

**Approaches to understanding and measuring women's empowerment and its relationship
with women's and children's dietary diversity in sub-Saharan Africa.**

by

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Author's Declaration

I hereby declare that I am the sole author of this thesis. This is a true copy of the thesis, including any required final revisions, as accepted by my examiners.

I understand that my thesis may be made electronically available to the public.

Abstract

Background

Women's empowerment has been identified as a key component of development policies since in many cases, there are existing and widening gender gaps in wellbeing including in access to improved nutrition especially in low-and-middle- income countries (LMICs). In addition, in many LMICs especially in those found in sub-Sahara Africa (SSA), there are existing gender-based barriers including norms, attitudes, and patriarchal societies that undermine the opportunities given to women. While there are many interventions, programmes, and field experiments that aim to redress these gender gaps in many LMICs, there is the need to understand and examine the concept and role of women's empowerment in access to welfare-improving inputs including improved dietary diversity for themselves and their children.

Study objective

To add to this growing literature, this thesis sought to examine the concept of women's empowerment and its relationship with women's and children's dietary diversity using a mixed-methods approach of qualitative focus group discussions (FGDs) and in-depth interviews (IDIs), and quantitative secondary data.

Methods

Studies 1 and 2 - For the qualitative studies, 89 married participants (64 women of reproductive age and 25 men) who were cohabiting with their spouses were recruited in Southeastern Nigeria in April, 2019. Of this number of women, 38 participated in IDIs while the rest took part in 2 FGDs of 13 participants each. The 25 men participated in 2 FGDs of 12 and 13 men respectively. In the IDIs, participants were grouped into two based on their primary economic activity. One group engaged only in farming and the other engaged in other economic activities (mainly hairdressing and food vending) in addition to farming. For the FGDs, men and women participants were recruited using a form of snowball sampling strategy from the IDIs participants and were also grouped according to their primary economic activity; namely farming only, or food trading as well as farming.

Study 1 reports findings from the IDIs and FGDs concerning the concept of empowerment and, in particular, women's empowerment using domains contained in two quantitative measures and one qualitative guideline. These measures were respectively; the Women's Empowerment in Agriculture Index (WEAI), the Survey-based Women's empOWERment (SWPER) index for women's empowerment in Africa, and the Food and Agriculture Organization guide to measuring women's empowerment and social protection. Men were recruited to permit gauging their perception of empowerment and women's empowerment.

Study 2 used IDIs to explore women's consumption of food items contained in the Minimum Dietary Diversity for women of reproductive age (MDD-W) measure and assessed important household dynamics that could influence food consumption decision-making.

Analyses for the IDIs and FGDs were done in excel and NVivo and followed the principle of constant comparison.

Studies 3 and 4: – Study 3 used secondary quantitative data from the Demographic and Health Surveys (conducted on 14,688 respondents) and Study 4 used the Feed the Future (on 10,041 respondents in the FTF) baseline studies. Data was extracted from each of the DHS and FTF for five sub-Sahara Africa countries (Mozambique, Rwanda, Malawi, Uganda, and Zambia). Study 3 explored the relationship between women's empowerment measured by the SWPER index (which

contains three domains of empowerment; *attitude towards violence, autonomy (social independence), and decision-making*) and children's dietary diversity measured by using the Infant and Young Children Dietary Diversity Score (IYCDDS). IYCDDS was the outcome of interest and was examined as a continuous and count variable while the seven food groups contained in it were treated as dichotomous variables (i.e. consumed or not consumed). Analyses were restricted to children between 6 and 23 months in line with the IYCDDS guidelines. The three domains of the SWPER index were examined as the key independent variables and other important demographic, economic, and geographic covariates were specified as controls. Interaction effects between the three SWPER domains of empowerment, gender of index child and wealth index were also explored to determine if women's empowerment has differential effects on IYCDDS for boys and girls, and based on women's socioeconomic status.

Study 4 examined the relationship between women's empowerment and women's dietary diversity using the FTF dataset. Empowerment was measured using the WEAI index which contains 10 indicators of empowerment within 5 broader domains of empowerment. The 10 indicators and the aggregate empowerment score were treated as key independent variables while Women's Dietary Diversity Score (WDDS) was treated as the outcome of interest. The WDDS was examined as a continuous and count variable and the food groups contained in the WDDs were also treated as dichotomous outcome variables. Analyses were restricted for women of reproductive age in line with the WDDS guidelines and those that engaged in agriculture in line with the WEAI index, and important demographic, economic, and geographic variables were specified as controls.

Ordinary least squares (OLS) regression verified with marginal effects from Poisson regression analyses were used for the continuous outcome variables and linear probability models (LPMs) verified with marginal effects from logistic regression analyses for the dichotomous outcome variables. Analyses of the two quantitative datasets were appropriately weighted and cluster-adjusted, and significance was established at 95% and 99% confidence intervals.

Findings

Study 1 findings suggest that local understanding of women's empowerment dynamics does not always resonate with external definitions and ideologies. Contextual factors play a significant role in determining the extent of positive effects of empowerment. It was challenging to identify a direct translation of "empowerment" into the local language with the same meaning when back-translated to English. Different local terminologies elicited different responses from participants with a gender divide where men pushed back on one particular local terminology. This suggests that terminologies used in presenting empowerment interventions might impact on their acceptance and success and make this a challenging term to use in cross-cultural and cross-country research.

Study 2 findings suggest that the consumption of nutrient-rich food groups, especially certain legumes, nuts and seed, flesh protein, and eggs, would benefit from improved women's economic empowerment, and the consumption of fruits and vegetables might benefit from improved agricultural practices in addition to economic empowerment. By contrast, staple food-items including grains and root-tubers that are consumed by all women irrespective of their income-earning status would not benefit so much. Dietary diversity is influenced by food production and purchase, where factors including seasonal variation in food production and prices are important determinants. Economic empowerment improved women's autonomy in food purchase and consumption. However, limited income restricted women from exhibiting full autonomy in consumption decisions and access.

Study 3 findings suggest that there were significant associations between women's autonomy and improved child's diet diversity in analyses pooled across five countries, and that Uganda and Zambia might account for these significant associations. There were no significant associations between the three domains of empowerment and improved IYCDs in Mozambique, Rwanda and Malawi. Results from Uganda suggested a differential impact for boys and girls where women's improved autonomy was protective for a female child's dietary diversity. Only Mozambique exhibited a significant positive association in the interaction between the domains of empowerment and wealth index. Findings suggest that women in poorer households who viewed violence as disempowering might practice improved dietary consumption for their children.

Findings also suggest that legumes, dairy and dairy products, and other vitamin A-rich fruits and vegetables account for the association between improved autonomy and IYCDs in the pooled analysis and that Uganda and Zambia might account for these significant associations.

These findings suggest that improvement in women's autonomy might confer the most dietary benefit for infant and young children through improved consumption of dairy and dairy products, grains and fruits and vegetables. However, these significant associations were only found in two (Uganda and Zambia) out of the five countries examined further suggesting that the benefits from improved autonomy on improved food consumption for infant and young children differs, and this difference in benefits also differ across countries.

Study 4 – Four empowerment indicators (autonomy, input in production decisions, empowerment in public speaking, and working less than 10.5 hours in a day) out of the 10 indicators used in the WEAI were positively and significantly associated with improved WDDS and food consumption in the pooled and disaggregated regression analyses. There were different significant associations between the four indicators of empowerment and women's food consumption in three out of the five countries examined (no significant associations were found in Malawi and Zambia).

Autonomy and input in production decisions were significantly associated with improved WDDS and findings suggest that Uganda and Rwanda might account for these associations. Autonomy in production was associated with the likelihood of consumption of grains and root-tubers, dairy and dairy products, flesh proteins and vitamin A-rich vegetables and fruits in Uganda. In Rwanda, input in production decisions was associated with the consumption of other fruits and vegetables including vitamin A-rich produce.

Empowerment in public speaking was significantly associated with improved WDDS and consumption of other fruits and vegetables in the pooled analyses and Mozambique and Rwanda might account for these significant associations. In Mozambique, empowerment in public speaking was associated the consumption of other vitamin A-rich fruits and vegetables and in Rwanda, empowerment in public speaking was associated with the consumption of grains/tubers, flesh protein, vitamin A-rich leafy greens, and other fruits and vegetables.

Non-excessive workload (i.e. working for less than 10.5 hours in 24 hours) was significantly but negatively associated with improved WDDS and Mozambique accounted for this association, where women who worked below 10.5 hours in a 24- hour cycle were less likely to consume flesh proteins.

The differential performance of the four indicators in the WEAI index further suggests that different empowerment strategies might confer different benefits towards consumption of different food items and these benefits might vary across countries.

In summary, this thesis found that local knowledge, perceptions and norms play a significant role in women's empowerment discourse and this will impact on how women's empowerment is conceptualised and how different empowerment measures perform. In addition, conceptualizing women's empowerment ought to be done in a manner that recognizes the multifaceted linkages between the different domains of empowerment and how they dictate women's participation in rural economic activities. Economic empowerment might be beneficial for the consumption of nutrient-dense food items including flesh proteins that are expensive for women to purchase, while autonomy, including in having input in production, might be beneficial for the consumption of nutrition-vital dairy and dairy products, fruits and vegetables for women and children. Leadership empowerment through empowerment in public speaking might be important for the consumption of grains and tubers and legumes in addition to nutrition-vital fruits and vegetables for women. However, these benefits might differ across different SSA countries.

Conclusion

Interpretation of the qualitative findings should be done with caution due to the limitations inherent in the study design including its limited generalisability. However, the qualitative studies contribute to a very limited area of knowledge and are the first to qualitatively examine two known measures of women's empowerment, and household-level dynamics between women's empowerment and food consumption. The quantitative studies are prone to limitations including recall bias of women's and children's food consumption and other retrospective data that rely on the memory of past events, however, the quantitative studies advance knowledge in the measurement and analyses of women's empowerment using two different but somewhat complementary measures of empowerment across multiple countries in two regions of sub-Saharan Africa. This enables a comparison of the performance of the two indexes in determining women's and children's dietary diversity.

This study provides a few key contributions to knowledge. Firstly, women's empowerment needs are diverse and largely context-specific: hence, local understanding of empowerment concepts and terms remains an important determinant of the rate of acceptance and successes of women's empowerment interventions in developing countries. Secondly, economic empowerment in the form of income earning improves women's consumption of certain food items including flesh proteins and some legumes, nuts and seeds, which are usually nutrient-rich and more expensive however, limited economic prospects for women still limit women from expressing full empowerment in food consumption. Thirdly, women's autonomy including in production is important for improving dietary diversity for women and children through the consumption of important products especially dairy, and vitamin A-rich fruits and vegetables. However, these benefits differ across countries examined. In addition, while empowerment in public speaking improved women's dietary diversity, it appears that women might have to work excessively to improve their dietary diversity since non-excessive workload reduced women's dietary diversity and consumption of flesh proteins. An overall observation is that an explanation of the variation in effect of women's empowerment measures in different country contexts, perhaps lies in the difficulty of measuring women's empowerment in a non-context-specific way.

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Dedication

I dedicate this thesis to the unwavering support of my parents, Profs Felix and Roseline Onah. My journey shows that anyone can reach beyond the stars with love, kindness, and support.

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Chapter 1

1.1. Introduction

There is a growing global interest in addressing gender disparities in economic development and access to opportunities including adequate food nutrition intake. This is linked to the recognition that redressing the wide gender gaps in all facets of human development will have a strong impact on global economic prosperity (World Bank Group, 2015). This perhaps contributed to the inclusion of gender equity as Goal 5 in the Sustainable Development Goals (Sachs, 2012). Females represent approximately 51% of the global population and can range from 49% to 59% in LMICs, and out of the global population of children, 86% are located in developing countries (WHO & UNICEF, 2012). However, women represent 60% of the chronically hungry and more than half of global child deaths are attributed to undernutrition with higher rates in developing countries (UNICEF, 2018; Women, 2015). Further disaggregation indicate that in developing countries, women are more disadvantaged in education and income-earning employment in rural areas, and when employed, they are more likely to hold seasonal jobs with little or no job security (Sachs, 2018).

The recognition that improving women's health and economic development, since they represent over 43% of agricultural labour workforce¹ in developing countries, has perhaps contributed to the increase in the number of social protection interventions that target women in rural settings (Kabeer, 2008; Razavi et al., 2012). The growth in these social interventions over the past decade can also be attributed, in part, to the realisation that improving the economic and human development of women has far-reaching positive effects on their households, children, and the broader

¹ See UN Women fact sheet available at <http://www.unwomen.org/en/news/in-focus/commission-on-the-status-of-women-2012/facts-and-figures>

economy (Ashraf et al., 2014; Duflo, 2012; Dupas, 2009; Fletschner & Kenney, 2014). In addition, many interventions that target children in developing countries are usually applied through women as primary caregivers (Ndaimani et al., 2018).

While there are many social protection interventions that primarily target women in LMICs (Briere, Hallman, & Quisumbing, 2003; Cohen et al., 2015; Duflo, 2012; Pettifor et al., 2016), evidence suggests that women are still restricted in their ability to take up services including improved nutrition, and social interventions due to social and economic barriers (Fletschner & Kenney, 2014; Kabear, 2001; Rehman, Moazzam, & Ansari, 2015). If the goal of development interventions is to better redress these existing gender gaps and address the barriers to uptake of services including wellbeing improving practices like nutrition, there is need for better understanding and measurement of gender empowerment.

There are numerous definitions of gender and households (Beaman & Dillon, 2012). For this thesis, gender is examined based on the definition proposed by the World Health Organisation (WHO) where gender connotes the “socially-constructed characteristics of women and men, including norms, roles and relationships of and between groups of women and men” (WHO, 2011, pg. 79). It is important to note that there are existing different definitions and identities of gender that fall beyond the binary male-female categories (Oakley, 2016) and while it is important to recognise these distinctions², this thesis focuses on the men-women and male-female distinctions and where women and men have self-identified as such in surveys used.

The United Nations considers a household to be “based on the arrangements made by persons,

² Gender, equity and human rights (WHO) (available at <http://www.who.int/gender-equity-rights/understanding/gender-definition/en/>)

individually or in groups, for providing themselves with food or other essentials for living” (United Nations, 1999, pg 6). This definition is broad enough to encompass different household structures that can be found in low-income settings.

1.2. Literature review

1.2.1. Conceptualizing women’s empowerment

There are many definitions of empowerment in the literature (Shaw,1994; Kabeer,1999; Moss, 2002; Mucedale, 2005; Alkire et al., 2013; Ibrahim & Alkire, 2007). Commonly cited definitions can be found in Kabeer (2001), Alsop, Bertelsen, and Holland (2006), Narayan-Parker (2005), and Alkire et al. (2013). Kabeer (2001) defined empowerment as expanding people’s ability to make strategic life choices, particularly in contexts in which this ability had been denied to them. Alsop et al. (2006, p10) described empowerment as “a group’s or individual’s capacity to make effective choices, that is, to make choices and then to transform those choices into desired actions and outcomes”. These definitions incorporate two key components: the concept of agency (the ability to act on behalf of what you value and have reason to value) as determined by Sen (1987) and a second component which relates to the institutional environment, which offers people the ability to exert agency fruitfully (Alkire et al., 2013; Alkire & Foster, 2011; Ibrahim & Alkire, 2007).

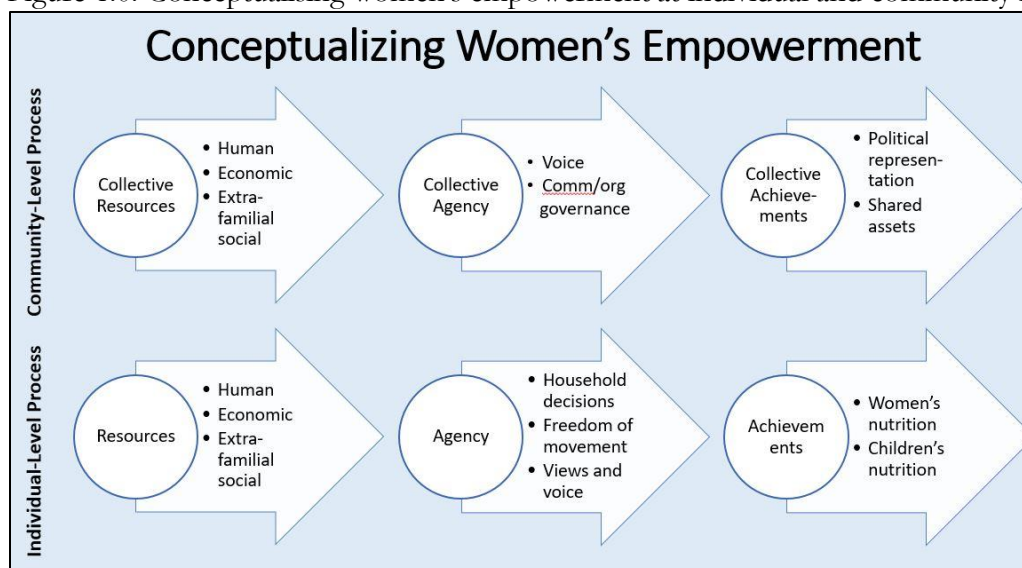
The concept of agency and ability to exert influence is linked to and perhaps is based on the theory of power in human relations. There are a few classical definition of power and Weber (1925, p. 212) considers power in two dimensions: as agency (the chance that an individual in a social relationship can achieve his or her own will even against the resistance of others) and as domination (the

probability that certain specific commands (or all commands) will be obeyed by a given group of persons). This definition is part of the early works that laid the foundation for understanding of the role of power in social interactions among social scientists (Bourdieu, 1979; Giddens, 1968; Wallimann et al., 1977; Wrong, 2017). Further, Giddens and Sutton (2017) argue that societal values that are attached to existing norms, including class, status, family, gender, and poverty, dictates how individuals are able to relate within households and societies. Bourdieu (1994) practicalised power in patriarchal societies to dictate how men and women should behave and conform to societal expectations. The definition of empowerment by Alsop et al. (2006) has close links with the discussions of power by Weber (1925) with similar definitions of agency, and domination closely linked to institutional environment.

For this study, the author has conceptualised women's empowerment using the framework proposed by Yount (2017). This framework is relevant to LMICs where there are norms and attitudes that limit women's wellbeing. Yount (2017) conceptualised women's empowerment based on the works of Kabeer (1999) and Mosedale (2005). The framework is published as a collaborative effort of the Consortium of International Agricultural Research Centers (CGIAR)'s Research Program on Agriculture for Nutrition and Health (A4NH) led by the International Food Policy Research Institute (IFPRI). This framework (Figure 1.1) conceptualises empowerment as a dynamic process where women acquire resources that enable them to develop "voice," that is, the capacity to articulate preferences, and agency, that is, the capacity to make decisions in an effort to fulfill their own aspirations. Within the voice and agency constructs, resources play a role including human resources such as schooling attainment, skill development, and self-efficacy; social resources such as participation in organizations, access to peer networks, and access to role models outside the family; and economic resources or material assets such as earnings, property, and land. These resources

determine the extent to which women can achieve and express agency both within and outside their households. Yount (2017), however, points out that these resources enable but do not automatically guarantee empowerment since there are structural and normative dynamics within the broader environment in which girls and women exist. Theoretically, a woman's ability to become empowered at the individual level depends on the environment in which she lives. If she is living in a very disempowered community, it would be difficult for her to gain access to the resources to develop voice and agency.

Figure 1.0: Conceptualising women's empowerment at individual and community levels



Source: CGIAR interview with Kathryn Yount (available at <http://a4nh.cgiar.org/2017/05/01/a-framework-for-measuring-womens-empowerment-at-multiple-levels/>)

To examine voice and agency, several indicators are examined in the literature as proxies for women's empowerment. These indicators include women's influence and participation in decisions at the household and expanded family levels, women's attitudes about gender-related issues including violence, women's willingness to voice attitudes that differ from the norm in the community, husbands' control over women, and women's ability to move freely in public and private spaces. As identified by Yount, VanderEnde, Dodell, and Cheong (2016), these are important process indicators that can illustrate the degree of individual's empowerment within and

outside households. While individual and community level empowerment needs may differ or overlap across different domains, the framework as proposed by Yount (2017) allows for comparative but also intensive, context-specific measurement of women's empowerment. At the household-level, gender differences in key factors including income-earning power (Sen, 1990) have been identified as important factors that inhibit or facilitate individuals' ability to express agency, autonomy, and empowerment both within and outside households (Kieran, Sproule, Doss, Quisumbing, & Kim, 2015; Majlesi, 2016).

1.2.2. Gender inequality, women's empowerment and health, economic production, nutrition, and human development

Existing evidence suggests strong linkages between gender inequality, nutrition and dietary diversity for women and children especially in LMICs (Backstrand et al., 1997; Mkandawire et al., 2018; Peterman et al., 2019; Sekabira & Qaim, 2017; A. Sen, 2001; Sinha et al., 2017). The studies cited above suggest that gender inequality affects women's and children's nutrition and dietary diversity by (1) restricting women's access to resources that can potentially improve their dietary intake and that of their children, and (2) perpetuating gender biases that could influence female and male food consumption within households. The unit or level of analyses impact on how gender inequality is measured and also the role of empowerment in improving important nutrition, health, and development outcomes. Using the Gender Inequality Index (GII) across 96 developing countries, Marphatia et. al. (2016) found that gender inequality at the macro-level explained about 10% of the variance in wasting and stunting, suggesting that reducing GII could lead to major reductions in child malnutrition in LMICs. In Bangladesh, Pitt, Rosenzweig, Hassan (1990) found that although linked to economic activities, there were gender differences in calorie intake within households which has implications for dietary diversity and nutrition outcomes. In rural Nepal, Harris-Fry et al. (2018) found that due to unequal earning power and socioeconomic status, women receive

inequitably lower shares of food and nutrients relative to men. In contrast to a study by Svedberg (1990), using updated datasets, Klasen (1996) found evidence of a rising anti-female bias in sub-Saharan Africa in food consumption and nutrition outcomes. These studies suggest that such gender inequalities which result in a gap in socioeconomic status between men and women and between boys and girls have far-reaching effects on women's and children's dietary diversity and nutrition outcomes.

In a bid to redress the wide gender and sex inequality in nutrition, health, and development, efforts have been made to improve women's access to and participation in activities that have the potential to improve their wellbeing (Mitra & Singh, 2007; Osmani, 1998). Social development outcomes including equal access to education, have been identified as a potential opportunity for improving women's welfare and economic opportunities with positive cross-sectoral synergies including health status, since women who are more educated have been shown to have better knowledge and access to both preventive and curative healthcare (Fletcher & Frisvold, 2009; Raghupathy, 1996). In addition, better gender and sex equality in educational attainment has been shown to be linked to improved economic growth and wellbeing at micro and macro levels (Benos & Zotou, 2014; Klasen, 2002; Psacharopoulos & Schultz, 1984).

For instance, Sen (1990) found that a woman's socioeconomic status (SES) is a determinant of her ability to express agency by participating in decision-making activities both within and outside the household and that this can be improved with better access to income-generating activities. This is in line with findings from other studies which have shown that women with improved socioeconomic indicators have the potential of improving their agency within households as expressed through their ability to participate in decision making in domains that affect their agency

(Ashraf, 2009; Lundberg, 2008), health (Hou & Ma, 2013; Onah & Horton, 2018; Speizer, Story, & Singh, 2014), and development (Bove & Vallengia, 2009; Majlesi, 2016).

Dupas (2009) using an experimental design in rural Kenya found that although the demand for long lasting insecticide treated bednets (LL-ITNs) was price-sensitive, giving out vouchers for LL-ITNs in the presence of both male and female household heads increased uptake by about seven percent when compared to targeting either of them alone. This illustrates the benefits of joint decision-making (an indication of improved agency for women, given that women are disadvantaged by unitary decision-making that favours men) on uptake of preventive healthcare. In addition, they found that targeting female household heads increased the probability that a child would sleep under a bednet, suggesting that women are more likely to share, or report shared bed net use with a child than men. By contrast, in rural Zambia, Ashraf et al. (2014) using a field experiment found that uptake of concealable contraceptives (injectables) was higher among the individual women treatment arm when compared to the couple treatment arm. They also found that hiding contraceptive vouchers from disapproving husbands alone explains 60-85% of the estimated treatment effect. This illustrates the effects of women's agency in uptake of health services, including contraception. This indicates that the context of the type of preventive or curative healthcare services being sought is important.

As discussed, a key strategy to improve on gender inequality and diet quality is through empowering women. The role of women's empowerment in improving women's and children's development outcomes, including diet quality, have gained increased focus in the past decade. Malapit and Quisumbing (2015,) using data from Ghana that applied the Women Empowerment in Agriculture Index (WEAI), found that women's empowerment is more strongly associated with diet quality than

with nutrition status for women and their children. Further, they found that different domains of women's empowerment have different impacts on nutrition. Na, Jennings, Talegawkar, and Ahmed (2015) using the Demographic and Health Surveys (DHS) across 10 sub-Saharan Africa (SSA) countries found that the likelihood of women meeting the recommended minimum dietary diversity for infants and children increases with economic and overall empowerment for women.

The Grameen Bank experiment on empowerment of women through credit is one of the many known microfinance programmes that target rural women in LMICs (Osmani, 1998). One of the main findings of the intervention was that even in patriarchal societies, improving women's access to economic enablers, including finances, has far-reaching positive effects on human capital development (education, employment opportunities), and economic growth (income generation, and savings for investment). Other interventions have found similar effects of women's empowerment on economic and human development (Narasimhan, 1999; Swain & Wallentin, 2009; Wiig, 2013).

Beath, Christa, and Enikolopov (2013) found that in conflict settings in Afghanistan with its historical conservative views on gender norms and attitudes, development programmes that mandate women's participation in community leadership and economic and social activities improved women's mobility and income generation. Still, such programmes were not effective in changing entrenched gender roles such as in intra-household decision-making or general attitudes towards women's roles in the society. These norms and attitudes were found to predate the prevailing insecurity in the country.

A key focus of women's empowerment initiatives is to improve food consumption adequacy and nutritional diversity for women and children. This is informed by empirical evidence which suggested that disempowered women tend to have restricted access to adequate food and nutrition

for themselves and their children (Afshar, 2016; Emerson, Strong, Colantuoni, Caulfield, & Doocy, 2017; Malapit, Kadiyala, Quisumbing, Cunningham, & Tyagi, 2015).

In Nepal, Malapit et al. (2015) found that women's empowerment mitigates the negative effect of low production diversity on maternal and child dietary diversity and height-for-age scores. Further, they found that while improved production diversity is positively associated with maternal and child dietary diversity, and weight-for-height z-scores, women's group membership, control over income, reduced workload, and overall empowerment were positively associated with better maternal nutrition. Using data pooled from 49 developing countries, Burroway (2017) found that women's employment provides different effects on nutrition outcomes. While agricultural jobs are associated with increased stunting, professional, clerical, sales, and domestic jobs are associated with reduced stunting. Also, a review study by Johnston et al. (2015) found that time spent in agriculture especially by women competes with time needed for resting, childcare, and food preparation and can have unintended negative consequences for nutrition.

These studies provide evidence of the diverse and positive link between women's empowerment and nutritional diversity. However, most of these studies are based on quantitative data highlighting the need for more qualitative investigation of women's empowerment. Lemke et al. (2013) contends that intricate dynamics within households including effects of gender and intra-household relations, social networks and income from informal sector activities on women's dietary diversity, are often not uncovered by conventional statistical methods. Qualitative research can reveal the unexpected and furthermore empower people, as their voices are heard.

In conclusion, it is important to note that many review studies have found a somewhat varied evidence on the effects of interventions that aim to improve women's empowerment (Duvendack & Palmer-Jones, 2011; Stewart et al., 2012; Stewart, van Rooyen, Dickson, Majoro, & de Wet, 2010;

Vaessen et al., 2014). These review studies suggest that there appears to be a gap between the often optimistic (societal) belief in the capacity of empowerment initiatives, especially economic empowerment, to ameliorate the position of women in decision-making processes within the household. This perhaps suggests that there is need to understand women's empowerment in order to add value to interventions that target women. In addition, indicators that have been identified as having the potential for bridging the wide gender inequality gaps can be better understood and made more efficient by better awareness of the systemic nature of gender dynamics and the role of women's empowerment in redressing these inequalities. This begs the question about how women's empowerment could be further measured and understood.

1.2.3. Measurement of women's empowerment

To better understand the role of women's empowerment in bridging prevailing gender gaps and the relationship between women's empowerment and key human development indicators, analyses that goes beyond macro-level estimates are warranted. Analyses at the macro-level using measures including the GDI and GII will provide estimates that do not adequately capture micro- or household-level gender gaps and dynamics where women's empowerment could play an important positive role. Hence, while macro-level analyses could provide national-level estimates which are important in cross-country comparisons, the intricate nature of gender inequality and the role of women's empowerment in bridging this gender gap would be best understood through household-level exploration. Using the household as the unit of analysis, different approaches have been used to examine differences between men and women within and across households. Researchers have examined the differences in wellbeing across households based on the gender of the household head (Buvinic & Gupta, 1997; Onah & Govender, 2014; Zhan & Sherraden, 2003). Researchers have also found that while households headed by a woman might be of a lower socioeconomic status in many

countries, within these households, there is greater equality between males and females when access to key welfare (education and healthcare) indicators are examined (Johnson & Rogers, 1993; Montoya & Teixeira, 2017). Chant (2003) in her work on female household headship and the feminisation of poverty, argues that what should be of more importance in gender-related research are the existing inequalities within household structures and not the differences in indicators across households based on the gender of the household head. This is also in line with the findings of Onah and Horton (2018), where sex is a major contributing factor to individuals' access to household resources and healthcare utilisation.

The realisation of the importance of focusing more on intra-household gender dynamics and the growth in literature on household-level social conflict models as against unitary models (see Bove & Valeggia, 2009; Kabeer, 2001; A. K. Sen, 1990; Wilson, 1991) has resulted in somewhat of a shift in the evaluation and measurement of women's empowerment. Many routinized cross-country standardized and nationally representative surveys, including the Multiple Indicator Cluster Surveys (UNICEF, 2000) and the Demographic and Health Surveys (DHS, 2008) now have modules or questions that examine women's empowerment indicators (including women participation in decision-making, access to education and other socioeconomic indicators, attitude and perception of domestic violence, and asset ownership). These embedded questions are now used in many cross-country analyses to examine trends, determinants, and causal effects of women's empowerment and key welfare indicators (including health, economic, and social indicators) (Grépin & Bharadwaj, 2015; Osamor & Grady, 2016). These surveys, however, are predominantly conducted in LMICs, hence nationally representative cross-country measures that can provide information on gender inequality and empowerment are lacking in many upper-middle-and-high income countries.

The United Nations Development Programme in the 1995 Human Development Report (HDR), introduced the Gender Development Index (GDI) as a derivative of the Human Development Index (HDI) (UNDP, 1999). The GDI was developed out of the need to have national-level gender inequality scores across life expectancy, education, and incomes indicators (Sen, 1994). For life expectancy, the GDI assumes (arbitrarily) that women live an average of five years longer than men and for income, the GDI considers gaps in income in terms of actual earned income (Klasen, 2006). As a derivative of the HDI, the GDI cannot be used independently from the HDI, that is, it cannot be used on its own as an indicator of gender-gaps. Only the gap between the HDI and the GDI can actually be accurately considered hence, the GDI on its own is not an independent measure of gender-gaps (Klasen & Schüler, 2011). The GDI has been used extensively to illustrate gender gaps in key development indicators across developing and developed countries (for examples, see Charmes & Wieringa, 2003; Morse, 2015; White, 1997). Based on the shortcomings identified in the construction of the GDI, including issues about lack of availability of data to feed into the index, reliability and uniformity issues, and adjustment weights used for life-expectancy and income-gaps (Dijkstra & Hanmer, 2000; Schüler, 2006), an alternative index (the Gender Inequality Index [GII]) was developed in 2010 to examine gender inequality across three domains (reproductive health, empowerment, and labour market participation) (UNDP, 2010). While the GDI and GII have the potential to provide macro-level estimates that can be used to compare gender inequality across countries, the indexes are not survey-based, but are measured at the macro-level, hence cannot be measured at household level or used to assess the effect of interventions that aim to ameliorate the effects of gender inequality at micro-levels. To enable researchers and development specialist to achieve a better understanding of household-level dynamics, there is need to examine and understand household-level gender inequality and the role of women's empowerment in redressing these prevalent gender gaps.

There has been an increase in evaluations and research using different tools and measures in the bid to better grasp how women's empowerment and agency dictate women's participation in economic activities and access to services including finance, nutrition, and healthcare at household and community levels (Alkire et al., 2013; Amin & Becker, 1998; Ewerling et al., 2017; Galiè, Teufel, Korir, et al., 2019; Lemke et al., 2003; R. S. Meinzen-Dick et al., 2017; Vaz et al., 2016). These measures have been used to examine correlations and associations between women's empowerment and key indicators including health and economic outcomes. Two of these measures, the Women Empowerment in Agriculture Index (WEAI) (Alkire et al., 2013) and the Survey-based Women's emPOWERment (SWPER) index for women's empowerment in Africa (Ewerling et al., 2017) are examined in this thesis and are discussed in detail in subsequent chapters.

Qualitative studies have been used in two ways in women's empowerment studies. Firstly, they have been used to understand how welfare-improving interventions empower women, and secondly, to measure and examine in-depth, the intricate nature of women's empowerment (Amin & Becker, 1998; Brody et al., 2015; Kabeer, 1999; Kim et al., 2007; Logie & Daniel, 2016; Mayoux, 1998; Meinzen-Dick, Rubin, Elias, Mulema, & Myers, 2019). Qualitative studies have usually been employed to complement quantitative studies by providing more nuanced contextual information that adds value to the limitations inherent in quantitative studies. For instance, in rural Bangladesh, Amin and Becker (1998) using in-depth interviews (IDIs) and focus group discussions (FGDs) found subtle but persisting benefits of providing women with credit facilities through the formation of women groups and non-governmental organisations (NGOs). In addition to having access to crucial financial services, women spoke of their perceived improvement in equality rights with men

as expressed through their ability to form organisations, socialise, and support each other. Women also spoke on how better access to loan facilities also enabled them to pool financial resources together, which improved their ability to purchase capital-intensive agricultural inputs without worrying about the stifling conditions they have been exposed to through informal money lenders. Using a mixed- methods approach, Kim et al. (2007) found that combining microcredit with awareness and training on gender-based violence improved women's ability to challenge the acceptability of gender-based violence and agency to leave abusive relationships in rural South Africa. These findings albeit unquantifiable, complement the findings of the quantitative studies by providing some subjective in-depth information on the effect of women's empowerment.

Evidence on the use of qualitative methods to assess women's empowerment strategies has been concentrated predominantly in Southeast Asia (Bhargavi, 2011; Datta & Gailey, 2012; Kabeer, 2011; Knowles, 2014; Kumari, 2011) with comparatively fewer studies in sub-Sahara Africa (R. S. Meinzen-Dick et al., 2019; Mercer, 2002; Price et al., 2018). In a systematic review of qualitative studies that have investigated the effects of economic self-help programmes and women's empowerment in developing countries, Brody et al. (2015) drew findings from twenty-one programmes in Southeast Asia and one programme in sub-Saharan Africa. They found evidence of improvement in various empowerment domains due to these programmes. The domains included psychological empowerment (perception of improved capability to speak in front of extended family members, authorities and community leaders, and ability to participate in household decision making and in dispute resolution), social empowerment (ability to establish networks beyond the household and also to support each other through solidarity), economic empowerment (through gaining transferable financial skills including account management), and political empowerment (through

their perception of being part of a catalyst for societal change, and better understanding of the political context within their environment). In rural Tanzania, using focus- group discussions among women that participated in livestock production, Price, Galie, Marshall, and Agu (2018) found that participants related disempowerment and lack of income with lack of autonomy and reliance on male spouses for financial support and that this could lead to poor diet quality especially when women are married to irresponsible male spouses. Also in rural South Africa, Lemke et al. (2003) found that rural poor unemployed women who relied on the male spouses and sons for financial support faced significant financial barriers to improved food and nutrition security for themselves and children within their households. However, they relied on social networks for better access to food items.

These qualitative studies provided an opportunity for an in-depth probing of the complex and multi-faceted nature of women empowerment across different domains that complement evidence from quantitative studies. However, the role of qualitative studies in the measurement of women's empowerment and understanding of empowerment needs of women has not been adequately developed as ascertained by Kabeer (2011). This calls for more research on investigating the role and usability of qualitative research in the assessment of women's empowerment. The FAO developed a guide for qualitatively examining women's empowerment (Pavanello et. al., 2015) however, I could not find any existing study that has applied this guide.

1.2.4. Dietary diversity

According to the Food and Agriculture Organization (FAO) of the United Nations, dietary diversity is defined as “.....a qualitative measure of food consumption that reflects household access to a variety of foods, and it is also used as a proxy for nutrient adequacy of the diet of

individuals...”(FAO, 2011, p. 77). Different foods and food groups are good sources for various macro- and micronutrients, and so a diverse diet best ensures nutrient adequacy. The principle of dietary diversity is embedded in evidence-based healthy diet patterns, such as the Mediterranean diet and the “DASH” diet (Dietary Approaches to Stop Hypertension), and is affirmed in all national food-based dietary guidelines (Honfoga & van den Boom, 2003; Sacks et al., 2001). The World Health Organization (WHO) notes that a healthy diet contains fruits, vegetables, legumes, nuts and whole grains. A diverse diet is most likely to meet both known and as yet unknown needs for human health (WHO, 2003).

The importance of dietary diversity stems from the suggestion that a diverse diet would most likely help an individual to meet both known and unknown human nutrition and health needs. This can be achieved through improved consumption of known essential nutrients including proteins, important fatty acids, vitamins and mineral requirements, and a wide range of other bioactive compounds that are still being discovered (Ruel, 2003; Ruel et al., 2010, 2013). For instance, evidence suggests that improved dietary diversity is essential for improved nutrition outcomes (Onyango, 2003; Warren et al., 2015) and food security (Hoddinott & Yohannes, 2002). Dietary diversity is examined as a score of the number of food groups consumed with varying recall period (ranges from 24 hours to seven or 30 days). There are numerous measures of dietary diversity for women and children. For this thesis, three measures proposed by the FAO have been used, the Women’s Dietary Diversity Scores (WDDS) (Kennedy et al., 2011), the Minimum Dietary Diversity for Women of reproductive age (MDD-W), and the Infant and Young Children Dietary Diversity Score (IYCD) (FAO, 2013). Dietary diversity scores are meant to reflect, in a snapshot form, the economic ability of a household to access a variety of foods. Studies have shown that an increase in dietary diversity is associated with socio-economic status and household food security (household energy availability) which is

linked to development and social wellbeing (especially for vulnerable groups incl. children and women of reproductive age) (Hatloy, Hallund, Diarra, & Oshaug, 2000; Hoddinott & Yohannes, 2002). Numerous studies have examined the determinants of infant and young children's feeding practices and a recent systematic review by Santoso et al. (2019) found the effective size of women's empowerment and children's dietary diversity to be 0.04 food groups.

Women's Dietary Diversity Score (WDDS) and the Minimum Dietary Diversity (MDD-W) measure : The WDDS (Kennedy et al., 2011) was developed based on the results from the Women's Dietary Diversity Project (Arimond et al., 2010). The WDDS is used to score the consumption of nine food groups for women aged 15-49 years. The food groups include; (1) Grains and root tubers; (2) Legumes, nuts, and seeds; (3) Organ meat; (4) Dairy and diary products; (5) Animal meat; (6) Eggs; (7) Dark green leafy vegetables; (8) Other vitamin A-rich fruits and vegetables; (9) Other vegetables and fruits. The mean score for women 15–49 years of age can be used as a proxy indicator for higher micronutrient adequacy, one important dimension of diet quality. WDDS can be generated from population-based surveys. The WDDS was subsequently updated into the MDD-W by separating legumes, nuts, and seeds into two food groups: legumes, and nuts and seeds, and by also subsuming organ meat into animal meat food group (FAO and FHI 360, 2016). The WDDS is constructed as a count variable where improvements in dietary diversity are examined as increases in diversity scores whereas, while the MDD-W is also constructed as a count variable, there is a cut-off point (minimum of 4 food groups) and women can be categorised to either meet the minimum dietary diversity cut-off or not. This results in a different types of statistical analysis that can be performed with the two dietary diversity measures for women of reproductive age.

Infant and Young Children Dietary Diversity Score (IYCDDS): The infant and young child minimum dietary diversity score (IYCDDS) score is a diet quality indicator designed by the World Health Organization (WHO) to assess complementary infant and young child feeding (IYCF) practices among children 6-23 months old. This indicator is one of eight IYCF indicators developed by the WHO to provide simple, valid, and reliable metrics for assessing IYCF practices at the population level (WHO, 2008). The infant and young children minimum dietary diversity (IYCMDD) is a derivative of the IYCDDS where infants and young children (size to 23 months) are categorised as meeting the dietary diversity threshold of consuming four (or five) out of seven (or eight) food groups depending on the number of food groups used in the past 24 hours. The food groups include; (1) Grains, roots, & tubers; (2) Legumes and nuts; (3) Dairy products; (4) Flesh foods; (5) Eggs; (6) Vitamin-A rich fruits & vegetables; (7); Other fruits & vegetables; and more recently (8) Breastmilk. IYCDDS examines dietary diversity as a mean score of food groups consumed in the past 24 hours and can be useful in capturing a population-level picture of infant and young child diet quality and the adoption of appropriate complementary feeding practices (Howlader et al., 2012). The IYCDDS is parallel to the WDDS and has been used to examine dietary diversity and nutrition adequacy in numerous studies (Aemro, Mesele, Birhanu, & Atenafu, 2013; Malapit & Quisumbing, 2015; Sraboni, Malapit, Quisumbing, & Ahmed, 2014). Examining dietary diversity as a score avoids the methodological problems raised by using cut-off points in establishing diet quality. These problems include the arbitrary nature of cut-off points and the possibility of throwing out important information contained in dietary diversity scores. Similar to the WDDS, the IYCDDS is constructed as a count variable, whereas the IYCMDD categorises infants and young children as meeting the minimum dietary diversity or not.

The WDDS and IYCMDD were the primary outcome measures for the quantitative analysis while the MDD-W was explored in the qualitative study. I could not update the WDDS into the MDD-W in the quantitative study due to data restrictions since the WDDS was already calculated in the datasets used.

1.2.5. Summary of literature review

This literature review suggests two areas of research for this thesis. First, there is the need for more analyses of available secondary data that have been developed and applied in investigating women's empowerment, and how these indexes are related to women's and children's food consumption. Second, there is the need to qualitatively examine women's empowerment across known domains and indicators of empowerment. A more systematic approach of including qualitative research to examining women's empowerment could potentially aid in a better understanding of the varied nature of women's empowerment and the role of contextual factors. This could shed more light into why different quantitative measures of empowerment produce varied results and why the same measures also produce varied results across different settings. Applying qualitative methods to not only evaluating women's empowerment interventions but also to understanding the complex nature of women's empowerment, independent of empowerment interventions and programmes is most important in SSA where there are existing gaps in the exploration of women's empowerment domains, and its relationship with women's and children's dietary diversity using quantitative and qualitative means.

1.3. Study objectives

The main study objective is to examine the performance of two measures of women's empowerment in determining the relationship between women's empowerment and dietary practices in six sub-Saharan Africa countries. Sub-questions include:

- I. To examine qualitatively in a rural African context, the domains of women's empowerment, using the broad domains obtained in the WEAI and SWPER measures and in the FAO qualitative guide for investigating women's empowerment.
- II. To qualitatively examine how these domains influence (or not) women's nutrition practices in a rural African context.
- III. To examine the relationship between women's empowerment and children's dietary diversity, using the Survey-based Women's emPowERment (SWPER) index in the same five sub-Saharan African countries examined in objective two.
- IV. To ascertain the relationship between women's empowerment and women's dietary practices (dietary diversity), using the Women Empowerment in Agriculture Index (WEAI) in five sub-Saharan African countries.

1.4. Summary of thesis chapters

In addition to the present chapter that provides a literature review of women's empowerment and women's and children's dietary diversity, there are five additional chapters as follows; (1)

Understanding women's empowerment; qualitative exploration of empowerment domains (Chapter 2); (2)

Qualitative exploration of the dynamics of women's dietary diversity: How much does economic empowerment matter?

(Chapter 3); (3) *Examining the relationship between women's empowerment and children's dietary diversity across 5 sub-Saharan Africa countries* (Chapter 4); (4) *What empowerment indicators are important for food consumption for women? Evidence from 5 sub-Saharan African countries* (Chapter 5); and (5) A concluding chapter which

provides a summary of the findings from chapters two to five (Chapter 6) and highlights the contributions of the thesis, and its implications for future research and for policy.

Specifically, chapter 2 examines the concept and domains of empowerment in Nigeria using focus group discussions (FGDs) among women of reproductive age and men who were married, engaged in agricultural activities and residing in a rural setting. Men were recruited as part of the study for all-male FGDs to enable an in-depth probe of their perceptions and understanding of empowerment and women's empowerment. Participants were recruited across two prevailing socioeconomic groups based on their primary economic activity. These groupings were; (1) women and men who engaged in farming activities only; and (2) women and men who engaged in other economic activities in addition to farming. A hybrid thematic analyses was performed using a mix of an inductive and deductive approach (Fereday & Muir-Cochrane, 2006).

Chapter 3 also in Nigeria, examines women's negotiation of access to household food resources in a bid to diversify their diets based on their primary economic activity. Married women of reproductive

age who engaged in two different economic activities as described in chapter 2 were recruited where the dynamics of food availability, costs, and consumption were explored. In-depth interviews (IDIs) were used to develop a roster of food items consumed over a week through household production and market purchase. This study also explored food items that were considered expensive and frequency of their consumption, and food items that women require permission to consume and frequency of permission sought. Analyses also followed an inductive and deductive approach.

Chapter 4 examines the relationship between women's empowerment and dietary diversity for an index child in households where the female primary caregiver was married and cohabiting with her male spouse. This study used the latest demographic and health survey (DHS) data rounds from five sub-Saharan African countries (Mozambique, Rwanda, Uganda, Zambia, and Malawi) and women's empowerment was measured using the SWPER index (Ewerling et al., 2017). Ordinary least squares (OLS) and linear probability models (LPMs) regression analyses were used to examine children's dietary diversity as an outcome variable with the domains of the SWPER index treated as the key independent variables. Other important covariates including demographic, socioeconomic, and geographical variables were used as control variables. Interaction effects between the different domains of empowerment with gender of the index child and women's socioeconomic status (wealth index) were also examined. Analysis was adequately weighted and controlled for cluster design effects.

Chapter 5 examines the relationship between women's empowerment and women's dietary diversity using the WEAI index. Data were extracted from the Feed the Future (FTF) study across the same five SSA countries examined in chapter 4. Women's food consumption as contained in the WDDS was used as the primary outcome of interest, while the 10 indicators within the five domains of

empowerment in the WEAI were used as key independent variables. Important covariates including demographic, socioeconomic, and geographical variables were used as control variables. Analyses were also adequately weighted and cluster-adjusted, and OLS and LPM regression models were specified.

For the quantitative study, the five countries were chosen as focal countries since the study objective focused on sub-Saharan Africa and those countries have available DHS and FTF data. Children's dietary diversity was chosen as an outcome of interest in the SWPER study using the DHS due to data availability since the DHS does not collect information on women's dietary diversity. Women's dietary diversity was chosen as the outcome of interest in the WEAI study since information on children's dietary diversity was only available in one out of the five focal countries. For the qualitative study, Nigeria was chosen due to its location in west Africa which has not received similar attention in women's empowerment studies, and also because the doctoral candidate is from the country and hence is familiar with local languages, norms, and perceptions in the country.

Chapter 6 summarises the thesis findings, identifies crucial additions to literature and provides research and policy recommendations where found.

Chapter 2

Understanding women’s empowerment; qualitative exploration of empowerment domains.

2.1. Abstract

This study qualitatively explored the conceptualization of women’s empowerment using six domains of empowerment extracted from three measures: two quantitative measures, (Women’s Empowerment in Agriculture Index and Survey-based Women's emPowERment index for women's empowerment in Africa) and one qualitative guideline (Food and Agriculture Organization guide to measuring women’s empowerment and social protection). Sixty-four married women of reproductive age across two socioeconomic groupings in south-eastern Nigeria participated in in-depth interviews (38 IDIs) and focus group discussions (2 FGDs) in April 2019. Twenty-five married men across two socioeconomic groupings participated in 2 FGDs to permit gauging their perception of women’s empowerment. Findings suggest that local understanding of women’s empowerment dynamics does not always resonate with external definitions and ideologies. Contextual factors play a significant role in determining the extent of positive effects from empowerment. It was challenging to identify a direct translation of “empowerment” into the local language with the same meaning when back-translated to English. Different local terminologies elicited different responses from participants with a gender divide where men pushed back on one local terminology. This suggests that terminologies used in presenting empowerment interventions impact on its acceptance and success.

Key words: Nigeria; women’s empowerment; empowerment domains; qualitative exploration; local attitudes.

2.2. Introduction

The need for better understanding of women's empowerment stems from the identification of women's empowerment as a key component of development policies. Evidence suggests that improving the economic and human development of women through empowerment has far-reaching positive effects on their households, children, and the broader economy (Ashraf et al., 2014; Duflo, 2012; Dupas, 2009; Fletschner & Kenney, 2014; Wouterse, 2017). It is not surprising that many social protection interventions target women since women represent over 43% of agricultural labor workforce in developing nations and hence, a key demographic for rural economic development (UN Women, 2012). This has made women's empowerment to be considered a crucial tool in efforts to improve rural economies in developing countries and perhaps explains its inclusion as a goal in the Sustainable Development Goal of the United Nations (Sachs, 2012).

Better conceptualization and operationalization of women's empowerment have led to improvements in the understanding of the role of empowerment in human development (Duflo, 2012). To examine empowerment, many quantitative measures have been developed, in English, to operationalize and conceptualize women's empowerment (see Alkire et al., 2013; Amin & Becker, 1998; Ewerling et al., 2017; Lemke, Vorster, van Rensburg, & Ziche, 2003; Meinzen-Dick et al., 2017; Meinzen-Dick, Rubin, Elias, Mulema, & Myers, 2019; Miedema, Haardörfer, Girard, & Yount, 2018; Vaz, Pratley, & Alkire, 2016), and many have been contested and debated (see Garcia & Wanner, 2017; R. Meinzen-Dick & Quisumbing, 2018; Raj, 2017; Richardson, 2018; K. M. Yount, Peterman, & Cheong, 2018). However, the role of qualitative research and its contribution to the development of a better understanding of the concepts of women's empowerment especially in local contexts have not received similar or adequate attention. This is important since a majority of

empowerment initiatives target women that are in low-and-middle income countries (LMICs) where English is not the primary language of communication hence, empowerment measures are often translated into local languages. This suggests the need for a more in-depth exploration of women's empowerment concepts, indicators, and domains in local contexts where empowerment terminologies should be translated into local terms to examine its usability, understanding and operationalizability.

The literature on the differences in economic and health outcomes of households based on the gender of the head builds on older literature when less data was available that explored differences in household behaviour according to the gender of the household head. This perhaps resulted in the abandonment of the gender of the household head as a key determinant of individuals' outcomes for a more in-depth understanding of male-female differences within households since evidence suggests that what should be of interest is on how males and females negotiate access to household resources (Budlender, 2003; Chant & Campling, 1997). This is also in line with the shift from the unitary household model (where households are believed to act in a collective manner) to the more developmentally-relevant household cooperative conflict model (where individuals use personal gains to negotiate access to household resources). This shift highlights the crucial role of women's empowerment in improving women's ability to access and utilise household resources (Chant, 2003; Chant & Campling, 1997; Sen, 1990, 2001). Qualitative exploration would enable an in-depth investigation of where women experience barriers to economic and social wellbeing, and perhaps highlight how empowerment can address these barriers and bridge gender gaps especially in LMICs.

A few qualitative studies have made an attempt to examine women's empowerment in its own right and as part of development outcomes in a bid to understand the operationalization and development of a more nuanced measure of women's empowerment (Akter et al., 2017; R. S. Meinzen-Dick et al., 2019; Price et al., 2018; Sara Pavanello, Pamela Pozarny, Ana Paula de la O Campos, 2015). Akter et al. (2017) and Meinzen-Dick et al. (2019) gained qualitative insights into women's empowerment in agriculture by exploring in-depth the "Women's Empowerment in Agriculture Index (WEAI)" (Alkire et al., 2013). The WEAI was designed as a monitoring and evaluation tool for the U.S. government's Feed the Future initiative to capture women's empowerment and inclusion levels in the agricultural sector. Since its launch in February 2012, the WEAI has been implemented in baseline studies in 19 Feed the Future focus countries. While this is a novel approach to qualitatively understand women's empowerment especially within local contexts, the limitations inherent in the WEAI measure are transferable to their findings. These include its restricted usability to rural areas and to women engaging in only agricultural activities. An alternative quantitative measure although not yet qualitatively explored is the "Survey-based Women's emPOWERment (SWPER) index for women's empowerment in Africa" (Ewerling et al., 2017). The SWPER index was developed out of an identified need to have a more streamlined index for measuring women's empowerment in routine cross-national surveys in LMICs (Ewerling et al., 2017), and was developed using questions from the latest rounds of Demographic and Health Surveys for 34 African countries. Pavanello (2015) through the "Food and Agriculture Organization (FAO)" of the United Nations, also developed a qualitative guide to measuring women's empowerment and social protection. No published research studies could be identified that have extensively applied this research guide.

Empowerment needs to be defined before it can be measured. Commonly cited definitions can be found in Kabeer (2001), Alsop et al. (2006), Narayan-Parker (2005), and Alkire et al. (2013). Kabeer (2001) defined empowerment as processes that expand people's ability to make strategic life choices, especially in contexts where they have been denied such abilities. Alsop et al. (2006, 10) described empowerment as "a group's or individual's capacity to make effective choices, that is, to make choices and then to transform those choices into desired actions and outcomes". These definitions incorporate two key components of empowerment: the concept of agency (the ability to act on behalf of what you value and have reason to value) as determined by Sen (1987) and a second component which relates to the institutional environment, which offers people the ability to exert agency fruitfully (Alkire et al., 2013; Alkire & Foster, 2011; Ibrahim & Alkire, 2007). According to Yount (2017), empowerment also incorporates the complex process where women acquire resources that enable them to develop "voice," (the capacity to articulate preferences), in addition to agency (the capacity to make decisions in an effort to fulfil their own aspirations). However, Yount (2017) points out that these resources enable but do not automatically guarantee empowerment since there are structural and normative dynamics within the wider environment in which girls and women exist.

Evidence on the benefits and importance of women's empowerment has largely focused on Southeast Asia countries (Akter et al., 2017; Narasimhan, 1999; Rehman et al., 2015; Sebayang et al., 2017; Gregory Seymour & Peterman, 2017; Sraboni et al., 2014; Vaz et al., 2013) with less comparable attention to other LMICs including those in sub-Saharan Africa (SSA) (Ganle, Afriyie, & Segbefia, 2015; Malapit & Quisumbing, 2015; Greg Seymour, 2017; Vaz et al., 2016; Wouterse, 2017). Bridging this gap in knowledge is important since evidence suggests that women's empowerment is influenced by prevailing contextual factors within different settings (Akter et al., 2017; R. S. Meinzen-Dick et al., 2019; Wooten, 2003). For instance, sociodemographic

characteristics including cultural and gender norms and primary economic activities including types of agricultural practices in Southeast Asia differ from norms and activities in other LMICs including those found SSA. Within SSA, existing evidence suggests that there has also been more focus on east and southern African countries (Komatsu et al., 2018; Nankinga et al., 2015; Ranganathan et al., 2019; Greg Seymour et al., 2016) relative to west Africa (Malapit & Quisumbing, 2015; Wouterse, 2016, 2017). This amplifies the need for research in west African settings including in Nigeria where contextual factors might differ from those in other regions of SSA. The present study found only one study that had applied known measures of empowerment to the Nigerian context (Voufo et al., 2017) although in a different state to the one chosen for this study.

To assist in filling this gap in literature, the present study was conducted in rural Nigeria where the aim was to qualitatively examine the concept, indicators, and domains of women's empowerment among rural women. To achieve this, the questions contained in the domains of the WEAI and the SWPER quantitative tools and in one qualitative tool: the FAO research guide on women's empowerment and social protection, were explored. These tools were chosen because; (1) the WEAI is a widely used index for measuring rural women's empowerment in agriculture. The index is survey-based and has led to the development of many similar indexes including those that measure women's empowerment in projects and in livestock production (Malapit et al., 2019; Meinzen-Dick et al., 2017; Price et al., 2018; Voufo et al., 2017); (2) the SWPER is one of the recent and growing number of women's empowerment indexes developed from cross-country standardised surveys, the Demographic and Health Surveys (DHS). Many of these indexes use similar questions as the SWPER but different indicators and domains of empowerment are constructed; (3) the FAO qualitative guide is one of the very few guides developed by multilateral development agencies to aid in understanding women's empowerment needs. The objective of this study was not to qualitatively

explore the usability of these indexes and guide, but to use the themes covered in these tools as a guide for an in-depth exploration of women's empowerment dynamics across rural women who engaged in different economic activities.

2.3. Methods

2.3.1. Study context

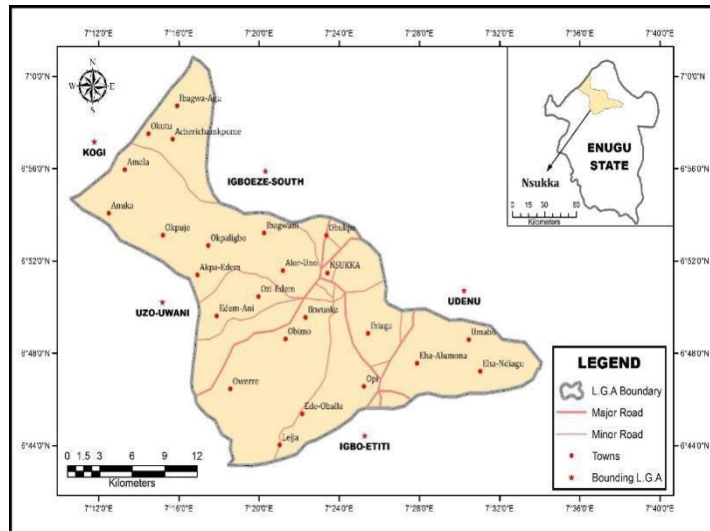
Nigeria is classified as a middle-income mixed-economy emerging market with a GDP of US\$375 billion and a GDP per capita PPP of US\$5,980 in 2018 dollars (World Bank, 2018). Agriculture accounts for 45% of the GDP and is the main base of rural livelihood where approximately 53% of the population reside. Forty-four percent of males and 72% of females engage in agricultural activities but operate less than one hectare of farmland per household mainly for subsistence (National Bureau of Statistics, 2005). The most recent available estimate on rural income per capita was US\$256.22 (2004 dollars) of which 82% was earned from farming activities (National Bureau of Statistics, 2009). Historically, division of labor was along gender lines, and women controlled such occupations as less intensive but economically viable food cultivation and processing, mat weaving, pottery making, and cooking among other supporting roles they provide to men within households (Chuku, 2004; Falola, 2010). However, anthropological evidence suggests that with colonization, which enforced patriarchal systems in Nigeria and many west African states and when the economy became increasingly geared towards the production of cash crops for export, men and European firms dominated the distribution of important cash crops including rubber, cocoa, groundnuts (peanuts), and palm oil. Women were pushed to the background and had to shift to the production of subsistence crops and home-based, less-commercial, activities. Such gendered division of labor and relationships is still prevalent especially in rural settings although women are increasingly

participating in the market value chain of staple food items including yams and cassava (Chuku, 2004; Falola, 2010). Nigeria operates a federal style of government with 36 states controlled by governors and 774 “local government areas (LGAs)” administered by an elected chairperson. With a GDP of US\$4,397 million (2006 dollars), Enugu state where the study was conducted is ranked 25th out of the 36 states of Nigeria in economy size (National Bureau of Statistics, 2007).

The qualitative study was conducted in Nsukka LGA of Enugu State, Nigeria. Nsukka LGA is in the northern part of Enugu State and comprises fifteen (15) communities located in specific geographical areas where a community may comprise several villages (see Figure 2.1). The LGA is predominantly rural and is underdeveloped in relation to human development and infrastructure (NBS, 2009). Agriculture is also the main economic activity. According to the last population census, Nsukka LGA has a population of 309,633 of which 57% are women, and comprises 63,603 households (National Population Commission, 2006). While there are 8 commercial and over 12 microfinance banks in Nsukka LGA (Central Bank of Nigeria, 2017), farmers and small and medium enterprises face constraints in accessing loans predominantly due to lack of acceptable collateral (Matthew & Uchechukwu, 2014). Also, due to restrictive norms towards women’s ownership of assets including buildings and land, women face further barriers towards successfully accessing loans (Ifelunini & Wosowei, 2013). There are other options for smaller loans and credit towards farm input during planting seasons and food consumption during shortages where women and men could borrow from group thrift contributions or loan sharks (E. O. Akerele, 2017; Anyiro, 2015). Loan sharks are the least favorable source of credit due to their extreme loan recovery practices (E. O. Akerele, 2017). Like in most rural settings in southern Nigeria, women’s education rates are low, participation in community leadership is low, and women are largely confined to subsistence farming and caregiving in the study setting. Women also face significant rates of intimate partner violence

and domestic violence perpetrated by other household members (Großklaus, 2015). These aspects of women's lives are mainly influenced by prevailing and persistent gender norms within the region.

Figure 2.1: Map of Nsukka Local Government Area (source: Nwodo et al., 2018)



2.3.2. Ethical considerations

Formal ethical approval from the University of Waterloo's Office of Research Ethics (#32095) and research permission was received from the Enugu State Ministry of Health and also from local government authorities in sampled villages and wards in Nsukka LGA. Written consent was collected from the participants in the In-Depth Interviews (IDIs) and Focus Group Discussions (FGDs). For participants with poor literacy levels, the information sheet and consent form were read out and explained, and consent verified by collecting participants' thumb-print. All data and information remained strictly confidential and anonymous to protect the privacy of each participant.

2.3.3. Data collection instrument

The questions used were adapted from the WEAI (Alkire et al., 2013) and SWPER (Ewerling et al., 2017) indexes, and the FAO guidelines on qualitatively examining women's empowerment and

social protection (Pavanello et al., 2015). The WEAI, SWPER, and FAO guidelines overlap and complement each other hence the tools were combined, and questions extracted which covered empowerment concepts broadly grouped under agency and autonomy. The WEAI has five domains: (1) decisions about agricultural production, (2) access to and decision-making power about productive resources, (3) control of use of income, (4) leadership in the community, and (5) time allocation. The SWPER has three domains: (1) social independence; (2) attitude towards abuse and violence; and (3) decision-making, while the FAO qualitative guidelines provide questions under three broad categories; (1) economic advancement; (2) power and agency; and (3) social protection operational issues. For this study, the adapted questions were grouped under six main domains: (1) Production (input in productive decision and autonomy in decisions), (2) Resources (ownership of assets, purchase, transfer, and sale of assets, and access to credit), (3) Control of use of income and savings, (4) Leadership in the community, (5) Decision-making on reproduction, education, and other household expenditure, and (6) Knowledge and attitude towards abuse and violence (for more information on the tool used, see Appendices – Study 1). Questions on social independence were not explored qualitatively since this domain was developed in the SWPER using sociodemographic questions including age, education level, and age at cohabitation which could not be probed qualitatively. Time allocation was also not explored qualitatively since the WEAI explores time allocation using time log sheets. This makes qualitative exploration of the domain (including interpretation) difficult and is in line with the difficulty reported by Meinzen-Dick et al. (2019). Economic advancement as a domain of empowerment was not explored since the tools do not cover the domain however, women and men were grouped into two groups based on their primary economic activity in order to enable us to examine the role of economic status on the participants' discussion of the different domains of empowerment. The FGDs and IDIs guides were translated

into the local language (Igbo) and the guides were piloted to ensure that participants understood the translated questions prior to data collection.

2.3.4. Data collection and management

Data were collected between 9th and 24th April 2019 among women and men that are married or have a live-in partner. Single and widowed men and women were excluded since the aim was to probe in-depth household-level and community-level dynamics of women's empowerment. Men-only FGDs were included to gauge men's perception and understanding of women's empowerment, since the WEAI and SWPER indexes and the FAO guidelines do not measure men's perception. Using inputs from local stakeholders and experts in Nsukka LGA in addition to published survey methodologies within the study location, participants in the IDIs and FGDs were stratified along economic groupings. Some surveys including the 2011 Socioeconomic Assessment by the World Bank, and the 2013 General Household Panel Survey, have created socioeconomic strata within the study location where socioeconomic grouping of the households was determined by the type of work of the main income earner (Nigerian Bureau of Statistics, 2013; World Bank Group, 2011). These published methodologies indicate locations within the study setting where each identified economic activity was most prevalent and was verified by local stakeholders. Location was important since households that are located close to markets tend to have more women engaging in work outside their homes. Two major economic groupings were prevalent within the study setting for women: smallholder farmers, and smallholder farmers who also worked outside their homes. These groupings based on location were explored while recruiting participants for the qualitative study. For men, two groups were identified based on their economic activities: farmers, and those that worked outside the home in occupations other than farming. These strata were utilized while

recruiting participants for the qualitative study. Thirty-eight IDIs were conducted (19 each for the 2 economic groups) and four single-sex FGDs (2 women, 2 men; across 2 economic groups: each FG had 12 or 13 participants) in four systematically selected wards within the district where households were randomly sampled. To limit the effects of possible interviewer bias, interviewers under the age of 30 led the IDIs and FGDs for participants under 30, and interviewers over the age of 30 correspondingly led groups for participants over 30. Male interviewers conducted the FGDs for men, and female interviewers those for women.

The self-reported female decision-makers and/or caregivers within sampled households were interviewed using the IDIs. The first contact within sampled households was asked to identify who they considered to be the female decision-maker and/or primary caregiver. The status of the identified female household member was verified before conducting the IDIs.

Participants in the FGDs were recruited by employing a somewhat snowball sampling technique where participants were recruited from the contacts within households that were sampled to participate in the IDIs. Information and invitation letters (translated into Igbo) were provided to male and female primary decision-makers and caregivers in these sampled households, who were invited to participate in the FGDs. To ensure diversity of participants in the FGDs, male and female primary decision-makers and/or caregivers were asked for the location and meeting point of other adults that engaged in similar economic and/or religious activities as themselves including village, social and peer groups. These addresses were used as recruitment points for other participants in the FGDs who received translated information and invitation letters. The FGDs were organized to ensure that participants were of similar economic background and economic activity (traders, teachers, farmers, religious and trading groups), besides considerations of gender. Invitations were

sent to men and women in advance of their meeting days. All participants in the IDIs and FGDs were 18 years and older and married. FGDs were conducted in the local language (Igbo) and discussions were captured using a voice recorder (the researcher and research assistant both speak Igbo). The researcher and research assistant translated the tools and transcribed the data into English.

2.3.5. Data analysis

The researcher and a research assistant managed and captured the data using NVivo. Data were analyzed using a hybrid thematic analysis following an inductive/deductive approach (i.e. integrated data-driven and theory-driven coding) (Fereday & Muir-Cochrane, 2006). This approach complemented the research objective by developing a priori themes in-line with the domains of empowerment contained in the tools being explored and also by generating themes and ideas that emanated from reviewing the qualitative data. These themes covered the six domains of the WEAI and SWPER indexes including those found in the FAO guidelines. One domain is common between the WEAI and SWPER indexes (decision-making).

Fereday and Muir-Cochrane (2006) described this process as a way of identifying themes from raw data to uncover meanings in relation a research objective and also using explicit coding and analytic procedures to abstract data under identified themes. Then, new relevant themes that emerged during the review of the transcripts are also captured and coded. The men's FGDs were grouped into one group of smallholder farmers only and one of smallholder farmers/market traders. The main activities involved in by the market traders' groups was yam trading. Yam trading is considered an important commercial activity in rural areas in Nigeria as it is considered both a staple and a cash crop, hence traders can make good incomes from its cultivation and sale (Ajibade et al., 2018). The

IDIs and FGDs for women were grouped into those who worked in the home and those who worked outside their homes. Occupations for these women were predominantly hairdressing and food vending. Key quotes selected from the IDIs and FGDs were used to represent majority opinion or, alternatively, cases of outliers according to topics. A Cohen's kappa interrater reliability test was performed to ensure that data were captured and coded consistently in NVivo (J Cohen, 1960). To do this, the researcher and research assistant conducted a coding comparison by selecting one transcript to be coded by both coders within the established coding scheme. The Cohen's kappa test showed a 0.94 agreement score indicating that if the transcripts are coded by independent researchers, 97% of the codes will be identical. This confirmed that a high level of consistency existed in interpretation of the study data and clarity of the coding scheme.

2.4. Results

2.4.1. Characteristics of sampled participants

In total, 89 participants for the study were recruited. Thirty-eight married women participated in the IDIs with an average age of 36.5years (SD 9.03years). Forty-three percent (n=16) of women in the IDIs worked outside their home and farm primarily as food vendors and hairdressers. For the FGDs, 26 women and 25 men participated in the four FGDs (2 for men; 2 for women) with an average age of 40 years (SD 7.2years) for women's groups, and 55years (SD 8.8years) for men's groups. All participants were married or cohabiting with their spouse and had a piece of farmland which they used for subsistence and commercial purposes.

2.4.2. Translation of empowerment and local understanding of the terminology

It proved challenging to identify a direct translation of the word "empowerment" into the local language used in the study setting. Three approaches were used to translate empowerment, each

providing a similar but different meaning when back-translated to English; “empower” translated to “*ike*” which means “power” in English, “to empower” translated to “*inye ike*” which means “to give power” in English, and with further exploration “to empower” was translated to “*bulie elu*” which means “to emancipate/lift up’ in English. For the IDIs and FGD, two terminologies were used (“to give power” and “to emancipate/lift up”) in local language to examine participants’ understanding of empowerment. Participants were asked three questions; (1) How would you explain “empowerment” and “women’s empowerment”?; (2) How do you know an empowered man/woman in your community?; and (3) List a few indicators of empowerment. Participants drew different meanings from the two terminologies and there were important gender differences. Findings suggest that men were in agreement with women when women’s empowerment was presented as a means to uplift and emancipate. However, when women’s empowerment was presented as a means to give power to women, there were clear divergence in views with men pushing back based on their understanding of the terminology to mean to limit men’s power by giving it to women or to take power from men and give it to women.

According to women’s IDIs and FGDs “to give power” meant to enable women have a better voice within households and in the broader communities. This included making women more respected, be seen as equals, allowed to do what they wanted including any job they chose, and allowed to freely perform other activities including going to church and hospitals whenever they wanted. Women suggested that this could be achieved through several ways including when women earn good or significant amounts of income, do the types of work they liked, are not beaten especially in public, are educated, are allowed and supported by men to run for leadership offices in communities and church, and can use facilities like healthcare when they need without seeking for permission. “To emancipate/lift up” was understood slightly differently as women considered an emancipated

woman to be one who managed to remove the barriers women face in households and communities. Such barriers include access to sole bank accounts, gender norms including those that affect women's ability to solely own and inherit assets, ability to travel to different parts of the country to engage in trade and to head community and church-based organizations. The quotes below illustrate women's perceptions and understanding of the different translation of empowerment:

An empowered woman does not need the approval of men or her husband to be successful in life. A woman that can have her own bank account, save money, and use it to provide for her needs including healthcare is empowered. We are not saying she should be disrespectful to men, but she has enough power to withstand all the issues that women face. Such women are needed more in the village to encourage other women. You know one of us just lost her husband and his people wanted to take everything from her including the shop that she used to sell yams with her husband. She used the courts and police to chase them away. That is empowerment; knowing your rights. - Female 22, 33 years old (trader and smallholder farmer)

Once you have a husband that beats you and also wants everyone to know that he can beat you when you do things he doesn't like or when you disagree with him, then you're not empowered. Many times, when this happens, everyone in the village will know and some might think you're problematic. You can't even buy food stuff on credit if this happens often. – Female 11, 25 years old (smallholder farmer)

Once you start making good money, you will notice that your husband and other women and men in the village will start respecting you and you can use that respect for many things. You know some women received some FADAMA³ money from the microfinance bank after many years of trying. They have used it to start a poultry and pig farm. These women are now empowered, and one is planning to contest for councillor. Sometimes it is all about money, if you start to make more, people will respect you. – Female 20, 40 years old (hairdresser and smallholder farmer)

Some women have tried to have more voice in the community. Sometimes you feel you can run for leadership office in the village, but men always hold the top positions. You can run for those offices but if men do not support you, where will you get your votes? The few educated women here have managed to get men to support them, so it is important to be educated. – Female 2, 30 years old (smallholder farmer)

It has been a journey for women especially when it comes to leadership and voice in the community. What men do is to get a woman that can write and make her the secretary at village and church organizations. What can you really achieve as a secretary? They only allow you to take meeting notes, you cannot influence decisions. That type is not being fully empowered if women cannot be presidents of such organizations. – Female 18, 37 years old (trader and smallholder farmer)

³ This is a World Bank-assisted project in Nigeria that provide financing that focus on improving farm productivity performance of clusters of farmers in six selected states with high potential (for more, see <http://projects.worldbank.org/P096572/third-national-fadama-development-project-fadama-iii?lang=en>)

The reaction by men in their FGDs when women's empowerment was presented as "to give power" stems from prevailing power relations between men and women which is considered an important dynamic of masculinity within the household and the broader community (Cornwall & Lindisfarne, 2016). However, men viewed the emancipation and upliftment of women in a more positive lens as they understood this to mean more about improving the way women live. This they identified to include outside the home employment for women, reducing or stopping domestic violence, supporting women's aspirations, and not feeling threatened by their success. The quotes below illustrate men's understanding of the terminologies used to describe women's empowerment;

We know we must allow women to be free to do what they want to do but we need them to come and ask first. This way they know we are still in-charge. You cannot just give up power in your home. Such things can make women start to disrespect you. – Male 16, 55 years old (trader and smallholder farmer)

To give women power is not something that can just be done. Power in the house and in the village is what we use to know respected men, you cannot give it up for women just like that. Weak men are those that do not have power over their women. – Male 9, 40 years old (trader and smallholder farmer)

When you think of it, to lift women up is to stop those things that bring them down. Shouting at women, not allowing and supporting her to grow her trade, and unnecessarily beating her are some things that can bring women down and reduce their ability to grow. So, to me, I believe an emancipated woman is one that does not experience all that. – Male 3, 49 years old (smallholder farmer)

This practice here of not allowing women to own property and to inherit property especially when their men die is a problem. To do that to a woman is very wrong even if she did not have children for the man. An emancipated woman will own everything with her husband and automatically inherit everything if he dies. – Male 12, 52 years old (trader and smallholder farmer)

2.4.3. Domains of women's empowerment

a. Production (input in productive decisions and autonomy in productive decisions)

Findings indicate that different scenarios influence women's decision-making power within households. Women tend to have more autonomy in decision-making regarding some agricultural activities while their decision-making power is limited when considering other economic activities

including working outside the home and the type of outside work. Since the study was conducted during the planting season (9 - 24 April 2019), women could remember and identify activities they could take sole charge of without recourse to their spouses. These included clearing of farms, deciding on subsistence crops to plant, and portion of land to use. However, joint decision-making was reported for planting of crops with potential yield for commercial purposes, and men generally decide on technical inputs including pesticides, manuring and artificial fertilizer application. Hence, there is somewhat of a division of labor where women are in-charge of preparing the land and planting of subsistence crops, whereas men with assistance from women, engage in planting economically viable crops, and enhancing crop productivity. In addition, women spoke of engaging in livestock raising of small animals (predominantly chickens) while men were in-charge of larger animals including pigs and goats. In the FGDs for women traders, participants recognized that during planting season, women need to make time to engage in planting activities for subsistence and/or commercial purposes. However, when it comes to other economic activities, these women spoke of initial conflicts they experienced before being allowed to engage in trading. These included issues of neglecting the family, especially the children, long hours away from home and possible overnight travels, and custody of potential income earned. Some of these issues were still occurring even when the study was conducted. Quotes contained in Table 2.1 illustrate women's experiences in decision-making in production activities.

Table 2.1: Sample quotes from female participants on decision-making in household production activities

General quotes from women smallholder farmers (n=22), and traders (incl. food vendors and hairdressers)/smallholder farmers (n=42)
<i>Women are always responsible for the initial work on the farm including planting of early crops that are consumed first including maize, vegetables, groundnut, cassava. We also remove the weeds when the time comes.</i>
<i>I don't need to wait for my husband. Once the rains start, I make plans to gather the children, so we can start with clearing the farm and planting. The earlier the better, so you can get two yields if the rain lasts long.</i>
<i>Even us women that have our shops and need to open every day, we also plan ahead to plant all the crops that is needed early in the morning or on weekends. If you don't plant and on time too, you will spend all your money buying food stuff that can be easily planted.</i>
Quotes restricted to women traders (incl. food vendors and hairdressers)/smallholder farmers (n=42)
<i>When I told my husband, I wanted to open a shop to braid hair, he refused. It took many months to convince him and then we decided to give it a trial for 3 months. I have been doing it for two years now. Sometimes you need to know how to handle your husband.</i>
<i>My husband still acts angry when I need to travel to the north to negotiate the yam that will be brought down for the market. He only smiles when he notices that I have paid school fees and bought food without asking him for money.</i>
<i>Women cannot afford to wait for money from men anymore, some men do not know how to save money and use it for something reasonable. I use my savings very well and I am also paying for my two children's college education.</i>

Men's perception of women's role and autonomy in decision-making in production activities was largely reflective of that of women. However, many male participants spoke of possible tension that could arise within households if men did not allow women to work. This suggests a growth in women's agency and voice within households, and men's reluctant agreement to women engaging in economic activities outside their homes. In addition, local farmers appeared to be more in agreement for women to engage in income-generating activities in contrast to the views of traders. In men's FGDs, participants spoke of men's role in providing financial support for production activities. These include buying seeds especially for economically viable crops (yams and cocoyam), purchase of fertilizers and pesticides, chicken feed and medication. Participants also spoke of the increasing role that women play as income earners within household and the resulting increase in their decision-making power. Quotes in Table 2.2 illustrate men's perceptions of their role in agricultural production and their perception of women's household roles and decision-making power.

Table 2.2: Sample quotes from male participants on decision-making on household production activities

General quotes from men smallholder farmers and traders/smallholder farmers (n=25)
<i>Women are taking on more responsibilities at home and we men really need their support especially financially, so it is good to allow women do honest jobs and make money. Although sometimes they now refuse to disclose the amount they make or provide the money for us to manage. It can be a problem.</i>
<i>My wives do not need to wait for me before they start planting. They know the portion of lands allocated to them. When I get the plant seeds and fertilizers, I share it among them to plant in their farms. I don't pay too much attention to what they plant, I only focus on my pig business.</i>
<i>Money is always a source of conflict in our homes so if your wife wants to work, you encourage her, so she can use her money for herself.</i>
Quotes restricted to men traders/smallholder farmers (n=13)
<i>My wife also trades in yam, but she has her own shop. I like it, she has a good reputation here, so she makes good money. I don't mind at all that she is very independent.</i>
<i>For some of us, if we had our way, our wives will not work outside our homes because their main responsibility is to take care of the children and home.....but these days, women now work and run businesses. If you do not allow them to do that, there will be trouble.</i>
<i>Two income is better than one. I encourage my wife to work and make as much money as she can. It is good for the household and we can afford more things.</i>
<i>I supply my wife with planting inputs and also help her with harvesting during the season. It is good for women to be in-charge of some things, it helps them learn more about what they can contribute to the household.</i>

b. **Resources** (*Ownership of assets. Purchase, sale, or transfer of assets. Access to and decisions about credit*)

Major assets (including land and buildings) were found to be jointly owned but controlled by men, while women owned minor assets like small livestock. While women are consulted for purchase and sale of major properties, men usually have the final decision on what to purchase and/or sell.

Generally, participants reported that it was difficult to obtain credit in the study setting. However, agricultural loans are increasingly becoming available although women still face obstacles in accessing such loans. A popular strategy is to have their husband access the loan and then give it to

the woman to use. However, this strategy is problematic since participants reported that men could change their minds sometimes and keep the credit to themselves. Men also worry that if their wives defaulted on the loan, it would tarnish their image and ability to borrow in the future. In addition, men would only support women's access to credit if they considered the purpose to be worthwhile from their own perspective. These dynamics differed for women based on primary economic activity where women traders reported better control over assets and access to credit. The quotes in Table 2.3 illustrate participants' experiences.

Table 2.3: Sample quotes from participants on control over household resources

General quotes from women smallholder farmers (n=22), and traders (incl. food vendors and hairdressers)/smallholder farmers (n=42)
<i>It is hard for women to say a particular property is "mine" it is usually "ours" unlike for men, it is very easy. Most of the lands we have are registered in our names, but my husband is in-charge of it and he added me just in case something happens tomorrow.</i>
<i>Women are allowed to own the livestock they raise, and they can sell it whenever they want although to avoid suspicion it is best to inform your husband of the price you sold the livestock.</i>
<i>It is common for our husbands to ask for our opinion sometimes when they want to buy or sell a (piece of) land but many times they end up doing what they want.</i>
Quotes restricted to women traders (incl. food vendors and hairdressers)/smallholder farmers (n=42)
<i>Although many women in our market make good money from the trade, you would never hear that a woman bought something as big as land without her husband's involvement. You don't want people to think you are challenging your husband or have other motives.</i>
<i>I used my money to buy my motorcycle but that was after helping my husband to buy his first. If I bought before my husband, it will be a problem here. I am not worried about my husband but what even my fellow women will say.</i>
<i>Getting a loan from the bank is a big problem here no matter how small. Many of us use our husbands to apply but that can be a problem because you keep hearing of women complaining that their husbands gave them only part of the loan and that will not be enough for the purpose of the loan.</i>
General quotes from men farmers and traders/smallholder farmers (n=25)
<i>It is good to make sure your wife knows all your investments including land, houses, and vehicles. So that if anything happens to you, you don't want your wife to lose everything. Our customs are still against women if you do not make her strong and independent when you are still there.</i>
<i>It is hard for us to get loans from the bank especially for women. I usually apply for any loan for my wives in my name. This is because I trust them. If you get such loan for a woman and she misuses it, you are in trouble.</i>
<i>If it makes sense for my wife to ask for loan like to use it to buy crops during season and sell it when it's scarce and make a profit, then yes I will agree and help her.....however, if it's for things like to buy a motorcycle, I don't think I will support her. She should not take loans for such things.</i>

c. **Income** (Control over use of income and savings)

Women (predominantly those who engaged in economic activities outside their homes and farm) reported better control over income they generated than household income. Women's control over the income they generated was attributed to increasing responsibilities that women bear. Besides expenditures for personal needs including food and healthcare, women are also becoming in charge of household expenditures including paying for school fees and healthcare for household members especially children and the elderly. However, women who engage in economic activities that generate limited income relative to their husbands' spoke of the difficulties they faced in gaining access to household income to augment theirs. This is prevalent among women that engaged in activities including food vendors and hairdressers. Women traders experienced better autonomy especially in savings since their incomes were enough to provide for some household expenditures and have enough left to save. Participants in the men's FGDs spoke of the increase in financial demands from their wives and the need for women to engage in income-generating activities to alleviate such demands. However, there is a notion that men are the primary income-earners within the household and women's income are supplementary to that of men. This gives credence to the "upliftment/emancipation" and "to give power" definitions of empowerment where in this context, men tend to oppose the idea of giving women power as primary income-earners. In addition, men also spoke of concealing their income from their spouses to prevent or reduce cases of financial demands for expenditures they considered to be frivolous. Men also spoke of the increase in tension within households when women refuse to openly share information on their income and savings. Table 2.4 contain quotes that illustrate participants' experiences.

Table 2.4: Sample quotes from participants on control over income and savings

General quotes from women traders (incl. food vendors and hairdressers)/smallholder farmers (n=42)
<i>Some of us started working because we realized that the money coming in from our husbands is never enough to run the house and pay for other needs including school and healthcare. Also, it is always a problem asking for money and then explaining what you need to do with the money to the last kobo⁴</i>
<i>I have sole control and custody over the money I make, and save my money for self-keep, emergencies, and important expenses including healthcare. Women cannot continue to wait for men to give us money for important things especially when they do not understand the need for it. When I use to ask my husband for money for sanitary pad for my daughter and I, he would only give me a little every two months. Imagine that. Now I buy it whenever we need it.</i>
<i>Some of us still need to ask for money since what we make is too little. But I always make sure that the money I ask for is not for personal use or my husband will start behaving funny. When I need to pay for school fees and healthcare, I go to him and he doesn't waste time to bring out the needed money.</i>
General quotes from men smallholder farmers and traders/smallholder farmers (n=25)
<i>It is good to allow women to keep the money they make from their sales. This will reduce the constant asking for money from them. And then when you say there is no money, or you give them less than what they asked for, it becomes a problem. The ones that work outside the home understand better how hard it is to make money unlike those that are at home hence, they are more careful on how they spend the money.</i>
<i>Even as it is good for women to work, men are the main workers in our homes. You will rarely hear that a man decides not to work so that a woman can work. Women working is good to add to the income that men bring in and not the other way around.</i>
<i>Sometimes, we men need to tell women that there is no money so they can stop always asking for money always. There is always one thing or the other that they need to buy. You need to hide your money sometimes.</i>
<i>My wife works but she is too secretive of how much she makes. I refuse to pay for anything in the house until I see her savings. I will not take from it, but it is good to know how much and why she is saving hers and using yours.</i>

d. **Decision-making** (Education, household expenditure, and reproduction)

Decision-making about education, household expenditures (including food), and reproductive health followed a similar pattern to that of control over income. Women who engaged in economic activities outside their home and farm and earned income reported better decision-making power, agency, and autonomy. Joint and sole decision-making were reported among these women. However, housewives reported fewer cases of joint decision-making on minor expenditures (including food and education expenditures) and more cases of not being consulted in decisions affecting major expenditures (large household purchases). This echoed a similar pattern to male participants' perception in the FGDs where women's agency was linked to their socioeconomic

⁴ This was used for emphasis as the kobo is the least denomination in the Nigerian currency and has been phased out due to its low value

status within households. Refusal to have sex was considered a major issue among all women regardless of income-earning status and primary economic activity. In addition, women reported changes in household dynamics if they refused sexual advances from their husbands. These changes include, withdrawal of economic and social support from their husbands, overt extramarital sexual relations by their husbands in some cases, and domestic violence. Men spoke of their support for family planning but rejected any positive reasoning behind women's refusal for sexual relations. They contended that women that refuse their husbands sex are either having extramarital sexual relations or have contracted sexually transmitted infections. Table 2.5 illustrates participants' views on decision-making on education, household expenditures, and reproduction.

Table 2.5: Sample quotes from participants on decision-making on education, household expenditures, and reproduction

General quotes from women smallholder farmers (n=22)
<i>When it comes to buying food and paying for school fees, my husband and I always discuss it and then he gives me money to go and buy the food items or pay fees, but I don't usually know when he makes big purchases. The last time, he bought food in bulk that would last us for a year but never asked for my opinion.</i>
<i>Sometimes it is not even a discussion, he will ask you to make a list and bring it to him. He will then put the prices he thinks each item will cost. You that go to the market know that some of the prices he is putting down is just too small but what can you do.</i>
<i>Saying no to your husband when he wants sex is just asking for trouble. He can change on you overnight. Sometimes he will start sleeping around or stop eating your food, or even threaten to beat you. I don't know if it is to punish you, but it is not fair on the woman, after all it is our body.</i>
General quotes from women traders (incl. food vendors and hairdressers)/smallholder farmers (n=42)
<i>If you are not making any money, most decisions are taken and then you are informed of the decision. When you start making money and your money is needed for things like school fees, you will be included in the conversation.</i>
<i>I keep my money and my husband keep his. I am responsible for school fees and running the home, my husband is responsible for buying bulk items and paying for repairs to our motorcycles. We always discuss this and agree on how to split it. He can also ask me when he needs my support. It is not a problem.</i>
<i>It is good to discuss family planning with your husband. I told mine that with 4 children, we should stop, and he agreed however, saying no to sex is a different issue. Sometimes our men begin to believe we don't care about them anymore or we are cheating. Men gossip too, they will spread rumors about you. For me, I try to satisfy my husband as much as I can. Sometimes it is hard especially after a long day.</i>
General quotes from men smallholder farmers and traders/smallholder farmers (n=25)
<i>Sometimes consulting a woman in all decisions, you make is a waste of time. I mean, if she is not making money, why bother asking her? Just tell her what needs to be done.</i>
<i>Yes, family planning is good since too many children is very expensive to provide for. But when using condoms, why would your own wife say no to you? She must be cheating on you or have fallen sick from cheating on you.....in fact she definitely must be cheating.</i>

e. **Leadership** (*Group membership and speaking in public*)

Participants considered leaders to be those that have over the years gathered experience, knowledge, skills, financial resources, and political or social connects that go beyond their community. Hence, leaders tended to be older individuals within the community or individuals that could attract development including infrastructures into the community. There was fairly a general agreement that women should participate in leadership of mixed (men and women) groups. However, women's participation is limited since while women spoke of difficulties that women faced when they tried to lead such groups including lack of support from their male counterparts: men somewhat refused the idea of women leading mixed groups. This speaks to the different reactions to terminologies of women's empowerment where men are more likely to support the idea of emancipating women than giving them power. In this context, power is considered by men to include taking orders from women. Participants noted that women leaders usually lead women's group but rarely lead men's groups or mixed (men and women) groups. When women participate in the leadership of mixed groups, they tend to hold positions that largely support other executives including secretaries. Hence, literacy is a strong determining factor for women's participation in leadership position. Female participants noted that leaders in women's only group tend to be more supportive, nurturing, and humble relative to leaders (usually men) in mixed groups. Another barrier to women's participation in mixed groups that are not dedicated to female-related activities is the need to obtain permission from their husbands to participate. In addition, women spoke of the perception by men that women-only groups are not as important as the broader community-level groups. In men's FGDs, participants also spoke of men's perception of the activities engaged by women in women-only groups as a determining factor to their permission for women to join such groups. Table 2.6 illustrates participants' views on leadership and participation in community-level groups.

Table 2.6: Sample quotes from participants on participation in and leadership of community-level groups

General quotes from women smallholder farmers (n=22), and traders (incl. food vendors and hairdressers)/smallholder farmers (n=42)
<i>It is good for women to come together, form groups, and support each other. Women also need to form groups to access services including the FADAMA microfinance funds and skills acquisition. Men tend to understand the need for us to form groups to access services including finance, but they need more information from us to make them understand why we need women groups in the community that support skills acquisition and other services including reproductive health support.</i>
<i>It is difficult for women to go beyond just participating in groups with men to becoming leaders in these groups. Men only support women to some extent including making women secretaries. They also sometimes support women to become vice-presidents of these groups because they now know that the government like seeing that women are involved in leadership. But you would never hear of women becoming presidents of such mixed groups.</i>
Quotes restricted to women traders (incl. food vendors and hairdressers)/smallholder farmers (n=42)
<i>If you are a woman, educated and make good money, you get more respected in the village and men approach you to join village development groups. When you get there, you are given more opportunity to speak and contribute to decisions in the group.</i>
<i>The leader of women traders in the market is a strong woman, she even went to teachers training college. She has led our groups to high levels where those seeking for public office now consult her for support. She always educates us on the need for women to empower themselves and grow their business so that women can become leaders in the village.</i>
General quotes from men smallholder farmers and traders/smallholder farmers (n=25)
<i>Leaders need to have something that they bring to the table. Many chosen leaders in our community are men and some women that have some connections that can benefit the community. If you can get the government or NGOs to build a water borehole here, you are automatically a leader. You will see how groups will approach you to join them.</i>
<i>A hardworking and good woman is always an important part of leadership in community organizations. It is important to include women to enable other women in the village to support initiatives and join such organizations. But we have not had a woman try to lead us yet. Who knows, that might change soon.</i>
<i>It is good for women to be part of leadership, but I don't think women should lead groups where men are members. It will be like taking orders from women. I don't think that will work.</i>
<i>Women-only groups are good for women as it helps them support each other. But there are many of these groups where women just go there to dance and gossip. If I think a group is not important, I will not allow my wife to participate.</i>

f. Knowledge and attitude towards abuse and violence

While some participants reported experiencing gender-based violence, all female participants reported that physical abuse and intimate partner violence should not be allowed within households across all scenarios that were presented (see interview guide in Appendices – Study 1). However, they observed that verbal abuse was a common occurrence within households. They opined that verbal abuse (which to many was also verbal exchange) was not that different from having a disagreement or a quarrel which was common among married couples and could happen in any household regardless of women's empowerment or economic status. They contended that verbal

abuse could sometimes be used as motivation for men and women to become more hardworking. However, they cautioned that verbal abuse or exchange should be curtailed since once it becomes too heated could turn into a physical abuse or violence. Male participants also had similar perceptions and beliefs as female participants although some men reported the need for men to use violence to control their women. Table 2.7 illustrates participants' knowledge and attitude towards domestic abuse and violence.

Table 2.7: Sample quotes from participants on knowledge and attitude towards abuse and violence

<p>General quotes from women smallholder farmers (n=22), and traders (incl. food vendors and hairdressers)/farmers (n=42)</p>
<p><i>It is never justified for a man to hit a woman or a woman to hit a man. We have been taught long ago that even thinking that since women are weaker, we are allowed to hit men, but men shouldn't hit us back is very wrong. Don't hit anyone as that might provoke them.</i></p>
<p><i>It is ok to quarrel with your husband. Sometimes our men can become lazy and you need to shout at him a little to get him to work hard. A few hard words will not kill the man, but one should not overdo it because he might get too angry and hit you.</i></p>
<p>General quotes from men smallholder farmers and traders/smallholder farmers (n=25)</p>
<p><i>There is no need to hit a woman even when she burns the food, neglects the children, or refuses to have sex with you. Hitting women is not good even though we know some women can talk back at you and insult you, it is good to walk away or for men with the strength to insult her back but don't beat her.</i></p>
<p><i>Some women need controlling. How can your wife go out anyhow without asking you? Or how can she just insult you non-stop. It is acceptable to hit such women to make her know her place and change her ways.</i></p>

2.5 Discussion

This study findings provide important information that could support the conceptualization and measurement of women's empowerment by exploring in-depth, what empowerment and women's empowerment mean for women and men in rural settings in a developing country. Empowerment as a construct is context-specific and measurement of women's empowerment can be influenced by local attitudes and understanding of translated terminologies. The difference in the understanding and attitude from men when asked to define empowerment and women's empowerment have implications for development projects that aim to improve women's economic wellbeing. The

present study suggests that there is need to ensure the use of appropriate local terms for empowerment for men and women, and that the terminologies are appropriately understood in order to ensure reliability of data. In addition, the way terminologies are presented to men and women will largely impact on the understanding and uptake of interventions that target different domains of empowerment. Meinzen-Dick et al. (2019) similarly experienced difficulties in finding a direct translation of the term “empowerment” across the eight countries that took part in the Gender, Agriculture, and Assets Program Phase Two (GAAP2) project. Their study also found differences in the understanding of the terminology between men and women. However, they did not examine men’s understanding of “women’s empowerment” and used the term “empowerment” and “autonomy” interchangeably whereas in the present study it has been noted that men and women attached different meaning to “emancipate” and to “give power”.

The present study findings suggest that how women and men understand women’s empowerment in local contexts do not always echo external definitions of empowerment, and the processes of gaining empowerment (e.g. through improved income) and ability to express such gained empowerment is not always clear-cut. Western ideologies would suggest that an empowered woman is one who has the capacity to make effective choices and to transform those choices into desired actions and outcomes in her life cycle (see Alkire et al., 2013; Alsop et al., 2006; Kabeer, 2001; Narayan-Parker, 2005; Yount, 2017). While this is largely true for many domains of empowerment where women tend to be disempowered, the role of contextual factors should not be overlooked. Yount (2017) building upon the framework by Kabeer (1999), made an important attempt to situate women’s empowerment domains and processes within prevailing contextual factors which would be

relevant to the majority of LMICs. In addition, empowerment initiatives (e.g. economic and financial initiatives) should not be expected to automatically improve different indicators of empowerment (e.g. asset ownership and autonomy in decision-making) since prevailing norms and contextual factors dictate the extent to which empowered women can express their gains and also determine if some of these western-defined modes of empowerment are relevant for women in rural local contexts of LMICs. For instance, using a mixed- methods approach, Bonilla et al. (2017) found that in rural Zambia, although women who received the Child Grant Programme reported improved financial empowerment and control of grant income, changes in intrahousehold relationships were limited by entrenched gender norms, which indicate men as heads of household and primary decision makers. Kabeer (2011) succinctly suggests that in rural Bangladesh, while the value attached to social affiliations by women is a product of the societies in which they exist, it may be no more context-specific than the apparently universal value attached to individual autonomy by many feminists. The present study findings also lend voice to the suggestion by Meinzen-Dick et al. (2019) which call for rethinking empowerment not as a direct equivalent to autonomy but also in terms of interdependence and multiple modalities of agency.

Exploring the questions contained in quantitative measures of empowerment, findings suggest that there are multifaceted linkages between the different domains and indicators of empowerment, and this view becomes clearer when domains are explored qualitatively. Economic empowerment through income-earning does not largely change women's roles in the division of labor for agricultural production and does not grant autonomy in ownership of large assets, two common domains and indicators of empowerment. Commercial agricultural activities are more associated with men, and subsistence activities with women and beyond agriculture, women face initial and ongoing household barriers towards engaging in other production activities although this might be

ameliorated when they generate enough income to offset important household expenditures without recourse to their male partners. Similar findings were reported by Meinzen-Dick et al. (2019) although South-east Asia seems to be an exception where Akter et al. (2017) suggest that in four Southeast Asian countries women have equal access to productive resources and a greater control over household income. Existing social norms and expectations in Nigeria prevent women from sole ownership and/or purchase of large assets including land without involving their male partners. For women to own assets including motorcycles, they first had to support their male partners to purchase such an asset before they could secure one for themselves. This speaks to the effect of gender and social norms on empowered women's ability to express autonomy and agency within their households and the broader community, and findings are consistent with Meinzen-Dick et al (2019). These findings offer important insights into how women's empowerment is assessed and conceptualized. Results suggest that asset ownership for women should not be directly assumed to result in empowerment since asset ownership for women is a social construct where empowered women are still expected to conform to social norms and expectations regarding married women's roles within households. Perhaps, since women do not expect to solely own or purchase large assets, their perception of sole control of these assets are influenced by this expectation, and this could affect the responses they provide in quantitative surveys that measure asset ownership and control as a domain of women's empowerment.

Income-earning status of women and education attainment are all important factors that determine women's roles in four known domains of empowerment, namely, social independence, participation in leadership positions, custody of income and savings, and decision-making roles on household expenditures. This indicates that improving women's economic status and education attainment could possibly confer positive effects on these domains of empowerment. However, prevailing

norms and limited economic potentials still reduce such empowered women's ability to express full autonomy within these domains. By using the strategy of insisting on engaging in income-generating activities and keeping their incomes for personal use while seeking access to household income for broader expenditures including payment of school fees for their children, women exhibit a form of empowerment that would not be adequately captured by quantitative measures. This strategy ensures that individual needs are met in the context of women's agency and autonomy in personal expenditures including healthcare.

The ability of women to participate in leadership opportunities within communities is influenced by prevailing norms. However, findings suggest that perhaps, there is need to examine if leading mixed male-female community groups is of importance to rural women. This is because interventions are largely targeted towards women-only groups where skills acquisition, economic empowerment, social capital and agency are important outcomes of interest. Also, it is not clear how empowering women would impact on women's autonomy in decision-making for recreational sexual relationships since such relationships are heavily influenced by gender conformity to norms and expectations as reported in this study. Findings also suggest a contradiction to popularly held knowledge that women's empowerment reduces intimate partner violence (IPV) (see Pereira, Peterman, Yount, & Unicef, 2017; Ranganathan et al., 2019; Schuler & Nazneen, 2018), since verbal abuse is generally accepted among study participants so long as individuals do not "over push it".

2.6. Conclusion

Conceptualizing women's empowerment ought to be done in a manner that recognizes the multifaceted linkages between the different domains of empowerment and how they dictate women's participation in rural economic activities. While many of the known domains of empowerment overlap and are interrelated, there are existing differences. For instance, economic

empowerment through income-generation does not have any apparent influence on the division of labor for agricultural production, ownership of large household assets, and autonomy in decision-making for recreational sexual relations.

Findings point to critical considerations for projects seeking to empower women. Although high scores on aggregate indicators as contained in known measures including the WEAI and SWPER are often considered desirable from a quantitative-study perspective, such scores may not clearly reflect the intricate nature of women's empowerment needs where different domains of empowerment could benefit from different empowerment initiatives. Finally, translating the different known measures of empowerment to local languages should be done with caution since different local terminologies for empowerment can confer different meaning to study participants. This might compromise the impact of empowerment interventions and comparing measured levels of empowerment across different settings may be challenging.

In conclusion, this qualitative exploration suggests that women's empowerment measures might gain from (1) a more in-depth exploration of women's empowerment needs in local settings in the presence of prevailing contextual norms, and (2) proper translation and piloting of translated measures to ensure that questions adequately capture and identify women's empowerment needs and gaps, and that (3) lessons learned are incorporated into empowerment tools to ensure reliability of tools and findings. To test the viability of some of these recommendations, Chapter 3 qualitatively explores women's negotiation of access to household food resources based on their primary economic activity. Chapters 4 and 5 examine the association between women's empowerment and women's and children's dietary diversity in five sub-Saharan Africa countries.

Chapter 3

Qualitative exploration of the dynamics of women's dietary diversity. How much does economic empowerment matter?

3.1. Abstract

Background

The positive effects of economic empowerment through income earning on improved dietary diversity for women are known especially for those of reproductive age. However, there is need to examine how economic empowerment impact on access and consumption of different food groups as measured by quantitative measures of women's dietary diversity including the minimum dietary diversity score for women of reproductive age (MDD-W).

Objective

This study qualitatively examines dietary diversity among married women of reproductive age who engaged in two different economic activities in order to explore the dynamics of food availability, access, costs, and consumption.

Methods

The food groups contained in the MDD-W were used to explore women's dietary diversity. Thirty-eight married women of reproductive age across two socioeconomic groupings were recruited in south-eastern Nigeria in April 2019 and in-depth interviews were used to develop a roster of food items consumed over a week through production and purchase. This study also explored food items that were considered expensive and frequency of consumption, and food items that women require permission to consume and frequency of permission sought.

Results

Findings suggest that the consumption of specific food groups especially legumes, nuts and seed, flesh protein, and eggs would benefit from improved women's economic empowerment, whereas staple food-items including grains/root-tubers that are consumed by all women irrespective of their income-earning status would not benefit so much. Dietary diversity is influenced by food production and purchase where factors including seasonal variation in food production and prices are important determinants. Economic empowerment improved women's autonomy in food purchase and consumption. However, limited income restricted women from exhibiting full autonomy in consumption decisions and access.

Conclusion

With limited agency and access to household financial resources, achieving adequate dietary diversity for women continues to be at risk.

Key words: Nigeria; dietary diversity; food production and purchase; qualitative exploration; women; food prices.

3.2. Introduction

In this chapter, the focus is narrowed from women's empowerment in general, to economic empowerment. The change in focus is necessary since the aim of this chapter is to examine how women are able to negotiate access to household food resources and improve their dietary diversity based on their primary economic activity. Since this thesis focuses on women's empowerment and dietary diversity, this qualitative exploration would potentially shed more light on the dynamics of women's dietary diversity at the household-level. Chapters 4 and 5 will continue with the exploration of the relationship between women's empowerment and women's and children's dietary diversity.

Improving the nutrition status and dietary diversity of the most vulnerable within communities, including women, has been a major focus of development interventions (Masset et al., 2012) since dietary diversity and good nutrition not only contribute to better welfare and health outcomes but also enable people to work and produce more (Hoddinott & Yohannes, 2002; Savy et al., 2006). The Food and Agriculture Organisation (FAO) of the United Nations defined dietary diversity as “.....a qualitative measure of food consumption that reflects household access to a variety of foods, and it is also used as a proxy for nutrient adequacy of the diet of individuals...”(FAO, 2013, pg. 77).

Different foods and food groups are good sources for various macro- and micronutrients, and so a diverse diet best ensures nutrient adequacy (Chakona & Shackleton, 2017).

Often, dietary diversity is measured as the number of food groups consumed with varying recall period (ranges from 24 hours to seven or 30 days) and there are numerous measures of dietary diversity (FAO and FHI 360, 2016; Kennedy et al., 2011). These food groups often vary from energy-dense carbohydrates to plant-based protein-rich sources (legumes), nuts and seeds, and flesh-based proteins. For this study, the Minimum Dietary Diversity for women of reproductive age

(MDD-W) (FAO and FHI 360, 2016) was explored. This tool contains 10 food groups and has been used in many studies to aggregate women's consumption of food groups where important determinants including women's empowerment, socio-economic status, and household food security have been explored (for examples, see Malapit & Quisumbing, 2015; Ruel, Deitchler, & Arimond, 2010). Evidence suggests that the determinants of improved dietary diversity for women are vast with different contextual factors playing an important role in women's food consumption (Chakona & Shackleton, 2017; Girma & Genebo, 2002). Since dietary diversity is meant to reflect, in a snapshot form, the economic ability of a household to access a variety of foods, there is the need for more in-depth exploration of the role of household dynamics on individuals' dietary diversity.

The household cooperative conflict model suggests that individuals within households have different access to resources, including food, based on multiple factors which include their economic and social status (H. Harris-Fry et al., 2017; A. Sen, 1987). These factors influence household allocation of resources including economic and food resources, and the role of cultural beliefs of what constitute adequate food and nutritional needs for different household members (Mangyo, 2008; Messer, 1997). In many rural societies in low-and-middle-income countries (LMIC) especially those with norms that are anchored on patriarchy, patrilineality, and patrilocality and expectations that favour males, there are apparent gender biases which limit women from unhindered access to household resources including food (Messer, 1997). Since men are expected to be the primary income earners and decision-makers in these societies, women often grapple with negotiating access to household food resources to ensure adequate quantity and quality of food consumed. For instance, Das Gupta(1987, 1995) argues that in Asia, even when household diets are adequate, women tend to consume a less diverse diet which is not enough to meet their daily nutritional needs which could be elevated by pregnancy, lactation, and heavy work loads. Further, women do not

consume adequate quantity and quality of food because they tend to be under the (nutritional) control of men or older women who intentionally or customarily deprive them of access to diverse diets.

For women to successfully negotiate access to household food resources and attain adequate diversity in their diets, economic empowerment through income generation has been identified as a key strategy (Chakona & Shackleton, 2017; Duflo, 2012; Voufo et al., 2017). It is argued that by empowering women economically through increased earning power, they are able to improve their social and economic status within households, and hence, have better autonomy and access to household food resources (Thang & Popkin, 2004; Yimer & Tadesse, 2015). Studies have suggested a link between women's economic empowerment, ability to negotiate better access to household resources including food, and improved dietary diversity scores (De Vreyer, 2020; Mangyo, 2008; Messer, 1997). However, it is not yet clear how women's ability to consume individual food items is enhanced by improved economic empowerment through income earning. Understanding what food groups are most impacted (or not) by improved women's economic empowerment becomes more important since in many rural societies in LMICs, while many economic empowerment initiatives improve women's income generation, usually, the income generated from these activities is not sufficient for women to fully negotiate unhindered access to household food resources and consumption decision-making (Meinzen-Dick et al., 2019).

To fill this gap in knowledge, this study developed a roster of household food availability in the past week and qualitatively examined women's food consumption activities as they relate to diversity in diets, especially for women who engaged in different economic activities. This approach is missing

in literature since we could not find any study that had used such methodology to explore women's dietary diversity. This study objective was to qualitatively examine the household-level dynamics of women's dietary diversity using the MDD-W across two socioeconomic groupings based on income-generating activity.

3.3. Methods

3.3.1. Study setting

The qualitative study was conducted in Nsukka local government Area (NLGA) located in the northern part of Enugu State in south-eastern Nigeria. NLGA comprises one urban and 14 rural communities, with a population of almost 310,000, comprising approximately 63,705 households (NPC, 2006). Agriculture is the main economic activity and the area is predominantly Igbo (i.e. ethnic group).

3.3.2. Ethical considerations

Formal ethical approval was received from the University of Waterloo's Office of Research Ethics (#32095) and research permission from Enugu State Ministry of Health (MH/MSD/REC19/048). In addition, permission to conduct the study and collect data from participants was sought from local government authorities in sampled districts and wards in Nsukka LGA. Written consent was collected from the participants in the in-depth interviews (IDIs) and consent forms were translated into the local language (Igbo). To accommodate participants with poor literacy levels, the information sheet and consent forms were read and explained before consent was sought verbally and written by collecting the participant's thumb-print. All data and information remained strictly confidential and anonymous to protect the privacy of each participant.

3.3.3. Data collection instrument

A brief roster was developed to collect information on food items produced and purchased including their annual and current availability respectively. Information was collected on food items that were considered too expensive to purchase, frequency of consumption of these food items, food items for which women needed permission from their husband before purchase and consumption, and frequency of permission sought. These questions were developed to add more contextual details on women's consumption of food items belonging to the ten food groups as measured by the MDD-W (FAO and FHI 360, 2016). Information on a few items of demographic information including age, occupation, household structure, number of children including their ages was also collected. Interview guides were translated into the local language (Igbo) and piloted to ensure that participants understood the translated questions prior to data collection.

3.3.4. Data collection and management

Data were collected between 9th and 24th April 2019 from women that were married or had a live-in partner. The study only sampled women of reproductive age (18 – 49 years) in line with the MDD-W guidelines (FAO and FHI 360, 2016) where dietary diversity was only measured for women of reproductive age. Participants were grouped into two socioeconomic groups based on their primary economic activity. This was informed by inputs from local stakeholders and experts within the local government in addition to published survey methodologies within the study location (NBS, 2013; World Bank Group, 2011). These published methodologies indicated locations within the study setting where each identified economic activity was most prevalent and was verified by local stakeholders. Two major economic activities were identified based on location: work primarily at

home and work outside home and since the study setting was predominantly rural, the identified socioeconomic groups also both engaged in smallholder agriculture. Location was important since households that were located close to markets tended to have more women engaging in work outside their homes. These groupings were explored while recruiting participants for the qualitative study. Thirty-eight IDIs (19 each for 2 economic groups) in four systematically selected wards within the local government were conducted and households were randomly selected. To limit the possible effects of interviewer bias, younger interviewers (below 30 years) led IDIs involving younger participants (below 30 years) while older interviewers led IDIs involving older participants.

In-depth interviews were administered to women that self-identified as the female decision-maker and/or caregiver within sampled households. This was achieved by asking the first contact within sampled households to identify who was considered the female decision-maker and/or primary caregiver. Their status was then verified before study commenced. Each IDI lasted for an average of 55 minutes. The duration was kept closer to the upper time-limit suggested for IDIs (60 minutes) (Britten, 2006) to give participants enough time to develop a roster of food items under different categories and also provide in-depth insights into food items' availability and consumption.

3.3.5. Data analysis

Data was managed and analysed using NVivo and Microsoft Office Excel, and analysis followed the inductive/deductive approach to thematic analysis (i.e. integrated data-driven and theory-driven coding) (Fereday & Muir-Cochrane, 2006). This approach complemented the research objective by developing themes that were in-line with the 10 food groups contained in the MDD-W and by also

exploring eight pre-determined themes that explored household-level gendered dynamics that relates to food access and consumption. Using explicit coding and analytic procedures, data was abstracted under the following pre-determined themes: (1) food items produced/cultivated, (2) availability of food items produced/cultivated, (3) food items purchased (4) availability of food items purchased, (5) food items considered too expensive to purchase, (6) consumption frequency of expensive food items, (7) food items that require permission from spouse to purchase and consume, and (8) frequency of permission sought. These themes were explored among women within the two identified socioeconomic groupings. New relevant themes that emerged during the review of the transcripts were also captured and coded. Key quotes selected from the IDIs were used to represent majority opinion or in some cases, outliers according to topics. An interrater reliability test (Cohen's Kappa) (Jacob Cohen, 1968) was performed by the researcher and research assistant to ensure data was captured consistently in Nvivo. This involved conducting a coding comparison by selecting two transcripts to be coded by both capturees within the established coding scheme. The test confirmed a high level of consistency (0.94 Cohen's k) in the interpretation of data and clarity of the coding scheme.

3.4. Results

3.4.1. Participants' characteristics

Thirty-eight married women participated in the IDIs with an average age of 36.5 years (SD: 9 years). Among participants, 23% (n=9) were in polygamous households while 77% (n=29) were in monogamous households. All participants had a farm and while 80% (n=30) of women used their farms both for subsistence and commercial purposes, 20% used them for subsistence only. All participants had at least one child and 50% (n=19) had at least one child under 5 years. Forty-three

percent (n=16) of women worked outside their homes and farm. Occupations for these women predominantly included hairdressing and food vending.

3.4.2. Food groups produced and purchased across households

Participants provided details of food items produced and/or purchased from which we developed a list of food groups based on MDD-W recommendations (FAO and FHI 360, 2016) (see Table 3.1). Participants largely purchased food items that were not cultivated in the region where the study was conducted. Participants could record more than one food item belonging to a particular food group.

Table 3.1: Description of food items included in the 10 MDD-W food groups

MDD-W food groups	Food items produced	Food items purchased
1; Grains, white roots and tubers, and plantains	Yams, cocoyam, water yam, maize, cassava	Yams, cocoyam
2; Pulses (beans, peas and lentils)	Black beans	Beans, pigeon peas
3; Nuts and seeds	Peanut	Bambara nut, breadfruit seeds
4; Dairy		
5; Meat, poultry and fish	Game meat, chicken	Beef, game meat, fish, chicken
6; Eggs		Eggs
7; Dark green leafy vegetables	Pumpkin leaves, African spinach	Pumpkin leaves, wild lettuce
8; Other vitamin A-rich fruits and vegetables	Pumpkin, oranges, mangoes, bananas	Watermelon, pumpkin, oranges, mangoes, bananas
9; Other vegetables	Okra	Okra
10; Other fruits		

All women reported producing at least one group 1 food item, 30% (n=11) reported producing at least one group 2 food item, 2% (n=1) produced at least one group 3, 5, and 8 food items, 27% (n=10) produced at least one group 7 food item, and 10% (n=4) reported producing at least one group 9 food item. There was no report of households producing food items belonging to groups 4, 6, and 10 of the MDD-W food groups (see Figure 3.1). Food items produced were reported over the year and data were collected during planting season. While we only examined food availability and consumption, purchasing might be more frequent during the planting season than at other times of year. In addition, food items were usually cultivated, harvested, processed in some instances, and

stored over time for consumption (see Ajibade, Ayinde, Abdoulaye, & Ayinde, 2018 for more details of food production activities in rural Nigeria). For food items purchased, we examined current (one week) purchase of food items as at study time. When availability of food items produced all year were examined, all participants reported having at least one food item belonging to group 1 of MDD-W food groups at their homes available all year. Seventeen percent (n=6) of participants reported having at least one food item belonging to food group 2 of the MDD-W available at their homes all year.

In total, women that engaged in economic activities outside their homes were more likely to purchase food items across eight food groups in the MDD-W. Ninety-three percent (n=35) of the women (including all the women who worked outside their home) reported currently purchasing at least one food item belonging to food group 1 of the MDD-W food groups. All women reported currently purchasing at least one food item belonging to group 2 of the MDD-W food groups. Sixty-three percent (n=24) of the women reported currently purchasing at least one food item belonging to group 3 of the MDD-W food groups, with women who worked outside their homes being more likely to purchase these food items. Ninety-three percent (n=35) of the women including all of those that worked outside their homes purchased at least one food item belonging to group 5 of the MDD-W food-groups. Thirty percent (n=11), 87% (n=33), 70% (n=27), and 6% (n=2) of all women purchased at least one food item belonging to groups 6, 7, 8, and 9 of the MDD-W food groups. There was no report of households purchasing food items belonging to groups 4 and 10 of the MDD-W food groups.

This study explored the reasons behind households' purchase of food items which they produce, and participants spoke of a variety of reasons for purchasing additional food items. Identified

reasons include seasonality of food items, and crop yield including prevailing pests and diseases affecting crop performance. It is important to note that data was collected two weeks after the first rains in the region (in April). This period marks the beginning of planting season and an abundant supply of green vegetables (both cultivated and purchased) and of many fruit varieties (Adepoju & Adejare, 2013; Odekunle, 2004). Also, this period affects the availability and price of certain food items including cassava, yams, beans, game meat, pigeon peas, bambara nut, and breadfruit seeds (Odekunle, 2004). Participants spoke of how these food items become less available in the market during this season and where available, their prices go significantly up relative to post-harvest season. The following quotes illustrate participants' reflections on availability of food items.

...You know for some time now there is this pest [Pythium myriotylum] that kills cocoyam around June/July when they should be growing nicely in the farms. So, people that have access to rivers start farming cocoyam in January and harvest it this time. They bring it to the market so that people that want to eat and also use the tiny ones as planting seeds can buy them. There is too much competition for it now, so the prices are too high. – 23-year-old, smallholder farmer only

Vegetables are now many in the market and very cheap due to the rains that started falling 2-3 weeks ago so anyone can buy it now. It gets scarcer and more expensive in the dry season. – 29-year-old, smallholder farmer and hairdresser

...We plant yams in our farms, but you know the yield is always small compared to those that they bring from the North. And now yam season is gone coupled with those buying to use them to plant so the price is very high and only a few of us can buy some for eating. – 30-year-old, smallholder farmer only

When the rain starts, game meat becomes very scarce because you know they hunt for the animals by burning the bushes during dry season so the price of it now is too high. – 44-year-old, smallholder farmer and food vendor

We plant black beans here but buy the white ones in the market. The black beans are used to make food that are different from the ones you can make with white beans and since we don't plant white beans here, we buy it. It can be expensive depending on when you go to the market. – 20-year-old, smallholder farmer and food vendor

Cassava is available anytime of the year and cheap. It is either you get them raw or you make or buy garri⁵ whenever you need it. But you know you cannot eat cassava alone, you still need to spend money to buy fish to make a soup. Good thing is that fish is not as expensive as beef or chicken. – 36-year-old, smallholder farmer only

⁵ Garri is a fine to coarse granular flour of varying texture made from cassava tubers which are cleaned after harvesting, grated, water and starch squeezed out of it, left to ferment and then fried either in palm oil or without palm oil and serves as a major staple food in West Africa.

3.4.3. Income generation, household food purchase and consumption frequency

Generally, women who worked outside their homes and farms had better access to financial resources and reported improved autonomy in food purchase, and better dietary diversity. To explore the role of income-generation on food purchase and consumption, women were asked to elaborate on the issues about food purchase using household or individual incomes. Women identified personal and children’s needs as a determinant of food purchases (see Table 3.2). These include the need for variety in food consumption, perceived health benefits of diversity in food consumption, and perceived malnutrition status of themselves and their children as reasons for increasing the purchase and consumption of green vegetables and flesh proteins. There is an apparent divide where women who engaged in economic activities outside their homes reported better autonomy in decisions regarding food consumption and better dietary diversity. However, these activities generated limited income as identified by participants hence, this limits women’s ability to exhibit fully agency in food consumption since incomes generated are usually not enough for the purchase of certain food items. Women spoke of the need to ask for additional household income to supplement their personal incomes and how this dynamic could determine frequency of food purchase and consumption. The quotes in Table 3.2 summarise participant’s reflections on food purchase and consumption.

Table 3.2: Sample quotes from women on food purchase and consumption

General quotes from smallholder farmers (n=22)
<i>For those of us that do not work, it is hard for us to just go to the market and buy food items. We must ask our husbands first and what they feel is important is what we buy. Many men will just give you the money and then you decide what to buy but there are men who will also tell you how much to spend on each item.....I am sure that women who work will not experience the same</i>
<i>For the fact that you don't make money, men will value you less and will only give you how much they think you need to buy food even when they are eating the same food. I think my husband eats outside before he gets back from work. That is the only way I can explain him allowing myself and the children to eat such poor food.</i>

<i>Most times you see people eating mostly cassava, cocoyam, and dry maize because they are cheaper than other food items. My husband is a construction work and he believes in eating cassava in the morning for energy and since it can sustain him until evening, I don't like it but since I don't make money, I have little say.</i>
Quotes restricted to employed women (food vendors and hairdressers)/farmers (n=16)
<i>When I feel that I am getting too thin or frail or when my children start looking too hungry, I buy more vegetables, beans, and meat. I usually don't wait for my husband because I have the money. Sometimes, I need to ask him too because meat and other items like breadfruit seeds can be too expensive, and I don't make enough money from my business.</i>
<i>Sometimes what we make is not enough to buy all food items we choose. We need to depend on our husbands for money. I don't like asking for money because he (husband) usually makes me to give account of my expenditure and then he would always say that fish or meat should be eaten once a week. That is not right but what can I do?.....I wish I made more money</i>
<i>I am happy I make my own money, this way, I can take better care of myself and my children and eat better food that is good for our health. You will be surprised by how many women that are not allowed to eat what they feel their bodies need because they do not work. Although sometimes even those that work experience the same issues.</i>
<i>We as women know the need to eat a balanced diet made of different food items, but money is always the problem. I use my money to buy cheaper items like vegetables and beans, but my husband buys expensive items like meat. This way, we can eat food that will make us strong.</i>

3.4.4. Food costs, household decision-making, and consumption frequency

To explore the relationship between food prices and consumption, participants were asked to identify food items they considered to be too expensive and their consumption patterns of such identified food items. Household dynamics in the consumption of certain food groups were explored by examining if participants needed to seek permission to purchase and consume certain food items. There was a clear divide among women who worked at home and on farms only and women who worked outside of their homes in addition to farming in food groups considered too expensive to consume and its consumption frequency, and food groups that require permission to consume and frequency of permission sought (see Figure 3.2). Among women who worked at home and on farms only (n=22), 50% of them considered certain grains and tubers to be too expensive to consume, 90% considered certain legumes/pulses, 40% certain nuts and seeds, and 100% considered flesh proteins too expensive to consume. Whereas among women who worked outside their homes and farms (n=16), 20% considered certain grains and tubers to be too expensive to

consume, 50% considered certain legumes/pulses, 30% certain nuts and seeds, and 90% flesh proteins too expensive to consume. Further, when frequency of consumption of these food groups considered too expensive to consume was examined, 10% of the women who worked at home and on farms only consumed these food items regularly, 40% occasionally, and 60% rarely. For women who worked outside their homes in addition to farming, 38% consumed food items considered to be too expensive regularly, 47% consumed these food items occasionally, and 15% consumed the food items rarely. While 75% of the women who worked at home and on farms only and 50% of those that worked outside their homes in addition to farming required permission sometimes to purchase and consume these expensive food items, 8% of the women who worked outside their homes in addition to farming and 23% of those that worked only at home and on farms required permission always.

Women spoke of the different dynamics that lead to the need to obtain permission before certain food items are consumed. While women that engaged in income-generating economic activities outside their homes in addition to farming reported improved autonomy in making decisions regarding the consumption of expensive food items including frequency of consumption relative to those that worked at home and on farms only, due to their limited income, autonomy in food access and decision-making was also restricted (see Table 3.3). Women typically required permission before purchasing and/or consuming expensive food items. Women spoke of food prices being an important factor that led to the need to seek for financial support and permission from their husbands. The quotes in table 3.3 illustrate household dynamics and how they affect the purchase and some participants' reasoning behind consumption of certain food items.

Table 3.3: Sample quotes from women on permission to consume food items and frequency of permission sought

General quotes from smallholder farmers (n=22)
<i>Where is the money for fancy (expensive) food? I don't work, and my husband is rarely at home due to work, we manage with the little food that he gave me money to buy until when he comes back from working on the highway, that is when we get to eat better....I am sure many women like myself experience this.</i>
<i>Some food items like meat, eggs, and breadfruit are important but very expensive, so we only eat them when my husband asks me to buy them which is not often....If I had my own money, I could maybe buy it more often.</i>
<i>My son is very good at hunting game meat, but my husband will always want to sell it. He always gives me a part of the money for my personal use and to buy nice food like breadfruit seeds.</i>
Quotes restricted to employed women (food vendors and hairdressers)/farmers (n=16)
<i>The money I make from hairdressing is not even enough to buy some food items like chicken and pigeon peas. I need to collect more money from my husband. He will always ask what it is for and I will need to explain first.....we don't eat chicken often, so I don't always worry about asking him for money.</i>
<i>Since I buy most of the food items at home with my money, I don't ask for permission most times for us (woman and children) to consume the expensive food items like meat that my husband buys. There are times when permission is needed like during the week.</i>
<i>Having my own money is good. Now, I can buy some food items that are good for me like beans and cow pea, not the everyday cassava or maize flour that my husband prefers we eat.</i>

3.4.5. Other household dynamics that affect women's dietary diversity

The present study recruited women of reproductive age and 27% (n=10) of them were breastfeeding at the time of data collection. Also, 23% (n=9) of the participants lived in polygamous households.

These dynamics played a role in different approaches to food consumption and dietary diversity.

Lactating women spoke of being encouraged by their husbands to consume more diverse food items including more green vegetables and eggs to enable them breastfeed adequately. Within polygamous households, women spoke of the influence of marital and social conflict (Bove & Vallengia, 2009) on their ability to improve their dietary practices. These conflicts had economic implications for their actions, with some of them withholding income from working and sale of food harvests. The quotes below provide more insight into these household-level dynamics.

I just had a baby, so my husband brought one of his sisters to come and stay with us for a while. She prepares for me whatever I want to see so that I can produce more milk. – 22-year-old, smallholder farmer only

I am still breastfeeding, so my husband ensures that I eat fruits and vegetables as much as I want. He even buys them for me. I am enjoying it for now since you know these things change once the baby grows and stops breastfeeding. - 30-year-old, smallholder farmer and hairdresser

My younger co-wife has all my husband's attention, so to be able to compete, I need to eat well and look good. Good enough, I hold the money I make from sales. I don't give it to my husband anymore. – 44-year-old, smallholder farmer and food vendor

My husband does not take care of me anymore since he married his new wife. I cater for myself and if I don't work hard, I won't be able to feed myself. – 40-year-old, smallholder farmer and food vendor

3.5. Discussion

This study findings provide evidence that complement existing literature on women's dietary diversity from known dietary diversity measures. The findings suggest that women's dietary diversity can be influenced by household and market determinants including food availability and prices where food prices are most important for items that are not produced within households. The interaction between food prices and availability, and women's dietary diversity appear in two ways. Firstly, the availability of certain food items within a household is influenced by their costs in the market and consequently women reported reduced consumption frequency. Secondly, due to the cost of these food items, women seem to need to seek for access to financial resources and permission to consume such items and are unable to consume them when their male counterparts are away from home. This is most significant for women that do not have an independent source of income.

Negotiating improved access to household food resources was improved by women's economic empowerment through income generation since there was a mediating role of economic empowerment towards the consumption of certain food items especially flesh proteins and certain legumes, nuts and seeds. This suggests that economic empowerment for women might have differential impact on women's ability to access and consume different food groups. The restrictive nature of limited income generation on women's ability to negotiate food access and achieve adequate diversity in their diets further suggests that although improved economic empowerment

appears to play a significant role in improving women's ability to consume expensive food items, limited income restricts women from achieving unlimited access to these food items and limits their ability to achieve adequate dietary diversity. This addition to the literature is important since we could not identify a study that has suggested this insight into women's dietary diversity. On the other hand, it appears that women's economic empowerment would not have much impact on access to and consumption of food items that were considered to be staple items predominantly those belonging to group 1 (grains and root tubers) of the MDD-W since all women consume these regardless of the income-generating status. For fruits and green vegetables, that is, food items belonging to groups 8 to 10 of the MDD-W, in addition to economic empowerment, there appears to be a need to empower women through improved agricultural practices that would ensure year-round availability of these food items since they are perishable and experience large seasonal variations in availability with resulting fluctuations in market prices.

Our finding of a link between the prices of food items and their consumption frequency is consistent with literature (Afshin et al., 2017; M. Pitt & Rosenzweig, 1986; Reardon et al., 2010; Thorne-Lyman et al., 2010). Two systematic reviews and meta analyses by Andreyeva, Long, and Brownell (2010) and Green et al. (2013) of over 200 studies in over 170 countries found that; 1) the demand for food was more responsive to price changes among households with lower incomes; 2) the demand for all food groups was more responsive to changes in price in lower income than higher income countries; and 3) increasing food prices or falling incomes in a recession create pressure to purchase foods that are lowest in cost, which makes calorie-and-energy-dense foods more attractive. In a peri-urban South African setting, Chakona and Shackleton (2017) found that dietary diversity for women in the area was more sensitive to changes in incomes and food prices

because women lacked safety nets to absorb income or price shocks since they depended more on food purchase. This linkage between food prices and access and consumption of diverse diets further highlights the potential role of economic empowerment through income generation on women's ability to exhibit autonomy and agency in access to different food items within households.

While there is limited literature on the relationship between economic empowerment and women's consumption of specific food groups, the relationship between economic empowerment and dietary diversity for women has received some attention in literature. Findings suggest that improved economic standing for women is associated with better dietary diversity and nutrition outcomes (D. Akerele, Sanusi, Fadare, & Ashaolu, 2017; Arimond et al., 2011; Galiè, Teufel, Girard, et al., 2019; Hamad & Fernald, 2012; King & Mason, 2001; Malapit et al., 2015; Meinzen-Dick, Behrman, Menon, & Quisumbing, 2012). A few recent studies have also examined seasonal variations in women's dietary diversity (Campbell et al., 2014; Keding et al., 2012; Ng'endo et al., 2016; Savy et al., 2006) and findings suggest that women's dietary diversity scores tend to decrease during food shortages. These studies also suggest a need for better integration of both quantity and quality in the scores that measure women's dietary diversity. Our study confirms the suggestion from these studies and goes a step further by suggesting that while improving dietary diversity through economic empowerment is desirable, further exploration of what empowerment strategies are most important for targeting the consumption of different food groups should be given adequate attention.

Breastfeeding status has been considered an integral part of dietary diversity for infants and children but not for women (Daelmans et al., 2009; Marriott et al., 2012). However, there is existing evidence

on feeding practices for lactating women in LMICs especially regarding food taboos, myths, and perceptions (Chakrabarti & Chakrabarti, 2019; Mohammed et al., 2019; Santos-Torres & Vásquez-Garibay, 2003; Sundararaj & Pereira, 1975). In rural Mexico, Santos-Torres & Vásquez-Garibay (2003) found that almost half of women examined avoided the consumption of fruits, vegetables, and legumes during lactation although this was associated with no-prenatal breastfeeding awareness. In a rural setting that is similar to our study setting in South East Nigeria, Ekwochi et al. (2016) suggests that women avoided the consumption of certain proteins and legumes due to perceived impact on child growth and development. Interestingly, most of the evidence on food taboos and breastfeeding suggests that women engage in feeding practices based on prevailing norms on the impact of the consumption of different food items on child health and development. Our findings are somewhat different since women spoke of engaging in improved dietary diversity and the consumption of fruits and vegetables due to their perceived benefits on their health and in turn, that of their children. This is an important observation since many of the studies that examine women's dietary diversity using known measures like the MDD-W rarely consider the role of their breastfeeding status and how this could influence women's diversity scores. Also, an important finding is the role of social conflict within polygamous families on women's dietary diversity. This suggests that beyond economic and financial factors, household-level dynamics including social conflict (in our case between co-wives) play a role in women's access to and consumption of different food items. This gives credence to the gender and cooperative conflict model as proposed by Sen (1987) where women within households (in our case polygamous households) compete for resources including the attention and affection of their spouses. For this study, improved dietary diversity was used as a tool of cooperative conflict based on its perceived positive effects on health outcomes and physical appearance.

This study acknowledges a few limitations. The generalization of the findings is limited due to the inherent nature of qualitative studies including the sample size and sampling methodology.

Participants were not asked to list the time of year when different food items were more or less available. This would give us a better understanding of the seasonal variations in availability of food items. Also, men's dietary diversity within households was not explored. This could have provided enough information to enable performing a more gendered analysis. This might shed more light into male-female differences in dietary diversity. Nevertheless, to the best of my knowledge, the present study is the first to qualitatively probe in-depth, women's dietary diversity using widely known measures like the MDD-W.

3.6. Conclusion

This study's findings shed light on the need for more in-depth understanding of women's dietary diversity and the potential role of qualitative exploration. A disaggregated approach to examining the role of women's empowerment on their dietary diversity is needed since our findings suggest that economic empowerment might be important for improving women's ability to consume specific food items and perhaps not so much for other food items. In addition, environmental factors including seasonality should be put into consideration when designing initiatives that aim to improve women's consumption of diverse diets. It is imperative to understand that for many women in LMICs and SSA, negotiating food consumption through production and purchase is complex especially when faced with limited personal income, agency, and access to household income. Economic empowerment through income generation confers positive effect on women's ability to negotiate and access more diverse diets. However, limited income restricts women's ability to be fully independent in food access and decision-making hence, the consumption of certain food items is affected. There is the need for further research on the extent to which economic empowerment

improves women's dietary diversity and consumption of specific food items, and how this can influence the development of interventions that could directly improve women's dietary diversity.

Figure 3.1: Characteristics of food groups consumed across households

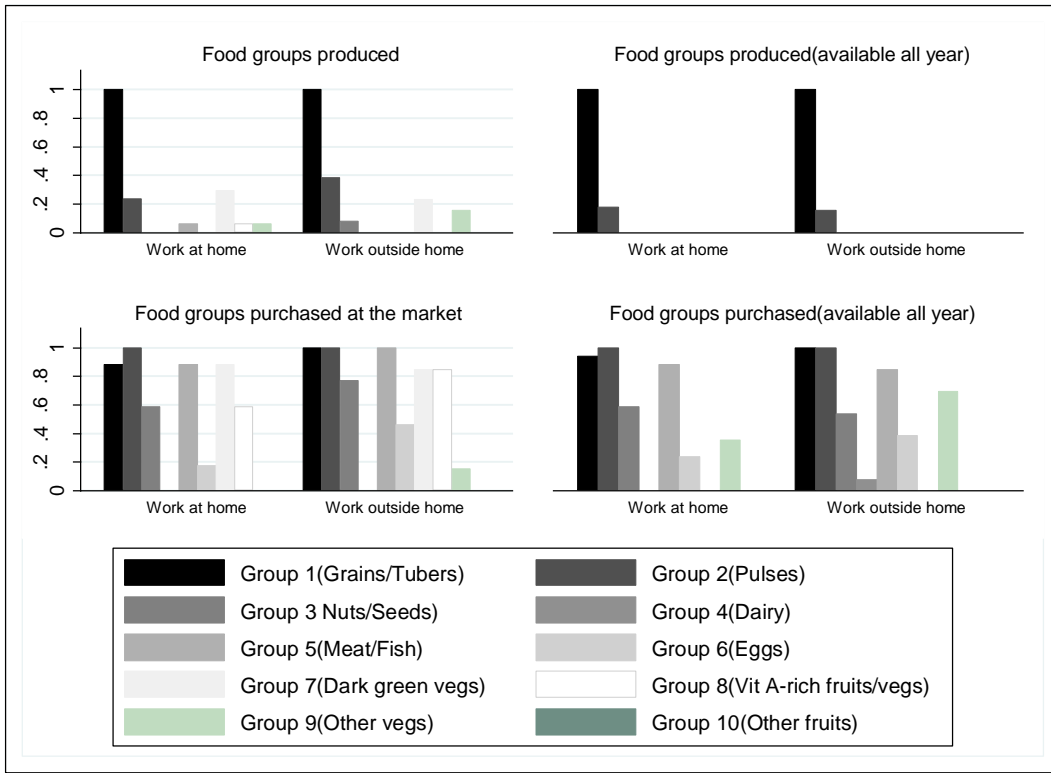
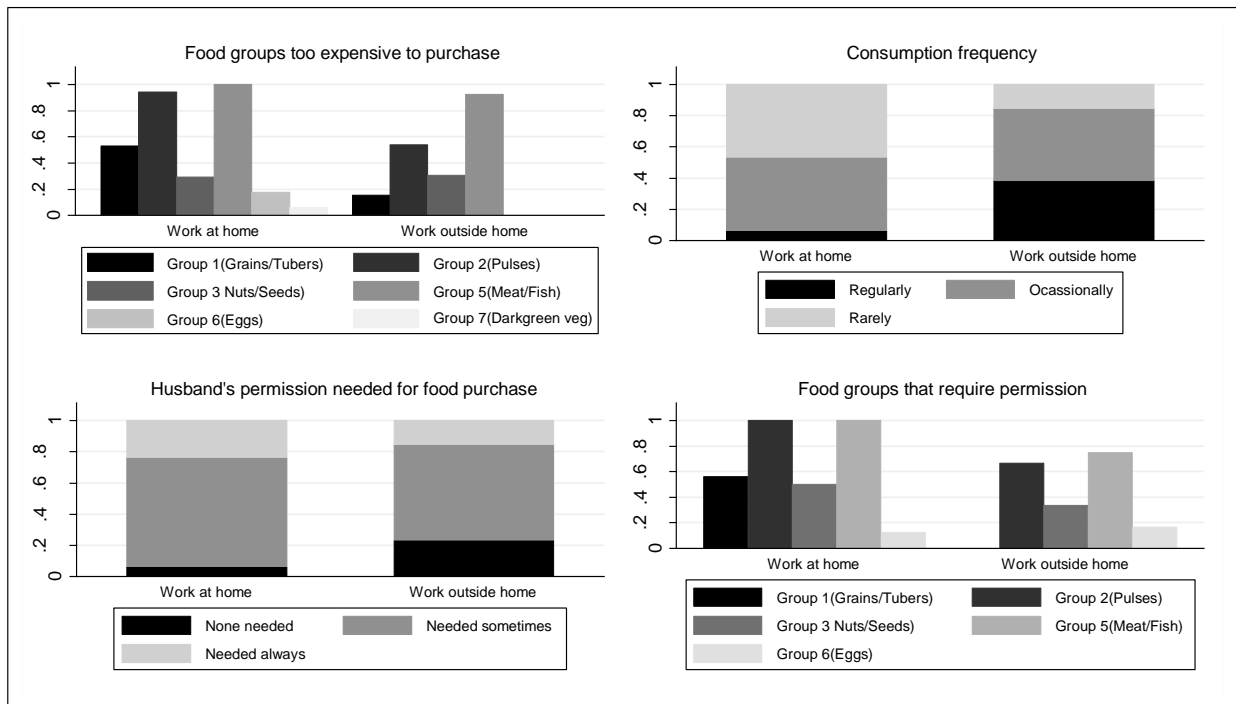


Figure 3.2: Expensive food groups and consumption frequency



Chapter 4

Examining the relationship between women's empowerment and infant and young children's food consumption across 5 sub-Saharan Africa countries

4.1. Abstract

This paper investigates the relationship between women's empowerment and infant and young children's food consumption using recent demographic and health surveys across five sub-Saharan Africa countries. Infant and young children's dietary diversity scores and food items consumed were examined as outcome measures where ordinal least squares (tested with marginal effects from Poisson regression) and linear probability models (tested with marginal effects from logistic regression) were specified. Analyses were cluster-adjusted and weighted, and important covariates were included. Women's empowerment through improved social independence (autonomy) was positively associated with improved dietary diversity and consumption of dairy and dairy products, legumes, and other fruits and vegetables in the pooled analyses and two out of the five countries examined appear to account for the significant associations. Findings suggest that improvement in women's social independence (autonomy) is important towards improved dietary diversity and consumption of some nutrient-rich food items although these benefits vary across the different countries examined. The difference in benefits suggest that women's empowerment is influenced by prevailing norms and related factors which are context specific. Improvement in women's empowerment is crucial in improving children's nutrition outcomes including food consumption however, efforts towards this should reflect contextual factors that tend to differ across settings.

4.2. Introduction

Although the pathways through which nutrition impacts on human health and development, and economic prospects are multifaceted, findings point to the need to improve the nutrition of important populations including women and children (Strauss & Thomas, 1998; World Health Organization, 2018). To achieve better nutrition outcomes, diversity in diet is encouraged to enable individuals consume the needed micronutrients for healthy growth, development, and functioning (Hoddinott & Yohannes, 2002; Honfoga & van den Boom, 2003; Sibhatu et al., 2015). Dietary diversity has been defined by many development organisations and experts and according to Ruel, (2003b, p 3912), ... “dietary diversity is the number of different foods or food groups consumed over a reference period”. To examine dietary diversity, many measures have been developed that can be applied to women and children including the dietary diversity score and minimum dietary diversity measure for women of reproductive age (WDDS and MDD-W) (FAO & FHI 360, 2016) and the infant and young children dietary diversity score (IYCDDS) (WHO, 2010). For this study, the focus was on the IYCDDS which is one of the measures of infant and young children feeding (IYCF) practices and is examined as the mean score of the number of food groups consumed by children 6–23 months of age out of seven food groups in a 24 hour cycle (WHO, 2010).

To improve on IYCF practices, empowering women as primary caregivers has been identified as a key strategy (Cunningham, Ruel, et al., 2015; Girma & Genebo, 2002). A summary of the literature on the relationship between women’s empowerment and children’s dietary diversity can be found in Chapter 1 where studies found a strong link between improved women’s empowerment (across several domains of empowerment including economic, autonomy, and agency) and improved children’s dietary diversity (Aemro et al., 2013; Malapit & Quisumbing, 2015; Muzi Na, Jennings,

Talegawkar, & Ahmed, 2015). In order to better understand the relationship between women's empowerment and key human development indicators including IYCF practices, different approaches have been used. Many routine cross-country standardized and nationally representative surveys, including the Multiple Indicator Cluster Surveys (UNICEF, 2000) and the Demographic and Health Surveys (DHS, 2008) now have modules or questions that examine women's empowerment indicators (including women's participation in decision-making, access to education and other socioeconomic indicators, attitudes and perceptions of domestic violence, and asset ownership). These embedded questions are now used in many cross-country analyses to examine trends, determinants, and causal effects of women's empowerment and key welfare indicators (including health, economic, and social indicators) (Grépin & Bharadwaj, 2015; Osamor & Grady, 2016). These surveys, however, are predominantly conducted in LMICs, hence nationally representative cross-country measures that can provide information on gender inequality and empowerment are lacking in many upper-middle- and-high income countries.

Beyond individual questions in cross-country standardized surveys, many tools have been developed to measure women's empowerment in the bid to better grasp how women's empowerment dictate women's participation in economic activities including agriculture, and access to services including nutrition and healthcare at household and community levels (Alkire et al., 2013; Amin & Becker, 1998; Ewerling et al., 2017; Lemke et al., 2003; R. S. Meinzen-Dick et al., 2017, 2019; Miedema et al., 2018; Vaz et al., 2016). Some of these tools have been developed out of known cross-country standardized surveys including the DHS (Ewerling et al., 2017; Miedema et al., 2018) while others have been developed as tools to be used in programme evaluations (Malapit et al., 2019; Meinzen-Dick et al., 2017; Vaz et al., 2016). These measures have been used to examine the relationship between women's empowerment and key indicators including health and economic outcomes.

However, since empowerment is culture- and context-specific and hence difficult to measure, there is no consensus on what concepts, domains, and indicators of empowerment that matter most for specific nutrition outcomes. In addition, due to the influence of contextual factors and cultural norms, women's empowerment measures might exhibit different associations with nutrition outcomes in different settings. This is in line with evidence from numerous studies that have applied different measures of women's empowerment and children's dietary diversity in LMICs (Emerson et al., 2017; Ewerling et al., 2017; Malapit & Quisumbing, 2015; Miedema et al., 2018). While different concepts, domains, and indicators of empowerment embedded in different measures of women's empowerment confer varied benefits on infant and young children nutrition and dietary diversity, the consensus is that women's empowerment is important for improving IYCF practices and nutrition outcomes (Bhagowalia, Menon, Quisumbing, & Vidhya Soundararajan, 2012; Cunningham, Ruel, et al., 2015; Galiè, Teufel, Girard, et al., 2019; Malapit et al., 2015; Malapit & Quisumbing, 2015).

The present study is focused on the Survey-based Women's emPOWERment (SWPER) index for women's empowerment in Africa (Ewerling et al., 2017) to examine the relationship between women's empowerment and the ICYDDS using the latest Demographic and Health Survey (DHS) rounds across five sub-Saharan African countries (Mozambique, Rwanda, Malawi, Zambia, and Uganda). The SWPER is one of the few women's empowerment measures that have recently been developed using questions embedded in the DHS. The index has been used to estimate the relationship between women's empowerment and institutional delivery, modern contraceptive use, and stunting prevalence but not with infant and young children dietary practices. Developed in 2017, the SWPER contains three domains of empowerment (*attitude towards violence, social independence*

(*autonomy*), and *decision-making*) and has received some critique and suggestions for further scrutiny and use in literature (Raj, 2017; Richardson, 2018; K. M. Yount et al., 2018). A few of the suggestions that informed this study include further cross-country disaggregated analyses, reliability and correlation tests, and examining its relationship with key nutrition and health outcomes. The primary objective of the present study was not only to examine the relationship between women's empowerment and the IYCDDS but also to examine which food groups within the IYCDDS are associated with improved women's empowerment across the three domains in the SWPER. We used pooled- and- disaggregated- analysis approaches and various hypotheses were tested. To test the hypothesis on how different domains of empowerment perform in regression models, we examined if empowerment domains should arbitrarily be aggregated into one score or not, and if the three domains in the SWPER should be analysed in a single or multiple regression models. We also explored the role of important covariates as controls, and interactions between empowerment domains and sex of index child, and between empowerment and household socioeconomic status using a wealth index. Analyses were conducted at the level of individual women and child.

4.3. Overview of the Survey-based Women's emPowERment (SWPER) index for women's empowerment in Africa

The Survey-based Women's emPowERment (SWPER) index was developed because of an identified need to have a more standardized index for measuring women's empowerment in routine cross-national surveys in LMICs (Ewerling et al., 2017). The index was developed after a systematic review of the literature on measures of women's empowerment (Ewerling et al., 2017). This review found that where available, indicators of women's empowerment came mainly from reports that based their analysis on specific countries or surveys where information on gender equality and empowerment were selected and grouped arbitrarily, and weights to empowerment indicators were

defined without a clear strategy. In addition, the review found that the most widely used empowerment and gender equality indicators, such as the Gender Development Index (GDI) and the Gender Inequality Index (GII), are calculated at the country level (Charmes and Wieringa, 2003; Dijkstra and Hanmer, 2000; Morse, 2015; UNDP, 1999; Schüler, 2006; UNDP, 2010; White, 1997). To address this identified gap in knowledge, Ewerling et al. (2017) developed the SWPER tool using data from the DHS as an index that encompasses three well known domains of women's empowerment (*attitude to violence, social independence, and decision-making*) which requires responses both from women and men in the household. Table 4.1 describes variables included in the SWPER index. Negative values in the mean empowerment score in any of the domains of empowerment imply that women are less empowered than men and vice versa for positive values (see Appendices 2 for more information on the development of the index).

4.3.1. Development of the SWPER index

The first domain, attitudes towards violence, was dominated by questions related to the respondent's opinion about whether wife-beating was justified or not in various scenarios. The second domain, social independence, included items related to education, information (frequency of reading newspaper or magazine), and age at first child's birth and at first cohabitation. The differences between the woman respondent and her husband in terms of education and age also appeared in this domain, but with lower loadings. The third domain, decision-making, comprised questions about involvement in household decisions and, with a lower loading given to whether the respondent performed any paid work in the past 12 months. In total, 15 items were extracted from the DHS and principal component analysis factor loadings were used to construct the index (see Appendices 2 for more information on the development of the index).

The SWPER enables within-country and between-country comparisons, and time trend analyses for African countries. It can be calculated at the individual, enabling detailed analyses to be done of empowerment as an outcome itself or as a determinant of other outcomes such as nutrition. While a major constraint of the metric is its restricted usability among only African countries due to reliance on key empowerment questions in the DHS, the metric addresses a prevalent gap in knowledge and aids in the work on estimating women's empowerment and its relationship with health and development outcomes. The methodology for creating the SWPER index is contained in Ewerling et al. (2017). To examine the convergent validity of the index, Ewerling et al. (2017) examined its association with contraceptive use, institutional delivery, and stunting. Findings suggested that decision-making domain presented positive and statistically significant adjusted effects for modern contraceptive use in 20 out of the 34 countries used to develop the index. After adjusting for wealth, 27 of 34 countries had a positive and statistically significant effect between social independence and institutional delivery, but only seven countries showed a statistically significant association with stunting.

A review of the 15 items extracted from the DHS and included in the development of the index illustrates which items are important drivers of the performance of the three domains across the five SSA countries examined in the present study (see Table 4.2). Women were mostly disempowered in their attitude towards domestic violence domain in Uganda and Zambia and more empowered in Mozambique and Malawi. Rwanda experienced moderate empowerment. This is because the percentage of respondents that consider wife-beating as justified across different scenarios are highest in Uganda and Zambia and lowest in Mozambique and Malawi. Women were also more disempowered in the social independence domain in Malawi and Mozambique and most empowered in Rwanda. This is because women recorded lower years of education in Mozambique and lower ages at first cohabitation and first birth in Malawi. Although there were high rates of women's

employment in the past 12 months, further review of the data shows that between 11% (in Rwanda) and 35% (in Malawi) of employment were paid neither in cash or in kind. Women were moderately empowered across the five SSA countries in decision-making since women reported similar rates across the three decision-making questions.

4.4. Country context and justification

This study covers five countries (Zambia, Malawi, Uganda, Rwanda, and Mozambique) in two economic regions in sub-Saharan Africa (SSA) with vast differences in economic outlook, social and gender norms, geography, agricultural practices, and other demographic characteristics. These countries fall within the lower-and-middle-income bracket with GDP per capita ranging from 338.48USD (Malawi) to 1,509USD (Zambia) in 2017 dollars (World Bank, 2017). Agriculture is the mainstay of rural populations in these countries and a major driver of rural economic growth. It is believed that within rural households in these and indeed most SSA countries, poverty, cultural and religious factors determine most of the households' decisions that affect economic activities including food consumption. Understanding the role of women's empowerment in such diverse settings will aid in ascertaining if one-size-fits-all policies are appropriate in these countries when it comes to women's empowerment policies and programmes. Further, social welfare interventions like cash transfers tied to improved nutrition practices and access to economic inputs can be made more effective with a better understanding of the role of women's empowerment and women's access to resources including food.

The relationship between the domains of empowerment and IYCF using the SWPER in these contexts after controlling for the effect of key characteristics will shed more light on the usability of the index. Examining the findings by Ewerling et al. (2017) on the association between the different domains of the index and stunting prevalence, out of the five SSA countries, only Zambia (in attitude towards violence domain) and Rwanda (in decision-making domain) reported positive and statistically significant adjusted effects. This sheds light on the need for more analyses using the index to examine the effects of women's empowerment and key nutrition and development outcomes including dietary diversity. In addition, Ewerling et al. (2017) only examined childhood stunting and used the wealth index as the only control variable to estimate adjusted effects. However, there are many exogenous factors (including maternal education and nutrition, illnesses, sanitation, etc.) that could crucially influence the causal pathway between food intake and outcomes such as stunting. Hence, this study goes beyond adjusting for the effects of wealth to include other demographic and geographical determinants that were not controlled for in the analysis by Ewerling et al. (2017).

Understanding the issues surrounding women's empowerment and children's dietary diversity is crucial if there are hopes to reduce the prevalent and incident rates of adverse health outcomes for women and their children including stunting, wasting, and anemia. This becomes more relevant in developing countries like those found in SSA countries where the gender of the child plays an important role in feeding practices by parents (for examples, see Malapit & Quisumbing, 2015; Sraboni & Quisumbing, 2018).

4.5. Data, empirical specification, and variables

4.5.1. Data

To investigate the relationship between women's empowerment and children's dietary diversity using the SWPER indexes, data was extracted from the latest DHS rounds in five African countries included in the development of the SWPER index.

4.5.2. The Demographic and Health Survey (DHS)

The DHS is primarily administered to female respondents as measured indicators relate mostly to maternal and child health outcomes. There are ten modules in the DHS questionnaire, including a module on women status and other gender-related questions including perception of domestic violence. The five countries examined have routine DHS surveys conducted every phase and our analysis focused on the most recent available data obtained in Phase 6 (2008-2013) or Phase 7 (2013-2018). In total, 14,688 married women (3,411 in Uganda, 3,245 in Zambia, 2,363 in Mozambique, 1,917 in Rwanda, and 3,752 in Malawi) provided information on dietary diversity for their children aged 6-23 months (see Figure 4.1 for the breakdown of the analysed sample obtained from the DHS).

The DHS samples were selected using a cluster design in urban areas and rural areas. The datasets also contain a weighting variable that was calculated using cluster-adjusted weights and all respondents were married and/or cohabiting women. The focus was on sampled households with a living child and where information on children's dietary diversity was collected.

4.5.3. Infant and young children's dietary diversity outcome variable

The Infant and young children's dietary diversity score (IYCD) is an indicator used to examine the quality of diet for children aged 6 - 23 months old. This indicator is one of eight Infant and

Young Children Feeding (IYCF) indicators developed by the WHO to provide simple, valid, and reliable metrics for assessing IYCF practices at the population level (WHO, 2008). We measured IYCDDS as the number of food groups from which items were consumed by children 6-23 months in the past 24 hours. The food groups include; (1) Grains, roots, & tubers; (2) Legumes and nuts; (3) Dairy products; (4) Flesh foods; (5) Eggs; (6) Vitamin-A rich fruits & vegetables; and (7) Other fruits & vegetables. IYCDDS can be useful in capturing a population-level picture of infant and young child diet quality and the adoption of appropriate complementary feeding practices (Howlader et al., 2012). According to WHO guidelines, infant and young children are recommended to consume foods from a minimum of four groups. To limit the chance of the effect of women's breastfeeding status especially exclusive breastfeeding for infant 0-6 months, analysis was restricted to children 6-23 months, however, women's breastfeeding status was added as a control variable since this was not included in the IYCDDS food groups.

The DHS data for the five SSA countries contain information on the youngest child's consumption of items from seven food groups as reported by the female primary caregiver with a 24-hour recall period. IYCDDS was examined as a continuous variable where OLS regression models were specified. In addition, the different food groups in the IYCDDS were examined as outcome variables using LPMs.

4.5.4. Key independent variables

The three domains of the SWPER index were used as the key independent variables. These domains examine women's empowerment in *decision-making*, *attitude towards violence*, and *social independence*. My hypothesis in line with Ewerling et al. (2017) was that each domain might have different associations with IYCDDS. To test this, five regression models were built; (1) with each of the three empowerment domains included in one model (model A); (2) with three models, each containing

only one of the three empowerment domains (models B, C and D) and (3) a model with the three domains cumulatively subsumed into one measure (model E). This is because studies have found that the effect of women's empowerment on dietary diversity differ based on the domains of empowerment examined, and most studies that have used an empowerment measure usually examine the empowerment domains in separate regression models (Malapit & Quisumbing, 2015).

4.5.5. Control variables

Although many of the usual socio-demographic control variables (age, cohabitating status, education level, and employment status) were used to calculate variables included in the SWPER index, we included a few of these variables as controls based on our hypothesis and existing literature. Control variables were limited to socio-demographic (sex of child, breastfeeding status, urban/rural location, men's and women's education, and age), economic (wealth index), and geographical (location and study month) variables. For the geographical control variables, four variables were extracted from the DHS GPS datasets, namely, growing season length, drought episodes, irrigation, and built population.

Growing season length – This GPS variable was estimated based on data collected between 1961 and 1991 and examines the length of growing period in sampled clusters. This refers to the number of days within the period of temperatures above 5°C when moisture conditions are adequate for crop growth. In most settings in SSA and under rain-fed conditions, the beginning of the growing period is usually linked to the start of the rainy season (FAO, 2007). This variable also controls for the effects of seasonal availability of food items on IYCDs as studies have shown the seasonal variations in availability of food items. The variable is reported in 1 – 16 categories with 1 representing zero days of growing season and 16 representing 365 days.

Drought episodes – This GPS variable was estimated using 1980 - 2010 precipitation data estimates for the Weighted Anomaly of Standardized Precipitation (WASP) (Dilley et al., 2005; CHRR, 2005).

Using the average monthly precipitation data, the WASP assesses the precipitation deficit or surplus over a three-month temporal window weighted by the magnitude of the seasonal cyclic variation in precipitation. The variable is categorised between 1 (low) and 10 (high) for the areas within the 10 km (rural) buffer surrounding the DHS survey cluster location and average number of drought seasons was used as the control variable. Our hypothesis was that drought-prone areas within sampled districts might have a more conservative agricultural activities and cropping patterns which would influence availability of food items included in the IYCDDS food groups.

Irrigation – This GPS covariate was developed using 2005 data to provide statistics on area equipped for irrigation per subnational unit using digital spatial data layers and printed maps (Siebert et al., 2013). The covariate measures the average proportion of the area within the 2 km (urban) or 10 km (rural) buffer surrounding the DHS survey cluster location equipped for irrigation at the time of measurement. Our hypothesis was that proximity to irrigation would influence food availability and dietary diversity.

Built population – This GPS variable was estimated in 2014 and examines human settlement within surveyed clusters in the DHS and was developed using satellite imagery to quantify built-up structures in terms of location and density (Pesaresi et al., 2015). The variable is an index ranging from 0.00 (extremely rural) to 1.00 (extremely urban) for the area within the 10 km (rural) buffer surrounding the DHS survey cluster locations. Due to the lack of a variable that examines distance to food markets, our hypothesis was that households within high density clusters would have more economic activities and transport infrastructure that might impact on access to food items belonging to the IYCDDS food groups.

Study month – We hypothesise that the month of data collection for the surveys included in this study might influence IYCDDS since months are linked to different environmental and economic

activities including rainfall, seasonal availability of food items, and cost of these items. The DHS was conducted between May and December in Mozambique (with January to March rainy season), October and February in Malawi (with November to April rainy season), November and April in Rwanda (with October to November, and March to May rainy seasons), June and December in Uganda (with October to November, and March to May rainy seasons), and August and April in Zambia (with November to April rainy season).

Wealth index – The wealth index as a measure of household socioeconomic status has already been calculated by the DHS hence, we included it in the models without further manipulation. Our assumption was that women’s empowerment would perform differently across different socioeconomic groupings and hence would have different effects on IYCDDS. To test this, we explored the interaction between SWPER and wealth index as it affects IYCDDS. This was also informed by suggestions from a recent systematic review conducted by Santoso et al. (2019).

Breastfeeding status – A dichotomous variable on current breastfeeding status was included as a control variable. Our hypothesis was that women’s breastfeeding status would influence children’s dietary diversity even as we restricted our analysis to children 6-23 months to avoid including children that are exclusively breastfed.

Location – A dichotomous (urban/rural) variable on respondents’ location was included as a control variable. We hypothesised that women’s location would play an important role on access to food items and dietary diversity.

Education (in years) – This is a continuous variable of men’s and women’s education levels. Although the difference in men’s and women’s education levels was included in the development of the SWPER index, our hypothesis was that women’s and men’s education levels will have important effects on their children’s dietary diversity since education might have effects that go beyond the

way it was incorporated in the index. This include improved knowledge transition and better choices including enhanced dietary diversity.

Age (in years) - This is a continuous variable of index child’s, men’s and women’s age. The difference between men’s and women’s age within households was included in the development of the SWPER index. However, our hypothesis was that women’s and men’s age as separate control variables might have important effects on their children’s dietary diversity. This was also informed by existing literature within similar contexts on the link between age and dietary habits (Muhammad et al., 2017).

4.5.6. Empirical specification

A systematic review of literature suggests that within households, an empowered woman would report greater dietary diversity for her children (Cunningham, Ruel, et al., 2015; Santoso et al., 2019). Although the reviews identified the lack of consensus on how empowerment is measured, our assumption was that women that scored higher on the SWPER index would be likely to practice and report better diversity in food groups consumed for their children. Analyses were disaggregated for the 5 SSA countries.

To specify the model, let Y_i be the outcome variable (IYCDDS) estimated as:

$$Y_i = \beta_0 + \beta_1 SWPER + \beta_2 C + \beta_3 I + \varepsilon \dots\dots\dots 1$$

where C is a vector of control variables; I is a vector of other demographic covariates;

$\beta_1, \beta_2,$ and β_3 are the estimated parameters/parameter vectors; and ε is the error term.

Estimating the interaction effect of sex of children and wealth index

$$Y_i = \beta_0 + \beta_1 SWPER + \beta_2 C + \beta_3 I + \beta_4 girl + \beta_5 (SWPER \times girl) + \varepsilon \dots\dots\dots 2$$

$$Y_i = \beta_0 + \beta_1 SWPER + \beta_2 C + \beta_3 I + \beta_6 Wealth + \beta_7 (SWPER \times Wealth) + \varepsilon \dots\dots\dots 3$$

where C, I; $\beta_1, \beta_2, \text{ and } \beta_3$ and ϵ are as above. For boys, the relationship between women's empowerment and the nutrition outcome is given by β_1 . For girls, the impact of empowerment is the sum of the coefficients of the empowerment variable and the coefficient of the interaction term with the girl child dummy ($\beta_1 + \beta_5$). If the nests of the test of the differential impact of women's empowerment on girls, which is represented by the coefficient on the interaction term (β_5) is significantly different from zero, then this suggests that women's empowerment has differential effects on boys and girls. For wealth index, the impact of empowerment is the sum of the coefficient of the empowerment variable and the coefficient of the interaction term with the wealth index dummy ($\beta_1 + \beta_6$). Also, if the nests of the test of the differential impact of women's empowerment across the four quantiles of the index using the highest (richest) index as reference category, which is represented by the coefficient on the interaction term (β_7) is significantly different from zero, then this suggests that women's empowerment has differential effects between the lowest three and highest two wealth quantiles.

Estimating the different food groups as contained in the IYCDDS as outcome variables, we used linear probability models (LPMs) to examine the probability that women consumed specific food groups (i.e. the seven food groups in the IYCDDS). let y_i be the outcome variable (different food groups in the IYCDDS) estimated as:

$$y_i = \sigma_0 + \sigma_1 SWPER + \sigma_2 C + \sigma_3 I + \epsilon \dots \dots \dots 4$$

where C is the control variables; I is for other demographic covariates; $\sigma_1, \sigma_2, \text{ and } \sigma_3$ are the parameters to be estimated interpreted as the change in the probability that $y_i = 1$, holding constant the other regressors; and ϵ is the error term. The SWPER is treated the same as described in equation 1.

Stata version 14.1 was used to perform multiple regression analysis to explore relationships between identified dependent and independent variables., Descriptive analyses were performed where means, percentages, and standard deviations were reported for children’s dietary diversity, the SWPER empowerment domains, and other covariates. To examine the relationship between the SWPER domains and IYCDDS including interaction effects with important sociodemographic covariates, OLS regressions were specified. To examine the relationship between the significant SWPER domain and children’s consumption of different food groups, LPM regression analyses were used. All regression models were adjusted for the effects of specified covariates, controlled for cluster sampling effects (including sampling bias and the lack of independent and identically distributed properties), and appropriate sampling weights were applied during analysis. In addition, internal validity and scale reliability tests were performed using the variables included in the index. These further analyses were informed by the review of the index, offered by Yount et al. (2018) and Richardson (2018) where further analyses were suggested to strengthen the usability of the index. The same variable weights used by Ewerling et al. (2017) were applied in developing the index. To test our regression approach, two additional regression analyses were performed, namely Poisson regressions (to test the OLS models) and Logistic regressions (to test the LPM models), and marginal effects were estimated. Significance was established at 95% confidence interval.

4.6. Results

The descriptive statistics of the sample are summarised in Table 4.3, the IYCDDS regression results in Tables 4.4 – 4.7, and Figures 4.4 and 4.5 illustrate the LPMs regression results.

4.6.1. Sample characteristics

Data was extracted from 18,816 married women with children residing in rural and urban areas. The average age of female respondents was 27.9 years (SD: 6.6) and this remains relatively the same across the five countries. Age of index child was 14.33 months (SD:5.2) on average (excluding last children who were below the age of six months and above 23 months) and approximately half of the sampled children were female. Average years of education for women was 5.42 years while Mozambique recorded the lowest education levels for women at 3.07 years. For the husbands of these women, the average years of completed education was 6.66 years with Mozambique also recording the lowest number of years at 4.50. Further disaggregation of sample characteristics can be found in Table 4.3.

Restricting analyses to married women with a living child between 6 and 23 months and using the same rounds of data, our findings are largely consistent with that of Ewerling et al. (2017) however, there are a few exceptions. There was a shift in the performance of Uganda across the three SWPER domains when compared to the findings by Ewerling et al. (2017) which used the same rounds of DHS data. There was a shift from moderate to high empowerment in participants' decision-making, and from poor to moderate empowerment for social independence and attitude towards violence domains. For Zambia, there was a shift from moderate to poor empowerment for attitude towards violence domain relative to the results presented by Ewerling et al. (2017) (see Fig 4.2). Across the five SSA examined, women's empowerment in decision making was the greatest, followed by attitude towards violence, with social independence (autonomy) recording the least empowerment except for Rwanda.

Results show a Cronbach alpha statistic of 0.035 indicating a very low internal consistency among the questions used to develop the SWPER index (Supplementary Table 8). This means that items within the tool may not be measuring the same underlying construct. Although the general suggestion is for tools to aim for a Cronbach alpha that is above 0.7 (Cronbach, 1951), the low Cronbach alpha reported in the SWPER construct is not necessarily a limitation because of the diverse nature of items included in measuring constructs like women's empowerment.

Using the recommended IYCF guidelines, 17% of sampled women reported that their index child consumed items from at least four food groups in the 24 hours preceding the study. For women that were not currently breastfeeding (n=2,431), 20% reported their child consumed items from at least four food groups. For those currently breastfeeding (n=13,168), 16% reported their child consumed items from at least four food groups. Across the five SSA countries, Rwanda recorded the highest number of infant and young children meeting the recommended consumption of items from at least food groups in a 24-hour period (25% for women who were not currently breastfeeding and 22% for those currently breastfeeding), while Mozambique recorded the least at 16% for those not currently breastfeeding and 10% for those currently breastfeeding (see Fig 4.3).

Results from the Pearson's and Spearman's correlation tests (supplementary Table 8) indicate a weak correlation between the three SWPER domains hence, retaining them in a regression model should not result in multicollinearity issues (see supplementary material). In addition, the regression models exhibited low multicollinearity with a square-root variance inflation factor of less than 3 across covariates. Results also suggest that including the three domains in a regression model does not significantly change the magnitude and direction of the associations between the three empowerment domains and IYCF when compared to having each domain as a separate model (see Table 4.4). While an aggregated SWPER approach appears to be significant (although with small magnitude), interpretation of such findings and ability to decipher which domain is driving the

significant association is restricted. These findings were also confirmed in our Poisson regression analyses (see supplementary Tables 1 - 6).

4.6.2. Empowerment domains and children's dietary diversity

Results suggest that social independence is the only domain of empowerment that produced positive and significant associations with IYCDDS and consumption of food groups in the pooled and disaggregated analyses (Table 4.5 and Figures 4.4 and 4.5). While aggregated empowerment score was significantly associated with IYCDDS in the pooled analyses across all countries, there was no significant associations in the disaggregated analyses for individual countries. Also, building individual regression models for the three empowerment domains (models B, C and D) did not produce significantly different coefficients from having all three domains in one regression model (model A). Hence, we focused our interpretation of the results on coefficients derived from the one regression model (A) with the three empowerment domains. Findings from the pooled analysis suggest that a unit increase in the standard deviation of social independence domain was associated with a 14.2%-point increase in IYCDDS implying that improvements in women's social independence increases the likelihood of a child consuming a more diverse diet. However, this significant association was found in only Uganda (14.5%-point increase in IYCDDS) and Zambia (26.5%-point increase in IYCDDS) across the five SSA countries examined further suggesting that Uganda and Zambia might account for the significant associations in the pooled analysis. While a unit increase in standard deviation in attitude towards violence was significant and positively associated with a 0.050%-point increase in IYCDDS in the pooled analysis, there were no significant associations found in the disaggregated analyses. Perhaps, this can be explained by the small magnitude of the association in the pooled and disaggregated analyses.

Further, analyses on the effect of interactions between the three domains of empowerment and key sociodemographic indicators on IYCDDS produced mixed results (see Table 4.6 and 4.7). In the pooled analyses, a unit increase in standard deviation of women's social independence was associated with a 14.3%-point increase in IYCDDS for female children implying that in households where the principal female reported improved social independence, girls were more likely to consume more diverse diets. For women who belonged to lower SES, there was no protective role of empowerment across the three domains examined except in Mozambique where findings suggest that a unit increase in standard deviation in attitude towards violence was associated with a 39%-point increase in IYCDDS.

4.6.3. Women's social independence and children's food consumption

Extending the analysis to investigate which food items were responsible for the association between women's social independence and IYCDDS, there were varying results between the pooled and disaggregated analyses (Figures 4.4 and 4.5).

In the pooled analysis, a unit increase in standard deviation of women's social independence increased the likelihood of consuming legumes by 2.5%-point, 5.8%-point for dairy and dairy products, and 3.1%-point for other vitamin A-rich fruits and vegetables suggesting that these food groups appear to account for the positive association between improvement in women's social independence and increased IYCDDS. This implies that in households where the principal woman experienced better empowerment through improved social independence, children were more likely to consume items from these three out of the seven food groups contained in the IYCDDS.

Conversely, a unit increase in standard deviation of women's social independence was associated

with a 2.8%-point decrease in the likelihood that a child would consume flesh proteins implying a negative association between improvement in women's social independence and consumption of one out of the seven IYCDs food groups. In the disaggregated analyses, a unit increase in standard deviation of women's social independence was associated with a 5.5%-and 12.1%-point increase in the likelihood of consumption of dairy and dairy products in Uganda and Zambia respectively. In Zambia only, a unit increase in standard deviation of women's social independence was associated with a 9.7%-point increase in the likelihood of consuming grains and tubers, and a 7.6%-point increase in the likelihood of consumption of other vitamin A-rich fruits and vegetables. This implies that children in household where the principal female caregiver was empowered in improved social independence were more likely to consume dairy and dairy products in Uganda and Zambia, and grains and tubers, and other vitamin A-rich fruits and vegetables in Zambia only. These findings were also confirmed in the logistic regressions (see supplementary tables).

4.6.4. Summary findings – associations between covariates and children's dietary diversity

Results from key control covariates indicate that gender of child, women's and men's age, and rural location exhibited no significant relationship with IYCDs across all five countries examined (see Table 4.5). Maternal education was significantly and positively associated with IYCDs in Rwanda and Malawi, but not in Mozambique, Uganda, and Zambia implying that increases in years of maternal education is associated with improved dietary diversity for children in two out of the five countries examined. Increases in paternal education was significantly and positively associated with improved IYCDs in Mozambique and Uganda but not in Malawi, Rwanda, and Zambia.

Increases in index child's age was positively associated with IYCDs across the five countries examined implying that as index child increases in age, children are more likely to consume a more diverse diet. There was a negative significant relationship between being breastfed and increases in IYCDs in Mozambique and Uganda but not in Rwanda, Malawi, and Zambia suggesting that

when the index child is breastfed, children are less likely to consume a more diverse diet in two out of the five countries examined.

4.7. Discussion

The present study provides evidence of the relationship between women's social independence and children's food consumption in two ways, namely, by examining children's dietary diversity score and by examining which food groups within the dietary diversity score that are most influenced. Findings suggest that the relationship between improved women's social independence and children's dietary diversity differs across the countries examined and where there were significant associations, different food groups in specific countries appeared to account for this relationship. Although there is yet no consensus on how empowerment should be measured and studies use different measurements, domains and indicators, the present study findings are consistent with literature. Evidence suggests that different empowerment indicators and domains including time use (Johnston et al., 2015; Komatsu et al., 2018), gender parity gap (Malapit et al., 2015), input in production decisions and credit decision-making (Malapit & Quisumbing, 2015), group membership, autonomy in production, credit decision-making, workload (Yimer & Tadesse, 2015), and socio-familial and economic domains of empowerment (Muzi Na et al., 2015) in different settings confer varied benefits on nutrition outcomes including dietary diversity for children. The diverse nature of the relationship between women's empowerment through improved autonomy and social independence suggests that contextual factors across different countries might play an important role in women's ability to gain and express empowerment which in turn impacts on dietary diversity and quality, and this is consistent with conclusion drawn from other studies

(Cunningham, Ruel, et al., 2015; Komatsu et al., 2018; Murugani & Thamaga-Chitja, 2019; Muzi Na et al., 2015).

The finding of no association between the sex of child and dietary diversity is consistent with the existing literature which suggests that gender biases are strongest in South Asia, and more nuanced elsewhere (Cunningham, Ruel, et al., 2015; Haddad, Peña, Nishida, Quisumbing, & Slack, 1996; Malapit & Quisumbing, 2015), however, the differential impact of improved women's social independence and dietary diversity between boys and girls (although only significant in one out of the five SSA countries examined) is somewhat consistent with literature. Malapit and Quisumbing (2015) reported that girls were more likely to consume a more diverse diet in households where the principal female caregiver had an input in credit decision-making but less likely to consume a more diverse diet in households where the principal female caregiver was empowered in agriculture. Sraboni and Quisumbing (2018) found that the different domains of empowerment suggested a positive association with improved dietary diversity for boys 6-59 months. While these studies used a different measurement of empowerment, findings draw the link to the need for empowering women in LMICs like those found in SSA where there are still prevailing male preferences (Chen et al., 1981; Messer, 1997; Patel & Rodrigues, 2002) that could limit access to crucial resources including diverse foods for females. While the present study found a limited effect in the interaction between the different domains of empowerment and wealth index on children's dietary diversity, to my knowledge, the present study is the first to investigate such interactions in literature and provides important comparable data for future studies that might use different measures to investigate the characteristics of a woman that could benefit most from empowerment, as suggested by Santoso et al. (2019).

The present study is also the first to examine the relationship between women's empowerment and children's consumption of foods from each of the specific food groups contained in dietary diversity measures and findings are important towards efforts to improve diet quality for infant and young children. Although findings varied across different countries examined, the present study suggests that empowering women through improved social independence appears to be most important in increasing the likelihood of children consuming nutrient-rich dairy and dairy products, and vitamin A-rich fruits and vegetables. Evidence from existing studies although limited are somewhat consistent with the present study finding where Sraboni and Quisumbing (2018) found that improved social wellbeing of women conferred mixed benefits towards vitamin A and protein intake for male and female infants and young children. This further supports the present study findings and suggest the need for empowering women in LMICs including in SSA in an effort to redress the prevailing high rates of adverse nutrition outcomes (Iannotti et al., 2009).

The present study has several limitations. First, the outcome of interest was based on a 24-hour recall information collected at one visit: this may not provide enough or accurate information of dietary patterns when compared to multiple visits. Future studies might consider examining children's dietary diversity using longitudinal methods. Second, the present study cannot suggest causality due to the inability to control for endogeneity hence our findings are reported as associations since we could not find an appropriate instrumental variable due to time and space restrictions. Future studies including those that could identify appropriate instrumental variables might be able to add to this gap in literature. It would be important to examine how food consumption and dietary diversity changes for boys and girls as they get older since findings from Sraboni and Quisumbing (2018) suggest a gender bias that favours male children at adolescence in Bangladesh.

The relationship between women's empowerment and children's dietary diversity are diverse where different domains might confer benefits and these benefits might also differ across different settings. This finding adds to existing literature on the diverse nature of women's empowerment where contextual factors play a significant role. Beyond dietary diversity, improved social independence for women provide benefits towards improved consumption of nutrient-rich food items and this finding should be important for food and nutrition policymakers with interests in improving children's nutrition intake. The present study also provides information that could potentially inform future studies that aim to examine the role of women's empowerment towards improved food intake for children.

Figure 4.1: Breakdown of the DHS sample

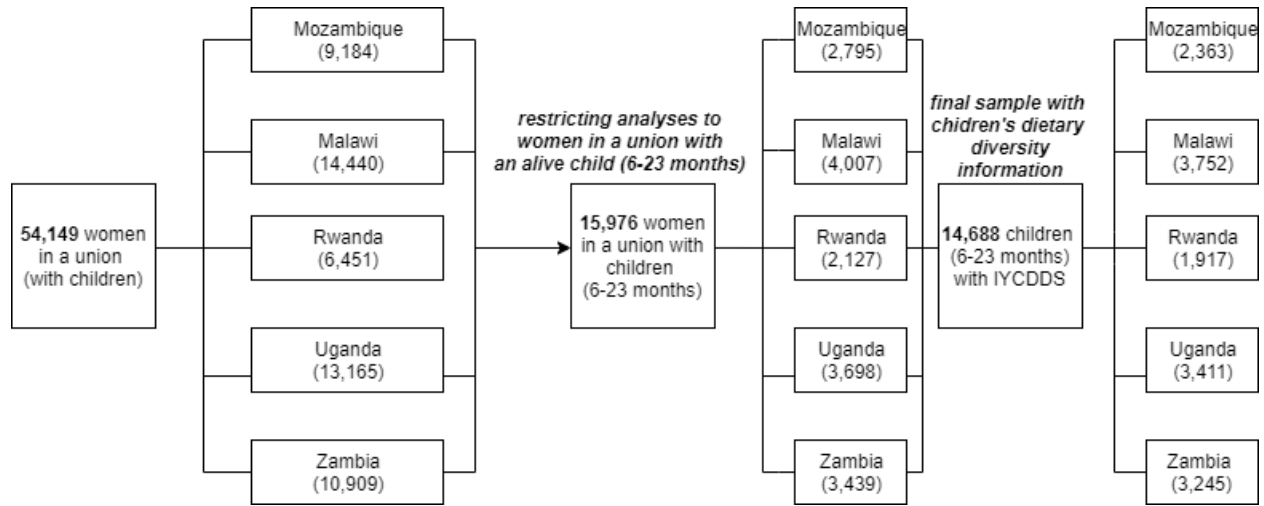


Figure 4.2: Country performance in women's empowerment using the SWPER index

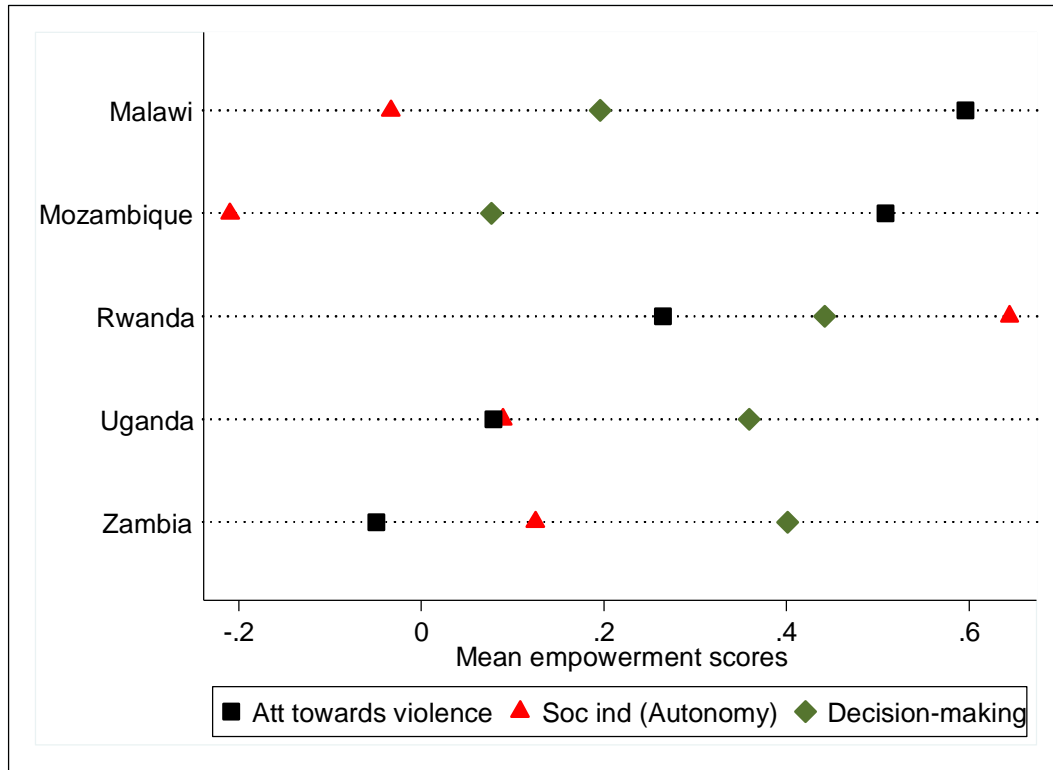


Figure 4.3: Number of food groups consumed by children 6 - 23 months

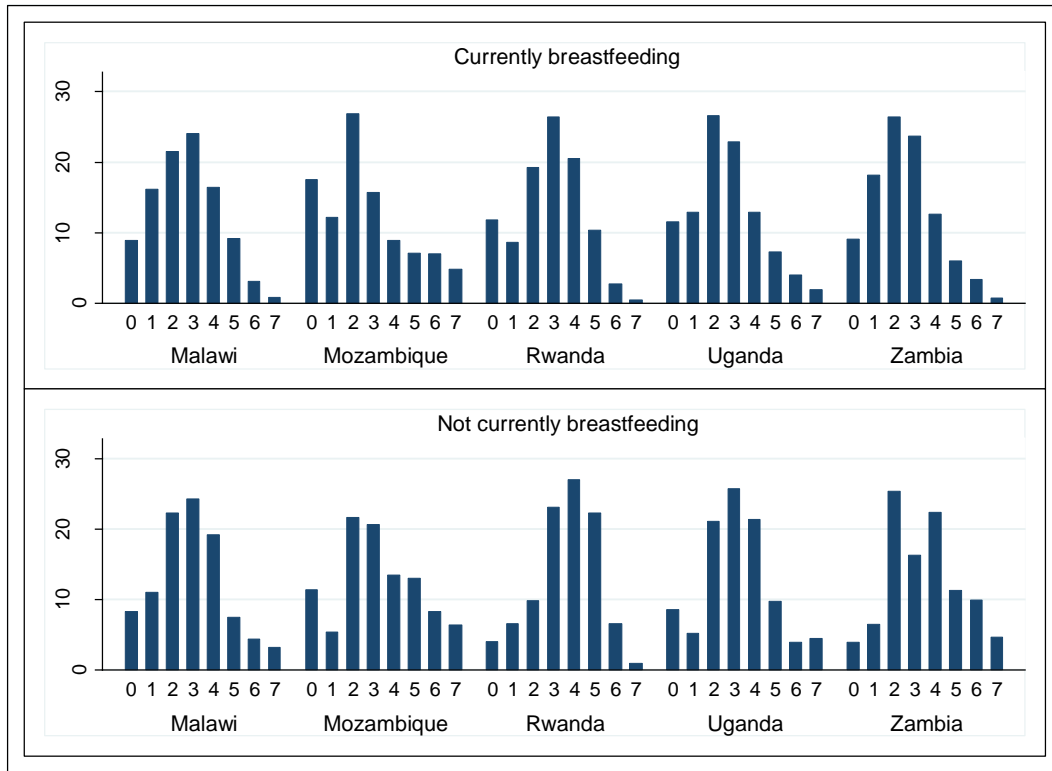
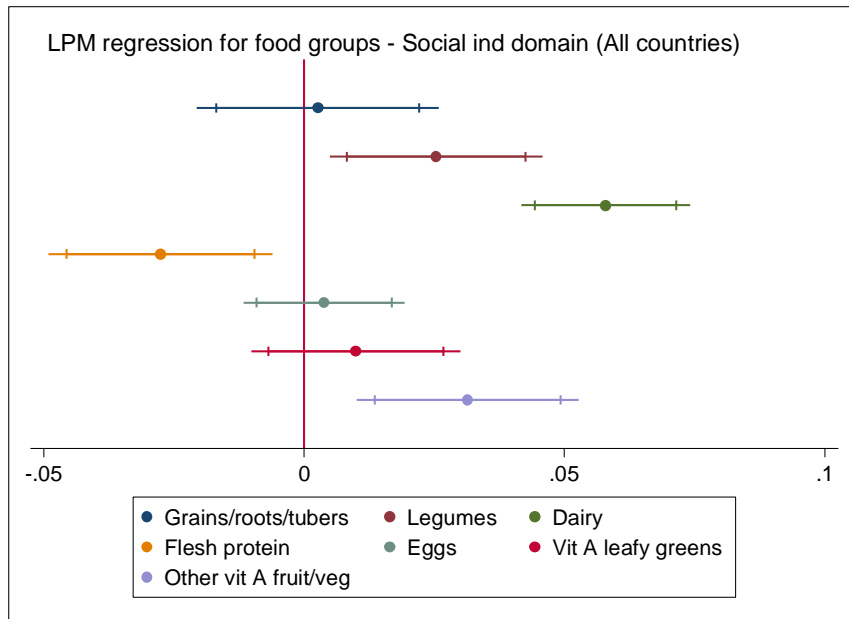
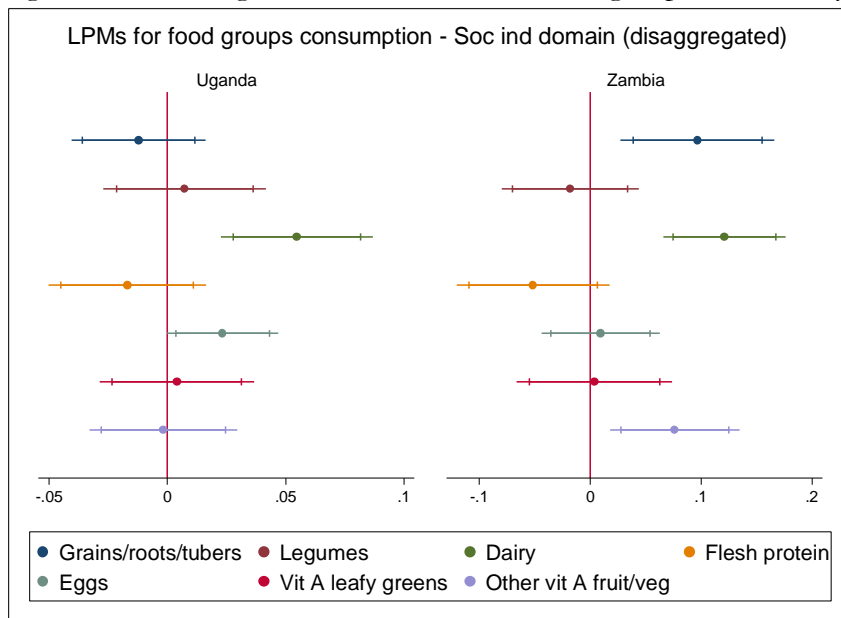


Figure 4.4: LPM regression results for each food group (All countries)



Note: Economic, demographic, and GIS control variables included in each model; lines indicate 90% and 95% confidence intervals

Figure 4.5: LPM regression results for each food group – Autonomy (soc ind)



Note: Economic, demographic, and GIS control variables included in each model; lines indicate 90% and 95% confidence intervals

Table 4.1: Description and coding for the variables included in the composition of the SWPER index

	DHS questions	Code or unit
Attitude towards Violence	Beating justified if wife goes out without telling husband	Justified= -1; don't know=0; not justified =1
	Beating justified if wife neglects the children	Justified= -1; don't know=0; not justified =1
	Beating justified if wife argues with husband	Justified= -1; don't know=0; not justified =1
	Beating justified if wife refuses to have sex with husband	Justified= -1; don't know=0; not justified =1
	Beating justified if wife burns the food	Justified= -1; don't know=0; not justified =1
Social independence	Frequency of reading newspaper or magazine	Not at all=0; <once a week=1; ≥once a week=2
	Respondent worked in last 12 months	No=0; in the past year=1; have a job, but on leave past 7 days=2; currently working=2
	Woman's education	Years
	Education difference: woman's minus husband's years of schooling	Years
	Age difference: woman's minus husband's age	Years
	Age at first cohabitation	Years
	Age of respondent at 1st birth	Years
Decision making	Who usually decides on respondent's health care	Husband or other alone= -1; joint=0; respondent alone=1
	Who usually decides on large household purchases	Husband or other alone= -1; joint=0; respondent alone=1
	Who usually decides on visits to family or relatives	Husband or other alone= -1; joint=0; respondent alone=1

(source: Ewerling et al., 2017)

Table 4.2: Distribution of the 15 SWPER items extracted from the DHS (percentages unless otherwise specified)

	Rwanda	Uganda	Zambia	Malawi	Mozambique
DHS questions: Attitude towards violence (response=yes)					
1. Beating justified if wife goes out without telling husband	19.7	40.0	38.0	7.1	9.2
2. Beating justified if wife neglects the children	27.0	40.6	39.3	9.0	7.4
3. Beating justified if wife argues with husband	18.4	28.8	42.1	7.2	13.3
4. Beating justified if wife refuses to have sex with husband	23.0	20.2	37.2	8.7	6.0
5. Beating justified if wife burns the food	6.8	13.6	30.0	5.6	6.4
DHS questions: Social independence					
6. Frequency of reading newspaper or magazine (less than once a week; [at least once a week])	18.5 [3.5]	10.0 [6.4]	11.0 [13.2]	10.1 [6.1]	4.7 [6.7]
7. Respondent worked in last 12 months ^a (work in the past year & currently working/on leave)	91.97	80.77	55.86	69.63	46.38
8. Woman's education in years (mean [SD])	4.8 [3.6]	6.0[4.0]	6.0 [3.6]	5.8[3.5]	3.4 [3.4]
9. Education difference: woman's minus husband's years of schooling (mean [SD]) ^b	-0.2[3.3]	-1.3[3.7]	-1.7[3.3]	-1.3 [3.5]	-1.5 [3.1]
10. Age difference: woman's minus husband's age (mean [SD]) ^c	-4.1[5.7]	-6.1[5.7]	-6.0[4.7]	-5.5[5.6]	-6.3[7.3]
11. Age at first cohabitation (mean [SD])	21.4[3.6]	18.2[3.7]	18 [3.3]	15.8 [3.2]	18 [4.1]
12. Age of respondent at 1st birth (mean [SD])	22.3[3.6]	18.8[3.2]	18.5[2.9]	16.7 [2.9]	18.6 [3.5]
DHS questions: Decision making					
13. Who usually decides on respondent's health care (Sole)	21.72	26.84	30.37	18.31	21.94
14. Who usually decides on large household purchases (Sole)	8.98	14.10	11.40	7.42	12.12
15. Who usually decides on visits to family or relatives (Sole)	14.92	21.89	19.82	16.69	14.43

^aany work regardless of income generation; ^bnegative numbers indicate that men are more educated than women; ^cnegative numbers indicate men are older than women

Table 4.3: Sample characteristics of women and children (percentages, except where otherwise specified)

	Mozambique	Malawi	Rwanda	Uganda	Zambia	Total
Maternal age (mean)	27.5	27.2	30.1	27.6	28.3	27.9
	(SD:7.08)	(SD:6.63)	(SD:5.93)	(SD:6.5)	(SD:6.7)	(SD:6.7)
Paternal age (mean)	33.90	32.56	34.31	33.76	34.45	33.72
	(SD:10.02)	(SD:8.98)	(SD:8.11)	(SD:8.88)	(SD:8.06)	(SD:8.89)
Index child's age months (mean)	14.21	14.40	14.08	14.32	14.50	14.33
	(SD:5.0)	(SD:5.1)	(SD:5.2)	(SD:5.2)	(SD:5.21)	(SD:5.2)
Probability child is female	51.7	48.6	49.8	49.7	49.5	49.7
Maternal years of education (mean)	3.07	5.62	4.76	6.46	6.49	5.42
	(SD:3.32)	(SD:3.57)	(SD:3.55)	(SD:4.03)	(SD:3.78)	(SD:3.88)
Paternal years of education (mean)	4.50	6.95	5.04	7.66	8.14	6.66
	(SD:3.73)	(SD:4.05)	(SD:3.87)	(SD:4.28)	(SD:3.78)	(SD:4.21)
Wealth index: Poorest	18.36	21.5	21.8	27.1	24.8	23
Poorer	20.18	23.2	20.9	21.9	24.2	24.2
Middle	21.31	19.9	18.5	18.5	22.1	20.1
Richer	20.81	17.6	17.8	15.9	19.7	17.6
Richest	19.34	17.5	20.8	16.5	15.1	16.9

Table 4.4: OLS Regression results for IYCDDS (pooled across all countries)

	(1) Model A	(2) Model B	(3) Model C	(4) Model D	(5) Model E
Att towards violence	0.050** (0.023)	0.053** (0.023)			
Social independence	0.142*** (0.034)		0.140*** (0.034)		
Decision-making	0.039 (0.025)			0.034 (0.025)	
SWPER cumulative					0.063*** (0.015)
Female index child	0.018 (0.039)	0.014 (0.040)	0.020 (0.039)	0.015 (0.040)	0.016 (0.039)
Maternal education	0.004 (0.008)	0.028*** (0.007)	0.006 (0.008)	0.028*** (0.007)	0.015** (0.007)
Paternal education	0.007 (0.005)	0.002 (0.005)	0.007 (0.005)	0.001 (0.005)	0.004 (0.005)
Maternal age	-0.004 (0.004)	0.005 (0.004)	-0.003 (0.004)	0.005 (0.004)	0.000 (0.004)
Paternal age	0.003 (0.003)	-0.001 (0.003)	0.003 (0.003)	-0.001 (0.003)	0.001 (0.003)
Wealth index [Q1: Lowest]	-0.256*** (0.042)	-0.262*** (0.042)	-0.270*** (0.042)	-0.278*** (0.042)	-0.257*** (0.042)
Age of index child	0.052*** (0.004)	0.052*** (0.004)	0.052*** (0.004)	0.052*** (0.004)	0.052*** (0.004)
Rural location	-0.127* (0.068)	-0.149** (0.069)	-0.132* (0.069)	-0.143** (0.068)	-0.132* (0.068)
Currently breastfeeding	-0.137** (0.068)	-0.137** (0.070)	-0.139** (0.069)	-0.136** (0.069)	-0.135** (0.068)
Study month	0.017*** (0.005)	0.015*** (0.005)	0.016*** (0.005)	0.015*** (0.005)	0.016*** (0.005)
Built population	-0.000*** (0.000)	-0.000** (0.000)	-0.000** (0.000)	-0.000** (0.000)	-0.000** (0.000)
Growing season length	0.000*** (0.000)	0.000*** (0.000)	0.000*** (0.000)	0.000*** (0.000)	0.000*** (0.000)
Proximity to irrigation	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
Drought episodes	-0.000*** (0.000)	-0.000*** (0.000)	-0.000*** (0.000)	-0.000*** (0.000)	-0.000*** (0.000)

Standard errors are in parenthesis

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table 4.5: OLS Regression results for IYCDDS (disaggregated by country)

	(1)	(2)	(3)	(4)	(5)	(6)
	All	Mozambique	Rwanda	Malawi	Uganda	Zambia
Att towards violence	0.050** (0.023)	0.079 (0.080)	-0.031 (0.039)	-0.051 (0.049)	0.040 (0.032)	-0.042 (0.049)
Social independence	0.142*** (0.034)	0.042 (0.087)	-0.112** (0.053)	0.090 (0.056)	0.145*** (0.051)	0.265*** (0.099)
Decision-making	0.039 (0.025)	-0.014 (0.054)	-0.047 (0.044)	0.064* (0.035)	0.008 (0.037)	0.145** (0.073)
Female index child	0.018 (0.039)	-0.030 (0.090)	0.097 (0.065)	0.020 (0.055)	0.038 (0.057)	-0.052 (0.120)
Maternal education	0.004 (0.008)	0.026 (0.022)	0.058*** (0.014)	0.041*** (0.013)	0.006 (0.015)	-0.010 (0.020)
Paternal education	0.007 (0.005)	0.032** (0.016)	0.010 (0.011)	0.004 (0.008)	0.030*** (0.009)	-0.007 (0.018)
Maternal age	-0.004 (0.004)	0.001 (0.012)	0.013 (0.009)	-0.006 (0.006)	-0.003 (0.008)	0.001 (0.015)
Paternal age	0.003 (0.003)	0.002 (0.007)	-0.010* (0.006)	0.004 (0.004)	0.005 (0.005)	0.005 (0.011)
Wealth index [Q1: Lowest]	-0.256*** (0.042)	0.173 (0.119)	-0.573*** (0.079)	-0.266*** (0.070)	-0.122 (0.074)	-0.346** (0.144)
Age of index child	0.052*** (0.004)	0.044*** (0.009)	0.056*** (0.007)	0.060*** (0.006)	0.032*** (0.006)	0.067*** (0.011)
Rural location	-0.127* (0.068)	-0.049 (0.162)	-0.204* (0.106)	-0.319*** (0.114)	-0.031 (0.104)	-0.122 (0.116)
Currently breastfeeding	-0.137** (0.068)	-0.249* (0.130)	-0.178 (0.120)	0.010 (0.090)	-0.218** (0.090)	-0.218 (0.204)
Study month	0.017*** (0.005)	-0.046 (0.036)	0.004 (0.007)	0.047*** (0.006)	-0.109*** (0.024)	0.003 (0.012)
Built population	-0.000*** (0.000)	0.000*** (0.000)	-0.355 (0.362)	0.000** (0.000)	-0.000 (0.000)	0.000 (0.021)
Growing season length	0.000*** (0.000)	0.000*** (0.000)	-0.049* (0.029)	0.004 (0.032)	-0.000 (0.000)	-0.000** (0.000)
Proximity to irrigation	0.000 (0.000)	-0.000 (0.000)	-0.014 (0.029)	0.000* (0.000)	0.000 (0.000)	-0.000 (0.021)
Drought episodes	-0.000*** (0.000)	-0.000 (0.000)	0.000 (0.000)	-0.000*** (0.000)	-0.000** (0.000)	0.000 (0.000)

Standard errors are in parenthesis

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table 4.6: OLS Regression results (interaction with gender of index child)

	(1)	(2)	(3)	(4)	(5)	(6)
	All	Mozambique	Rwanda	Malawi	Uganda	Zambia
Att towards violence	0.073*** (0.026)	0.106 (0.109)	-0.023 (0.053)	-0.080 (0.063)	0.059 (0.041)	0.042 (0.053)
Social independence	0.071* (0.036)	-0.031 (0.110)	-0.134** (0.065)	0.032 (0.063)	0.073 (0.062)	0.139 (0.094)
Decision-making	0.042 (0.038)	0.034 (0.083)	-0.057 (0.059)	0.046 (0.043)	-0.044 (0.046)	0.184* (0.103)
Female index child	0.020 (0.038)	0.037 (0.118)	0.068 (0.083)	-0.023 (0.077)	-0.012 (0.063)	-0.055 (0.107)
Att to violence × female child	-0.048 (0.043)	-0.056 (0.136)	-0.018 (0.082)	0.063 (0.095)	-0.035 (0.058)	-0.169* (0.095)
Soc Ind × female child	0.143*** (0.050)	0.142 (0.110)	0.041 (0.067)	0.119 (0.083)	0.146** (0.073)	0.227 (0.166)
Decs-making × female child	-0.005 (0.047)	-0.079 (0.111)	0.017 (0.084)	0.035 (0.059)	0.106 (0.067)	-0.095 (0.122)
Economic variables	YES	YES	YES	YES	YES	YES
Demographic variable	YES	YES	YES	YES	YES	YES
GIS variables	YES	YES	YES	YES	YES	YES

Standard errors are in parenthesis *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table 4.7: OLS Regression results for IYCDSDS (interaction with wealth index)

	(1)	(2)	(3)	(4)	(5)	(6)
	All	Mozambique	Rwanda	Malawi	Uganda	Zambia
Att towards violence	-0.020 (0.071)	-0.212 (0.146)	-0.099 (0.077)	-0.122 (0.103)	0.065 (0.076)	-0.133 (0.149)
Social independence	0.256*** (0.047)	0.168 (0.105)	-0.075 (0.069)	0.072 (0.078)	0.250*** (0.063)	0.375*** (0.125)
Decision-making	0.161*** (0.053)	-0.001 (0.084)	-0.039 (0.081)	0.165** (0.068)	0.211*** (0.073)	0.272* (0.154)
Wealth index [Q1: Lowest]	-0.226*** (0.050)	-0.081 (0.158)	-0.551*** (0.095)	-0.295*** (0.100)	-0.002 (0.076)	-0.273* (0.155)
Wealth index (Q1) × Att to violence	0.085 (0.073)	0.390** (0.172)	0.094 (0.087)	0.095 (0.114)	-0.032 (0.083)	0.115 (0.151)
Wealth index (Q1) × Soc Ind	-0.230*** (0.051)	-0.171 (0.116)	-0.072 (0.079)	0.035 (0.081)	-0.219*** (0.079)	-0.376** (0.151)
Wealth index (Q1) × Decs making	-0.185*** (0.056)	-0.023 (0.108)	-0.017 (0.098)	-0.143* (0.075)	-0.310*** (0.080)	-0.216 (0.154)
Economic variables	YES	YES	YES	YES	YES	YES
Demographic variable	YES	YES	YES	YES	YES	YES
GIS variables	YES	YES	YES	YES	YES	YES

Standard errors are in parenthesis *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Chapter 5

What empowerment indicators are important for food consumption for women? Evidence from 5 sub-Saharan African countries

5.1. Abstract

This paper draws on data from five sub-Saharan African countries to investigate the relationship between women's empowerment and women's dietary diversity and consumption of different food items. Women's empowerment was measured using the indicators in the five domains of Women's Empowerment in Agriculture index (WEAI) and women's dietary diversity and food consumption was examined using the women's dietary diversity score (WDDS) measure. OLS and LPM regressions were used and analyses were confirmed using marginal effects from Poisson and logistic regression analyses. Results suggest that four out of the 10 WEAI indicators of empowerment showed different magnitude and direction in significant associations with improved WDDS and that varied associations were found in three out of the five countries examined. In addition, the four significant empowerment indicators were associated with the consumption of different food groups across different countries, suggesting that diverse food groups account for the association between the WEAI and WDDS. Empowerment through improved autonomy, and input in production were associated with improved consumption of fruits and vegetables including vitamin A-rich produce. Empowerment in public speaking was associated with improved consumption of grains and tubers, flesh proteins, and other fruits and vegetables including vitamin A-rich produce, and non-excessive workload was associated with reduced consumption of flesh protein. However, these findings varied across the different countries examined. The varied nature of empowerment indicators towards improving women's dietary diversity and food consumption implies that interventions that seek to empower women should tailor their strategies on existing norms that impact on women. In addition, different empowerment indicators and strategies might confer different benefits towards the consumption of different food groups.

5.2. Introduction

Improving women's nutrition outcomes through better access to a more diverse diet has been identified as a key strategy towards improving the lives and livelihoods of women (Fredman et al., 2016; Negera et al., 2013; Sinharoy et al., 2018). This could be attributed to the link between improved dietary intake and health outcomes and by extension, enhanced economic productivity (Abris et al., 2018; Deaton, 2002). Dietary diversity is usually measured as a snap-shot of women's consumption of different food items with a recall period of 24 hours to 15 days (Ruel, 2003). Many measures of dietary diversity have been developed for specific population groups including the dietary diversity score for women of reproductive age (WDDS) (Kennedy et al., 2011). The WDDS measures women's consumption of nine food groups over a 24-hour recall period and mean scores are used to determine levels of dietary diversity. The WDDS has been used in numerous studies which have examined the relationship between important factors that impact on women's wellbeing and women's dietary diversity (Abris et al., 2018; Amugsi et al., 2016; Keding et al., 2012). Beyond the performance of individuals on dietary diversity measures, a key area of importance is to further examine which food groups within the dietary diversity measures account for the mean scores obtained and also which factors are most related with the consumption of these food groups.

A key factor that has been identified to improve women's well-being along with food consumption is empowerment, and many studies have applied different measures of women's empowerment (Chakona & Shackleton, 2017; Miedema et al., 2018; Murugani & Thamaga-Chitja, 2019; Pereira et al., 2017; Quisumbing & Maluccio, 2000; Vaz et al., 2013, 2016; Yimer & Tadesse, 2015). One of the well-known measures of women's empowerment is the Women's Empowerment in Agriculture Index (WEAI) (Alkire et al., 2013). Since its development, this measure has been used in numerous

studies (predominantly in Asia) with varied findings on the role of different empowerment indicators and women's dietary diversity and nutrition outcomes (Cunningham, Ploubidis, et al., 2015; De Pinto, Seymour, Bryan, & Bhandary, 2019; Komatsu et al., 2018; Malapit & Quisumbing, 2015; Meinzen-Dick et al., 2019; Ross, Zereyesus, Shanoyan, & Amanor-Boadu, 2015; Greg Seymour, 2017; Sraboni et al., 2014; Yimer & Tadesse, 2015). The varied nature of the relationship between the indicators of empowerment in the WEAI and women's food consumption and nutrition outcomes has enabled a conclusion to be drawn that the extent to which women are able to express empowerment is context-specific where prevailing contextual factors and norms that dictate women's role would influence the ability of empowerment measures to detect the relationship between women's empowerment and their food intake. However, there has not been any effort to-date to: (1) perform a multi-country analysis of the WEAI index where a clearer analysis of the relationship between the WEAI and women's dietary diversity across different settings could be made; and (2) perform an analysis of which food groups in the women's dietary diversity measure are most influenced by different indicators of empowerment as contained in the WEAI.

To fill this gap, the present study aims to examine the relationship between women's empowerment and women's dietary diversity and food consumption using the WEAI and WDDS measures.

Analysis will be conducted across five SSA countries (Mozambique, Rwanda, Malawi, Uganda, and Zambia).

5.3. Data, empirical specification and variables

5.3.1. The Feed the Future Study (FTF)

The Feed the Future programme is a United States Government initiative that seeks to address global food insecurity by focusing on growth of the agricultural sector and improvement in nutritional status in 19 developing countries. The United States Agency for International Development (USAID) is responsible for leading the government-wide effort to implement the Feed the Future initiative. The programme seeks to reduce poverty and undernutrition in 19 developing countries by focusing on accelerating growth of the agricultural sector, addressing root causes of undernutrition, and reducing gender inequality. The main target of the programme is “to reduce by 20% the prevalence of poverty and the prevalence of stunted children under five years of age in the areas where we (USAID personnel) work” (Sitko et al., 2011).

Data was extracted from five countries in SSA out of the 19 countries where the programme has been implemented and a baseline survey was conducted between 2010 - 2013. These were low-and-lower-middle income countries in east (Uganda and Rwanda) and southern (Zambia, Malawi, and Mozambique) Africa with GDP (PPP) per capita ranging from as low as USD1,172 in Malawi to USD3,997 in Zambia. There were also wide ranges of wealth inequalities in these countries with as much as 61% of Zambians living below the domestic poverty line as of 2012 and 20% of Ugandans living below the poverty line as of 2013 (IMF, 2019).

The Feed the Future study used population-based surveys to collect data which have been used in the present study and the focus has been on a total of 10,041 households (1,558 in Zambia, 2,316 in Uganda, 2,856 in Malawi, 2,425 in Mozambique, and 1,831 in Rwanda) where married women in rural settings were interviewed (see Figure 1 for the breakdown of the analysed sample obtained from the FTF).

As part of the modules in the questionnaire used, the WEAI was administered to the male and female decision-makers in surveyed households. As indicated above, our study has been restricted to sampled households in rural areas with women in union and with information on women's dietary diversity where the relationship between women's empowerment as measured by the WEAI and women's consumption of different food groups (dietary diversity) was explored.

5.3.2. The Women's Empowerment in Agriculture Index (WEAI)

According to Alkire et al. (2013), the WEAI was developed upon research evidence on agency and empowerment, including the works of Alsop, Bertelsen, & Holland (2006), Ibrahim & Alkire (2007), Narayan-Parker (2005), and Narayan, Pritchett, and Kapoor (2009). This research evidence proposed domain-specific measures of empowerment constructed from questions that could be administered in individual or household surveys. Based on the methodology reported in Alkire and Foster (2011), the WEAI is an aggregate index, reported at the country or regional level, based on individual-level data collected by interviewing men and women within the same households. Ten indicators of the WEAI reflect the percentage of women who are empowered in five domains of empowerment (5DE) in agriculture. These five domains of the WEAI are (1) decisions about agricultural production, (2) access to and decision-making power about productive resources, (3) control of use of income, (4) leadership in the community, and (5) time allocation based on a log of different activities, and each of the five domains receives equal weight. Table 5.1 presents the domains, indicators, and weights in the WEAI. The response options for the questions contained in the index ranges from dichotomous (Yes/No), to more detailed categories which could range from 1 – 10 (for more information, see Alkire et al., 2013).

Across the five SSA countries, disempowerment in resources domain contributed the most (approx. 30% - 38%) towards women's disempowerment (see Fig 5.2). This was followed by

disempowerment in leadership domain (approx. 20% - 25%), and disempowerment in production decisions contributed the least (approx. 9% - 13%) towards women's disempowerment. Further disaggregated analysis of the contribution of the 10 sub-domains towards women's disempowerment can be found in Fig 5.3.

1.3.3. Women's dietary diversity outcome variable

The women's dietary diversity score (WDDS) is an indicator used to examine the quality of diet for women of reproductive age (FAO, 2013; Kennedy et al., 2011). The indicator is recommended by the United Nations Food and Agriculture Organisation (FAO) as a simple and valid measure of women's dietary diversity through the consumption of food items belonging to nine food groups. The WDDS is measured as the number of food groups consumed by women 15-49 years in the past 24 hours where the food groups include; (1) Starchy foods; (2) Legumes and nuts; (3) Dairy products; (4) Flesh foods; (5) Eggs; (6) Dark-green leafy vegetables; (7) Vitamin-A rich fruits & vegetables; (8) Other fruits & vegetables; (9) Organ meat. According to the FAO guidelines, mean scores determine performance on the WDDS, that is, women that had higher mean scores experienced better dietary diversity. Although the WDDS has been updated into the Minimum Dietary Diversity for Women (MDD-W) measure by separating legumes, nuts, and seeds into two food groups; legumes, and nuts and seeds, and by also subsuming organ meat into animal meat food group (FAO and FHI 360, 2016), the present study has used the original WDDS due to data limitations.

The FTF data for the five SSA countries contains information on the women's consumption of nine food groups and WDDS was examined as a continuous variable. In addition, individual food groups

were examined as dichotomous outcome variables in line with our hypothesis that the different domains and indicators of women's empowerment would have differential impacts on women's consumption of individual food groups. This was also informed by the qualitative study on economic empowerment and women's dietary diversity conducted by the same researchers (Onah, Hoddinott, Janes, and Horton, 2019): Chapter 3 where we found that economic empowerment would be important for the consumption of some food items including expensive-to-purchase items but would not be as important for the consumption of staple food items, hence exploring the role of other indicators and domains of women's empowerment in women's food consumption is warranted.

1.3.4. Key independent variables

The WEAI index aggregate score and 10 empowerment indicators contained in the five domains of empowerment were used as the key independent variables and these domains are described in Table 5.1. The WEAI was examined as an aggregate score in one regression model and relevant empowerment indicators were examined in 10 separate regression models. Our hypothesis was that the aggregate empowerment score and each indicator might have different associations with WDDS and consumption of different food groups for women. This paper has chosen the WEAI indicators of empowerment to be included in the analysis by selecting indicators within the index that show variations in the proportions of women empowered or not across the five SSA countries (see Table 5.3). This approach is consistent with one of the approaches used by other studies that have applied the WEAI index. To examine the role of women's empowerment towards different nutrition and health outcomes, studies that have applied the WEAI measure usually used two approaches in determining which indicators that should be included in the analysis: (1) by examining which

indicators that contribute the most towards women's disempowerment; and (2) by examining which indicators show the most variation in the proportion of women empowered or not (for examples see Cunningham et al., 2015b; Komatsu et al., 2018; Malapit et al., 2015; Malapit and Quisumbing, 2015; Ross et al., 2015; Seymour, 2017; Seymour et al., 2016; Seymour and Peterman, 2017; Sraboni et al., 2014; Yimer and Tadesse, 2015). This approach makes intuitive sense since in most cases, indicators on which most respondents met stipulated thresholds might not be important regressors.

1.3.5. Control variables

Control variables included women's and men's sociodemographic characteristics and household asset index. Other survey characteristics including month of study and study districts were also included to control for spatial and seasonal factors.

Age – Women's and men's age in years were included as control variables based on the hypothesis that the age of adult male and primary respondent would influence women's performance on the WDDS and consumption of different food items. Studies have also suggested that women's empowerment improves with her own age, and age has a strong positive association with improved dietary diversity (Malapit & Quisumbing, 2015).

Education – Women's education in years was estimated as a control variable in the regression models based on the hypothesis that improved educational attainment for women is linked with improved knowledge transition within households and socioeconomic status (SES) of household members, and that this could influence women's ability to consume more diverse diets. In addition, education has been shown to improve women's knowledge about their health and development needs including nutrition (Assaf et al., 2018; Mukuria et al., 2005).

Household size – Household size was estimated as a continuous control variable based on the hypothesis that in households within rural settings such as in the present study, income-generation

potentials are limited, and that household size would be an important determinant of household's SES and individuals' ability to achieve improved dietary diversity. In addition, studies have shown that within such households, women are among the most vulnerable to dire health and development outcomes in the face of limited economic resources (Graham, 2014).

Hunger scale – This is a count variable that indicates severity of hunger within households and was included as a control variable based on our assumption that women within households that report higher hunger scores would perform poorly on the WDDS.

Asset index – This index is a measure of household socioeconomic status and has been constructed using a principal component analysis (PCA). A list of household assets has been used to develop this index using published methodologies and literature which suggest the use of such indexes in rural settings to measure household SES (Booyesen et al., 2008; Michelson et al., 2013). The assumption is that women belonging to higher SES households would perform better on the WDDS.

Study districts – This variable detail the number of districts across the five SSA countries that were included in the FTF baseline studies. This control variable has been included based on the assumption that different districts would have different economic and agricultural activities, and geographical characteristics including rainfall patterns and drought which could affect food availability and influence women's food consumption.

Study month – This variable provides information on which months of the year the study was conducted and has been included as a control based on the assumption that timing of study would have an important effect on individuals' and households' food consumption. This is because there are important seasonal variations in food availability and timing of study might reflect these variations (Campbell et al., 2014).

1.3.6. Empirical specification

To specify the model, let Y_i be the outcome variable (WDDS) treated as a continuous variable using the OLS model and estimated as:

$$Y_i = \beta_0 + \beta_1 WEAI + \beta_2 C + \beta_3 I + \varepsilon \dots \dots \dots 1$$

where C denotes the control variables; I stands for other demographic covariates; $\beta_1, \beta_2, \text{ and } \beta_3$ are the estimated parameters/parameter vectors; and ε is the error term. The WEAI index has been treated as an aggregate empowerment score in one model, and other 10 sub-domains were included in different models based on our hypothesis.

Estimating the different food groups as contained in the WDDS, we have used linear probability models (LPMs). Let y_i be the outcome variable (different food groups in the WDDS) estimated as:

$$y_i = \sigma_0 + \sigma_1 WEAI + \sigma_2 C + \sigma_3 I + \varepsilon \dots \dots \dots 2$$

where C stands for the control variables; I is for other demographic covariates; $\sigma_1, \sigma_2, \text{ and } \sigma_3$ are the parameters to be estimated and interpreted as the change in the probability that $y_i = 1$, holding constant the other regressors, and ε is the error term. The WEAI has been treated the same as described in equation 1.

Stata version 14.1 has been used to perform multiple regression analysis to explore the relationships between identified dependent and independent variables. Descriptive statistics have been used to summarise sample statistics including the 10 WEAI indicators. The OLS regression model adjusted for the effects of specified covariates has been used to examine significant associations between women's empowerment and WDDS, and different food groups as contained in the WDDS as outcome variables have been analysed using LPMs adjusted for the effects of specified covariates

specified. For these analyses, cluster sampling effects (including sampling bias and the lack of independent and identically distributed properties) have been controlled for and appropriate sampling weights have been applied. To test the correctness of the regression approaches used, marginal effects from Poisson and logistic regression models have been used to test the OLS and LPM models. Significance has been established at 95% and 99% confidence intervals.

1.4. Findings

5.4.1. Sample characteristics

On average and across the 5 SSA countries examined, women consumed 3 out of 9 food groups of the WDDS except for Zambia where women consumed food items belonging to 4 food groups. The average age was 28.90 years (SD: 9.77) and this remains relatively the same across the five countries (see Table 5.2). On average, household size was 6 and across countries, Malawi recorded the highest prevalence of hunger based on a mean hunger score of 1.14 while Mozambique recorded the lowest score of 0.65 on average. The average age for women was 28.95 years (31.85 years for men) and women on average had 5.50 years of schooling with Uganda recording the highest years of schooling. For variables included in the SES index, the most common type of roof material is thatch (52%) followed by corrugated metal (24.7%) and nearly all households used firewood as fuel (92.5%). Fifty-six percent of the variation in the socioeconomic index created by the principal component analysis is explained by the first two component factors (household roofing and floor type) while the least variation is explained by the last two component factors (electricity and fuel source). The heteroskedastic bootstrap confidence intervals were also narrow and results from the correlation matrix indicate that there was no significant correlation between the variables included in the SES index. Twenty-six percent of sampled women belonged to the first (lowest) SES quartile, 29%

belonged to the second, 23% to the third, and 22% to the fourth (highest) quartile. Further country-level disaggregation is presented in Table 5.2.

5.4.2. Summary statistics of the 10 WEAI indicators

Findings suggest that there were important variations in women's performance across 4 out of the 10 WEAI indicators with further variations across the five SSA countries examined (Table 5.3).

These variations were found in: (1) two production domain indicators (*autonomy and input in production domains and activities*); (2) one resources domain indicator (*sole/joint decision-making regarding credit and credit source*); and (3) one leisure domain indicator (*non-excessive in workload*). This implies that a majority (in most cases, over three-quarters) of women met the thresholds and were considered empowered in six out of the 10 empowerment indicators.

5.4.3. Women's empowerment and dietary diversity

To further test which indicators exhibit important associations with women's dietary diversity, regression models were specified and presented in Figures 5.4 – 5.10 (also see supplementary Table 9 – 19 for more details). Findings suggest that the two indicators in the production domain (autonomy in production decision, and input in production decisions and activities), one leadership domain indicator (comfortable speaking in public), and time domain indicator (non-excessive workload) exhibited significant associations with improved WDDS. While production and leadership indicators exhibited positive associations with WDDS, non-excessive workload (time domain) exhibited a negative association with WDDS. These findings were also confirmed in the Poisson regression models with marginal effects.

Empowerment in autonomy in production decisions was associated with a 20%-point increase in WDDS in the pooled analysis and Uganda appears to account for this significant association with a

37%-point increase in WDDS for women who were empowered in autonomy in production decisions (see Fig 5.5, and supplementary Table 10). This implies that women who had autonomy in at least one production domain or activity were more likely to consume a more diverse diet in one out of the five countries examined. Empowerment in input in production decisions was associated with a 19%-point increase in WDDS in the pooled analysis and Rwanda appears to account for this association with a 46%-point increase in WDDS (see Fig 5.5, and supplementary Table 11). This implies that women who had an input in at least two production decisions were more likely to consume a more diverse diet in one out of the five countries examined.

Empowerment in public speaking was associated with a 15%-point increase in WDDS in the pooled analysis and Mozambique and Rwanda appear to account for these significant findings with 23%-point and 45%-point increase in WDDS respectively (see Fig 5.8 and supplementary Table 17). This suggests that women who were comfortable speaking in public in at least one context were more likely to consume a more diverse diet in Mozambique and Rwanda implying that empowerment in public speaking was associated with improved WDDS in two out of the five SSA countries examined.

Conversely, working in paid and/or unpaid labour for less than 10.5 hours in a day (i.e. non-excessive) and hence empowered was associated with a 14%-point reduction in WDDS and Mozambique appears to account for this association with a 34%-point decrease in WDDS (see Fig 5.9 and supplementary Table 18). This suggests that women who engaged in workload that was considered non-excessive were less likely to consume a more diverse diet in one out of the five

countries examined. This counter intuitive finding was investigated further to determine which food groups accounted for this negative association.

5.4.4. Women's empowerment and food consumption

Focusing on the four empowerment indicators with significant associations with WDDS, the present study further examined which food groups within the WDDS that might account for these significant associations. Findings show variations in food items that accounted for the relationship between the four empowerment domains and WDDS (Figures 5.11 – 5.15 and supplementary Table 20 – 39) and these variations differ across the five SSA countries examined. These findings were also confirmed when marginal effects from logistic regression models were specified.

Results suggest that in the pooled analysis, empowerment in autonomy in production was significantly and positively associated with a 5%-point increase in the likelihood of consumption of flesh proteins, an 8%-point increase in the likelihood of consuming vitamin A-rich leafy greens, and a 9%-point increase in the likelihood of consuming other vitamin A-rich fruits and vegetables (see Fig 5.10 and supplementary Table 20). This suggests that women who had autonomy in at least one production activity were more likely to consume these three out of the nine WDDS food groups. Empowerment through input in at least two domains of production was significantly associated with a 5%-point increase in the consumption of other fruits and vegetables as well as vitamin A-rich products (see Fig 5.10 and Appendices – Table 21). This implies that women who had input in at least two domains of food production were more likely to consume these two out of the nine WDDS food groups in the pooled analysis. Further disaggregation suggests that in Uganda, food groups that accounted for the relationship between autonomy in production activities and improved WDDS was other vitamin A-rich fruits and vegetables (12%-point increase in likelihood of

consumption; i.e. one out of nine WDDS food groups) (see Fig 5.11 and supplementary Table 22). In Rwanda, empowerment in input in production decisions was associated with a 4%-point increase in the likelihood of consuming grains and tubers, 6%-point increase for dairy and dairy products, a 7%-point increase in the likelihood of consuming flesh proteins, and a 11%-point increase in the likelihood of consuming other fruits and vegetables including in particular vitamin A-rich products suggesting that women who had inputs in at least two production decisions were more likely to consume these five out of the nine WDDS food groups (see Fig 5.11 and supplementary Table 23).

In the pooled analysis, findings suggest that other fruits and vegetables might account for the association between empowerment in public speaking and improved WDDS since empowerment in public speaking was only significantly associated with a 7%-point increase in the likelihood of women consuming other fruits and vegetables (see Fig 5.12 and supplementary Table 24) . This suggests that women who were comfortable speaking in public in at least one context were more likely to consume this one out of the nine WDDS food groups. In the disaggregated analyses, Mozambique and Rwanda, appear to account for the significant association in the pooled analysis although the associations between empowerment in public speaking and women's consumption of food groups were varied. Empowerment in public speaking was significantly associated with an 11%-point increase likelihood of consuming other fruits and vegetables in Mozambique (i.e. one out of nine WDDS food groups) (see Fig 5.13 and supplementary Table 25). In Rwanda, empowerment in public speaking was significantly associated with a 6%-point increase in the likelihood of consuming grains and tubers, 8%-point increase in the likelihood of consuming flesh proteins, 16%-point increase in likelihood of consuming vitamin A-rich leafy greens, and a 9%-point increase for

other fruits and vegetables consumption (i.e. four out of the nine WDDS food groups) (see Fig 5.13 and supplementary Table 26).

Non-excessive workload was significantly associated with a 6%-point decrease in the likelihood of consumption of other vitamin A-rich fruits and vegetables in the pooled analysis, and in Mozambique, non-excessive workload was associated with a 10%-point decrease in the likelihood of consuming flesh proteins (see Fig 5.14 and supplementary Table 27). This suggests that other vitamin A-rich fruits and vegetables might account for the negative association in the pooled analysis, and flesh protein for the negative association in Mozambique. By extension, these findings further suggest that women who worked for less than 10.5 hours in paid and/or unpaid labour were less likely to consume vitamin A-rich fruits and vegetables in general and flesh proteins specifically in Mozambique (see Fig 5.15 and supplementary Table 28).

5.5. Discussion

The present study has found varying degrees of associations between four empowerment indicators and women's dietary diversity and food consumption, and these associations also varied across the five SSA countries examined. Findings suggest that while examining the relationship between empowerment and increases in dietary diversity is of importance, there is need to go further and examine within the dietary diversity measures, which food groups are responsible for the changes in the scores. This is important because evidence suggests that just as women's empowerment is heavily influenced by prevailing social and economic contextual factors (Johnston et al., 2015; Malapit et al., 2015; Sraboni & Quisumbing, 2018), consumption of different food groups is also

influenced by these factors (Ruel et al., 2013). For instance, a study in rural Bangladesh found that husband's occupation, women's education levels, and higher socioeconomic status was linked to consumption of nutrient-rich food items for pregnant women (Shamim et al., 2016). A qualitative study by the present study's authors (Onah, Hoddinott, Janes, and Horton, 2019) found that households use a mix of food production and purchase for consumption where more nutrient-rich food items are largely purchased, and women's limited income restricts them from full empowerment in ensuring improved dietary diversity. The role of other empowerment indicators towards the consumption of specific food items might shed more light on strategies that aim to use women's empowerment in improving nutrition outcomes including dietary diversity.

The findings that improved autonomy in production, and input in production decisions were associated with improved dietary diversity for women is consistent with literature. Malapit et al. (2015) in Nepal, Yimer and Tadesse (2015) in Ethiopia, Ross et al. (2015) in Ghana, and Sinharoy et al. (2018) in Bangladesh all using the WEAI measure found that improvement in women's autonomy, and input in production was associated with improved women's dietary diversity. However, the present study goes a step further and has found that vitamin A-rich fruits and vegetables including dark-green vegetables, and to a lesser extent flesh protein, might account for this association. The present study is the first, to the best of my knowledge, to investigate this and findings suggest that improvement in autonomy, and input in production decisions might be important for not only improved dietary diversity but for consumption of nutrient-rich food items. Linking this finding to the qualitative work conducted by the authors of the present study, one could argue that since vegetables and fruits are largely cultivated and when purchased, are not as expensive as other food items, women's empowerment in production could possibly improve their consumption (Onah, Hoddinott, Janes, and Horton, 2019). Another possible link in existing literature is the role of women's empowerment in crop diversity. In rural Bangladesh, De Pinto et al.

(2019) found that when women were empowered in autonomy, and input in production decisions, there was a shift from cereals cultivation towards fruits and vegetables, perhaps because foods with less economic value including fruits and vegetables are largely considered “women’s crops” (Doss, 2002; Orr et al., 2016).

There is limited literature that has found a positive association between empowerment in public speaking as an indicator of leadership empowerment and women’s dietary diversity (Ross et al., 2015; Yimer & Tadesse, 2015). However, a few studies have used different measures of empowerment and have subsumed questions on public speaking in different empowerment domains. In northern Benin, Alaofè et al. (2017) found that women’s empowerment in leadership (which included questions on public speaking) was associated with improved women’s dietary diversity. The present study found that empowerment in public speaking was largely associated with the consumption of fruits and vegetables including vitamin A-rich products. Although the association was only significant in one out of the five countries examined, empowerment in public speaking was also found to be associated with the likelihood of consuming flesh protein. These findings are somewhat consistent with available literature where Tsiboe et al. (2018) using the WEAI measure in Ghana, found that disempowerment in leadership (which includes public speaking) was associated with reduced intake of proteins, carbohydrates, and fats.

The finding that non-excessive workload was associated with reduced dietary diversity for women is against existing evidence (Komatsu et al., 2018; Malapit & Quisumbing, 2015; Yimer & Tadesse, 2015). Perhaps, an explanation for this finding could be found in Mozambique where non-excessive workload was negatively associated with the consumption of flesh proteins. The qualitative work by

the present study's authors might also shed further light on this counter-intuitive finding since findings suggested that flesh proteins were one of the food items considered too expensive to purchase and consume frequently due to limited income Chapter 3 (Onah, Hoddinott, Janes, and Horton, 2019). Hence, workload of less than 10.5 hours in 24 hours might generate income that may not be enough to offset household expenditure needs and for frequent purchases and consumption of flesh proteins. This is suggestive because both the present study and existing literature have not examined the income difference between working below or above 10.5 hours in 24 hours. In addition, rural households perhaps also lacked sufficient assets to work longer hours and generate more income further suggesting that income-generating activities might be limited. There are thus implications for targeting initiatives that seek to reduce women's workload since a reduction might result in reduced financial resources that could compromise dietary diversity and quality.

In conclusion, the differential performance of the four indicators in the WEAI towards women's food consumption further suggests that different empowerment strategies might confer different benefits towards consumption of different food items and these benefits might vary across countries. The prevailing contextual factors within different countries including those that dictate women's roles and responsibilities are likely to play a significant role towards women's empowerment and dietary diversity.

Figure 5.1: Breakdown of the FTF sample

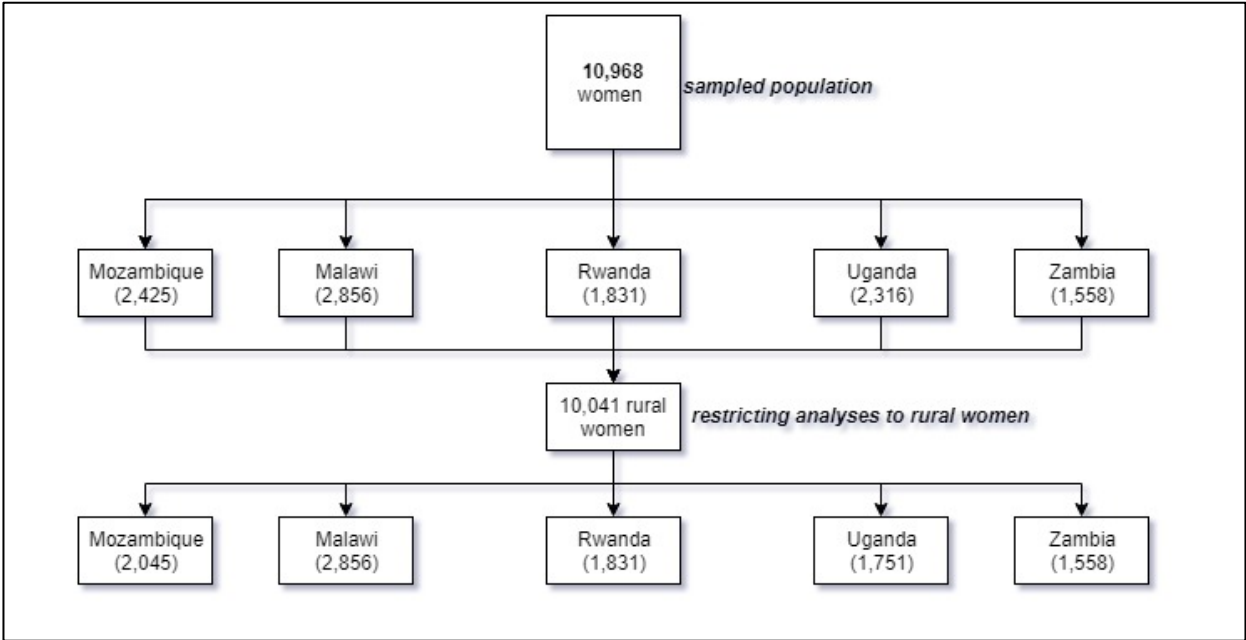


Figure 5.2 Contribution of each of the five domains to women’s disempowerment. Source: Authors’ calculations using the Feed the Future baseline datasets

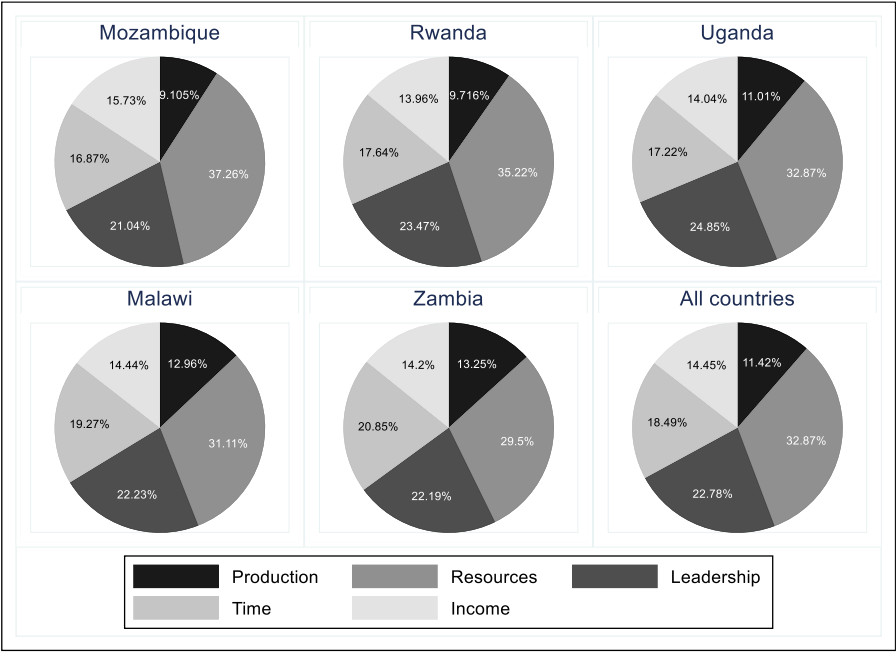


Figure 5.3: Contribution of each of the 10 sub-domains to women’s disempowerment. Source: Authors’ calculations using the Feed the Future baseline dataset

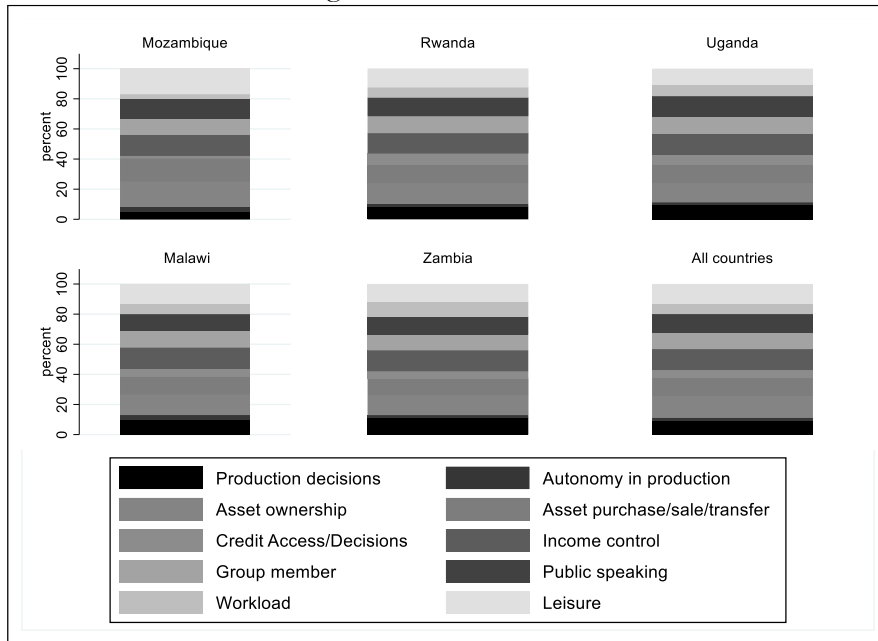
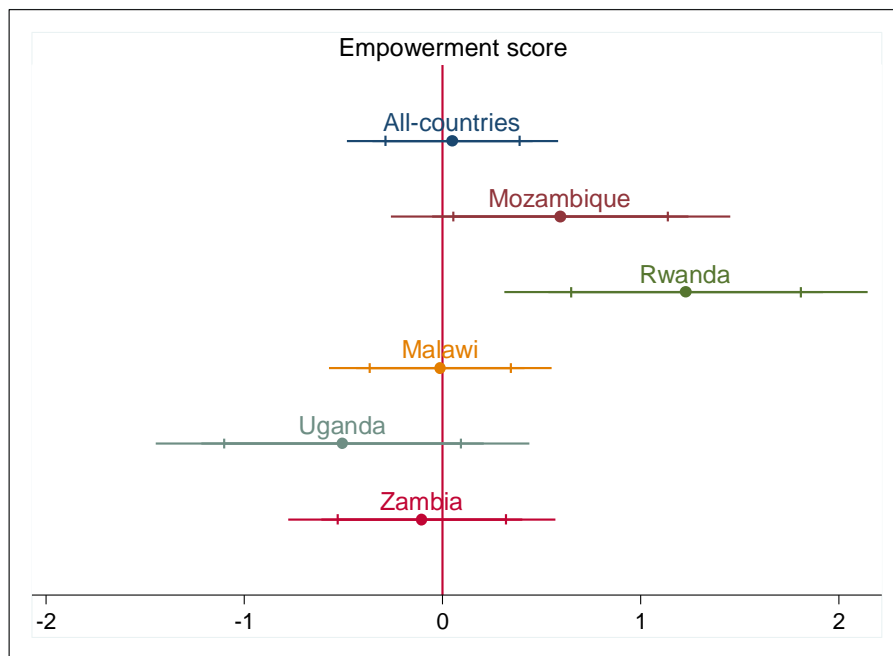
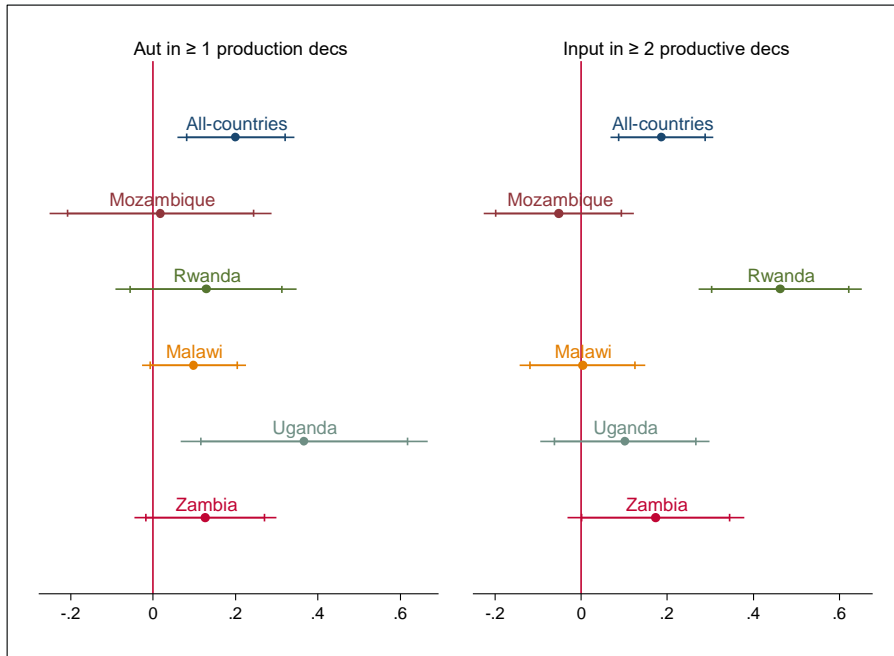


Figure 5.4: OLS regression for empowerment score and WDDS



Note: demographic, economic, and study control variables included in models
 Lines indicate confidence intervals at 90% and 95%

Figure 5.5: OLS regression for production domain and WDDS



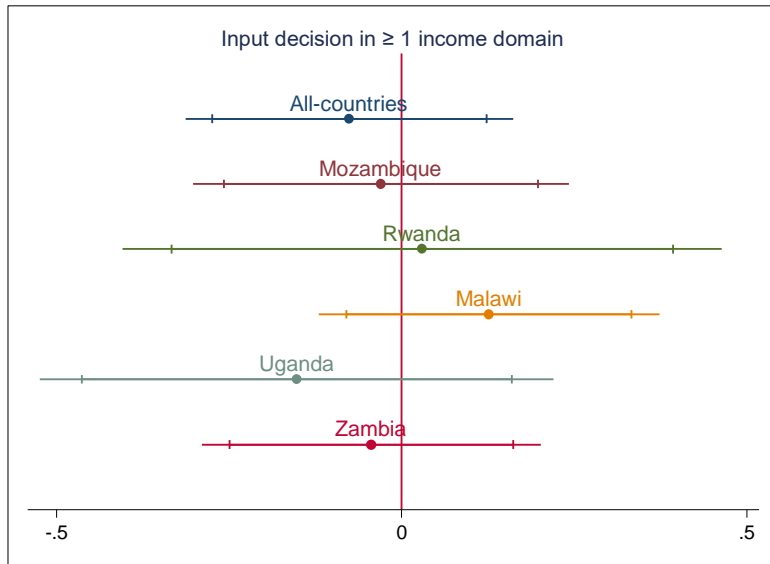
Note: demographic, economic, and study control variables included in models
 Lines indicate confidence intervals at 90% and 95%

Figure 5.6: OLS regression for resources domains and WDDS



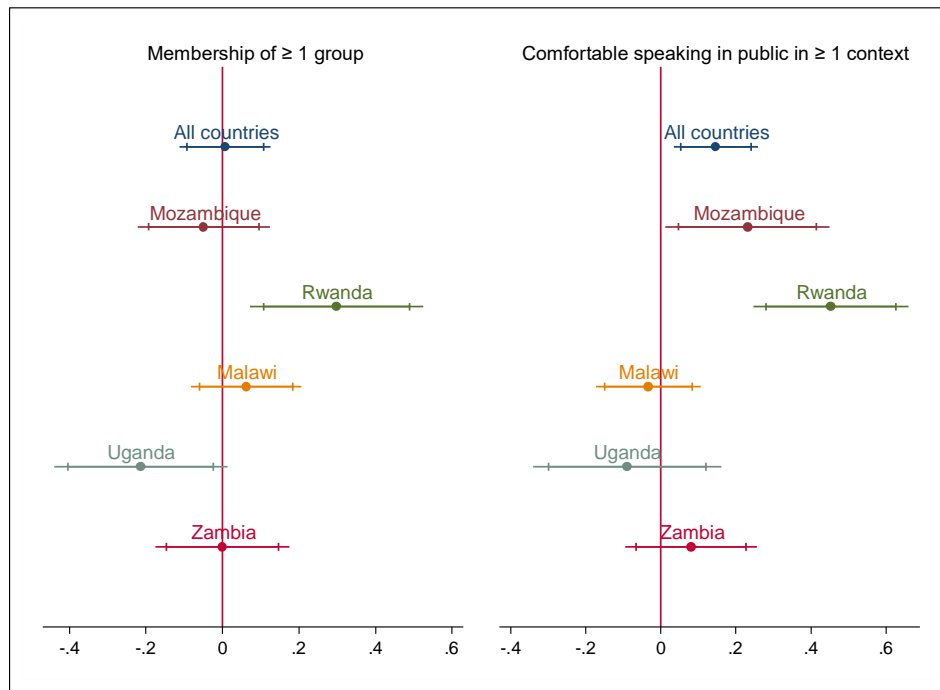
Note: demographic, economic, and study control variables included in models
 Lines indicate confidence intervals at 90% and 95%

Figure 5.7: OLS regression results for income domain and WDDS



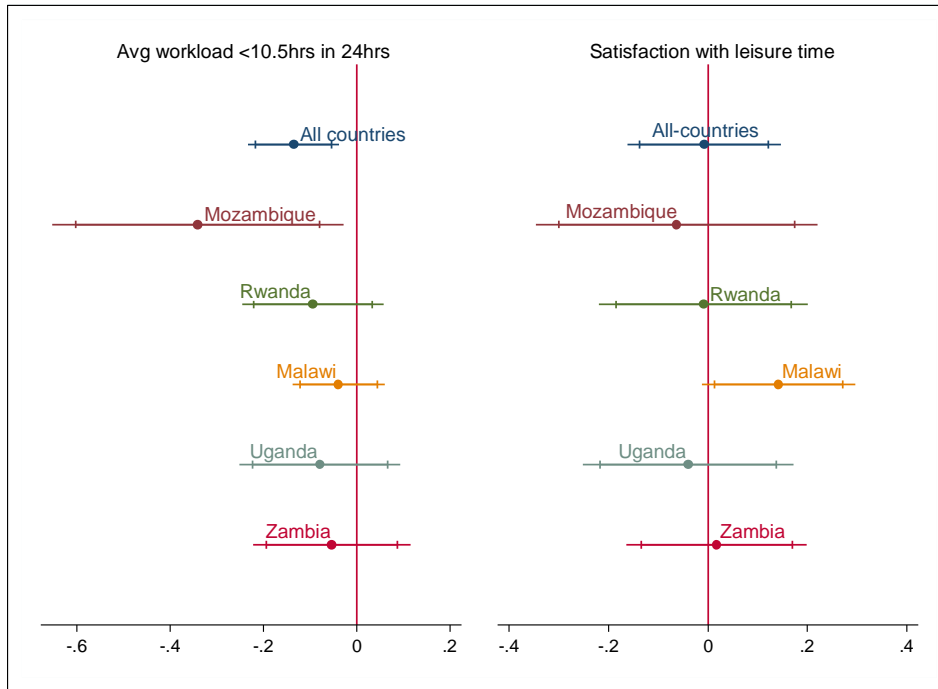
Note: demographic, economic, and study control variables included in models
 Lines indicate confidence intervals at 90% and 95%

Figure 5.8: OLS regression results for leadership domain and WDDS



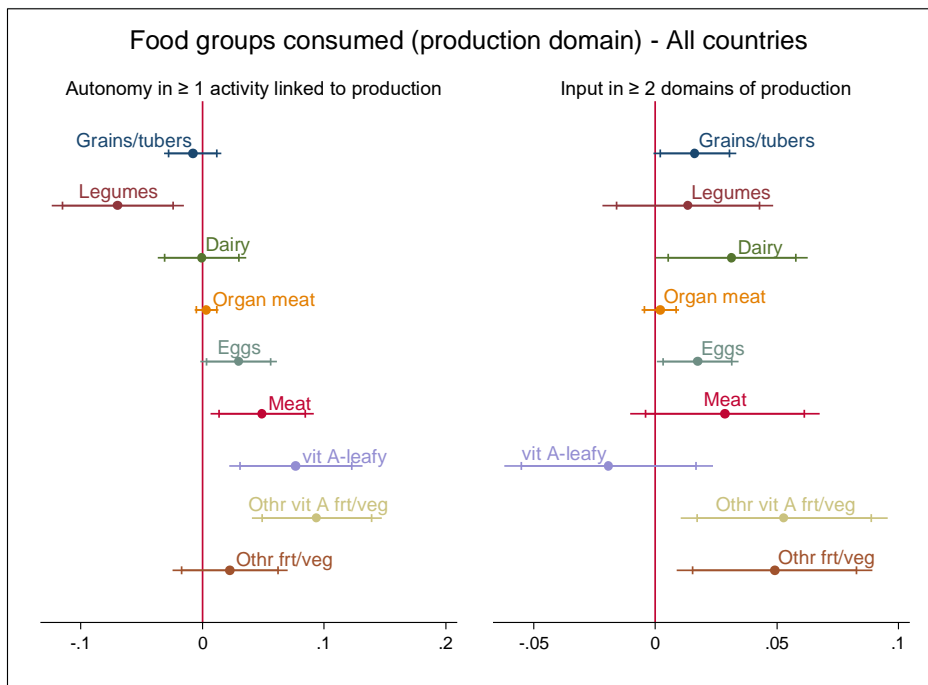
Note: demographic, economic, and study control variables included in models
 Lines indicate confidence intervals at 90% and 95%

Figure 5.9: OLS regression for leisure domain and WDDS



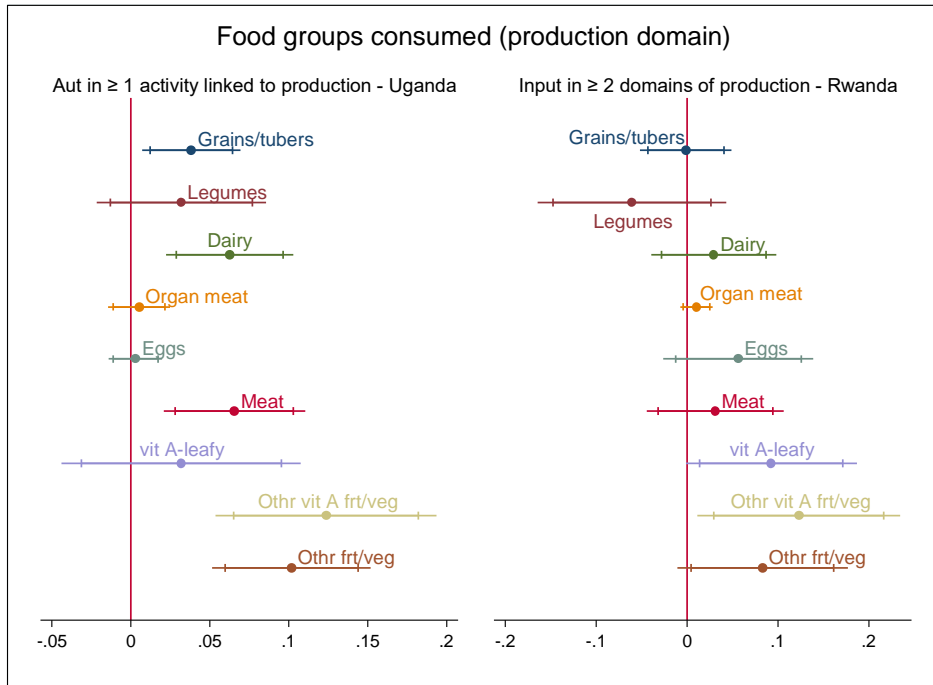
Note: demographic, economic, and study control variables included in models
 Lines indicate confidence intervals at 90% and 95%

Figure 5.10: LPM results for food groups consumed – production domain (all countries)



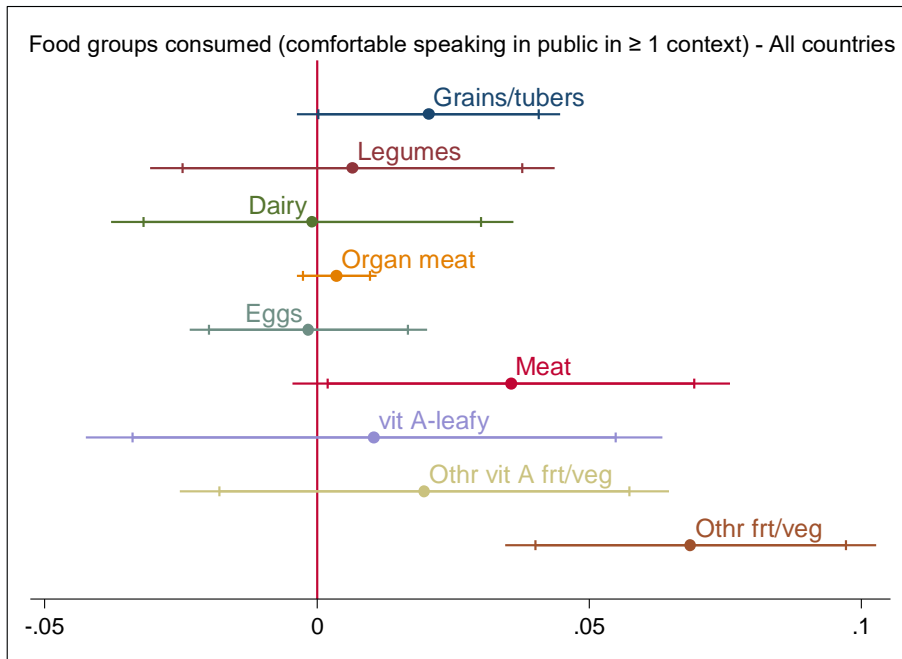
Note: demographic, economic, and study control variables included in models
 Lines indicate confidence intervals at 90% and 95%

Figure 5.11: LPM results for food groups consumed – production domain (disaggregated)



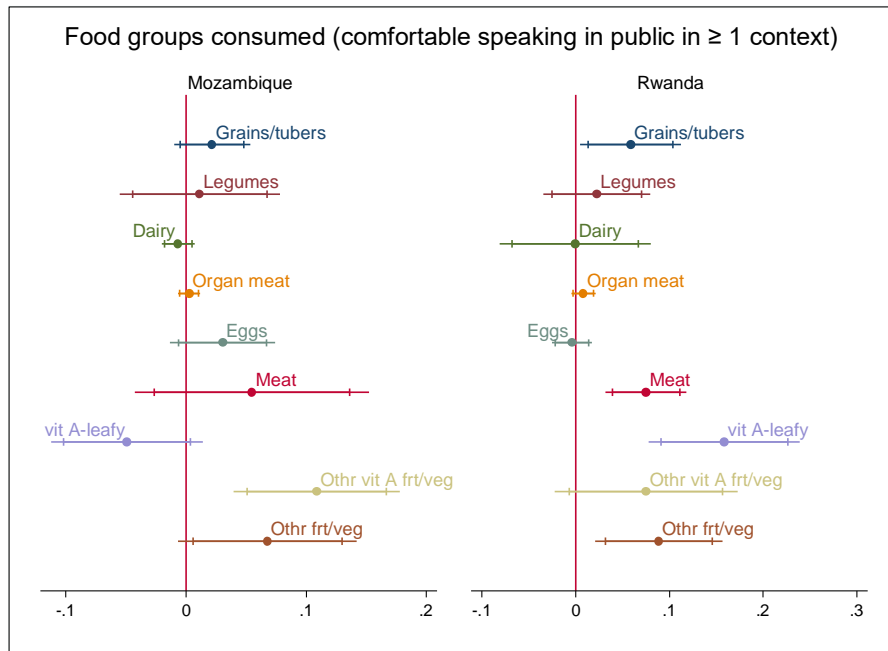
Note: demographic, economic, and study control variables included in models
 Lines indicate confidence intervals at 90% and 95%

Figure 5.12: LPM results for food groups consumed – leadership domain (all countries)



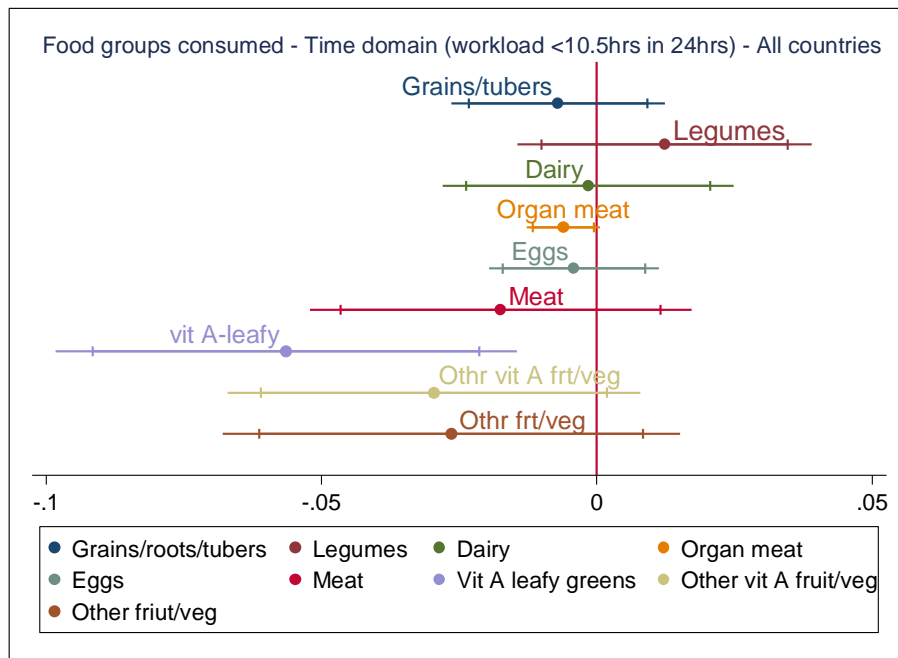
Note: demographic, economic, and study control variables included in models
 Lines indicate confidence intervals at 90% and 95%

Figure 5.13: LPM results for food groups consumed – leadership domain (disaggregated)



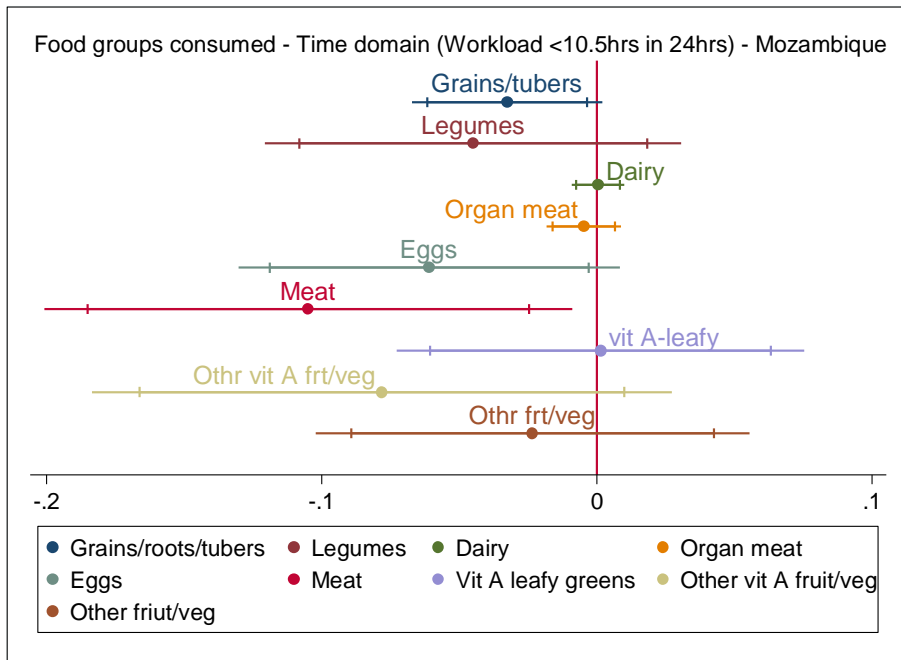
Note: demographic, economic, and study control variables included in models
 Lines indicate confidence intervals at 90% and 95%

Figure 5.14: LPM results for food groups consumed – time domain (all countries)



Note: demographic, economic, and study control variables included in models
 Lines indicate confidence intervals at 90% and 95%

Figure 5.15: LPM results for food groups consumed – time domain (disaggregated)



Note: demographic, economic, and study control variables included in models
 Lines indicate confidence intervals at 90% and 95%

Table 5.1: Domains, indicators, and weights in the WEAI

Domain	Indicator	Definition of indicator	Weight
2. Production	1.1 Input in productive decisions	Sole or joint decision-making over food and cash-crop farming, livestock, and fisheries	1/10
	1.2 Autonomy in production	Autonomy in agricultural production reflects the extent to which the respondent's motivation for decision-making reflects own values rather than a desire to please others or avoid harm	1/10
3. Resources	2.1 Ownership of assets	Sole or joint ownership of major household assets	1/15
	2.2 Purchase, sale, or transfer of assets	Whether respondent participates in decision to buy, sell, or transfer assets	1/15
	2.3 Access to and decisions about credit	Access to and participation in decision-making concerning credit	1/15
4. Income	3.1 Control over use of income	Sole or joint control over income and expenditures	1/5
5. Leadership	4.1 Group membership	Whether respondent is an active member in at least one economic or social group	1/10
	4.2 Speaking in public	Whether the respondent is comfortable speaking in public concerning issues relevant to oneself or one's community	1/10
6. Time	5.1 Workload	Allocation of time to productive and domestic tasks	1/10
	5.2 Leisure	Satisfaction with time for leisure activities	1/10

Source:(Alkire et al., 2013)

Table 5.2: Sample characteristics (percentages, except where otherwise specified)

	All	Mozambique	Malawi	Rwanda	Uganda	Zambia
<i>Outcome variable</i>						
1. Sum of food groups consumed (out of 9)	3.38 (SD: 1.31)	3.39 (SD: 1.40)	3.49 (SD: 1.27)	3.43 (SD: 1.34)	3.36 (SD: 1.29)	4.10 (SD: 1.13)
<i>Women and household characteristics</i>						
2. Women's age in years (mean)	28.95 (SD: 9.30)	29.04 (SD: 9.57)	28.36 (SD: 8.92)	29.63 (SD: 9.67)	28.44 (SD: 9.61)	29.26 (SD: 9.74)
3. Men's age in years (mean)	31.85 (SD: 12.87)	32.05 (SD: 12.87)	31.41 (SD: 14.12)	32.78 (SD: 14.43)	31.42 (SD: 14.59)	31.68 (SD: 14.80)
4. Women's education in years (mean)	5.50 (SD: 4.28)	2.22 (SD: 0.88)	2.45 (SD: 0.98)	2.99 (SD: 1.01)	7.92 (SD: 4.62)	5.12 (SD: 2.90)
5. Household hunger scale [0-6] (mean)	0.97 (SD: 1.31)	0.65 (SD: 1.68)	1.14 (SD: 1.33)	1.34 (SD: 1.30)	0.79 (SD: 1.24)	0.69 (SD: 1.12)
6. Household size	6.09 (SD: 2.53)	5.32 (SD: 2.51)	5.29 (SD: 1.96)	5.30 (SD: 1.90)	6.98 (SD: 2.75)	6.69 (SD: 2.99)
7. Asset index: <i>Q1</i>	26.19	23.19	23.51	25.31	30.54	34.94
<i>Q2</i>	28.86	26.38	25.76	25.98	25.19	34.51
<i>Q3</i>	22.98	25.56	22.83	23.40	21.67	21.92
<i>Q4</i>	21.97	20.76	18.67	19.62	16.63	7.25

Table 5.3: Descriptive statistics of the 10 WEAI indicators

	All	Mozambique	Malawi	Rwanda	Uganda	Zambia
<i>Empowerment indicators</i>						
Empowerment score, =1 if empowered	0.81 (SD: 0.13)	0.80 (SD: 0.14)	0.79 (SD: 0.14)	0.84 (SD: 0.12)	0.81 (SD: 0.13)	0.77 (SD: 0.13)
<i>Production domain</i>						
1. Autonomy in ≥ 1 activity linked to production	0.14 (SD: 0.34)	0.17 (SD: 0.37)	0.23 (SD: 0.42)	0.12 (SD: 0.32)	0.12 (SD: 0.32)	0.11 (SD: 0.31)
2. Input in ≥ 2 domains of production	0.66 (SD: 0.47)	0.33 (SD: 0.47)	0.71 (SD: 0.45)	0.65 (SD: 0.48)	0.70 (SD: 0.46)	0.83 (SD: 0.37)
<i>Resources domain</i>						
3. Sole/joint ownership of ≥ 2 small or 1 large asset	0.93 (SD: 0.24)	0.94 (SD: 0.24)	0.93 (SD: 0.25)	0.97 (SD: 0.16)	0.92 (SD: 0.27)	0.90 (SD: 0.30)
4. Sole/joint right over ≥ 1 type of asset transaction	0.85 (SD: 0.34)	0.91 (SD: 0.21)	0.83 (SD: 0.36)	0.87 (SD: 0.33)	0.85 (SD: 0.35)	0.83 (SD: 0.38)
5. Sole/joint decision-making regarding ≥ 1 credit source	0.47 (SD: 0.50)	0.12 (SD: 0.32)	0.37 (SD: 0.48)	0.57 (SD: 0.50)	0.51 (SD: 0.50)	0.39 (SD: 0.47)
<i>Income domain</i>						
6. Input in decisions on wage, employment, minor expenses	0.93 (SD: 0.24)	0.83 (SD: 0.37)	0.95 (SD: 0.22)	0.95 (SD: 0.22)	0.95 (SD: 0.22)	0.96 (SD: 0.20)
<i>Leadership domain</i>						
7. Membership of ≥ 1 group	0.81 (SD: 0.31)	0.66 (SD: 0.47)	0.78 (SD: 0.42)	0.83 (SD: 0.37)	0.84 (SD: 0.37)	0.74 (SD: 0.44)
8. Comfortable speaking in public in ≥ 1 context	0.87 (SD: 0.33)	0.79 (SD: 0.41)	0.78 (0.41)	0.87 (SD: 0.33)	0.91 (SD: 0.28)	0.84 (SD: 0.37)
<i>Leisure domain</i>						
9. Avg workload >10.5 hrs in 24hrs (excessive workload)	0.52 (SD: 0.49)	0.19 (SD: 0.39)	0.54 (SD: 0.59)	0.53 (SD: 0.49)	0.55 (SD: 0.49)	0.74 (SD: 0.43)
10. Satisfaction with leisure time	0.80 (SD: 0.40)	0.94 (SD: 0.24)	0.84 (SD: 0.37)	0.87 (SD: 0.34)	0.73 (SD: 0.45)	0.83 (SD: 0.38)

Chapter 6

6.1. Conclusion

The field of women's empowerment and dietary diversity is not new, and many studies have suggested different links between women's empowerment and women's and children's dietary diversity. A key observation from the review of existing literature and the findings from the studies included in Chapters 2 to 5 of this thesis is that contextual factors are important in any studies or interventions that target women's empowerment. Unlocking the different roles of contextual factors in determining how women express empowerment and in the measurement of women's empowerment across different domains of empowerment should be of significant importance as evidence suggest that there are multifaceted linkages between different empowerment indicators and domains.

Different approaches have been used to measure and examine women's empowerment and results have varied across different settings. However, using qualitative approaches to examine women's empowerment and women's dietary diversity have not received as much focus as quantitative explorations hence, this thesis adds important value to this gap in knowledge. In addition, this thesis uses a more detailed statistical approach to examine women's and children's dietary diversity and findings are helpful in understanding the relationship between women's empowerment and dietary diversity. The goal of this thesis was to; (1) qualitatively explore the conceptualisation of women's empowerment in a local context; (2) qualitatively examine food consumption for women belonging to different socioeconomic groups; and (3) quantitatively examine the relationship between women's empowerment and women's and children's dietary intake using two empowerment indexes. The thesis uses these two broad methodological approaches to examine local understandings of empowerment and women's empowerment terminologies and needs, and to draw important links

between women's empowerment and dietary diversity. This chapter provides a summary of important findings from Chapters 2 – 5.

Local understanding of empowerment terminologies plays an important role in women's empowerment narrative by (1) determining the level of understanding and acceptability of women's empowerment initiatives, and (2) by determining how reliable women's empowerment indexes are in adequately measuring women's empowerment. The clear gender divide in the understanding of empowerment and women's empowerment that was found in Chapter 2 also speaks to the need to ensure that the way women's empowerment initiatives and measures are presented to men and women are acceptable to them within households and communities. The multidirectional way by which prevailing norms at household and community levels interact will largely dictate how women's empowerment ideologies are perceived and expressed, and these local norms and contextual factors might not always echo perceived understanding of women's empowerment needs.

For instance, economic empowerment through improved income has been shown to improve women's agency and autonomy (the capacity and freedom to act independently) including in production within and outside their households (Brody et al., 2015; Duflo, 2012; Kabir, 2016; Mehra, 1997). Such improvements are generally considered desirable. However, can this optimistic view of the role of income generation be extended to all settings where women face restrictions in their agency and autonomy? Chapter 2 of this thesis argues that perhaps not. While women with improved income-earnings express better access to financial resources and agency and autonomy towards certain demands such as personal and household purchases, other areas such as ownership of large assets, role in agricultural production, and decision-making regarding recreational sex might

not be directly or immediately influenced by improved income-generation. This can be linked to existing norms at the community-level that are against women's sole ownership of large assets as well as those at the household-level that dictate women's roles in agricultural production and in sexual relationship with their male spouse. The question remains: Can this finding of varied effects of income-generation on other areas of women's empowerment be extended to all rural settings in Nigeria and other developing countries? The answer is perhaps with caution since within complex and multi-ethnic countries including Nigeria, there are large variations in gender norms across different regions within the country. That being said, more important questions arise: Is sole ownership of large assets desirable to rural women? Or are women in such settings more interested in joint ownership and decision-making? Or are rural women only interested in inheritance rights to these assets? And would rural women's asset ownership needs differ based on household structure (monogamy vs. polygamy; nuclear vs. extended)? These are important questions that need to be explored in-depth to understand the most important empowerment needs to women in different rural settings and this perhaps highlights the role of qualitative investigation. These diverse reflections of women's needs would perhaps aid in ensuring that women's empowerment measures including the WEAI and SWPER correctly identify and classify a woman as empowered or not across different domains.

Chapter 3 argues that perhaps income generation might be important for the consumption of certain food items that are predominantly purchased but not so important towards the consumption of food items that women predominantly produce. For the latter, perhaps, improved agricultural practices might be important. In addition, should the target of economic empowerment initiatives be income generation or generation of adequate income or custody of income? What amount of

income would be considered adequate? Such questions would perhaps aid in the understanding of the determinants of improved dietary diversity (consumption of different food groups) for women. Since income-earning potentials are limited in rural settings in developing countries including in SSA, to improve dietary diversity for women would perhaps require a more nuanced approach that would include improved agricultural practices for women or “women’s crops” and improved women’s agency, autonomy and access to household financial and food resources. To do this, prevailing contextual factors and norms would need to be considered. Evidence suggests that in agricultural production there are crops that are considered men’s and women’s (De Pinto et al., 2019; Doss, 2002). However, how this gender divide in food production extends to food consumption is yet to be demonstrated. This might be important towards a better understanding of women’s dietary diversity and food consumption. Also, in many developing countries including in SSA, there are many social constructs and perceptions that influence women’s body size and by extension, food consumption (E. Cohen et al., 2013; Hardin et al., 2018; Mokhtar et al., 2001; Okop et al., 2016). How these norms persist in favour of calorie-dense food consumption against more diversity in diets might impact on empowerment initiatives that aim to improve women’s and children’s dietary diversity.

Chapters 4 and 5 found varying degrees of association between different empowerment domains and women’s and children’s dietary diversity and food consumption. Improved autonomy including in production, input in production decisions, public speaking, and non-excessive workload all showed important associations with women’s and children’s dietary diversity and food consumption. These associations varied across the countries examined; within countries with significant associations, different food groups accounted for the improvements (or reductions) in dietary

diversity scores. Although these studies pooled data across five countries, the finding of a varied degree of association between empowerment domains and women's and children's dietary diversity is consistent with literature where different studies in different locations have reported different findings. This further highlights the role of contextual factors in different settings that might influence firstly women's empowerment measurement, and secondly food consumption practices. Linking these findings to Chapters 2 and 3 of this thesis further suggests that perhaps the varied results and insignificant findings in some domains and countries might be as a result of a lack of in-depth exploration of the community-level and household-level contextual factors by the two measures of empowerment used; the WEAI and the SWPER. These indexes (especially the WEAI) were developed using some triangulation of qualitative and quantitative work, and the regression analyses I performed controlled for existing sociodemographic, economic, and geographical factors. However, one can argue that the development of the questions and indicators used in the indexes does not account for the varied nature of the relationship between women's empowerment needs and contextual factors across different developing-country settings. Hence, some important questions arise; Should indexes including the WEAI be used only in contexts in which they were piloted and developed? Should settings with similarities in cultural norms and perceptions have separate measures of empowerment? Can these suggested strategies be realistically achieved given the already existing lack of consensus on how women's empowerment should be measured? The known tools that measure women's empowerment have advanced the knowledge in the field of improving women's wellbeing, however, some of these questions need further investigation. To investigate the relationship between indicators like women's empowerment and dietary diversity both which can be influenced by contextual factors, there is need to ensure that both measures control for such prevailing contextual factors that might determine the reliability of the results obtained.

6.2. The messiness of women's empowerment conceptualisation and measurement

Although there is consensus on the definition of women's empowerment, one thing is clear from the review of existing literature in studies that have explored women's empowerment; it is a messy topic. This is because there are numerous concepts including agency (intrinsic, acquired, expressed, instrumental, etc.) and autonomy (personal, political, behavioral, emotional, and cognitive, etc.), domains (including decision-making, choice and voice, mobility, and power and control), and indicators of empowerment across different existing indexes. Hence, different empowerment indexes are often developed to focus on different activities including agricultural production, politics, socioemotional wellbeing, etc. Although evidence suggests that empowerment domains and indicators might overlap across different indexes, further investigation suggests that the questions used to elicit empowerment are usually different across different indexes. This makes the comparability of empowerment indexes difficult to achieve. For instance, the WEAI measures autonomy to reflect personal decision-making in agricultural production while the SWPER uses socio-demographic differences between men and women in households to establish social independence and autonomy. Decision-making is explored in the WEAI in the context of autonomy and input in agricultural production decisions whereas the SWPER explores decision-making in mobility, healthcare, and household expenditures. This illustrates how the comparability of indexes can be difficult to achieve.

These differences in women's empowerment indexes are further exacerbated when contextual norms and factors are considered since evidence also suggests that empowerment is embedded in

and influenced heavily by existing contextual factors which vary across settings. This further makes it difficult to elicit the role of women's empowerment across different setting even when the same measures and indexes are used. The applicability of empowerment indexes also differs and further complicates the usability of empowerment indexes in different settings. For instance, it is difficult to compare the WEAI and SWPER. The WEAI is applicable to rural agrarian settings especially in agricultural production, useful as a tool to measure progress in empowerment initiatives, but does not examine household dynamics that go beyond agricultural production, e.g. sexual relations, domestic violence, etc. On the other hand, the SWPER is useful in measuring empowerment in standardized national surveys but with restricted applicability to mostly countries in SSA. In addition, the questions in the SWPER are not nuanced enough to measure women's empowerment in rural agricultural production.

Further, based on the findings from chapters 4 and 5 of this thesis, it is difficult to conclude if women's empowerment as measured by the WEAI and SWPER is a significant predictor of women's and children's feeding practices due to the varied associations found in the analyses. This perhaps suggests that the WEAI and the SWPER are not adequately poised to identify empowered women in the five SSA countries examined. Further, other exogenous factors exist that could play important mediating roles in the relationship between women's empowerment and food consumption for women and children. Although not the focus of this thesis, food consumption and dietary diversity for women, infants and young children are influenced by social norms and contextual factors. These factors might play an important mediating role in women's perceptions and understanding of the benefits of consuming specific food items.

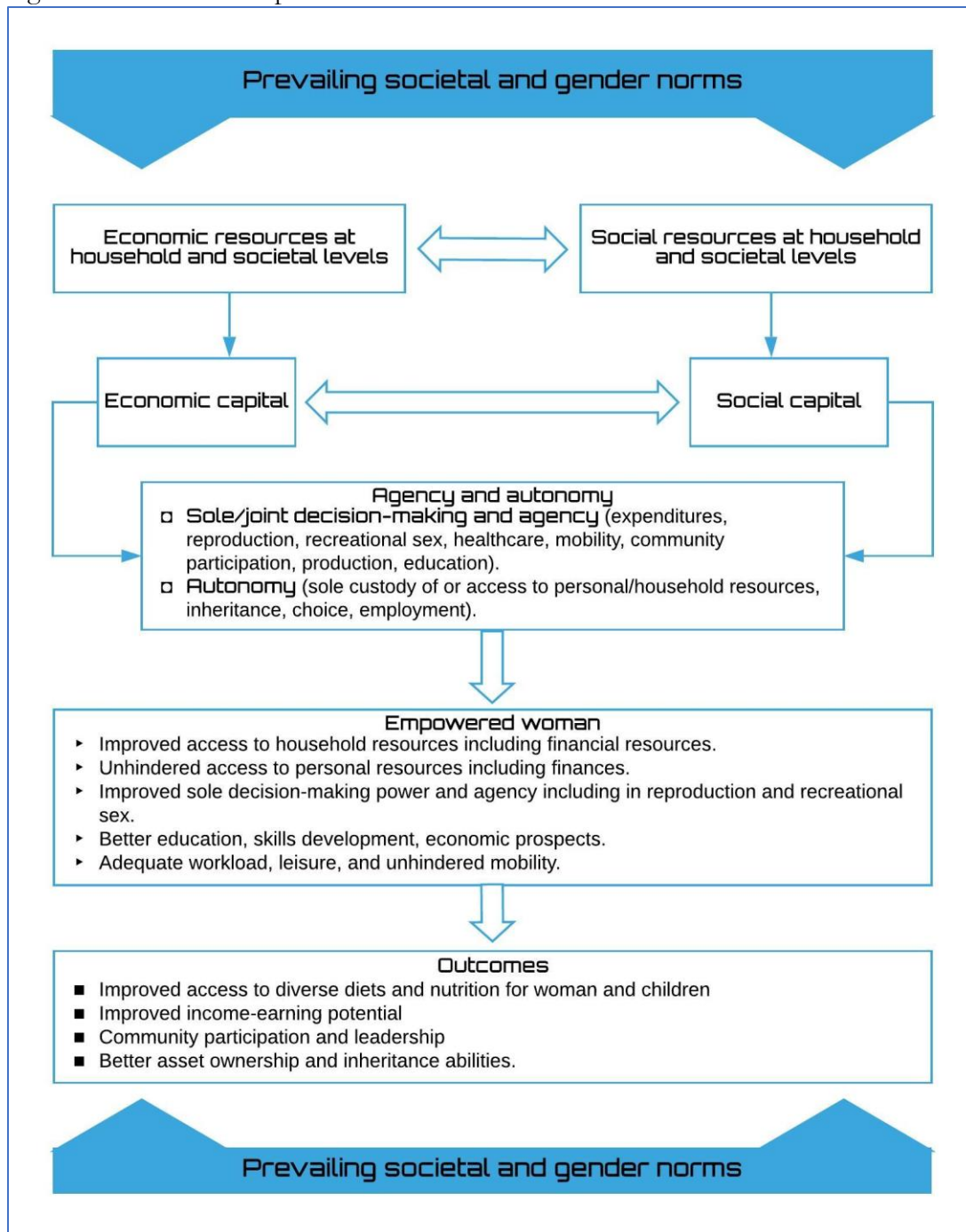
6.3. Conceptualising women's empowerment: author's interpretation

Women's empowerment is embedded in existing contextual factors within societies and individuals and households exist within these societies (see Fig 6.1). The nature of these contextual factors and the level of adherence by individuals and household within societies to existing norms and cultural expectations dictate the extent to which women feel and are empowered, especially if the type of empowerment examined is against existing norms and cultures.

Within these societies and households are economic resources including employment and income, and social resources including education, that women could access to gain improved economic and social capital. With gains in both types of capital, women become more empowered and this manifests in indicators which include improved access to household resources, sole and joint decision-making across varied scenarios, better education, and adequate workload to name a few.

Women with such gains through improved empowerment can experience improved outcomes including nutrition outcomes and consumption of more diverse diets. Finally, an empowered woman would have empowered children with better nutrition and health outcomes, and these children would grow into empowered women and men. This framework builds upon the framework developed by Yount (2017) and Kabeer (1999) with concepts taken from Mosedale (2005) to clearly illustrate the process of gaining and expressing empowerment for women, and how this is influence by contextual factors and societal and household levels.

Figure 6.1: Women’s empowerment at societal and household levels



6.4. Recommendations

Different chapters have mentioned the strengths and limitations of the study approaches used, hence, this chapter concludes by making suggestions for future research.

There may be a case to be made for further adaptation and testing of known measures of women's empowerment, including those that are used to examine the performance of women's empowerment initiatives. This is because local understanding of empowerment terminologies, perceptions and attitudes towards different empowerment indicators and initiatives might not always resonate with external ideas; context is important. This will go a long way in determining if empowerment initiatives are acceptable to women and men, successfully implemented, appropriately measured and reported in literature.

Initiatives to empower women towards improved dietary diversity might need to examine what type of empowerment initiatives confers the most benefit towards improved consumption of different food items. While economic empowerment might be important towards food items that are expensive to purchase or produce, other forms of empowerment, including autonomy and input in production, might be important for the consumption of other food items which might not be expensive but require other non-financial inputs towards improved production and consumption.

While different domains of empowerment confer different benefits towards women's and children's dietary diversity, such benefits tend to vary across different settings, and this suggests that women's empowerment needs might vary across different settings thereby further confirming the role of contextual factors towards improved empowerment and dietary diversity for women and children. The implication is that contextual factors have to be taken into account in policy initiatives to achieve improved women empowerment and dietary diversity.

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Appendices

Appendices 1 - Study 1 and 2: IDI and FGDs guides

Demographic and background information	
a). Respondent's age:	b). Do you work outside the home? <input type="checkbox"/> Yes <input type="checkbox"/> No
c). Do you have any co-wives? <input type="checkbox"/> Yes <input type="checkbox"/> No	b2). If Yes, what do you do? (<i>note occupation/economic activity</i>)
c2). If Yes, how many:	
c3). Position among wives (1 st /2 nd /3 rd /etc):.....	
d). Do you live with your husband/partner daily? <input type="checkbox"/> Yes <input type="checkbox"/> No	e). Do you have any children? <input type="checkbox"/> Yes <input type="checkbox"/> No
f). Do you have a farm or garden that you cultivate? <input type="checkbox"/> Yes <input type="checkbox"/> No	e2). If Yes, how many:, how many are below 5 years old:
f2). If Yes, do you eat all you cultivate or also sell them? <input type="checkbox"/> Eat only <input type="checkbox"/> Sell only <input type="checkbox"/> Eat/Sell	g). Which food items do you cultivate/produce? (<i>list all</i>) i..... ii..... iii..... iv..... v..... vi.....
h). Which food items do you buy from the market? i..... ii..... iii..... iv..... v..... vi.....	g2). Do you have these food item available all year? <input type="checkbox"/> Yes <input type="checkbox"/> No
h2). Which food item is available in the market all year? (<i>list all</i>) i..... ii..... iii..... iv..... v..... vi.....	g2i). If No, which food items do you have all year? i..... ii..... iii..... iv..... v..... vi.....
h3). Which food item is not available in the market all year? (<i>list all</i>) i..... ii..... iii..... iv..... v..... vi.....	g2ii). which food items do you not have all year? i..... ii..... iii..... iv..... v..... vi.....
i). Are there any food items that are too expensive to buy or produce? (<i>list all</i>) i..... ii..... iii..... iv..... v..... vi.....	j). Do you have food items that you only buy when your husband agrees? <input type="checkbox"/> Yes <input type="checkbox"/> No
i2). How often do you consume these food items? <input type="checkbox"/> Regularly <input type="checkbox"/> Occasionally <input type="checkbox"/> Rarely	j2). What are these food items? (<i>list all</i>) i..... ii..... iii..... iv..... v..... vi.....
	j3). Can you eat these food items whenever you want, or you need to ask your husband/partner first? <input type="checkbox"/> Whenever <input type="checkbox"/> Need permission sometimes <input type="checkbox"/> Need permission always
Production (<i>input in productive decisions and autonomy in productive decisions</i>)	

- i. What are the sources of income (including agriculture, wage employment, public transfers, remittances, gift-giving, etc.) available in your household? Which of the sources of income/income-generating activities that you have mentioned are typically performed by men and which by women? Why?
- ii. What are the roles of women within households when it comes to economic activities including farming?
- iii. Are women allowed or do you think women need to be allowed to engage in any farming activity they choose? Why or why not?
- iv. Should women engage in any farming activities that can generate income for themselves or household? Why? Why not?
- v. In your household (or outside the household), who decides what crops to plant or the area under cultivation or livestock to own/raise? Why?
- vi. Do you think these issues will be different for women in richer households than yours? Poorer households? how?

Resources (*Ownership of assets. Purchase, sale, or transfer of assets. Access to and decisions about credit*)

- i. What are the main household assets or property (e.g. house, land, livestock) in your household?
- ii. Who in your household (or outside your household) owns these assets or property? Why?
- iii. Who in the household makes decisions regarding the use and sale of these assets? Why?
- iv. What types of asset (land/productive livestock/houses/machinery/vehicle, etc) do women own in your community? Is this the same for you? How many of these assets do you own as an individual or a group?
- v. Can women do whatever they want (purchase, sale, transfer, borrow, use, etc) with these assets? Why? Why not? What are your experiences?
- vi. What types of credit or other financial services (savings, insurance, loans from microfinance institutions, CBOs, NGOs, social networks) do male/female members in your household typically have access to?
- vii. What are the different constraints/challenges that men and women face when accessing these types of credit? Why?
- viii. Have you or anyone in your household borrowed money before? What was the purpose?
- ix. How was the decision made to borrow the money and how the money will be spent?
- x. Do you think these issues will be different for women in richer households than yours? Poorer households? how?

Income (*Control over use of income and savings*)

- i. Would you say you earn an income that goes into paying for some household expenditures? And is this income **very little/large enough/almost the same as your spouse/more than your spouse**?
- ii. Do you have unhindered access to the income you earn in your household? Why?
- iii. How are decisions made on spending household money? Who decides for purchasing food? For expenses like school fees and clothes? For healthcare? For leisure (snacks, partying, going out)?
- iv. How do you think the amount you earn affect your ability to contribute to household decision making?
- v. In your household, do you save money? Who decides how much to save? How is the decision made regarding when and how to use the savings?
- vi. Do you think it is appropriate for women to earn and manage household money? Explain.
- vii. Do you think it is appropriate for women to make economic decisions in the household (e.g. selling crops, livestock or land, purchasing tools, asking for a loan)? Do you think it is appropriate for women to work outside the house? Explain.
- viii. Do you think these issues will be different for women in richer households? Poorer households? how?

Leadership (*Group membership and speaking in public*)

- i. How would you explain “empowerment” and “women’s empowerment”? How do you know whether men and women are empowered in your community? List a few indicators of empowerment.
- ii. How can a woman/man be empowered? What are the obstacles for women/men empowerment
- iii. Did anyone in your household participate in community meetings to help decide on community programmes?

- iv. Are there any differences in the way men and women behave or participate in these community meetings (e.g. speaking up in public)? Explain.
- v. Are you a member of any established association or social network (e.g. producer organization, rural organization, union, women group, mixed group, etc.)?
- vi. Do you hold a leadership position?
- vii. Are men and women usually participants in separate networks or mixed-gender ones? Why? What are the advantages and disadvantages of this?
- viii. Do people perceive men networks to be more important than women's? Explain

Decision-making (*Education, expenditure, and reproductive health*)

- i. In your household, who decides when to send children to school? Are decisions different when they are made regarding boys' and girls' education? Are there preferences for boys' (or girls') education? Why?
- ii. Who usually decides on when healthcare should be sought? Why?
- iii. Who usually decides on large household purchases? Why?
- iv. Who usually decides on visits to family or relatives? Why?
- v. Do you think a woman can refuse to have sex with the husband? Why?
- vi. Do you think a woman should decide if she wants her husband/spouse to practice family planning like use condoms during sex? Why?
- vii. Do you think these issues will be different for women in richer households than yours? Poorer households? how?

Knowledge and attitude towards violence

- i. Have you ever experienced gender-based violence?
- ii. If you have experienced gender-based violence in the past, was this related to issues of women's empowerment?
- iii. Do you think it is justified for a man to hit or beat a woman? Why?
Justified if wife goes out without telling husband? Why?
Justified if wife neglects the children? Why?
Justified if wife argues with husband? Why?
Justified if wife refuses to have sex with husband? Why?
Justified if wife burns the food?
- iv. Do you women will experience violence related to issues think these issues in richer households than yours? Poorer households? how?

Food consumption and dietary diversity

- i. Can you name up to 10 food groups that were consumed in your household in the past day?
- ii. Usually, which of these food groups are consumed more frequently? Why?
- iii. Do you think there are food groups you do not consume enough? Explain. Is this the same for every member in your household?
- iv. In your household, who decides on what food to consume during meals? Why?
- v. Are there preferences given to any food for men or women and boys or girls? Why?
- vi. Is anyone allowed to have second servings? Is this different for men and women, and boys and girls?
- vii. Do you need to ask for permission to prepare any specific meal at home? From who? Why?
- viii. If you work for income, do you experience difficulties in doing this other work and also cook daily?
- ix. Do you think this affects the type of food you can cook or consume? Why?
- x. Do you think food consumption issues will be different for women in richer households than? Poorer households how?

Question guide for focus group discussions (FGDs)

Production (<i>input in productive decisions and autonomy in productive decisions</i>)	
i.	What sources of income/income-generating activities are typically performed by men and which by women? Why?
ii.	What are the roles of women within households when it comes to economic activities including farming?
iii.	Are women allowed or do you think women need to be allowed to engage in any farming activity they choose? Why or why not?
iv.	Are there any farming activities that women should not do alone or in groups? Can they do this if a man is involved?
v.	Should women engage in any farming activities that can generate income for themselves or household? Why? Why not?
vi.	How are decisions made during planting season? Who decides what crops to plant or the area under cultivation and how are these decisions made? Why?
vii.	In your household (or outside the household), who decides what livestock to own/raise and sell (or fisheries, forest products, etc.) How are these decisions made? Why?
Resources (<i>Ownership of assets. Purchase, sale, or transfer of assets. Access to and decisions about credit</i>)	
i.	Who in your household (or outside your household) owns these assets or property? Why?
ii.	Who in the household makes decisions regarding the use and sale of these assets? Why? What is the impact of this?
iii.	Who keeps these assets or property if a marriage is dissolved because of separation or death? Why?
iv.	What types of asset (land/productive livestock/houses/machinery/vehicle, etc) do women own in your community? Is this the same for you? How many of these assets do you own as an individual or a group?
v.	Can women do whatever they want (purchase, sale, transfer, borrow, use, etc) with these assets? Why? Why not? What are your experiences?
vi.	What types of credit or other financial services (savings, insurance, loans from microfinance institutions, CBOs, NGOs, social networks, etc.) do male/female members in your household typically have access to?
vii.	What are the different constraints/challenges that men and women face when accessing these types of credit? Why? Are they accessible equally to men/women?
viii.	How are decision made to borrow to money and how the money will be spent?
Income (<i>Control over use of income and savings</i>)	
i.	How are decisions made on spending household money? Who decides for purchasing food? For expenses like school fees and clothes? For healthcare? For leisure (snacks, partying, going out)?
ii.	Do you think the amount a woman/man earns affect their ability to contribute to household decision making? How?
iii.	In your households, do you save money? Who decides how much to save? How is the decision made regarding when and how to use the savings?
iv.	Do you think it is appropriate for women to earn and manage household money? Explain.
v.	Do you think it is appropriate for women to make economic decisions in the household (e.g. selling crops, livestock or land, purchasing tools, asking for a loan)? Do you think it is appropriate for women to work outside the household? Explain.
Leadership (<i>Group membership and speaking in public</i>)	
i.	How would you explain “empowerment” and “women’s empowerment”? How do you know whether men and women are empowered in your community? List a few indicators of empowerment.
ii.	Is it easy for women to have an opinion in households and in public?
iii.	Do you think it is easy for women to speak in public and disagree with men openly? Why? Explain.
iv.	Does anyone in your household participate in community meetings to help decide on community

	programmes? Who? Why?
v.	Are there any differences in the way men and women behave or participate in these community meetings (e.g. speaking up in public)? Explain.
vi.	Are men and women usually participants in separate networks or mixed-gender ones? Why? What are the advantages and disadvantages of this?
vii.	Do people perceive male networks to be more important than female's? Explain
Decision-making (<i>Education, expenditure, and reproductive health</i>)	
i.	In your households, who decide when to send children to school? Are decisions different when they are made regarding boys' and girls' education? Are there preferences for boys' (or girls') education? Why?
ii.	Who usually decides on when healthcare should be sought? Why?
iii.	Who usually decides on large household purchases? Why?
iv.	Who usually decides on visits to family or relatives? Why?
v.	Do you think a woman can refuse to have sex with the husband? Why?
vi.	Do you think a woman should decide if she wants her husband/spouse to practise family planning like use condoms during sex? Why?
Knowledge and attitude towards violence	
i.	Do you think there are ongoing gender-based violence in the community? When and where does violence occur?
ii.	What are community responses when gender-based violence occurs? What is done to prevent violence? What social and legal services exist to help address these problems? What is done to help survivors? Do women's support networks exist to help survivors?
v.	Have any you ever experienced gender-based violence? Can you give more details to how it happened?
vi.	Do you think it is justified for a man to hit or beat a woman? Why? Justified if wife goes out without telling husband? Why? Justified if wife neglects the children? Why? Justified if wife argues with husband? Why? Justified if wife refuses to have sex with husband? Why? Justified if wife burns the food?

Appendices 2 - Study 3: Women's empowerment and IYCDDS

Supplementary Table 1: OLS Regression results for IYCDDS - SWPER cumulative

	(1)	(2)	(3)	(4)	(5)	(6)
	All	Mozambique	Rwanda	Malawi	Uganda	Zambia
SWPER cumulative	0.063*** (0.015)	0.020 (0.038)	-0.054* (0.027)	0.040 (0.027)	0.042* (0.021)	0.063 (0.038)
Female index child	0.016 (0.039)	-0.033 (0.090)	0.097 (0.065)	0.016 (0.055)	0.038 (0.057)	-0.071 (0.124)
Maternal education	0.015** (0.007)	0.029 (0.020)	0.050*** (0.013)	0.047*** (0.011)	0.023* (0.012)	0.027 (0.020)
Paternal education	0.004 (0.005)	0.031** (0.016)	0.011 (0.011)	0.003 (0.008)	0.026*** (0.009)	-0.011 (0.018)
Maternal age	0.000 (0.004)	0.002 (0.010)	0.009 (0.008)	-0.003 (0.006)	0.002 (0.007)	0.011 (0.017)
Paternal age	0.001 (0.003)	0.001 (0.007)	-0.007 (0.005)	0.002 (0.004)	0.003 (0.005)	-0.001 (0.012)
Wealth index [Q1: Lowest]	-0.257*** (0.042)	0.172 (0.119)	-0.577*** (0.079)	-0.258*** (0.070)	-0.133* (0.074)	-0.263* (0.136)
Age of index child	0.052*** (0.004)	0.043*** (0.009)	0.056*** (0.007)	0.059*** (0.006)	0.031*** (0.006)	0.064*** (0.011)
Rural location	-0.132* (0.068)	-0.047 (0.162)	-0.197* (0.106)	-0.327*** (0.114)	-0.038 (0.104)	-0.185 (0.121)
Currently breastfeeding	-0.135** (0.068)	-0.253* (0.129)	-0.173 (0.119)	0.006 (0.090)	-0.222** (0.090)	-0.240 (0.212)
Study month	0.016*** (0.005)	-0.045 (0.036)	0.003 (0.007)	0.048*** (0.006)	-0.107*** (0.025)	0.003 (0.013)
Built population	-0.000** (0.000)	0.000*** (0.000)	-0.355 (0.364)	0.000*** (0.000)	-0.000 (0.000)	0.003 (0.021)
Growing season length	0.000*** (0.000)	0.000*** (0.000)	-0.051* (0.029)	-0.000 (0.032)	-0.000 (0.000)	-0.000** (0.000)
Proximity to irrigation	0.000 (0.000)	-0.000 (0.000)	-0.016 (0.030)	0.000 (0.000)	0.000 (0.000)	-0.003 (0.021)
Drought episodes	-0.000*** (0.000)	-0.000 (0.000)	0.000 (0.000)	-0.000*** (0.000)	-0.000** (0.000)	0.000 (0.000)

Standard errors are in parenthesis

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Supplementary Table 2: Marginal effects of Poisson regression for IYCDDS - Table A

	(1) Model A	(2) Model B	(3) Model C	(4) Model D	(5) Model E
Att towards violence	0.051** (0.024)	0.053** (0.024)			
Social independence	0.136*** (0.032)		0.134*** (0.032)		
Decision-making	0.038 (0.025)			0.033 (0.025)	
SWPER cumulative					0.062*** (0.015)
Female index child	0.018 (0.039)	0.014 (0.040)	0.019 (0.039)	0.015 (0.039)	0.015 (0.039)
Maternal education	0.003 (0.008)	0.027*** (0.007)	0.006 (0.008)	0.027*** (0.007)	0.014** (0.007)
Paternal education	0.007 (0.005)	0.002 (0.005)	0.007 (0.005)	0.001 (0.005)	0.004 (0.005)
Maternal age	-0.004 (0.004)	0.005 (0.004)	-0.003 (0.004)	0.005 (0.004)	0.000 (0.004)
Paternal age	0.003 (0.003)	-0.002 (0.003)	0.002 (0.003)	-0.002 (0.003)	0.001 (0.003)
Wealth index [Q1: Lowest]	-0.259*** (0.042)	-0.263*** (0.042)	-0.272*** (0.042)	-0.279*** (0.042)	-0.259*** (0.042)
Age of index child	0.053*** (0.004)	0.052*** (0.004)	0.053*** (0.004)	0.052*** (0.004)	0.053*** (0.004)
Rural location	-0.116* (0.064)	-0.138** (0.065)	-0.122* (0.065)	-0.132** (0.064)	-0.121* (0.064)
Currently breastfeeding	-0.112* (0.063)	-0.112* (0.065)	-0.114* (0.064)	-0.111* (0.064)	-0.109* (0.063)
Study month	0.017*** (0.005)	0.015*** (0.006)	0.016*** (0.005)	0.015*** (0.006)	0.016*** (0.006)
Built population	-0.000*** (0.000)	-0.000** (0.000)	-0.000*** (0.000)	-0.000** (0.000)	-0.000** (0.000)
Growing season length	0.000*** (0.000)	0.000*** (0.000)	0.000*** (0.000)	0.000*** (0.000)	0.000*** (0.000)
Proximity to irrigation	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
Drought episodes	-0.000*** (0.000)	-0.000*** (0.000)	-0.000*** (0.000)	-0.000*** (0.000)	-0.000*** (0.000)

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Supplementary Table 3: Marginal effects of Poisson regression for IYCDDS – Table B

	(1)	(2)	(3)	(4)	(5)	(6)
	All	Mozambique	Rwanda	Malawi	Uganda	Zambia
Att towards violence	0.051** (0.024)	0.079 (0.082)	-0.032 (0.040)	-0.053 (0.048)	0.042 (0.034)	-0.047 (0.051)
Social independence	0.136*** (0.032)	0.041 (0.087)	-0.117** (0.053)	0.079 (0.054)	0.133*** (0.049)	0.255*** (0.091)
Decision-making	0.038 (0.025)	-0.014 (0.054)	-0.049 (0.045)	0.062* (0.035)	0.005 (0.037)	0.146** (0.073)
Female index child	0.018 (0.039)	-0.032 (0.089)	0.098 (0.065)	0.022 (0.055)	0.039 (0.057)	-0.055 (0.117)
Maternal education	0.003 (0.008)	0.025 (0.022)	0.056*** (0.014)	0.042*** (0.013)	0.007 (0.015)	-0.010 (0.020)
Paternal education	0.007 (0.005)	0.032** (0.016)	0.008 (0.010)	0.002 (0.008)	0.029*** (0.009)	-0.009 (0.018)
Maternal age	-0.004 (0.004)	0.001 (0.013)	0.014 (0.009)	-0.006 (0.006)	-0.003 (0.008)	0.002 (0.015)
Paternal age	0.003 (0.003)	0.001 (0.007)	-0.011* (0.006)	0.004 (0.004)	0.005 (0.005)	0.004 (0.011)
Wealth index [Q1: Lowest]	-0.259*** (0.042)	0.171 (0.116)	-0.586*** (0.078)	-0.269*** (0.071)	-0.123* (0.074)	-0.360** (0.147)
Age of index child	0.053*** (0.004)	0.044*** (0.009)	0.056*** (0.007)	0.060*** (0.006)	0.032*** (0.006)	0.070*** (0.011)
Rural location	-0.116* (0.064)	-0.040 (0.157)	-0.175* (0.095)	-0.279*** (0.103)	-0.022 (0.098)	-0.124 (0.117)
Currently breastfeeding	-0.112* (0.063)	-0.228* (0.125)	-0.145 (0.108)	0.026 (0.085)	-0.203** (0.086)	-0.154 (0.184)
Study month	0.017*** (0.005)	-0.046 (0.036)	0.004 (0.007)	0.048*** (0.007)	-0.109*** (0.024)	0.002 (0.012)
Built population	-0.000*** (0.000)	0.000*** (0.000)	-0.332 (0.314)	0.000** (0.000)	-0.000 (0.000)	-0.001 (0.019)
Growing season length	0.000*** (0.000)	0.000*** (0.000)	-0.050* (0.030)	0.006 (0.032)	-0.000 (0.000)	-0.000*** (0.000)
Proximity to irrigation	0.000 (0.000)	-0.000 (0.000)	-0.013 (0.030)	0.000 (0.000)	0.000 (0.000)	0.001 (0.019)
Drought episodes	-0.000*** (0.000)	-0.000 (0.000)	0.000 (0.000)	-0.000*** (0.000)	-0.000** (0.000)	0.000 (0.000)

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Supplementary Table 4: Marginal effects of Logistic regression for food group consumption (all countries)

	(1) Grains/ roots	(2) Legumes	(3) Dairy	(4) Flesh protein	(5) Eggs	(6) Vit A-rich leafy veg	(7) Other vit A-rich fruit/veg
Social independence	0.000 (0.012)	0.023** (0.010)	0.046*** (0.007)	-0.029*** (0.011)	-0.001 (0.008)	0.009 (0.010)	0.032*** (0.011)
Female index child	0.007 (0.012)	-0.007 (0.012)	-0.003 (0.010)	0.000 (0.013)	-0.009 (0.009)	0.010 (0.011)	0.013 (0.012)
Maternal education	0.004 (0.002)	0.001 (0.002)	0.006*** (0.002)	0.006*** (0.002)	0.006*** (0.002)	-0.003 (0.002)	-0.000 (0.003)
Paternal education	-0.003** (0.002)	-0.002 (0.002)	0.007*** (0.001)	0.002 (0.002)	0.004*** (0.001)	0.001 (0.002)	0.002 (0.002)
Maternal age	-0.001 (0.002)	0.004** (0.002)	-0.001 (0.001)	0.003* (0.002)	-0.001 (0.001)	0.004*** (0.001)	0.001 (0.002)
Paternal age	0.002 (0.001)	-0.002 (0.001)	0.003*** (0.001)	-0.002* (0.001)	0.001** (0.001)	-0.001 (0.001)	-0.001 (0.001)
Wealth index [Q1: Lowest]	-0.026 (0.019)	0.031 (0.019)	0.082*** (0.011)	0.051*** (0.019)	0.018* (0.009)	-0.004 (0.016)	0.054*** (0.017)
Age of index child	0.011*** (0.001)	0.011*** (0.001)	-0.005*** (0.001)	0.013*** (0.001)	0.003*** (0.001)	0.020*** (0.001)	0.012*** (0.001)
Rural location	-0.028 (0.023)	0.049** (0.022)	-0.074*** (0.014)	-0.061*** (0.020)	-0.031*** (0.011)	0.026 (0.019)	0.048** (0.021)
Currently breastfeeding	-0.030 (0.021)	0.032* (0.019)	-0.079*** (0.015)	-0.045** (0.018)	-0.029** (0.012)	0.048*** (0.018)	-0.010 (0.020)
Study month	0.002 (0.002)	0.001 (0.002)	-0.001 (0.001)	0.006*** (0.002)	0.004*** (0.001)	-0.005*** (0.002)	0.007*** (0.002)
Built population	0.000 (0.000)	-0.000*** (0.000)	-0.000** (0.000)	-0.000 (0.000)	-0.000** (0.000)	-0.000 (0.000)	0.000 (0.000)
Growing season length	0.000* (0.000)	0.000*** (0.000)	0.000 (0.000)	0.000** (0.000)	0.000* (0.000)	0.000 (0.000)	0.000*** (0.000)
Proximity to irrigation	-0.000 (0.000)	0.000*** (0.000)	0.000 (0.000)	-0.000*** (0.000)	0.000 (0.000)	0.000 (0.000)	-0.000*** (0.000)
Drought episodes	-0.000*** (0.000)	-0.000*** (0.000)	-0.000*** (0.000)	0.000*** (0.000)	0.000*** (0.000)	0.000*** (0.000)	0.000*** (0.000)

Standard errors in parentheses
 *** p<0.01, ** p<0.05, * p<0.1

Supplementary Table 5: Marginal effects of Logistic regression for food groups consumed – Uganda

	(1) Grains/ roots	(2) Legumes	(3) Dairy	(4) Flesh protein	(5) Eggs	(6) Vit A- rich leafy veg	(7) Other vit A-rich fruit/veg
Social independence	-0.013 (0.015)	0.006 (0.018)	0.049*** (0.015)	-0.018 (0.017)	0.018 (0.011)	0.003 (0.017)	-0.003 (0.015)
Female index child	0.013 (0.015)	0.000 (0.019)	0.016 (0.016)	-0.018 (0.018)	-0.008 (0.014)	0.009 (0.018)	0.012 (0.018)
Maternal education	0.009** (0.004)	0.004 (0.005)	0.000 (0.004)	0.008** (0.004)	0.004 (0.003)	-0.001 (0.005)	0.009** (0.004)
Paternal education	-0.001 (0.002)	0.000 (0.003)	0.004 (0.003)	0.004 (0.003)	0.004** (0.002)	0.008*** (0.003)	0.003 (0.002)
Maternal age	0.004* (0.002)	0.006*** (0.002)	-0.001 (0.002)	0.005** (0.002)	-0.001 (0.002)	0.003 (0.002)	0.001 (0.002)
Paternal age	0.000 (0.001)	-0.002 (0.002)	0.004*** (0.001)	-0.004** (0.002)	-0.000 (0.001)	0.002 (0.002)	0.001 (0.001)
Wealth index [Q1: Lowest]	-0.025 (0.020)	-0.003 (0.027)	0.125*** (0.022)	0.021 (0.024)	0.032** (0.014)	-0.113*** (0.026)	-0.015 (0.022)
Age of index child	0.007*** (0.002)	0.006*** (0.002)	-0.004** (0.002)	0.006*** (0.002)	0.001 (0.001)	0.010*** (0.002)	0.007*** (0.002)
Rural location	-0.027 (0.025)	-0.012 (0.032)	-0.052* (0.029)	-0.005 (0.024)	-0.013 (0.017)	0.058* (0.031)	0.016 (0.029)
Currently breastfeeding	-0.032 (0.027)	-0.046* (0.027)	-0.093*** (0.023)	-0.055** (0.026)	-0.006 (0.018)	0.012 (0.027)	-0.032 (0.022)
Study month	0.011* (0.006)	-0.010 (0.008)	0.002 (0.007)	-0.015** (0.007)	-0.020*** (0.006)	0.014* (0.007)	-0.054*** (0.008)
Built population	0.000*** (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000* (0.000)	0.000*** (0.000)	0.000 (0.000)
Growing season length	0.000 (0.000)	-0.000** (0.000)	-0.000 (0.000)	0.000** (0.000)	-0.000 (0.000)	-0.000** (0.000)	0.000*** (0.000)
Proximity to irrigation	-0.000*** (0.000)	0.000*** (0.000)	0.000*** (0.000)	-0.000*** (0.000)	0.000* (0.000)	-0.000*** (0.000)	-0.000*** (0.000)
Drought episodes	-0.000** (0.000)	0.000** (0.000)	-0.000*** (0.000)	-0.000*** (0.000)	-0.000* (0.000)	-0.000 (0.000)	-0.000 (0.000)

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Supplementary Table 6: Marginal effects of Logistic regression for food groups consumed – Zambia

	(1) Grains/roots	(2) Legumes	(3) Dairy	(4) Flesh protein	(5) Eggs	(6) Vit A-rich leafy veg	(7) Other vit A-rich fruit/veg
Social independence	0.090*** (0.035)	-0.015 (0.027)	0.102*** (0.025)	-0.056* (0.033)	0.002 (0.023)	0.002 (0.035)	0.072** (0.029)
Female index child	0.010 (0.033)	-0.049 (0.032)	0.009 (0.027)	-0.039 (0.036)	0.004 (0.025)	0.002 (0.031)	-0.000 (0.031)
Maternal education	-0.006 (0.007)	0.007 (0.006)	-0.006 (0.007)	0.013** (0.006)	0.011* (0.006)	-0.004 (0.007)	-0.012* (0.007)
Paternal education	-0.008* (0.005)	-0.002 (0.005)	0.005 (0.004)	0.002 (0.005)	0.008* (0.004)	-0.002 (0.005)	-0.008 (0.005)
Maternal age	-0.006 (0.006)	0.011* (0.006)	-0.001 (0.004)	0.010** (0.005)	-0.001 (0.003)	0.002 (0.004)	0.001 (0.004)
Paternal age	0.007 (0.004)	-0.006 (0.004)	0.002 (0.004)	-0.004 (0.004)	0.003 (0.003)	0.001 (0.004)	-0.001 (0.003)
Wealth index [Q1: Lowest]	-0.139* (0.080)	0.164* (0.084)	0.073* (0.042)	0.163** (0.068)	-0.004 (0.036)	0.099 (0.061)	0.011 (0.056)
Age of index child	0.011*** (0.003)	0.007** (0.003)	-0.013*** (0.003)	0.019*** (0.003)	0.006** (0.002)	0.026*** (0.003)	0.011*** (0.003)
Rural location	-0.133 (0.084)	0.114 (0.084)	-0.148*** (0.039)	0.011 (0.062)	-0.052** (0.026)	0.055 (0.059)	-0.030 (0.051)
Currently breastfeeding	-0.089 (0.060)	0.024 (0.052)	-0.102** (0.045)	0.007 (0.053)	-0.058* (0.032)	0.003 (0.053)	-0.055 (0.050)
Study month	-0.005 (0.004)	-0.004 (0.003)	-0.002 (0.004)	0.007** (0.004)	0.009*** (0.003)	-0.005 (0.004)	0.000 (0.004)
Built population	0.010* (0.005)	-0.003 (0.004)	-0.008 (0.006)	-0.004 (0.006)	0.007 (0.005)	-0.004 (0.006)	0.002 (0.005)
Growing season length	-0.000 (0.000)	0.000 (0.000)	-0.000*** (0.000)	-0.000 (0.000)	0.000*** (0.000)	-0.000*** (0.000)	-0.000 (0.000)
Proximity to irrigation	-0.010* (0.005)	0.003 (0.004)	0.008 (0.006)	0.004 (0.006)	-0.007 (0.005)	0.004 (0.006)	-0.002 (0.005)
Drought episodes	-0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	-0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	-0.000 (0.000)

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Appendices 2 - Study 3: Development of the SWPER index

Adapting from Ewerling et al. (2017), the equation used to estimate individual standardized scores for each of the PCA j components is:

$$S_{ij} = \frac{[\lambda_{1j}(x_{1i}-\bar{x}_1)]+[(\lambda_{2j}(x_{2i}-\bar{x}_2)]+\dots+[\lambda_{15j}(x_{20i}-\bar{x}_{15})]}{\sigma_j} \dots\dots\dots 1$$

where S_{ij} are the individual standardized scores for individual i and component j ; x_{1i}, \dots, x_{15i} are the individual values for variables x_1 - x_{15} included in the PCA analysis; σ_j are the standard deviations of the predicted scores of each component j . The weight given to each of the 15 variables in each component j is contained in Table 1 below, and defined as:

$$\lambda_{vj} = \frac{\varphi_{vj}}{\sigma_v} \dots\dots\dots 2$$

where φ_{vj} is the PCA loading for each of the variables v in each domain j and σ_v is the standard deviation of each variable v in the combined dataset.

By using simple algebra, the equation above can be simplified as:

$$S_{ij} = \frac{[-(\sum_{v=1}^{15} \lambda_{vj} \bar{x}_v) + \sum_{v=1}^{15} (\lambda_{vj} x_{vi})]}{\sigma_j} \dots\dots\dots 3$$

Supplementary Table 7: Variable weights used in the equations for estimating individual scores for each domain of the SWPER Index

	λ_{v1} Attitude to violence	λ_{v2} Social independence	λ_{v3} Decision- making
Beating justified if wife goes out without telling husband	0.489	-0.006	-0.001
Beating justified if wife neglects the children	0.493	-0.020	-0.040
Beating justified if wife argues with husband	0.501	0.000	0.007
Beating justified if wife refuses to have sex with husband	0.493	0.000	0.026
Beating justified if wife burns the food	0.546	-0.003	0.014
Frequency of reading newspaper or magazine	0.056	0.549	0.150
Respondent worked in last 12 month	-0.001	-0.060	0.180
Woman's education in years	0.015	0.090	0.026
Education difference: woman's minus husband's years of schooling	-0.004	0.050	-0.009
Age difference: woman's minus husband's age	0.002	0.026	0.012
Age at first cohabitation	-0.004	0.131	-0.006
Age of respondent at 1st birth	-0.008	0.141	-0.019
Who usually decides on respondent's health care	0.008	0.004	0.770
Who usually decides on large household purchases	-0.034	-0.013	0.831
Who usually decides on visits to family or relatives	0.008	-0.052	0.768

Source: Ewerling et al. (2017)

Supplementary Table 8: Pearson's and Spearman's correlation matrix – SWPER index

	Pearson correlation matrix			Spearman's correlation matrix		
	Att to violence	Social independence	Decision- making	Att to violence	Social independence	Att to violence
Att to violence	1.0000			1.0000		
Social independence	0.0987*	1.0000		0.1451*	1.0000	
Decision- making	0.0348*	0.1114*	1.0000	0.0791*	0.1080*	1.0000

*sig at $p < 0.05$

Appendices 3 - Study 4: Women's empowerment and WDDS

Supplementary Table 9: Marginal effects of Poisson regression for WDDS – Empowerment score

VARIABLES	(1) All	(2) Mozambique	(3) Rwanda	(4) Malawi	(5) Uganda	(6) Zambia
Empowerment score	0.053 (0.206)	0.655** (0.331)	1.258*** (0.368)	-0.002 (0.214)	-0.505 (0.350)	-0.105 (0.253)
Asset index	-0.117*** (0.025)	-0.040 (0.165)	0.042 (0.171)	-0.127** (0.064)	0.090 (0.084)	-0.174 (0.161)
Men's age	0.005*** (0.002)	0.004 (0.004)	0.001 (0.002)	0.005* (0.003)	0.007*** (0.003)	0.003 (0.003)
Women's age	-0.011*** (0.002)	-0.008** (0.004)	-0.010*** (0.004)	-0.016*** (0.003)	-0.013*** (0.004)	-0.002 (0.003)
Women's education	0.038*** (0.009)	0.030 (0.067)	0.082*** (0.031)	0.066** (0.033)	0.031*** (0.011)	0.034*** (0.012)
Household size	0.052*** (0.012)	0.041 (0.025)	0.048 (0.032)	0.056*** (0.021)	0.032* (0.017)	0.043*** (0.013)
Hunger scale	-0.115*** (0.019)	-0.137*** (0.051)	-0.132*** (0.032)	-0.199*** (0.036)	-0.079** (0.034)	-0.042 (0.056)
Study location	0.000 (0.000)	0.004*** (0.001)	0.019** (0.008)	0.069* (0.037)	-0.029*** (0.007)	-0.069 (0.077)
Study month	0.018* (0.009)	-0.022 (0.015)	0.027*** (0.010)	-0.103 (0.076)	0.001 (0.019)	0.009 (0.228)

Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Supplementary Table 10: Marginal effects of Poisson regression for WDDS – Prod domain (Aut in production)

	(1) All	(2) Mozambique	(3) Rwanda	(4) Malawi	(5) Uganda	(6) Zambia
Aut in production	0.197*** (0.069)	0.020 (0.140)	0.124 (0.108)	0.098 (0.062)	0.352** (0.142)	0.119 (0.083)
Asset index	-0.111*** (0.025)	-0.073 (0.152)	0.061 (0.169)	-0.138** (0.067)	0.112 (0.086)	-0.203 (0.158)
Men's age	0.005*** (0.002)	0.005 (0.004)	0.002 (0.002)	0.005* (0.003)	0.008*** (0.003)	0.003 (0.003)
Women's age	-0.011*** (0.002)	-0.011*** (0.004)	-0.010*** (0.004)	-0.015*** (0.003)	-0.011*** (0.004)	-0.002 (0.003)
Women's education	0.038*** (0.010)	-0.031 (0.064)	0.091*** (0.029)	0.068** (0.032)	0.031*** (0.011)	0.035*** (0.012)
Household size	0.039*** (0.015)	0.045* (0.024)	0.053* (0.030)	0.046** (0.019)	0.021 (0.018)	0.042*** (0.013)
Hunger scale	-0.116*** (0.018)	-0.159*** (0.050)	-0.157*** (0.030)	-0.197*** (0.036)	-0.073** (0.031)	-0.023 (0.056)
Study location	0.000* (0.000)	0.004*** (0.001)	0.016** (0.008)	0.069* (0.038)	-0.029*** (0.006)	-0.062 (0.074)
Study month	0.019** (0.009)	-0.010 (0.015)	0.027*** (0.010)	-0.091 (0.084)	-0.012 (0.022)	-0.005 (0.225)

Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Supplementary Table 11: Marginal effects of Poisson regression for WDDS – Prod domain (Input in productive decisions)

	(1) All	(2) Mozambique	(3) Rwanda	(4) Malawi	(5) Uganda	(6) Zambia
Input in prod decs	0.191*** (0.063)	-0.050 (0.088)	0.479*** (0.101)	0.004 (0.074)	0.098 (0.101)	0.178* (0.107)
Asset index	-0.108*** (0.026)	-0.076 (0.152)	0.085 (0.170)	-0.130** (0.065)	0.119 (0.089)	-0.216 (0.156)
Men's age	0.005*** (0.002)	0.005 (0.004)	0.002 (0.002)	0.004* (0.003)	0.008*** (0.003)	0.003 (0.003)
Women's age	-0.011*** (0.002)	-0.010*** (0.004)	-0.010*** (0.004)	-0.016*** (0.003)	-0.012*** (0.004)	-0.002 (0.003)
Women's education	0.035*** (0.010)	-0.040 (0.076)	0.088*** (0.031)	0.066** (0.032)	0.028** (0.011)	0.034*** (0.012)
Household size	0.037** (0.016)	0.047* (0.024)	0.037 (0.029)	0.046** (0.020)	0.020 (0.019)	0.043*** (0.012)
Hunger scale	-0.104*** (0.020)	-0.159*** (0.051)	-0.129*** (0.031)	-0.193*** (0.037)	-0.063* (0.034)	-0.008 (0.056)
Study location	0.001** (0.000)	0.004*** (0.001)	0.018** (0.008)	0.067* (0.037)	-0.030*** (0.007)	-0.066 (0.073)
Study month	0.016* (0.009)	-0.012 (0.016)	0.023** (0.010)	-0.094 (0.082)	-0.013 (0.020)	-0.003 (0.219)

Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Supplementary Table 12: Marginal effects of Poisson regression results for WDDS – Resources domains (Asset ownership)

	(1) All	(2) Mozambique	(3) Rwanda	(4) Malawi	(5) Uganda	(6) Zambia
Sole/joint asset ownrshp	-0.015 (0.102)	0.423* (0.233)	0.334* (0.192)	0.026 (0.101)	-0.021 (0.159)	-0.254* (0.131)
Asset index	-0.111*** (0.025)	-0.055 (0.151)	0.058 (0.169)	-0.136** (0.069)	0.116 (0.086)	-0.178 (0.158)
Men's age	0.005*** (0.002)	0.005 (0.004)	0.002 (0.002)	0.004* (0.003)	0.008*** (0.003)	0.003 (0.003)
Women's age	-0.011*** (0.002)	-0.011*** (0.004)	-0.010*** (0.004)	-0.016*** (0.003)	-0.011*** (0.004)	-0.002 (0.003)
Women's education	0.038*** (0.010)	-0.025 (0.064)	0.091*** (0.029)	0.068** (0.032)	0.032*** (0.011)	0.038*** (0.012)
Household size	0.039*** (0.015)	0.046* (0.024)	0.051* (0.030)	0.047** (0.019)	0.020 (0.019)	0.043*** (0.012)
Hunger scale	-0.118*** (0.019)	-0.161*** (0.051)	-0.160*** (0.030)	-0.195*** (0.036)	-0.069** (0.033)	-0.020 (0.055)
Study location	0.000* (0.000)	0.004*** (0.001)	0.016** (0.008)	0.066* (0.038)	-0.028*** (0.006)	-0.071 (0.073)
Study month	0.019** (0.009)	-0.012 (0.015)	0.027*** (0.010)	-0.091 (0.084)	-0.009 (0.025)	-0.032 (0.216)

Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Supplementary Table 13: Marginal effects of Poisson regression results for WDDS – Resources domain (Asset sale, purchase, and transfer)

	(1) All	(2) Mozambique	(3) Rwanda	(4) Malawi	(5) Uganda	(6) Zambia
Input in asset transactions	0.038 (0.074)	0.302** (0.140)	0.359*** (0.126)	-0.100 (0.091)	-0.162 (0.131)	-0.119 (0.099)
Asset index	-0.110*** (0.025)	-0.071 (0.151)	0.068 (0.170)	-0.134** (0.068)	0.114 (0.086)	-0.186 (0.160)
Men's age	0.005*** (0.002)	0.005 (0.004)	0.002 (0.002)	0.005* (0.003)	0.008*** (0.003)	0.003 (0.003)
Women's age	-0.011*** (0.002)	-0.012*** (0.004)	-0.010*** (0.004)	-0.016*** (0.003)	-0.011*** (0.004)	-0.002 (0.003)
Women's education	0.037*** (0.010)	-0.025 (0.064)	0.096*** (0.029)	0.068** (0.032)	0.032*** (0.011)	0.035*** (0.012)
Household size	0.039*** (0.015)	0.043* (0.024)	0.046 (0.030)	0.047** (0.019)	0.021 (0.018)	0.044*** (0.013)
Hunger scale	-0.117*** (0.019)	-0.159*** (0.051)	-0.152*** (0.030)	-0.196*** (0.036)	-0.071** (0.032)	-0.021 (0.056)
Study location	0.000* (0.000)	0.004*** (0.001)	0.016** (0.008)	0.067* (0.037)	-0.029*** (0.006)	-0.067 (0.075)
Study month	0.019** (0.009)	-0.011 (0.015)	0.026*** (0.010)	-0.095 (0.082)	0.002 (0.027)	-0.017 (0.224)

Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Supplementary Table 14: Marginal effects of Poisson regression results for WDDS – Resources domain (input in ≥ 1 credit source)

	(1) All	(2) Mozambique	(3) Rwanda	(4) Malawi	(5) Uganda	(6) Zambia
Input in credit source decs	0.005 (0.059)	0.233 (0.179)	0.240*** (0.066)	-0.039 (0.069)	-0.181* (0.096)	-0.054 (0.062)
Asset index	-0.110*** (0.025)	-0.064 (0.154)	0.050 (0.166)	-0.136** (0.069)	0.120 (0.084)	-0.172 (0.161)
Men's age	0.005*** (0.002)	0.005 (0.004)	0.002 (0.002)	0.004* (0.003)	0.009*** (0.003)	0.003 (0.003)
Women's age	-0.010*** (0.002)	-0.011*** (0.004)	-0.010*** (0.004)	-0.016*** (0.003)	-0.011*** (0.004)	-0.002 (0.003)
Women's education	0.037*** (0.010)	-0.029 (0.064)	0.093*** (0.028)	0.068** (0.032)	0.035*** (0.011)	0.036*** (0.012)
Household size	0.038** (0.015)	0.043* (0.025)	0.045 (0.029)	0.046** (0.019)	0.020 (0.018)	0.044*** (0.013)
Hunger scale	-0.117*** (0.019)	-0.161*** (0.051)	-0.161*** (0.030)	-0.194*** (0.036)	-0.062* (0.032)	-0.020 (0.057)
Study location	0.000 (0.000)	0.004*** (0.001)	0.018** (0.007)	0.068* (0.038)	-0.029*** (0.007)	-0.071 (0.076)
Study month	0.019** (0.009)	-0.007 (0.015)	0.029*** (0.010)	-0.092 (0.084)	-0.003 (0.027)	-0.000 (0.227)

Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Supplementary Table 15: Marginal effects of Poisson regression results for WDDS – Income domain (Input in at least 1 income decision)

	(1) All	(2) Mozambique	(3) Rwanda	(4) Malawi	(5) Uganda	(6) Zambia
Input in ≥ 1 income domain	-0.078 (0.119)	-0.028 (0.136)	0.026 (0.219)	0.130 (0.130)	-0.153 (0.178)	-0.042 (0.125)
Asset index	-0.111*** (0.025)	-0.073 (0.153)	0.062 (0.172)	-0.137** (0.069)	0.119 (0.087)	-0.190 (0.161)
Men's age	0.005*** (0.002)	0.005 (0.004)	0.002 (0.002)	0.004* (0.003)	0.008*** (0.003)	0.003 (0.003)
Women's age	-0.011*** (0.002)	-0.011*** (0.004)	-0.010*** (0.004)	-0.016*** (0.003)	-0.011*** (0.004)	-0.002 (0.003)
Women's education	0.037*** (0.010)	-0.032 (0.065)	0.094*** (0.030)	0.068** (0.032)	0.032*** (0.011)	0.035*** (0.012)
Household size	0.039** (0.015)	0.045* (0.024)	0.051* (0.030)	0.046** (0.019)	0.020 (0.019)	0.043*** (0.013)
Hunger scale	-0.121*** (0.019)	-0.159*** (0.051)	-0.161*** (0.032)	-0.195*** (0.036)	-0.079** (0.033)	-0.022 (0.056)
Study location	0.000 (0.000)	0.003*** (0.001)	0.016** (0.008)	0.068* (0.038)	-0.029*** (0.006)	-0.069 (0.075)
Study month	0.019** (0.009)	-0.010 (0.015)	0.027*** (0.010)	-0.096 (0.080)	-0.010 (0.025)	-0.012 (0.226)

Standard errors in parentheses; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Supplementary Table 16: Marginal effects of Poisson regression results for WDDS – Leadership domain (Group membership)

	(1) All	(2) Mozambique	(3) Rwanda	(4) Malawi	(5) Uganda	(6) Zambia
Membership of ≥ 1 group	0.008 (0.061)	-0.045 (0.088)	0.313** (0.122)	0.065 (0.074)	-0.212* (0.111)	0.000 (0.089)
Asset index	-0.108*** (0.025)	-0.048 (0.165)	0.041 (0.171)	-0.132* (0.069)	0.124 (0.085)	-0.189 (0.164)
Men's age	0.005*** (0.002)	0.004 (0.004)	0.002 (0.002)	0.004* (0.003)	0.008*** (0.003)	0.003 (0.003)
Women's age	-0.011*** (0.002)	-0.010*** (0.004)	-0.010*** (0.004)	-0.016*** (0.003)	-0.012*** (0.004)	-0.002 (0.003)
Women's education	0.037*** (0.010)	0.024 (0.067)	0.082*** (0.029)	0.069** (0.032)	0.032*** (0.011)	0.034*** (0.012)
Household size	0.038** (0.015)	0.048* (0.025)	0.052* (0.030)	0.048** (0.019)	0.022 (0.019)	0.043*** (0.013)
Hunger scale	-0.115*** (0.019)	-0.148*** (0.051)	-0.141*** (0.031)	-0.198*** (0.036)	-0.073** (0.033)	-0.027 (0.056)
Study location	0.000* (0.000)	0.004*** (0.001)	0.019** (0.008)	0.067* (0.037)	-0.027*** (0.006)	-0.067 (0.076)
Study month	0.018* (0.009)	-0.022 (0.015)	0.025** (0.010)	-0.093 (0.081)	-0.001 (0.026)	0.005 (0.228)

Standard errors in parentheses; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Supplementary Table 17: Marginal effects of Poisson for WDDS – Leadership domain (comfortable speaking in public in ≥ 1 context)

	(1) All	(2) Mozambique	(3) Rwanda	(4) Malawi	(5) Uganda	(6) Zambia
Public speaking	0.149** (0.059)	0.246** (0.117)	0.474*** (0.114)	-0.029 (0.069)	-0.093 (0.129)	0.082 (0.090)
Asset index	-0.111*** (0.025)	-0.072 (0.152)	0.081 (0.166)	-0.134* (0.068)	0.115 (0.086)	-0.189 (0.161)
Men's age	0.005*** (0.002)	0.005 (0.004)	0.002 (0.002)	0.004* (0.003)	0.008*** (0.003)	0.003 (0.003)
Women's age	-0.011*** (0.002)	-0.011*** (0.004)	-0.010*** (0.004)	-0.016*** (0.003)	-0.011*** (0.004)	-0.003 (0.003)
Women's education	0.037*** (0.010)	-0.032 (0.064)	0.091*** (0.029)	0.068** (0.033)	0.032*** (0.011)	0.035*** (0.012)
Household size	0.038** (0.015)	0.044* (0.024)	0.055* (0.029)	0.048** (0.019)	0.021 (0.019)	0.043*** (0.012)
Hunger scale	-0.116*** (0.019)	-0.157*** (0.050)	-0.155*** (0.030)	-0.196*** (0.036)	-0.070** (0.032)	-0.022 (0.056)
Study location	0.000* (0.000)	0.003*** (0.001)	0.017** (0.008)	0.067* (0.038)	-0.028*** (0.006)	-0.066 (0.075)
Study month	0.020** (0.009)	-0.011 (0.015)	0.030*** (0.010)	-0.091 (0.084)	-0.010 (0.024)	-0.005 (0.227)

Standard errors in parentheses; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Supplementary Table 18: Marginal effects of Poisson for WDDS – Time domain (Non-excessive workload [< 10.5 hrs in 24hrs])

	(1) All	(2) Mozambique	(3) Rwanda	(4) Malawi	(5) Uganda	(6) Zambia
Non-excessive workload	-0.135*** (0.050)	-0.313** (0.150)	-0.094 (0.076)	-0.039 (0.050)	-0.076 (0.088)	-0.055 (0.085)
Asset index	-0.117*** (0.024)	-0.049 (0.165)	0.039 (0.175)	-0.127** (0.064)	0.090 (0.085)	-0.176 (0.162)
Men's age	0.005*** (0.002)	0.004 (0.004)	0.001 (0.002)	0.005* (0.003)	0.007*** (0.003)	0.003 (0.003)
Women's age	-0.012*** (0.002)	-0.009** (0.004)	-0.010*** (0.004)	-0.016*** (0.004)	-0.013*** (0.004)	-0.002 (0.003)
Women's education	0.038*** (0.009)	0.026 (0.067)	0.093*** (0.031)	0.065** (0.033)	0.030*** (0.011)	0.034*** (0.012)
Household size	0.052*** (0.012)	0.035 (0.025)	0.054* (0.032)	0.056*** (0.020)	0.033** (0.017)	0.043*** (0.013)
Hunger scale	-0.115*** (0.019)	-0.133** (0.052)	-0.141*** (0.033)	-0.199*** (0.036)	-0.076** (0.034)	-0.042 (0.056)
Study location	0.000* (0.000)	0.004*** (0.001)	0.017** (0.008)	0.069* (0.038)	-0.029*** (0.007)	-0.070 (0.076)
Study month	0.018* (0.009)	-0.019 (0.015)	0.025** (0.011)	-0.102 (0.077)	-0.009 (0.018)	0.007 (0.225)

Standard errors in parentheses; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Supplementary Table 19: Marginal effects of Poisson regression for WDDS – Time domain
(satisfaction with leisure time)

	(1) All	(2) Mozambique	(3) Rwanda	(4) Malawi	(5) Uganda	(6) Zambia
Satisfied with leisure time	-0.009 (0.079)	-0.069 (0.145)	-0.010 (0.105)	0.142* (0.080)	-0.044 (0.105)	0.015 (0.092)
Asset index	-0.111*** (0.025)	-0.088 (0.155)	0.066 (0.170)	-0.138** (0.069)	0.117 (0.086)	-0.188 (0.162)
Men's age	0.005*** (0.002)	0.005 (0.004)	0.002 (0.002)	0.005* (0.003)	0.008*** (0.003)	0.003 (0.003)
Women's age	-0.011*** (0.002)	-0.011*** (0.004)	-0.010*** (0.004)	-0.016*** (0.003)	-0.011*** (0.004)	-0.002 (0.003)
Women's education	0.037*** (0.010)	-0.031 (0.064)	0.092*** (0.029)	0.068** (0.032)	0.031*** (0.011)	0.035*** (0.012)
Household size	0.039*** (0.015)	0.046* (0.024)	0.051* (0.030)	0.047** (0.019)	0.020 (0.018)	0.043*** (0.013)
Hunger scale	-0.119*** (0.018)	-0.159*** (0.051)	-0.160*** (0.030)	-0.195*** (0.036)	-0.073** (0.033)	-0.022 (0.056)
Study location	0.000* (0.000)	0.003*** (0.001)	0.016** (0.008)	0.064* (0.038)	-0.028*** (0.006)	-0.068 (0.074)
Study month	0.019** (0.009)	-0.010 (0.015)	0.026*** (0.010)	-0.094 (0.080)	-0.008 (0.025)	-0.009 (0.222)

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Supplementary Table 20: Marginal effects of Logistic regression for food groups consumed – Production domain (Autonomy in ≥ 1 activity linked to production)

	(1) Grains	(2) Legumes	(3) Dairy	(4) Organ meat	(5) Eggs	(6) Flesh protein	(7) Vit A-rich leafy green	(8) Othr vit A- rich fruit/veg	(9) Other fruit/veg
Aut in prod decs	-0.008 (0.011)	-0.066*** (0.025)	0.001 (0.019)	0.003 (0.004)	0.028** (0.012)	0.049** (0.020)	0.078*** (0.029)	0.094*** (0.028)	0.023 (0.024)
Asset index	-0.004 (0.003)	0.016** (0.008)	-0.000 (0.007)	-0.005*** (0.002)	-0.005 (0.004)	-0.001 (0.007)	-0.030*** (0.009)	-0.070*** (0.007)	-0.008 (0.008)
Men's age	0.000 (0.000)	0.001*** (0.000)	0.001** (0.000)	0.000 (0.000)	0.000* (0.000)	0.001 (0.001)	-0.000 (0.001)	0.001 (0.001)	0.001** (0.001)
Women's age	-0.000 (0.000)	0.001 (0.001)	-0.000 (0.001)	0.000 (0.000)	-0.002*** (0.000)	-0.001 (0.001)	-0.000 (0.001)	-0.005*** (0.001)	-0.002*** (0.001)
Women's education	0.000 (0.001)	0.011*** (0.003)	0.010*** (0.003)	0.001* (0.001)	0.004** (0.002)	0.003 (0.003)	-0.007* (0.004)	0.006* (0.003)	0.010*** (0.003)
Household size	0.003** (0.001)	0.000 (0.004)	0.003 (0.003)	-0.001 (0.001)	0.002 (0.002)	0.005 (0.005)	0.013** (0.006)	0.010** (0.005)	0.004 (0.005)
Hunger scale	-0.006* (0.003)	-0.025*** (0.007)	-0.014** (0.007)	-0.002 (0.002)	-0.006 (0.004)	-0.026*** (0.008)	0.005 (0.009)	-0.016** (0.008)	-0.032*** (0.010)
Study location	0.000 (0.000)	-0.001*** (0.000)	-0.001** (0.000)	-0.000 (0.000)	0.000*** (0.000)	0.001*** (0.000)	0.000*** (0.000)	-0.000** (0.000)	0.001*** (0.000)
Study month	0.003*** (0.001)	-0.020*** (0.003)	-0.005** (0.003)	0.000 (0.001)	0.005*** (0.001)	0.011*** (0.004)	0.002 (0.003)	0.016*** (0.004)	0.008** (0.003)

Standard errors in parentheses
 *** p<0.01, ** p<0.05, * p<0.1

Supplementary Table 21: Marginal effects of Logistic regression for food groups consumed – Production domain (Input in ≥ 2 productive decisions)

	(1) Grains	(2) Legumes	(3) Dairy	(4) Organ meat	(5) Eggs	(6) Flesh protein	(7) Vit A-rich leafy green	(8) Othr vit A-rich fruit/veg	(9) Other fruit/veg
Input in prod decs	0.015* (0.008)	0.013 (0.017)	0.033* (0.018)	0.002 (0.004)	0.018* (0.010)	0.029 (0.021)	-0.019 (0.022)	0.052** (0.021)	0.050** (0.022)
Asset index	-0.003 (0.003)	0.017** (0.008)	-0.000 (0.007)	-0.005** (0.002)	-0.005 (0.004)	0.000 (0.008)	-0.032*** (0.009)	-0.069*** (0.008)	-0.009 (0.008)
Men's age	0.000 (0.000)	0.001*** (0.001)	0.001** (0.000)	-0.000 (0.000)	0.000 (0.000)	0.001 (0.001)	-0.000 (0.001)	0.000 (0.001)	0.001** (0.001)
Women's age	-0.000 (0.000)	0.001 (0.001)	-0.001 (0.001)	0.000 (0.000)	-0.002*** (0.000)	-0.001* (0.001)	-0.000 (0.001)	-0.005*** (0.001)	-0.002*** (0.001)
Women's education	-0.000 (0.002)	0.010*** (0.003)	0.010*** (0.003)	0.001 (0.001)	0.003 (0.002)	0.002 (0.003)	-0.006 (0.004)	0.004 (0.003)	0.010*** (0.003)
Household size	0.002* (0.001)	0.001 (0.004)	0.002 (0.003)	-0.001 (0.001)	0.002 (0.002)	0.006 (0.005)	0.012* (0.006)	0.010** (0.005)	0.004 (0.005)
Hunger scale	-0.007** (0.003)	-0.025*** (0.008)	-0.010 (0.007)	-0.002 (0.002)	-0.004 (0.004)	-0.022*** (0.008)	0.005 (0.009)	-0.014* (0.008)	-0.028*** (0.010)
Study location	0.000 (0.000)	-0.001*** (0.000)	-0.001** (0.000)	-0.000 (0.000)	0.000*** (0.000)	0.001*** (0.000)	0.000*** (0.000)	-0.000** (0.000)	0.001*** (0.000)
Study month	0.003*** (0.001)	-0.021*** (0.003)	-0.006** (0.003)	0.000 (0.001)	0.004*** (0.001)	0.011*** (0.004)	0.002 (0.004)	0.015*** (0.004)	0.007** (0.003)

Standard errors in parentheses
 *** p<0.01, ** p<0.05, * p<0.1

Supplementary Table 22: Marginal effects of Logistic regression for food groups consumed – Production domain (Autonomy in ≥ 1 activity linked to production) - Uganda

	(1) Grains	(2) Legumes	(3) Dairy	(4) Organ meat	(5) Eggs	(6) Flesh protein	(7) OVit A-rich leafy green	(8) Othr vit A- rich fruit/veg	(9) Other fruit/veg
Aut in prod decs	-0.001 (0.024)	-0.055 (0.045)	0.027 (0.032)	0.006 (0.005)	0.042 (0.031)	0.030 (0.036)	0.092* (0.048)	0.119** (0.053)	0.080* (0.043)
Asset index	0.012 (0.012)	-0.018 (0.021)	0.018 (0.021)	0.002 (0.005)	0.013 (0.014)	0.045 (0.028)	-0.004 (0.030)	-0.003 (0.024)	0.064** (0.027)
Men's age	0.001 (0.001)	0.001* (0.001)	0.002** (0.001)	0.000 (0.000)	0.001** (0.000)	0.001 (0.001)	-0.000 (0.001)	0.000 (0.001)	0.002* (0.001)
Women's age	-0.001 (0.001)	0.001 (0.001)	-0.001 (0.001)	0.000 (0.000)	-0.002** (0.001)	-0.002* (0.001)	0.001 (0.001)	-0.005*** (0.001)	-0.003** (0.001)
Women's education	0.000 (0.002)	0.002 (0.003)	0.011*** (0.004)	0.001 (0.001)	0.005* (0.003)	0.007* (0.004)	-0.004 (0.005)	0.003 (0.004)	0.011** (0.005)
Household size	0.002 (0.002)	-0.006 (0.005)	0.000 (0.005)	-0.002** (0.001)	-0.000 (0.003)	0.003 (0.007)	0.015* (0.009)	0.008 (0.006)	0.002 (0.006)
Hunger scale	0.001 (0.006)	-0.032*** (0.012)	-0.011 (0.012)	-0.001 (0.003)	-0.005 (0.006)	-0.013 (0.015)	0.042*** (0.015)	-0.020 (0.015)	-0.031* (0.018)
Study location	-0.001* (0.001)	-0.003 (0.002)	-0.003* (0.002)	-0.001** (0.000)	-0.004** (0.002)	-0.006*** (0.002)	-0.006*** (0.002)	-0.001 (0.002)	-0.005* (0.003)
Study month	0.003*** (0.001)	-0.020*** (0.003)	-0.005** (0.003)	0.000 (0.001)	0.005*** (0.001)	0.065** (0.027)	0.091*** (0.035)	-0.162 (0.124)	0.018 (0.027)

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Supplementary Table 23: Marginal effects of Logistic regression for food groups consumed – Production domain (Input in ≥ 2 productive decisions) - Rwanda

	(1) Grains	(2) Legumes	(3) Dairy	(4) Organ meat	(5) Eggs	(6) Flesh protein	(7) Vit A-rich leafy green	(8) Othr vit A-rich fruit/veg	(9) Other fruit/veg
Input in prod decs	0.035*** (0.013)	0.031 (0.025)	0.076*** (0.025)	0.006 (0.011)	0.003 (0.010)	0.073*** (0.026)	0.032 (0.038)	0.120*** (0.033)	0.110*** (0.028)
Asset index	-0.006 (0.026)	-0.066* (0.038)	0.153*** (0.033)	-0.009 (0.019)	0.007 (0.014)	0.064 (0.045)	0.007 (0.066)	-0.063 (0.059)	-0.025 (0.058)
Men's age	-0.000 (0.000)	-0.000 (0.001)	-0.000 (0.001)	-0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.001 (0.001)	0.001 (0.001)	0.000 (0.001)
Women's age	0.000 (0.001)	-0.000 (0.001)	-0.001 (0.001)	0.001 (0.000)	-0.002** (0.001)	0.001 (0.001)	-0.003** (0.001)	-0.005*** (0.001)	-0.002 (0.001)
Women's education	0.010 (0.009)	-0.001 (0.008)	0.014* (0.008)	0.003 (0.002)	0.001 (0.002)	-0.002 (0.009)	0.025 (0.015)	0.026* (0.014)	0.019** (0.010)
Household size	-0.000 (0.004)	0.006 (0.006)	0.017** (0.007)	-0.001 (0.002)	0.002 (0.003)	0.003 (0.007)	0.002 (0.012)	0.004 (0.011)	0.005 (0.008)
Hunger scale	-0.011* (0.006)	-0.022*** (0.007)	-0.019* (0.011)	-0.001 (0.003)	-0.001 (0.005)	-0.018** (0.009)	-0.030*** (0.011)	0.003 (0.012)	-0.027*** (0.010)
Study location	0.001 (0.001)	0.002 (0.002)	-0.003 (0.002)	-0.000 (0.001)	-0.000 (0.001)	0.002 (0.002)	0.007** (0.003)	0.006* (0.003)	0.006** (0.003)
Study month	0.002 (0.002)	-0.001 (0.002)	0.002 (0.003)	0.000 (0.001)	0.001 (0.001)	-0.003 (0.003)	-0.001 (0.004)	0.015*** (0.005)	0.008** (0.003)

Standard errors in parentheses
 *** p<0.01, ** p<0.05, * p<0.1

Supplementary Table 24: Marginal effects of Logistic regression for food groups consumed – Leadership domain (Comfortable speaking in public in ≥ 1 context)

	(1) Grains	(2) Legumes	(3) Dairy	(4) Organ meat	(5) Eggs	(6) Flesh protein	(7) Vit A-rich leafy green	(8) Othr vit A-rich fruit/veg	(9) Other fruit/veg
Public speaking	0.018* (0.010)	0.007 (0.017)	-0.004 (0.021)	0.004 (0.004)	-0.002 (0.011)	0.036* (0.022)	0.011 (0.027)	0.020 (0.023)	0.073*** (0.020)
Asset index	-0.004 (0.003)	0.016** (0.008)	-0.000 (0.007)	-0.005*** (0.002)	-0.005 (0.004)	-0.001 (0.007)	-0.030*** (0.009)	-0.070*** (0.008)	-0.009 (0.008)
Men's age	0.000 (0.000)	0.001*** (0.000)	0.001** (0.000)	0.000 (0.000)	0.000* (0.000)	0.001 (0.001)	-0.000 (0.001)	0.001 (0.001)	0.001** (0.001)
Women's age	-0.000 (0.000)	0.001 (0.001)	-0.000 (0.001)	0.000 (0.000)	-0.002*** (0.000)	-0.001 (0.001)	-0.000 (0.001)	-0.005*** (0.001)	-0.002*** (0.001)
Women's education	0.000 (0.002)	0.011*** (0.003)	0.010*** (0.003)	0.001 (0.001)	0.004** (0.002)	0.002 (0.003)	-0.007* (0.004)	0.005 (0.003)	0.010*** (0.003)
Household size	0.003* (0.001)	0.000 (0.004)	0.003 (0.003)	-0.001 (0.001)	0.002 (0.002)	0.005 (0.005)	0.012** (0.006)	0.010** (0.005)	0.004 (0.005)
Hunger scale	-0.006** (0.003)	-0.025*** (0.008)	-0.014** (0.007)	-0.002 (0.002)	-0.006 (0.004)	-0.026*** (0.008)	0.005 (0.009)	-0.015* (0.008)	-0.031*** (0.009)
Study location	0.000 (0.000)	-0.001*** (0.000)	-0.001** (0.000)	-0.000 (0.000)	0.000*** (0.000)	0.001*** (0.000)	0.000*** (0.000)	-0.000** (0.000)	0.001*** (0.000)
Study month	0.004*** (0.001)	-0.020*** (0.003)	-0.005** (0.003)	0.000 (0.001)	0.004*** (0.001)	0.011*** (0.004)	0.002 (0.003)	0.016*** (0.004)	0.008*** (0.003)

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Supplementary Table 25: Marginal effects of Logistic regression for food groups consumed – Leadership domain (Comfortable speaking in public in ≥ 1 context) - Mozambique

	(1) Grains	(2) Legumes	(3) Dairy	(4) Organ meat	(5) Eggs	(6) Flesh protein	(7) Vit A-rich leafy green	(8) Othr vit A-rich fruit/veg	(9) Other fruit/veg
Public speaking	0.013 (0.012)	0.012 (0.035)	-0.005 (0.004)	0.003 (0.005)	0.034 (0.026)	0.055 (0.049)	-0.052 (0.034)	0.115*** (0.039)	0.067* (0.036)
Asset index	-0.014 (0.016)	0.059 (0.039)	-0.005 (0.012)	0.006 (0.009)	-0.008 (0.034)	-0.087** (0.044)	-0.028 (0.037)	0.073 (0.054)	-0.066 (0.045)
Men's age	0.002** (0.001)	0.002 (0.001)	0.000 (0.000)	-0.000 (0.000)	0.000 (0.001)	0.001 (0.001)	-0.001 (0.001)	0.000 (0.001)	0.001 (0.002)
Women's age	-0.001 (0.001)	0.000 (0.002)	-0.000 (0.000)	-0.000* (0.000)	-0.001 (0.001)	-0.002 (0.002)	0.000 (0.002)	-0.004** (0.002)	-0.003 (0.002)
Women's education	0.031*** (0.011)	0.002 (0.018)	-0.002 (0.005)	-0.002 (0.003)	0.007 (0.010)	-0.005 (0.018)	-0.012 (0.020)	-0.013 (0.016)	-0.016 (0.019)
Household size	0.004 (0.005)	0.016** (0.008)	0.001 (0.001)	0.000 (0.001)	0.002 (0.005)	-0.003 (0.009)	0.009 (0.009)	0.007 (0.008)	0.014 (0.009)
Hunger scale	0.004 (0.008)	-0.057*** (0.018)	-0.014 (0.011)	0.002 (0.003)	0.002 (0.013)	-0.041* (0.022)	-0.019 (0.017)	-0.005 (0.019)	-0.029 (0.018)
Study location	0.001*** (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000** (0.000)	0.000* (0.000)	0.000 (0.000)	0.001*** (0.000)	0.001*** (0.000)
Study month	0.044*** (0.014)	0.010* (0.006)	-0.000 (0.001)	-0.002** (0.001)	-0.009 (0.006)	-0.033*** (0.005)	-0.009** (0.005)	-0.002 (0.007)	0.027*** (0.007)

Standard errors in parentheses
 *** p<0.01, ** p<0.05, * p<0.1

Supplementary Table 26: Marginal effects of Logistic regression for food groups consumed – Leadership domain (Comfortable speaking in public in ≥ 1 context) - Rwanda

	(1) Grains	(2) Legumes	(3) Dairy	(4) Organ meat	(5) Eggs	(6) Flesh protein	(7) Vit A-rich leafy green	(8) Othr vit A-rich fruit/veg	(9) Other fruit/veg
Public speaking	0.048** (0.019)	0.021 (0.026)	0.002 (0.039)	0.010 (0.009)	-0.004 (0.009)	0.106*** (0.036)	0.153*** (0.039)	0.074 (0.048)	0.098** (0.041)
Asset index	-0.003 (0.026)	-0.069* (0.037)	0.145*** (0.034)	-0.009 (0.018)	0.006 (0.014)	0.063 (0.043)	0.016 (0.063)	-0.063 (0.060)	-0.022 (0.057)
Men's age	-0.000 (0.000)	-0.000 (0.001)	-0.000 (0.001)	-0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.001 (0.001)	0.001 (0.001)	0.000 (0.001)
Women's age	0.000 (0.001)	-0.000 (0.001)	-0.001 (0.001)	0.001 (0.000)	-0.002** (0.001)	0.001 (0.001)	-0.003*** (0.001)	-0.005*** (0.001)	-0.002 (0.001)
Women's education	0.010 (0.010)	-0.002 (0.009)	0.014* (0.007)	0.003 (0.002)	0.001 (0.002)	-0.000 (0.008)	0.024* (0.014)	0.031** (0.014)	0.019** (0.009)
Household size	0.002 (0.005)	0.007 (0.006)	0.018** (0.007)	-0.000 (0.002)	0.002 (0.002)	0.005 (0.007)	0.005 (0.011)	0.009 (0.011)	0.008 (0.008)
Hunger scale	-0.012* (0.006)	-0.026*** (0.008)	-0.024** (0.010)	-0.001 (0.003)	-0.002 (0.005)	-0.022** (0.009)	-0.032*** (0.010)	-0.004 (0.011)	-0.029*** (0.009)
Study location	0.001 (0.001)	0.001 (0.002)	-0.003* (0.002)	-0.000 (0.001)	-0.000 (0.001)	0.002 (0.002)	0.007** (0.003)	0.005 (0.003)	0.005** (0.003)
Study month	0.002 (0.002)	-0.000 (0.002)	0.002 (0.003)	0.000 (0.001)	0.002* (0.001)	-0.003 (0.003)	0.000 (0.004)	0.016*** (0.005)	0.010*** (0.003)

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Supplementary Table 27: Marginal effects of Logistic regression for food groups consumed – Time domain (workload <10.5hrs in 24hrs)

	(1) Grains	(2) Legumes	(3) Dairy	(4) Organ meat	(5) Eggs	(6) Flesh protein	(7) Vit A-rich leafy green	(8) Othr vit A-rich fruit/veg	(9) Other fruit/veg
Non-excessive workload	-0.007 (0.010)	0.012 (0.014)	-0.000 (0.013)	-0.006* (0.004)	-0.004 (0.008)	-0.017 (0.018)	-0.057*** (0.021)	-0.030 (0.019)	-0.026 (0.021)
Asset index	-0.003 (0.003)	0.018** (0.008)	-0.001 (0.007)	-0.005** (0.002)	-0.005 (0.004)	-0.001 (0.008)	-0.032*** (0.009)	-0.072*** (0.008)	-0.011 (0.008)
Men's age	0.000 (0.000)	0.001** (0.001)	0.001** (0.000)	-0.000 (0.000)	0.000 (0.000)	0.001 (0.001)	-0.000 (0.001)	0.000 (0.001)	0.001** (0.001)
Women's age	-0.000 (0.000)	0.001 (0.001)	-0.001 (0.001)	0.000 (0.000)	-0.002*** (0.000)	-0.002* (0.001)	-0.001 (0.001)	-0.005*** (0.001)	-0.003*** (0.001)
Women's education	-0.000 (0.002)	0.010*** (0.003)	0.011*** (0.003)	0.001 (0.001)	0.003* (0.002)	0.003 (0.003)	-0.007* (0.004)	0.005 (0.003)	0.011*** (0.003)
Household size	0.003* (0.002)	0.001 (0.004)	0.004 (0.003)	-0.001 (0.001)	0.003 (0.002)	0.007 (0.005)	0.015*** (0.005)	0.013*** (0.005)	0.007 (0.005)
Hunger scale	-0.005* (0.003)	-0.026*** (0.008)	-0.013* (0.007)	-0.003 (0.002)	-0.005 (0.004)	-0.023*** (0.009)	0.005 (0.009)	-0.017** (0.008)	-0.032*** (0.010)
Study location	0.000 (0.000)	-0.001*** (0.000)	-0.001** (0.000)	-0.000 (0.000)	0.000*** (0.000)	0.001*** (0.000)	0.000*** (0.000)	-0.000** (0.000)	0.001*** (0.000)
Study month	0.003** (0.001)	-0.021*** (0.003)	-0.006** (0.003)	0.000 (0.001)	0.004*** (0.001)	0.011*** (0.004)	0.002 (0.003)	0.016*** (0.004)	0.007** (0.003)

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Supplementary Table 28: Marginal effects of Logistic regression for food groups consumed – Time domain (workload <10.5hrs in 24hrs) - Mozambique

VARIABLES	(1) Grains	(2) Legumes	(3) Dairy	(4) Organ meat	(5) Eggs	(6) Flesh protein	(7) Vit A-rich leafy green	(8) Othr vit A-rich fruit/veg	(9) Other fruit/veg
Non-excessive workload	-0.036 (0.025)	-0.042 (0.036)	0.002 (0.005)	-0.004 (0.005)	-0.051* (0.028)	-0.105** (0.048)	-0.001 (0.038)	-0.072 (0.050)	-0.027 (0.039)
Asset index	-0.023 (0.018)	0.063 (0.043)	-0.015 (0.012)	0.007 (0.009)	0.016 (0.027)	-0.090** (0.045)	-0.022 (0.041)	0.094 (0.059)	-0.094** (0.045)
Men's age	0.002** (0.001)	0.002 (0.002)	0.000 (0.000)	-0.000 (0.000)	0.000 (0.001)	0.001 (0.001)	-0.001 (0.002)	0.000 (0.001)	0.001 (0.002)
Women's age	-0.001 (0.002)	0.001 (0.002)	-0.000 (0.000)	-0.000* (0.000)	-0.001 (0.001)	-0.002 (0.002)	0.002 (0.002)	-0.003* (0.002)	-0.002 (0.002)
Women's education	0.032** (0.013)	0.015 (0.019)	-0.003 (0.007)	-0.003 (0.003)	0.007 (0.012)	-0.002 (0.021)	-0.010 (0.022)	0.003 (0.019)	0.010 (0.017)
Household size	0.003 (0.005)	0.013 (0.008)	0.001 (0.001)	-0.001 (0.002)	0.003 (0.005)	-0.012 (0.012)	0.005 (0.010)	0.006 (0.009)	0.023*** (0.009)
Hunger scale	0.007 (0.009)	-0.066*** (0.021)	-0.013 (0.011)	0.002 (0.004)	0.018 (0.012)	-0.034 (0.022)	-0.010 (0.020)	-0.005 (0.020)	-0.033* (0.020)
Study location	0.001*** (0.000)	0.000 (0.000)	-0.000 (0.000)	0.000 (0.000)	0.000** (0.000)	0.001** (0.000)	0.000* (0.000)	0.001*** (0.000)	0.001*** (0.000)
Study month	0.047*** (0.017)	0.007 (0.006)	-0.001 (0.001)	-0.002** (0.001)	-0.007 (0.005)	-0.036*** (0.005)	-0.011** (0.005)	-0.002 (0.007)	0.022*** (0.008)

Standard errors in parentheses
 *** p<0.01, ** p<0.05, * p<0.1

Supplementary Table 29: OLS Regression results WDDS – Empowerment aggregate score

	(1) All	(2) Mozambique	(3) Rwanda	(4) Malawi	(5) Uganda	(6) Zambia
Empowerment score	0.050 (0.205)	0.596* (0.325)	1.228*** (0.349)	-0.012 (0.215)	-0.505 (0.360)	-0.105 (0.255)
Asset index	-0.117*** (0.024)	-0.051 (0.166)	0.044 (0.172)	-0.101** (0.043)	0.091 (0.085)	-0.167 (0.159)
Men's age	0.005*** (0.002)	0.005 (0.004)	0.002 (0.002)	0.005* (0.003)	0.008*** (0.003)	0.003 (0.003)
Women's age	-0.011*** (0.002)	-0.008** (0.004)	-0.010*** (0.004)	-0.016*** (0.003)	-0.013*** (0.004)	-0.002 (0.003)
Women's education	0.037*** (0.009)	0.034 (0.068)	0.087** (0.033)	0.068* (0.035)	0.030*** (0.010)	0.035*** (0.012)
Household size	0.053*** (0.013)	0.044 (0.026)	0.048 (0.033)	0.058*** (0.022)	0.033* (0.017)	0.045*** (0.014)
Hunger scale	-0.112*** (0.018)	-0.127*** (0.047)	-0.127*** (0.030)	-0.191*** (0.033)	-0.080** (0.033)	-0.043 (0.054)
Study location	0.000 (0.000)	0.005*** (0.001)	0.020** (0.008)	0.070* (0.039)	-0.029*** (0.007)	-0.070 (0.077)
Study month	0.019** (0.010)	-0.028* (0.016)	0.028*** (0.011)	-0.112 (0.091)	0.001 (0.018)	0.004 (0.225)

Standard errors are in parenthesis

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Supplementary Table 30: OLS results WDSS – Production domain (Aut in at least 1 production domain/activity)

	(1) All	(2) Mozambique	(3) Rwanda	(4) Malawi	(5) Uganda	(6) Zambia
Aut in ≥ 1 prod activity	0.200*** (0.072)	0.018 (0.135)	0.128 (0.111)	0.099 (0.064)	0.366** (0.151)	0.126 (0.087)
Asset index	-0.110*** (0.024)	-0.078 (0.151)	0.063 (0.169)	-0.111** (0.045)	0.114 (0.087)	-0.195 (0.156)
Men's age	0.005*** (0.002)	0.005 (0.004)	0.002 (0.002)	0.005* (0.003)	0.008*** (0.003)	0.003 (0.003)
Women's age	-0.011*** (0.002)	-0.012*** (0.004)	-0.010*** (0.004)	-0.015*** (0.003)	-0.012*** (0.004)	-0.002 (0.003)
Women's education	0.037*** (0.009)	-0.028 (0.060)	0.096*** (0.032)	0.071** (0.034)	0.030*** (0.010)	0.035*** (0.012)
Household size	0.040*** (0.015)	0.047* (0.026)	0.053* (0.030)	0.048** (0.020)	0.021 (0.019)	0.044*** (0.014)
Hunger scale	-0.114*** (0.017)	-0.149*** (0.045)	-0.151*** (0.028)	-0.189*** (0.034)	-0.073** (0.031)	-0.024 (0.055)
Study location	0.000* (0.000)	0.004*** (0.001)	0.016** (0.008)	0.069* (0.039)	-0.029*** (0.006)	-0.064 (0.074)
Study month	0.020** (0.009)	-0.014 (0.016)	0.028*** (0.010)	-0.099 (0.097)	-0.012 (0.021)	-0.009 (0.222)

Standard errors are in parenthesis

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Supplementary Table 31: OLS results for WDDS – Production domain (Input in at least 2 production decisions)

	(1) All	(2) Mozambique	(3) Rwanda	(4) Malawi	(5) Uganda	(6) Zambia
Input in ≥ 2 productive decs	0.188*** (0.061)	-0.052 (0.088)	0.462*** (0.096)	0.003 (0.074)	0.102 (0.099)	0.174* (0.103)
Asset index	-0.108*** (0.025)	-0.081 (0.151)	0.085 (0.169)	-0.105** (0.044)	0.122 (0.090)	-0.207 (0.153)
Men's age	0.005*** (0.002)	0.005 (0.004)	0.002 (0.002)	0.005* (0.003)	0.008*** (0.003)	0.003 (0.003)
Women's age	-0.011*** (0.002)	-0.011*** (0.004)	-0.010*** (0.004)	-0.016*** (0.003)	-0.012*** (0.004)	-0.002 (0.003)
Women's education	0.034*** (0.010)	-0.036 (0.071)	0.093*** (0.033)	0.068** (0.034)	0.027** (0.011)	0.034*** (0.012)
Household size	0.039** (0.016)	0.049* (0.026)	0.038 (0.029)	0.048** (0.020)	0.020 (0.019)	0.045*** (0.013)
Hunger scale	-0.102*** (0.019)	-0.149*** (0.046)	-0.123*** (0.028)	-0.186*** (0.034)	-0.064* (0.033)	-0.009 (0.055)
Study location	0.001** (0.000)	0.004*** (0.001)	0.019** (0.008)	0.068* (0.039)	-0.030*** (0.007)	-0.067 (0.073)
Study month	0.016* (0.010)	-0.016 (0.016)	0.024** (0.010)	-0.102 (0.096)	-0.014 (0.019)	-0.007 (0.216)

Standard errors are in parenthesis

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Supplementary Table 32: OLS results for WDDS – Resources domain (Sole/joint ownership of ≥ 2 small/1 large asset)

	(1) All	(2) Mozambique	(3) Rwanda	(4) Malawi	(5) Uganda	(6) Zambia
Sole/joint asset ownrshp	-0.018 (0.101)	0.405* (0.218)	0.315* (0.174)	0.023 (0.097)	-0.017 (0.158)	-0.261* (0.138)
Asset index	-0.111*** (0.025)	-0.061 (0.150)	0.061 (0.169)	-0.109** (0.046)	0.118 (0.086)	-0.171 (0.155)
Men's age	0.005*** (0.002)	0.005 (0.004)	0.002 (0.002)	0.005* (0.003)	0.008*** (0.003)	0.003 (0.003)
Women's age	-0.011*** (0.002)	-0.011*** (0.004)	-0.010*** (0.004)	-0.016*** (0.003)	-0.011*** (0.004)	-0.002 (0.003)
Women's education	0.037*** (0.009)	-0.022 (0.059)	0.096*** (0.032)	0.071** (0.034)	0.031*** (0.010)	0.038*** (0.012)
Household size	0.040*** (0.016)	0.048* (0.026)	0.051* (0.030)	0.049** (0.020)	0.021 (0.019)	0.045*** (0.013)
Hunger scale	-0.115*** (0.017)	-0.151*** (0.046)	-0.153*** (0.028)	-0.188*** (0.034)	-0.069** (0.032)	-0.021 (0.054)
Study location	0.000* (0.000)	0.004*** (0.001)	0.017** (0.008)	0.067* (0.039)	-0.028*** (0.006)	-0.072 (0.073)
Study month	0.020** (0.009)	-0.016 (0.016)	0.028*** (0.010)	-0.099 (0.098)	-0.009 (0.023)	-0.036 (0.213)

Standard errors are in parenthesis

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Supplementary Table 33: OLS results for WDDS – Resources domain (input in sale, purchase or transfer of assets)

	(1) All	(2) Mozambique	(3) Rwanda	(4) Malawi	(5) Uganda	(6) Zambia
Input in asset transaction	0.036 (0.073)	0.293** (0.130)	0.334*** (0.113)	-0.106 (0.096)	-0.160 (0.133)	-0.122 (0.101)
Asset index	-0.110*** (0.025)	-0.076 (0.150)	0.069 (0.170)	-0.107** (0.046)	0.117 (0.086)	-0.179 (0.158)
Men's age	0.005*** (0.002)	0.005 (0.004)	0.002 (0.002)	0.005* (0.003)	0.008*** (0.003)	0.003 (0.003)
Women's age	-0.011*** (0.002)	-0.012*** (0.004)	-0.010*** (0.004)	-0.015*** (0.003)	-0.011*** (0.004)	-0.002 (0.003)
Women's education	0.037*** (0.009)	-0.022 (0.060)	0.101*** (0.032)	0.071** (0.033)	0.031*** (0.010)	0.035*** (0.012)
Household size	0.040*** (0.015)	0.045* (0.026)	0.046 (0.030)	0.048** (0.019)	0.021 (0.019)	0.046*** (0.014)
Hunger scale	-0.114*** (0.018)	-0.149*** (0.046)	-0.145*** (0.028)	-0.188*** (0.033)	-0.072** (0.032)	-0.022 (0.055)
Study location	0.000* (0.000)	0.004*** (0.001)	0.017** (0.008)	0.068* (0.039)	-0.029*** (0.006)	-0.068 (0.075)
Study month	0.020** (0.009)	-0.015 (0.016)	0.027*** (0.010)	-0.103 (0.096)	0.003 (0.025)	-0.021 (0.221)

Standard errors are in parenthesis

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Supplementary Table 34: OLS results for WDDS – Resources domain (Input in at least 1 credit source)

	(1) All	(2) Mozambique	(3) Rwanda	(4) Malawi	(5) Uganda	(6) Zambia
Input in decs in credit source	0.005 (0.059)	0.228 (0.186)	0.239*** (0.066)	-0.041 (0.070)	-0.185* (0.096)	-0.053 (0.062)
Asset index	-0.110*** (0.025)	-0.067 (0.154)	0.054 (0.167)	-0.109** (0.047)	0.123 (0.084)	-0.166 (0.159)
Men's age	0.005*** (0.002)	0.006 (0.004)	0.002 (0.002)	0.005* (0.003)	0.009*** (0.003)	0.003 (0.003)
Women's age	-0.010*** (0.002)	-0.012*** (0.004)	-0.010*** (0.004)	-0.016*** (0.003)	-0.011*** (0.004)	-0.002 (0.003)
Women's education	0.037*** (0.009)	-0.027 (0.060)	0.099*** (0.031)	0.071** (0.034)	0.033*** (0.010)	0.036*** (0.012)
Household size	0.040** (0.016)	0.045* (0.027)	0.045 (0.029)	0.048** (0.020)	0.021 (0.018)	0.045*** (0.014)
Hunger scale	-0.114*** (0.018)	-0.152*** (0.046)	-0.154*** (0.027)	-0.186*** (0.033)	-0.063** (0.031)	-0.022 (0.056)
Study location	0.000 (0.000)	0.004*** (0.001)	0.018** (0.008)	0.068* (0.040)	-0.029*** (0.007)	-0.072 (0.076)
Study month	0.019** (0.009)	-0.011 (0.016)	0.029*** (0.010)	-0.100 (0.098)	-0.003 (0.026)	-0.005 (0.224)

Standard errors are in parenthesis

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Supplementary Table 35: OLS results for WDDS – Income domain (Input in ≥ 1 income domain)

	(1) All	(2) Mozambique	(3) Rwanda	(4) Malawi	(5) Uganda	(6) Zambia
Input in decs in income	-0.076 (0.120)	-0.030 (0.137)	0.030 (0.219)	0.126 (0.125)	-0.152 (0.188)	-0.044 (0.123)
Asset index	-0.111*** (0.025)	-0.078 (0.152)	0.064 (0.172)	-0.110** (0.047)	0.122 (0.088)	-0.182 (0.158)
Men's age	0.005*** (0.002)	0.005 (0.004)	0.002 (0.002)	0.004 (0.003)	0.008*** (0.003)	0.003 (0.003)
Women's age	-0.011*** (0.002)	-0.012*** (0.004)	-0.010*** (0.004)	-0.016*** (0.003)	-0.011*** (0.004)	-0.002 (0.003)
Women's education	0.037*** (0.010)	-0.029 (0.061)	0.099*** (0.033)	0.071** (0.034)	0.031*** (0.011)	0.035*** (0.012)
Household size	0.040** (0.016)	0.047* (0.026)	0.051* (0.030)	0.047** (0.020)	0.020 (0.019)	0.045*** (0.014)
Hunger scale	-0.118*** (0.018)	-0.149*** (0.046)	-0.154*** (0.029)	-0.187*** (0.034)	-0.079** (0.032)	-0.023 (0.055)
Study location	0.000 (0.000)	0.004*** (0.001)	0.017** (0.008)	0.069* (0.039)	-0.029*** (0.006)	-0.070 (0.075)
Study month	0.020** (0.009)	-0.014 (0.016)	0.027*** (0.010)	-0.104 (0.094)	-0.010 (0.023)	-0.017 (0.223)

Standard errors are in parenthesis

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Supplementary Table 36: OLS results for WDDS – Leadership domain (Group membership)

	(1) All	(2) Mozambique	(3) Rwanda	(4) Malawi	(5) Uganda	(6) Zambia
Membership of ≥ 1 group	0.007 (0.060)	-0.049 (0.087)	0.298** (0.115)	0.062 (0.073)	-0.214* (0.114)	0.000 (0.088)
Asset index	-0.108*** (0.025)	-0.058 (0.166)	0.043 (0.171)	-0.105** (0.046)	0.126 (0.085)	-0.181 (0.161)
Men's age	0.005*** (0.002)	0.004 (0.004)	0.002 (0.002)	0.005* (0.003)	0.008*** (0.003)	0.003 (0.003)
Women's age	-0.011*** (0.002)	-0.010*** (0.004)	-0.010*** (0.004)	-0.016*** (0.003)	-0.012*** (0.004)	-0.002 (0.003)
Women's education	0.036*** (0.009)	0.027 (0.068)	0.087*** (0.032)	0.071** (0.034)	0.030*** (0.010)	0.034*** (0.012)
Household size	0.040** (0.016)	0.051* (0.026)	0.052* (0.030)	0.049** (0.020)	0.022 (0.019)	0.044*** (0.014)
Hunger scale	-0.112*** (0.018)	-0.137*** (0.046)	-0.135*** (0.028)	-0.190*** (0.034)	-0.074** (0.032)	-0.028 (0.055)
Study location	0.000 (0.000)	0.005*** (0.001)	0.019** (0.008)	0.068* (0.039)	-0.027*** (0.007)	-0.069 (0.076)
Study month	0.018* (0.009)	-0.029* (0.016)	0.026** (0.010)	-0.101 (0.095)	-0.001 (0.025)	0.000 (0.225)

Standard errors are in parenthesis

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Supplementary Table 37: OLS results for WDDS – Leadership domain (comfortable speaking in public in ≥ 1 context)

	(1)	(2)	(3)	(4)	(5)	(6)
	All	Mozambique	Rwanda	Malawi	Uganda	Zambia
Public speaking	0.146** (0.057)	0.231** (0.110)	0.453*** (0.104)	-0.033 (0.070)	-0.089 (0.127)	0.080 (0.088)
Asset index	-0.111*** (0.025)	-0.075 (0.151)	0.084 (0.166)	-0.107** (0.046)	0.117 (0.087)	-0.181 (0.158)
Men's age	0.005*** (0.002)	0.005 (0.004)	0.003 (0.002)	0.005* (0.003)	0.008*** (0.003)	0.003 (0.003)
Women's age	-0.011*** (0.002)	-0.012*** (0.004)	-0.010*** (0.004)	-0.016*** (0.003)	-0.011*** (0.004)	-0.003 (0.003)
Women's education	0.036*** (0.009)	-0.029 (0.061)	0.097*** (0.032)	0.071** (0.034)	0.031*** (0.010)	0.035*** (0.012)
Household size	0.039** (0.016)	0.046* (0.026)	0.055* (0.029)	0.049** (0.020)	0.021 (0.019)	0.045*** (0.014)
Hunger scale	-0.113*** (0.018)	-0.146*** (0.045)	-0.149*** (0.027)	-0.188*** (0.034)	-0.070** (0.031)	-0.023 (0.055)
Study location	0.000* (0.000)	0.004*** (0.001)	0.018** (0.008)	0.067* (0.039)	-0.029*** (0.006)	-0.067 (0.075)
Study month	0.021** (0.009)	-0.015 (0.016)	0.030*** (0.010)	-0.099 (0.098)	-0.010 (0.023)	-0.010 (0.224)

Standard errors are in parenthesis

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Supplementary Table 38: OLS results for WDDS – Time domain (Workload of ≤ 10.5 hrs in 24hrs)

	(1)	(2)	(3)	(4)	(5)	(6)
	All	Mozambique	Rwanda	Malawi	Uganda	Zambia
Non-excessive workload	-0.136*** (0.050)	-0.341** (0.157)	-0.094 (0.076)	-0.039 (0.050)	-0.079 (0.087)	-0.054 (0.085)
Asset index	-0.117*** (0.024)	-0.060 (0.165)	0.040 (0.176)	-0.102** (0.043)	0.091 (0.085)	-0.169 (0.159)
Men's age	0.005*** (0.002)	0.004 (0.004)	0.002 (0.002)	0.005* (0.003)	0.008*** (0.003)	0.003 (0.003)
Women's age	-0.012*** (0.002)	-0.009** (0.004)	-0.010*** (0.004)	-0.016*** (0.004)	-0.013*** (0.004)	-0.002 (0.003)
Women's education	0.037*** (0.009)	0.029 (0.069)	0.098*** (0.034)	0.068* (0.034)	0.029*** (0.010)	0.034*** (0.013)
Household size	0.053*** (0.012)	0.039 (0.027)	0.054* (0.032)	0.058*** (0.022)	0.033* (0.017)	0.045*** (0.014)
Hunger scale	-0.113*** (0.018)	-0.124** (0.048)	-0.135*** (0.030)	-0.192*** (0.033)	-0.077** (0.033)	-0.043 (0.055)
Study location	0.000 (0.000)	0.005*** (0.001)	0.018** (0.008)	0.070* (0.039)	-0.029*** (0.007)	-0.071 (0.076)
Study month	0.018* (0.009)	-0.026* (0.016)	0.026** (0.011)	-0.111 (0.092)	-0.009 (0.017)	0.002 (0.222)

Standard errors are in parenthesis

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Supplementary Table 39: OLS results for WDDS – Time domain (Satisfaction with leisure time)

	(1)	(2)	(3)	(4)	(5)	(6)
	All	Mozambique	Rwanda	Malawi	Uganda	Zambia
Satisfaction with leisure time	-0.008 (0.078)	-0.062 (0.142)	-0.009 (0.106)	0.142* (0.078)	-0.039 (0.107)	0.017 (0.091)
Asset index	-0.111*** (0.025)	-0.092 (0.154)	0.068 (0.170)	-0.110** (0.046)	0.120 (0.086)	-0.180 (0.160)
Men's age	0.005*** (0.002)	0.005 (0.004)	0.002 (0.002)	0.005* (0.003)	0.008*** (0.003)	0.003 (0.003)
Women's age	-0.011*** (0.002)	-0.011*** (0.004)	-0.010*** (0.004)	-0.016*** (0.003)	-0.011*** (0.004)	-0.002 (0.003)
Women's education	0.036*** (0.009)	-0.027 (0.060)	0.097*** (0.032)	0.071** (0.034)	0.030*** (0.010)	0.035*** (0.012)
Household size	0.041*** (0.016)	0.048* (0.026)	0.051* (0.030)	0.049** (0.020)	0.021 (0.019)	0.045*** (0.014)
Hunger scale	-0.116*** (0.017)	-0.149*** (0.046)	-0.153*** (0.028)	-0.188*** (0.034)	-0.073** (0.032)	-0.023 (0.054)
Study location	0.000* (0.000)	0.004*** (0.001)	0.017** (0.008)	0.065 (0.039)	-0.028*** (0.006)	-0.069 (0.074)
Study month	0.019** (0.009)	-0.014 (0.016)	0.027*** (0.010)	-0.102 (0.094)	-0.008 (0.024)	-0.013 (0.219)

Standard errors are in parenthesis

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$