WOMEN’S EMPOWERMENT & CHILDHOOD MALNUTRITION IN TIMOR-LESTE: A MIXED-METHODS STUDY
ABOUT THE AUTHORS

Jill Scantlan received her masters of science in social epidemiology at the University College London. She currently works as a research associate at the Center for Evidence-based Policy at the Oregon Health and Science University in Portland, Oregon. To contact the author email jill.k.scantlan@gmail.com.

Angela Previdelli received her Master of Regional Planning from Cornell University. Her research focuses on ways to support the livelihoods of smallholder agricultural producers both domestically and abroad. She currently works for Mercy Corps in Portland, Oregon. To contact her email angelaprev@gmail.com.

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ABBREVIATIONS

BMI – Body Mass Index
CI – Confidence Interval
DHS – Demographic and Health Survey
GHI – Global Hunger Index
HAZ – Height-for-Age Z-Score
HPA – Hypothalamic-Pituitary-Adrenal
IPV – Interpersonal Violence
OR – Odds Ratio
TLDHS – Timor-Leste Demographic and Health Survey
UN – United Nations
UNICEF - United Nations Children’s Fund
WAZ – Weight-for-Age Z-Score
WHO – World Health Organization

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Introduction

Timor-Leste has had a turbulent history of conflict and is one of the world’s newest nations, having gained independence from Indonesia in 2002. While there has been relative calm in the country over the past five years, a history of colonial oppression and violence has left profound and lasting effects on the Timorese public, especially women. Gender-based violence was widespread during the Indonesian occupation in Timor-Leste and continues today [1]. Timor-Leste also remains one of the poorest countries in Asia, by all development indicators. As of 2010, Timor-Leste had the second highest stunting prevalence (58%) and the highest moderate underweight prevalence (47%) among children under five in the world [5] [4].

As development professionals, local governments, and the humanitarian sector work towards eliminating childhood malnutrition globally, Timor-Leste provides a strong case study to understand the underlying causes of the condition and point towards sustainable solutions. One such solution focuses specifically on women’s empowerment as a vehicle for improving family nutritional statuses. This report offers both a high-level statistical analysis and in-depth inquiry of the relationship between women’s empowerment and childhood malnutrition in Timor-Leste.

Rationale

The global burden of child malnutrition has significantly reduced since the introduction of the Millennium Development Goals in 1990. The largest absolute improvements in children’s nutritional statuses were in South, East and South-east Asia from 1985 to 2011. Despite global and regional improvements, however, children’s nutritional status in Timor-Leste has worsened [5]. Government, UN agencies and non-governmental organizations in Timor-Leste recognize that the state of malnutrition in Timor-Leste is alarming and requires multiple interventions. There is a growing body of research that promotes improving women’s empowerment as an important point of intervention for improving nutrition [3]. This hypothesis is potentially significant for Timor-Leste as the country dedicates more attention toward alleviating malnutrition. However, the evidence backing the effect of women’s empowerment on malnutrition is inconsistent and more research is needed.

Research Objective and Questions

Based on a combination of quantitative research, relying on national survey data sets to run statistical analyses, and qualitative research, relying on direct interviews with Timorese women, this project aimed to answer the following questions:

**Question 1:** To what extent does women’s empowerment positively affect children’s nutritional statuses in Timor-Leste? Objective: provide statistical evidence in support of the hypothesis that increases in women’s empowerment is related to improvements in childhood malnutrition.

**Question 2:** How do women in Timor-Leste de-
fine women’s empowerment? Objective: gather context-specific definitions of women’s empowerment in rural Timor-Leste. This information can then be used to pinpoint specific points of intervention.

**Question 3:** How are joint decisions made in households in Timor-Leste? Objective: detail the interpersonal experiences of Timorese women’s ability to control their resources and make decisions that affect their family’s nutrition.

**Methodology**

The study used a mixed-methods approach to explore women’s empowerment and child malnutrition in Timor-Leste. The first stage of the research used population-based data from the 2009/2010 Timor-Leste Demographic and Health Survey to create three quantitative women’s empowerment measures: (1) a household decision-making index, (2) attitudes towards violence index and (3) lifetime experience of violence variable. The study then constructed a regression model and controlled for variables that also have an influence on women’s empowerment and child malnutrition to estimate the independent effect of women’s empowerment on children’s nutritional status. Finally, the study explored whether the results differed by key demographics.

The second phase of the study used qualitative methods to explore the context-specific meaning of empowerment and joint decision-making in Timor-Leste. The qualitative study collected semi-structured individual interviews from 33 women living in the Ainaro and Manufahi Districts of Timor-Leste. The final recommendations in this report are based on both the quantitative and qualitative data.

**Quantitative Findings**

Significant relationships were found between all three empowerment measures and children’s nutritional statuses after controlling for variables that also influence women’s empowerment and children’s nutrition. This reveals that an independent association exists between women’s empowerment and children’s nutritional statuses in Timor-Leste. Although we cannot say whether this association is causal, showing an independent effect is a step towards proving causality. The relationships were positive among two of the empowerment measures, attitudes towards violence and experiences of violence, but the strength of the associations were relatively small. The results also differed substantially by the respondent’s age and the age difference with their husband. Women’s decision-making had an unexpected negative relationship with children’s nutrition (the more decisions women were involved in the worse their children’s malnutrition was), but only among women older than their husbands. The variability in the direction of the associations and the strength of the association among age subgroups makes drawing clear conclusions from the quantitative results alone difficult. The study does, however, provide statistical evidence that increases in women’s empowerment is independently related to improvements in childhood nutrition. This helps to support the hypothesis that improving women’s empowerment is an important point of intervention for improving nutrition in Timor-Leste.

**Qualitative Findings**

As a part of the qualitative interview process, respondents were asked to reflect on important
activities in their life, household decision-making, personal decision-making, and their perception of women’s empowerment. The majority of women deemed their household responsibilities and child care as important. Respondents expressed that because this work is time consuming, they are usually unable to earn income and participate in community activities. Nearly all of the women who discussed the importance of income-generating activities directly linked increases in income to access to education and family welfare.

Many respondents associated their current economic difficulties and lack of empowerment to their lack of formal education. Some women discussed their education as a missed opportunity in their past, while others expressed a current hope to return to school when they are financially capable. Access to education for children was a theme that was often connected to other aspects of their lives and their concepts of empowerment, especially in regards to income generation. Many of the women linked their ability to earn income to the potential to fund their children’s education. Respondents were asked several questions on household decision-making. The majority of respondents emphasized that all household decisions are made jointly. Respondents were most adamant about joint decision-making when the decision concerned large financial investments such as, sending children through secondary school and higher education, buying materials to repair the house, and contributing animals and farm products for cultural ceremonies. Several contradictions emerged when respondents talked about household decision-making. Many respondents insisted that all decisions are made jointly but then go onto describe an inferior role in the decision-making process.

Respondents also expressed a concern for trust and safety within the household. Some women experienced violence if they did not fulfill their household responsibilities. Other women expressed that they consult, ask permission or inform their husbands in all decision-making processes in order to avoid interpersonal conflicts. Although the qualitative study did not focus on undernutrition, respondents talked in length about the importance of nutrition for their children’s health and development. To a lesser extent, respondents also linked their lack of resources and time constraints with their high fertility and the importance of spacing births. What respondent’s did not say is also telling. Methods for accessing improved water and sanitation facilities, health practices utilized when children are sick (such as the use of oral rehydration salts for children with diarrhea), breast feeding practices and general hygiene practices were not mentioned (with the exception of one respondent who talked about hand washing).

**Discussion and Recommendations**

This report offers a series of thematically grouped recommendations in the following areas:

**Income Generation**

Income generation was a central point of focus for nearly all respondents, with participants pointing toward various barriers (e.g. household responsibilities) to their ability to earn and control their income. Respondents made strong links between income and education and family welfare. **Recommendations:** Further research is needed to understand the influence of gender on household
division of labor, control over economic resources, and the role of loans and savings groups in Timor-Leste.

Interpersonal Violence

The TLDHS survey shows that violence is present and culturally accepted at a national scale in Timor-Leste. The qualitative portion of this study also alludes to a trend of violence in the household, but did not directly address this issue. Violence has a well-established link to childhood development issues.

**Recommendations:** Violence, fear and intimidation are important themes to study and improve when supporting women's empowerment, especially as there are direct links between violence and childhood malnutrition.

Education

Nearly all respondents placed a high level of importance in educational attainment, linking it both to their personal pursuit as well as that of their children, and pointed toward several barriers (e.g. lack of funds). Several respondents alluded to a link between their sense of empowerment and their ability to pursue education. Many women linked the importance of income generation to their ability to finance their children's education.

**Recommendations:** Access to education and educational attainment are important to securing greater employment opportunities and economic development for Timorese women. It is important to analyze and dismantle barriers to education when working toward decreasing childhood malnutrition and supporting women's empowerment.

Health Beliefs and Knowledge

Respondents clearly identified the link between nutritious foods with their child's health. However, many appear to only emphasize energy intake and not infection prevention. It is the combination of these two elements, insufficient intake and infection, which is the most immediate cause of undernutrition.

**Recommendations:** It is important to disseminate information and training specifically related to increasing women's knowledge of infection prevention and nutrition so as to improve the health and wellbeing of both women and children in Timor-Leste.

Joint Decision-Making

The authors noted several contradictions within respondents' ideas about the decision-making process. These contradictions point toward the possibility of women taking on subservient roles within the process. This relationship may help explain why quantitative results suggest that the more decisions women are involved in, the greater the chances for child stunting. They also point toward possible links to exceptional disempowerment among women older than their husbands, as well as flaws within the DHS measures of agency and decision-making.

**Recommendations:** Greater scrutiny must be placed on the decision-making process in Timor-Leste households to understand the nuance of power dynamics between partners. Revisions to the DHS measures are also necessary to capture this nuance.

Measuring Women's Empowerment in Timor-Leste

The DHS decision-making measure clearly does not fully reflect all the dimensions of women's empowerment in Timor-Leste. The survey does not capture whether women are able to overcome
barriers to empowerment (e.g. valid participation in community activities, income generation and control over resources).

**Recommendations**: The DHS survey requires revisions to include questions that capture women’s ability to earn and control income within the household, political inclusion, overcome gender roles that prohibit their ability to make decisions and participate in their community in a meaningful way.

**Conclusion**

Childhood malnutrition in Timor-Leste is a complex condition. The determinants that influence and cause childhood malnutrition are equally complex. This study chose to analyze the condition from the perspective of women’s empowerment. While previous studies have made evidence-based linkages between women’s empowerment and childhood malnutrition, research in Timor-Leste is lacking. To the author’s knowledge, this is also the first study to use 2009/2010 TLDHS and qualitative data to specifically examine the relationship between women’s empowerment and child malnutrition. This paper hopefully provides a rationale for focusing on women in nutrition programming, helps define the concept of women’s empowerment and offers a set of concrete recommendations to all those who are working towards improving childhood malnutrition, both in Timor-Leste and abroad. Moving forward, researchers, development professionals, government officials and other interested parties should consider this study and other evidence when planning health and development programs and research in Timor-Leste.

**References**


Childhood malnutrition is a global problem and while many countries are making progress toward decreasing malnutrition, Timor-Leste’s childhood malnutrition rates have been increasing in recent years. As development professionals, local governments, and the humanitarian sector work towards eliminating childhood malnutrition globally, Timor-Leste provides a strong case study to understand the underlying causes of the condition and work towards sustainable solutions. One such solution focuses specifically on women’s empowerment as a vehicle for improving family nutritional statuses. This report offers both a high-level statistical analysis and in-depth inquiry of the relationship between women’s empowerment and childhood malnutrition in Timor-Leste.

Section one of this report introduces the major themes of this paper. It begins with an introduction to the Timor-Leste context. Next, it details the two central areas of research in this study, childhood malnutrition and women’s empowerment. Lastly, it presents a framework to help explain how women’s empowerment impacts childhood malnutrition. Section two presents the structure of the research conducted in this study. It begins with the rationale that supports the themes of the paper. Next, the section reviews the central research questions and objectives. Lastly, it presents the methodology used to conduct the study. Section three focuses on the findings of the research. The section is separated into three parts. The first part reviews the quantitative findings of the study. The
second part reviews the qualitative findings. The third part provides a synthesized summary of both sets of findings and presents relationships between the two areas of research. The fourth and final section of this report provides conclusions and recommendations. Malnutrition is an overarching term that refers to the absence of some or all of the nutrients necessary for human health. Although malnutrition technically refers to both too little nutrition (undernutrition) and too much nutrition (overnutrition), this report will use the term malnutrition as a reference to undernutrition only.

Timor-Leste Historical Context

Timor-Leste, also known as East Timor, is located in South-East Asia and adjacent to Indonesian West Timor. Indonesia occupied Timor-Leste in 1975 shortly after Portugal relinquished its colonial rule over the country. During the 24-year occupation, mass killings, death from illness and starvation, systematic rape, torture and displacement were commonplace in Indonesian-occupied Timor-Leste. Following mounting international pressure, the Indonesian government held a referendum in 1999 and the vast majority of Timorese voted for independence. Peace did not come easily, however, and the Indonesian withdrawal was accompanied by further mass violence and killings and the destruction of much of Timor’s infrastructure. A UN peacekeeping mission began in 2001 and ended in 2012. During the UN’s years of intervention there were several outbreaks of violence that have led to two major crises, including the most recent in 2008. Since that time, while post-conflict tensions remain, Timor-Leste has been relatively calm. Although stability has returned to Timor-Leste, the country’s turbulent history is still tangible and has left profound and lasting effects on the Timorese public, especially women [1]. As this study seeks to understand the linkages between women’s empowerment and the country’s prevalence of malnutrition, it is important to consider how political oppression and

Figure 1: Malnutrition Map of Timor-Leste using 2009/2010 TLDHS data
violent crises impact the current Timorese society. The country remains one of the poorest in Asia, by all development indicators. The majority of the population is engaged in agriculture, mostly at a subsistence level. Timor-Leste’s history of poverty and conflict has created a context that has led to a variety of public health issues. Childhood malnutrition is one of those issues. To better understand how to improve childhood malnutrition in Timor-Leste, we must first understand the specific determinants of the condition and its application in Timor-Leste.

**Determinants of Malnutrition in Timor-Leste**

As of 2010, Timor-Leste had the second highest stunting prevalence (58%) and the highest moderate underweight prevalence (47%) among children under five in the world [4] [5]. Stunting is a result of chronic undernutrition and having low height-for-weight. Being underweight is a result of both acute and chronic undernutrition and having low weight-for-height. Figure 1 shows the levels of stunting per each region in Timor-Leste. The areas in yellow, orange and red have the worst rates of stunting (indicated by a height-for-age z-score below -2.00). For more details on these measures see appendix 2.

There are many causes of malnutrition (see UNICEF framework in appendix 1). Many of the immediate causes are rooted in poverty and exacerbated by poor healthcare, inadequate care, food insecurity, lack of water and sanitation services, and low education. According to the 2009/2010 Demographic and Health Survey (DHS), 49% of rural households in Timor-Leste are in the poorest or poorer household wealth category. The proportion of the population under the national poverty line (less than $0.88 USD per day) grew from 36% in 2001 to 50% in 2007 [6]. Many rural households do not have access to improved water or sanitation facilities. Almost half of households in rural Timor-Leste defecate in the open (43%) and use water sources unprotected against contamination (44%). Twenty-nine percent of women in Timor-Leste also have no formal education. When only looking at women in the poorest or poorer household wealth categories, the proportion of women with no formal education increases to 44% [4].

A qualitative study by Mizumoto et. al (2013) identified several the risk factors associated with child malnutrition in the Alieu district of Timor-Leste. According to this study the most cited causes of child malnutrition include: environmental factors, such as lack of water and sanitation and livestock proximity to the home, in combination with attitudes and behaviors towards treatment of diarrhea, breast feeding and diet. Many of the mothers viewed diarrheal episodes as a normal aspect of child development and linked it to the teething process [7].

Intimate partner violence also has a profound effect on childhood malnutrition [8 – 11]. Ever-partnered women in Southeast Asia currently have the highest prevalence of IPV (37.7%) among the World Health Organization’s (WHO) regions [10]. Gender-based violence was widespread during
the Indonesian occupation in Timor-Leste and continues today. In the 2009/2010 TLDHS, very high proportions of women agreed IPV was justified when women neglect children (76%), go out without telling their husbands (72%), argue with their husbands (64%), burn food (43%), or refuse to have sex (30%). This high level of acceptance is likely a reflection of the normalization of violence and of the inferior status of women in Timor-Leste. Although IPV is normalized among many families, cultural taboos prohibit open discussion on physical and/or sexual violence [12] [4]. On June 21, 2010, Timor-Leste passed its first law against domestic violence, making it a punishable crime [4].

**Health Pathway between Women’s Empowerment and Child Nutrition**

Themes on health beliefs and practices, household decision-making, income generation, interpersonal violence (IPV) and educational empowerment emerged from the qualitative research process. In order to understand the links between these themes, women’s empowerment and children’s nutrition the following health pathways are explained: material (control over resources), psychosocial (depression) and biological (domestic violence). Care practices are also explained, as they are the linking point between women’s empowerment and children’s nutrition in all three pathways. For further explanation of women’s empowerment see appendix 3.

**Control Over Resources**

Control over resources (time, income, food, healthcare, etc.) can have a direct impact on the immediate causes of malnutrition and is often mediated through care practices. Research on intra-household resource allocation shows that women and men have different preferences for allocating food and non-food resources within the household, and shows that income or assets controlled by women are more likely to be used for the benefit of children and themselves [13] [14]. For example, if a woman has control over her time and the use of the household’s income, she is more likely to make a timely decision to treat her sick child. Similarly, a woman’s influence in household decision making, either alone or jointly with their partner, reflects her value within the family [15]. In this light, household level decision making can be thought of as a reflection of a woman’s influence over the allocation of resources towards health-related goods and services [8].

**Care Practices**

Care practices act as important linking points between the basic and underlying causes of malnutrition and the immediate causes (see appendix 1). In many societies, women play the key caretaking role within the household and are responsible for their own health and the health of their children [8]. Engle, Menon & Haddad (1999) outline five care practices that are crucial for children’s nutritional well-being: food preparation, feeding practices, psychosocial care, hygiene and home healthcare practices [16]. Women often have multiple productive (income-generating and domestic work) and reproductive responsibilities. These responsibilities, paired with the overall devaluation of women’s
leisure time, lead women with lower status to have less time to allocate to care practices. Women with a lower status are more likely to have decreased mobility and access to social networks and new information on health and nutrition. They are also less likely to challenge culturally based beliefs on care practices [8]. This, in turn, causes children to have inadequate diets and makes them more vulnerable to repeated infection.

**Depression**

Strong evidence links maternal depression to child stunting and underweight children [9]. Depression is both an underlying cause of malnutrition and an important mediator between violence and malnutrition. The exact mechanisms that cause children with depressed mothers to have poor nutritional statuses are not clear, although the most likely mediator is care practices [8]. Women are more prone to depression in the postpartum period due to shifts in hormones that occur during childbirth and increased stress associated with being the primary caregiver. This, in turn, affects the mother’s ability to provide adequate care practices for their children.

**Violence**

There are direct and indirect pathways linking violence against women and children’s nutritional status. One pathway suggests that when children experience violence in utero or during infancy, that repeated exposure to violence causes disruptions in a child’s hypothalamic-pituitary-adrenal (HPA) axis. This axis regulates reactions to stress and major body functions such as immunity, digestion, energy storage and expenditure [11]. Studies show that mothers’ exposure to repeated stress directly influences their children’s growth, health, behavior and cognitive abilities. Other pathways of maternal domestic violence include effects on maternal behaviors (smoking, drinking, drug use), psychological state (depression, anxiety), nutrition, and physical impairment (fatigue, injury, disability). These pathways, in turn, can affect children’s HPA axis, their intrauterine growth potential or the care practices they receive [17]. Figure 2 summarizes the hypothesized health pathways outlined in previous sections.
WOMEN’S EMPOWERMENT + CHILDREN’S NUTRITONAL STATUS

HYPOTHESESIZED HEALTH PATHWAY

1. WOMEN’S EMPOWERMENT
   - HOUSEHOLD DECISION-MAKING
     - MOTHER’S OWN NUTRITION
     - CONTROL OVER RESOURCES
   - DEPRESSION
   - DOMESTIC VIOLENCE

2. CARE PRACTICES
   - INTRAUTERINE GROWTH RESTRICTION
     - REDUCED ENERGY INTAKE/MICRO-NUTRIENT DEFICIENCIES + INFECTIONS
     - STUNTING, UNDERWEIGHT + WASTING
   - CHILDREN’S STRESS-RESPONSE SYSTEM
**Rationale**

The global burden of child malnutrition has significantly reduced since the introduction of the Millennium Development Goals in 1990. Stunting, underweight and wasting, the three anthropometric indicators commonly used to monitor malnutrition, have globally reduced by 35%, 36% and 11% respectively since 1990. Despite the progress made in the last 20 years, malnutrition persists as a leading cause of death and disability among children in low- and middle-income countries. Health conditions related to malnutrition\(^\text{1}\) caused the deaths of 3.1 million children in 2011, which accounted for roughly 45% of all deaths in children under five worldwide [19]. Child stunting is the primary risk factor for poor early childhood development. In 2006 alone, more than 200 million children displayed signs of stunting. Although stunting begins in utero and continues only through the age of 2 or 3, it has long-term consequences on stunted children’s educational attainment and income-generation [20].

The largest absolute improvements in children’s nutritional statuses were in South, East and South-

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1 Fetal growth restriction (birth weight below the 10th percentile-for-gestational age), wasting, stunting, suboptimal breastfeeding and micronutrient deficiencies (mainly vitamin A and zinc) [19]
east Asia from 1985 to 2011 [5]. While many countries made progress, others saw increases in childhood malnutrition. Between 2003 and 2009, children’s nutritional statuses in Timor-Leste worsened among all three anthropometric indicators. As of 2010, Timor-Leste had the second highest stunting prevalence (58%) and the highest moderate underweight prevalence (47%) among children under five in the world [5] [4]. New data from the Global Hunger Index (GHI) also highlights Timor-Leste’s poor nutritional performance. Out of the 78 countries included in the GHI in 2013, Timor-Leste ranked 75th. Since 2005, Timor-Leste’s hunger score index has increased (from 26.0 to 29.6). Neighboring Indonesia’s score, by comparison, reduced its 1990 score by half (from 19.7 to 10.1) and is two-thirds less than Timor-Leste’s score. Vietnam also reduced its GHI score by three-fourths since 1990 [21]. This makes Timor-Leste one of the few countries in East and South-east Asia where malnutrition rates are increasing.

Government, UN agencies and non-governmental organizations in Timor-Leste recognize that the state of malnutrition in Timor-Leste is alarming and requires multiple interventions. Timor-Leste’s current National Nutrition Strategy outlines the Government’s strategic plan, priorities and the key strategic elements of their nutrition policies from 2012 to 2017. Chief among their nutrition priorities are improving household food security, nutritional intake, women and child caring practices, environmental health, preventing infectious disease and improving access to nutritional health services. The plan also identifies a multi-sectoral approach and evidence-based research as key strategies for improving nutrition in Timor-Leste. There is a growing body of research and publications that recognize women as key actors in this effort.

A recently published series on maternal and child nutrition by the Lancet medical journal hypothesizes that improving women’s empowerment is an important point of intervention for improving nutrition [3]. For example, the series explains that women’s empowerment is a mechanism through which increases in income and yield from agricultural inputs affect intrahousehold resource allocation and children’s nutrition [3]. This hypothesis is potentially significant for Timor-Leste as they dedicate more attention toward alleviating malnutrition. The Lancet series recognizes that although this hypothesis is compelling, the evidence backing the effect of women’s empowerment on malnutrition is inconsistent and more research is needed.

**Research Objectives and Questions**

This study is driven by the need to better understand the meaning of women’s empowerment and how it connects to childhood malnutrition. By offering a Timor-Leste case study, this paper aims to shed light on the difficulties of measuring women’s empowerment and stresses the importance of women’s role in battling global childhood malnutrition. Based on a combination of quantitative research, rely-

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2 The GHI is a comprehensive tool created by the International Food and Policy Research Institute (IFPRI) and is designed to measure and monitor regional and country-specific trends in hunger. It uses three indicators to create their hunger score: undernourishment (percent of the population with insufficient caloric intake); child underweight and; child mortality.
Question 1: To what extent does women’s empowerment positively affect children’s nutritional statuses in Timor-Leste?

Question 1 uses quantitative methods, relying on national survey data, to draw statistical relationships between indicators of women’s empowerment and rates of childhood malnutrition in Timor-Leste. The objective of this question is to provide statistical evidence in support of the hypothesis that increased women’s empowerment is related to improvements in childhood malnutrition.

Question 2: How do women in Timor-Leste define women’s empowerment?

Question 2 uses qualitative methods, relying on first-person interviews, to gather information detailing the ways that Timorese women conceptualize empowerment in their personal lives. The objective of this question is to gather context-specific definitions of women’s empowerment in rural Timor-Leste. This information can then be used to pinpoint specific points of intervention.

Question 3: How are joint decisions made in Timor-Leste households?

Question 3 uses qualitative methods, relying on first-person interviews, to shed light on the process of decision making within Timorese households. The objective of this question is to detail the interpersonal experiences of Timorese women’s ability to control their resources and make decisions that affect their family’s nutrition.

Methodology

The study used a mixed-methods approach to explore women’s empowerment and child malnutrition in Timor-Leste. Women’s empowerment is a complex phenomenon that has different meanings across cultures. Because of this, there isn’t one clear method for measuring women’s empowerment. Using a mix of data collection methods allowed the researchers to explore different questions from various perspectives and to balance out the methodological weaknesses present in the quantitative and qualitative tools [22].

Quantitative

The first stage of the research used quantitative methods to answer: to what extent does women’s empowerment positively affect children’s nutritional statuses in Timor-Leste? This study used population-based data from the 2009/2010 Timor-Leste Demographic and Health Survey to create three quantitative women’s empowerment measures: (1) a household decision-making index, (2) attitudes towards violence index and (3) lifetime experience of violence variable. The study then constructed
a regression model to estimate the independent effect of women's empowerment on children's nutritional status. To create the regression model, the study controlled for variables that also have an influence on women's empowerment and child malnutrition, such as age, education, wealth and geography, and explored whether the results differed by key demographics. See appendix 2 for more details on the quantitative sampling, empowerment measure, analysis strategy, and study strengths and limitations.

Qualitative
The second phase of the study used qualitative methods to explore the context-specific meaning of empowerment and to answer three central questions: (1) how do women in Timor-Leste define women's empowerment, (2) how are joint decisions made in households in Timor-Leste. The qualitative study collected semi-structured individual interviews from August 5 – 9, 2013 in the Ainaro and Manufahi Districts of Timor-Leste. The research team consisted of six interviewers, five female and one male, one translator, all Timorese nationals, a research manager and the lead researcher from University College London.

Community leaders in 4 sucos (villages) were asked to purposely recruit women aged 18 – 49, with at least one child under the age of 5 from their communities to participate in the study. They were also instructed to recruit participants from geographically distant communities and with different occupations and socioeconomic statuses. Due to limited time, individual participants were sampled from only two districts within Timor-Leste (Ainaro and Manufahi). Therefore, the views expressed by women in this study may only be applicable to these districts. However, any limitations in sampling may be less concerning due to Timor-Leste’s fairly homogenous rural population. Researchers interviewed a total of 33 women.

Recruitment and Informed Consent
Respondents were recruited based on a 3-step process. Firstly, local meetings were held with community leaders to identify potential participants. Next, a second meeting was held with pre-identified participants to discuss the purpose of the research, how their information would be used and the potential risks and benefits of participating in the research. Respondents were asked to discuss the information with their families before making a decision to participate. A few days later, the research team visited the homes of pre-identified participants and obtained informed consent from the respondent.

Data Collection and Analysis
The interviewers were divided into three groups with one interviewer and one note taker per group.
Team members alternated roles between interviews to promote triangulation of data, cross check responses and minimize interviewer bias. Directly after interviewing each participant, the research team expanded their interview notes by writing detailed accounts of the interview and their observations [23].

After the data was collected, the lead researcher, an interpreter and the interview team held a one-day workshop to discuss initial research findings. The workshop reviewed emerging themes, contradictions in the data and any issues with individual questions or respondents. Mercy Corps staff translated the interview transcripts and cross checked with one another for accuracy. The lead researcher collaborated with an external researcher on the analysis of the interview data to minimize bias. The two researchers reviewed the data and drew initial themes separately before comparing results and agreeing on key findings. The final key findings in this report are based off both the quantitative and qualitative data.

**Ethical Issues**
The interview process exercised confidentiality protocols, such as allocating a random number to each participant to anonymize them and keeping the respondent lists and interview transcripts separate. The University College London and Cabinet Ministry of Health and Research in Timor-Leste provided ethical approval (including the confidentiality protocols and procedures) prior to the fieldwork.

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3 For more details on confidentiality and information protection processes, please contact the lead researcher
Quantitative Results

The quantitative aspect of this research project set out to answer, to what extent does women’s empowerment positively affect children’s nutritional statuses in Timor-Leste by analyzing existing data from the 2009/2010 DHS in Timor-Leste. This study hypothesized that as a woman’s empowerment increases, so would the nutritional status of her children – namely measured by height and weight (see appendix 3 for more detail on the undernutrition measurement). Conversely, this study expected that as a woman’s empowerment decreases, or she becomes disempowered, the nutritional status of her children would decrease. Finally, this study also expected to see this relationship remain consistent across all demographic groups after controlling for variables that influence women’s empowerment and child malnutrition.

After controlling for household wealth, maternal characteristics (education, body mass index, and age), child characteristics (age and sex) and place of residence, significant associations remained between children’s nutritional statuses and all three women’s empowerment measures - household decision-making, attitudes towards violence and lifetime experience of violence. This suggests that women’s empowerment has an independent effect on children’s nutrition. However, the results dif-
pered substantially along two characteristics – the respondent’s age and whether the respondent was older or younger than their husband.

As expected, there was a positive association between women’s empowerment and children’s nutritional statuses, but only among two of the empowerment measures – attitudes towards violence and experiences of violence among women younger their husbands. These associations were also only found in specific age subgroups. The study found no relationship between the women’s attitudes towards violence and their children’s nutritional statuses among younger women (age 15 – 29). However, among women aged 30 – 49, the children’s odds of being underweight increased by 1.25 times per every increase in the attitudes towards violence index (95% CI: 1.08-1.45; p=0.003). Put simply, the study found the relationship between a woman’s attitude toward violence and childhood malnutrition negligible among younger women but significant among older women. Older women may agree that violence is justified more often than younger women, but the difference is small.

Another empowerment measure focused specifically on women who experienced violence in the past year. The study found those women who were younger or the same age as their husbands were 1.27 times more likely to have stunted children if they experienced violence (95%CI:1.02-1.59; p=0.03)⁴. This result supports the observed health pathway between violence and child stunting (see background section). However, women older than their husbands who had experienced violence were 52% less likely to have stunted children (95% CI: 0.24-0.96; p=0.04). This suggests that in Timor-Leste, a woman being older than their husband may be a protective factor against child malnutrition during pregnancy through the first few years, despite exposure to violence. It is interesting to note that although the Manufahi and Ainaro districts are close to one another, they had among the highest and lowest prevalence’s of IPV in Timor-Leste respectively (Manufahi = 78% vs. Ainaro = 12%).

Unlike the other two empowerment measures, women’s decision-making showed an unexpected positive relationship with child stunting. Among women younger than their husbands, the odds were small (OR=1.06) and not statistically significant (p=.30). Among women who were older than their husbands, the odds of child stunting increased one-and-a-half times per increase in the decision-making index (95% CI:1.19-2.00, p=0.001). This means that the greater the occurrence of a woman’s participation in a household decision (either alone or jointly), the greater the odds of stunting in their children. This is the opposite of what was expected.

The study went on to explore women’s empowerment, household decision-making, and the influence of age on empowerment through a qualitative inquiry. The next section of this paper reviews decision-making in Timor-Leste in detail and helps explain some of the quantitative findings.

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⁴ CI = confidence interval. The narrower the range of values in the CI, the more precise an estimate is and vice versa. Statistical significance is determined at p<.05
Qualitative Results

Through a qualitative interview process (see methodology section for details) respondents were asked to reflect on important activities in their life, household decision-making, personal decision-making, and their perception of women’s empowerment (for full topic guide see appendix 4). If more than half of the respondents mentioned the same theme within their interviews, this was considered a reoccurring theme. The respondents are labeled by number for anonymity. Many of these themes centered on empowerment within the household, including the gendered division of labor, health practices and beliefs, and joint decision-making. Women also discussed economic empowerment, the desire to participate in income-generating activities, and empowerment within the broader community. Finally, respondents identified several barriers to realizing economic, community, and educational empowerment.

Different Levels of Empowerment

Gendered Divisions of Labor

The majority of respondents considered their work within the household as a part of their normal gender role. Respondent 7 explained, “(another) important activity is preparing food for my family because this activity is the responsibility of a mother or a housewife like me. In Timor culture if a man and woman (are) living together in one house, (the) woman is spending more time in the kitchen than the man.” Similarly, respondent 8 said, “... as a mother and a woman we should know how to cook. As a mother it is my duty to give food to the children. Breakfast, lunch, dinner. It is our tradition.”

A few respondents also expressed that the importance of cooking is obligatory due to their husband’s potential disapproval and anger. For example, one respondent said “cook(ing) is important, prepare(ing) food is important because when our children (are) hungry we must give them food, and when our husband want to eat (and) we did not prepare the food our husband can (be) angry.”

“You know, if my husband (is) hungry, he can easily anger and (this) can lead to domestic violence.”

5 Three terms are used throughout the qualitative results section to denote the quantity of respondents who identified a theme in their interview. When mentioning a “majority”, this means that roughly 75-100% of respondents mentioned a theme. “Many” denotes that about 50-74% of respondents mentioned a theme. When mentioning a “few” respondents, this means that about 25 - 49% of respondent mentioned a theme.
Similarly, respondent 24 said that “the most important activity is to prepare foods for my family. You know, if my husband (is) hungry, he can easily anger and (this) can lead to domestic violence.”

Health Practices and Beliefs

The majority of respondents also considered cooking as the most important activity for their children’s health. It is important to note that the qualitative topic guide did not directly ask about health or nutrition. Despite this, respondents linked several health beliefs around food. Many noted that insufficient consumption of food, especially nutritious food, leads to decreased physical energy. For example, respondent 20 explained that, “…as a human being we need food to eat. If we are not going to eat (this) can cause disease for us and we (will) have no power energy to do our daily activities.” Many respondents also linked poor nutrition to their children’s physical appearance and risk of mortality. Respondent 8 captured this by saying, “if the child does not eat then they will get a poor body condition. Children will die caused by hunger.” A few respondents linked good nutrition with improving their children’s cognitive functions and performance in school. Respondent 32 expressed this by saying, “(an) important activity is cooking and preparing breakfast for (the) household. Foods (are) required by our body as (a) source of energy. Kids also need foods so then they can better absorb learning in their schools.”

Many respondents expressed a number of other health beliefs during their interviews, such as: linking cleaning their yard as important for reducing mosquitoes and importance of cleaning food plates for multiple health issues (including cough, stomach illness and malaria). It is important to note that none of the respondents talked about how they clean water or access potable water sources except for respondent 20, who mentioned that lacking access to water causes anemia. Similarly, only respondent 25 linked hand washing with preventing disease by saying, “before eating I have to tell my children to wash their hands because when we eat with dirty hands, the bacteria in their hands can create disease.”

Economic Empowerment

Although the topic guide for the interviews did not directly address income generation, a majority of the respondents spoke at length about the importance of engaging in income generating activities to support their children and family. Respondent 32 explained, “(the) first important activity is doing business (because) there is a lot of necessity (for it) in (the) household, such as pay(ing) children’s school fees (and) buy(ing) school uniforms. Everything must use money, so I am doing these activities to respond to the necessity in (the) household.”

The majority of respondents specifically cited tais (a handmade, embroidered textile) as an important income generating activity. Respondents touched on the multiple uses that tais have and their importance in Timor culture. Respondent 5 explained, “I’m making (tais) because they are needed.
Our cultural events and our daily lives need these tais. Daughter-in-laws need it. We must provide it for some cultural events, maybe some for friends who need it. We can also sell (them) in the market and then have money and (can) also give (them) to visitors when they come to our village." Respondent 15 emphasized the importance of making tais for income generation by saying, “making tais (is) a part of (a) women’s life according to our cultural tradition. Tais can be sold and the money can be used to buy other things like household utensils, school uniforms, books, bags, pencils and shoes for my kids. Making tais is an alternative livelihood for women in Timor.”

Not all respondents cited participation of income-generating activities. When asked about their aspirations, an overwhelming majority of the respondents expressed a desire to earn income. The majority of respondents wanted to earn money to use directly for their children. Respondent 29 explained, “(I want to be) productive at home and outside the house. I don’t know how to do it outside the house but I want to help my husband earn money. I want to…send (my kids) to the university level for their better future.” A smaller number of respondents linked income generation to a desire to become financially independent from their husbands. When asked about what they would change in their life, respondent 19 said, “as (women) we must force ourselves to work hard and we should not (be) dependent (on) our husband for money. I want to make money as (much) as possible for sure.” Similarly, when asked about future aspirations, respondent 33 said, “I want to make money. That’s why I learn how to do vegetable gardening and making tais, that can give me money. As I said previously, my husband is controlling the money, so I need to find (a) way to get money.”

Community Empowerment

Respondents had diverse answers when asked to explain their concept of women’s empowerment/role in society and the community. A few commented that women should participate in the community, but only within their traditional gender role. Many other respondents specifically mentioned the need to prioritize household activities above community activities. Respondent 4 exemplified this by explaining that “as a mother or housewife I have obligations for cooking, (taking) care of my children, etc. I have to show all these good attitudes as (a) married woman in (this) society. To show a woman’s dignity to others is important for me so people will not pout me. I think it is important
for (women) to focus on taking care of her family before (being) active in the community activities.”

Many respondents also emphasized the importance of a woman’s role as a community member. For example, respondent 28 said, “(a woman’s role in society is) to contribute to the development of the community. We need to actively participate in the community activities, no matter if you are men or women.” A few respondents specifically said that women have a responsibility to participate in the community’s cultural activities. Respondent 10 explained, “women must participate in cultural (ceremonies), participate in village programs and participate in (some) training to increase their capacity.” Several women specifically discussed the need for women-based community organizations.

Respondent 25 echoed this by saying, “I think women should be organized, like to form a group of women in my village so if there’s a problem we can take part to resolve (it).” Respondents also discussed their participation in village savings and loans programs. When asked about women’s role in society respondent 20 said, “women can take advantage (of) different community activities like micro-finance. She can borrow money to open a business and then return the borrowed money back. A few women explained a need to help other women. For example, respondent 2 explained, “my empowerment is…teaching or helping other women in this neighborhood who (are) in trouble….”

**Joint-Decision Making**

Respondents were asked several questions on household decision-making. The majority of respondents emphasized that all household decisions are made jointly. Respondents were most adamant about joint decision-making when the decision concerned large financial investments such as, sending children through secondary school and higher education, buying materials to repair the house, and contributing animals and farm products for cultural ceremonies. Respondent 8 explained why joint decision-making is important by saying, “the money is not a lot, so we need to be wise and we have to decide together what to buy so then there’s extra money to bring home to pay the children’s school fees.” Many respondents emphasized that making a joint decision indicates respect and trust in the other person. Respondent 28 exemplified this by saying, “my husband is never making (a) decision alone. He always asks my opinion… (this) mean(s) that he is respecting me.” Similarly, respondent 4 said, “the decision(s) we make together is something like if we want to…shop in the market or send out children to school… (a) wife and husband have the same right to make (a) decision. Also we are equals in looking (out) for money in the household, especially for our children.”
When asking respondents why they make joint decisions a few emphasized that consulting each other in a decision avoids interpersonal conflicts. Respondent 15 reflected this by saying, “if I make (a) personal decision (without) my husband (he) will become mad that I (did) not consider him as a husband, so we have to together make decisions together.” Similarly, another respondent said “…if (a) wife or husband just decide by his or her own self to use the money without letting (the) husband or wife know, she or he can get upset and domestic violence (happens) in our family. If we talk to each other everything will be better.”

This coincides with the quantitative results, where the majority of respondents indicated that they normally make household and economic decisions jointly with their husbands. Several contradictions emerged, however, in the qualitative responses when respondents talked about household decision-making. Many respondents insisted that all decisions are made jointly but then went on to describe an inferior role in the decision-making process. Respondent 14 exemplified this by first explaining that “so far it (has) never happened in my household that my husband make(s) a decision without discussing (it) with me, we always make decisions together.” She then immediately goes onto say, “in my opinion I (have) never (made) any personal decision without consulting with my husband. Every decision I discuss it with my husband and I have always followed the will of my husband.” Respondent 4 also contradicted her earlier statement about being equal to her husband in decision-making by saying, “...before I spend the money for something other than daily needs, then I need to ask permission from my husband. I don’t want to have problem(s) if something happen(s) because of that decision and I did not ask permission first.”

Barriers to Empowerment

Income Generation

The majority of respondents explained that they lack time to participate in activities other than their normal housework. A majority of respondents also specifically discussed activities related to income generation. For example, respondent 4 said, “The activity that I think is very important, but this activity is rarely happen(ing,) is making tais. It is important because it provides money for me but I need to spend more of my time (taking) care of my children than (doing) that activity.”

The responses from the women interviewed in Timor-Leste clearly placed income generation at the center of their idea of empowerment. However, many respondents pointed toward a conflict between their desire to contribute to their household income and their responsibilities as a mother. Respondent 33 expressed this by saying, “going to the farm is (an) important activity because we are living in (a) rural area and (we are) depending a lot on this activity. If we are not going to do this activity then we don’t know from where we get the money to buy household needs. But this activity is less frequent because I… (had) a baby, so (I) spend most of my time to look after my baby and other children.”
Among respondents who discussed lacking time to participate in income-generating activities, a few also emphasized lacking access to capital. For example, respondent 19 explained, “the activity which I consider important but rarely happens is that I want to do business but I don’t have the capital and I have very limited time. I spend most of my time (doing) household activities so I don’t have enough time to do business.”

A few respondents also specifically mentioned not being able to participate in saving and loan groups. When asked about important activities that happen less frequently, respondent 3 said, “I could not participate in savings and loan groups because it is very difficult for me to split the time.”

Community Involvement

A few respondents linked their inability to be active in the community to their household responsibilities. Respondent 1 explained that “as a widow and head of the family I have to give my full attention to all my children by myself, especially to provide food for them, send them to school…but this (means I) don’t have enough time to participate actively in community works…” When asked about important activities that happen with less frequency, respondent 24 said, “it is important to participate in community activities but I am rarely participating, mostly because I am doing a lot of activity in my household.”

Education

Many respondents associated their current economic difficulties and lack of empowerment to their lack of formal education. Respondent 14 linked her education level to her inability to formally earn income by saying, “My study was only until senior high school. I wanted to continue to university level but the economic factor was not allowing me to do that. My friends who continued until university level now all work. Just me unemployed. But now I am a volunteer teacher, teaching in elementary school. Who knows, maybe in the future the government will accept me to be a paid teacher.”

When asked whether girls and boys have equal access to education, many respondents described a conflict between continuing their education and starting a family. This contradiction was clearly articulated by respondent 10 when she explained, “We can say that boys and girls are equals. But the
fact is that mostly boys have a better opportunity to go to (a) higher education level. Some people are thinking that high school is enough for the girls, as they usually opt to get married faster than the boys. At higher levels (in education) I think...boys (have a) better motivation to finish school than girls...I think the choice to get married as soon as they graduate from high school. It has changed, but still boys (have a) better opportunity in my opinion."

Many respondents linked their motivation to support their children's educational attainment to their personal history with barriers to formal education. When asked what they wanted to do most in their life, most respondents expressed a desire to provide a better life for their children. When explaining why she wants to increase her income, respondent 7 said, "I want my kiosk to grow (and) give me more money. My income will increase and I can save my money so in the future I will be able to send my children to college...I want (them to) have a better life than us in the future." Some women also wanted to continue their own education. Respondent 6 expressed this by saying, "I want to open (a) small business by having a kiosk and have some income...I will use (the money) to pay my children's school fees. I (also) want to have a better education level so I can find a good job (and) not just stay at home."

Summary of Quantitative and Qualitative Findings

Significant relationships were found between all three empowerment measures and children’s nutritional statuses after controlling for variables that also influence women's empowerment and children's nutrition. This reveals that an independent association exists between women’s empowerment and children’s nutritional statuses in Timor-Leste. Although we cannot say whether this association is causal, showing an independent effect is a step towards proving causality. The relationships were positive among two of the empowerment measures, attitudes towards violence and experiences of violence, but the strength of the associations were relatively small. The results also differed substantially by the respondent's age and the age difference with their husband. Women’s decision-making had an unexpected negative relationship with children's nutrition (the more decisions women were involved in the worse their children’s malnutrition was), but only among women older than their husbands. The variability in the direction of the associations and the strength of the association among age sub-groups makes drawing clear conclusions from the quantitative results alone difficult. The study does, however, provide statistical evidence that increases in women's empowerment is independently related to improvements in childhood nutrition. This helps to support the hypothesis that improving women's empowerment is an important point of intervention for improving nutrition in Timor-Leste.

The qualitative aspect of the research study attempted to probe deeper into defining women’s empowerment and joint decision-making in order to elaborate on the quantitative results. Respondents were asked to reflect on important activities in their life, household decision-making, personal
decision-making, and their perception of women’s empowerment. The majority of women deemed their household responsibilities and child care as important. Women described an “empowered” woman as one who can prioritize household activities but at the same time be an active participant in economic and community activities. However, respondents also expressed that because this work is time consuming, they are usually unable to earn income and participate in community activities. Nearly all of the women who discussed the importance of income-generating activities directly linked increases in income to access to education and family welfare.

The ability to translate economic activity into benefits for their children was a frequent outcome of empowerment for women in this study. However, respondents also highlighted several barriers to empowerment including lacking time for activities outside the household, lack of education (which limits their earning potential), and early marriage (as a barrier to completing education). Many respondents associated their current economic difficulties and lack of empowerment to their lack of formal education. Some women discussed their education as a missed opportunity in their past, while others expressed a current hope to return to school when they are financially capable. Access to education for children was a theme that was often connected to other aspects of their lives and their concepts of empowerment, especially in regards to income generation. Many of the women linked their ability to earn income to the potential to fund their children’s education.

Respondents were asked several questions on household decision-making. The majority of respondents emphasized that all household decisions are made jointly. Respondents were most adamant about joint decision-making when decision concerned large financial investments such as, sending children through secondary school and higher education, buying materials to repair the house, and contributing animals and farm products for cultural ceremonies. Several contradictions emerged when respondents talked about household decision-making. Many respondents insisted that all decisions are made jointly but then go onto describe an inferior role in the decision-making process. This would mean that disempowered women are more likely to indicate that they make joint-decisions and possibly explains the strong positive correlation between decision-making and child stunting among women older than their husbands. This is not surprising considering women said that they make joint decisions to avoid conflict or get their husband’s permission. Curiously, respondents were asked to explain how age affects decision-making but the majority responded that it had no effect. Respondents also expressed a concern for trust and safety within the household. Some women experienced violence if they did not fulfill their household responsibilities. Other women expressed that they consult, ask permission or inform their husbands in all decision-making processes in order to avoid interpersonal conflicts.

Although the qualitative study did not focus on undernutrition, respondents talked in length about the importance of nutrition for their children’s health and development. To a lesser extent, respondents also linked resource and time constraints with their high fertility and the importance of spac-
ing births. What respondent’s did not say is also telling. Methods for accessing improved water and sanitation facilities, health practices utilized when children are sick (such as the use of oral rehydration salts for children with diarrhea), breast feeding practices and general hygiene practices were not mentioned (with the exception of one respondent who talked about hand washing).
Discussion and Recommendations

Income Generation

Income generation was a central theme in nearly all of the responses gathered through the interview process. The frequency of this theme indicates that economic empowerment is a high priority for the majority of the group of respondents. Nearly all of the women who discussed the importance of income-generating activities directly linked increases in income with access to education and family welfare. Therefore, as academics, government officials and development professionals consider the relationship between women’s empowerment and childhood malnutrition, it is important to study the role of capital and economic independence (i.e. purchasing choices).

The respondents cited household duties as one of the greatest barriers hindering their participation in income generating activities. The current investigation conducted only a cursory inquiry into the household division of labor and the community’s practiced gender roles. Within the interview responses, participants cited household obligations as one of the greatest barriers to income generation and community involvement. It is important to continue research into household division of labor
in order to improve women’s economic independence. Additionally, it is unclear whether a woman’s economic independence is culturally accepted within the community or the household.

Therefore, it is important to consider not only ways to generate income for Timorese women, but also ensure that women are able to exercise control over their income. As residents and stakeholders consider ways to support women’s empowerment in Timor-Leste communities, it is recommended to continue research focused on interpersonal household dynamics, especially as they relate to labor and capital. A minority of the respondents discussed loan and savings groups. The current investigation did not include these groups within the scope of the research. However, as an available resource within the community, it is important to understand the potential benefits and disadvantages that these groups may pose to women in need of capital and a means of income-generation in Timor-Leste. A few respondents indicated that they are already members of such groups, while others mentioned these groups as future interests. Future research could investigate the current impact that these groups have on their members and assess their potential ability to offer women a means of income-generation and pursuing economic control within the household.

**Interpersonal Violence**

Similarly, although to a lesser degree, respondents expressed a concern for trust and safety within the household. While a minority of women expressed these concerns, the TLDHS survey confirms that violence is present and culturally accepted within Timorese households. The Manufahi district in Timor-Leste has the highest prevalence of women experiencing physical or sexual IPV (78%) whereas Ainaro has one of the lowest (12%). There is evidence from this study that violence against women negatively affects children’s nutritional statuses in Timor-Leste. This relationship is also well established in other studies (see health pathways section in the background). Directly exploring domestic violence was outside the scope of the qualitative aspect of this study on women’s empowerment in Timor-Leste. Therefore, it is important to explore how fear and violence might prohibit a Timorese woman's sense of empowerment within the household. Given the sensitive nature of domestic violence in Timor-Leste, WHO guidelines on ethical and safety regulations should be followed [24].

**Education**

Many of the respondents placed great importance on education. The respondents generally discussed education within two themes, their personal education level and the future of their family members’ educational pursuits. In regards to the first theme, personal education level, the women who discussed the subject lamented that they would have liked to pursue greater levels of education, but were in capable due to reasons such as lack of financial resources, marriage and family obligations. Some of the women discussed their education as a missed opportunity in their past, while others expressed a current hope to return to school when they are financially capable. When discussing the second theme, the potential of their children to attain greater levels of education, most
of the women seemed hopeful that it would be possible. Access to education for children was a theme that was often connected to other aspects of their lives and their concepts of empowerment, especially in regards to income generation. Many of the women linked their ability to earn income to the potential to fund their children’s education.

While the qualitative portion of this study asked questions specifically relating to access to education, it merely scratched the surface of the educational barriers facing Timorese women. When considering ways to improve Timor-Leste’s malnutrition problem, it is important to understand the path linking education, empowerment and nutrition. It is clear from the overwhelming responses in the qualitative portion of this study that women are well aware of the importance of education and how it supports empowerment. It is recommended that more attention be placed on the household (i.e. early marriage, childcare) and institutional barriers (i.e. cost of education, availability of transportation, gender discrimination) women face in pursuit of education in Timor-Leste.

**Health Beliefs and Knowledge**

Respondents clearly identified the link between nutritious foods with their child’s health within their interviews. This is a promising knowledge and practice base to build from in future health and development programming. However, respondents appear to only emphasize energy intake and not infection prevention. The repeated cycle of reduced energy intake/micro-nutrient deficiencies and infection is the most immediate cause of undernutrition (see health pathway diagram). These knowledge and practice gaps could explain the high levels of malnutrition, despite the respondent's emphasis on their children’s nutrition. Maternal undernutrition is another potential driver of child malnutrition in Timor-Leste. Fetal growth restriction is the cause of 12% of all stunting cases globally and stems from woman having a short stature and being underweight during pregnancy [19]. This is relevant for Timor-Leste where the average stature height for women is 150.4cm (4.94 feet) and at the time of the 2009/2010 TLDHS, 23.4% of respondents had low BMI (<18.5 kg/m2). Authors of the 2013 Lancet Maternal and Child Health Series advocate for maternal health interventions to begin during adolescence in order to curb maternal undernutrition earlier. Adolescent nutrition interventions in Timor-Leste should also provide support for continuing education and preventing early marriage, as these were key barriers to empowerment.
Joint Decision-Making

The contradictions present when asking women about joint decision-making demonstrate two things. Firstly, women who make joint decisions may actually be taking on subservient roles in the decision-making process. This could help explain why the quantitative decision-making index had a strong positive correlation with child stunting (the more decisions women were involved in, the more stunted their children were). This relationship was only found among women older than their husbands, which may also suggest this subgroup of women is exceptionally disempowered. The contradictions may also reflect a fundamental flaw in how the DHS measures agency and decision-making. It is clear from prior research on women’s empowerment that having more say in decisions (and therefore having increased agency) leads to improvements in health (see health pathways). The quantitative results are therefore puzzling because they showed a clear insignificant relationship between the decision-making index and children’s nutritional status among women younger than their husbands (who made up the majority of the sample).

The results may have been skewed because the 2009/2010 TLDHS only included questions about decisions that women were already typically involved in. Nearly two-thirds (73%) of women reported that they are involved in all five of decisions listed in the survey, including: small and large household purchases, personal healthcare decisions, whether they can visit family and friends and what to do with the money their husband earns. These questions also only reflect individual and household decision-making, whereas the qualitative results clearly show that women experience barriers to participating in the public sphere (especially income generation and participating in community-level activities). The DHS decision-making index may then only reflect the decisions women are normally involved in and miss the numerous other decisions where women are regularly excluded.

Measuring Women’s Empowerment in Timor-Leste

It is clear from the qualitative study that the quantitative DHS decision-making measure does not fully reflect all the dimensions of women’s empowerment in Timor-Leste. The quantitative measure included questions about decisions where women are already typically involved. Given the results from the quantitative and qualitative studies, measuring women’s empowerment in Timor-Leste should instead reflect whether women are able to overcome barriers to empowerment, including the ability participate in community and cultural events outside their normal gender role and pursue income-generating activities. Attempts to measure women’s empowerment in the past have mainly focused on single indirect proxy measures, such as education or women’s labor force participation rate. These measurements only reflect access to resources, without regarding the woman’s control over assets or the ability to make purposeful choices [25] [26]. Therefore, a more complex measurement (such as an index) should be used.
Conclusion

Childhood malnutrition in Timor-Leste is a complex condition. The determinants that influence and cause childhood malnutrition are equally complex. This study chose to analyze the condition from the perspective of women’s empowerment. While previous studies have made evidence-based linkages between women’s empowerment and childhood malnutrition, research in Timor-Leste is lacking. To the author’s knowledge, this is also the first study to use 2009/2010 TLDHS and qualitative data to specifically examine the relationship between women’s empowerment and childhood malnutrition. This paper hopefully provides a rationale for focusing on women in nutrition programming, helps define the concept of women’s empowerment and offers a set of concrete recommendations to all those who are working towards improving childhood malnutrition, both in Timor-Leste and abroad. Moving forward, researchers, development professionals, government officials and other interested parties should consider this study and other evidence when planning health and development programs and research in Timor-Leste.
REFERENCES


Appendix 1: UNICEF Conceptual Framework

NUTRITION CONCEPTUAL FRAMEWORK

**ENGLE, MENON AND HADDAD’S EXTENDED CARE MODEL**

- **Outcome:**
  - Child survival, growth, development
  - Health

- **Immediate Determinants:**
  - Adequate dietary intake
  - Care for women: breastfeeding, feeding,
    psychosocial care, food processing,
    hygiene practices, home health practices
  - Household food security
  - Information, education, communication

- **Underlying Determinants:**
  - Health services, healthy environment
  - Family and community resources:
    and control: human, economic,
    organizational
  - Political, cultural, social, economic
    structure and context
  - Potential resources

- **Basic Determinants:**
  - Nutrition conceptual framework

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APPENDICES
Appendix 2: Defining Women’s Empowerment in the Literature

Empowerment is a complex concept with numerous definitions. The concept of empowerment can be understood as being comprised of levels and features. The levels refer to the scales at which people can exercise/experience empowerment. The features explain the different perspectives that influence a person’s sense of empowerment. It is important to note that empowerment is multidimensional. Women can be empowered on one level but not necessarily on another. A study on women's economic roles in Ghana, Mason (2005) observed that although women were strongly empowered economically, as the primary traders, they were sexually submissive domestically and had no direct influence on local political process [27]. This multidimensionality greatly impacts the way in which an individual woman feels empowered within her specific context.

Most academic literature on this subject conceptualizes empowerment as the ability to make choices, access to and control over resources/assets and the process of change from disempowerment to empowerment [28]. Narayan (2005) describes empowerment as “increasing poor people's freedom of choice and action to shape their own lives” and as the “expansion of assets and capabilities of poor people to participate and negotiate with, influence, control and hold accountable institutions that affect their lives.” Nalia Kabeer (1999) focuses on the process of change within her definition and views empowerment as “people's ability to make strategic choices in a context where this ability was previously denied to them.” Kabeer focuses on three interrelated elements to empowerment – resources, agency and achievements. Resources include economic, material and social factors. Agency is “the ability to define one’s goals and act upon them.” Achievements result from the combination of resources and agency. Malhotra et. all (2002) views women's empowerment as distinctive from other social groups. First, Malhotra argues that women are a part of several cross-cutting disadvantaged groups rather than one unifying group. Second, Malhotra argues that the household and interfamilial relationships are at the center of women’s disempowerment. Lastly, Malhotra argues that a systematic transformation of patriarchal systems and organizations must occur in order to achieve true empowerment for women [29].

Agency is a common theme among all of these definitions. Agency can be commonly thought of as the process of substantive decision-making and offers the most direct and tangible means of measuring empowerment. Narayan's definition stresses the importance of agency, defining agency as the “capacity of actors to take purposeful action, [which is a] function of both individual and collective assets and capabilities.” Keeber places agency at the center of empowerment, using it as a critical link between resources and achievements. Malhotra and Schuler (2005) consider women's empowerment as being a result of the agency of the person who feels empowered, explaining that, “women themselves must be significant actors in the process of change that is measured.” [30]
Appendix 3: Quantitative Methodology

Design features – DHS Sampling Frame and Survey Population
The quantitative aspect of the project used data from the 2010 Timor-Leste Demographic and Health Survey (TLDHS). The TLDHS is cross-sectional and nationally representative survey of the Timor-Leste population. The sampling frame uses a multi-stage cluster design. 11,463 households were randomly selected to participate in the survey. The response rate was 98%. More details can be found in the TLDHS 2009-2010 survey report [4].

Selected households were given a questionnaire in order to generate a complete list of all household members and obtain general information on age, sex, education, relationship to the head of household and characteristics of household dwellings. In addition, 13,137 women aged 15-49 were surveyed on several demographic and maternal and child health characteristics (including height, weight and hemoglobin measurements). The overall response rate for the individual women’s questionnaire was 95.2%. One-third of all households were also randomly selected to complete a domestic violence module and only one eligible woman per household was selected (n=3,022) [4].

Analytical Sample
Participants were excluded from the current study’s analysis based on several parameters. Firstly, only participants selected for the domestic violence module were included in the analysis. After selection, respondents were further excluded because: privacy during the interview could not be obtained (65 records), the respondent refused to participate in the domestic violence module (6 records), the respondent did not have a child under-5 (385 records), respondent’s children did not have anthropometric data (455 records). This resulted in a final sample size of 2,111 [4].

Undernutrition Measurement
Height and weight measurements were taken from children under-5 in order to measure their nutritional status. Two anthropometric indices were used to determine nutritional status: height-for-age (HAZ) and weight-for-age (WAZ). These indices are comprised of z-scores that represent standard deviation (SD) units from the median of a reference population. The 2009/2010 DHS data from Timor-Leste uses a references population from the WHO Child Growth Standards. HAZ is a measure of linear growth and reflects chronic undernutrition in utero and throughout early childhood. Conversely, WAZ is a measure that reflects both chronic and acute undernutrition. The clinically relevant cut-off points for HAZ and WAZ are below -2 standard deviations from the median of the reference population. Children with z-scores more than -2.00 were coded as 0 (not stunted/underweight) and children with z-scores equal to or less than -2.00 were coded as 1 (stunted/underweight).

Empowerment Measurement
In 1999/2000 the DHS began using three new gender-related sets of questions to monitor women’s
empowerment: Women’s participation in decision-making, attitudes towards violence and experiences of violence [31]. More recent studies on the relationship between women’s empowerment and children’s nutrition use either a simple additive index [15] [32–34] or construct a latent empowerment variable through factor analysis [8] [35]. In order to replicate previous work, a simple additive index was created for the decision-making and attitudes towards violence variables. Previous studies on maternal experiences of violence and children’s nutritional status also use a single dichotomous variable to measure violence [17] [36]. The empowerment measurements will now be discussed in detail.

a). Decision-making

Women’s participation in decision-making is supposed to reflect “…women’s status as the degree of women’s access to (and control over) material resources (including food, income, land, and other forms of wealth) and social resources (including knowledge, power, and prestige) within the family, in the community, and in the society at large” [34] [37]. The following questions on women’s participation in household decision making were asked:

Who in your family usually has the final say on…
1. Your own health care?
2. Making large household purchases?
3. Making household purchases for daily needs?
4. Visits to family and/or relatives/friends?
5. Deciding what to do with money your husband earns

An additive decision-making index ranging from zero to five was created based on the questions above (1-5) to indicate how many of the above decisions women were involved in, either jointly or alone. Responses for each question were originally coded as: Respondent alone = 1; Respondent & husband/partner = 2; Husband/partner alone = 4; Someone else = 5; Respondent & someone else jointly = 6; husband/partner has no earnings = 7 (relevant for question 5 only). Variables were then recoded to be dichotomous. If the respondent indicated that they made the decision alone or jointly with their husband/family (answer 1, 2 or 6), they were recoded as 1. If they indicated that their husband or someone else made the decision without them (answer 4 or 5), they were coded as 0. If all five questions had valid answers, the dichotomised questions (1-5) were added up to create a score of zero to five. If one value was missing (i.e., only 4 questions were answered), the overall score was rescaled to 0-5 scale. For example: Q1: (yes = 1); Q2: (yes = 1); Q3: (no = 0); Q4: missing; Q5: (yes = 1)

| Score a = sum of scores from decision-making questions (missing = 0) | Score a = 1+1+0+1+0 = 3 |
| Score b = number of non-missing values | Score b = 1+ 1 + 1 +1 = 4 |
| Score a/b * 5 (number of questions in the decision-making module) | Score a/b * 5 = 3.75 |

The decision to rescale the scores was made because several respondents were missing question 5 (who in your family has the final say on deciding what to do with the money your husband earns). This rescaled index was used if respondents were missing only 1 response. If they were missing data from more than one question with each empowerment measure their empowerment score would be coded as missing. Finally, each score was dived by its standard deviation to make standardized decision making scores.
b). Attitudes towards Violence
The second core empowerment measure reflected attitudes towards violence. This module asked questions relating to attitudes towards wife beating to capture women’s acceptance of unequal gender roles/norms. The following questions were asked:

Sometimes a husband is annoyed or angered by things that his wife does. In your opinion, is a husband justified in hitting or beating his wife in the following situations:

6. If she goes out without telling him?
7. If she neglects the children?
8. If she argues with him?
9. If she refuses to have sex with him?
10. If she burns the food?

An additive attitudes towards violence index ranging from zero to five was created based on the questions above (6-10) to indicate how many of the above scenarios women agreed that wife beating was justified. Responses were originally coded as: No = 0; Yes = 1; Don’t know = 8. “Don’t know” responses were then recoded as missing. If all five questions had valid answers, the dichotomized questions (6-10) were added up to create a score of zero to five. If only 4 questions were answered, the overall score was rescaled to 0-5 scale (based off the same method in the decision-making index). If they were missing data from more than one question with each empowerment measure their empowerment score would be coded as missing. Finally, each score was dived by its standard deviation to make standardized attitudes towards violence scores.

c). Experiences of Violence
The third core empowerment measure was experiences of violence. The DHS collects information on experiences of violence over the past 12 months through a separate module on domestic violence. This module focuses on intimate partner violence (IPV), the most common type of violence perpetrated against women [4]. Spousal/partner violence was measured using a modified Conflict Tactics Scale (CTS) developed by Strauss [2]. Based on previous research on the relationship between IPV and child undernutrition, only physical (less severe and severe) and sexual violence were included in the analysis [17] [36]. The following questions were asked:

Physical violence – less severe
(Does/did) your (last) husband/partner ever do any of the following things to you?
11. Push you, shake you, or throw something at you?
12. Slap you?
13. Punch you with his fist or with something that could hurt you?
14. Kick you, drag you, or beat you up?

Physical violence – severe
15. Try to choke you or burn you on purpose?
16. Threaten or attack you with a knife, gun, or any other weapon?

Physical violence – sexual
17. Physically force you to have sexual intercourse with him even when you did not want to?
18. Force you to perform any sexual acts you did not want to?
The experience of violence variable was dichotomized based on whether the respondent had ever experienced physical or sexual violence in the past 12 months. If the respondent answered "yes" to at least one question in the physical and sexual sub-categories (11 – 18) it was coded as 1. If they did not answer "yes" to any of the questions in those sub-categories, it was coded as 0. Respondents who answered "don't know" were recoded as missing.

Other Covariates

Variables that were identified as covariates in previous studies on women's empowerment and child undernutrition were explored as potential risk factors, confounders or effect modifiers [15] [8] [34] [36] [39]. The following variables were explored as covariates: household wealth (poorest, poorer, middle, richer, and richest), place of residence (rural/urban), region, child's age (months), child's sex (male/female), child's birth order (1st-2nd=1, 3rd-4th=2, 5th-6th=3, >6th=4), respondent's age (years), respondent's Body Mass Index (low BMI=<18.5 kg/m2), respondent's and respondent's husband's education (no education=0, primary=1, secondary=2, higher=3), respondent and husband's age differential (husband older=0; respondent same age or older=1), respondent and husband's education differential (women has less education=0; woman has more education=1) and age at first marriage (years).

Missing Data and Sensitivity Analysis

17.7% (455 out of 2,566 records) of children eligible for analysis had missing anthropometric data. Sensitivity analysis was conducted to determine whether there were any statistically significant differences between children with and without missing anthropometric data. The following significant differences were observed among children missing anthropometric data: higher proportion of male children (5.4% difference; p=0.04); on average 11.8 months younger (p<0.001); higher proportion living in urban areas (6.3%; p<0.001); mothers of children missing data on average have a lower BMI (2.36 kg/m2 less; p<0.001).

There was also missing data among the variables included in the empowerment indices. 60-73 out of 2,556 records (2.4%-2.9%) were missing from questions on who in the family usually has the final say on household decisions. 22 – 206 records (1%-8.1%) were missing from questions on attitudes towards violence. With the exception of attitudes towards violence if a wife refuses sex from her husband (206 missing records), all other missing data among the empowerment variables was minimal and most likely did not bias the data. There was minimal data missing from other variables in the analysis (less than 2.5% among 4 variables).

Analysis Method/Strategy: Crude Analysis

Crude analysis was conducted first in order to determine which covariates were potential confounders, effect modifiers or were not relevant for the models. All analysis was adjusted for the survey design and utilized the "survey" commands available in the Stata 12 statistical package except for non-parametric hypothesis tests, which are not available in Stata. Chi-square tests for survey data were used to explore the crude relationship between outcome, exposure (experience of violence only) and covariates. Due to the non-normal distribution shape of the empowerment variable indices (decision-making and attitudes towards violence), Ranksum and Kruskal Wallis tests were used to explore the relationship between the empowerment exposures and covariates.

All covariates that had unadjusted associations with child nutrition and empowerment variables were brought forward in the analysis as potential confounders. Covariates that were only related to the outcome variables were also brought forward in the analysis as potential effect modifiers. Variables
were eliminated that were only related to the exposure or had not been identified in the literature as important explanatory variables. The covariates brought forward for analysis were first checked for multicollinearity using Spearman’s correlations. Only one variable was eliminated from the analysis (husband’s education) due to being highly correlated with household wealth ($r=0.59$). See tables 1-3 in the results appendix for full descriptive, crude and correlation analysis.

**Analysis Method/Strategy: Multivariable Analysis**

Unadjusted odd’s ratios were then calculated between the outcome variables, main exposures and remaining covariates using logistic regression. Following this, adjustment for covariates occurred in three stages. Firstly, the models were adjusted for age – respondent’s age, the child’s age and the age differential between the respondent and her husband. Secondly, the models were adjusted for the socioeconomic status variables. Lastly, the models were adjusted for the remaining covariates identified as potential confounders via the crude analysis or variables identified as important in previous studies. After full adjustment, interactions between variables independently associated with child stunting and underweight and empowerment and experience of violence variables were tested. Statistically significant interactions were included in the final models and odds ratios were calculated per each interaction strata.

**Strengths and Limitations**

There are several strengths of the study. The TLDHS is the only survey of its size to include women’s empowerment measures in Timor-Leste. Despite using a sub-sample of women within the study and having to exclude participants for having children with missing anthropometric data, the sample size was still large enough to detect significant differences in women’s empowerment and child nutrition. The survey was also nationally representative and had a high response rate for the individual women’s questionnaire (95.2%). There are also limitations to the study. These limitations include: cross-sectional study design (the outcomes and exposures were collected at the same point in time), the main exposure measurements were self-reported (reporting bias), residual confounding (some studies included care practices in their models), misclassification of the exposure measurement (especially with the joint decision-making index) and multicollinearity of covariates. Some authors argue that using a simple additive index to measure empowerment is limiting [30]. If individual variables within an index show varying effects on the outcome these differences will be diminished when put into an additive index and may cause the effect to be small and statistically insignificant. In the current study, variations in effect size and association direction were present between individual variables within the empowerment indices and children’s nutrition variables.
Appendix 4: Interview Topic Guide

*participation criteria – women aged 18 – 49 with at least one living child under-5 should have been established during the general information meeting*

Respondent ID (from consent form) ________________________________

*Who is present during the interview (observation only)?*
  a. Respondent and enumerators only
  b. Respondent, spouse, and enumerators
  c. Respondent, other household member and enumerators

Read to participant: Thank you for agreeing to take part in this survey. We would like to ask you some questions that will help us to understand various areas of your life and how this is connected with how much control you feel you have when you are making decisions and putting your decisions into action. The results of this survey will be completely confidential and no identifying data will be collected. Some of the questions may also be quite personal and we hope this will be OK with you. If, however, you do not feel comfortable answering any questions, please feel free to say so. Similarly, if for any reason you feel unsafe during the interview, you will be able to reschedule (or relocate) the interview to a time (or place) that may be more safe or convenient for you.

I. Important Activities in the Respondent’s life

*Interviewer hint – Use probes when the participant’s response to your question is brief or unclear, when the participant seems to be waiting for a reaction from you before continuing to speak, or when the person appears to have more information on the subject*

Read to respondent: We are going to begin by talking about your daily life and the activities that are most important in your life. If you do not wish to answer a particular question, please feel free to say.

1. *Can you describe the main activities you engage in on a daily or weekly basis?*
2. *Which activities would you characterize as the most important?*
3. *Are there any other events or activities that are important in your life, but occur less frequently? If so, please describe them.*
4. *We would like to hear a bit more about the activities you said were important. Can you explain why (__________) is the most important daily activity?*
II. Women’s Decision-making

**Interviewer hint – Use probes** when the participant’s response to your question is brief or unclear, when the participant seems to be waiting for a reaction from you before continuing to speak, or when the person appears to have more information on the subject.

Read to respondent: Now we would like to ask your opinion on who is normally involved in important personal and household decisions in general in your community. Decisions could involve only 1 person or more than 1 person.

III. Household Decisions
A household decision is a decision that affects everyone living in a household.

5. In your opinion, what household decisions do men normally make on their own, without consulting their wife?
6. In your opinion, what household decisions do women normally make on their own, without consulting their husband?
7. In your opinion, what household decisions do husbands and wives make together?
8. In your opinion, does anyone else in a household have influence over household decision-making? If so who and what decisions do they participate in?
9. In your opinion, does household decision-making change over time? For example, are there any periods in women’s lives when they have more or less control over household decision-making? If so, please explain.
10. In your opinion, how does the age of a woman affect her influence in household decision-making?

IV. Personal Decisions

**Interviewer hint:** Using the diagram below to show who normally has the most influence in different personal decisions in women’s lives. For example, if the respondent always makes the decision alone fill in the circle to the far left. If they always make the decision together with their husband fill in the middle circle. But if they usually make the decision alone but also make it with their husband sometimes fill in a circle in between “respondent alone” and “joint”

11. In your opinion, who has the most influence in deciding a woman’s education level?
12. Can you please describe why?
13. In your opinion, who has the most influence in deciding the choice of a woman’s husband/partner?
14. *Can you please describe why?*
15. *In your opinion, who has the most influence in deciding the choice of when a woman married?*
16. *Can you please describe why?*
17. *In your opinion, who has the most influence in deciding the choice of how many children the family should have?*
18. *Can you please describe why?*
19. *In your opinion, who has the most influence in deciding the choice of the children’s education level (is this different or the same for boy and girl children?)*
20. *Can you please describe why?*

V. Women’s empowerment

**Interviewer hint – Use probes when the participant’s response to your question is brief or unclear, when the participant seems to be waiting for a reaction from you before continuing to speak, or when the person appears to have more information on the subject**

Read to respondent: The final set of questions we would like to ask you concerning your feelings about yourself, women’s role in the community/society you live in and whether you would like to do or change anything about your life and your community.

VI. Describing Women’s Empowerment

21. *In your opinion, what is a woman’s role in the community/society?*
22. *What does it mean to be empowered?*
23. *What opportunities are more open to women in life?*
24. *What opportunities are more open to men in life?*

VII. Psychological Assets (Self-Esteem/Self-confidence)

25. *What is the one thing you would most like to do in your life?*
26. *If you could change anything in your life what would you like to change the most?*
### Appendix 5: Quantitative Results

#### Table 1: Crude Association between Outcomes and Exposures with Covariates

<table>
<thead>
<tr>
<th>Covariates</th>
<th>Stunted</th>
<th>Underweight</th>
<th>Decision-making</th>
<th>Violence Attitudes</th>
<th>Experience of Violence</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Freq (%)</td>
<td>Cases (%)</td>
<td>Chi-2 p-value</td>
<td>Cases (%)</td>
<td>Chi-2 p-value</td>
</tr>
<tr>
<td></td>
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<tr>
<td><strong>Wealth Index</strong></td>
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<tr>
<td>poorest</td>
<td>515 (24.4)</td>
<td>324 (62.9)</td>
<td>&lt;.001</td>
<td>0.02</td>
<td>269 (52.2)</td>
</tr>
<tr>
<td>poorer</td>
<td>459 (21.7)</td>
<td>283 (61.7)</td>
<td>&lt;.001</td>
<td>0.02</td>
<td>218 (47.5)</td>
</tr>
<tr>
<td>richer</td>
<td>412 (19.5)</td>
<td>229 (56.8)</td>
<td>&lt;.001</td>
<td>0.02</td>
<td>188 (46.7)</td>
</tr>
<tr>
<td>richest</td>
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<td>239 (58.0)</td>
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<td>0.02</td>
<td>202 (46.6)</td>
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<tr>
<td>Total</td>
<td>2,111 (100)</td>
<td>1,234 (58.5)</td>
<td></td>
<td></td>
<td>995 (47.1)</td>
</tr>
<tr>
<td><strong>Type of place of residence</strong></td>
<td></td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>Urban</td>
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<td>251 (55.0)</td>
<td>&lt;.001</td>
<td>0.02</td>
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<td>1,234 (58.5)</td>
<td></td>
<td></td>
<td>995 (47.1)</td>
</tr>
<tr>
<td><strong>Child age</strong></td>
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<td></td>
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<td>less than 1 year</td>
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<td>0.02</td>
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<td>0.02</td>
<td>199 (47.5)</td>
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<td>0.02</td>
<td>227 (63.4)</td>
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<td>4</td>
<td>450 (21.3)</td>
<td>269 (58.8)</td>
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<td>0.02</td>
<td>256 (56.9)</td>
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<td>Total</td>
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<td>1,234 (58.5)</td>
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<td></td>
<td>995 (47.1)</td>
</tr>
<tr>
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<td></td>
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<tr>
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<td>1056 (50.0)</td>
<td>638 (60.4)</td>
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<td>0.73</td>
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<td>Total</td>
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<td></td>
<td>995 (47.1)</td>
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<td>205 (57.3)</td>
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<tr>
<td>Total</td>
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<td>1,234 (58.5)</td>
<td></td>
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<td>995 (47.1)</td>
</tr>
<tr>
<td><strong>Respondent's age</strong></td>
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<td></td>
<td></td>
<td></td>
</tr>
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<td>15-24</td>
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<td>217 (56.7)</td>
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<td>0.01</td>
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<td>254 (53.1)</td>
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<td>0.02</td>
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<td>0.02</td>
<td>143 (49.1)</td>
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<tr>
<td>Total</td>
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<td>1,234 (58.5)</td>
<td></td>
<td></td>
<td>995 (47.1)</td>
</tr>
<tr>
<td><strong>Maternal BMI</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not low BMI</td>
<td>1610 (76.6)</td>
<td>897 (55.7)</td>
<td>&lt;.001</td>
<td>0.01</td>
<td>709 (44.0)</td>
</tr>
<tr>
<td>Low BMI</td>
<td>492 (23.4)</td>
<td>333 (67.7)</td>
<td>&lt;.001</td>
<td>0.02</td>
<td>282 (57.3)</td>
</tr>
<tr>
<td>Total</td>
<td>2,102 (100)</td>
<td>1,230 (58.5)</td>
<td></td>
<td></td>
<td>991 (47.2)</td>
</tr>
<tr>
<td><strong>Educational attainment</strong></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No education</td>
<td>717 (34)</td>
<td>449 (62.6)</td>
<td>&lt;.001</td>
<td>0.02</td>
<td>367 (51.2)</td>
</tr>
<tr>
<td>Primary</td>
<td>650 (30.8)</td>
<td>383 (58.9)</td>
<td>&lt;.001</td>
<td>0.02</td>
<td>310 (47.7)</td>
</tr>
<tr>
<td>Secondary</td>
<td>713 (33.8)</td>
<td>387 (54.3)</td>
<td>&lt;.001</td>
<td>0.02</td>
<td>307 (43.1)</td>
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<tr>
<td>Higher</td>
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<td>15 (48.4)</td>
<td>&lt;.001</td>
<td>0.02</td>
<td>11 (35.5)</td>
</tr>
<tr>
<td>Total</td>
<td>2,111 (100)</td>
<td>1,234 (58.5)</td>
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<td></td>
<td>995 (47.1)</td>
</tr>
<tr>
<td><strong>Respondent and husband age differential</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt; 8 years</td>
<td>599 (28.4)</td>
<td>338 (56.4)</td>
<td>0.04</td>
<td>0.69</td>
<td>283 (47.2)</td>
</tr>
<tr>
<td>7-4 years</td>
<td>532 (25.2)</td>
<td>300 (56.4)</td>
<td>&lt;.001</td>
<td>0.02</td>
<td>242 (45.5)</td>
</tr>
<tr>
<td>3-1 years</td>
<td>545 (25.8)</td>
<td>311 (57.1)</td>
<td>&lt;.001</td>
<td>0.02</td>
<td>242 (44.0)</td>
</tr>
<tr>
<td>No diff or older</td>
<td>388 (18.4)</td>
<td>262 (67.5)</td>
<td>&lt;.001</td>
<td>0.02</td>
<td>204 (52.6)</td>
</tr>
<tr>
<td>Missing</td>
<td>47 (2.2)</td>
<td>14 (48.9)</td>
<td>&lt;.001</td>
<td>0.02</td>
<td>24 (51.1)</td>
</tr>
<tr>
<td>Total</td>
<td>2,111 (100)</td>
<td>1,234 (58.5)</td>
<td></td>
<td></td>
<td>995 (47.1)</td>
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Table 1: Crude Association between Outcomes and Exposures with Covariates (Cont.)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Category</th>
<th>Freq (%)</th>
<th>Chi-2 p-value</th>
<th>Cases (%)</th>
<th>Chi-2 p-value</th>
<th>Cases (%)</th>
<th>Chi-2 p-value</th>
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</thead>
<tbody>
<tr>
<td>Respondent and husband education</td>
<td>Less education</td>
<td>1380 (65.6)</td>
<td>0.51</td>
<td>809 (58.6)</td>
<td>0.45</td>
<td>661 (48.1)</td>
<td>0.097</td>
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<tr>
<td></td>
<td>More education</td>
<td>722 (34.4)</td>
<td></td>
<td>421 (58.3)</td>
<td></td>
<td>330 (45.7)</td>
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</tr>
<tr>
<td></td>
<td>Missing</td>
<td>9 (.43)</td>
<td></td>
<td>4 (44.4)</td>
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<td>4 (44.4)</td>
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<tr>
<td></td>
<td>Total</td>
<td>2,102 (100)</td>
<td></td>
<td>1,234 (58.5)</td>
<td></td>
<td>995 (47.1)</td>
<td></td>
</tr>
<tr>
<td>Husband's education</td>
<td>No education</td>
<td>546 (25.9)</td>
<td>&lt;.001</td>
<td>353 (64.7)</td>
<td>0.002</td>
<td>291 (53.3)</td>
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<tr>
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<td>Primary</td>
<td>618 (29.3)</td>
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<td>377 (61.0)</td>
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<td>295 (47.7)</td>
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<tr>
<td></td>
<td>Secondary</td>
<td>853 (40.5)</td>
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<td>41 (45.1)</td>
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<td>374 (43.9)</td>
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<tr>
<td></td>
<td>Higher</td>
<td>91 (4.3)</td>
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<td>32 (35.3)</td>
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<td>35 (38.5)</td>
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<tr>
<td></td>
<td>Total</td>
<td>2,108 (100)</td>
<td></td>
<td>1,233 (58.5)</td>
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<td>995 (47.1)</td>
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</tr>
<tr>
<td>Age at first marriage</td>
<td>10-17</td>
<td>662 (31.4)</td>
<td>0.66</td>
<td>385 (58.2)</td>
<td>0.7</td>
<td>296 (44.7)</td>
<td>0.239</td>
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<tr>
<td></td>
<td>18-19</td>
<td>465 (22.0)</td>
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<td>267 (57.4)</td>
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<td>222 (47.7)</td>
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<tr>
<td></td>
<td>20-22</td>
<td>545 (25.8)</td>
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<td>313 (57.3)</td>
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<td>259 (47.5)</td>
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<tr>
<td></td>
<td>23-39</td>
<td>439 (20.8)</td>
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<td>269 (61.3)</td>
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<td>218 (49.7)</td>
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<tr>
<td></td>
<td>Total</td>
<td>2,111 (100)</td>
<td></td>
<td>1,234 (58.5)</td>
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<td>995 (47.1)</td>
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Table 2: Correlation between Covariates

<table>
<thead>
<tr>
<th>Correlation (p-value)</th>
<th>Respondent's age</th>
<th>Respondent's education</th>
<th>Maternal BMI</th>
<th>Child age</th>
<th>Husband's education</th>
<th>Age differential</th>
<th>Wealth</th>
</tr>
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<tbody>
<tr>
<td>Respondent's age</td>
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<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Respondent's education</td>
<td>-0.24 (&lt;.001)</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maternal BMI</td>
<td>0.02 (0.38)</td>
<td>0.13 (&lt;.001)</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Child age</td>
<td>0.18 (&lt;.001)</td>
<td>-0.04 (0.09)</td>
<td>0.07 (0.002)</td>
<td>1</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Husband's education</td>
<td>-0.18 (&lt;.001)</td>
<td>0.59 (&lt;.001)</td>
<td>0.16 (&lt;.001)</td>
<td>-0.02</td>
<td>(0.28)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Age differential</td>
<td>0.25 (&lt;.001)</td>
<td>0.08 (&lt;.001)</td>
<td>-0.04 (0.06)</td>
<td>0.02 (0.39)</td>
<td>0.06 (0.01)</td>
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</tr>
<tr>
<td>Wealth</td>
<td>-0.08 (&lt;.001)</td>
<td>0.45 (0.001)</td>
<td>0.21 (&lt;.001)</td>
<td>0.03 (0.18)</td>
<td>0.41 (&lt;.001)</td>
<td>-0.04 (0.07)</td>
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</table>

Table 3: Correlation between Main Exposure Variables

<table>
<thead>
<tr>
<th>Correlation (p-value)</th>
<th>Decision-making</th>
<th>Attitudes towards violence</th>
<th>Experience of violence</th>
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</thead>
<tbody>
<tr>
<td>Decision-making</td>
<td>1</td>
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<td></td>
</tr>
<tr>
<td>Attitudes towards violence</td>
<td>0.062 (0.005)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Experience of violence</td>
<td>-0.123 (&lt;.001)</td>
<td></td>
<td>(0.172)</td>
</tr>
<tr>
<td>Variable</td>
<td>Category/Unit</td>
<td>Stunting</td>
<td></td>
</tr>
<tr>
<td>-----------------------------</td>
<td>---------------</td>
<td>----------</td>
<td>---</td>
</tr>
<tr>
<td></td>
<td></td>
<td>OR</td>
<td>95% CI</td>
</tr>
<tr>
<td>Decision-making</td>
<td>Per 1 SD</td>
<td>1.10</td>
<td>(1.00, 1.22)</td>
</tr>
<tr>
<td>Any Experience of Violence</td>
<td>Yes</td>
<td>1.17</td>
<td>(0.95, 1.43)</td>
</tr>
</tbody>
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**Interaction with Age of Respondent**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Category/Unit</th>
<th>Underweight</th>
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<th>Underweight</th>
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<th>Underweight</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td>OR</td>
<td>95% CI</td>
<td>p-value</td>
<td>OR</td>
<td>95% CI</td>
<td>p-value</td>
<td>OR</td>
<td>95% CI</td>
<td>p-value</td>
</tr>
<tr>
<td>Attitudes towards Violence</td>
<td>Per 1 SD</td>
<td>1.10</td>
<td>(1.00, 1.22)</td>
<td>0.06</td>
<td>1.00</td>
<td>(0.86, 1.16)</td>
<td>0.99</td>
<td>1.25</td>
<td>(1.08, 1.45)</td>
<td>0.003</td>
</tr>
</tbody>
</table>

*Adjusted for: respondent's age, BMI and education, child's sex and age, household wealth and area of residence*