITEM J	YES, SOLELY1 YES, JOINTLY2 NO3
J Large consumer durables Ex. car, motorcycle, TV, computer, refrigerator.	YES...1 NO...2 → ITEM K	YES, SOLELY1 YES, JOINTLY2 NO3
K Small consumer durables Ex. radio, cookware, kitchen tools- Ex. blender, electric mixer, etc	YES...1 NO...2 → ITEM L	YES, SOLELY1 YES, JOINTLY2 NO3
L Cell phone	YES...1 NO...2 → ITEM M	YES, SOLELY1 YES, JOINTLY2 NO3
M Other land not used for agricultural purposes Ex. pieces/plots, residential or commercial land.	YES...1 NO...2 → ITEM N	YES, SOLELY1 YES, JOINTLY2 NO3
N Means of transportation Ex. bicycle, motorcycle, car.	YES...1 NO...2 → NEXT MODULE	YES, SOLELY1 YES, JOINTLY2 NO3

RESPONDENT'S CODE

MODULE D (B): ACCESS TO CREDIT

LENDING SOURCE NAMES		D3	D4	D5	D6
"Next I'd like to ask about your household's experience with borrowing money or other items in the past 12 months."		Would you or anyone in your household be able to take a loan or borrow cash/in-kind from [SOURCE] if you wanted to? *		Who makes the decision about what to do with the money/ item borrowed from [SOURCE] most of the time? CIRCLE ALL APPLICABLE	
Has anyone in your household taken any loans or borrowed cash/in-kind from [SOURCE] in the past 12 months? <i>INSUMO PARA PRODUCAO (ferramentas, sementes, adubo, animais, maquinario e etc.)</i>		Who made the decision to borrow from [SOURCE] most of the time? CIRCLE ALL APPLICABLE		Who makes the decision about what to do with the money/ item borrowed from [SOURCE] most of the time? CIRCLE ALL APPLICABLE	
A	Non-governmental organization (NGO) OR credit cooperatives (Ex. INTEGRAR)	YES.....1 NO.....2→ MAYBE.....3	YES, CASH.....1 YES, IN-KIND.....2 YES, CASH AND IN-KIND.....3 NO.....4 I DON'T KNOW.....97 } NEXT SOURCE	SELF.....1 SPOUSE.....2 OTHER HH MEMBER.....3 OTHER NON-HH MEMBER.....4 NOT APPLICABLE.....98	SELF.....1 SPOUSE.....2 OTHER HH MEMBER.....3 OTHER NON-HH MEMBER.....4 NOT APPLICABLE.....98
B	Private or public banks Ex. Banco do Nordeste, Banco do Brasil, Caixa Econômica Federal	YES.....1 NO.....2→ MAYBE.....3	YES, CASH.....1 YES, IN-KIND.....2 YES, CASH AND IN-KIND.....3 NO.....4 I DON'T KNOW.....97 } NEXT SOURCE	SELF.....1 SPOUSE.....2 OTHER HH MEMBER.....3 OTHER NON-HH MEMBER.....4 NOT APPLICABLE.....98	SELF.....1 SPOUSE.....2 OTHER HH MEMBER.....3 OTHER NON-HH MEMBER.....4 NOT APPLICABLE.....98
C	Informal lender Ex. agiotas	YES.....1 NO.....2→ MAYBE.....3	YES, CASH.....1 YES, IN-KIND.....2 YES, CASH AND IN-KIND.....3 NO.....4 I DON'T KNOW.....97 } NEXT SOURCE	SELF.....1 SPOUSE.....2 OTHER HH MEMBER.....3 OTHER NON-HH MEMBER.....4 NOT APPLICABLE.....98	SELF.....1 SPOUSE.....2 OTHER HH MEMBER.....3 OTHER NON-HH MEMBER.....4 NOT APPLICABLE.....98
D	Friends or relatives	YES.....1 NO.....2→ MAYBE.....3	YES, CASH.....1 YES, IN-KIND.....2 YES, CASH AND IN-KIND.....3 NO.....4 I DON'T KNOW.....97 } NEXT SOURCE	SELF.....1 SPOUSE.....2 OTHER HH MEMBER.....3 OTHER NON-HH MEMBER.....4 NOT APPLICABLE.....98	SELF.....1 SPOUSE.....2 OTHER HH MEMBER.....3 OTHER NON-HH MEMBER.....4 NOT APPLICABLE.....98
E	Group based micro-finance or lending	YES.....1 NO.....2→ TALVEZ.....3	YES, CASH.....1 YES, IN-KIND.....2 YES, CASH AND IN-KIND.....3 NO.....4 I DON'T KNOW.....97 } NEXT SOURCE	SELF.....1 SPOUSE.....2 OTHER HH MEMBER.....3 OTHER NON-HH MEMBER.....4 NOT APPLICABLE.....98	SELF.....1 SPOUSE.....2 OTHER HH MEMBER.....3 OTHER NON-HH MEMBER.....4 NOT APPLICABLE.....98
F	Other sources? Which one? _____	YES.....1 NO.....2→ TALVEZ.....3	YES, CASH.....1 YES, IN-KIND.....2 YES, CASH AND IN-KIND.....3 NO.....4 I DON'T KNOW.....97 } NEXT SOURCE	SELF.....1 SPOUSE.....2 OTHER HH MEMBER.....3 OTHER NON-HH MEMBER.....4 NOT APPLICABLE.....98	SELF.....1 SPOUSE.....2 OTHER HH MEMBER.....3 OTHER NON-HH MEMBER.....4 NOT APPLICABLE.....98

RESPONDENT'S CODE

MODULE E: TIME ALLOCATION

E1. PLEASE RECORD A LOG OF THE ACTIVITIES FOR THE INDIVIDUAL IN THE LAST WORKED WEEK DAY COMPLETE 24 HOURS (STARTING ON MORNING AT 4 AM, FINISHING 3:59 AM). THE TIME INTERVALS ARE MARKED IN 15 MIN INTERVALS AND ONE ACTIVITY CAN BE MARKED FOR EACH TIME PERIOD BY DRAWING A LINE THROUGH THAT ACTIVITY. ONLY THE PRIMARY ACTIVITY.

"Now I'd like to ask you about how you spent your time during 24 hours of the past work weekday. We'll begin from the morning until the time that you went to sleep. This will be a detailed accounting. I'm interested in everything you do (i.e. resting, eating, personal care, work inside and outside the home, caring for children, cooking, shopping, socializing, etc.), even if it doesn't take you much time."

Activity	Night			Morning							Afternoon				
	4	5		6	7	8	9	10	11	12	13	14	15		
A Sleeping and resting															
B Eating and drinking - Breakfast, lunch, dinner, snack, etc.															
C Personal care - Taking shower, tooth brushing, etc.															
D School - Courses, training, fundamental education, etc.															
E Work as employed - Ex. 'Agrícola', 'pedreira', 'doméstica', etc.															
F Own business work - Ex. Selling 'salgadinhas', 'vendinha', etc.															
G Farming/plot - Working in your/community plot or handling cattle.															
H Farming/backyard - handling poultry, collecting fruit or honey, hortalias															
I Shopping - Buying food or other items to household															
J Weaving, sewing, textile care															
K Cooking - Preparing food to household members															
L Domestic work - Sweeping, washing, ironing, etc.															
M Care for children/adults/elderly - Feeding, bathing, etc.															
N Travelling and commuting															
O Watching TV/listening to radio/reading															
P Exercising - Walking, playing soccer, etc.															
Q Social activities and hobbies															
R Religious activities - 'Culto', church service, religious meeting, etc.															
Other Specify:															

RESPONDENT'S CODE

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MODULE E: TIME ALLOCATION

Activity	Afternoon						Night					
	16	17	18	19	20	21	22	23	24	1	2	3
A Sleeping and resting												
B Eating and drinking - Breakfast, lunch, dinner, snack, etc.												
C Personal care - Taking shower, tooth brushing, etc.												
D School - Courses, training, fundamental education, etc.												
E Work as employed - Ex. 'Agrícola', 'pedreira', 'doméstica', etc.												
F Own business work - Ex. Selling 'saíadinhos', 'vendinha', etc.												
G Farming/plot - Working in your/community plot or handling cattle.												
H Farming/backyard - handling poultry, collecting fruit or honey, hortalias												
I Shopping - Buying food or other items to household												
J Weaving, sewing, textile care												
K Cooking - Preparing food to household members												
L Domestic work - Sweeping, washing, ironing, etc.												
M Care for children/adults/elderly - Feeding, bathing, etc.												
N Travelling and commuting												
O Watching TV/listening to radio/reading												
P Exercising - Walking, playing soccer, etc.												
Q Social activities and hobbies												
R Religious activities - Culto, church service, religious meeting, etc.												
Other Specify:												

QNO.	QUESTION	RESPONSE
E2.	In the last 24 hours did you work (at home or outside of the home) more than usual, about the same as usual, or less than usual?	MORE THAN USUAL.....1 ABOUT THE SAME AS USUAL.....2 LESS THAN USUAL.....3

RESPONDENT'S CODE

MODULE F: GROUP MEMBERSHIP

"Now I'm going to ask you about mixed groups in the community. These can be either formal or informal and customary groups."		Is there a [GROUP] in your community?	Could you mention the [GROUP] name?	Are you an active member of this [GROUP]?
GROUP CATEGORIES		F1	F1(A)	F2
A	Union Ex. <i>Sindicato dos Trabalhadores e Trabalhadoras Rurais de Apodi</i>	YES1 NO2 I DON'T KNOW ...97 ↑ GROUP B		YES1 NO2
B	Cooperatives Ex. <i>Coofap, Coopapi</i>	YES1 NO2 I DON'T KNOW ...97 ↑ GROUP C		YES1 NO2
C	Association Ex. <i>associação de assentamento ou comunidade</i>	YES1 NO2 I DON'T KNOW ...97 ↑ GROUP D		YES1 NO2
D	Group and networks of solidarity economy and trade Ex. <i>Rede Xique-Xique</i>	YES1 NO2 I DON'T KNOW ...97 ↑ GROUP E		YES1 NO2
E	Credit and microfinance group Ex. <i>crédito rotativo informal</i>	YES1 NO2 I DON'T KNOW ...97 ↑ GROUP F		YES1 NO2
F	Social movements Ex. <i>MST (Movimento dos Trabalhadores Rurais Sem Terra)</i>	YES1 NO2 I DON'T KNOW ...97 ↑ GROUP G		YES1 NO2
G	Water users' group Ex. <i>UERN, UFERSA, association, union's groups</i>	YES1 NO2 I DON'T KNOW ...97 ↑ GROUP H		YES1 NO2
H	Territorial organization group Ex. <i>comité e grupos gestores</i>	YES1 NO2 I DON'T KNOW ...97 ↑ GROUP I		YES1 NO2
I	Religious group	YES1 NO2 I DON'T KNOW ...97 ↑ GROUP J		YES1 NO2
J	ONLY FOR WOMEN Women-only producer group Ex. <i>In association, union, etc</i>	YES1 NO2 I DON'T KNOW ...97 ↑ GROUP L		YES1 NO2
L	Others (specify) _____	YES1 NO2 ↑ NEXT MODULE		YES1 NO2

RESPONDENT'S CODE

MODULE G: POLICY/PROGRAMME ACCESS

DOCUMENTS

Now, I will ask about agricultural production policy and programmes that you access in the last year. Our interest is about all support that you receive in the last years in order to improve your agricultural production. But first I will ask about the documents that you and your farm has.

QNO.	QUESTION	OPTIONS
G1	Which one of this documents do you have?	RG.....1 CPF.....2 RG AND CPF.....3 NO, I DON'T HAVE ANY.....4 I DON'T KNOW.....97
G2	Your farm/plot has DAP (<i>Declaração de aptidão para o PROMAF</i>)?	YES.....1 NO.....2 → END I DON'T KNOW.....97 → SKIP TO G4
G3	Does [your wife / the household female/ your] ² name is in the farm/plot DAP?	YES.....1 NO.....2 I DON'T KNOW.....97

RURAL DEVELOPMENT PROGRAMMES

I would like to ask to you about your participation in rural development programmes.

QNO.	QUESTION	OPTION
G4	Which one of these programmes have you participated?	Projeto Dom Helder Camara – PDHC.....1 Programa Uma Terra e Duas Águas (P1+2).....2 Programa Um Milhão de Cisternas (P1MC).....3 Projeto MULHERES (COOPERVIDA).....4 Produção Agroecológica Integrada Sustentável (PAIS).....5 Projeto de Desenvolvimento Sustentável (PDS).....6 Outro..... Nenhum.....97
G5	Only for women Have you participated in a rural development programme focused on women? Which one?	Resposta:

TECHNICAL ASSISTANCE

I would like to ask about technical assistance in your farm/plot.

QNO.	QUESTION	OPTIONS
G6	Do you receive visit of technical assistance in your farm/plot?	YES.....1 NO.....2 → SKIP TO G9 I DON'T KNOW.....3
G7	How often do you receive visit from technical assistance?	WEEKLY.....1 15 DAYS.....2 MONTHLY.....3 BIMONTHLY.....4 ANNUAL.....5

² Adaptar a questão, caso o respondente seja homem perguntar para ele sobre a mulher da casa. Caso a respondente seja mulher perguntar sobre ela.

		RESPONDENT'S CODE			
G8	When do you receive technical visits, technicians talk about credit programmes available to you?	YES.....1			
		NO.....2			
		I DON'T KNOW.....97			
G9	Do you know the name of the provider of technical assistance in your property?	A:			
G10	Does [your wife / the household female/ Do you] ³ receive orientation from the technicians about agricultural production?	YES.....1			
		NO.....2			
		I DON'T KNOW.....97			
CREDIT ACCESS					
Now, I would like to ask about credit access to agricultural production in the last year. There are available some credit lines target to smallholder farmer. The objective of these lines is support small farmers to improve their agricultural production as for instance Pronat, Agro amigo, etc.					
QNO.	QUESTIONS	OPTIONS			
C11	Have you heard about these credit lines?	YES.....1			
		NO.....2			SKIP TO C16
G12	Is there somebody in your household which access credit to agricultural production in the last 12 months ?	YES.....1			SKIP TO G16
		NO.....2			I DON'T KNOW.....3
G13	Who was the person whom access this type of credit? MARK ALL OPTIONS APPLICABLE	SELF.....1			
		SPOUSE.....2			
		OTHER HH MEMBER.....3			
		OTHER NON-HH MEMBER.....4			
		NOT APPLICABLE.....98			
A:					
G14	ONLY IF the answer of G11 include "self". This question is specific about PRONAF that you access, in your name, not your spouse or other person. Which line of PRONAF did you access				
G15	ONLY IF the answer of G11 include "self". Could you tell me how much was, approximately, the value of the last PRONAF access?	UNTIL R\$ 1.000.....1			
		BETWEEN R\$1.001 - R\$3.000.....2			
		BETWEEN R\$3.001 - R\$10.000.....3			
		BETWEEN R\$10.001 - R\$30.000.....4			
		BETWEEN R\$30.001 -R\$50.000.....5			
		ABOVE R\$50.001.....6			
		I DON'T REMEMBER.....97			
ACCESS PURCHASING PROGRAMME - PAA/PNAE					
Finally, I would like to ask questions about access government purchasing programs - PAA (Programa Nacional de Alimentação Escolar) and PNAE (Programa Nacional de Alimentação Escolar) and PNAE (Programa Nacional de Alimentação Escolar), are programs which aims to create market for family farms products.					
QNO.	QUESTIONS	OPTIONS			
G16	Do you have heard about these programmes?	YES.....1			
		NO.....2			FIM
G17	Did you sell your products to these programmes?	ONLY PAA.....1			
		ONLY PNAE.....2			
		TO PAA AND PNAE.....3			
		NEVER SOLD TO THEM.....4			
		I DON'T REMEMBER.....97			
DOUBLE CHECK IF THERE IS SOME MISSING ANSWERS, DOUBLE CHECK IF THE MODULE A IS CORRECTLY FULFILLED					

³ Adaptar a questão, caso o respondente seja homem perguntar para ele sobre a mulher da casa. Caso a respondente seja mulher perguntar sobre ela.

Appendix C

Results of A-WEAI: Original Inadequacy Cutoffs

Appendix C. Results of A-WEAI: Original Inadequacy Cutoffs

Table C.1: Results of A-WEAI using original inadequacy cutoff

	Women	Men
5DE Index (1-M0)	0.890	0.921
Disempowerment Index (M0)	0.110	0.079
% Disempowered Headcount (1-H)	71.35	75.16
% Disempowered Headcount (H)	28.65	24.84
Average Inadequacy Score (A)	0.384	0.319
No. of observations	173	153
% of Data used	100	100
GPI (1-HGPIxIGPI)	0.925	
% of women with gender parity (1-HGPI)	71.05	
% of women with no gender parity (HGPI)	28.95	
Average Empowerment Gap (IGPI)	0.259	
No. of women in dual households	153	
% of Data Used	100	
<i>A-WEAI</i>	0.894	

Note: Adjusted version

Table C.2: Results of A-WEAI decomposed by dimension and indicator using original inadequacy cutoff

	Production	Resources	Income	Leadership	Time	
	Input	Ownership	Access	Control	Groupmember	Workload
<i>Women</i>						
Censored headcount	0.158	0.000	0.263	0.088	0.076	0.140
% Contribution	28.72	0.00	15.96	15.96	13.83	25.53
Contribution	0.032	0.000	0.018	0.018	0.015	0.028
% Contr. by dimension	28.72	15.96		15.96	13.83	25.53
<i>Men</i>						
Censored headcount	0.085	0.000	0.209	0.007	0.065	0.170
% Contribution	21.43	0.00	17.58	1.65	16.48	42.86
Contribution	0.017	0.000	0.014	0.001	0.013	0.034
% Contr. by dimension	21.43		17.58	1.65	16.48	42.86

Note: Adjusted version

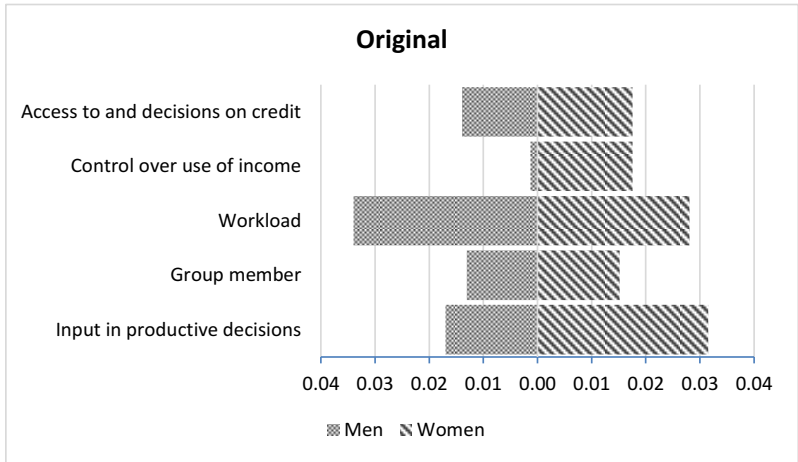


Figure C.1: Contribution to disempowerment: Original

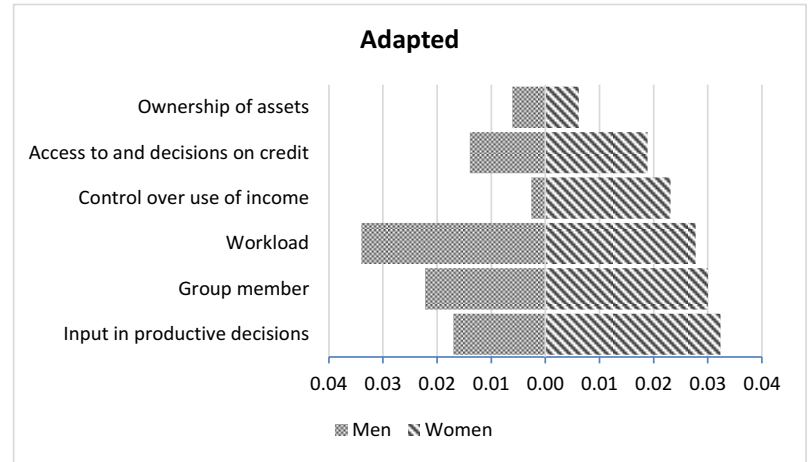


Figure C.2: Contribution to disempowerment: Adjusted

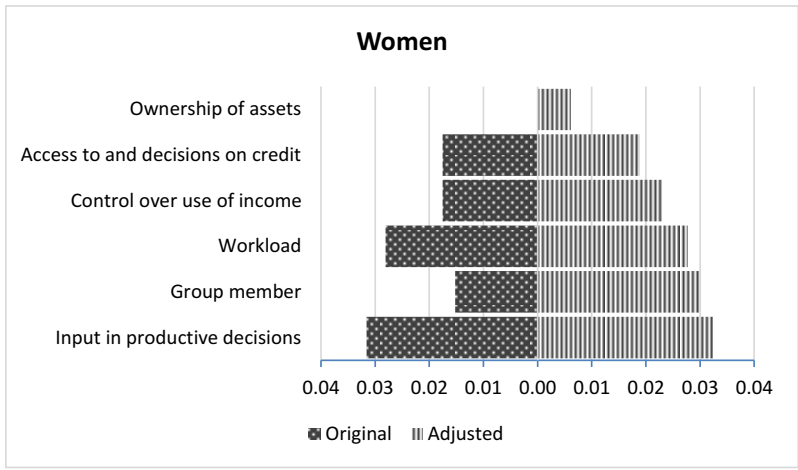


Figure C.3: Contribution to disempowerment: Women

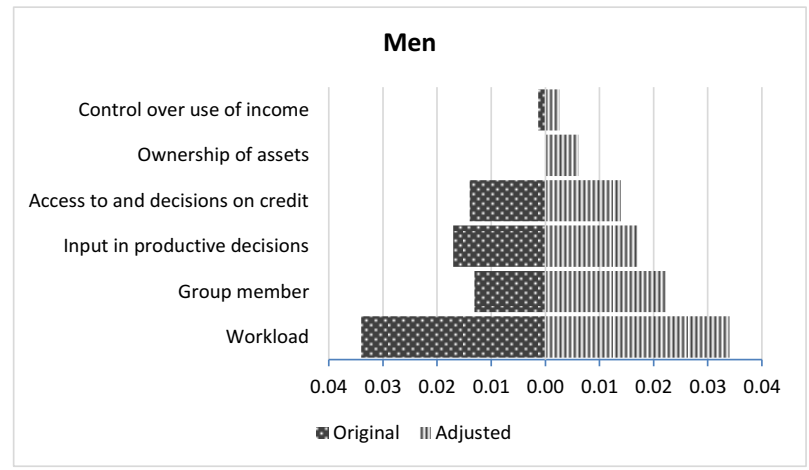


Figure C.4: Contribution to disempowerment: Men

Appendix D

Distributions and Correlations

Table D.1: Distribution of sample characteristics by subgroup: Women in non-land and land reform farms

Variables	Land reform (n = 107)		Non-land reform (n = 66)	
	<i>Mean</i>	<i>Std. Dev.</i>	<i>Mean</i>	<i>Std. Dev.</i>
Age group				
21 - 30 years	0.187	0.392	0.076	0.267
31 - 60 years	0.692	0.464	0.712	0.456
≥ 61 years	0.075	0.264	0.212	0.412
Years of education (1 = less than four years)	0.215	0.413	0.212	0.412
Main source of income				
Agriculture	0.206	0.406	0.076	0.267
Waged work	0.262	0.442	0.136	0.346
Governmental	0.505	0.502	0.712	0.456
Household income value				
R\$501 - R\$1.000	0.396	0.491	0.469	0.503
R\$1.001 - R\$2.000	0.170	0.377	0.156	0.366
≥R\$2.001	0.009	0.097	0.047	0.213
Farm size				
12 - 20 ha	0.558	0.500	0.167	0.377
21 - 50 ha	0.078	0.270	0.167	0.377
≥51 ha	0.026	0.160	0.143	0.354
Production system (1 = agro-ecological)	0.874	0.334	0.892	0.312
Farming activities diversified (>5 activities)	0.280	0.451	0.197	0.401
Woman's agricultural production (1 = yes)	0.657	0.477	0.738	0.444
Woman's DAP (1 = yes)	0.682	0.468	0.574	0.499
Women's access to technical assistance (1 = yes)	0.284	0.453	0.045	0.210
Beneficiary of credit (1 = yes)	0.387	0.489	0.262	0.443
Women-only producer group (1 = yes)	0.411	0.494	0.273	0.449

Table D.2: Distribution of sample characteristics: Women in dual household (n = 152*)

Variables	Means	Std. Dev.
<i>Dependent variables</i>		
Empowerment in agriculture (1 = yes)	0.628	0.484
Gender parity in agriculture (1 = yes)	0.693	0.460
<i>Key independent variables</i>		
Access to technical assistance (1 = yes)	0.196	0.398
Women-only productive group (1 = yes)	0.352	0.479
Beneficiary of credit (1 = yes)	0.349	0.478
<i>Other variables</i>		
Category of farm (land reform)	0.628	0.483
Aged 15—30 years	0.190	0.498
Aged 31—60 years	0.693	0.463
Aged over 61 years	0.118	0.323
Years of education (1 = more than four years)	0.216	0.413
Main source of earnings (1 = agriculture)	0.157	0.365
Production system (1 = agro-ecological)	0.888	0.316
Access to water (1 = yes)	0.868	0.339
More than 5 different agricultural activities on the farm (1 = yes)	0.243	0.430

(*) One household was dropped from the sample.

Table D.3: Correlations between women's individual scores and household characteristics in Chapada do Apodi.

	Empowerment in agriculture			Gender parity in agriculture		
	No	Yes	Total	No	Yes	Total
<u>Age group</u>						
15-30 yrs	12	18	30	10	19	29
	19.7	16.1	17.3	21.7	17.9	19.1
31-60 yrs	40	81	121	31	74	105
	65.6	72.3	69.9	67.4	69.8	69.1
>60 yrs	9	13	22	5	13	18
	14.8	11.6	12.7	10.9	12.3	11.8
Total	61	112	173	46	106	152
	100	100	100	100	100	100
Pearson chi2	0.860			0.325		
Cramer's V	0.071			0.046		
Fisher's exact (p-value)	0.639			0.855		
<u>Years of education</u>						
<4 yrs	46	90	136	37	82	119
	75.4	80.4	78.6	80.4	77.4	78.3
>4 yrs	15	22	37	9	24	33
	24.6	19.6	21.4	19.6	22.6	21.7
Total	61	112	173	46	106	152
	100	100	100	100	100	100
Pearson chi2	0.575			0.179		
Cramer's V	-0.058			0.034		
Fisher's exact (p-value)	0.446			0.831		
<u>Type of household</u>						
Dual households	57	96	153			
	93.4	85.7	88.4			
Female only households	4	16	20			
	6.6	14.3	11.6			
Total	61	112	173			
	100	100	100			
Pearson chi2	2.307					
Cramer's V	0.116					
Fisher's exact (p-value)	0.145					
<u>Category of farm</u>						
Non-land reform	27	39	66	17	37	55
	44.3	34.8	38.2	37.0	35.9	36.2
Land reform	34	73	107	29	68	97
	55.7	65.2	61.9	63.0	64.2	63.8
Total	61	112	173	46	106	152
	100	100	100	100	100	100
Pearson chi2	1.492			0.017		
Cramer's V	0.093			0.011		
Fisher's exact (p-value)	0.253			1.000		
<u>Farm size</u>						
<11 ha	19	29	48	11	30	41
	46.3	37.2	40.3	39.3	41.1	40.6
12-20 ha	15	35	50	13	30	43
	36.6	44.9	42.0	46.4	41.1	42.6
21-50 ha	5	8	13	3	7	10
	12.2	10.3	10.9	10.7	9.6	9.9
>51	2	6	8	1	6	7

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Appendix D. Distributions and Correlations

Table D.3 – Continued from previous page

	(a) Empowerment in agriculture			(b) Gender parity in agriculture		
	<i>No</i>	<i>Yes</i>	<i>Total</i>	<i>No</i>	<i>Yes</i>	<i>Total</i>
	4.9	7.7	6.7	3.6	8.2	6.9
Total	41	78	119	28	73	101
	100	100	100	100	100	100
Pearson chi2	1.408			1.251		
Cramer's V	0.109			0.092		
Fisher's exact (p-value)	0.717			0.396		
<i>Main source of household income</i>						
Agriculture	22	42	64	17	43	60
	36.1	37.5	37.0	37.0	40.6	39.5
Non- agricultural	39	70	109	29	63	92
	63.9	62.5	63.0	63.0	59.4	60.5
Total	61	112	173	46	106	152
	100	100	100	100	100	100
Pearson chi2	0.800			0.175		
Cramer's V	0.068			-0.034		
Fisher's exact (p-value)	0.650			0.721		
<i>Diversif. production (5)</i>						
Yes	49	81	130	36	79	115
	80.3	72.3	75.1	78.2	74.5	75.7
No	12	31	43	10	27	37
	19.7	27.7	24.9	21.8	25.5	24.3
Total	61	112	173	46	106	152
	100	100	100	100	100	100
Pearson chi2	2.679*			0.347		
Cramer's V	0.133			0.048		
Fisher's exact (p-value)	0.117			0.683		
<i>Women's Dap</i>						
Yes	51	21	72	40	33	72
	94.4	21.4	47.4	86.7	31.1	47.4
No	3	77	80	6	73	80
	5.6	78.6	52.6	13.3	68.9	52.6
Total	54	98	152	46	106	152
	100	100	100	100	100	100
Pearson chi2	74.452***			38.866***		
Cramer's V	0.700			0.506		
Fisher's exact (p-value)	0.001			0.000		
<i>Women's production</i>						
Yes	35	35	70	36	34	70
	64.8	35.7	46.1	78.3	32.1	46.0
No	19	63.9	82	10	72	82
	35.2	64.3	53.9	21.7	67.9	54.0
Total	54	98	152	46	106	152
	100	100	100	100	100	100
Pearson chi2	11.867***			29.231***		
Cramer's V	0.280			0.439		
Fisher's exact (p-value)	0.000			0.000		
<i>Income value (R\$/month)</i>						
< R\$500	23	43	66	18	38	56
	39.0	38.7	38.8	40.0	36.5	37.6
R\$501- R\$1.000	26	46	72	20	46	66
	44.1	41.4	42.4	44.4	44.2	44.3
R\$1.001-R\$2.000	10	18	28	7	17	24
	17.0	16.2	16.5	15.6	16.4	16.1

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Table D.3 – Continued from previous page

	(a) Empowerment in agriculture			(b) Gender parity in agriculture		
	<i>No</i>	<i>Yes</i>	<i>Total</i>	<i>No</i>	<i>Yes</i>	<i>Total</i>
R\$2.001-R\$3.000	0	4	4	0	3	3
	0.0	3.6	2.4	0.0	2.9	2.0
Total	59	111	170	45	104	149
	100	100	100	100	100	100
Pearson chi2	2.202			1.411		
Cramer's V	0.114			0.097		
Fisher's exact (p-value)	0.650			0.855		
<u>Production system</u>						
Agro-ecology	51	97	148	40	90	130
	87.9	88.2	88.1	93.0	86.5	88.4
Conventional	7	13	20	3	14	17
	12.1	11.8	11.9	7.0	13.5	11.6
Total	58	110	168	43	104	147
	100	100	100	100	100	100
Pearson chi2	0.002			1.251		
Cramer's V	-0.004			0.092		
Fisher's exact (p-value)	1.000			0.396		
<u>Access to water</u>						
No	12	14	26	10	10	20
	19.7	12.5	15.0	21.7	9.4	13.2
Yes	49	98	147	36	96	132
	80.3	87.5	85.0	78.3	90.6	86.8
Total	61	112	173	46	106	152
	100	100	100	100	100	100
Pearson chi2	1.591			4.250**		
Cramer's V	0.096			0.167		
Fisher's exact (p-value)	0.266			0.064		
<u>Access to technical assistance</u>						
No	53	83	136	38	80	118
	93.0	74.8	81.0	90.5	76.2	80.3
Yes	4	28	32	4	25	29
	7.0	25.2	19.1	9.5	23.8	19.7
Total	57	111	168	42	105	147
	100	100	100	100	100	100
Pearson chi2	8.097***			3.866**		
Cramer's V	0.219			0.162		
Fisher's exact (p-value)	0.004			0.066		
<u>Access to credit</u>						
No	49	64	113	38	60	98
	81.7	57.7	66.1	82.6	57.1	64.9
Yes	11	47	58	8	45	53
	18.3	42.3	33.9	17.4	42.9	35.1
Total	60	111	171	46	105	151
	100	100	100	100	100	100
Pearson chi2	10.016***			9.106***		
Cramer's V	0.242			0.246		
Fisher's exact (p-value)	0.002			0.003		
<u>women-only farmer group</u>						
No	46	65	111	36	63	99
	75.4	58.0	64.2	78.26	59.43	65.13
Yes	15	47	62	10.0	43.0	53.0
	24.6	42.0	35.8	21.74	40.57	34.87
Total	61	112	173	46.0	106.0	152.0

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Table D.3 – Continued from previous page

	(a) Empowerment in agriculture			(b) Gender parity in agriculture		
	<i>No</i>	<i>Yes</i>	<i>Total</i>	<i>No</i>	<i>Yes</i>	<i>Total</i>
	100	100	100	100	100	100
Pearson chi2	5.184**			5.007**		
Cramer's V	0.173			0.182		
Fisher's exact (p-value)	0.031			0.027		

Note: *Coeff.(SE) Robust standard errors in parentheses ***p < 0.01, **p < 0.05, *p < 0.10.

Table D.4: Correlations between individual scores empowerment and individual and household's characteristics in Chapada do Apodi.

	Women			Men		
	<i>No</i>	<i>Yes</i>	<i>Total</i>	<i>No</i>	<i>Yes</i>	<i>Total</i>
<u>Age group</u>						
15-30 yrs	12	18	30	7	13	20
	19.7	16.1	17.3	16.7	11.7	13.1
31-60 yrs	40	81	121	31	78	109
	65.6	72.3	69.9	73.8	70.3	71.2
>60 yrs	9	13	22	4	20	24
	14.8	11.6	12.7	9.5	18.0	15.7
Total	61	112	173	42	111	153
	100	100	100	100	100	100
Pearson chi2	0.860			2.027		
Cramer's V	0.071			0.115		
Fisher's exact (p-value)	0.639			0.346		
<u>Years of education</u>						
<4 yrs	46	90	136	35	103	138
	75.4	80.4	78.6	83.3	92.8	90.2
>4 yrs	15	22	37	7	8	15
	24.6	19.6	21.4	16.7	7.2	9.8
Total	61	112	173	42	111	153
	100	100	100	100	100	100
Pearson chi2	0.575			3.083*		
Cramer's V	-0.058			-0.142		
Fisher's exact (p-value)	0.446			0.123		
<u>Type of household</u>						
Dual households	57	96	153			
	93.4	85.7	88.4			
Female only households	4	16	20			
	6.6	14.3	11.6			
Total	61	112	173			
	100	100	100			
Pearson chi2	2.307					
Cramer's V	0.116					
Fisher's exact (p-value)	0.145					
<u>Category of farm</u>						
Non-land reform	27	39	66	20	35	55
	44.3	34.8	38.2	47.6	31.5	36.0
Land reform	34	73	107	22	76	98
	55.7	65.2	61.9	52.4	68.5	64.1
Total	61	112	173	42	111	153
	100	100	100	100	100	100
Pearson chi2	1.492			3.424*		
Cramer's V	0.093			0.149		
Fisher's exact (p-value)	0.253			0.089		

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Appendix D. Distributions and Correlations

Table D.4 – Continued from previous page

	Women			Men		
	No	Yes	Total	No	Yes	Total
<u>Farm size</u>						
<11 ha	19	29	48	21	31	52
	46.3	37.2	40.3	55.3	30.7	37.4
12-20 ha	15	35	50	9	42	51
	36.6	44.9	42.0	23.7	41.6	36.7
21-50 ha	5	8	13	2	17	19
	12.2	10.3	10.9	5.3	16.8	13.7
>51	2	6	8	6	11	17
	4.9	7.7	6.7	15.8	10.9	12.2
Total	41	78	119	38	101	139
	100	100	100	100	100	100
Pearson chi2	1.408			10.112**		
Cramer's V	0.109			0.269		
Fisher's exact (p-value)	0.717			0.017		
<u>Main source of household income</u>						
Agriculture	22	42	64	31	59	90
	36.1	37.5	37.0	73.8	53.6	59.2
Non-agricultural	4	4	8	5	14	19
	6.6	3.6	4.6	11.9	12.7	12.5
Governmental	35	66	101	6	37	43
	57.4	58.9	58.4	14.3	33.6	28.3
Total	61	112	173	42	110	152
	100	100	100	100	100	100
Pearson chi2	0.800			6.128**		
Cramer's V	0.068			0.201		
Fisher's exact (p-value)	0.650			0.043		
<u>Income value (R\$/month)</u>						
< R\$500	23	43	66	8	35	43
	39.0	38.7	38.8	19.5	31.5	28.3
R\$501- R\$1.000	26	46	72	21	48	69
	44.1	41.4	42.4	51.2	43.2	45.4
R\$1.001-R\$2.000	10	18	28	8	24	32
	17.0	16.2	16.5	19.5	21.6	21.1
R\$2.001-R\$3.000	0	4	4	4	4	8
	0.0	3.6	2.4	9.8	3.6	5.3
Total	59	111	170	41	111	152
	100	100	100	100	100	100
Pearson chi2	2.202			4.165		
Cramer's V	0.114			0.166		
Fisher's exact (p-value)	0.650			0.233		
<u>Production system</u>						
Agro-ecology	51	97	148	28	96	124
	87.9	88.2	88.1	73.7	88.1	84.4
Conventional	7	13	20	10	13	23
	12.1	11.8	11.9	26.3	11.9	15.7

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Appendix D. Distributions and Correlations

Table D.4 – Continued from previous page

	Women			Men		
	<i>No</i>	<i>Yes</i>	<i>Total</i>	<i>No</i>	<i>Yes</i>	<i>Total</i>
Total	58	110	168	38	109	147
	100	100	100	100	100	100
Pearson chi2	0.002			4.420**		
Cramer's V	-0.004			0.173		
Fisher's exact (p-value)	1.000			0.066		
<u>Access to water</u>						
No	12	14	26	3	19	22
	19.7	12.5	15.0	7.1	17.1	14.4
Yes	49	98	147	39	92	131
	80.3	87.5	85.0	92.9	82.9	85.6
Total	61	112	173	42	111	153
	100	100	100	100	100	100
Pearson chi2	1.591			2.462		
Cramer's V	0.096			-0.127		
Fisher's exact (p-value)	0.266			0.131		
<u>Access to technical assistance</u>						
No	53	83	136	20	40	60
	93.0	74.8	81.0	47.6	36.0	39.2
Yes	4	28	32	22	71	93
	7.0	25.2	19.1	52.4	64.0	60.8
Total	57	111	168	42	111	153
	100	100	100	100	100	100
Pearson chi2	8.097***			1.715		
Cramer's V	0.219			0.105		
Fisher's exact (p-value)	0.004			0.200		
<u>Access to credit</u>						
No	49	64	113	31	45	76
	81.7	57.7	66.1	73.8	40.5	49.7
Yes	11	47	58	11	66	77
	18.3	42.3	33.9	26.2	59.5	50.3
Total	60	111	171	42	111	153
	100	100	100	100	100	100
Pearson chi2	10.016***			13.490***		
Cramer's V	0.242			0.297		
Fisher's exact (p-value)	0.002			0.000		
<u>Women-only producer group</u>						
No	46	65	111			
	75.4	58.0	64.2			
Yes	15	47	62			
	24.6	42.0	35.8			
Total	61	112	173			
	100	100	100			
Pearson chi2	5.184**					
Cramer's V	0.173					

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Table D.4 – Continued from previous page

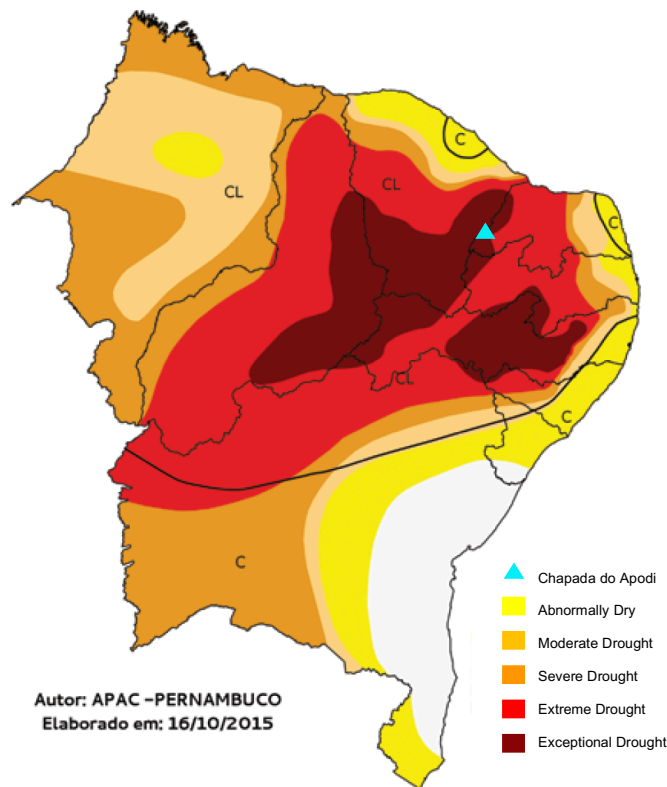
	Women			Men		
	<i>No</i>	<i>Yes</i>	<i>Total</i>	<i>No</i>	<i>Yes</i>	<i>Total</i>
Fisher's exact (p-value)	0.031					

Note: *Coeff.(SE) Robust standard errors in parentheses ***p < 0.01, **p < 0.05, *p < 0.10.

Appendix E

Climatological Conditions During the Fieldwork

Table 1 - Drought conditions during September 2015*



Note: (*) Beginning of data collection o the present study.

Table 2- Drought severity classification

Category	Description	Possible Impacts
S0	Abnormally Dry	Going into drought: <ul style="list-style-type: none"> • short-term dryness slowing planting, growth of crops or pastures Coming out of drought: <ul style="list-style-type: none"> • some lingering water deficits • pastures or crops not fully recovered
S1	Moderate Drought	<ul style="list-style-type: none"> • Some damage to crops, pastures • Streams, reservoirs, or wells low, some water shortages developing or imminent • Voluntary water-use restrictions requested
S2	Severe Drought	<ul style="list-style-type: none"> • Crop or pasture losses likely • Water shortages common • Water restrictions imposed
S3	Extreme Drought	<ul style="list-style-type: none"> • Major crop/pasture losses • Widespread water shortages or restrictions
S4	Exceptional Drought	<ul style="list-style-type: none"> • Exceptional and widespread crop/pasture losses • Shortages of water in reservoirs, streams, and wells creating water emergencies

Source: Adaptation National Drought Mitigation Center, Nebraska, USA.

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