zef
Center for
Development Research
University of Bonn

ZEF-Discussion Papers on
Development Policy No. 366

Cecilia Chemeli Maina, Bethelhem Legesse Debela, Matin Qaim

Women's empowerment and nutrition: Evidence from rural households in Africa and Asia

Bonn, February 2026

The **CENTER FOR DEVELOPMENT RESEARCH (ZEF)** was established in 1995 as an international, interdisciplinary research institute at the University of Bonn. Research and teaching at ZEF address political, economic and ecological development problems. ZEF closely cooperates with national and international partners in research and development organizations. For information, see: www.zef.de.

ZEF – Discussion Papers on Development Policy are intended to stimulate discussion among researchers, practitioners, and policy makers on current and emerging development issues. The papers are not peer-reviewed. They reflect work in progress and should be regarded as preprints.

Cecilia Chemeli Maina, Bethelhem Legesse Debela, Matin Qaim, Women's empowerment and nutrition: Evidence from rural households in Africa and Asia, ZEF – Discussion Papers on Development Policy No. 366, Center for Development Research, Bonn, February 2026, pp. 36.

ISSN: 1436-9931

Published by:
Zentrum für Entwicklungsforschung (ZEF)
Center for Development Research
Genscherallee 3
D – 53113 Bonn
Germany
Phone: +49-228-73-1861
Fax: +49-228-73-1869
E-Mail: zef@uni-bonn.de
www.zef.de

The authors:
Cecilia Chemeli Maina, Center for Development Research (ZEF), University of Bonn.
Contact: cmaina@uni-bonn.de
Bethelhem Legesse Debela, International Rice Research Institute (IRRI).
Contact: b.debela@cgiar.org
Matin Qaim, Center for Development Research (ZEF), Institute for Food and Resource Economics (ILR), University of Bonn.
Contact: mqaim@uni-bonn.de

Acknowledgements

This research was financially supported by the German Federal Ministry for Economic Cooperation and Development (BMZ), the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), and the European Union (EU) as part of the Agrifood Systems-Transformative Research and Policy (AFS-TRP) Project. This publication does not necessarily reflect the views of BMZ, GIZ, or the EU.

Abstract

Women play key roles in food systems, yet continue to face persistent disadvantages in terms of low decision-making power and limited access to goods, services, and markets. Discrimination against women is often deeply ingrained in social norms, policies, and institutions. Widely observed gender gaps are not only unfair; they also undermine broader sustainability objectives. Extensive evidence shows that women's empowerment contributes to productivity, efficiency, and broader social welfare gains. We review and synthesize the literature on links between women's empowerment and nutrition, focusing on rural households in Africa and Asia. We analyze advances in the measurement of women's empowerment, discuss strengths and limitations of existing metrics, and summarize the broad empirical evidence showing that women's empowerment is positively associated with dietary quality and nutrition. Further, we develop a conceptual framework, highlighting key mechanisms of the empowerment-nutrition relationship, including women's bargaining power, control over income, and time allocation. Using this framework and examples from different countries, we show that development initiatives, such as promoting agricultural commercialization and women's off-farm employment, can involve tradeoffs, sometimes resulting in undesirable empowerment and/or nutrition outcomes. Such tradeoffs need to be properly understood and addressed through gender-transformative policies. We conclude by discussing policy and research implications.

Keywords: Women's empowerment, agricultural development, contract farming, dietary diversity, child anthropometrics

JEL Codes: J16, O13, Q12, I12, Q18

1. Introduction

Despite some progress in improving gender equity, women around the world face systematic discrimination, limiting their rights, freedoms, and opportunities. Gender gaps are particularly pronounced in food systems of low- and middle-income countries (LMICs). Recent research shows that land productivity on female-managed farms is 24% lower than on male-managed farms (Anríquez et al., 2025), whereas labor productivity is 33% lower (Piedrahita et al., 2025). These differences are due to unequal access to productive resources and related structural constraints. Women are less likely than men to own land or hold secure tenure rights (FAO, 2023). Women also have lower access to inputs, technologies, and financial services, which could otherwise expand their economic opportunities and strengthen their decision-making power. In many parts of rural Africa and Asia, girls face a higher risk than boys to drop out of school. Entrenched cultural norms typically also mean that women are more involved than men in unpaid housework and reproductive activities, including cooking, washing, cleaning, and childcare. In contrast, men are typically more involved in cash-earning activities, providing them with more power to decide how the household income is spent. While cultural nuances exist, and gender roles evolve with economic development, certain gender gaps are observed almost everywhere. These gaps are not only unfair from a gender equity perspective, they also contribute to other undesirable outcomes. Ensuring equal access to agricultural inputs, technologies, and complementary resources for both men and women would help close gender gaps, improving land and labor productivity, food security, environmental resilience, and inclusive growth.

Women's empowerment has received considerable attention in research and policy, as it can be an important leverage point for advancing multiple sustainable development goals (SDGs). While it directly supports the achievement of SDG 5 (gender equality), it also generates spillover benefits for other goals, including SDG 1 (no poverty), SDG 2 (zero hunger and improved nutrition), SDG 3 (good health and wellbeing), and SDG 8 (decent work and economic growth) (United Nations, 2015). Research in various contexts shows that strengthening women's roles and reducing gender gaps contribute to better welfare outcomes for societies, including improved income, food security, nutrition, and health (Mane et al., 2025; Quisumbing et al., 2023).

However, not all development initiatives necessarily strengthen women's roles. Agricultural development programs are sometimes implemented without sufficiently considering gender roles, which may unintentionally even lead to women's disempowerment. For instance, the promotion of new technologies and cash crops may increase farm productivity and income, but may – at the same time – reduce women's involvement in strategic decision-making (Fischer and Qaim, 2012; Mehraban et al., 2022). More gender-sensitive approaches are needed. On the other hand, there are also examples of initiatives to strengthen women's empowerment that may not always lead to positive outcomes in other social dimensions. For example, programs to support women's employment or participation in community self-help groups may aggravate women's time constraints, possibly leading to negative outcomes for child nutrition and health (Malapit et al., 2019; Debela et al., 2021). Avoiding such unintended side-effects requires a good understanding of the drivers of women's empowerment and the relevant mechanisms underlying the relationship between women's roles and broader social welfare outcomes.

In this article, we focus on the relationship between women's empowerment and nutrition in LMICs. We concentrate on rural households in Africa and Asia, where poverty and undernutrition are widespread and gender gaps pronounced. As women's empowerment can be measured in multiple ways, we start with some definitions and a review of existing metrics. Further, we synthesize the evidence on associations between women's empowerment and diets and nutrition. Building on that evidence, we develop a conceptual framework, explaining some of the key underlying mechanisms. This framework is then used to analyze actual synergies and tradeoffs between women's empowerment, nutrition, and other development goals in selected country case studies. The aim of this review is to synthesize the evidence on the topic, derive policy recommendations on how to avoid undesirable side-effects, and discuss need for further research.

2. Definition of women's empowerment

Empowerment is the process by which people expand their ability to make strategic life choices, meaning choices that have significance in one's life course, particularly in contexts where this ability had been denied to them before (Kabeer, 1999). This definition draws on Amartya Sen's (1985) work on the capability approach that highlights an individuals' freedom to choose and pursue a life they have reasons to value (Alkire, 2005; Kabeer, 1999). The concept of women's empowerment has three main elements: resources, agency, and achievement. Resources refer to the current and future access, ownership, and control of human, material, and social assets that enable the exercise of choice; agency is the ability of a person to define and act upon their goals, while achievements are outcomes that are related to individual wellbeing (Kabeer, 1999).

Agency includes both formal decision-making and other forms of influence such as bargaining, resistance, negotiation, and indirect control, and it can operate at both individual and collective levels (Kabeer, 1999). Agency is also framed in relation to power: "power within" (intrinsic agency) refers to confidence, capability, and awareness of rights; "power to" (instrumental agency) is the ability to achieve one's goals despite opposition; "power over" is exercising control over others; and "power with" involves working collectively (Rowlands, 1995). Resources can improve agency, while agency can in turn enhance access to resources. Achievements result from individuals having both the agency and the resources needed to define their goals and take action towards achieving them (Elias et al., 2021; Farnworth et al., 2019).

Empowerment in general is both a process of changing power relations and an outcome, and is expressed across three interconnected levels: personal (internal changes in self-worth and critical awareness), relational (changes in power dynamics with others), and environmental (broader institutional or social norm changes), each of which influences the others (Carr, 2003; Elias et al., 2021; Hillenbrand et al., 2015; Lombardini and McCollum, 2018).

While the three elements of empowerment are well defined conceptually, there are several challenges in terms of measuring them, for instance, capturing resources as a potential to enable choice rather than just material resources (Bageant et al., 2024). Measuring agency is even more challenging because decision-making does not always reflect meaningful power,

with gender norms or restrictions constraining agency (Bageant et al., 2024). Achievements are generally easier to measure, but even here, careful interpretation is required, as observed outcomes may not only stem from limited choices but can also reflect preferences (Bageant et al., 2024; Quisumbing et al., 2023).

It should be stressed that empowerment is also context-specific and dynamic and might have varied local definitions that are hard to capture and compare. Most of the data collected on women's empowerment are cross-sectional, lack intersectional dimensions, and focus more on gender equity than on women's empowerment itself. Existing metrics are discussed in the following section.

3. Metrics of women's empowerment

Metrics of women's empowerment have evolved over time, gradually improving at capturing the multidimensional nature of the underlying concept (Van Den Bold et al., 2013). For a long time, the household was the main unit of analysis in quantitative micro-level research, assuming that households pool income, resources, objectives, and preferences (Quisumbing, 2025). Based on household-level data, many studies differentiate between male-headed and female-headed households to identify gender gaps (FAO, 2023). Such studies typically show that female-headed households are disadvantaged in terms of access to resources and wellbeing outcomes. A clear drawback of working with household-level data alone is that gender roles and levels of empowerment within households cannot be analyzed. At the individual level, significant differences between male and female household members often exist, with women facing disadvantages in terms of access to productive resources, education, decision-making, and the distribution of goods. To analyze such differences, sex-disaggregated intrahousehold data are required.

An increasing number of surveys collects sex-disaggregated data in different forms. Some surveys only collect a few variables for male and female household members separately – such as education, employment, asset ownership, health, or dietary status – which are then used as simple proxies of women's status and wellbeing within the household (Chrisendo et al., 2020; Sekabira and Qaim, 2017; Van Den Bold et al., 2013). Such data can also be used to

calculate composite indices, such as the Gender Gap Index, the Gender Development Index (GDI), and the Gender Inequality Index (GII) (Alkire et al., 2013; Malapit et al., 2019; Quisumbing, 2025). Understanding gender gaps in access to resources and wellbeing outcomes is important, but remains restricted, as it only captures some and not all dimensions of women's empowerment. The agency dimension in particular is not sufficiently addressed.

More recent surveys focusing on gender roles try to collect more specific data on women's empowerment, including questions on women's income control, time allocation, bargaining power, and involvement in decision-making across various domains (Elias et al., 2021; Mohammed et al., 2025; Quisumbing, 2025). Important to note is that the answers to such questions can depend a lot on who in the household is being asked, and how exactly the questions are phrased, as nuances matter and perceptions may differ (Ambler et al., 2021; Peterman et al., 2021). Hence, careful survey design and data interpretation are important to capture women's empowerment in meaningful ways.

The metrics developed to measure women's empowerment have transformed over time and range from indirect to direct measures, quantitative to qualitative approaches, and single-dimension indicators (resources, agency, or achievements) or single-level indicators (individual, relational, or environmental), to multidimensional and multilevel approaches (Quisumbing et al., 2023). Direct methods capture the actual exercise of agency, such as "women do control income or are involved in concrete decisions" (Chege et al., 2015; Ogutu et al., 2020). In contrast, indirect methods assess the material and economic resources accessible to women that shape their individual capacity to act (e.g., land ownership) (Desai et al., 2022; Quisumbing et al., 2023). Multidimensional and multilevel approaches typically involve indices to measure empowerment more comprehensively across the different dimensions. An overview of such multidimensional indices, along with their strengths and limitations, is presented in Table 1. A few further details are discussed in the following.

One of the first efforts to measure women's empowerment comprehensively, with data from both male and female household members, was the Women's Empowerment in Agriculture Index (WEAI) (Alkire et al., 2013). WEAI assesses the degree of empowerment and disempowerment across 10 indicators. Additionally, it includes a gender parity index that measures the share of women who are empowered relative to men within the same household. While WEAI is broad in terms of its coverage of multiple dimensions, the data

requirements are fairly extensive, meaning that including all the relevant questions into a survey is time-consuming and costly.

Partly as a response to the large data requirements, variations of the WEAI have been developed, including the abbreviated WEAI (A-WEAI), a shorter version that reduces the number of indicators and requires significantly less time to administer (Malapit et al., 2017). Another variation is the project-level WEAI (pro-WEAI), which monitors the impact of project activities with strong theoretical links to empowerment (Malapit et al., 2019). The pro-WEAI has specialized modules, such as the health and nutrition module (proWEAI+HN) to capture the dimensions of women's agency relevant to health and nutrition outcomes, and the market inclusion module (pro-WEAI+MI) to measure empowerment across value chain interventions (Malapit et al., 2023).

Other empowerment metrics developed for specific topics and contexts include the Water, Sanitation, and Hygiene Index (EWI); the Women's Empowerment in Fisheries Index (WEFI); the Women's Empowerment in Livestock Index (WELI), and the Women's Empowerment in Nutrition Index (WENI) (Dickin et al., 2021; Galiè et al., 2019; McDougall et al., 2022; Narayanan et al., 2019). While these indices are interesting in specific study settings, they need adaptation to different cultural and socioeconomic contexts and are therefore less suitable for large, nationally representative surveys or international comparisons.

A few other indices of women's empowerment were developed to facilitate comparisons across countries and economic sectors, beyond agriculture. For instance, the Survey-based Women's emPowERment (SWPER) Index uses Demographic and Health Survey (DHS) data, which are available for many countries, thus allowing comparisons across contexts (Ewerling et al., 2020). The Women's Empowerment Metric for National Statistical Systems (WEMNS) is a more recent index that captures empowerment for both men and women in rural and urban areas across different sectors (Seymour et al., 2024). WEMNS is concise, captures multiple dimensions of empowerment, and can be incorporated in larger national surveys. It was intended to measure empowerment across diverse contexts and to track progress over time with longitudinal data (Seymour et al., 2024).

Beyond these quantitative metrics, qualitative approaches to evaluate women's empowerment also exist. A drawback of most quantitative approaches is that the metrics are

defined exogenously, therefore not rooted in local societies (Tavenner and Crane, 2022). Qualitative approaches can better capture context-specific information on how empowerment is locally defined, providing insights into the processes through which it occurs, and highlighting its complexity, including the tradeoffs involved (Elias et al., 2021; Morgan, 2014). Examples include the “ladder of power and freedom”, which provides evidence on agency and local gender norms and how these interact to shape gender roles, relations, and access to opportunities (Petesch and Bullock, 2018). The ladder of power and freedom approach can also be applied in longitudinal research. Another approach is the Gender Indicator Monitoring Tool (GIMT), which tracks intrahousehold and social norm changes (Elias et al., 2021). The disadvantage of qualitative approaches is that they cannot be easily compared across different contexts. Yet, qualitative methods can help create and further refine quantitative indicators of change that are reliable, contextually relevant, and comparable across different settings. Combinations of quantitative and qualitative approaches to assess women’s empowerment are gaining popularity, exploiting the positive aspects of both approaches.

Table 1. Summary of multidimensional women's empowerment metrics

Metric	Themes/ domains	Strengths	Limitations
Women's Empowerment in Agriculture Index (WEAI) (Alkire et al., 2013)	Instrumental agency	• Focuses on agency, the least measured WE dimension • Allows comparison of men and women within households • Identifies aggregate sources of disempowerment • Transparent counting-based approach with defined indicators and weights	• Time consuming, high costs • Unsuitable for large and regular national surveys • Difficult to administer due to complex questions • Extensive training of enumerators required
Abbreviated WEAI (A-WEAI) (Malapit et al., 2017)	Intrinsic agency	• Less time consuming than WEAI • Improves on some difficult survey questions • Allows comparison of men and women within households • Identifies intrahousehold inequalities • Can be used in large national surveys	• Reduced indicators limit the multidimensionality of WE • May not provide enough granularity for project-level monitoring or targeted interventions • Loss of information results in higher rates of disempowerment
Project-level WEAI (pro-WEAI) (Malapit et al., 2019)	Intrinsic agency, instrumental agency, collective agency	• Multidimensional focus on agency • Allows projects to track and address impact on WE • Additional indicators used to better capture WE • Contains qualitative protocols in addition to quantitative	• Mixed methods approach requires more resources and time • Not easily included in project level questionnaires • Lack of generalizability beyond project contexts • Oversimplification due to aggregation, loss of nuanced information
Pro-WEAI for market inclusion (pro-WEAI+MI) (Malapit et al., 2023)	Intrinsic agency, instrumental agency, collective agency	• Investigates barriers to market access and inclusion for different value chain actors • Measures other aspects of the WE environment (e.g., sanitation, sexual hostility)	• Specific to value chain interventions • Lack of generatability beyond project contexts
Pro-WEAI for health- and nutrition (pro-WEAI + HN) (Heckert et al., 2023)	Intrinsic agency, Instrumental agency, Collective agency	• Captures dimensions relevant to health and nutrition outcomes • Allows comparisons across contexts • Goes beyond productive domains	• Lack of attention to agency in other aspects that impact nutrition outcomes such as water, sanitation, and hygiene (WASH) • Focused on households engaged in agriculture
Women's Empowerment	Agency, resources, achievements	• Includes non-farming women, landless households	• Interviews only women

Metric	Themes/ domains	Strengths	Limitations
in Nutrition Index (WENI) (Narayanan et al., 2019)		• Captures different aspects of WE crucial for nutritional empowerment	• Omits key nutrition-sensitive themes such as animal-sourced foods, intrahousehold food distribution, input access, time use, and child nutrition • Not designed for comparisons across communities and groups
Women's Empowerment in Livestock Index (WELI) (Galiè et al., 2019)	Instrumental agency, resources	• Captures changes in WE in the livestock sector • Can be used for comparison across individuals and over time	• Interviews only women • Thresholds of WE at the indicator and question levels were chosen arbitrarily, caution is needed when interpreting absolute index values
Survey-based Women's emPowERment Index (SWPER) (Ewerling et al., 2020)	Resources, agency	• Enables within-country and between-country comparisons • Can be constructed using existing DHS data • Allows for time trend analyses • Shorter, general questions	• Only applicable to women in marriage/partnership • Scope is limited and does not cover all aspects of WE • Countries with limited DHS data are underrepresented • Certain elements may actually reflect disempowerment (e.g., women work status)
Women's Empowerment Metric for National Statistical Systems (WEMNS) (Seymour et al., 2024)	Intrinsic agency, instrumental agency, collective agency, agency-enabling resources	• Measures women's and men's empowerment • Applicable to urban and rural areas • Applicable to variety of livelihood strategies • Comparable across different countries and contexts • Captures the full range of dimensions of empowerment • Short time required	• Does not cover details of individual sectors • Some indicators are only applicable to women and not men hence scores are not directly comparable
Women's Empowerment in Fisheries Index (WEFI) (McDougall et al., 2022)	Intrinsic, instrumental, collective agency	• Measures WE in aquaculture and/or fisheries • Provides room for local adaptation • Used in a wide range of applications to assess program impact • Contains qualitative aspects	• Limited scope beyond aquaculture/fisheries • Needs validation in local contexts • Lack of comparability across contexts

Notes: WE, women's empowerment.

4. Women's empowerment and diet/nutrition outcomes

Many studies analyze associations between women's empowerment and diet and nutrition outcomes. Studies use a variety of metrics for both women's empowerment and diets/nutrition. An overview of selected studies focusing on Africa and Asia is provided in Table 2. As can be seen, the overwhelming majority of these studies shows positive associations. Many of these studies are not rigorously identified, meaning that these positive associations should not be over-interpreted in a causal sense. Furthermore, even where causal interpretation is justified, positive effects do not necessarily mean that women's empowerment is the most important determinant of nutritional improvements. What we can learn from Table 2 is that women's empowerment is generally a conducive factor for higher levels of dietary quality and child anthropometric improvements, regardless of how exactly women's empowerment is measured. This is not surprising, as women often prioritize nutrition and health more than men. Furthermore, women's own nutrition and health status is often closely related to the nutrition and health status of their children through pregnancy, lactation, childcare, and related biological mechanisms (Smith et al., 2003).

Evidence from Africa suggests that various empowerment dimensions are positively associated with diet and nutrition outcomes (Jones et al., 2020). For instance, using panel data and models with household fixed effects, Sekabira and Qaim (2017) show that women's ownership of assets and access to mobile phones improves dietary diversity in Uganda (Sekabira and Qaim, 2017). Several studies find positive associations between women's involvement in intrahousehold decision-making or income control and dietary quality outcomes in Malawi, Kenya, and Uganda, (Chiputwa and Qaim, 2016; Mohammed et al., 2025; Ogutu et al., 2020). Heckert et al. (2019) used a randomized controlled trial to show that women's involvement in various types of decisions causally contributes to improvements in child anthropometric outcomes in Burkina Faso. Other studies reveal that women's involvement in cash cropping is positively associated with height-for-age z-scores (HAZ) and other child anthropometric outcomes in Ethiopia and Ghana (Debela et al. 2022; Jisso et al., 2022). Baye et al. (2024) reveal positive associations between women's empowerment measured with the SWPER and child dietary diversity in Ethiopia.

Several studies in the African context analyze women's secondary education, nutritional knowledge, and community group membership and find positive associations with child HAZ and reduced stunting in Burkina Faso, Ghana, Nigeria, and Gambia (Ariyo et al., 2025; Melesse, 2021; Nikiema and Kponou, 2024; Pienaah et al., 2025; Sey-Sawo et al., 2023; Wassie et al., 2024). These are not necessarily comprehensive metrics of women's empowerment but can still be considered as proxies of women's status. Other studies analyze women's off-farm employment and effects on various types of diet and nutrition outcomes using quasi-experimental regression approaches with mixed results. Since employment opportunities for women are considered as means to empower women, these show important dynamics depending on the context. Mutsami et al. (2025; 2026) find positive effects of women's off-farm employment on household nutrient consumption and women's dietary diversity in Malawi, Tanzania, and Zambia. In contrast, Debela et al. (2021) and Melaku et al. (2024) find negative effects on child HAZ in Tanzania and Ethiopia. The effects of women's off-farm employment on diets and nutrition are channeled through various mechanisms, which may vary by context. This is an aspect that we explore in more detail below.

Evidence from Asia also supports the findings of positive associations between women's empowerment, dietary quality, and nutrition (Table 2). Several studies use the WEAI and show positive associations with dietary diversity scores and nutrient consumption at household and individual levels in Bangladesh, India, Pakistan, and Nepal (Gupta et al., 2019; Ishfaq et al., 2022; Malapit et al., 2015; Seymour et al., 2019; Sraboni and Quisumbing, 2018). Other studies from India suggest that women's involvement in production decisions, self-help groups, and access to mobile phones and financial services is associated with more diverse diets and reduced child undernutrition (Chatterjee and Dubey, 2024; Gupta et al., 2019; Singh et al., 2024). Similar results were also reported in a study in Timor-Leste (Bonis-Profumo et al., 2021). In addition, several cross-country studies across LMICs suggest that women's status strongly improves child nutrition and health (Richards et al., 2013; Smith et al., 2003). Positive associations between WEAI and child anthropometric outcomes have also been reported for countries across Asia and Africa (Quisumbing et al., 2021).

Table 2. Overview of selected empirical studies linking women's empowerment to diet and nutrition outcomes

Study	Countries	Metrics of women's empowerment (WE)	Metrics of dietary quality/ nutrition (DQN)	Association between WE and DQN
Africa				
Fischer and Qaim (2012)	Kenya	Women's control of farm revenues	Household nutrient consumption	Positive
Chege et al. (2015)	Kenya	Women's control of farm revenues	Household nutrient consumption	Positive
Chiputwa and Qaim (2016)	Uganda	Women's control of production and farm revenues	Household nutrient consumption	Positive
Sekabira and Qaim (2017)	Uganda	Female use of mobile phones, asset ownership	Household dietary diversity	Positive
Heckert et al. (2019)	Burkina Faso	Women's involvement in decision-making	Child anthropometrics	Positive
Ogutu et al. (2020)	Kenya	Women's control of farm revenues	Household nutrient consumption	Positive
Debela et al. (2021)	Tanzania	Women's off-farm employment	Child anthropometrics	Negative
Debela et al. (2022)	Ghana	Women's involvement in cash cropping	Child anthropometrics	Positive
Baye et al. (2024)	Ethiopia	SWPER	Child dietary diversity	Positive
Melaku et al. (2024)	Ethiopia	Women's off-farm employment	Child anthropometrics	Negative
Mohammed et al. (2025)	Malawi	Women's involvement in decision-making	Household dietary diversity	Positive
Mutsami et al. (2025)	Malawi	Women's off-farm employment	Household nutrient consumption	Positive
Mutsami et al. (2026)	Tanzania, Zambia	Women's off-farm employment	Women's dietary diversity	Positive
Asia				
Sraboni and Quisumbing (2018)	Bangladesh	WEAI	Dietary diversity, nutrient intakes among children and adults	Positive
Seymour et al. (2019)	Bangladesh	Women's time and income poverty, WEAI	Household dietary diversity, child dietary diversity, minimum meal frequency	Positive
Sraboni et al. (2014)	Bangladesh	WEAI	Household calorie availability, dietary diversity	Positive
Malapit et al. (2015)	Nepal	WEAI	Maternal and child dietary diversity, child anthropometrics	Positive
Gupta et al. (2019)	India	Abbreviated WEAI	Women's dietary diversity	Positive
Chrisendo et al. (2020)	Indonesia	Women's off-farm employment	Household dietary diversity, nutrient consumption	Positive
Ishfaq et al. (2022)	Pakistan	WEAI and extended indices	Household dietary diversity, calorie consumption	Positive

Study	Countries	Metrics of women's empowerment (WE)	Metrics of dietary quality/ nutrition (DQN)	Association between WE and DQN
Various countries				
Quisumbing et al. (2021)	6 countries across Africa and Asia	WEAI	Child anthropometrics	Positive
Smith et al. (2003)	36 countries across Africa, Asia, and Latin America	Women's decision-making power, gender equity at community level	Child anthropometrics	Positive

Notes: This is not a full overview of all studies analyzing associations between women's empowerment (WE) and dietary quality and/or nutrition (DQN). The studies selected represent studies in different countries/regions and using different metrics. "Positive" in the last column means that a positive association between WE and DQN was found for all or most groups and models analyzed. "Negative" means a negative association was found for all or most groups and models analyzed. WEAI, Women's Empowerment in Agriculture Index. SWPER, Survey-based Women's emPowERment Index.

5. Conceptual framework

Women's empowerment influences nutrition and diets through multiple mechanisms, as illustrated in Figure 1. More empowered women are typically better educated and more likely to contribute to household income generation, which often results in higher overall household incomes (Das and Mahanta, 2023; Richards et al., 2013; Singh, 2008). If women contribute directly to income generation, they are also more likely to control financial resources and make spending decisions (Atkin, 2009; Maligalig et al., 2019; Melaku et al., 2024). Research shows that, when women control at least some of the household income, a greater proportion is typically spent on nutrition and health (Haddad et al., 1997; Ogutu et al., 2020; Santoso et al., 2019). Empowered women also tend to have stronger bargaining power and are more involved in household decision-making. A recent study shows that women's decision-making in agricultural production is associated with higher farm production diversity and higher household dietary diversity (Mohammed et al., 2025). These effects are in addition to the fact that a better health and nutrition status of mothers leads to healthier and better nourished children through pregnancy and lactation (Smith et al., 2003).

However, women's empowerment does not affect diets and nutrition in isolation. There are many other factors that jointly influence women's empowerment and diets and nutrition, which is also conceptually shown in Figure 1. Understanding these factors is important to promote positive outcomes and avoid undesirable side-effects.

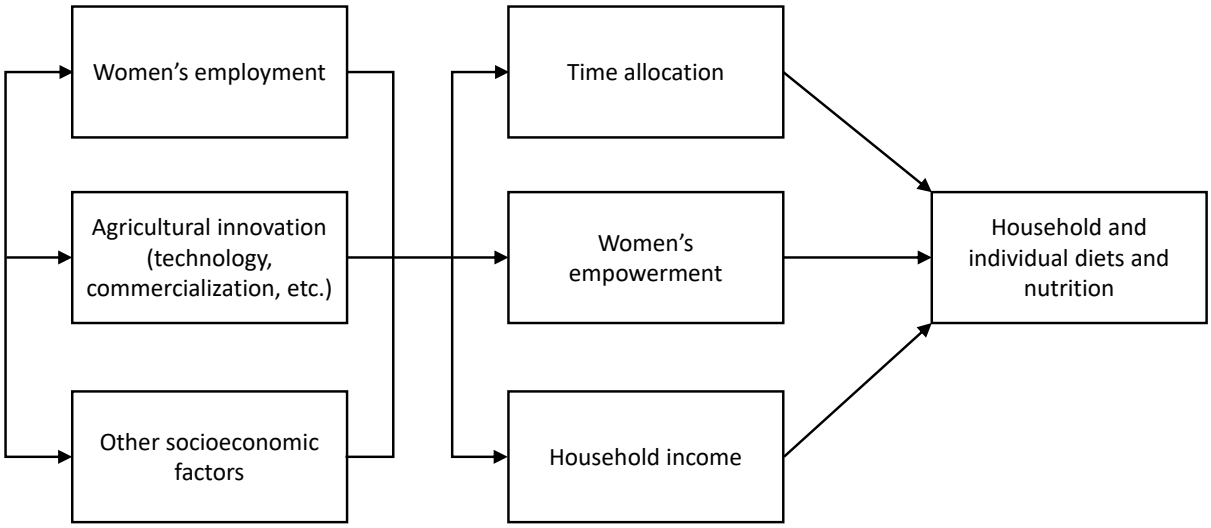

Figure 1. Mechanisms influencing women' empowerment and effects on diets and nutrition

Women's empowerment is influenced by a range of broader socioeconomic factors – such as education, cultural norms, and other types of institutions – a detailed discussion of which would be beyond the scope of this article. Yet, two broader aspects deserve some more discussion here, as they directly relate to agricultural households. These two aspects are (i) agricultural innovation and (ii) women's employment.

Agricultural innovation. Agricultural innovations may involve new technologies or new institutional setups to improve market access and increase levels of commercialization. New technologies may increase productivity, farm sales, and household income, which typically also leads to improved diets and nutrition of household members (Von Braun and Kennedy, 1994). Some technologies may strengthen women's roles and contribute to empowerment. For instance, research shows that women's access to mobile phones increases their market opportunities and intrahousehold decision-making power (Rajkhowa and Qaim, 2022; Sekabira and Qaim, 2017), which may further boost the positive nutrition effects. Technologies that help to save women's time in agricultural production or household chores may also contribute to women's empowerment (Mehraban et al., 2022; Pieper et al., 2025).

However, depending on the particular conditions, technological and institutional innovations may also weaken women's positions. For instance, in many smallholder contexts, women control the production of subsistence food crops (Fischer and Qaim, 2012; Njuki et al., 2022). When new technologies that increase yields or new cash crops are introduced, men sometimes take over control of production and income, which can contribute to women's

disempowerment (Von Braun and Kennedy, 1994). Loss of women's income control may also occur when smallholder farms increase their levels of commercialization, for instance, through improved infrastructure or new contract farming schemes (Chege et al., 2015; Ogutu et al., 2020). This does not necessarily mean that the diet and nutrition outcomes of commercialization are negative, but possible tradeoffs between the income and women's empowerment mechanisms need to be considered.

Women's employment. Women typically bear the largest burden of unpaid housework, including tasks such as water fetching and firewood collection, washing, cleaning, meal preparation, and care work. Women's involvement in income-generating activities, either through work on the own farm or off-farm work in self-employed or wage-employed activities, contributes to higher household incomes and can further strengthen their role and bargaining power within the household. Own cash-earning activities in particular increase the likelihood that women have access to financial resources and are also involved in spending decisions (Atkin, 2009; Santoso et al., 2019). In addition, off-farm employment may increase women's exposure to new ideas and access to information, strengthening their confidence. All of these mechanisms can clearly improve household diets and nutrition (Mutsami et al., 2025).

At the same time, women's employment also changes their time allocation. Women are often time-constrained, so more time for farm and off-farm employment typically means less time for household chores and care work, unless other household members take over some of these tasks (Debela et al., 2021). More time in off-farm employment may also mean that women spend less time on food production, meal preparation, and breastfeeding (Melaku et al., 2024). Depending on the context, such a reallocation of women's time may possibly lead to negative partial effects on diets and nutrition, especially for small children. Such tradeoffs can also occur in home garden interventions that mostly target women, require women's time, and thus potentially reduce the time available for other nutrition-enhancing activities (Iannotti et al., 2009). Another case in point is women's involvement in self-help groups and community activities. On the one hand, involvement in collective action can support women's income and access to markets and services, but on the other hand, time constraints need to be considered (Attanasio et al., 2014; Brody et al., 2015; Kumar et al., 2018; Weinberger and Jütting, 2001). Such tradeoffs are further analyzed in the next section based on concrete empirical examples.

6. Complexities and tradeoffs in women's empowerment

In this section, we discuss concrete empirical examples to illustrate important mechanisms outlined in the conceptual framework above, with a particular focus on possible tradeoffs. However, while tradeoffs need to be understood, they are often not inevitable and can be reduced or avoided through smarter policies (Qaim and Parlasca, 2025). Therefore, we also discuss gender-transformative policy options, which need to be tailored to the particular context.

6.1. Unintended effects of agricultural development interventions

Many agricultural development interventions in Africa and Asia involve the dissemination of new technologies, new types of crops, or new institutional mechanisms to increase smallholder famers' commercialization and links to emerging value chains. Such interventions – if properly planned and implemented – tend to improve farm productivity and income, thus reducing poverty and undernutrition. However, such initiatives can also have unintended negative consequences for women's empowerment by changing gender roles and decision-making power within the household.

Increased farm commercialization can have a negative impact on women's agency and control over resources, as women are often primarily responsible for managing subsistence food crops, whereas men are typically in charge of production enterprises destined for sale and cash income generation (Chiputwa and Qaim, 2016; Von Braun and Kennedy, 1994). If production becomes more profitable and market-oriented through agricultural development interventions, this may lead to situations where household incomes are increased but women lose control over agricultural production and income. This loss of women's control and financial autonomy may also lead to partial negative diet and nutrition effects, as shown in Figure 2. This example relates to smallholder farmers in Kenya producing vegetables under contract for local supermarket chains (Chege et al., 2015). Participation in the contract scheme leads to significant gains in farm productivity and income. However, it also leads to women losing control over the income from vegetable sales, as the contracts are mostly made with the male household heads, who then also make the sales transactions and collect the revenues. Overall, the supermarket contracts improve the nutrient consumption in the

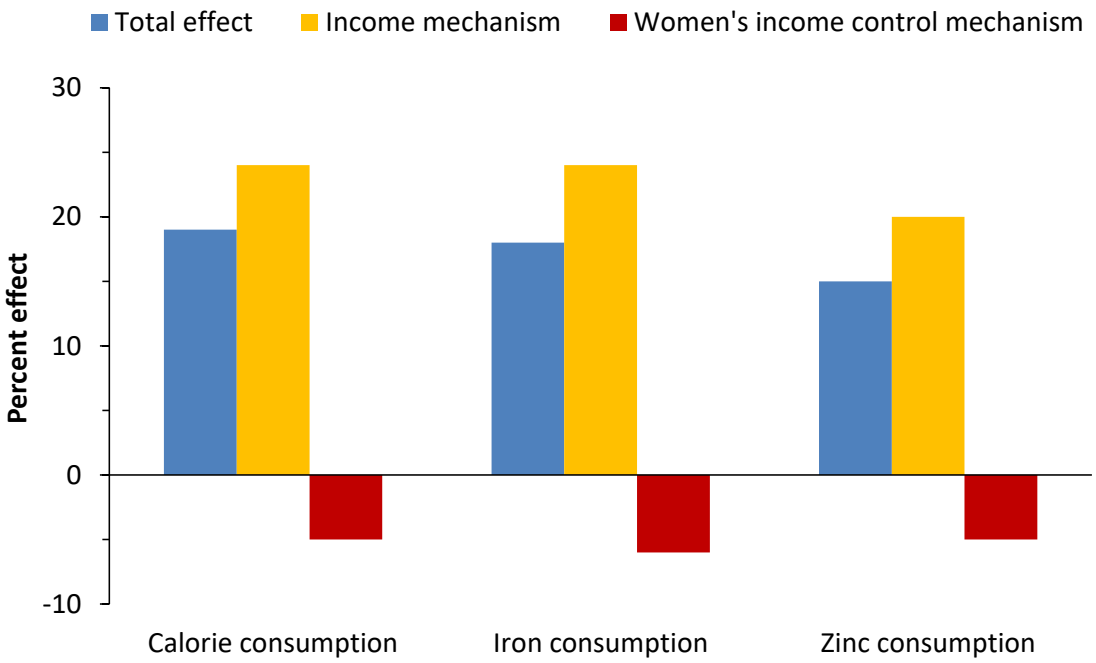

Figure 2. Partial and total effects of contract farming on smallholder diets in Kenya
Source: Own presentation based on data from Chege et al. (2015)

farming households, as the positive income effects outweigh the negative partial women's disempowerment effects (Figure 2). However, the overall income and nutrition effects could be further improved, and the negative gender effects be avoided, if the supermarkets would contract female instead of male farmers.

Similar effects with a focus on child nutrition were also shown for contract farming schemes in Ghana (Debela et al., 2022). Depending on the nature of the contracts, the effects on child nutrition vary, as the contracts affect farm production patterns, household incomes, and gender roles within the household. However, if the contracts are made with women farmers, they clearly have positive effects on child anthropometric outcomes, underlining that contracting features and intrahousehold gender dynamics are important factors determining nutrition outcomes.

Yet another study analyzed effects of agricultural development interventions in the banana sector of Kenya (Fischer and Qaim, 2012). For a long time, banana used to be a typical subsistence crop in Kenya, managed primarily by women with low levels of inputs and technology. Since the late-1990s, development programs had introduced new technologies

and improved agronomic practices, which were disseminated to growers through newly formed farmer groups. The groups were also supported to organize collective marketing, in order to sell the higher banana yields in lucrative markets. The programs helped to increase productivity and income. However, with banana becoming a more market-oriented enterprise, men increasingly took over its management, reducing women's decision-making power and control over revenues. This also led to a partial negative effect on dietary quality. Research shows that such undesirable gender and diet effects did not occur when women themselves were signed up as members of the farmer groups (Fischer and Qaim, 2020).

That women often lose control of agricultural production and income when smallholder farms become more commercially oriented has also been shown in several other studies (Njuki et al., 2022; Ogutu et al., 2020). However, depending on the cultural context, the level of commercialization is not the only factor that matters. A recent study in Indonesia analyzed changing gender roles in farming households that switched from rubber to oil palm cultivation, both export crops that are fully commercialized in the local context (Mehraban et al., 2022). Women are heavily involved in rubber cultivation, but much less in oil palm, which is a crop that requires much less labor input (Chrisendo et al., 2020). The agricultural work time that women saved from the switch to oil palm resulted in more time available for household chores and leisure, but their lower involvement in farm work also led to women being less involved in production decisions and farm income control (Mehraban et al., 2022). Crop production and sales became more and more controlled by male farmers alone. While switching to oil palm helped relax women's time constraints, this was not associated with women's economic empowerment.

Agricultural development and poverty reduction in the small farm sector require new technologies and market orientation. Against this background, concluding that farms should remain low-tech and subsistence-oriented in order to avoid women's disempowerment would be inappropriate. What is required are gender-sensitive and gender-transformative approaches that strengthen women's involvement to the extent possible. We already mentioned that involving women farmers as formal partners in contract schemes and farmer groups can help as an empowering mechanism in many cases (Debela et al., 2022; Fischer and Qaim, 2012). This requires that women are official owners or co-owners of relevant productive

assets, which can be supported through joint land titles, joint bank accounts, and joint registration of enterprises.

Beyond assets, complementary mechanisms to strengthen women should also be considered. Targeting women specifically in agricultural training and microcredit programs can help, especially also when female extension officers are involved (Meemken at Qaim, 2018). In addition, workshops about gender roles and sources of discrimination, involving both men and women farmers, can be useful to create awareness and instigate behavioral change. In Uganda, Fairtrade-certified coffee cooperatives have established a mechanism where the disbursement of coffee revenues to farmers requires the presence of both male and female spouses. This increases intrahousehold transparency and the likelihood of women being involved in income control (Chiputwa and Qaim, 2016). Suitable mechanisms will have to be adapted to the particular context. The examples show that gender-transformative approaches are generally possible.

6.2. Unintended effects of women's empowerment interventions

We now focus on interventions that support women's empowerment and look at their effects on diets and nutrition. Many such interventions, such as improving women's education and access to productive resources, are very successful and clearly improve diet and nutrition outcomes (Malapit et al., 2015; Njuki et al., 2022; Sraboni and Quisumbing, 2018). However, some interventions may improve women's empowerment while leading to unfavorable nutrition outcomes, which is often primarily related to issues of time allocation.

In particular, interventions that expand women's employment or participation in group activities can improve household welfare and women's status through gains in income and bargaining power, but they also require women's time, which is often very limited. Women in rural Africa and Asia are involved in agriculture and other economic activities, but they also bear the primary responsibility for multiple tasks within the household (Ferrant et al., 2014). Engaging in off-farm employment or group activities may increase women's total labor burden, but will typically also lead to some reallocation, such that less time is available for breastfeeding, care activities, meal preparation, and other household chores (Weinberger and Jütting, 2001). It should be noted that reallocation of women's time may also occur if men

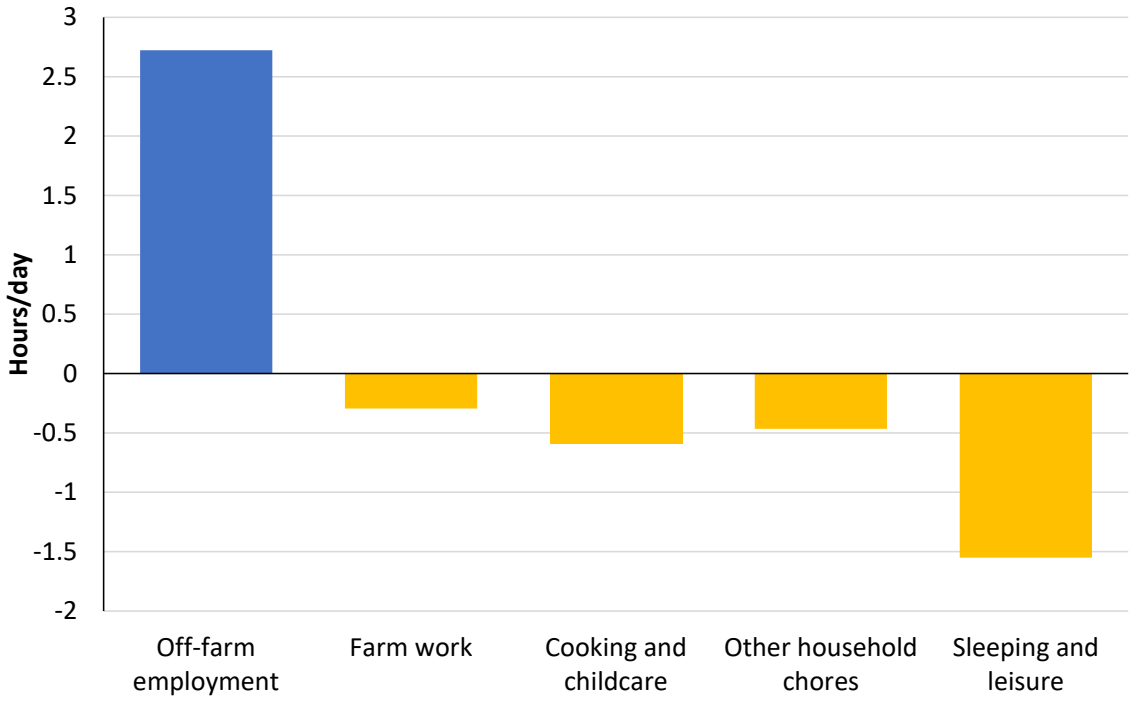

Figure 3. Effects of women's off-farm employment on their daily time allocation in Tanzania and Zambia
Source: Own presentation based on data from Mutsami et al. (2026)

shift to new labor-demanding employment opportunities and women have to take over some of the men's previous tasks.

Using data from rural Tanzania and Zambia, Figure 3 shows that women involved in off-farm employment have significantly less sleep and leisure time, and also reduce their time spent on other activities, including farm work, cooking, and childcare. Such reallocation of women's time may be associated with negative effects on household dietary quality and child nutrition.

Evidence from several countries documents such tradeoffs between women's involvement in off-farm employment and child nutrition outcomes. A recent study in Ethiopia shows that maternal employment in the local cut-flower industry leads to reduced child HAZ and weight-for-age z-scores (WAZ) (Melaku et al., 2024). These negative child nutrition effects occur in spite of gains in household income and women's bargaining power. The issue is that women employed in the cut-flower industry are away from home for many hours, reducing the time spent on childcare by about 70%, in addition to reducing the time for livestock keeping and meal preparation. As a result, households with employed mothers have lower dietary diversity and consume animal-sourced foods less often than households in which mothers are not employed in the cut-flower industry. In some cases, other household members contribute to

childcare and other household tasks, but – in the Ethiopian case – this sharing of housework does not fully offset the reduction of maternal time at home (Melaku et al., 2024).

Another study with representative data from rural Tanzania also shows that maternal off-farm employment contributes to lower child HAZ and higher rates of stunting, with women's time constraints being the main driving factor (Debela et al., 2021). The reduction in time available for childcare outweighs the benefits of higher household income and increased women's empowerment. However, the relationship between maternal time in off-farm employment and child HAZ was found to be non-linear (Figure 4): initially, up to about 17 hours of maternal off-farm employment per week, each additional hour reduces child HAZ, suggesting that the negative effect from reduced time for childcare outweighs the positive effect from the additional income obtained. Beyond that point, a certain improvement in child nutrition outcomes is observed, possibly due to higher income (from better-paid jobs) and better childcare alternatives, outweighing the negative time allocation mechanism. Beyond 55 hours of weekly off-farm employment, the relationship turns negative again, even though such high off-farm working hours by mothers were very rarely observed in rural Tanzania. This non-linear relationship underlines the complexities of the underlying mechanisms, which will likely differ across socioeconomic and cultural contexts.

Similar evidence is also available from countries in Asia (Jakaria et al., 2022). A study assessing the impact of maternal employment on child nutrition in five South Asian countries (Bangladesh, India, Maldives, Nepal, and Pakistan) found that, on average, children of employed mothers have a higher likelihood of stunting and underweight than children of non-employed mothers (Hosen et al., 2023). Also in this case, the study authors conclude that the negative effect of reduced time for childcare and feeding outweighs the positive diet and nutrition effects resulting from increased household income (Hosen et al., 2023).

However, not all studies analyzing women's off-farm employment find negative effects on diets and nutrition. Chrisendo et al. (2020) find positive effects of women's off-farm employment on household dietary quality and nutrient consumption in Indonesia. Mutsami et al. (2025) show similar effects in Malawi. Furthermore, Mutsami et al. (2026) reveal that women's off-farm employment has positive effects on women's own dietary diversity.

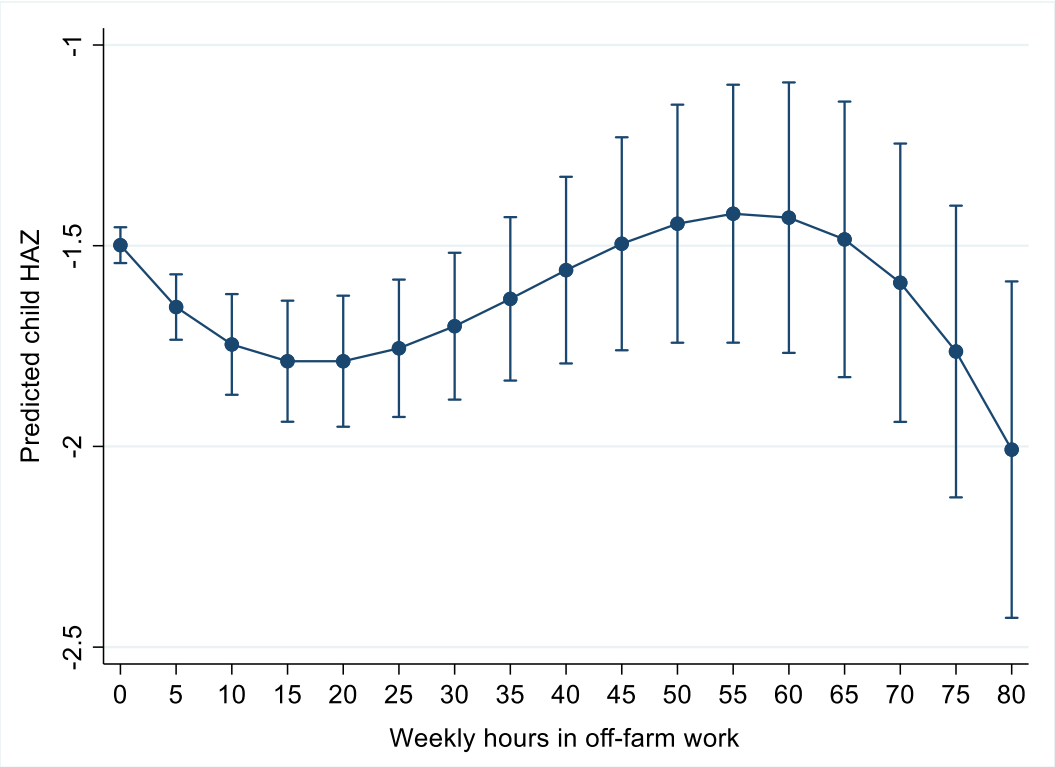

Figure 4. Effects of maternal off-farm employment on child height for-age z-scores (HAZ) in Tanzania

Notes: Predictions from a polynomial regression model are shown with 90% confidence intervals.

Source: Own presentation based on data from Debela et al. (2021)

These studies did not look at child anthropometric outcomes, which may possibly explain the positive effects: less time for childcare, meal preparation, and feeding may negatively affect small children the most, which is not fully reflected in household- or women-level dietary data. Another reason for the differences may be the type of employment that women pursue. Off-farm work can also include self-employed activities, which women typically pursue at home. Such self-employed activities may be easier to combine with childcare and feeding than long hours of wage employment away from home (Debela et al., 2021; Mutsami et al., 2026).

In any case, possible negative effects on child nutrition should not be taken as an argument that women should not pursue off-farm employment. More important is awareness of this issue and identifying and implementing strategies to avoid the undesirable side-effects. Mitigating women's time constraints requires affordable access to alternative childcare, such as community-based childcare centers, which were shown to contribute positively to child development, household income, and mothers' wellbeing in rural Africa (Donald et al., 2023). Improving women's working conditions can also mitigate tradeoffs by ensuring women have

sufficient time for breastfeeding and childcare through paid maternity leave, flexible work hours, or the provision of childcare facilities at or near the workplace (Debela et al., 2021; Melaku et al., 2024). Public social protection programs can help support women during pregnancy and lactation (Amarante et al., 2016), while expanding part-time job opportunities can enable mothers to better balance income generation with caregiving responsibilities.

In addition, policies should focus on changing gender norms and promoting a more equitable intrahousehold distribution of unpaid work, with men taking over more household responsibilities in order to offset reductions in maternal time for childcare and meal preparation. Awareness campaigns and community-based engagement can help rebalance domestic responsibilities, strengthening both women's empowerment and family wellbeing. Studies show improvements in child anthropometrics when the father is involved in childcare and feeding (Abate and Belachew, 2017; Saaka et al., 2023). Other important areas of policy interventions include the promotion of technologies that help to reduce women's work time, such as electricity and devices facilitating food processing and other household chores (Pieper et al., 2025).

7. Conclusion

Women worldwide continue to face persistent discrimination, with notable gender gaps in terms of access to resources, agency, and achievements. Such gender gaps are particularly pronounced in rural areas of Africa and Asia. Women's empowerment is associated with significant benefits for agricultural productivity, nutrition, health, and overall wellbeing. In agriculture, closing gender gaps is especially critical for building resilient, inclusive, and sustainable food systems. In this article, we have reviewed the literature on the progress made in measuring women's empowerment, starting from crude proxies and simple indicators to assess resources and achievements up to much more complex composite indices that directly capture agency and related concepts. We have also reviewed a range of empirical studies that predominantly show a positive relationship between women's empowerment and diet and nutrition outcomes across different countries and regions, regardless of how women's empowerment and diets and nutrition are measured. However, the mechanisms underlying this relationship are complex and context-dependent, which may – in principle – also result in

negative associations under certain conditions. This means simplistic conclusions are not appropriate. We have developed a conceptual framework to analyze some of the key mechanisms and possible tradeoffs.

Using this conceptual framework, we have reviewed a range of empirical studies to highlight some of the mechanisms and tradeoffs and explain them in a broader context. Agricultural development initiatives often involve the promotion of technological and institutional innovations to make smallholder farming more productive and market-oriented. However, while mostly improving household incomes, such initiatives can change gender roles within households and, in some cases, contribute to women's disempowerment, with negative partial effects on dietary quality and nutrition. This was shown for the promotion of cash crops, contract farming schemes, and other initiatives to increase smallholder productivity and commercialization. We have also reviewed specific initiatives to enhance women's empowerment, which typically have multiple benefits, but can in some cases also be associated with negative diet and nutrition outcomes. In particular, women's engagement in off-farm employment can be associated with negative child nutrition effects, due to women's time constraints and their prime responsibility for childcare, meal preparation, and feeding.

If left unaddressed, these tradeoffs risk undermining the long-term impact of agricultural development and women's empowerment initiatives. Mitigating tradeoffs requires context-specific strategies that balance women's economic opportunities with household wellbeing, gender equity, and nutrition outcomes. We have discussed various policy options for gender-transformative action that can help introduce new technologies and increase smallholder market orientation while strengthening the role of women, including the tailoring of contract schemes and training programs to the needs of female farmers, among others. We have also discussed potential policy measures to support women's off-farm employment while safeguarding and improving child nutrition, such as affordable childcare, labor-saving technologies, flexible work arrangements, and a fairer distribution of care and housework tasks among male and female household members.

Of course, improving diets and nutrition in rural Africa and Asia also requires other measures beyond gender-transformative agricultural policies and women's empowerment, such as nutrition and feeding programs, knowledge and awareness campaigns on healthy diets, and supply chain improvements to make healthy foods more accessible and affordable. Successful

strategies require coordinated policy approaches across the agricultural, nutrition, health, labor, and social protection sectors.

There are a few knowledge gaps that should be addressed in future research. When it comes to measuring women's empowerment, metrics need further improvement to become more practicable in various policy-making contexts and more comparable across different situations. Data and metrics also need to better track the dynamic nature of women's empowerment and how relevant subdomains interact with diet, nutrition, and broader welfare outcomes. A challenge is to capture the nuances of what empowerment means in different contexts while still allowing broader comparisons across locations and countries. Further work is needed to understand the mechanisms of the empowerment-nutrition relationship, and how to avoid tradeoffs and achieve synergies in specific situations. Clearly, suitable policy approaches need to be well adapted to local socioeconomic and cultural contexts.

References

Abate KH, Belachew T (2017) Women's autonomy and men's involvement in child care and feeding as predictors of infant and young child anthropometric indices in coffee farming households of Jimma Zone, South West of Ethiopia. PLOS ONE 12:e0172885. https://doi.org/10.1371/journal.pone.0172885

Alkire S (2005) Why the capability approach? J Hum Dev 6:115–135. https://doi.org/10.1080/146498805200034275

Alkire S, Meinzen-Dick R, Peterman A, et al (2013) The Women's Empowerment In Agriculture Index. World Dev 52:71–91. https://doi.org/10.1016/j.worlddev.2013.06.007

Amarante V, Manacorda M, Miguel E, Vigorito A (2016) Do cash transfers improve birth outcomes? Evidence from matched vital statistics, program, and social security data. Am Econ J Econ Policy 8:1–43. https://doi.org/10.1257/pol.20140344

Ambler K, Doss C, Kieran C, Passarelli S (2021) He says, she says: spousal disagreement in survey measures of bargaining power. Econ Dev Cult Change 69:765–788. https://doi.org/10.1086/703082

Anríquez G, Quiñónez F, Foster W (2025) Levelling the farm fields: a cross-country study of the determinants of gender-based yield gaps. Glob Food Secur 46:100873. https://doi.org/10.1016/j.gfs.2025.100873

Ariyo O, Akinyemi JO, Adeyemo T, et al (2025) Empowerment and minimum dietary diversity among women of reproductive age in Nigeria. Glob Soc Welf. https://doi.org/10.1007/s40609-025-00402-9

Atkin D (2009) Working for the future: Female factory work and child health in Mexico. Yale University

Attanasio O, Augsburg B, de Haas R, et al (2014) Group lending or individual lending? Evidence from a randomised field experiment in Mongolia, WZB discussion paper SP II 2014-303. WZB Berlin Social Science Center, Berlin, Germany

Bageant E, Lentz E, Narayanan S, et al (2024) How do women's empowerment metrics measure up? A comparative analysis. Food Policy 129:102764. https://doi.org/10.1016/j.foodpol.2024.102764

Bonis-Profumo G, Stacey N, Brimblecombe J (2021) Measuring women's empowerment in agriculture, food production, and child and maternal dietary diversity in Timor-Leste. Food Policy 102:102102. https://doi.org/10.1016/j.foodpol.2021.102102

Brody C, De Hoop T, Vojtkova M, et al (2015) Economic self-help group programs for improving women's empowerment: a systematic review. Campbell Syst. Rev. 19, 182

Carr ES (2003) Rethinking empowerment theory using a feminist lens: the importance of process. Affilia 18:8–20. https://doi.org/10.1177/0886109902239092

Chatterjee P, Dubey A (2024) The role of women's empowerment on child nutrition in India: a longitudinal analysis. Environ Dev Sustain 26:14139–14162. https://doi.org/10.1007/s10668-023-03183-3

Chege CGK, Andersson CIM, Qaim M (2015) Impacts of supermarkets on farm household nutrition in Kenya. World Dev 72:394–407. https://doi.org/10.1016/j.worlddev.2015.03.016

Chiputwa B, Qaim M (2016) Sustainability standards, gender, and nutrition among smallholder farmers in Uganda. J Dev Stud 52:1241–1257. https://doi.org/10.1080/00220388.2016.1156090

Chrisendo D, Krishna VV, Siregar H, Qaim M (2020) Land-use change, nutrition, and gender roles in Indonesian farm households. For Policy Econ 118:102245. https://doi.org/10.1016/j.forpol.2020.102245

Das K, Mahanta A (2023) Rural non-farm employment diversification in India: the role of gender, education, caste and land ownership. Int J Soc Econ 50:741–765. https://doi.org/10.1108/IJSE-06-2022-0429

Debela BL, Gehrke E, Qaim M (2021) Links between maternal employment and child nutrition in rural Tanzania. Am J Agric Econ 103:812–830. https://doi.org/10.1111/ajae.12113

Debela BL, Ruml A, Qaim M (2022) Effects of contract farming on diets and nutrition in Ghana. Appl Econ Perspect Policy 44:911–929. https://doi.org/10.1002/aepp.13204

Desai S, Chen F, Reddy S, McLaughlin A (2022) Measuring women's empowerment in the global south. Annu Rev Sociol 48:507–527. https://doi.org/10.1146/annurev-soc-030420-015018

Dickin S, Bisung E, Nansi J, Charles K (2021) Empowerment in water, sanitation and hygiene index. World Dev 137:105158. https://doi.org/10.1016/j.worlddev.2020.105158

Donald A, Lowes S, Vaillant J (2024) Experimental evidence on rural childcare provision. World Bank Group, Washington, DC

Elias M, Cole SM, Quisumbing AR, et al (2021) Assessing women's empowerment in agricultural research. In: Pyburn R, van Eerdewijk A (eds) Advancing gender equality through agricultural and environmental research: past, present, and future, chapter 9, pp 329–362. International Food Policy Research Institute (IFPRI), Washington, DC

Ewerling F, Raj A, Victora CG, et al (2020) SWPER Global: a survey-based women's empowerment index expanded from Africa to all low- and middle-income countries. J Glob Health 10:020434. https://doi.org/10.7189/jogh.10.020434

FAO (2023) The status of women in agrifood systems. Rome

Farnworth CR, Jafry T, Lama K, et al (2019) From working in the wheat field to managing wheat: women innovators in Nepal. Eur J Dev Res 31:293–313. https://doi.org/10.1057/s41287-018-0153-4

Ferrant G, Pesando LM, Nowacka K (2014) Unpaid care work: the missing link in the analysis of gender gaps in labour outcomes. Boulogne Billancourt OECD Dev Cent 20:1–12

Fischer E, Qaim M (2012) Gender, agricultural commercialization, and collective action in Kenya. Food Secur 4:441–453. https://doi.org/10.1007/s12571-012-0199-7

Galiè A, Teufel N, Korir L, et al (2019) The women's empowerment in livestock index. Soc Indic Res 142:799–825. https://doi.org/10.1007/s11205-018-1934-z

Gupta S, Vemireddy V, Pingali PL (2019) Nutritional outcomes of empowerment and market integration for women in rural India. Food Secur 11:1243–1256. https://doi.org/10.1007/s12571-019-00978-z

Haddad L, Hoddinott JF, Alderman H (1998) Intrahousehold resource allocation in developing countries: models, methods, and policies. Food Nutr Bull 19:71–72. https://doi.org/10.1177/156482659801900111

Heckert J, Martinez EM, Seymour G, et al (2023) Development and validation of a health and nutrition module for the project-level Women's Empowerment In Agriculture Index (pro-WEAI+HN). Matern Child Nutr 19:e13464. https://doi.org/10.1111/mcn.13464

Hillenbrand E, Karim N, Mohanraj P, Wu D (2015) Measuring gender-transformative change: a review of literature and promising practices. CARE, USA

Hosen MZ, Pulok MH, Hajizadeh M (2023) Effects of maternal employment on child malnutrition in South Asia: an instrumental variable approach. Nutrition 105:111851. https://doi.org/10.1016/j.nut.2022.111851

Iannotti, L., Cunningham, K., Ruel, M. (2009). Improving diet quality and micronutrient nutrition: homestead food production in Bangladesh. IFPRI Discussion Paper 928, International Food Policy Research Institute, Washington, DC.

Jakaria M, Bakshi RK, Hasan MM (2022) Is maternal employment detrimental to children's nutritional status? Evidence from Bangladesh. Rev Dev Econ 26:85–111. https://doi.org/10.1111/rode.12819

Jisso M, Tesfaye T, Biadgilign S, et al (2022) The role of multi-dimensional women's empowerment in agriculture to improve the nutritional status of under-five children in rural cash crop producing, resource-limited settings of Ethiopia. J Nutr Sci 11:e92. https://doi.org/10.1017/jns.2022.86

Jones RE, Haardörfer R, Ramakrishnan U, et al (2020) Intrinsic and instrumental agency associated with nutritional status of East African women. Soc Sci Med 247:112803. https://doi.org/10.1016/j.socscimed.2020.112803

Kabeer N (1999) Resources, agency, achievements: reflections on the measurement of women's empowerment. Dev Change 30:435–464. https://doi.org/10.1111/1467-7660.00125

Kumar N, Scott S, Menon P, et al (2018) Pathways from women's group-based programs to nutrition change in South Asia: a conceptual framework and literature review. Glob Food Secur 17:172–185. https://doi.org/10.1016/j.gfs.2017.11.002

Lombardini S, McCollum K (2018) Using internal evaluations to measure organisational impact: a meta-analysis of Oxfam's women's empowerment projects. J Dev Eff 10:145–170. https://doi.org/10.1080/19439342.2017.1377750

Malapit H, Quisumbing A, Meinzen-Dick R, et al (2019) Development of the project-level Women's Empowerment In Agriculture Index (pro-WEAI). World Dev 122:675–692. https://doi.org/10.1016/j.worlddev.2019.06.018

Malapit HJ, Heckert J, Adegbola PY, et al (2023) Measuring empowerment across the value chain: the evolution of the project-level Women's Empowerment Index For Market Inclusion (pro-WEAI+ MI), IFPRI discussion paper 2172. International Food Policy Research Institute, Washington, DC

Malapit HJ, Pinkstaff C, Sproule K, et al (2017) The Abbreviated Women's Empowerment in Agriculture Index (A-WEAI), IFPRI discussion paper 01647. International Food Policy Research Institute, Washington, DC

Malapit HJL, Kadiyala S, Quisumbing AR, et al (2015) Women's empowerment mitigates the negative effects of low production diversity on maternal and child nutrition in Nepal. J Dev Stud 51:1097–1123. https://doi.org/10.1080/00220388.2015.1018904

Maligalig R, Demont M, Umberger WJ, Peralta A (2019) Off-farm employment increases women's empowerment: evidence from rice farms in the Philippines. J Rural Stud 71:62–72. https://doi.org/10.1016/j.jrurstud.2019.09.002

Mane E, Macchioni Giaquinto A, Cafiero C, et al (2025) Closing the gender gap in global food insecurity: socioeconomic determinants and economic gains in the aftermath of COVID-19. Glob Food Secur 45:100850. https://doi.org/10.1016/j.gfs.2025.100850

McDougall C, Kruijssen F, Sproule K, et al (2022) Women's Empowerment In Fisheries and Aquaculture Index (WEFI): guidance Notes. CGIAR Research Program on Fish Agri-Food Systems (FISH), Penang, Malaysia

Meemken E-M, Qaim M (2018) Can private food standards promote gender equality in the small farm sector? J Rural Stud 58:39–51. https://doi.org/10.1016/j.jrurstud.2017.12.030

Mehraban N, Debela BL, Kalsum U, Qaim M (2022) What about her? Oil palm cultivation and intra-household gender roles. Food Policy 110:102276. https://doi.org/10.1016/j.foodpol.2022.102276

Melaku AB, Qaim M, Debela BL (2024) Maternal employment in high-value agriculture and child nutrition: evidence from the Ethiopian cut-flower industry. Food Policy 128:102732. https://doi.org/10.1016/j.foodpol.2024.102732

Melesse MB (2021) The effect of women's nutrition knowledge and empowerment on child nutrition outcomes in rural Ethiopia. Agric Econ 52:883–899. https://doi.org/10.1111/agec.12668

Mohammed FY, Khonje MG, Qaim M (2025) Women's roles in decision-making and nutrition-sensitive agriculture. Food Secur. 17:1301-1315. https://doi.org/10.1007/s12571-025-01553-5

Morgan M (2014) Measuring gender transformative change, program brief: AAS2014-41. CGIAR Research Program on Aquatic Agricultural Systems, Penang, Malaysia

Mutsami C, Parlasca MC, Qaim M (2025) Evolving farm and off-farm income sources and jobs in rural Africa. J Int Dev 37:1367–1380. https://doi.org/10.1002/jid.70010

Mutsami C, Parlasca MC, Qaim M (2026) Women's off-farm employment and dietary quality in rural Africa. J Agric Econ. https://doi.org/10.1111/1477-9552.70026

Narayanan S, Lentz E, Fontana M, et al (2019) Developing the women's empowerment in nutrition index in two states of India. Food Policy 89:101780. https://doi.org/10.1016/j.foodpol.2019.101780

Nikiema PR, Kponou MKC (2024) Women's empowerment and child nutritional outcomes in rural Burkina Faso. Rev Econ Househ. https://doi.org/10.1007/s11150-024-09749-y

Njuki J, Eissler S, Malapit H, et al (2022) A review of evidence on gender equality, women's empowerment, and food systems. Glob Food Secur 33:100622. https://doi.org/10.1016/j.gfs.2022.100622

Ogutu SO, Gödecke T, Qaim M (2020) Agricultural commercialisation and nutrition in smallholder farm households. J Agric Econ 71:534–555. https://doi.org/10.1111/1477-9552.12359

Peterman A, Schwab B, Roy S, et al (2021) Measuring women's decisionmaking: indicator choice and survey design experiments from cash and food transfer evaluations in Ecuador, Uganda and Yemen. World Dev 141:105387. https://doi.org/10.1016/j.worlddev.2020.105387

Petesch P, Bullock R (2018) Ladder of power and freedom: a qualitative data collection tool to understand local perceptions of agency and decision-making. GENNOVATE resources for scientists and research teams. CIMMYT, Mexico

Piedrahita N, Costa V, Mane E (2025) Gender gap in agricultural labour productivity: a comparison across African countries. Glob Food Secur 46:100872. https://doi.org/10.1016/j.gfs.2025.100872

Pienaah CKA, Molle MN, Luginaah I (2025) The role of child nutrition counselling, gender dynamics, and intra-household feeding decision-making on child dietary diversity in semi-arid northern Ghana. Appetite 204:107755. https://doi.org/10.1016/j.appet.2024.107755

Pieper T, Nguyen T-T, Qaim M (2025) Access to electricity and gendered labor allocation: insights from Ethiopia. Energy Policy 207:114814. https://doi.org/10.1016/j.enpol.2025.114814

Qaim M, Parlasca MC (2025) Agricultural economics and the transformation toward sustainable agri-food systems. Agric Econ 56:327–335. https://doi.org/10.1111/agec.70023

Quisumbing AR (2025) From bargaining power to empowerment: measuring the unmeasurable. Agric Econ 56:419–430. https://doi.org/10.1111/agec.70022

Quisumbing A, Cole S, Elias M, et al (2023) Measuring women's empowerment in agriculture: innovations and evidence. Glob Food Secur 38:100707. https://doi.org/10.1016/j.gfs.2023.100707

Quisumbing, A.R., Sproule, K., Martinez, E.M., Malapit, H. (2021) Do tradeoffs among dimensions of women's empowerment and nutrition outcomes exist? Evidence from six countries in Africa and Asia. Food Policy 100, 102001.

Rajkhowa P, Qaim M (2022) Mobile phones, women's physical mobility, and contraceptive use in India. Soc Sci Med 305:115074. https://doi.org/10.1016/j.socscimed.2022.115074

Richards E, Theobald S, George A, et al (2013) Going beyond the surface: gendered intra-household bargaining as a social determinant of child health and nutrition in low and middle income countries. Soc Sci Med 95:24–33. https://doi.org/10.1016/j.socscimed.2012.06.015

Rowlands J (1995) Empowerment examined. Dev Pract 5:101–107. https://doi.org/10.1080/0961452951000157074

Saaka M, Awini S, Kizito F, Hoeschle-Zeledon I (2023) Fathers' level of involvement in childcare activities and its association with the diet quality of children in Northern Ghana. Public Health Nutr 26:771–778. https://doi.org/10.1017/S1368980022002142

Santoso MV, Kerr RB, Hoddinott J, et al (2019) Role of women's empowerment in child nutrition outcomes: a systematic review. Adv Nutr 10:1138–1151. https://doi.org/10.1093/advances/nmz056

Sekabira H, Qaim M (2017) Can mobile phones improve gender equality and nutrition? Panel data evidence from farm households in Uganda. Food Policy 73:95–103. https://doi.org/10.1016/j.foodpol.2017.10.004

Seymour G, Heckert J, Quisumbing AR, et al (2024) Measuring women's empowerment in national surveys: development of the Women's Empowerment Metric for National Statistical Systems (WEMNS), IFPRI discussion paper 2254. International Food Policy Research Institute (IFPRI), Washington, DC

Seymour G, Masuda YJ, Williams J, Schneider K (2019) Household and child nutrition outcomes among the time and income poor in rural Bangladesh. Glob Food Secur 20:82–92. https://doi.org/10.1016/j.gfs.2019.01.004

Sey-Sawo J, Sarr F, Bah HT, Senghore T (2023) Women's empowerment and nutritional status of children in the Gambia: further analysis of the 2020 Gambia Demographic And Health Survey. BMC Public Health 23:583. https://doi.org/10.1186/s12889-023-15494-1

Singh G, Jha A, Singh G, Sr AJ (2024) Role of women's empowerment in improving the nutritional status of children under five years of age: an insight from the National Family Health Survey-5. Cureus 16:. https://doi.org/10.7759/cureus.59410

Singh R (2008) Education, skills and vocational training and access to rural non-farm employment. Indian J Labour Econ 51:901–909

Smith LC, Ramakrishnan U, Ndiaye A, et al (2003) The importance of women's status for child nutrition in developing countries IFPRI Research Report 131, International Food Policy Research Institute, Washington, DC

Sraboni E, Malapit HJ, Quisumbing AR, Ahmed AU (2014) Women's empowerment in agriculture: what role for food security in Bangladesh? World Dev 61:11–52. https://doi.org/10.1016/j.worlddev.2014.03.025

Sraboni E, Quisumbing A (2018) Women's empowerment in agriculture and dietary quality across the life course: evidence from Bangladesh. Food Policy 81:21–36. https://doi.org/10.1016/j.foodpol.2018.09.001

Tavenner K, Crane TA (2022) Hitting the target and missing the point? On the risks of measuring women's empowerment in agricultural development. Agric Hum Values 39:849–857. https://doi.org/10.1007/s10460-021-10290-2

United Nations (2015) The 17 Goals, Sustainable Development. https://sdgs.un.org/goals. Accessed 3 Sept 2025

Van Den Bold M, Quisumbing AR, Gillespie S (2013) Women's empowerment and nutrition: an evidence review. SSRN Electron J. https://doi.org/10.2139/ssrn.2343160

Von Braun J, Kennedy ET (1994) Agricultural commercialization, economic development, and nutrition. Johns Hopkins University Press for the International Food Policy Research Institute (IFPRI), Baltimore and London.

Wassie EG, Tenagashaw MW, Tiruye TY (2024) Women empowerment and childhood stunting: evidence from rural northwest Ethiopia. BMC Pediatr 24:30. https://doi.org/10.1186/s12887-023-04500-5

Weinberger K, Jütting JP (2001) Women's participation in local organizations: conditions and constraints. World Dev 29:1391–1404. https://doi.org/10.1016/S0305-750X(01)00049-3