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Enhancing the effectiveness of agriculture-to-nutrition pathways:

Key insights from a gender analysis of impact evaluation design

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Acronyms

ADB	Agriculture Development Bank
AGRICOLA	AGRICultural OnLine Access
AGRIS	International Information System for the Agricultural Science and Technology
BCC	Behaviour Change Communication
BMI	Body Mass Index
CGIAR	Consultative Group for International Agricultural Research
CSI	Coping Strategy Index
DANIDA	Danish International Development Agency (DANIDA)
DID	Difference-in-Difference
E-HFP	Enhanced Homestead food production project
F&BKP	Food and Business Knowledge Platform
FAO	Food and Agriculture Organization of the United Nations
HDDS	Household Dietary Diversity
HHFIAS	HH Food Insecurity Access Scale score
HHS	Household Hunger score
HKI	Hellen Keller International
IDDS	Individual Dietary Diversity Score
IHHD	Intra household dynamics
IILP	Integrated Improved Livelihoods Program
IFPRI	International Food Policy Research Institute
IOB	Policy and Evaluation Department, Ministry of Foreign Affairs, the Netherlands
IYCF	Infant Young Child Feeding
MAHFP	Number of Months of Adequate Household Food Provisioning
MCHN	Maternal Child Health Nutrition
MHHS	Mean Household Hunger Scale
NSA	Nutrition Sensitive Agriculture
RAIN	Realigning Agriculture to Improve Nutrition
RCDP	Rwanda Dairy competitiveness programme
SUN	The Scaling up Nutrition
UNICEF	United Nations International Children's Emergency Fund
USAID	United States Agency for International Development
WEAI	Women's Empowerment in Agriculture index
WFP	World Food Program
WHO	World Health Organization

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Abstract

This paper dives into past impact evaluations of nutrition sensitive agricultural programs to unpack the different approaches to how they analysed women's empowerment. It focuses on evaluation objectives, evaluation design methodologies and choice of indicators. The paper applies a women's empowerment lens to agricultural-nutrition pathways framework to understand how nutrition sensitive programs addressed women's role and influence (or lack thereof) in relation to key decision making moments along the pathways. These include decisions on what is produced, what is sold and how income is used, and how these influence what is consumed in the household and by whom. The household, and intra household dynamics, are the level that the analysis of the impact evaluations specifically looks at.

It explores how evaluations designs and project designs perpetuate implicit understandings of women empowerment and women's role in agriculture which influence the evidence generated on how women's empowerment matters for key pathways from agriculture to nutrition. It critically analyses how the choice of indicators used at impact and outcome level have implications for interpretations of how women empowerment may aid or hinder expected impact pathways from agriculture to nutrition. It especially looks at how women empowerment can be a key entry point to link agriculture with nutrition outcomes.

These findings are used to distil key recommendations for how nutrition sensitive evaluation designs can more effectively measure and create the evidence on how agricultural programs can contribute to nutrition, through women's empowerment. As the results have shown, women's empowerment is always an essential aspect to understand and address to create the link between agricultural programs and nutrition outcomes. Not only can this be achieved by including women's empowerment as an additional objective of the program, but women's empowerment can also be positioned as a means towards realising nutrition outcomes. It depends on the context and the starting point of the project, to what degree women's empowerment is desirable and considered needed. These lessons are important for future program design, implementation, monitoring and evaluation.

1. Introduction

There has been a growing momentum to address the multi-sectoral causes of undernutrition stimulated by the Lancet special nutrition issue (2013) and international initiatives (e.g. Scaling up Nutrition movement, Sustainable Development Goals). This has resulted in an increased appetite to move beyond an exclusive focus on understanding nutrition specific interventions towards a better understanding of measuring the impact of nutrition sensitive interventions, particularly those encompassing agriculture in contributing to nutrition security (Black et al., 2008; Ruel & Alderman, 2013, FAO, 2015ab, Webb, 2013). Yet the specific mechanisms in which agriculture contributes to nutrition outcomes remain a subject of much debate with the growing evidence that increased agricultural productivity does not automatically translate into improved household or individual nutritional status (Webb, 2013). This is of concern given that agricultural policies and development aid policies continue to heavily invest in programs striving towards improved food security and nutrition, yet fail to show significant impact on key nutrition outcomes such as stunting. Women's pivotal role at the interface of agricultural, nutrition and health pathways has been noted as a critical area to better understand in leveraging greater impact of agricultural programmes on nutrition outcomes (FAO, 2017; Quisumbing et al, 2014). It is in this context that there has been growing interest amongst Dutch policy makers and practitioners such as the International Research and Policy Evaluation Department (IOB) and the Netherlands Nutrition Working Group for greater coherence on Monitoring Evaluation and Learning (MEL) guidance and criteria on how to better measure agriculture nutrition pathways, particularly how gender and women empowerment mediates these pathways.

Several reviews linking agricultural interventions with improved maternal and child nutrition outcomes conclude that the available evidence base is weak (DFID, 2014, Ruel et al, 2013, Masset et al, 2012). This is attributed to poor program design without a clear Theory of Change (ToC) and methodological limitations due to weak evaluation designs and poor sample sizes, resulting in a lack of rigorous evidence (Ruel et al, 2017; Leroy, Olney et al. 2016). As a result, little is known about how agricultural interventions can contribute towards better nutrition, and effective ways of how to go about measuring this. This is a well acknowledged challenge given the complexity of nutrition sensitive programs which prioritize addressing underlying causes of malnutrition and involve long result chains and multiple pathways to make the links between improvements in agricultural productivity and nutrition outcomes. In response there has been renewed effort amongst practitioners, policy makers and scientists to better understand and measure how agriculture policies and interventions can be better leveraged to secure impact on a range of nutrition outcomes. This has led to multiple agriculture to nutrition impact pathways frameworks to support programs to better design and measure the links between agriculture and nutrition (Ruel & Alderman, 2013; Herforth & Harris, 2014; Malapit & Quisumbing, 2016; Meeker & Haddad, 2013). They highlight six main pathways from agriculture towards nutrition captured in Box 1.

Box 1: Six pathways through which agriculture impacts nutrition

1. **Food source** – Agriculture production leads to increased availability and accessibility of diverse food from own production
2. **Income from agriculture production and non-agriculture work**- Increased income from non-farm income and farm income by marketing of agriculture production could increase household capacity to purchase diverse foods
3. **Food prices**- impacted by agriculture policies through supply and demand factors and thus affecting the selling and purchasing capacity of farmers
4. **Women's social status and empowerment**- Women's role in decision making may hamper their influence on production and consumption results
5. **Women's time**- Women's involvement in agriculture could impact the time allocation for care practices or feeding of children in the household. Intensive workload from agriculture hampers their role as caretaker and vice versa
6. **Women's own workload and health and nutritional status**- Women's involvement and employment in agriculture can affect their own health and nutritional status because of longer working hours in degraded conditions on the farm as well as having a lack of resources to seek for health services

The six pathways highlight different processes operating at the individual, household, food market environment, health environment and enabling environment¹ that affect women and men differently. Understanding the gender dynamics of processes within the household (intra household dynamics) has been identified as key for understanding why the predominant agricultural pathways emphasised in agricultural interventions focused on increased production (pathway 1) or increased income (pathway 2) do not automatically translate in improved nutrition (Webb, 2013). Women's role at the 'nexus' of agricultural and nutrition and health is well recognised (IFPRI, 2011; UNICEF, 2011; van den Bold et al, 2013; Ruel et al, 2017) as evidenced by three of the above pathways specifically highlighting the critical role that women play in food and nutrition security. These emphasise how women's role and status (pathway 4), time (pathway 5) and workload (pathway 6) need to be considered in nutrition sensitive program design, implementation and evaluation. These are often referred collectively as 'women empowerment pathways' in an effort to support program designers and evaluators to understand how nutrition sensitive agricultural programs can both empower or cause harm to women (Herforth & Harris, 2016).

Women's role at the household level is given specific emphasis based on evidence that the nutritional impact of agricultural interventions depends on ultimately who is able to benefit from the intervention and how the intervention itself alters household resource allocations and the relative bargaining power of women and men in the household (Carletto et al, 2015). Moreover, evidence shows that the position of women in a particular context (at household, community and also regional and national levels) is influenced by gender norms in their environment which create opportunities as well as obstacles to produce food, to prepare and consume it, to get access to markets and/or to define the use of food and income at household level. In response, several key food security and nutrition reports recommend investment in women farmers and women empowerment as a guaranteed strategy to improve nutrition impact (FAO, 2017; FAO 2013; FAO & ADB, 2013; Herforth et al, 2012). This builds on decades of evidence emphasising women's control over discretionary income is known to improve child nutrition and evidence that agricultural projects with improved nutrition results can be linked to the active involvement of women (UNICEF, 2011; Leroy & Frongillo, 2007; Hawkes & Ruel, 2006).

In spite of the recognition that the three 'women's empowerment' pathways are critical for catalysing agricultural interventions nutritional impact, they remain the pathways least understood and most difficult to measure (Herforth & Ballard, 2016). Although there has been growing sophistication in the validation of nutrition and food security indicators, the identification of appropriate indicators to measure women empowerment, and by association how to measure changes at intra household level, remains a nascent and developing field (Ruel et al, 2017). To date there is no 'one approach' or coherence in approaches. It is in this context, that there has been increasing attention towards the design of more rigorous theory-based nutrition sensitive programs, which explicitly look at the agricultural-nutrition pathways of impact overall with a particular emphasis on developing a better understanding of how women's empowerment operates across these; and understanding what works and does not work in agriculture to improve nutrition (Leroy, Olney et al. 2016; Ruel et al, 2017). There is much to learn from past evaluations approaches to Nutrition Sensitive Agriculture (NSA) contribution to nutrition and their analysis of the mediating role of women empowerment in achieving impact on nutrition outcomes. The growing literature on women's empowerment and how you measure empowerment provides added value for understanding how gender dimensions of intra household dynamics mediate the different agriculture to nutrition pathways.

The purpose of this study is to provide insights and key lessons for Dutch practitioners and policy makers to advance the understanding of agriculture to nutrition pathways, focusing on how the gender dimensions of intra household dynamics and in particular women's empowerment play a

¹ The enabling environment refers to the food market environment (i.e. prices of food), natural resources environment and the health, water, and sanitation environment (Herforth & Harris, 2014).

key role therein. With this understanding, the study seeks to support improvement in the design of agricultural policies and programs to better leverage women empowerment across the agriculture-nutrition pathways to achieve impact on both nutrition and women's empowerment.

This study is structured as follows. Section 2 summarizes the methodology. Section 3 introduces the conceptual framework of the agricultural-nutrition pathways through an women empowerment lens. This builds on the current evidence on what is known about how women's empowerment operates across key decision making nodes along the agricultural-nutrition pathways, mainly at intra household level. Section 4 provides key observations from the synthesis of evaluations, providing an overview of evaluation objectives, evaluation design and indicators and implications to the evidence generated. Section 5 focuses on the analysis of implications to interpretations of women's empowerment and a discussion of the strengths and weaknesses of evaluation design for understanding how women's empowerment works through the pathways. Section 6 concludes with key recommendations for measurement of women empowerment through the agricultural nutrition pathways and highlights emerging promising approaches.

2. Methodology

The study was developed through two stages. It draws on a comprehensive secondary literature review of 49 resources comprising 30 empirical literature on agriculture-nutrition pathways, 5 papers on Women Empowerment in Agriculture in relation to nutrition and 14 impact evaluations² on nutrition sensitive programs since 2000 followed by a deep dive into 7 purposively selected nutrition sensitive agriculture projects.

- **Stage 1: Literature review.** This comprised a broad review of empirical literature and impact evaluations focusing on summarizing: a) current evidence on how intra household dynamics influence food production, purchase and food distribution and whose decisions affect household and individual nutrition, b) collecting insights from the impact evaluation on how the contribution to intra household dynamics to nutrition outcomes were measured.
- **Stage 2: Deep dive into impact evaluations focusing on measurement approaches from a women empowerment lens.** This comprised an in-depth analysis of seven purposively selected nutrition-sensitive projects with a women empowerment agriculture-nutrition pathways lens.

Stage 1 involved an in-depth literature review using keywords in the title in AGRICOLA and AGRIS (Bake, 2017 internal report). Evaluation reports and grey literature were obtained from websites of major donor organizations including IOB, OECD-DAC and IFDC, FAO, IFAD, IFPRI, the World Bank, ADB, IADB and 3IE and TANGO, SUN and SPRING. This also included five observational studies analysing the link between Women Empowerment in Agriculture Index (WEAI) and nutritional status of children. The search keywords in the title and abstract included: food security, impact evaluation, gender relation, women empowerment, food production, diet diversity, intra household dynamics, resource allocation, bargaining power, purchase, sales, decision making, labour and norms. The search terms narrowed the selection of agricultural sectors to programs prioritizing combinations of homestead garden and livelihood enhancement projects together with nutrition counselling rather than bio fortification programs or value chains projects. Stage 1 applied an intra household dynamics lens to understanding how gender affects food production, purchase and food

² The sample for the in-depth analysis of evaluations was determined by meeting the following criteria: Clear description of nutrition-agriculture intervention program and strategy, evaluations and reports articulating agriculture to nutrition impact pathways, evaluations and reports with either explicit nutrition outcome or as added on nutrition outcomes, evaluations and reports articulating at least on dimension of gender or intra household dimensions, suitable research design: Clear methodology, valid sample size, and sampling design, Generalizability and representativeness of data and results, Clear results and conclusion of the study.

distribution. This involved looking at four dimensions: access to and control over resources, decision making, gender norms and gender division of labour³.

Stage 2 further deepened the analysis of a sub-set of impact evaluations of seven nutrition sensitive projects using a specific ‘women empowerment lens’ to allow a more detailed analysis of measurement of gender dimensions of intra household dynamics along the agricultural-nutrition pathways. From these seven projects, nine documents were reviewed. This comprised a sample of five quantitative evaluations undertaken in the last five years, three follow up qualitative evaluations, and one process evaluation. The deep-dive purposively focused on a small sub-sample of evaluations to capture a breadth of different types of approaches to measuring how gender dimensions of intra household dynamics operate across agriculture-nutrition pathways to contribute to nutrition outcomes, in order to explore the strengths and weaknesses of different designs (See Table 1).

It is important to note that the different evaluations used the terms women empowerment and gender-and by association key dimensions of intra household dynamics- interchangeably. This is a reflection of the scant completed nutrition sensitive agricultural evaluations and lack of consistent and replicable approaches to measuring women empowerment (Herforth & Ballard, 2016; Ruel et al, 2017). Since the field of nutrition sensitive evaluations is constantly evolving, our sub-sample was limited to what was publicly available at the time of the research and to those available evaluations that provided the most detail about their approach of measuring women empowerment in the evaluations⁴. As a result, many of the newer generation of innovative projects in other agricultural fields with a more explicit focus on women empowerment pathways and measuring women empowerment were not included since these projects are still ongoing in the middle of implementation⁵. This will be an important area for more follow up work.

Table 1: Project overview

Project name	Location	Duration
Strengthening Household Ability to Respond to Development Opportunities (SHOUHARDO I & II)	Bangladesh	I: 3 years (2006-2009) II: 5 years (2010-2015)
Enhanced homestead food production project (E-HFP)	Burkina Faso	2 years (2010-2012)
Realigning Agriculture to Improve Nutrition (RAIN)	Zambia	4 years (2011-2015)
Nobo Jibon	Bangladesh	5 years (2010-2015)
PATHWAYS Program: empowering women in agriculture	Bangladesh, Tanzania, Mali, Malawi, Ghana	3 years (2013- 2016)
Integrated Improve Livelihoods Program (IILP)	Rwanda	5 years (2011-2016)
Dairy Competitiveness Program (RCDP II)	Rwanda	5 years (ongoing)

The findings of Stage 1 and 2 were used to formulate key insights and recommendations on measurement of intra household dynamics and women’s empowerment in nutrition sensitive programming and areas for follow up.

³ For more information on the application of the intra household lens see Eerdewijk & Danielsen (2015) and Verhart et al (2015).

⁴ During the time of our research, a number of new research reports have also emerged supporting this study’s key findings (Ruel et al, 2018; Leroy et al, 2016; Herforth & Ballard, 2016).

⁵ For more detail on new generation of nutrition sensitive agricultural projects measuring women empowerment through adapted versions of the Women Empowerment and Agriculture Index (WEAI), see the work of the GAAP 2 (Gender Agriculture and Assets Project) implemented by IFPRI and partners. See Johnson et al (2017) and <http://gaap.ifpri.info/2015/08/07/gaap2-2/>

3. Women's empowerment in the Agriculture-Nutrition pathways

3.1 The added value of a women's empowerment lens

The identification of three women's empowerment pathways (Box 1) has provided new opportunities to further understand women's critical contributions to nutrition in nutrition sensitive agricultural programs. However, there is a need for caution in treating the three women focused pathways as separate from each other (i.e. as stand-alone pathways) and separate from other agricultural nutrition pathways for three major reasons:

1. It risks leading to interventions that target women, without looking at the social relations women are embedded in. Rather, a social relations approach to gender entails looking beyond women to also include men in the analysis and intervention design that acknowledges the different roles men and women play, how their differential access to resources affects the different decisions women and men are able to make, and recognises how these are interrelated.
2. It risks looking at the household as a unitary unit, assuming resources are equally shared and decisions are made based on mutual discussion and agreement. However, intra household processes are dynamic and are essential to understand before interventions are designed. The intra household dynamics determine how roles are divided, resources allocated and how decisions are made around production, sales, consumption, health care etc. These dynamics are shaped by social and gender norms in a particular context. Women's empowerment interventions are not just an issue of training women, raising their awareness or reaching out to them. It requires a thorough analysis of the relations they are embedded in at different levels to determine what empowerment approach works best and why.
3. It risks losing an analysis of how the three different pathways are inherently linked and work at different levels to incrementally support or hinder each other. This means recognising that a shift at one node of the pathway may have implications for other nodes, which may have positive or negative impact on achieving positive nutrition outcomes.

The different ways in which women's empowerment is understood or interpreted reveals certain types of assumptions underlying the way change happens along the agriculture towards nutrition pathways summarized in Box 2.

Box 2: Assumptions about Women's Empowerment

1. Women are mainly mothers and are the only caregivers in the family
2. Women make decisions and do activities on their own, as if they are not influenced by others in the family and/or community
3. Women's increased knowledge and skills on how to produce food, leads to increased production of food, and therefore automatically increased dietary diversity in the family
4. Women's increased access to productive resources, increases the production of nutritious crops for sale and/or for direct consumption
5. Women's control over food crops, leads to the consumption of these by herself and by family members
6. Women's increased income (through agricultural training, access to finance, increased production), means automatically greater control of women over that income, which leads to expenditures on food and care practices, which together will lead to improved nutritional status
7. Women's knowledge on Infant and Young Child Feeding (IYCF) practices improves the diet of their children
8. All women are the same regardless of age, situation on life-cycle and other social markers (ethnicity, religion, wealth status) and have the same ability to manoeuvre decisions along the agricultural-nutrition pathways (i.e. they experience the same constraints)

These aforementioned risks of the current usage of the women's empowerment framework (pathways 4, 5, 6) led to the realisation that a more elaborated lens is needed to review current evidence from wider literature and impact evaluations. To respond to these risks, Stage 2 purposively took the decision to move beyond an intra household dynamic lens (used in Stage 1) to apply a more explicit women's empowerment lens building on the latest comprehensive review of current thinking on women's empowerment (Eerdewijk et al, 2017). The reason for this was twofold. Firstly 'women's empowerment' has been used as both a lens and approach to understand how gender affects the different agricultural nutrition pathways in the latest state of art thinking on nutrition sensitive agriculture (FAO, 2017; Ruel, 2017). Using an elaborated women's empowerment lens therefore supports a thorough grounding of this study's analysis within the broader literature from the field. Secondly, a women's empowerment lens allows for a more operational analysis focusing on strategies and interventions adopted by projects to empower women. Nevertheless, it is important to note that the intra household level is still considered the most important level of analysis, where the link between actual food availability and consumption, is (or is not) made.

In this study, we apply the women's empowerment lens drawing on a recent framework developed for the Bill and Melinda Gates Foundation (Eerdewijk et al, 2017). Here, the empowerment of women and girls is formulated as the "expansion of choice and strengthening of voice through the transformation of power relations, so women and girls have more control over their lives and futures" (Eerdewijk et al, 2017: 13).

At the heart of the definition are two components: women and girls *expansion of choice* (ability to make decisions and fulfil aspirations) and *voice* (being able to speak up and be heard) through the transformation of power relations. This understanding draws on Kabeer (1999) who links women's empowerment to their ability to make choices in the areas of their lives that matter to them: both the 'strategic life choices' and choices related to daily life. *Voice* concerns women's capacity to speak up and be heard, through taking part in both shaping and sharing in discussions and decisions, in public and private domains, that affect their lives. In this context, empowerment takes place through the interplay of three key elements: agency, resources and institutional structures (Eerdewijk et al, 2017; Yount, 2017).

Agency lies at the centre of women's empowerment. It refers to a woman's capabilities to act independently, to make their own free choices, and to implement those choices without rebuke (Kabeer, 1999). It is characterized by three expressions: decision-making (ability to influence, make and act on decisions), leadership (women's ability to lead and inspire social change) and collective action (women and girls gain solidarity to take action to advance their interests together). In a nutrition context, this can include key decisions regarding both production and consumption such as: what to produce, how to spend income, when to breastfeed, and what food to prepare.

Resources refer to what women have, own or use relative to men, as individuals or collectively. Resources include tangible assets (i.e. land, inputs, money) and intangible resources (i.e. critical consciousness, social capital, time, knowledge and skills, bodily integrity (Eerdewijk et al, 2017). In a nutrition context, the access and control over key productive and financial assets that enable agricultural production is considered an important determinant of women's ability to decide (agency) how they spend their time, what is being grown, and how income is used (to spend on food). Critical consciousness refers to the level of self-awareness amongst women, particularly their capacities to challenge disempowerment as agricultural producers or mothers, their awareness that change is possible in their current roles and they aspire for a change.

Institutional structures refer to the social arrangements of formal and informal rules and practices. Institutions can either limit or create opportunities for women through shaping and influencing agency (ability to decide) as well as the distribution of resources. They comprise formal laws and policies such as inheritance laws that influence women's ability to control resources like land and credit. In a nutrition context this affects what types of nutritious foods can be grown on what land.

It also include norms which refer to the collectively held beliefs of how women, men, girls and boys should behave and act in different life stages and social settings. In a nutrition context, examples include views of what constitutes a good mother, when to feed child, what types of work women and men can do. These norms influence people in different spaces, such as at household level, in the community, in the market etc. For example, norms influence decisions on the age of marriage and childbearing which have important implications on the intergenerational cycle of malnutrition as well as food acceptability and preference at household level. These norms can therefore be critical barriers for achieving mother and child health and nutrition.

These three elements (agency, resources and institutional structures) interact and are mutually reinforcing. As such, women's empowerment is multi-dimensional, dynamic and context specific comprising both a process and outcome. In the context of nutrition sensitive programs, the interaction of the three elements at intra household level are critical to understand. It acknowledges how the interaction influences how roles are divided, how resources are controlled and how decisions are made at household and production unit to influence nutrition outcomes in agricultural programs.

Literature on women's empowerment and gender equity also highlight two important cross-cutting and related concepts that have relevance in nutrition: life-cycle and intersectionality. **Life-cycle** acknowledges how age is a critical aspect that determines women's experiences of choice and voice over their life. Key life stages include infancy, childhood, adolescence, and adulthood and old age. In the context of nutrition, the reproductive age is a key stage (particularly with the emphasis on the 1000 days) to understand how women's voice and choice relative to men over key decisions and resources influences nutrition outcomes for themselves and the future generation of children because of the intergenerational transmission of malnutrition. **Intersectionality** draws attention to the fact that women are not a homogenous group and face different opportunities and constraints based on how their gender intersects with other social markers such as ethnicity, religion, cast and other social markers.

3.2 Women's influence in key nutrition related decisions: what does the evidence tell us

Measuring women's empowerment is an evolving field. The lack of validated and replicable women empowerment indicators used in nutrition sensitive interventions has been a constraint to the generation of evidence⁶. Nevertheless, there has been a steady growth in research and evaluations which do address different elements of women empowerment. Overall, the literature reinforces the importance of the **agency** dimension of women's empowerment focusing on women's key role in **decision making** moments along different nodes of the agricultural nutrition pathways matter for their own and their children's nutritional status. In particular, decision making in relation to the use and benefits of key **resources** are positively associated with increased agriculture productivity, child health and nutrition and overall household welfare (Meinzen-Dick et al., 2012; Quisumbing, 2010; World Bank, 2001). The decisions where the evidence suggests women play a key role towards achieving progress towards nutrition can be clustered as follows:

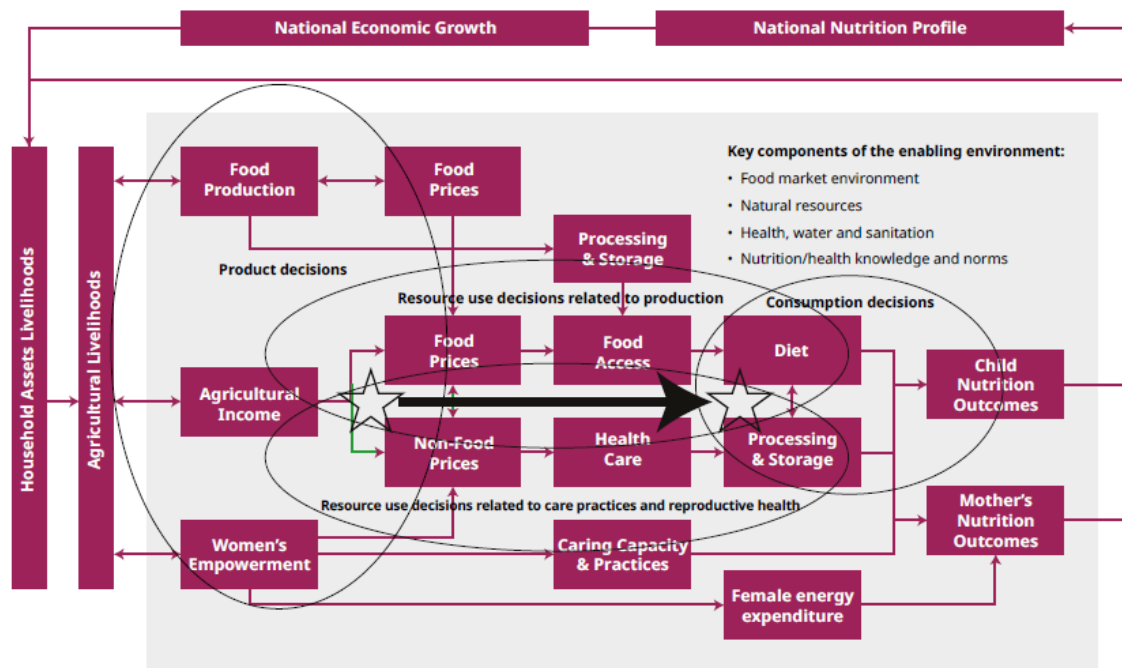
1. **Production decisions** regarding choice of crops to grow, use of farm inputs, to sell or to eat, the use of income at household level
2. **Resource use decisions** regarding time use for productive versus care work, reproductive health and feeding practices at household level.
3. **Consumption decisions** regarding to what food is prepared, how food is distributed, what food is accepted and actually eaten

⁶ This is currently being addressed by the ongoing adaption of the Women Empowerment in Agriculture Index (WEAI) to project level contexts (Ruel et al, 2017; Herforth & Ballard, 2016, Johnson et al, 2017). However, this is beyond the scope of this study as this is work in progress.

It is mainly at household and farm level where women and men make key decisions related to agriculture and nutrition. It is within the household and where the household overlaps with the units of production (farm level), where intra household dynamics influence how decisions related to production, time and resources use and consumption are interlinked. There are multiple contextual factors that influence how these decisions are made (such as access to markets, food prices, current policies in relation to commercialization, the availability of inputs etc.), as well as institutional structures referring to gender norms and values, but also national laws and policies.

Figure 1 below demonstrates the relevant nodes (illustrated as stars) where key decisions overlap (red circles) in the pathways framework from a women's empowerment perspective. The first node (Star 1) demonstrates the links between production decisions and resulting resources (food and/or money) and how these resources are used (and controlled by whom) in relation to how women and men decide who does what to generate income and to care for the family. The arrow demonstrates the crucial links between decisions determining what to do with income, decisions that determine who does what, and the decisions around who consumes. These culminate into the second node (Star 2) where production and consumption decisions are linked through decisions on how income is used and how time is allocated between different household members. It demonstrates the relationship between control over resources (time, money, productive resources) and a say in decision making greatly influences the nutritional status of people, and more specifically mothers and their children. The below sections provides an overview of current evidence on how improving the position of women in the three areas of decision making is essential to address the causes of malnutrition.

Figure 1: The agriculture-nutrition pathways framework and the key decision making moments



Source: Adapted from Herforth & Harris (2014)

3.2.1 Why women's empowerment matter in production decisions that determine choice of crops to grow, use of farm inputs, whether to sell or to eat, the use of income

According to FAO (2011), when women have increased access and control over land, labour and time, production could be increased by 20 to 30%. With increased production, women would be able to control the type of production, which could lead to the cultivation of major nutrient dense food

crops particularly fruits and vegetables. As women play an important role as care takers and household keepers, it is these type of decisions they are anticipated to influence (Kiewisch, 2015). According to Kadiyala et al. (2014), women's asset ownership in India predicts more decision making power on decisions what to produce, in what quantities, which has consequences for decision-making about their health.

The relative value of an agricultural product and its marketability are important determinants of whether a product is sold or consumed. Njuki et al.(2011a) argued that women have more control over poultry and smaller cattle like goats and pigs because they could be sold in small and local markets, whereas men take larger cattle to distant and larger markets. As high value crops and livestock are marketed by men, decisions around the use of revenues from these sales are also made by men (Alkire et al., 2013; World Bank, 2007). A study by Kiewisch (2015) concluded that although women provide maximum labour to produce cash crops such as cocoa in Cote d'Ivoire, they had no control over the income from cocoa sales. Similarly, in Kenya although women marketed their crops, they had to hand over the income to their husband (Eerdewijk & Danielsen, 2015).

Studies have shown however, when women's control of household income improves, this positively influences decisions on expenditures related to food, health, and care for children. Boros & Mcleod (2015) found that women use money earned from milk sales to buy food, meat, school books and family welfare commodities like clothes, soap, medical items and new assets for households. Njuki et al. (2011) analysed the various expenditures made by men and women and found that men spent 6% of their total income on food, while women spent 23% of their total income. This illustrates the inter-linkages highlighted in Figure 1 between asset ownership and decision making over the use of income and overlap with women's care taking tasks of women.

3.2.2 Why women's empowerment matter in resource use decisions regarding time use for productive versus care work, reproductive health and feeding practices

Reviews have shown that longer hours in agriculture for women leads to longer working days, less resting, sleeping and leisure time and reduced time for feeding and food preparation. This not only affects the woman's own health status (nutrition and stress levels) but also has implications for the nutritional status of other family members. Because of women's multiple roles as producers and reproductive role as mothers, the introduction of new agricultural programs may generate new risks to herself and other household members. When women are not able to negotiate how they spend their time because of an increased workload, this may jeopardize the quality of their infant and child care practices such as breastfeeding (Wyatt et al, 2013). With increased workload, women may not get help to do the cooking, or to perform necessary tasks on the farm, which may result in women being unable to breastfeed when needed and undertake other farm level tasks. If a woman is involved in farm labour, there are also potential occupational health hazards that they face, especially in relation to their reproductive roles.

According to a study in Ghana, women who were able to negotiate more time for household and care tasks, scored better on dietary diversity, as did their children. However, improved dietary diversity does not automatically translated into improved health status of women and children. When care practices and hygiene standards are not sufficient, food cannot be digested well. Also, heavy workloads of women and the children that help them, can be detrimental in relation to uptake of essential nutrients (Komatsu, Malapit, & Theis, 2015).

From a lifecycle perspective, there are also important workload and time-use implications to consider when a woman is pregnant or breastfeeding. Early and frequent pregnancies may deplete a mother's nutrient reserves, which in turn can reduce the child's access to nutrients during gestation and through breastmilk. This increases the risks that children have a low birth weight, suffer from stunting during early childhood, have impaired cognitive development and lower school performance and become less healthy and less economically productive adults. These examples show the importance of addressing the overlaps highlighted in Figure 1 between the different

women empowerment pathways. It illustrates how the nodes between women's time use intersect with her workload along the production pathways to influence both her own health status and the nutrition status of other household members, particularly children during the first 1000 days. Women's time use and decisions around their health and in particular reproductive health, are essential dimensions of women's empowerment which may determine a woman's ability to contribute to family nutrition which need to be considered in the design of nutrition sensitive agricultural programs.

3.2.3 Why women's empowerment matter in consumption decisions regarding to what food is prepared, how food is distributed, what food is accepted and actually eaten

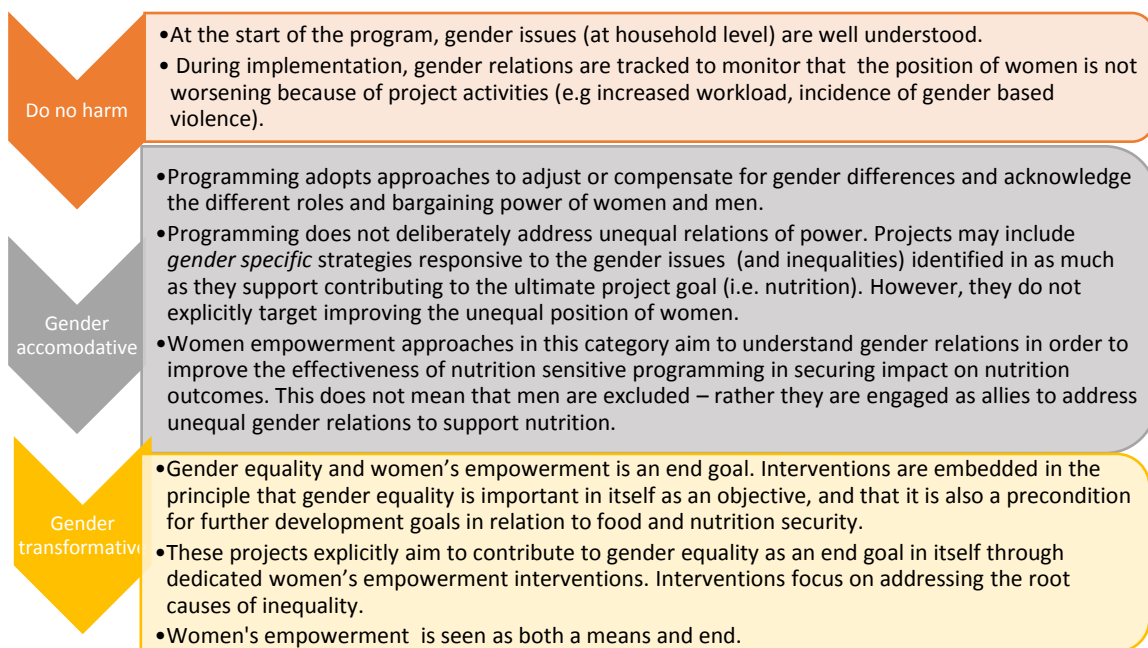
There are several factors that influence decisions around who eats what and why. One is that some people favour certain types of food (food favouritism), a second concerns the social and gender norms that influence food distribution, acceptability and preference. Gomna & Rana (2007) study on fish and meat consumption in Nigeria's fishing communities showed that men received more and better pieces of fish than others. The women who distributed the food stated that their husbands might be embarrassed if given the fish head or tail.

Consumption patterns in households are also determined by food preferences and acceptability of certain types of food. For example, a study by Noack & Pouw (2014) illustrates how food taboos, preferences and traditions mediate decision-making processes on food consumption within households and also change over time and at different stages of lifecycle.

3.3 A continuum of gender equality programming

The above evidence highlights the necessity of understanding gender dynamics at the household level before interventions are designed. During the intervention design stage, there are different ways to address gender issues at the household level and depending on the focus of the interventions, and whether or not the projects focus on women's empowerment. The level of engagement of a project in gender and women's empowerment can be guided by the following gender equality continuum of different strategies to support the design of more gender aware programming (Figure 2). In practice these strategies overlap and are not as clear cut as described. The programs that were looked at in this review used combinations of the above strategies.

Figure 2: Gender equality continuum



Source: Interagency Gender Working Group (2009), USAID (2012)

4. Observations: Synthesis of impact evaluations

This section introduces the different nutrition sensitive agriculture projects evaluated, focusing on the main impact that these projects tried to achieve and the type of interventions used to achieve this (Table 1). The analysis focuses on how women's empowerment has been addressed in both impact goals formulation and interventions design. Specific emphasis is given to how women's empowerment at household level was addressed and whether intra household dynamics were understood. This is followed by an analysis of how women's empowerment was measured in relation to achieving impact on nutrition outcomes, focusing on the overall evaluation design and choice of indicators. It discusses the implications of the choice of indicators to the evidence that was generated on women's empowerment and its role to achieve nutrition outcomes in agricultural programs.

4.1. Nutrition sensitive project objectives and interventions

The majority of projects reviewed (e.g. Shourhardo II, E-HFP, RAIN, Nobo Jibon) included the overarching objective to achieve impact on improving the nutritional status of children under 2 (U2) measured as reduced prevalence of stunting and wasting followed closely by reducing household food insecurity (measured as HFIAS, months of adequate food provision, household hunger score). At outcome level, projects sought to achieve impact on household dietary diversity, mothers nutritional status and health, increased diversity of agricultural food production, and increased and improved practices of IYCF (See Annex 1 for detail on specific formulations of the programs objectives at impact and outcome level).

The majority of projects adopted nutrition sensitive intervention design with an emphasis on increased agricultural production and income as a means to increase food availability and access in the household. Nutrition specific and women empowerment interventions were either layered into the design through stand-alone interventions or integrated across the packages. Also, some programs targeted women specifically, interpreting this as their effort to address women's empowerment.

4.1.1 Nutrition sensitive: increased production and income types of interventions

Most of the projects reviewed included interventions that address both food production and agricultural income as a means to achieve nutrition outcomes (diverse diets) and impact (stunting/wasting) (See Annex 1).

Interventions focused on increasing **food production** typically involved asset transfers of agricultural inputs (equipment, seeds/samplings of nutritious food items, small livestock, fertilizer), linkages to service providers in government and the market and training on agriculture techniques. Several projects include production interventions specifically for women focused on homestead production projects/kitchen gardens aimed at promoting the diverse production of vegetables and fruit and sometimes small animal husbandry (e.g. E-HFP, RAIN). These interventions targeted women, assuming that women are able to control the use of that piece of land, and that they also control the use of the products.

Interventions focused on **income generation** typically included an asset transfer (Income Generating Asset: IGA) as well as an associated livelihood training (often linked to on-farm/off-farm activities related to cash crops, fisheries, income generating activities of homestead development, or value-chain enhancement). It was anticipated that income generated will be spent on food to improve the diet of household or non-food expenditure (e.g. medicines, food supplements, transport for health seeking behaviour) translating in improvements in health status. This was often supported with linkages to financial services (Village Loan Savings Associations (VLSA), self-help savings groups) and financial literacy training (e.g. RCDP, ILLP, Pathways). Both Nobo Jibon and

Shouhardo delivered income generation interventions at household level across different wealth groups (extreme poor, homestead poor) regardless of the recipient⁷.

In Shouhardo, the financial services component deliberately targeted women as a means to enhance their control over income. This was also the case in RCDP, ILLP and Pathways where the main focus was on the income generation for women, as a means to increase women's access to income through formal channels of cooperatives and loan associations or through upgrading in the value chain. In Pathways, emphasis was also given to using value chain approaches to address systemic failures that limit women's access to inputs, services, finance and output markets so they can increase their access to income. In RAIN, E-HFP, Pathways also adopted an approach to enhancing women's access to income through targeting women directly through all interventions related to income generation.

Target groups

As the above shows, some of the production and income related interventions focused intentionally on women. However, when the interventions focused at the **household level**, it was noted that additional social categories were distinguished to help targeting, and that the type of support was tailored to these different categories. Often, **wealth criteria** were used. For example, in Nobo Jibon three wealth categories were distinguished:

- extreme poor (landless and limited productive assets)
- homestead productive poor (some land and productive assets) and
- productive poor (productive assets and moderate amounts of land)

By using wealth criteria to select households female headed households automatically became the main target group in the extreme poor and homestead productive poor households because of their lack of productive assets. Interventions for the extreme poor women focused on increasing income through the provision of assets to set up small businesses for income generation (e.g. sewing machines). The homestead productive poor, were provided with asset transfers to support production (e.g. crops, equipment, inputs) which they could consume directly as well as sell for income. However, the productive poor were mainly male headed households, resulting the male head of household being targeted. They received training and market linkage support as a way to generate income.

In summary, the wealth categories for targeting household level become a default mechanism of targeting and benefitting women and men individually for different types of interventions. As result, because the interventions focus on the farm level (production unit), they do not intentionally engage with intra household dynamics nor how these affect the overall impact of the interventions for women and men differently. Interestingly, nutrition criteria were not used to target the production and income related interventions.

4.1.2 Nutrition specific: maternal and child health nutrition, health and nutrition counselling in the context of agricultural programs

The interventions focusing on agricultural production and income generation, were often used as a platform to deliver nutrition specific interventions through adapted versions of Maternal Child Health Nutrition (MCHN) packages and different forms of nutrition counselling. This is a common strategy for nutrition-sensitive programs to achieve impact on nutrition.

The **MCHN interventions** mostly targeted mothers who were pregnant or lactating, or had infants under two or five and infants (U2/U5) as the key recipient. They included a mixture of interventions comprising food rations and supplements for mothers and infants (Iron Folate, Vitamin A, de-

⁷ Whilst their nutrition-specific interventions targeted women under the MCHN package and included stronger nutrition counselling package.

worming) as well as linkage to health services (ante-natal and post-natal care), growth monitoring, together with counselling to improve both the mother's and child's health status.

The **nutrition counselling interventions** also mostly targeted women who were pregnant and lactating, or women in households with children under 2. Counselling focused primarily on increasing their knowledge of Infant Young Child Feeding Practices (IYCF) and was delivered through specific 'courtyard sessions' administered by health workers or specific cadre created under the project who are separate from the cadre providing services under agricultural production. For example, in RAIN nutrition counselling was provided by Community Health workers, whilst in E-HFP, two providers were used: older women as well as Community Health workers.

Target groups

It was noted that not all evaluations were consistent in explaining whether nutrition counselling was only delivered to 'women' of the household as opposed to other household members. In E-HFP, the emphasis on counselling focused on mothers primarily. RAIN made more explicit mention that special 'gender trainings' were provided to women group members and their husbands focusing on the link between gender and improved nutrition, highlighting importance of husbands providing land for homestead gardening, assisting with household chores and supporting women to visit health centres. Shouhardo also included dedicated sessions for 'men' focused on providing care to PLW and children below 2 emphasising the importance of sharing/reducing workload, assisting with chores in household, ensuring pregnant women eat sufficient food and supporting health facility visits.

4.1.3 Women's empowerment focused interventions

Amongst the projects reviewed, the degree of explicit emphasis given to 'women empowerment' depended on how the project was designed from the start; meaning whether a gender accommodative approach was taken to women's empowerment (as a means to an end) or whether there was an effort to be transformative (women's empowerment as an end goal).

Only one project (Shouhardo) clearly delineated a separate 'women empowerment' intervention package, whilst two projects (RAIN, Pathways) embedded it through the entire project approach (cross-cutting) in an effort to be more transformative (Figure 2). Shouhardo positioned women empowerment as crosscutting but also states its Economic Knowledge and Transformative Action (EKATA) women's group⁸ as the main vehicle for women's empowerment. It was also supported by a women focused self-help savings group, as a means to support the economic empowerment of women, and at the same time to increase women's decision making power within the household, by discussing issues of gender based violence, educational entitlements, leadership skills and other types of entitlements.

The other projects integrated a gender and/or women's empowerment approach throughout the interventions:

- RAIN sought to embed a women empowerment approach (labelled as its gender intervention) by targeting women throughout all interventions and integrating discussions of gender throughout all its extension material and including targeted orientation for implementing staff on gender.
- The CARE Pathways project focused on transformation of gender relations at intra household level, by engaging both women and men within targeted households. In each country it included context specific programs to engage men and boys to advance women's empowerment.

⁸ This consists of a group of 20 women and 15 adolescent girls who meet bi-weekly at a community, to discuss issues around gender based violence, educational entitlements for women and girls, build women's leadership, advocacy and literacy skills, consciousness-building around women's rights (dowry, early marriage, divorce and violence against women).

- Some programs (e.g. Shouhardo, RAIN) also integrated specific ‘empowerment’ sessions within the nutrition Behaviour Change Communication (BCC) targeting both women and men aimed at promoting more joint decision making within couples, or other household members to support women to practice key decisions that impact on nutrition.
- Also interventions focusing on the community are recurring, through community dialogues targeting leaders and elites addressing institutional structural dimensions related to harmful gender norms and gender equality issues (e.g. Pathways, RAIN).

4.1.4 Linking agriculture to nutrition interventions

In summary, many of the agriculture (*nutrition sensitive*) and nutrition (*nutrition specific*) interventions in the sample were not directly integrated or aligned. Overall it was found that for agricultural focused activities, men and women were targeted separately with different types of interventions, based on their wealth status linked to their access to resources. In contrast, many of the classical nutrition specific programming such as MCHN targeting women ran in isolation of the agricultural production and income interventions which mainly benefitted men. Nobo Jibon and Shouhardo included dedicated MCHN packages in their programs, but the target groups for these packages, did not necessarily overlap with households that also received agricultural and income generation packages. At the other end of spectrum were programs that did not include any nutrition related interventions, yet made assumptions that agricultural productivity or increased income would be spent on purchase of nutrition food. For example, RCDP focused on income generating activities, with the assumption that increased income would automatically lead to nutritional benefits.

This shows how the dynamics within the household, remain a black box in both cases. The nutrition specific interventions targeted women intentionally, without looking at intra household dynamics and how these influence production and consumption outcomes and the nutrition sensitive interventions completely overlooked intra household dynamics with the focus on wealth status.

Where linkages were observed between nutrition specific and nutrition sensitive interventions, it was through:

- Integration of nutrition messages in the training on agricultural production and livelihoods for men in the same program (e.g. Nobo Jibon)
- Interventions targeting men and women from the same household through sessions on gender and inviting men for nutrition sessions
- Integration of agricultural as well as nutrition messages into Behaviour Change Communication (BCC) messages disseminated throughout the program

Women’s empowerment intervention packages at times were observed as being better able to align the nutrition and agriculture interventions through linkages mentioned above. However, these were restricted to a certain type of woman, targeting women at a certain point of their lifecycle when they were mothers (i.e. when pregnant, lactating, or with children U2). In contrast, the commercial oriented agricultural activities targeted men⁹. Women empowerment interventions included interventions (e.g. community dialogues, or awareness sessions targeting both women and men at different stages of lifecycle) that intentionally addressed underlying gender norms at household and community level, and through this, explicitly sought to make a stronger link between agriculture and nutrition outcomes. These are the interventions in the sample that showed the most potential for achieving progress on both women’s empowerment as an outcome as well as improved nutritional outcomes.

⁹ Given the search criteria and availability of completed evaluations at time of research, the sample was not able to include learning from innovative approaches to empowering women in nutrition sensitive value chain investments which is new area of nutrition sensitive programming which is developing. This is an area that merits more follow up.

4.2. Positioning women's empowerment in impact evaluation design

Women's empowerment was addressed in the evaluation design in different ways, depending on whether and to what degree measuring women's empowerment was conceptualised in the program design stage (See Section 4.1)¹⁰. The types of interventions as well as the main purpose of the evaluation, influenced the choice of evaluation design, indicators and data collection instruments. In the review, evaluations sought to measure women's empowerment for different purposes related to understanding how the project contributed to the following:

1. Women empowerment as an end goal (in addition to children's nutritional status as the main impact)
2. How women's empowerment (as a whole, or different elements of empowerment) contributed to improving children's nutritional status as a mediating factor
3. How a specific labelled set of 'women empowerment package' of interventions impacts nutritional status of children

4.2.1 *Women empowerment as an end goal*

Four evaluations included a specific objective to understand the overall impact of the program on women's empowerment as a result (e.g. E-HFP, Pathways, RAIN, IILP/RCDP) in addition to progress on nutrition indicators (See Annex 2).

Two of these (e.g. E-HFP and RAIN) included a counterfactual design¹¹ (See Annex 2). RAIN focused on agricultural only versus agricultural plus nutrition interventions (which incorporated elements related to women's empowerment) to analyse the overall impact of program on main impact indicator: stunting (two treatments versus a control) on secondary outcome indicators, including women's empowerment. In contrast, E-HFP focused on the impact of BCC strategy delivered to mothers of children under two by older women versus same package delivered by health committee members to explore if this had impact on stunting and women's empowerment.

Whilst experimental Randomized Control Trials (RCT) are often perceived as the gold standard of impact evaluation design, none were used to attribute the impact of the project on women empowerment, nor how a women empowerment package integrated into a nutrition sensitive project achieved progress on nutrition, nor how women empowerment interventions worked through different pathways.

4.2.2 *How evaluations assess mediating role of women's empowerment to nutrition*

Three evaluations focused on understanding components of women's empowerment in relation to underlying determinants of nutritional status of children, to explain how different pathways work (e.g. Nobo Jibon, E-HFP, RAIN).

Our review revealed that it was more common for evaluations to rely on quasi-experimental or non-experimental designs. Different statistical analyses were used to make the link between different elements of how women's empowerment contribute to changes in nutrition. Non-experimental designs of Nobo Jibon and CARE Pathways focused on descriptive analysis of baseline and endline comparison of key impact indicators. This limited both the rigor and the ability of the evaluation design to provide a narrative of linkages across the agricultural-nutrition pathways. It also implies that the evaluation over-estimates the impact of the program and fails to analyse the impact of other external factors in the areas.

E-HFP's follow up observational study and process evaluations of IILP/RCDP used mixed methods to prioritize understanding the linkages between decision-making moments along the different agricultural-nutrition impact pathways. E-HFP combined impact evaluation with qualitative research to understand women empowerment along the production pathway. It focused on the interaction

¹⁰ As noted in the methodology, many programs used the terms gender and women empowerment interchangeably.

¹¹ The counterfactual, often referred to as the 'control group' is used in evaluations to understand what would have happened in the absence of a program. It often describes a group who has not received the intervention

between institutional structures related to community norms on women's land ownership and how this affects women's decision making on what can be produced. IILP and RCDP II explored the impact of project engagement on care seeking and care giving practices and women's decision making about how income is used and consumption practices within the household. As such it was more focused on *how* and *why* different dimensions of women empowerment inter-relate to have an impact on nutrition along the impact pathways.

A more comprehensive narrative of how projects address women empowerment along the agriculture-nutrition pathways was made through the use of complementary qualitative evaluations. Both Shouhardo and Nobo Jibon included a follow up qualitative evaluation to provide context and in-depth understanding of the results of the quantitative impact evaluations. Specific attention was given to understanding how projects contributed to gender and women empowerment in relation to work and income, decision making, mobility, harmful gender norms (child marriage, dowry) and domestic violence as well as information on unintended consequences. References to women's agency in relation to key decisions around production, use of income and time use were discussed in more depth. How these impact on nutrition outcomes, particularly diet were not explicitly linked. Rather, decisions that impact upon consumption were restricted to the discussion of evaluation results on Maternal and Child Health and Nutrition where women's practices of IYCF and food intake of mothers during pregnancy.

4.2.3 Understanding the impact of a women empowerment intervention packages on nutrition

Only one evaluation sought to understand how its dedicated transformative women empowerment package impacted progress on nutrition indicators (e.g. Shouhardo's EKATA component). Shouhardo used propensity score matching to look at average effect of treatment across the four types of interventions (one of which was a women's empowerment package) on underlying determinants of nutrition. This is in contrast to RAIN which sought to understand the impact of agricultural only versus agriculture plus nutrition package, without being able to dilute the impact of including women empowerment as an approach that was embedded across all its interventions. We observed a noticeable absence of analysis of specific implementation modality delivery models and how 'women empowerment interventions' work in practice.

4.2.4 Data collection methods

Quantitative data collection methods were the main method to collect data in impact evaluations. Access and control of key productive assets as well as level of decision making (joint/sole) was collected using predominantly quantitative questionnaires administered to primary care-giver of children (often women as they were the main target beneficiary).

The qualitative evaluation of Shouhardo and Nobo Jibon, process evaluation of IILP/RCDP, follow up study of E-HFP included mixed methods asking both women and men respondents used semi structure surveys and FGD to explore in more detail the interactions between the different nodes of decision making that might influence how they translate into improve nutrition outcomes. For example, E-HFP explored how changing degrees of access and control over ownership of assets (land) led to more decision making power of women over what was produced. They also looked at how community norms positively reinforced more acceptance for women to access land for their own production.

4.3 Impact and outcome indicators used to measure women's empowerment

Close analysis of indicators used in the evaluations to measure women empowerment at impact and outcome levels provide insights into how projects have measured women's empowerment as an end goal as well as how they interpret women's contribution to nutrition along the pathways (See Annex 3 and 4). The choice of indicators used along the different decision making nodes of the agriculture nutrition pathways illustrate how women's empowerment is interpreted. They have implications for what evidence is generated on the role of women's empowerment in achieving impact on nutrition.

Five evaluations used overall composite indices to report on progress on overall women's empowerment (CARE Pathways, RAIN, Nobo Jibon, E-HP) as an end goal. Only RAIN included sub-indices for different domains. When applied to the agriculture nutrition pathways framework, the review revealed trends in how women empowerment was measured at different nodes of the pathways and how the links were made to nutrition outcomes. It is important to note, that none of these indicators were documented as being expert-validated indicators.

4.3.1. Indicators related to women's empowerment in production decisions

The majority of evaluations used indicators on **women's access and control over assets** to explain how the level of access (joint/sole) to *resources* are linked to women's influence over decisions (joint/sole) on what to produce and for what purpose and who decides on how the benefits of production are used. The key resources include women's access to productive resources (land, household assets) and credit.

Indicators captured **women's ability to decide**: a) what is grown on land and b) what agricultural produce is used for (i.e. whether they can sell field crops, and own produced fruit, vegetables, or whether it is kept for home consumption). For example, RAIN's women empowerment in agriculture score asked women about the level of their decision making on spending money from sale of agricultural products and over what can be done with the different types of crops grown (field crops, food crops). Other evaluations did not go into detail about the types of decisions, rather they used indicators of women's overall influence over productive decisions (e.g. CARE Pathways).

Many evaluations also included indicators on the level of women's influence in decision making on purchase decisions (joint/sole) and for what purpose. The latter often falls into two categories: food expenditure (food products, special food for children) and non-food expenditure (medicines for woman and children). The level of detail varied across the evaluations. E-HFP asks about women's ability to influence purchasing decisions more generally, whilst RAIN unpacks the types of purchasing decisions to 12 types of decisions. Broadly, most evaluations focused on how women's control over income led to more control over purchase of non-food goods that benefit health of children (e.g. health expenditure). Few evaluations actively explored how the interventions changed women's ability to influence how income is used, and how this in turn translated into better food consumption.

Interestingly, indicators on the quality of **spousal communication** and **levels of social support** are good examples of indicators measuring intra household dynamics as they attempt to provide a narrative of how they may interact with women's relative influence over use of income from what is produced (e.g. RAIN, CARE Pathways, E-HFP). Some evaluations collected data on women's access to social networks and support, mobility to healthcare provider/hospitals, mobility to village meetings or any other social meetings. In some cases, this was linked to women's influence (ability to decide with or without husband) on their mobility overall and as well in terms of ability to travel to different locations and to meet with different people. Measures of women's mobility (freedom of movement) were often used in relation to health seeking behaviour (ability to access to health care) or in relation to bargaining power and ability to access credit. Some evaluations linked indicators of participation in income generating activities to improvements in women's mobility. Few made a link to mobility of markets, but this is a reflection of the sample reviewed.

However, within the evaluations reviewed, there was limited discussion of how the availability and prices of specific foods in the market, and women's mobility and access to the market might impact their decisions on what foods to purchase and consume. Only the RCDP/ILLP process evaluation emphasised affordability of food being an important determinant of the purchase of nutritious food. Whilst own production can fill a gap, it does not address all needs for a diverse balanced diet of a family. The market environment (i.e. food prices, proximity to market, women's access to market) also influences the ability of women and households ability to buy and sell in the market. Whilst our analysis is restricted to the sample, the emerging literature on nutrition and value chains and food systems has much to offer to unpacking this area in further detail. For a recent review on

analysis of food value chain pathways and impact on vulnerable groups, see Maestre et al (2017) and Gelli et al (2015).

Evidence generated

Evidence generated through the reviewed evaluations confirmed wider literature's findings (Meizen-Dick et al, 2012; Ruel et al, 2017) on **access to land for women** as an important precondition for supporting the increased production of nutritious food (vegetables and fruit) (e.g. E-HFP, Nobo Jibon). Moreover, as production increased, and there were chances to generate income, this had a catalysing effect on women's empowerment elements.

- In the E-HFP project, as women increased food production and income generation from surplus sales, it served to change norms about women owning land for own production, which further enhanced access for more women to land to increase production.
- In RAIN, E-HFP and Shourhardo, increased agricultural production and income generation by women 'smoothened' relationships with spouses, which facilitated more bargaining power of women leading to more harmonious 'joint decision making' on how the benefits of agricultural production could be used.
- In RAIN, women reported they also had more decision making choice over which foods could be grown and more influence (decision making power) over how the crops could be used.

Evidence from the impact evaluations also shows that **mobilization of women into groups** was an important vehicle for the uptake and practice of new skills and knowledge on nutrition by women. Both Shouhardo and RAIN highlighted the value of collective organisation of women through delivering training as well as nutrition sessions in groups as a means to enhance social capital. This has a catalysing effect of acting as an important precondition for increasing women's access to resources (i.e. information on optimal nutrition practices) as well as control over how these resources are used.

- In Shouhardo, the EKATA groups approach was identified as being instrumental for leading to collective action on enforcing laws addressing harmful gender norms (e.g. child marriage). This was linked to building up social capital and confidence amongst women to act on new skills and knowledge and speak up on key areas of women's rights.
- Shouhardo and Nobo Jibon highlight the value of self-help savings schemes targeting women as a way to enhance women's control over income. Shouhardo further demonstrated how training on financial literacy targeting women improves women's influence over what is purchased. Interventions that promote increased mobility of women (i.e. to go to the market) have shown that women have more control over how income is used because they no longer have to go through their husbands or a middle man, to purchase goods. However, how this translates into better nutrition outcomes through greater influence of women over what types of food is purchased and who consumes what in the household is less clear and requires further exploration.

4.3.2. Indicators related to women's empowerment and resource use decisions

Indicators on labour and time use of women were not regularly collected, with the exception of three evaluations (CARE Pathways, RAIN, IILP/RCDP). There was no standard indicator on what types of labour is done by men and women in the evaluations. Time spent on any activity or leisure time was used as a proxy indicator for labour for men and women used to make a connection to impact on caring capacities. Evaluations that did collect data on time-use, used these in relation to analysing the implications in relation to the adoption of IYCF practices and health seeking behaviour (discussed below). Few evaluations (IILP and RCDP II) from this sample looked at unintended consequences in terms of how engaging in agricultural production may hamper women's child care time, women's influence on decision making in relation to this IYCF and overall caring capacity.

However, some evaluations with explicit women empowerment packages also captured data on the influence of gender norms regarding perceptions of women's appropriate time use in relation to key gender roles. For example RAIN's **perception of equality score** collected data on perceptions of whether women can work outside home, and if men could help with daily tasks. Yet this was asked to women, and was not cross-checked with husband's perceptions. CARE Pathways also asked about perceptions of gender equitable norms on roles in the household.

Some evaluations explored the role of the modality of intervention delivery for the uptake and practice of new knowledge/technology in relations to women's ability to decide on how to invest time in reproductive or productive activities. Shouhardo highlighted the value of the women's group (EKATA) as an important safe space for women to learn about their rights to support them to act on the new knowledge gained.

Evidence generated

Because there was limited use of quantitative time-use indicators used in the sample of evaluations, the evidence on how agricultural production and income generation activities affect care practices was limited. The use of qualitative methods (Shouhardo, Nobo Jibon, and ILLP/RCDP) were able to explore this in more depth. Links were made from women having greater access to income, being able to afford modes of transport to invest in care-seeking activities. There were also reports of men becoming more engaged in care giving activities and supporting pregnant women with workloads. It is important to note that this is an area that is acknowledged by broader literature as being important to monitor in nutrition sensitive agriculture programs (Wyatt et al, 2015; Ruel et al, 2017).

4.3.3. Indicators related to women's empowerment and consumption decisions

To understand how these key decisions translate into improved nutrition outcomes, it is important to revisit the main indicators used to measure nutrition at impact and outcome level within the sample (See Annex 3). These illustrate how the reviewed projects interpret women's role (and implicitly their interpretations of women's empowerment) in influencing decisions on what is consumed at household level, and particularly amongst the nutritionally vulnerable target groups. Overall, we noted that this is where more expert validated indicators were used. The impact evaluations reviewed confirm nutritional status for children (measured through anthropometric indicators such as stunting and wasting) as the most popular overall impact indicator used across the projects.

At outcome level, indicators related to **food consumption and diet** were the most popular. Dietary Diversity Scores (DDS) at household level or individual level for children (6-23m) or mothers were the most commonly used indicators to express progress on nutrition. Often, DDS was used as a proxy indicator of food access at the household level or proxy of micronutrient intake at the individual level focusing on children of certain age and mothers. Individual DDS were mostly used to understand women's and children's food consumption at both impact¹² and outcome level of the program to understand how the projects enhanced the micronutrient adequacy of diets of vulnerable household members. However, no evaluations attempted to distinguish how DDS varies across different types of women according to different stages ages, nor compare how women or girls DDS differ in relation to men and boys. Rather, DDS scores were reported for women generally (not according to different age groups, or other social markers (religion, household type)). For children's diet (measured as Minimal Acceptable Diet, Minimum Meal Frequency for children aged below 2), the analysis along pathways tends to focus on tracing the relationship between IYCF practices and level of knowledge of care givers as one pathway.

Indicators of food access and diet quality and diversity were predominantly used to make links to nutrition outcomes for vulnerable groups. Other proxies for **food access** included household level indicators of food security such as Adequate Household Provisioning, and Household Hunger

¹² When diet indicators were collected at impact level, these were usually also in addition to anthropometric indicators of nutrition (See Annex 3)

Scores, and Coping Strategies Index. Here, links were made to women's level of access to productive assets, and their influence over decisions on income.

IYCF indicators were used at both impact and outcome level as the main indicators to explain the impact of the inclusion of MCHN and nutrition counselling interventions to improvements on mothers' and children's diets. For instance, three programs (e.g. Nobo-Jibon, Shouhardo, E-HFP) included IYCF as impact indicators. All three used either change in the proportion of households adopting IYCF or difference-in-differences (DID) estimates from the baseline-end line on changes on IYCF practices. Few evaluations (E-HFP and IILP/RCDP) looked at consumption of different food groups within the household amongst different members in relation to individual food consumption, focusing on the mother. In addition, most interventions and measures of IYCF looked into actual practices, but did not unpack the factors that might be limiting or supporting the uptake and practice of IYCF knowledge.

Project evaluations prioritized collection of diet indicators of nutritionally vulnerable people (i.e. children under 2, women of reproductive age, PLW). None of the evaluations sought to understand decisions on 'who consumes' what in the household beyond children aged 2 and over. Apart from CARE Pathways intra household food score, no effort was made to understand the intra household food distribution amongst other household members beyond vulnerable groups (i.e. pregnant or lactating women and children age <2, and age <5). There was no indicators on food preferences or cooking practices, nor how food preferences may be affected by food availability in the market.

Evidence generated

Because of the lack of measurement of decisions that influence what is consumed at household level and within household, there was limited information on what pathways leads to decisions on what is consumed and how food is distributed within the household. Rather, the evidence focuses on demonstrating how mothers knowledge of optimal IYCF practices is a critical pathway to progress on nutrition status of children. The connection to how knowledge of IYCF practices and time for these, may conflict with other roles and tasks (i.e. in the productive sphere), has not been made.

Because few evaluations looked directly at whether 'produce' generated through agricultural production interventions (e.g. homestead gardening) was consumed, it was difficult to distinguish the relative influence of the production pathways on nutrition outcomes. The only exception was E-HFP which showed a marked increase in mothers' intake of fruit (from their own production) and linked this to improvement in mothers' nutritional status. Similarly, there was limited discussion of how the food environment (on-farm availability, diversity and safety of food) interacts with women empowerment to impact nutrition. The evaluations do not explore the links between increased production, diversity and how that links directly to diet quality. For example, what proportion of own home production (assumed to be diverse food crops) is saved for own consumption and how are 'gaps' in food groups filled through purchases at the market.

In summary, there was no information on how **food preferences** affect what is consumed at household level, and how **cooking practices** may affect diet quality. There was also limited analysis in the selected evaluations of how the gender dimensions of intra household dynamics impacts on intra household distribution beyond nutritionally vulnerable groups, defined as children under 2.

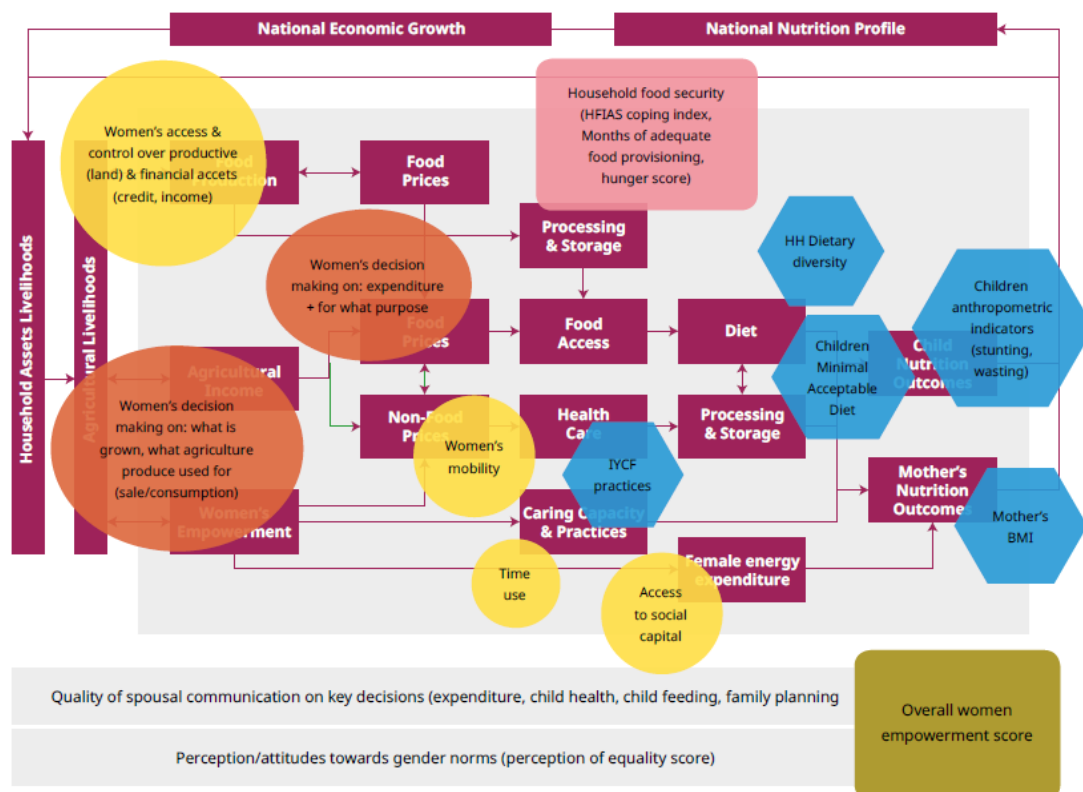
4.3.4 The role of women's empowerment indicators

A positive feature of the review was the demonstration of **clear efforts to isolate and distinguish specific women empowerment indicators** or composite indices to support projects to report on their contribution to women empowerment at impact or outcome level. For example, women's empowerment was captured as an overarching composite empowerment score (e.g. E-HFP, CARE Pathways, RAIN) or scores for different sub-domains of empowerment are provided (e.g. RAIN) (See Annex 4). On the one hand, using **composite women empowerment** indices allows the project to

report on achievement on 'women empowerment' overall. However, combining different dimensions of empowerment into a single number brings risks.

Figure 3 dissects the women empowerment indexes and maps these across the agriculture-nutrition pathways. When applied across the pathways, we begin to see how the contents of composite indexes emphasise certain decision making nodes at specific junctures of the pathways. In doing so, it becomes visible how evaluations can overlook how different dimensions (agency, resources, structure) of women empowerment interact to contribute or hinder progress on nutrition status and or diet. Figure 3 also demonstrates how certain elements of empowerment are prioritized over others, thereby reinforcing dominant understandings of women's empowerment.

Figure 3: Components of women empowerment indicators mapped across the agricultural nutrition pathways



Three main clustering of indicators: implications for interpretations of women's empowerment

Figure 3 demonstrates a dominance of *resource* related indicators (yellow), *decision making* (orange) in relation to production and income decisions. There is another cluster around women's knowledge and practice of IYCF, time-use, access to social capital, and mobility. A third clustering centres around *nutrition related indicators* (blue). This reinforces predominant interpretations of women empowerment grounded in *resources* as the most important element for women empowerment and their *agency* to decide how these *resources* are used. This is symptomatic of broader literature which has used resources as proxies for empowerment (Nayaran, 2015).

In spite of agency being at the heart of women's empowerment conceptually (Section 3), the quality and breadth of decision making indicators varied. Most evaluations focused on women's decision making as the main expression, focusing on her relative influence (expressed as joint/sole) in relation to their spouse. Decision making indicators clustered around decisions related to *production* (the front end of the agricultural nutrition pathways) and less so on how these translate

to *consumption* decisions (the back end of the agriculture-nutrition pathways related to decisions on care practices and food preparation and distribution). Of the three main elements of women empowerment, institutional structures were operationalised the least. In our sample, they were mainly represented as indicators on gender norms capturing collectively held expectations and beliefs about how women, men, girls and boys should behave at different stages of their lives (grey). Overall, few evaluations were able to use these indicators to explain the interactions between different empowerment elements and how these manifest along the pathways.

Different levels of analysis

Most indicators focused on the individual level: indicators collected information from the primary caregiver, usually the mother. Promising attempts to measure intra household dynamics were observed through the use of indicators measuring the influence of institutional structures such as gender norms. For example, indicators measuring the quality of spousal communication (between primary caregiver and spouse) on key decisions related to different elements of pathways (production, health care, food preparation), and perception on key gender norms which looked beyond the individual to norms at household and community level.

At intra household level, evaluations either included an overarching indicator “expressing attitudes that support gender equitable roles in family life” or went into detail on expectations on women’s expected behaviour: mobility, ability to express opinion freely, attitudes to whether acceptable to beat a partner to keep family together, girls going to school. Both indicators focused on women’s perception of these norms, and did not ask other household members in the quantitative questionnaire.

The evaluations focused predominantly on women’s relationships with their male spouse. In one instance, there was a dedicated spouse relationship score concerning women’s ability to communicate with spouse on key issues related to household income and expenditure, and IYCF and family planning. In this indicator, all these aspects were captured. However, important relationships with other household members and actors in the community were rarely explored beyond access to service providers.

Institutional structures work across the arenas of the family, farm/business, community, state and market. Yet, most of the evaluations focused on women’s relationships in the arena of the farm, then in relation to the household and to limited extent in relation to the community and the market.

Omissions of indicators

Institutional structures were the element of women’s empowerment least explored. Gender norms regarding intra household food distribution and how this affects food consumption for different household members were not addressed. This is an important omission given the gender norms surrounding what different food groups and quantity that different household members can consume (e.g. certain meats). Similarly, none of the reviews explore how food preferences and acceptability of certain types of foods (except during pregnancy) influence what is consumed in the household. This tends to be more explored in food taboos for pregnant women. As a result, the evaluations do not go into detail about the types of nutrition messages contained in the BCC.

Another key omission was on gender norms in the market concerning mobility and how this affects women’s access and engagement in markets. This is especially relevant in relation to the income generation pathways. The growing literature applying gender analysis on value chains could address some of these omissions. Also, we found limited analysis of how intersectionality affects women’s ability to manoeuvre decisions along the different nodes of the agriculture nutrition pathways.

Because of the gap in data collection on intra household food distribution and preferences, correlations among intra household dynamics and care practices, food distribution and preferences, and production and income decisions are not measured as a result. The lack of evidence as a result, perpetuates a dominant homogenous view of women’s main role in securing nutrition outcomes

through their roles as ‘mothers’, rather than as producers. This ignores their productive role as farmers and income generators, and reinforces gender norms about what women and men are supposed to do in the household. It also places pressure on women as the primary stakeholder responsible for the wellbeing of their children.

None of the evaluations collected data on the care practices and knowledge of other care givers. This is a significant omission given that many mothers are also involved in productive work (farm labour, other), and are likely to hand over child care and feeding responsibilities to other household members, often other women (mothers in laws, daughters and female relatives), a process referred to “the replacement mechanism” (Johnston & Kadiyala, 2015).

The relationship between time and workload in relation to productive and reproductive tasks was rarely included in the primary impact evaluation. This is a significant omission given the growing evidence that agriculture interventions hamper women’s child care time and capacity as they need to manage the care, feeding, and health of young children alongside the agriculture work (Black, Alderman, et al., 2013; Johnston & Kadiyala, 2015; Malapit & Quisumbing, 2016; Ruel & Alderman, 2013). Potential negative nutrition impacts can occur if agricultural investments demand additional time and labour from women at the expense of optimal infant and young child feeding and care, or at the expense of pursuing other income-generating activities (Herforth, 2012). We also noted no attempts to measure or document backlash from men (in terms of Gender Based Violence, or controlling the benefits of asset transfers).

4.4 Concluding Notes: implications for understanding women’s empowerment

In summary, the different evaluations designs and choice of indicators prioritize the *resource* and the *agency* elements of empowerment and how they play out along the agricultural-nutrition pathways. In doing so, this reinforces many of the assumptions highlighted in Section 3 (Box 2).

This is partly because the majority of evaluations did not articulate a clear definition of women empowerment in the design phase, nor provide a clear theory of change of how their intervention approach positions women’s empowerment across the targeted agricultural-nutrition pathways in the scope of their program. These challenges highlight the complexity of measuring women’s empowerment as a multi-faceted construct that is context specific and both a process and outcome. It explains the highly varied nature of women empowerment indicators included in Annex 4. Interestingly, the reviewed evaluations failed to document the extent to which the indicators were pre-tested in different contexts and their rationale for selecting specific women empowerment indicators. These challenges are also a reflection of the evolving field of measuring empowerment and the lack of a validated women empowerment indicator(s) used in nutrition-sensitive agriculture. The exception is the Women Empowerment in Agriculture Index (WEAI), which has been designed for agricultural programs (See Annex 5). It is only recently that it is being adapted to project level and will include a nutrition add on module to understand more of the agriculture nutrition pathways (See Recommendations).

Composite measures are useful for providing an overall assessment of the projects contribution to women’s empowerment overall. However, they were not always able to measure the interaction between different elements of empowerment across different levels. The reliance on composite indices obscures how empowering experience in one dimension of a woman’s life may affect other dimensions of her life (both positively and negatively). Therefore, they were less useful for understanding women empowerment as a process, and as a contributory factor to progress on nutrition.

Moreover, it was also noted that there was no attempt to ground measures of women’s empowerment in women’s own perspectives of what empowerment means to them as a basis to compile the women empowerment indicators. Thus, women’s voices were notably absent from these

evaluations. Women's own interpretations of empowerment matter for pragmatic reasons, they allow a more accurate understanding of empowerment grounded in lived realities of women's lives and to that specific context¹³. Empowerment is dynamic and context specific; it can mean different things to different people depending on their context (agro-ecological, age, class) and changes over time. What is considered empowering at one point of time may change as motivations and aspirations change.

Mixed methods evaluations were found to make a more explicit effort to use women empowerment indicators to explain how different elements of empowerment indicators (agency, resources, structures) interact along the pathways. For example, E-HFP evaluation used the combination of indicators at different levels collected through mixed methods to show how collective and systematic change on cultural norms on women's land ownership has catalysing effect on enhancing women's individual agency and access to resources.

The implications of these challenges is evidence gaps of links between decisions around production, income and income use, and the decisions made in the household in relation to care practices, time, workload and how tasks are divided in relation to production and care related work (see Figure 3). This makes it hard to track how women's empowerment works as a mediating factor in agricultural interventions to contribute to nutritional status. At worse, they leave the intra household dynamics unpacked and reinforce assumptions (Box 2) of women's empowerment and existing ideas on what men and women do, need or want without engaging with women's own voices and interpretations of what matters to them.

5. Measuring women's empowerment in nutrition-sensitive agricultural programs

The analysis of indicators and evaluations design revealed a number of strengths and weaknesses in impact evaluation approaches regarding the level of insights they provided on the mediating role of women's empowerment in the agriculture nutrition pathways.

5.1. Purpose of evaluations

The key purpose of impact assessments is to attribute impact of the project as a whole towards progress on impact indicators. In the review, a main strength of the different evaluations was their ability to report on progress on the nutritional status of children, followed closely by food security and diet indicators at impact level. The review also demonstrated promising attempts to understand women's empowerment through designated indicators: either at overall impact level or outcome level.

However, because of the lack of clear definition of women empowerment and theory of change of how women's empowerment operates across the pathways, evaluations have not been able to assess in detail how the different components of women empowerment inter-relate or interlock at key decision nodes along the agricultural-nutrition pathways in ways to secure impact on nutrition outcomes related to nutritional status or diet. Rather, the evaluations prioritize certain elements of women's empowerment (i.e. access/control over resources) and/or focus on one element of the pathways (e.g. agricultural production). Given the underlying implicit assumptions highlighted earlier and our analysis of how these reinforce interpretations of women's empowerment, it means that evaluations fail to test if these assumptions hold true during program implementation. This is a missed opportunity to collect evidence on how the different elements of women empowerment relate along the different nodes of the agriculture to nutrition pathways. More importantly, it is not known whether these programs may have done harm.

¹³ Newton et al (2018) *What do participatory approaches have to offer the measurement of empowerment of women and girls* (KIT working paper, forthcoming)

For example, many evaluations refer to nutrition sessions as a key method to achieve positive impact on diet. Yet few go into detail into the ways in which these methods are delivered or which modalities of dissemination are most effective and for whom. In our sample, only ILLP and RCDP II evaluations and the E-HFP follow up qualitative research dug into more detail into how control and ownership of assets and change in norms around ownership of assets affected nutrition.

5.2. Choice of evaluation design

Women's empowerment was analysed through different evaluation designs with mixed results in what elements of empowerment were linked to nutrition. Some impact evaluations relied on experimental designs using quantitative methods to look at attribution of the project to women's empowerment overall using a composite indices across different treatment groups. However, none used experimental design to test how women empowerment interventions contribute to nutrition outcomes with a control group. The scarcity of experimental designs used in this review are symptomatic of the challenges of rolling out such studies in practice. Indeed the trade-offs between experimental (randomized) versus quasi-experimental designs remain amongst the largest challenges for evaluating nutrition sensitive programs (Leroy, Olney et al. 2016)

Nevertheless, experimental designs using RCTs are limited in their ability to provide a narrative about the pathways. Since they are focused on attribution towards overall impact indicators (usually nutritional status), rather than understanding how the pathways work, it raises questions on whether they are the appropriate design for understanding how women's empowerment works as a mediating factor along the pathways. It assumes empowerment is an 'end state' and not a process that is constantly evolving. As a result, the experimental designs in this sample, have not been able to test how interventions address different dimensions of women's empowerment.

In our review, we found more promising efforts to provide a narrative about how different dimensions of women's empowerment relate to the agriculture-nutrition pathways through the use of mixed methods evaluation design. This took different shapes. For example, E-HFP carried out quantitative RCT together with follow up qualitative evaluation. Similarly, Shourhardo and Nobo Jibon carried out follow up qualitative evaluation to complement and explain the quantitative results. The process evaluation of ILLP/RCDP used mixed methods to provide a more nuanced narrative of the impact of productive work to understand its positive impacts on women's decision making but also the negative impact on care giving capacities of women.

The approach to evaluation design influences the extent to which different nodes of agriculture nutrition pathways are analysed. In practice, these relationships tend to be analysed in more depth outside of an impact evaluation, often through intermediary follow up studies, or as observational studies during program implementation (Ruel et al, 2017). Looking at impact, without understanding which interventions were successful (or not) to achieve women's empowerment, and how this worked in practice does not allow learnings on how such interventions can be replicated in other contexts. Rather, it may be more constructive to evaluate the contribution of an intervention (as opposed to attribution) to empowerment as a process of transformative change.

5.3. Unit of analysis

The main unit of analysis for nutrition data focused on the individual level, collecting data on children aged under 2 (collected from primary care giver who are the mother) and women of reproductive age. Women were also the primary unit of analysis and collection for indicators on women empowerment and intra household dynamics at the household level. For example, they were asked about their relative level of influence on decision making (joint/sole) on key areas of decisions. For data collected from women, there was no effort to disaggregate differences by household types and wealth categories.

In most of quantitative evaluations, data was only collected from women. Mixed methods approaches displayed more effort to extend the unit of analysis beyond women to also include men (usually the spouses), in an effort to better understand the intra household dynamics. One

evaluation extended to the community level to involve interviews with community leaders and staff implementers (IILP/RCDP). Evaluations that used mixed methods approaches had a wider array of unit of analysis and were therefore more detailed in their analysis and reporting of how different domains of women's empowerment interact across the pathways to affect nutrition outcomes. Overall we noted limited efforts in unit of analysis to disaggregate beyond sex, and age to other social markers that may affect evidence generated.

5.4. Documentation in the evaluations

The evaluations design and use of composite indices and single indicators has implications for what is analysed and ultimately what is reported on. On the one hand, the explicit effort to analyse women's empowerment does support the rationale for having a separate section within the evaluation reporting on women empowerment. However, the downside is that it often resulted in the compartmentalizing of a narrative of changes in women empowerment as stand-alone 'gender section of the evaluation' (e.g. Nobo Jibon). As a result, the analysis of how women empowerment domains intersect and interlock across the pathways in relation to other underlying determinants of nutrition was minimized.

It was also observed that in documentation, ambitious efforts to calculate composite indices across different domains of empowerment did not always translate into a thorough analysis of how the different women empowerment domains interact along the pathways to impact on nutrition. For example, RAIN includes a comprehensive set of indicators for women's empowerment covering eight different domains. Yet the evaluation failed to explain how the different sub-domains affect different parts of the agriculture nutrition pathways. As a result, evaluations need to pay attention to how they document and package results of how women empowerment mediate progress towards nutrition.

5.5. Concluding notes

The analysis of the strengths and weaknesses of women empowerment indicators (content and the way they are used) together with the evaluation design have implications to the types of evidence generated on how women's empowerment impacts nutrition and subsequently how empowerment is understood. Impact evaluations tend to emphasise quantitative methods and women are main unit of data collection and analysis. Data on intra household relations and how the behaviour of women is connected and influenced by behaviour of other household members, particularly spouses, was only collected in follow up qualitative evaluations.

When programs do not define women empowerment from the start they risk reinforcing implicit assumptions of how women's empowerment mediates the agriculture nutrition pathways. This results in impact evaluation designs that do not measure whether these assumptions hold true during program implementation. This is a missed opportunity to collect evidence on how the different pathways connect and for understanding women's empowerment along the pathways. Therefore there remains scope for further improvement in evaluation designs to better understand how women empowerment can be leveraged to secure progress on nutrition. This involves moving beyond instrumentalizing women to transforming women's ability and position to influence key decision making nodes along the pathways.

6. Moving forward: recommendations and promising approaches

The field of programming and evaluating women empowerment in agriculture to nutrition pathways is constantly evolving. In spite of the many challenges in understanding and measuring how women's empowerment works along the agricultural-nutrition pathways, this analysis provided useful insights. The review stimulates a new approach to doing things differently for both programming and measurement. The below recommendations from this analysis are enriched by recent research on nutrition sensitive evaluation (Herforth & Ballard, 2016; Leroy et al, 2016; Ruel et al, 2017) and KIT's ongoing research on measurement approaches on women's empowerment.

To follow through with these recommendations it is important to be mindful of the need to invest in capacity building on both planning, delivering and measuring women empowerment. This entails a broader strategy of training program staff (implementers and M&E staff) on gender and understanding how existing inequalities (gender and social) affect progress on nutrition. These recommendations are premised on the assumption that the below steps are taken during the program design phase:

- A gender situation analysis focusing on intra household dynamics has been carried out to understand what are the key levers of women's empowerment along the different agricultural nutrition pathways.
- The above is used to frame a Theory Of Change (ToC) of how the program positions women empowerment's mediating role to achieve impact on nutrition.
- Both ToC and gender situation analysis are used to design a tailored intervention package addressing women empowerment levers.

Resources for applying a gender lens and nutrition sensitive agriculture program design

[KIT and SNV food and nutrition security diagnostic tool](#)

[KIT and SNV Nutrition Sensitive Agriculture and gender toolkit](#)

[FAO nutrition sensitive agriculture design checklist](#)

[USAID online nutrition sensitive agriculture training on women empowerment](#)

[SPRING Agriculture and Nutrition Assessment tool](#)

[Mercy Corps nutrition sensitive agriculture approach](#)

6.1. Intervention design

When designing agricultural programs to be more nutrition sensitive, carefully consider what types of nutrition impact is realistic in the scope of your program

If an agricultural project is seeking to achieve impact on **reducing incidence of stunting**, this implies a multi-sectoral approach to programming entailing the following:

- Broader scope of multi-sectoral interventions addressing both immediate and underlying cause of under-nutrition (addressing both inadequate diet as well as disease)
- Much longer time frame of programming (5 years)
- Targeting households with pregnant and lactating mothers of children under two

If the focus of agriculture programs is to **improve diet** of household members, this implies at minimum agricultural interventions and/or nutrition specific interventions consider intra household dynamics. At a maximum, projects could be designed to integrate and align agriculture, nutrition and intra household dynamics interventions together. Recent research states that it is more appropriate for agricultural projects to choose improving dietary diversity at household level as their

outcome, rather than addressing stunting. This suggests that future design could consider extending the target group towards improving individual diet of other household members (women who are not pregnant, adolescent girls and boys) beyond the traditional focus of vulnerable groups (pregnant and lactating women and children under 2) (Herforth & Ballard, 2016).

Promising measures on Diet

For measures of diet at individual level, currently the **Minimum Dietary Diversity for Women (MDD-W)** is recommended as a valid and simple indicator for women's diet quality (nutrition adequacy and dietary diversity) at different stages of the lifecycle (age 15-49). It can also highlight the specific needs of women and make the link between food production and consumption along the impact pathways (FAO, 2016a). For more information on how to measure MDD-W, see the [Minimum Dietary Diversity for Women: a guide for measurement](#) (FAO, 2016b).

Adopt integrated and aligned programming of agriculture and nutrition related interventions

To achieve impact on nutrition related indicators (stunting and dietary diversity), nutrition sensitive agriculture could consider better aligning and integrating its agriculture and nutrition interventions. This involves moving away from a siloed approach to programming towards looking at how the different agriculture-nutrition pathways intersect through:

- Content and sequencing of interventions
- Targeting strategies based on insights in intra household dynamics, focusing on different individuals within the household and wider community

Applying the agriculture nutrition pathways framework (Figure 1) together with the gender equality continuum (Figure 2) are useful tools to think through the multiple options of how to link food and nutrition interventions through addressing intra household dynamics. The different examples below illustrate differences from a minimum consideration (separate agriculture and nutrition focused interventions address intra household dynamics in their respective designs) and maximum (agriculture and nutrition interventions explicitly connected through taking into account intra household dynamics).

Agricultural intervention and intra household dynamics addressed in one intervention: When agricultural training focuses on improving productivity of a cash crops, it is important to ensure women are also involved and/or informed, since the additional workload to produce more may influence how they allocate their time for care practices (e.g. breastfeeding) of their children.

- **Gender blind:** Agricultural training increases workload for women, they have no time for reproductive roles. As productivity increases and becomes more profitable, men take control over the profits.
- **Do no harm:** Would ensure women are taught about the importance of exclusive breastfeeding provided they are also able to negotiate time to actually implement and use their new knowledge. If not, the project team should reconsider the intervention design to avoid doing harm (i.e. increasing workload of women and having an adverse effect on care practices).
- **Gender accommodative:** Would include nutrition messages about health risks of increased workload of women (when pregnant and breastfeeding) into agricultural extension messaging targeting men. The aim would be to empower women to negotiate their time with spouses (to practice breastfeeding) as a means to improve nutrition of their children.

Nutrition intervention and intra household dynamics addressed in one intervention: Often women are the sole target for nutrition and health related messages. The roles women and men play is not as fixed and separated as is often assumed. For example men are often responsible for buying food, they decide what income is used for and it is therefore essential to engage men in nutrition sessions. Therefore, it is important to also engage men in interventions on nutrition and health related issues (i.e. nutrition counselling).

- **Gender blind:** Nutrition sessions only target women for counselling on infant and young child feeding.
- **Do no harm:** Would target women and men separately for nutrition sessions with messages based on the specific roles they play in relation to nutrition (nutrition sessions would not aim to change the existing dynamics within the household).
- **Gender accommodative:** Would link food and nutrition to create sustainable impact through joint couple sessions. For example BCC would emphasise the value of a more effective division of tasks and access to resources for men and women to promote nutrition of household. Discussions with men and women could encourage bottom up solutions that fit their specific needs and interests best. This can have a positive spin off effect on promoting collective decision making in the production sphere (more space and investments for nutritious foods) as well as in the consumption sphere (equal food distribution for all family members based on their specific needs).

Agriculture, nutrition and intra household dynamics addressed in one intervention: an explicit focus on intra household dynamics provides a more effective approach to integrate and align agriculture and nutrition interventions.

- **Gender accommodative:** Would take the above agriculture and nutrition gender accommodative strategies and carefully consider the sequencing of interventions and target both women and men to ensure harmonisation of messages across all intervention packages (e.g. agricultural extension messages and nutrition counselling sessions). Together, these can be considered examples of using *women empowerment strategies as a means to achieve better nutrition*. They can benefit women by increasing women's bargaining power in the household and more harmonious relationships in the households to support nutrition.
- **Gender transformative:** Would take the gender accommodative strategies a step further to purposively move beyond benefitting women to including interventions addressing unequal power relations. Women empowerment strategies are focused on achieving *women empowerment as an end goal* and not only as a means to nutrition outcomes (e.g. intra household dietary diversity). The household and community level are important intervention levels. At the household, there is more active focus on increasing women's ability and confidence to speak up and negotiate through improving spousal communication and bargaining. At community level, community dialogues, interactive dramas and specific sessions targeting local stakeholders and traditional leaders, and interventions targeting children in schools focusing on gender and nutrition are used to address root causes of inequality. They focus on challenging harmful gender norms over the longer term.

Promising approach: women empowerment nutrition curriculum

Helen Keller's (HKI) Nurturing Connections is a women empowerment focused curriculum aimed for integrated agricultural-for-nutrition projects. It focuses on creating an enabling environment for improved nutrition for women and children. The curriculum comprises a range of interactive participatory exercises with women, their spouses/partners, and mother in laws/or community leaders. The topics addressed include intra household decision making around food production, nutrition practices, division of labour and resource allocation. For more information see, [Nurturing Connections manual](#) and [Haselow et al \(2016\)](#)

Consider piloting and testing different intervention modalities and document learning

Given that the field of understanding women's empowerment role in nutrition is evolving, it is critical that new programs collect information on how the impact was achieved in different contexts. Ongoing learning throughout the implementation of programs could explore what combinations of interventions (agriculture, nutrition and intra household dynamics) and delivery systems work best to sustain the empowerment effects of interventions over the long term.

Consider creating space in the design of Monitoring, Evaluation and Learning Systems for local interpretations of empowerment through participatory monitoring systems

Because empowerment is a bottom up process, women's own experiences and articulations of what empowerment means to them is central to measurement process. This means that attempts to measure empowerment cannot be exclusively imposed by external agents. Participatory approaches to measuring empowerment offer a useful avenue to complement routine M&E as means to track and understand changes in local understandings of empowerment.

6.2 Indicators for measuring women's empowerment

The selection of indicators capturing the role of gender and intra household dynamics along the pathways depends on the different strategies applied in agricultural nutrition programs. This implies different choices of indicators depending on the program focus from doing no harm, understanding women empowerment as a process and as means to nutrition, and understanding women empowerment at impact level. Where programs do not address women's empowerment, the minimum requirement would be to include measures of do no harm to understand the potential negative impact interventions may have for the position of women.

At a minimum, consider including 'do no harm' indicators to capture the potential harmful or unintended consequences of agriculture nutrition programs throughout implementation in two key areas:

- Competing workload demands for women
- When men take over the benefits of training and asset transfers

To support adaptive programming, programs can monitor changes in workload and division of labour for child care and feeding, particularly in agricultural programs with new trainings asset transfers that have implications for competing workload demands. Measuring time-use in relation to workload is noted as an area that requires further exploration. This will support understanding about any negative consequences that affect the care of 'vulnerable infants' and will have other nutrition consequences for women themselves (energy expenditure, health) and other female household members. It is also an opportunity to explore if male household members take up some child-care responsibilities through the influence of women empowerment focused behaviour change sessions.

Another area to monitor is women's ability to control benefits from asset transfers and to what extent men took over. This can be supported by including indicators of gender based violence to explore if there is any backlash to women from other household members.

Resources on measuring agency, resources and time

Donald et al (2017) [Measuring Women's Agency](#), World Bank Policy Research Paper

Doss et al (2011) [Measuring ownership, control and use of assets](#), World Bank Policy Research Paper

Seymour et al (2017) [Measuring Time use in development settings](#) World Bank Policy Research Paper

When women's empowerment is understood as a mediating process towards nutrition (means to an end):

1. Consider using multiple indicators that capture the three domains of empowerment (agency, resources, institutional structures) aligned with the scope of project

For example, if the project focuses primarily on improving women's position as producers to improve food and nutrition outcomes, it is important to monitor the changes in the three women's empowerment domains. Here, the project could track changes on whether decisions on production include women's interests and how this is linked to the availability, access and control over resources. For example, do women have greater control over how productive resources are used and as a result have greater control over what types of food they grow? Does that mean they also gain greater control over how they use their time? And, to track whether this has implications for social norms. Monitoring these issues provides insights for what works in what types of "packaged" interventions are best able to link food and nutrition security outcomes. On top of that, it also provides insights in how women's empowerment helps to create linkages these linkages between agriculture and nutrition.

2. Consider using indicators which help to better understand how gender norms work across the pathways.

The review identified promising attempts to monitor women's attitudes to key gender norms in household (who should work, who should control income), and quality of intra-household relations through spousal communication. Understanding gender norms is an area recognised requiring more follow up with regards to how they affect intra-household food distribution and care practices and health care, including issues related to sexual and reproductive health and rights - child marriage, bodily integrity, voice in decisions on number of children etc.

Resources on measuring gender norms

[GEMS scale](#): Gender equitable men scale

[GENNOVATE](#): a CGIAR cross program to understand how gender norms and agency influence men, women and youth to adopt innovation in agriculture and natural resource management

CARE (2017): [Applying Theory to Practice: CARE's Journey Piloting Social Norms Measures for Gender Programming](#)

3. Consider broadening the unit of analysis and data collection beyond the individual to intra-household level

To understand how women empowerment works across the pathways, data is required from multiple individuals in the same household. This entails collecting data from both primary care-giver (women) and their spouse. In a nutrition context, it also important to collect data from other caregivers involved in care of young infants (mothers in laws, siblings). Throughout, best practice gender responsive data collection principles should be applied to data collection. These include attention to tailoring questions and interview guides to context, using mixed gender field teams for data collection, seeking consent, choosing appropriate times and locations for data collection.

Resources on gender analysis and data collection

[Biodiversity practical tips on gender responsive data collection](#)

[IFPRI gender toolbox](#)

When the focus of evaluation is to measure women empowerment at impact level, consider using existing validated measures of women's empowerment

- When seeking to understand overall impact of agriculture program on nutrition as well as women's empowerment (as end goal), consider using the latest validated women's empowerment measures such as the upcoming Project level Women in Agriculture Empowerment Index (Pro-WEI).
- When developing new composite women empowerment indicators, ensure that evaluations include detail explanation of the definition of women empowerment, rationale around the construction of the metric and validation process.

Promising indicators: Project level WEAI adapted for nutrition

IFPRI is currently adapting the WEAI to a nutrition context through the development of Pro-WEAI in the Gender, Agriculture, and Assets Project 2 (GAAP2, 2015-2020). It is anticipated that the Pro-WEAI will be streamlined and easier to adapt and contextualize to each project. It includes a much stronger focus on mixed methods approaches which will allow analysis of women empowerment as both a process and overall impact. New domains include mobility and intra-household relations around respect among household members and attitudes on domestic violence. A specific add-on for nutrition is included to cover questions on women's decision making on children and own health, purchase decisions on health products.

For more information: <http://a4nh.cgiar.org/2016/04/04/developing-a-nutrition-sensitive-pro-weai/>

6.3 Impact evaluation design

Consider including an explicit objective within the evaluation design to distinguish between:

1. How nutrition sensitive agricultural interventions empower women (impact)
2. How women's empowerment contributes to improved dietary diversity (mediating factor)

Resources on how to integrate gender into impact evaluation design

Fletcher (2015) [*Addressing gender in impact evaluation: what should be considered?*](#) (Methods Lab)

World Bank Toolkit (2012) [*Gender issues in monitoring and evaluation in agriculture*](#)

Consider using multi method evaluation designs

Because empowerment is both outcome and process, non-linear and dynamic, mixed methods evaluation designs have proved to be more comprehensive in capturing the complexities of empowerment processes. Careful consideration of the use of different quantitative and qualitative methods (sequencing, triangulation, validation) to explain empowerment as both *outcome* and *process* will provide a more comprehensive picture of *what* progress was made on women's empowerment overall and *how* it operates across the agriculture nutrition pathways.

Promising mixed methods evaluation design to analyse agriculture-nutrition pathways

The **Agriculture, Nutrition and Gender Linkages (ANGeL)** pilot project implemented by Ministry of Agriculture in Bangladesh (2015-2018) is designed to analyse different approaches to integrating agricultural interventions, nutrition and women empowerment pathways to explore relative impact on nutrition outcomes. It includes the HKI Nurturing connections intervention. See <https://www.ifpri.org/project/agriculture-nutrition-and-gender-linkages-angel>

6.4 Areas for further enquiry

As the field of understanding women's empowerment in nutrition is evolving, it is critical that information is also collected on how the impact was achieved along the pathway of impact. Promising areas of follow up research are summarized below.

Understanding women's role in the market and value chains: The gender dimensions of the links between availability and affordability of nutritious foods and consumption and expenditure on nutritious foods and how these translate to nutrition outcomes is underexplored. Gender sensitive value chains analysis¹⁴ together with new measurement approaches such as Cost of Diet may be useful for understanding the link between women empowerment, food availability and affordability in the market towards improvement in diet.

Promising approaches: Cost of Diet

Cost of Diet (CoD) is an innovative method developed by Save the Children to calculate the amount and combination of local foods required to support a typical family meet their average dietary needs. It calculates the minimum cost of foods meeting the nutrient needs of a typical household and whether this can be met by locally available foods. It makes an assessment if an affordable nutritious diet can be achieved using locally available foods. See <http://www.heacod.net/countries/reports/cost-diet-summary> and [Deptford](#) et al (2017)

Exploration of how the pathways from agriculture to nutrition are connected through decision making, resources use and the influence of social norms:

Further research could focus on identifying the tipping points of success. This could dig deeper into the role of intra household dynamics and women's empowerment focused interventions. Research could further unpack how essential women's empowerment is and what are the most successful combinations of interventions and in what contexts. It could focus on understanding how these combinations work for different types of women and men at different stages of the life-cycle and across different social groups (wealth, religion, ethnicity) who may require different intervention packages to achieve progress on key nutrition outcomes. These are questions that emerge from the frame work in this study and could be applied to further learn from practice.

¹⁴ For a recent review on analysis of food value chain pathways, see also [Maestre](#) et al, (2017) and gender sensitive value chain toolkit see FAO (2016) [Developing gender sensitive value chains : a guiding framework](#), and KIT, Agri-ProFocus & IIRR (2012) [Challenging chains to change](#): Gender equity in agricultural value chain development.

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Annexes

Annex 1: Project objectives, pathways and target group¹⁵

	Project objectives
Shouhardo I & II	<p>To reduce households vulnerability to food insecurity. It included five sub-objectives:</p> <ul style="list-style-type: none"> Increased availability and access to nutritious food for poor and extreme poor households Improved health and nutrition for children under two Empowerment of women and adolescent girls Increased responsiveness of elected bodies and service providers to poor and extreme poor Disaster management <p>Envisaged pathways: Integrated approach to reducing food insecurity and child undernutrition through combination of nutrition-specific interventions addressing underlying causes through: accessible MCHN services will improve health and nutrition status of vulnerable individuals within targeted households, well planned income generation to food insecure households will improve household food security of households; well implemented women's empowerment efforts would support projects reduce inequalities within households.</p> <p>Target group: Pregnant and lactating women, poor and extreme poor households</p>
E-HFP	<p>To improve maternal and child health and nutrition</p> <p>Envisaged pathways: Primarily nutrition-sensitive agricultural program including small transfer of agricultural and animal assets, training in optimal agricultural and animal raising practices and optimal health and nutrition practices through BCC strategy. Pathways focused on increase maternal and child intake of micronutrient-rich foods through women's increased production of these foods, increased income and women's control over income through sale of surplus household production, increased maternal knowledge and adoption of optimal health and nutrition practises</p> <p>Target group: Mothers of children aged 3-12 months</p>
RAIN	<p>To design, implement and evaluate a model of multi-sectoral integration to improve stunting rates in Mumbwa district Zambia and document evidence of both impact and process for application for other contexts.</p> <p>Envisaged pathways: Nutrition-sensitive program addressing the multi-sectoral causes of malnutrition, focused on learning how to tackle challenge of inter-sectoral collaboration through pathways: increase year round availability of nutrient rich foods at household level; promotion of optimal health, nutrition and care seeking behaviour through social behaviour change communication focusing on gender. Project was specifically designed to contribute evidence on degree to which agricultural interventions, either alone or combined with nutrition and health activities can reduced the prevalence of stunting in young children.</p> <p>Target group: Mothers of children (0-24m) and children (0-24m)</p>
Nobo Jibon	<p>To reduce food insecurity and vulnerability for beneficiary households in Barisal Division, Bangladesh. It included three sub-objectives:</p> <ul style="list-style-type: none"> To improve health and nutritional status of children under 5 years and pregnant and lactating women (PLW) To increase market-based production and income generation for poor and extreme poor households To support targeted households to protect lives and assets and quickly resume livelihood activities following natural disasters. <p>Envisaged pathways: Integrated approach to reducing food insecurity and child undernutrition through combination of nutrition-specific interventions addressing underlying causes through accessible MCHN services will improve health and nutrition status of vulnerable individuals within targeted households, well planned income generation to food insecure households will improve household food security of households.</p> <p>Target group: PLW. Targeting for livelihood component at household level based on income and ownership/access to land: extreme poor, homestead productive poor, productive poor households</p>

¹⁵ **Shouhardo** (TANGO International, 2015; Levinson et al 2016) ; **E-HFP** (Olney, Bliznashka, Pedehombga, Dillon, & Ruel, 2016; Olney, Pedehombga, Ruel, & Dillon, 2015; van den Bold et al., 2015); **RAIN** (Harris et al, 2016) **Nobo Jibon** (Langworthy et al., 2015) ; **CARE Pathways** (Njuki et al., 2013; Tango 2016) ; **ILLP/RCDP** (SPRING, 2014)

CARE Pathways	<p>To achieve long term impact towards more secure and resilient livelihoods for poor women farming households through their increased food and nutrition security and their improved coping and adapting ability.</p> <p>Envisaged pathways: Approach is based on global theory of change that address underlying causes of poverty and women's exclusion in agricultural through increased productivity and empowerment of women farmers and more equitable agricultural systems at scale. Focuses on 5 domains of change: women's capacity (skill, knowledge, self-confidence), access to productive assets/resources (inputs, financial tools), increased productivity, increased influence over household decisions and assets, improved enabling environments (cultural and social norms and attitudes)</p> <p>Target group: marginalised poor women farmers</p>
IILP	<p>To improve the livelihood and food consumption of Rwanda's most vulnerable women and children</p> <p>Envisaged pathways: Integrated livelihood and nutrition program focusing on following pathway: increasing agricultural production through formation of cooperative groups and linkages to farmer field schools and markets, promoting nutrition practices through health and nutrition groups, increasing access to income through access to financial services through improving adult literacy and access to financial services through integrated savings and lending groups, and linkages to micro-finance institutions (MFIS), Savings and Credit Cooperative Organizations (SACCOs).</p> <p>Target group: Very poor, mainly women.</p>
RCDP II	<p>To reduce poverty through expanded marketing of good quality milk that generates income and employment, and improves household nutrition.</p> <p>Envisaged pathways: Mainly livelihood income generation focused with small consumption element: Main pathways to link to nutrition focused on income generation via empowering women along the dairy value train through training and market linkages; food consumption through promotion of consuming milk.</p> <p>Target group: various female beneficiaries along the dairy value chain (dairy farmers, milk transports, milk collection centres, processors and retailers).</p>

Annex 2: Evaluation objectives and design

	Evaluation Objectives	Design
Shourhardo	<p>Quantitative impact evaluation: To determine if the observed reductions in prevalence of stunting over the project's implementation period, from 61.7 to 48.8 percent for children under five, were caused by project's interventions. Sought to understand <i>how</i> the reductions were brought about by underlying and immediate determinants of stunting, as defined in the UNICEF Conceptual Framework for the Causes of Maternal and Child Undernutrition. Specifically focused on analysing impact of four different project's interventions on underlying determinants of nutrition: maternal and child health and nutrition (MCHN), women's empowerment, livelihoods promotion, and water and sanitation.</p> <p>Qualitative evaluation: To evaluate effectiveness of meeting strategic objectives, linkages with NGO services, effectiveness of DRR approaches, coordination with Govt. of Bangladesh and other donors, effectiveness of approaches on gender and women empowerment issues, unintended positive and/or negative effects, effectiveness of BCC and extension strategies.</p> <p>Under women empowerment, evaluation focused on work and income, decision making, mobility, child marriage, dowry & girls education, domestic violence and EKATA.</p>	<p>Design: Quasi- experimental. No counterfactual, but propensity score matching used to create comparable on-observables-control group to serve as control group.</p> <p>Quantitative Analysis:</p> <ol style="list-style-type: none"> 1. Descriptive methods: Comparison of the changes in stunting in the project area with changes nationally over the same period of time. 2. Comparison between specific age trajectory of stunting in eligible project households compared to projected age trajectory of cohort of children at the time of the baseline. Cohorts children were 6-18 months old at baseline and 48-60 months at end line. 3. Comparison of changes in stunting and its determinants between the baseline and end line surveys for the group of households who were eligible to participate and the group who were not. <ol style="list-style-type: none"> a. Intent-to-treat, difference in difference analysis b. Instrumental variables regression analysis to estimate the impact of participation in the project. (Child and mother household characteristics were used as independent variables) c. Propensity score matching- Average effect of treatment of four sets of interventions on underlying determinants of stunting.
E-HFP	<p>Impact evaluation:</p> <ol style="list-style-type: none"> 1. To assess impact of HKI 2-year enhanced homestead food production program in Burkina Faso on child nutritional status and health as primary impact measures and mothers nutritional status and empowerment as secondary impact measures. 2. Examine how HKI's E-HFP program influenced women's accumulation of ownership, of and control over agriculture assets and small animals, and what the implication of such changes might be with regard to program sustainability. <ol style="list-style-type: none"> a. Did the program improve asset ownership by women, men or both? (impact evaluation only) b. Did the land agreement or project activities influence community norms on women's landownerships or rights and how? (qualitative research only) c. Were women able to maintain control over the E-HFP activities and outputs as intended in the program? (impact evaluation + qualitative research) <p>Qualitative evaluation:</p> <p>Two rounds of follow up qualitative research focused on understanding how and why the program had the expected impacts. It included a specific focus on how project changed gender norms on land and asset ownership (Bold et al, 2012; Bold et al, 2015)</p>	<p>Design: Impact evaluation involving cluster-randomized control trial, longitudinal design, household survey and follow up qualitative study. Includes a counterfactual. Data on treatment groups was later pooled as there were no differences seen between the two groups on mothers outcomes.</p> <p>Quantitative Analysis: Cluster-randomized controlled trial of mothers of young children with three groups a. control group b. E-HFP with the BCC strategy implemented by older women, c. BCC implemented by health committee members.</p> <p>Program impacts on anthropometry, HB, anaemia, diarrhoea, agricultural production, household dietary diversity, maternal knowledge and IYCF practices used difference-in-difference (DID) estimates derived from linear regression. Estimates looked at change in program indicators between baseline and endline.</p> <p>Difference-in-difference impact estimates were used to measure the impact of the program on household consumption of individual food groups and household dietary diversity, mother intake of individual food groups and their dietary diversity, mother's BMI and prevalence of underweight, overall women's empowerment score and 7 components of women's empowerment identified through factor analysis.</p> <p>Women's empowerment data was reduced from 30 items to 7 items through exploratory factor analysis to identify the most important components of women's empowerment. Gender disaggregated double difference estimates derived from linear regression analysis of impact of the program on changes in household durables, agriculture assets, small animal ownership at household level. The dependent variables were stunting, underweight, wasting, diarrhoea prevalence and anaemia.</p>

RAIN	<p>Quantitative impact evaluation</p> <ol style="list-style-type: none"> 1. Assess impact of two different RAIN intervention packages on stunting among children 24-59 months of age 2. Assess impact of RAIN package of interventions on: <ul style="list-style-type: none"> • Core WHO infant and young child feeding (IYCF) indicators among children 0-23 months • Health and nutrition knowledge among caregivers of young children • Different domains of women's empowerment • Agricultural production, in particular the availability of , access to, a year-round supply of diverse and nutritious food 	<p>Design: Hybrid experimental RCT combining a cluster randomized probability design comparing two RAIN intervention packages with a plausibility design comparing RAIN intervention arms to non-randomized control group through 3 different study arms. Includes a counterfactual. 1.Agriculture only group; 2.Agriculture-Nutrition group (agriculture and nutrition/health interventions); 3. Control group: access to standard government agriculture and health services with no project implementation.</p> <p>Quantitative Analysis: Three sets of analysis:</p> <ol style="list-style-type: none"> 1. Estimation of main impact of RAIN interventions on stunting using DID estimates, and following sub-analysis: <ul style="list-style-type: none"> • Analysis of change in stunting prevalence amongst children in high potential-for-impact age group (24-47.0 months) • Dose-response analysis between program exposure and child growth outcomes, creating an internal comparison group to test program effects with greater degrees of confidence • Analysis of change in underlying determinants of stunting over time 2. Estimation of impact of RAIN interventions on secondary outcomes: infant and young child feeding practices, maternal nutrition and health knowledge, women's' empowerment and agricultural production. 3. Decomposition analysis to examine various social, behaviour and economic factors as potential drivers of change in linear growth, and stunting over time. Basic regression analysis used to test model of nutrition outcomes against underlying determinants. Oaxaca-Blinder decomposition analysis or simple linear decomposition used to determine which factors contributed to change in nutrition outcomes and by how much. <p>All impact analysis conducted using 1) intent-to treat analysis, where all sampled households are included in the analysis, regardless of whether they were actually exposed to the RAIN project as well as 2) per-protocol analysis, where analysis restricted to households confirmed as RAIN beneficiaries in two intervention arms.</p>
Nobo Jibon	<p>Mixed methods impact evaluation: Measure the performance of key indicators against baseline values to measure strategic objectives and intermediate results of Nobo Jibon. Specific objectives:</p> <ul style="list-style-type: none"> - To assess progress against agreed indicators/targets (stunting, food insecurity access scale, coping strategy index) - To evaluate theory of change through establishing plausible links between inputs, output, outcomes and impacts on target population - To asses overall impact of project on target population - To identify where interventions (in isolation/combination) were insufficient to meet program goals. <p>Qualitative evaluation: To evaluate effectiveness of meeting strategic objectives, linkages with NGO services, effectiveness of DRR approaches, coordination with Govt. of Bangladesh and other donors, effectiveness of approaches on gender and women empowerment issues, unintended positive and/or negative effects, effectiveness of BCC and extension strategies</p>	<p>Design: Non-experimental non adequacy design for simple pre-post comparisons of results disaggregated by districts, gender of household head. No counterfactual. Used mixed methods.</p> <p>Analysis: the analysis focused mainly on comparison of descriptive indicators baseline-endline. Results were presented as mean differences in different project districts</p>

PATHWAYS	<p>Impact evaluation using mixed methods with an empowerment lens: To estimate and analyse the status of key impact and outcome indicators described in the CARE Pathways Indicator framework.</p> <p>Assess CARE pathways contribution to increase poor women's farmers productivity and empowerment in more equitable agriculture systems at scale.</p>	<p>Design: Non-experimental, mixed methods. Baseline –end-line comparison. No counterfactual. Global report and 5x country specific reports available.</p> <p>Analysis: Analysis disaggregated impact indicators by sex of household head. Reporting focused on changes along impact indicators. Supplemented by qualitative tools to explore contextual factors related to agency, structures and relations to understand impact on poor smallholders women farmers.</p>
ILLP & RCDP II	<p>Process evaluation mixed methods: To understand how key household level behaviours along agriculture-to-nutrition pathways influence IILP +RCDP II interventions to better leverage agricultural investments to achieve measurable improvements in nutrition. Focuses on testing the production-income and women empowerment pathways.</p> <p>Evaluation focused on three questions:</p> <ul style="list-style-type: none"> - Have increases in income as a result of participating in Feed the Future activities, changed purchasing and consumption. - To assess the impact of engaging in project on activity on care-seeking and care-giving practices. - Impact of interventions and involvement in these interventions on women's empowerment (household decision making around use of income and consumption and participation outside the household, perception of status). 	<p>Design: A mixed method approach, using both quantitative and qualitative data collection methods. No counterfactual</p> <p>Analysis: Changes in number and percentage of beneficiaries for various indicators: household expenditure, animal ownership and crop production, food acquisition and consumption. Qualitative data was used to understand the determinants of food purchase, understand the linkages along the decision making nodes of agricultural-nutrition pathways and gather implementers opinions on how the programs addressed gender and women's empowerment.</p>

Annex 3: Impact and outcome indicators used in evaluations

	Impact and outcome indicators
Shourhardo	<p>Impact: Child nutritional status : Stunting (children aged 6-59 months + children 6-23 months), HAZ scores for under-fives (6-59m) and under-twos (6-23m)</p> <p>Outcomes: underlying determinants of stunting clustered along following variables:</p> <ul style="list-style-type: none"> • Household food security: Average number of months of adequate household food provisioning (MAHFP), months of adequate food, HH Dietary Diversity (HDDS), HH hunger score. • Caring practices for mothers during pregnancy : ANC during pregnancy, ANC in medical facility, more food during pregnancy, more daytime rest during pregnancy, Vit A during 6 weeks of delivery, Iron/folic acid during pregnancy) • Caring practices of children: handwashing at 5 critical times, safe disposal of faeces (0-35m), No. of vaccinations received (0-23m), Vit A capsule last 6 m(6-23 m), • Household health environment received: access to safe water, access to improved toilet facilities • Mothers and children food consumption: mother dietary diversity, Minimum Dietary Diversity (6-23m), Minimum Meal Frequency (6-23m), Minimum Acceptable Diet (6-23m) • Mothers nutritional status and food consumption: Mother's Body Mass Index • Children health: Diarrhoea in last two weeks (0-59m) <p>Qualitative evaluation looked at effectiveness in meeting strategic objectives, effectiveness of linkages with government and non-government services, effectiveness of DRR approaches, coordination with government and other donor activities, effectiveness of approaches on gender issues and women's empowerment, unintended positive and/or negative effects, effectiveness of BCC and extension strategies.</p>
E-HFP	<p>Impact: Child nutritional and health status: Stunting (children aged 6-59), wasting (WAZ), underweight, mean haemoglobin, anaemia, diarrhoea prevalence; agricultural production, household dietary diversity, maternal knowledge of IYCF, and IYCF practices.</p> <p>Outcomes: articulated as secondary impact indicators.</p> <ul style="list-style-type: none"> • Mothers nutritional and health status: BMI, prevalence of underweight • Household food security: household consumption of individual food groups (7-day recall), HH Dietary Diversity Score • Mother and children food consumption: mothers intake of individual foods (24hr recall), mothers dietary diversity, mother knowledge of IYCF. • Women's empowerment: overall score, 7 domains across: meeting with other women, purchasing decisions, healthcare decisions, family planning decisions, spousal communication, IYCF decisions, meeting with other women (See Annex 4 of women empowerment indicators) <p>Qualitative evaluation looked at views on land ownership and links to agricultural decision making, and changes in control over different assets, and community norms on women's land ownership.</p>

RAIN	<p>Impact: Child nutritional status: stunting among children (24-59m), HAZ, prevalence of stunting, WHZ, prevalence of wasting</p> <p>Outcomes: framed as underlying determinants of stunting and secondary outcomes of interest.</p> <p>Underlying determinants of stunting in relation to:</p> <ul style="list-style-type: none"> • Child characteristics, child immunization and supplementation (deworming, vit A, immunization), • Maternal characteristics (demographics related to age, education, marriage status), health seeking behaviour, mothers nutritional status (weight, BMI, dietary diversity), time-use • Household characteristics: food security (Household Hunger Score), household dietary diversity score, socio-economic status, access to services <p>Secondary outcomes in relation to:</p> <ul style="list-style-type: none"> • Core WHO IYCF indicators among children (0-23m): early initiation of breast feeding, exclusive breast feeding <6m, continued breastfeeding at 1 year (12-15.9m)), introduction of solid, semi-solid, soft foods, minimum dietary diversity (>4 food groups), minimum meal frequency (6-23.9m), minimum acceptable diet (6-23.9m), consumption of iron rich foods • Health and nutrition knowledge among caregivers (mothers) of young children(0-23m) • Different domains of women's empowerment (See Annex 4 of women empowerment indicators) <p>Agricultural production (availability of , access to, year round supply of diverse and nutritious food): # of field crops cultivated, # of vegetables/fruit cultivated, rearing animals and production of animal source foods; production of seven food groups</p>
Nobo Jibon	<p>Impact: Child nutritional status: stunting (6-59months), Average HH Food Insecurity Access Scale (HFIAS), Average, HH coping Strategy Index</p> <p>Outcomes: reported according to strategic objectives.</p> <ul style="list-style-type: none"> • Maternal and child health nutrition: stunting (U2 and U5), underweight, wasting , IYCF practices (breastfeeding, minimal acceptable diet (6-23m), iron rich food (6-23m), children receiving supplements (12-23m), nutrient consumption among PLW, attendance at ANC, caregiver WASH practices • Market-based production and income generation: Household Dietary Diversity Score (HDDS), Months of Adequate Household Food Provisions (MAHFP), # of income sources, average value of agricultural products sales, use of improved agricultural techniques, types of buyers of agricultural product, use of marketing practices, source of agricultural inputs, household production (agricultural, livestock, fish). • Disaster risk reduction: household preparedness, impact of recent disaster <p>Women empowerment measured under 'vulnerable groups: women's income earning activity, ability to make decisions on family visits, expenditure on children's health, how to spend women's income, major household purchases, purchase of daily household needs (See Annex 4 of women empowerment indicators)</p> <p>Qualitative evaluation looked at effectiveness in meeting strategic objectives, effectiveness of linkages with government and non-government services, effectiveness of DRR approaches, coordination with government and other donor activities, effectiveness of approaches on gender issues and women's empowerment, unintended positive and/or negative effects, effectiveness of BCC and extension strategies.</p>

CARE Pathways	<p>Impact: Impact measured across four impact areas:</p> <ol style="list-style-type: none"> 1. Food and nutrition security: Mean household dietary diversity (12 food groups over 24 hr recall) and mean women's intra household food access. For the latter, food preparer is asked if all, some or no female household member over the age of 15 ate the food item 2. Livelihoods resilience: coping strategies index, % households adopting negative coping strategies in past 3 months, % households using adaption strategies to reduce the impact of future shocks. 3. Economic poverty reduction: per capital household income, per capital monthly household expenditures, % households with savings, % women with savings, mean asset index. 4. Women empowerment: women empowerment index (See Annex 4 of women empowerment indicators)
ILLP & RCDP II	<p>Impact: income changes, household expenditures, animal ownership and crop production, food acquisition and consumption (food purchase, own food production, determinants of food purchase, individual and household food consumption in 24 hrs, care giving and care-seeking activities, changes in health nutritional status, women's empowerment (See Annex 4 of women empowerment indicators)</p>

Annex 4: Composite indexes of women empowerment

Description and variables	
E-HFP Women empowerment Score Total women's empowerment score based on 30 questions reduced to 7 unique factor indexes through exploratory factor analysis.	
<ul style="list-style-type: none"> Meeting with other women Spousal communication Social support Purchasing decisions 	<ul style="list-style-type: none"> Family planning decisions Health care decisions IYCF decisions
RAIN Women's empowerment measured through eight domains of social, economic and agricultural empowerment	
<p>Spouse relationship score: An average over the eight indicator variables. The higher score means higher empowerment. Percent often communicating with spouse on following:</p> <ul style="list-style-type: none"> Work activities/agriculture activities What happens at home Expenditures What happens in community or area? Your child's health Your own health Child feeding Family planning 	<p>Perception of equality score: Reverse coded overall score as an average over the six indicators variables. Higher score means higher empowerment. Percent of women who agree with the statement</p> <ul style="list-style-type: none"> In a household, the man should make important decisions If the woman works outside home, her husband or partner should help her with daily housework A husband should not let his wife work outside home, even if she would like to do it A woman has the right to express her opinion if she does not agree with what the husband or partner says A woman must accept that her husband or partner beats her in order to keep family together It is better to send a son to school than a daughter
<p>Asset selling score: Access to Assets and ability to sell assets. An average of seven indicator variables implying high score meaning higher empowerment. Measured as percent of women able to sell assets alone or jointly</p> <ul style="list-style-type: none"> Land House Another house Animals Small animals Jewelry Motorbike/bicycle 	<p>Asset access score: An average of seven variable indicators with high score implying higher empowerment. Measure as percent of women possessing assets alone or joint:</p> <ul style="list-style-type: none"> Land House Another house Animals Small animals Jewelry Motorbike/bicycle
<p>Decision making power score: Measured as average of twelve indicators on decision making. Percent who can decide on her own or with the spouse on the following:</p> <ul style="list-style-type: none"> Buying important things for the family What food is prepared every day If you have to work to earn money Visiting other family members, friends or relatives Seeing a doctor or visiting dispensary when you are pregnant Use of family planning methods Sending your child/children to school What to do when child is ill How to make children listen or obey Having another child or not Whether or not you breastfeed the child and when to wean the child What and how to feed the infant in his/her first year. 	<p>Women social capital score: An average of over nine indicators variables. The higher score means higher empowerment.</p> <p>Percentage have somebody who could help when needed or when having problems:</p> <ul style="list-style-type: none"> To accommodate you for several nights if needed To help you with money/lend some money To help when you don't have enough food at home To talk to when you have a problem <p>Percentage usually meet with other women to discuss any of the followings:</p> <ul style="list-style-type: none"> Education problems Health problems Problems of the community To receive information on health and nutrition

<p>Financial empowerment score: An average over the three indicators variables. The higher score means higher empowerment. Percentage of women who:</p> <ul style="list-style-type: none"> • Have own money that can be used when wanting it • Know a project that can lend money for women to start or extend business • Benefit from loan to start or extend business 	<p>Purchasing decisions score: Measured as an average of seventeen variable indicators. Percentage of women who</p> <ul style="list-style-type: none"> • Usually decide on food products of all food groups and medicine • Women can decide on sales of field crops, fruits, veg, animal and animal products • Women can decided on medicines for herself and children, toiletries and hygiene material and special food for children.
<p>Nobo Jibon Women's economic empowerment index: The scores of economic empowerment were calculated by taking the mean sum of scores for individual decisions. If the response indicated that a women made decision alone, or jointly with husband, the score value is one. If the response indicated that the decision was made by her husband, somebody else, the value is zero. Women who score 5 considered more empowered. Greater decision making authority interpreted as woman making it alone or with husband.</p>	
<p>Decision related to</p> <ul style="list-style-type: none"> • Family visits • Expenditure on children 's health 	<ul style="list-style-type: none"> • How to spend women's income • Major household purchases • Purchase of daily needs
<p>CARE Pathways Women Empowerment Index (WEI) Score: A total of 13 weighted indicators within the five domains. Score ≥ 0.80 on this index is considered to be "empowered." Inspired by CARE's empowerment framework of agency, structure and relations. Five Domains of Empowerment</p>	
<p>Production</p> <ul style="list-style-type: none"> - With decision making input for HH productive decision domains - With autonomy in HH production <p>Access to resources,</p> <ul style="list-style-type: none"> - Sole/joint ownership of household assets - Sole or joint control over purchase or sale of household assets - Access to and decision on credit <p>Control over income,</p> <ul style="list-style-type: none"> - With control over household income and expenditure in HH decision-making 	<p>Leadership</p> <ul style="list-style-type: none"> - Participation on formal and informal groups - Confident speaking about gender in communities - Express self confidence - Demonstrating political participation <p>Autonomy and time</p> <ul style="list-style-type: none"> - Satisfied with the amount of time available for leisure activities - Workload - Achieving a mobility score of 16 or greater - Expressing attitudes that support gender equitable roles in family
<p>ILLP & RCDP II Women empowerment measured in relation to:</p>	
<ul style="list-style-type: none"> • Involvement in income related decisions • Involvement in food related decisions • Women's participation outside household and perception of status 	

Annex 5 Women Empowerment in Agriculture Index (WEAI)

Domain	Indicator	Score	Definition of indicator	Examples of questions
Production	Input in productive decisions	1/10	Sole or joint decision making over food and cash-crop farming, livestock and fisheries	Who makes the decisions about how any income or crops from the lands/property are used? Who makes a decision about how any income or crops from this land are used?
	Autonomy in production	1/10	Autonomy in agricultural production reflects that extent to which respondent's motivation for decision making reflects own values rather than a desire to please others or avoid harm	Do you own this or any other house either alone or jointly with someone else? Do you own any land either alone or jointly with someone else?
Resources	Ownership of assets	1/15	Sole or joint ownership of major household assets	Did you take a loan or borrow money in the last 3 years? (if they wanted to)
	Purchase, sale or transfer of assets	1/15	Whether respondent participates in decision to buy, sell or transfer assets	Who usually make a decision about making a major household purchase?
	Access to and decision about credits	1/15	Access to and participate in decision making concerning credit	Who usually makes a decision about health care for yourself?
Income	Control over use of income	1/5	Sole or joint control over income and expenditure	Who usually decides how the money you earn will be used?
Leadership	Group member	1/10	Whether respondent is an active member in at least one economic or social group	Who usually decides how your husband's/partner's earning will be used?
	Speaking in public	1/10	Whether the respondent in public concerning issues relevant to oneself or one's community	
Time	Leisure	1/10	Satisfaction with time for leisure activities	
	Labor usage by gender/workload	1/10	Allocation of time to productive and domestic tasks	

Source: Alkire et al., (2013), Heckert & Fabric (2013); Johnston & Kadiyala (2015), Malapit & Quisumbing (2014)

Background information: Women in Agriculture Empowerment Index (WEAI)

Amongst the studies reviewed and the current work on women empowerment in nutrition sensitive programming, the Women in Agriculture Empowerment Index (WEAI) is the only overarching indicator that has been validated in thirteen countries (Alkire et al., 2013). The WEAI was developed by IFPRI for monitoring women's empowerment in Feed the Future program in 2012. The WEAI index has been promoted as a way to measure intra household dynamics within agricultural programs to monitor gender equality, identify disempowerment gaps and to track changes in the five domains of the index. It is often used to measure women empowerment in agriculture programs that have specific women empowerment component.

Currently, the WEAI index is not well suited to measure intra household dynamics in terms of food consumption and intra-household food distribution in relation to empowerment. Moreover, WEAI is not able to analyze the inter-relationships and interlocking between different components of intra-household dynamics along the impact pathways. It prioritizes measurement around access and control of assets and less so the intangible aspects such as the quality of relationships and institutional structures. The current project level WEAI piloting is likely to address some of these challenges.

Associations between WEAI and nutrition outcomes

Nevertheless, WEAI has been a useful measure in associational studies looking at results on the WEAI in relation to nutrition outcomes. Recent studies show that increased production diversity in the household has an important determining role over the nutrition outcomes for mothers and children (Malapit, Kadiyala et al. 2013). Whether 'food crops/livestock' produced are directly consumed is less understood. For example, (Malapit and Quisumbing 2015) study in Ghana showed that girls are more likely to be breastfed if female decision maker is more involved in production decisions. The WEAI-Nutrition studies, also confirm that the largest factor behind women's disempowerment is lack of access to resources and productive assets (H. J. L. Malapit & Quisumbing, 2014; Sraboni et al., 2014). These studies confirm that women's control over income is critical to achieve positive improvements in nutrition, but mainly for women and girl's dietary diversity (Sraboni, Malapit et al. 2014, Malapit and Quisumbing 2015). Similarly, in Nepal autonomy and decision making power of women along with paid and unpaid income for women was most important for women's empowerment (Malapit & Quisumbing, 2013). This reinforces the importance of access and control over income as being critical for positive gains in nutrition outcomes. A cross-country analysis of WEAI from thirteen countries confirmed that ownership of assets and lack of leisure time are the least important in women's empowerment, while the most important aspects are access to and decision on credit. Similarly, heavy workload and agriculture-related drudgery of women also significantly contributed to the disempowerment of women and involvement in groups contributed to empowerment by building self-confidence and social security. Group membership, access to credit and workload were the three most constrained aspects. The study also concluded that women's empowerment has a strong positive association with education, IYCF indicators (Minimum acceptable diet and exclusive breastfeeding). Whereas, the association is negative with the household hunger score, and maternal and children nutrition indicators (Women's DDS) (Malapit et al., 2014). See Ruel et al (2017) for more recent analysis of recent associational studies.