

Article

Empowering Rural Women for Food Security: Evidence from Pig Production in Post-Conflict Colombia

Leidy Carolina Ortiz-Araque ^{1,2,*} , Ingrid Paola Quintana-Leal ², Sandra Milena Montesino-Rincón ^{1,2}, Ana Milena Salazar-Beleño ^{1,2} and Oscar Orlando Porras-Atencia ¹ 

¹ Grupo de Investigación de Innovación, Desarrollo Tecnológico y Competitividad en Sistemas de Producción Agroindustria, Instituto Universitario de la Paz (UNIPAZ), Barrancabermeja 687031, Colombia; sandra.montesino@unipaz.edu.co (S.M.M.-R.); ana.salazar@unipaz.edu.co (A.M.S.-B.)

² Escuela de Ingeniería Agroindustrial, Instituto Universitario de la Paz (UNIPAZ), Barrancabermeja 687031, Colombia; ingrid.quintanal@unipaz.edu.co

* Correspondence: leidy.ortiz@unipaz.edu.co

Abstract

Female empowerment in post-conflict rural contexts is strategic for food security and socioeconomic resilience. This study analyzed the relationship between women's productive empowerment and food security in 40 rural women involved in pig production in Santa Rosa del Sur, Bolívar, Colombia. A mixed approach with a descriptive-exploratory design and longitudinal scope was used. Data collection employed adapted versions of the Women's Empowerment in Agriculture Index (A-WEAgI) and the Household Food Insecurity Access Scale (HFIAS), alongside participant observation and reflective thematic analysis. Quantitative data were analyzed via descriptive statistics and Spearman correlation. The baseline revealed low empowerment regarding income, resources, technical capacities, and time. The global A-WEAgI reached 21%, while HFIAS showed moderate food insecurity in 52% of households. Spearman analysis (CS) indicated moderate negative correlations between food insecurity and income (CS = −0.56), access to resources (CS = −0.51), and technical capacities (CS = −0.49), suggesting that greater women's empowerment was associated with lower food insecurity. Post-intervention, improvements occurred in technical skills, leadership, and organizational participation. Qualitative findings showed increased confidence in Agroindustry activities, though limitations in economic autonomy, commercialization, and domestic workloads persisted. Gender-focused rural strategies enhance productive capacities and food resilience; however, structural barriers related to economic autonomy and gender inequality persist.

Keywords: women's empowerment; food security; rural development; rural women; agroindustry



Academic Editors: José Carlos Vázquez-Parra, Inés Álvarez-Icaza Longoria and Luz Elena Malagon

Received: 16 May 2026

Revised: 16 June 2026

Accepted: 19 June 2026

Published: 21 June 2026

Correction Statement: This article has been republished with a minor change. The change does not affect the scientific content of the article and further details are available within the backmatter of the website version of this article.

Copyright: © 2026 by the authors. Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the [Creative Commons Attribution \(CC BY\)](https://creativecommons.org/licenses/by/4.0/) license.

1. Introduction

Globally, food insecurity has become one of the most critical challenges to public health, social well-being, and sustainable development [1–3]. According to the FAO [4], more than 673 million people suffer from hunger worldwide, disproportionately affecting rural populations in developing countries, where structural poverty, limited institutional presence, and protracted conflicts converge. In Latin America, 41 million people face this problem, which is intensified in territories characterized by socioeconomic inequality, historical exclusion, and violence, thereby compromising the stability and sustainability of local food systems [5–7].

In contexts of forced displacement and social vulnerability, food security is a central component of women's self-reliance and comprehensive recovery. Recent empirical studies have demonstrated that women's access to productive assets such as land, credit, and productive resources significantly strengthens their empowerment and contributes to improvements in household food security. For example, Schling and Pazos [8] found that effective land ownership among rural women in Peru was positively associated with empowerment and food security outcomes. Similarly, Haque et al. [9] reported that women's economic empowerment was strongly linked to improved household food security in rural Bangladesh. These findings suggest that strengthening women's productive capacities can contribute to more resilient and sustainable rural food systems.

In Colombia, evidence directly links food insecurity to armed conflict, particularly in rural areas where forced displacement, loss of livelihoods, destruction of productive assets, and the weakening of the social fabric have profoundly affected local food systems [10–13]. In these contexts, women who are victims of conflict face cumulative forms of vulnerability, including limited access to land, restricted access to credit, low participation in decision-making spaces, and a high burden of unpaid work, all of which constrain their economic autonomy and their ability to influence household well-being [13,14].

While several studies recognize women's empowerment as a strategic axis for strengthening food security and the resilience of rural households [15,16], the literature reveals a significant gap in understanding how these processes operate in post-conflict settings. There is limited empirical evidence that examines, in an integrated manner, the relationship between productive empowerment, collective action, and food security outcomes in territories affected by violence, where social, economic, and cultural dynamics shape the effectiveness of rural development strategies.

The municipality of Santa Rosa del Sur, in the department of Bolívar, provides a relevant setting for addressing this gap. Despite its history of armed conflict [17], recent years have seen the emergence of associative initiatives led by women victims, focused on food production and processing, creating potential spaces for economic and social empowerment. However, knowledge remains limited regarding how these productive empowerment processes contribute to mitigating food insecurity in this region [13,18].

Therefore, this study aims to analyze how women's productive empowerment influences food security among rural women affected by armed conflict in Santa Rosa del Sur, Bolívar, Colombia. Specifically, the study examines the relationship between empowerment processes, economic autonomy, access to productive resources, and household food security, while exploring the social and productive mechanisms that shape these dynamics in a post-conflict rural context [19–21].

This study contributes in three main ways. First, it provides empirical evidence from a post-conflict rural context that has been scarcely documented in previous research. Second, it offers an integrated understanding of the relationship between women's empowerment and food security through the combination of quantitative and qualitative evidence. Third, it proposes an analytical perspective that links productive empowerment with food security through mechanisms such as decision-making, control over income, and collective action, thereby contributing to the design of public policies aimed at rural development with a gender perspective and to the achievement of Sustainable Development Goals 2 (Zero Hunger) and 5 (Gender Equality).

Based on this rationale, the study was guided by the following research question:

How does women's productive empowerment influence household food security among rural women affected by armed conflict in Santa Rosa del Sur, Bolívar, Colombia, and what social and productive mechanisms explain this relationship?

This question was addressed through a sequential explanatory mixed-methods approach that combined quantitative measurements of empowerment and food security with qualitative exploration of participants' experiences and perceptions.

This article is structured as follows. Section 2 presents the theoretical framework addressing food insecurity, armed conflict, and women's empowerment. Section 3 describes the methodological approach, study area, participants, instruments, and analytical procedures. Section 4 presents the quantitative and qualitative findings. Section 5 discusses the results in relation to the existing literature, and Section 6 concludes by highlighting the main contributions, limitations, and implications for rural development and food security policies in post-conflict settings.

2. Theoretical Framework

2.1. Food Insecurity and Armed Conflict

Food insecurity is defined as the lack of physical, social and economic access to sufficient, safe and nutritious food that meets dietary needs and cultural preferences for an active and healthy life [22–24]. In contexts of armed conflict, this problem intensifies due to forced displacement, loss of livelihoods, destruction of productive infrastructure and fragmentation of local markets [25,26].

The political economy of conflict literature has extensively documented the effects of violence on livelihoods, agricultural production, and food systems. George et al. [27] demonstrated that armed conflicts reduce agricultural productivity through displacement, destruction of productive assets, and market disruptions. Similarly, Vesco et al. [14] highlighted how conflict affects multiple dimensions of human development, including food security, economic resilience, and social well-being. Adhikari [28] further explains that conflict-induced displacement weakens productive capacities and increases household vulnerability by disrupting access to land, labor, and local markets.

From a political economy perspective, armed conflict affects food systems not only through direct violence but also through structural mechanisms associated with unequal access to resources, institutional fragility, market exclusion, and the erosion of local productive capacities. These effects are particularly pronounced among rural women, who frequently face additional barriers related to land ownership, access to credit, productive assets, and participation in decision-making processes. Consequently, understanding women's empowerment in post-conflict settings requires an analysis of the broader social and economic structures that condition both livelihood opportunities and food security outcomes. In this regard, the present study contributes to the literature by examining how productive empowerment processes may strengthen food security among women affected by armed conflict in a rural Colombian context.

Within this framework, food insecurity is understood not only as an immediate humanitarian consequence of conflict but also as a structural condition shaped by unequal access to resources, institutional fragility, and persistent socioeconomic exclusion. This study contributes to this body of literature by examining how women's productive empowerment may function as a mechanism for strengthening food security in a rural post-conflict context in Colombia.

2.2. Women's Empowerment and Rural Development

Women's empowerment has been conceptualized as the process by which women expand their capacity to make strategic decisions about their lives in contexts where they have historically been excluded [29]. In the field of rural development, this process transcends the individual dimension and incorporates access to productive resources (land,

credit, technical assistance), participation in decision-making spaces, control over income, and social recognition within the community [30,31].

Empirical evidence has shown that the empowerment of rural women is associated with improvements in agricultural productivity, sustainable management of natural resources, and the overall well-being of households [32]. Participation in associative organizations and community networks strengthens economic autonomy and helps to close persistent gender gaps in rural contexts. These processes generate multiplier effects that extend beyond the productive sphere and impact the social and economic structure of the territory [33].

2.3. Women's Empowerment and Food Security

Empirical evidence suggests a consistent relationship between women's empowerment and household food security. Empowered women tend to prioritize spending on food, health, and education, resulting in greater dietary diversity and improved nutritional care practices. Analytically, this relationship has been demonstrated through the operationalization of empowerment using multidimensional indices such as the Women's Empowerment Index, Empowerment in Agriculture Index (WEAI) and its adaptations at the project level (A-WEAI), which allow for quantifying domains such as productive decision-making, access to resources, community leadership and time use.

Recent studies have directly linked these domains to standardized measures of household food insecurity, such as the Household Food Insecurity Access Scale (HFIAS), which has shown statistically significant associations between higher levels of empowerment and lower levels of food insecurity [9,34–36]. This methodological approach has allowed for the translation of a complex social construct into observable and comparable variables, strengthening the causal analysis between empowerment and food outcomes.

In post-conflict contexts, this relationship takes on added importance, as women's empowerment not only impacts access to food, but also the rebuilding of the social fabric, the strengthening of social capital, and the adoption of collective strategies that increase the resilience of local food systems. These processes are crucial for the transition from vulnerable subsistence economies to more resilient and sustainable territorial food systems [37,38].

3. Materials and Methods

3.1. Research Design

The study was developed using a mixed-methods sequential explanatory case study approach (QUAN → QUAL), which allowed for the analysis of complex phenomena related to women's empowerment and food security in rural and associative contexts. In a first quantitative phase, changes in dimensions of empowerment and food security conditions were measured; in a second qualitative phase, a deeper interpretation of these changes was gained based on the experiences, perceptions, and social dynamics of the participants.

The study adopted a pre-experimental longitudinal pre-test–post-test approach with a single group [39,40], evaluating the participants before and after the implementation of the technical productive strengthening program aimed at strengthening the pork processing value chain.

3.2. Study Area

The study was conducted in the municipality of Santa Rosa del Sur, located in the southern part of the department of Bolívar, Colombia, a territory characterized by high rurality, multidimensional poverty, and historical impacts stemming from internal armed conflict. According to territorial records and institutional reports, the local economy de-

pend primarily on small-scale agricultural activities, artisanal mining, informal economies, and family-based production systems with limited value-added processing.

In this context, rural women's community organizations have emerged as community mechanisms for social reconstruction, income generation, and strengthening food security. Specifically, this research was conducted with an agricultural production association comprising women victims of the armed conflict, involved in primary pig production.

In order to protect the collective identity of the participants and avoid possible revictimization processes in a context associated with armed conflict, the name of the organization was anonymized in this study, following ethical principles of confidentiality and protection of vulnerable populations. Additional measures were implemented to ensure participant confidentiality. Personal identifiers were removed from all databases, interview transcripts, field notes, and analytical records. Participants were assigned numerical codes (e.g., Participant 1, Participant 2) that were used throughout the qualitative analysis and reporting process. All digital records were stored in password-protected files accessible only to the research team. Furthermore, no information that could directly identify individual participants, their households, or their specific locations was included in the dissemination of results.

3.3. Participants and Selection Criteria

The study population consisted of 40 women belonging to a rural pig farming association located in southern Bolívar, Colombia. A purposive non-probability sampling strategy was employed, selecting participants who met the following inclusion criteria: (i) active participation in productive and organizational activities related to pig farming; (ii) a minimum of one year of membership in the association; and (iii) partial or total responsibility for food-related decision-making within their households.

The quantitative phase included all 40 women, who voluntarily participated in the baseline and post-intervention assessments using the adapted Women's Empowerment in Agriculture Index (A-WEAgI) and the Household Food Insecurity Access Scale (HFIAS) [19–22].

For the qualitative phase, a subsample of 15 participants was purposively selected from the original group to participate in semi-structured individual interviews. Selection criteria included diversity in age, level of participation within the association, productive experience, and observed changes in empowerment dimensions during the intervention process. This strategy allowed the inclusion of different perspectives and experiences while ensuring a comprehensive understanding of the empowerment and food security processes under study. All participants provided informed consent prior to their involvement in the research. The findings are analytical and exploratory in nature and are not intended to statistically represent all rural women affected by armed conflict in the region.

3.4. Intervention Design

The intervention consisted of a technical and productive capacity-building program comprising 12 theoretical and practical sessions focused on developing Agroindustry skills, associative leadership, and food security. The sessions were conducted during the period 2025–2026 on a scheduled basis and lasted approximately four hours each.

The program was designed using a participatory and applied learning approach, integrating experiential education strategies, collaborative problem-solving, and practical knowledge acquisition. The intervention aimed to strengthen skills related to pork processing, food safety, good manufacturing practices, community leadership, and value-added generation in rural agri-food systems.

Each session was structured into three methodological components:

- Introduction and technical socialization: During the initial phase the objectives of the session were presented, feedback was given on previously developed content and concepts associated with meat processing, and food safety, good manufacturing practices, rural entrepreneurship and female leadership were introduced.
- Practical activities and collaborative work: Participants developed applied exercises in working groups, including case studies, production simulations, formulation and processing of meat products, hygienic food handling, and artisanal standardization of pork products. This phase promoted collective interaction, horizontal learning, and the technical appropriation of Agroindustry processes.
- Participatory evaluation and feedback: At the end of each session, collective spaces were held for reflection and sharing of learning, difficulties, and possible applications of the knowledge acquired in productive and domestic contexts. This phase allowed for the identification of perceptions related to economic autonomy, organizational participation, and food security.

The progressive structure of the intervention made it possible to combine the transfer of technical knowledge with processes of organizational strengthening and productive empowerment, favoring the practical application of learning in family production units.

3.5. Instruments and Variables

Empowerment was measured using a matrix adapted from the Women's Empowerment in Agriculture Index (A-WEAgI), adjusted to the agribusiness, rural and associative context of the study. The instrument evaluated seven dimensions; see Table 1.

Table 1. A-WEAgI adapted for associates.

Dimension	Adapted Indicator	Guiding Question	Suggested Scale	Suitability Criterion
Production	Participation in swine activities	Do they actively participate in pork production, processing, or marketing processes?	Does not participate = 0 Partial participation = 1 Actively participates = 2	≥1
	Decision on productive activities	Can you decide or influence what productive activities you undertake?	No decision = 0 Decide with other people = 1 Decide autonomously = 2	≥1
Resources	Access to supplies, equipment, or raw materials	Do you have access to the supplies, equipment, or resources needed to produce?	No = 0 Limited access = 1 Sufficient access = 2	≥1
	Control over productive resources	Can you decide on the use of equipment, raw materials, or production spaces?	No = 0 Partially = 1 Yes = 2	≥1
Income	Participation in revenue generation	Does the productive activity allow you to generate income for yourself or your family?	No = 0 Occasionally = 1 Regularly = 2	≥1
	Decision on use of income	Can you decide how to use the money generated?	No decision = 0 Decide with other people = 1 Decide autonomously = 2	≥1

Table 1. Cont.

Dimension	Adapted Indicator	Guiding Question	Suggested Scale	Suitability Criterion
Leadership	Participation in meetings or associative spaces	Do you have time for meetings, training sessions, or decisions?	Does not participate = 0 Partial participation = 1 Actively participates = 2	≥ 1
	Ability to express opinions	Do you feel heard when expressing your ideas within the group?	No = 0 Sometimes = 1 Yes = 2	≥ 1
Time	Available time for training	Do you have time to attend training sessions or productive activities?	No = 0 With difficulty = 1 Yes = 2	≥ 1
	Domestic/productive workload	Does domestic work limit your participation in educational activities?	Much = 0 Moderately = 1 Enough = 2	≥ 1
Technical Capabilities	Knowledge of primary pig production	Have you acquired technical skills in primary pig production?	No = 0 Basics = 1 Enough = 2	≥ 1
	Knowledge of pig processing	Have you acquired technical skills in the processing of meat products?	No = 0 Basics = 1 Enough = 2	≥ 1
	Practical application of knowledge	Are these real or familiar production processes?	No = 0 Occasionally = 1 Regularly = 2	≥ 1
Food safety	Improved access to food	Does productive activity contribute to improving access to food in your home?	No = 0 Partially = 1 Yes = 2	≥ 1
	Food diversification	Has productive participation favored a more varied or stable diet?	No = 0 Partially = 1 Yes = 2	≥ 1

Level of Empowerment Score Range

Each woman can have a maximum of 2 points in each item:

Low 0–0.99;

Medium 1.00–1.49;

High 1.50–2.00;

Dimensional average;

A-WEAgI index;

$$\text{A-WEAgI} = \text{"Score Obtained"} / 30 \times 100$$

Low 0–33%;

Average 34–67%;

High 67–100%.

3.6. Information Gathering

The collection of information was developed in four phases: (i) socioeconomic characterization and baseline measurement of empowerment; (ii) implementation of the technical-productive intervention program; (iii) post-intervention measurement through application of the adapted A-WEAgI instrument; and (iv) collection of qualitative information through participant observation, field records and semi-structured testimonies.

Qualitative information was collected through semi-structured individual inter-views conducted after completion of the intervention program, complemented by participant observation and field notes. The interviews lasted approximately 30–45 min and explored participants' perceptions regarding technical capacity development, organizational participation, economic autonomy, food security, and gender-related barriers. An interview guide was developed to ensure consistency while allowing participants to elaborate on their personal experiences and perspectives. A total of 15 interviews were conducted, audio-recorded with participants' consent, and subsequently transcribed verbatim for thematic analysis.

3.7. Data Analysis

The data were processed using Stata (<https://www.stata.com>, accessed on 10 May 2026)/R statistical software version 2020, with descriptive statistics to characterize the participants and analyze the distribution of empowerment dimensions. Spearman's rank correlation coefficient was used to assess associations between empowerment dimensions and variables related to food security. Inferential analyses were interpreted with an exploratory scope.

The classic equation is

$$CS = 1 - (6 \sum d_i^2) / (n(n^2 - 1))$$

where

CS = denotes Spearman's rank correlation coefficient;

d_i = difference between the ranks of each observation;

n = number of data pairs.

Qualitative analysis

The information was analyzed through reflective thematic analysis [40,41] developing an initial coding process, identification of thematic patterns and interpretive construction of categories related to empowerment and food security.

Triangulation

Convergent triangulation of quantitative and qualitative results was performed to strengthen the internal validity of the study's contextual understanding, and comprehensive interpretation of the study findings.

3.8. Ethical Considerations

All participants provided written informed consent before enrolling in the study. The research guaranteed confidentiality, anonymity, and voluntary participation, in accordance with ethical principles applicable to social research with vulnerable populations and victims of armed conflict.

4. Results

4.1. Socioeconomic Characterization

The socioeconomic characterization of the 40 participating women made it possible to highlight the structural conditions of social and economic vulnerability associated with rural contexts historically affected by armed conflict and persistent limitations in access to productive resources, economic stability and food security [42,43] (Table 2).

Table 2. Socioeconomic characterization of the participants.

Variable	Category	Frequency (n)	Percentage (%)
Age	18–30 years	6	15
	31–45 years	22	55
	>45 years	14	35
Marital status	Common-law union	21	52.5
	Married	10	25
	Single woman	6	15
	Widow	3	7.5
Educational level	Incomplete primary education	10	25
	Completed primary education	8	20
	Incomplete secondary education	14	35
	Completed secondary education	6	15
	Technical	2	5
Number of children	1–2 children	8	32
	3–4 children	11	44
	>4 children	6	24
Main economic activity	Agricultural production	16	40
	Unpaid domestic work	13	32.5
	Informal trade	6	15
	Other activities	5	12.5
Monthly household income	<1 SMMLV	38	97
	1–2 SMMLV	2	3
	>2 SMMLV	0	0
Prior participation in training	Yes	14	35
	No	26	65
Access to productive assets	Yes	40	100
	No	0	00
Participation in household economic decisions	Low	0	0
	Average	14	35
	High	26	65
Perceived food security status	Moderate insecurity	21	52.5
	Mild insecurity	14	35
	Acceptable food safety	5	12.5

All participants are officially registered as victims of the armed conflict. Seventy percent of the women reported having a history of forced displacement. These conditions have contributed to instability in subsistence economies and informal activities.

Demographically, the largest segment of the population (55%) is between 31 and 45 years old, corresponding to the economically active population with simultaneous responsibilities for caregiving, production, and family support [44,45]. Similarly, cohabitation predominates (52.5%), reflecting family structures associated with rural dynamics of shared economic and domestic responsibility [46].

Regarding educational attainment, most of the women members have incomplete secondary education (35%) and incomplete primary education (25%). This reflects the persistent limitations in access to and retention in education in rural contexts. These conditions can directly influence the adoption of technologies, business development, and processes of economic autonomy [47].

From an economic perspective, 97% of households reported incomes below the current legal monthly minimum wage, demonstrating precarious financial conditions and limited capacity for saving and productive investment. Although 100% of participants reported having direct access to productive assets, these are community-owned assets associated with the organization's activities, and this access is primarily conditioned on collective use rather than autonomous control of resources or means of production [48].

Regarding household economic decision-making, a high level of participation predominated (64%), followed by a medium level (35%). However, during the qualitative processes, it was identified that this participation mainly consists in decisions related to household management and family food, while strategic decisions regarding investment, marketing, and asset control continue to exhibit dynamics of economic dependence and structural gender limitations.

Regarding food security, more than half of the participants (52.5%) reported moderate food insecurity, associated with unstable income, limited productive diversification, and partial dependence on subsistence economies. These results suggest the presence of multidimensional gaps that justify the implementation of comprehensive strategies for strengthening technical and productive skills and empowering women in post-conflict rural contexts [49,50].

The findings reveal the presence of multidimensional gaps related to income, economic stability, effective access to productive resources and food security, creating a scenario that justifies the implementation of comprehensive strategies for technical-productive strengthening and female empowerment in post-conflict rural contexts [51].

4.2. Baseline of Female Empowerment

The baseline assessment of empowerment (see Table 3) revealed heterogeneous levels among the different dimensions analyzed using the A-WEAgI index (see Table 4), reflecting the coexistence of incipient productive capacities and structural constraints related to economic autonomy, access to resources, and food security [19,20,52].

The WEAgI global women's empowerment index showed an average value of 21%, corresponding to a low level of empowerment [53]. This result suggests that, although the participants possess some degree of productive and organizational participation, significant limitations persist in strategic dimensions associated with resource control, income generation, and economic autonomy.

Table 3. Baseline of female empowerment A-WEAgI.

Dimension	Average Score	Standard Deviation	Predominant Level
Production	1.20	0.27	Medium
Resources	0.96	0.25	Low
Income	0.88	0.29	Low
Leadership	1.08	0.26	Medium
Time	0.92	0.23	Low
Technical capabilities	0.76	0.29	Low
Food security	0.88	0.25	Low

Table 4. Global ranking of the Women's Empowerment Index A-WEAgI.

Indicator Value	Worth
Total average score (out of 30)	6.30
WEAgI Index (%)	21.0
Predominant level of empowerment	Low

The dimension with the highest score was production (1.20 ± 0.27), indicating that women actively participate in agricultural activities and basic food processing. However, this participation does not necessarily translate into autonomous decision-making capacity regarding production processes or marketing, highlighting a gap between participation and effective control of the means of production [54].

The leadership dimension showed an intermediate level (1.08 ± 0.26), primarily associated with participation in community meetings, organizational spaces, and training processes. However, preliminary qualitative results indicated that this participation occurs predominantly in operational and organizational support settings, while strategic decisions remain partially concentrated in traditional hierarchical and familial dynamics.

In contrast, the dimensions of income (0.88 ± 0.29), time use (0.92 ± 0.23), and access to resources (0.96 ± 0.25) showed the lowest levels of adequacy. Specifically, the limitations related to generating one's own income and economic control reflect persistent conditions of financial dependence and limited autonomy in managing productive resources.

The technical skills dimension registered one of the lowest values (0.76 ± 0.29), revealing significant limitations in knowledge related to Agroindustry processing, food safety, and the standardization of meat processing. This finding methodologically justified the implementation of the technical and productive capacity-building program developed during the intervention.

Regarding food security, the average score (0.88 ± 0.25) indicated moderate vulnerability, characterized by limited dietary diversification and reliance on unstable income for food access. These results suggest that food insecurity depends not only on food availability but also on structural constraints related to economic autonomy and productive capacity.

Overall, the baseline findings show that the participants have a predominantly functional and operational empowerment profile, but with significant limitations in strategic dimensions related to economic autonomy, resource control, and decision-making capacity. These results are consistent with previous studies conducted in rural Latin American contexts, where women's productive participation does not necessarily imply effective control over assets, income, or marketing processes [55].

4.3. Relationship Between Empowerment and Food Security

HFIAS food security classification revealed that most participants experienced moderate food insecurity (52%), as shown in Figure 1, followed by mild food insecurity (36%). Only 12% of households reported conditions consistent with acceptable food security, while no cases of severe food insecurity were identified [56]; see Figure 1.

These results reflect persistent conditions of food vulnerability associated with unstable incomes, limited saving capacity, partial dependence on subsistence economies, and restrictions on sustainable access to diverse and nutritious foods. In explaining these dynamics, the prevalence of moderate levels of food insecurity coincides with the limitations identified in strategic dimensions of women's empowerment, particularly in access to resources, economic autonomy, and productive technical skills [57,58].

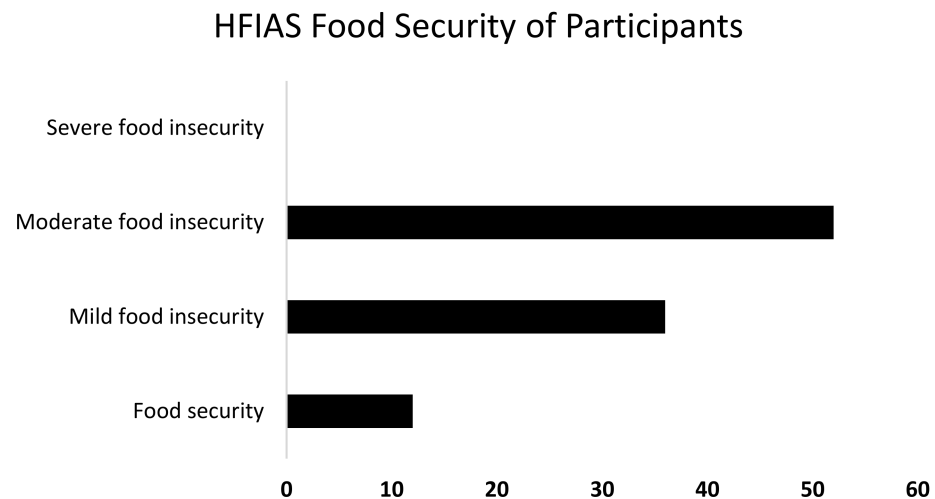


Figure 1. Index of food security of participants.

In addition, the qualitative findings suggest that, although participants manage to maintain basic food security mechanisms through family networks, small-scale agricultural production, and collective community support strategies, difficulties persist related to economic stability, dietary diversification, and continuous access to quality food. In this sense, the observed food insecurity is not solely due to the physical availability of food, but also to structural factors linked to economic exclusion and productive limitations in post-conflict rural contexts [26,28].

Correlations were performed between the average score of each dimension of the A-WEAgI index and the total score obtained on the HFIAS; see Table 5. Because higher values on the HFIAS represent higher levels of food insecurity, the negative correlations indicate that higher levels of female empowerment tended to be associated with lower conditions of food vulnerability.

Table 5. Spearman correlation between dimensions of female empowerment (A-WEAgI) and food security (HFIAS).

Dimension A-WEAgI	Spearman's Coefficient (CS)	p-Value	Magnitude of Association	Interpretation
Production	−0.39	0.053	Low–moderate	Higher productive participation tended to be associated with lower food insecurity
Resources	−0.51	0.012	Moderate	Greater access to and control of resources was linked to better food conditions.
Income	−0.56	0.007	Moderate	Economic autonomy showed a trend associated with a reduction in food insecurity
Leadership	−0.28	0.171	Low	Organizational participation showed a weak association with food security
Time	0.42	0.036	Moderate	Greater time constraints were associated with increased food insecurity
Technical capabilities	−0.49	0.015	Moderate	Technical and productive strengthening tended to be related to better food conditions

Spearman's exploratory analysis showed associative trends between several dimensions of women's empowerment and the food security conditions of the rural households assessed. The dimensions of income ($CS = -0.56$; $p = 0.007$) and resources ($CS = -0.51$; $p = 0.012$) showed the most consistent negative associations with the HFIAS score, suggesting that higher levels of economic autonomy, access to, and control over productive resources tended to be related to lower levels of food insecurity [59].

Technical skills showed a moderate negative association ($CS = -0.49$; $p = 0.015$), indicating that participants with higher levels of technical expertise and practical application of knowledge reported better food security. These results suggest that strengthening technical and productive skills can contribute to improved food stability and reduced economic vulnerabilities in post-conflict rural contexts [60].

The production dimension showed a weak-to-moderate negative association ($CS = -0.39$; $p = 0.053$), indicating a trend whereby higher levels of participation in swine activities and Agroindustry processing may be related to lower levels of food insecurity. However, the magnitude and limited significance of this association suggest that productive participation alone does not guarantee substantial improvements in food security if it is not accompanied by effective access to resources and income generation [61].

On the other hand, the leadership dimension showed a weak and non-significant association ($CS = -0.28$; $p = 0.171$), indicating that, although organizational participation tended to be related to better food conditions, this dimension does not yet represent a determining factor in reducing food insecurity within the evaluated context. This could be explained by the structural limitations that persist in the participants' autonomous access to economic resources and strategic decision-making capacity [62].

In contrast, the time dimension showed a moderate positive association ($CS = 0.42$; $p = 0.036$), indicating that greater constraints related to domestic work and caregiving tended to be associated with higher levels of food insecurity. This result reflects how inequalities in time distribution continue to constitute significant barriers to strengthening women's empowerment and food security in rural households [63].

These findings suggest that security in post-conflict rural contexts maintains a multidimensional relationship with women's empowerment, particularly with dimensions related to economic autonomy, access to productive resources, and technical training. Furthermore, the findings reinforce the need to implement comprehensive strategies that link economic inclusion, productive capacity building, and the reduction in gender gaps as mechanisms to improve the food-related and socioeconomic resilience of rural women [64,65].

4.4. Changes Observed After the Technical–Productive Intervention

The implementation of the technical and productive skills strengthening program revealed positive changes in areas related to technical capabilities, organizational participation, and the practical application of Agroindustry knowledge. Overall, participants reported greater confidence in activities associated with meat processing, hygienic food handling, and participation in collective production processes.

During the theoretical and practical sessions, a progressive increase in the active participation of the members was observed, particularly in activities related to the formulation of pork products, the application of good manufacturing practices, and the collaborative resolution of production problems. Field records showed that the participants strengthened skills related to basic process standardization, hygienic handling of raw materials, and the operational organization of artisanal Agroindustry activities.

In quantitative terms, the dimensions associated with technical skills and leadership showed the greatest changes after the intervention process. Specifically, participants

reported improvements in knowledge related to primary pig production, Agroindustry processing, and the practical application of learning in domestic and production contexts.

The technical skills dimension showed the greatest increase after the intervention (+0.72) see Figure 2, demonstrating a significant acquisition of knowledge related to Agroindustry transformation, food safety, and the practical application of production processes. This suggests that the methodological components based on experiential learning and practical problem-solving facilitated the transfer and assimilation of technical knowledge.

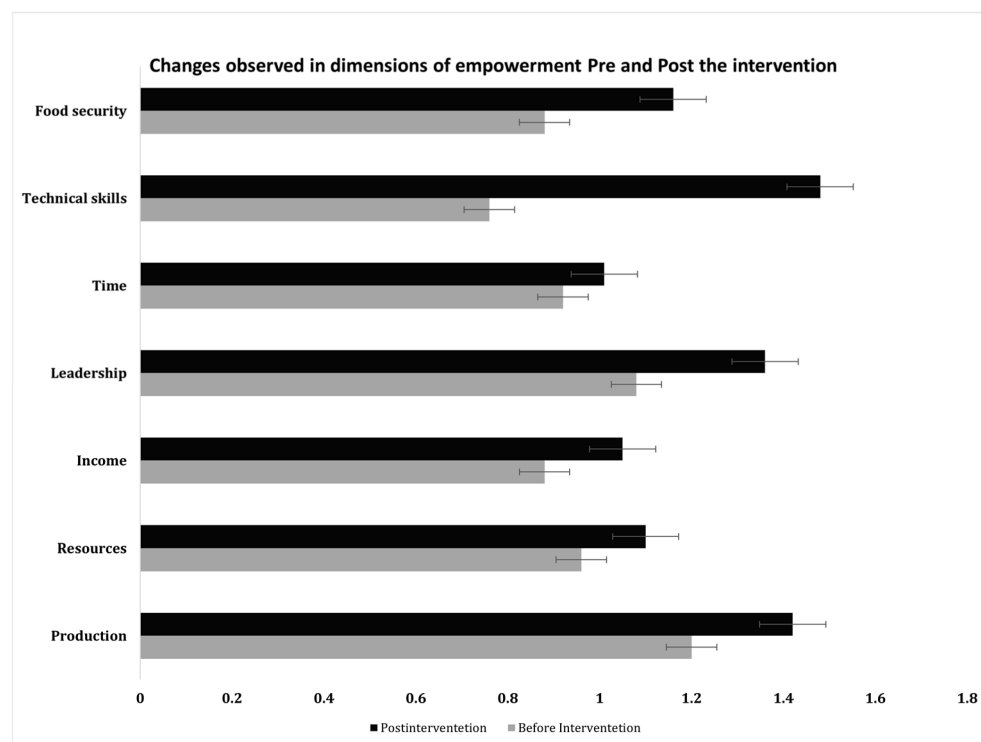


Figure 2. Changes observed in dimensions of empowerment before and after the intervention.

Likewise, the leadership dimension showed significant improvements (+0.28), particularly related to participation in collective activities, organizational interaction, and the strengthening of collaborative dynamics among participants. The group work processes developed during the intervention fostered spaces for interaction and mutual recognition, strengthening active participation within the organization.

Although the dimensions related to income and access to resources showed moderate increases, structural limitations persisted regarding investment capacity, marketing, and economic autonomy. This demonstrates that, while technical and productive strengthening contributes to women's empowerment, structural changes related to financial autonomy require longer-term support processes and effective access to economic resources and rural markets.

Additionally, the qualitative findings showed that several participants perceived improvements in their confidence to participate in production processes and decision-making related to agri-food activities. Some women stated that the training helped them strengthen previously limited skills and generate greater interest in initiatives associated with rural entrepreneurship and food processing.

That food security in post-conflict rural contexts maintains a multidimensional relationship with women's empowerment participatory technical and productive interventions can contribute to strengthening the Agroindustry and organizational capacities of rural women victims of armed conflict. However, the findings also demonstrate that women's

empowerment is a gradual and multidimensional process, conditioned by structural factors related to access to resources, economic autonomy, and persistent gender inequalities.

4.5. Qualitative Results: Perceptions of Empowerment and Food Security

The reflective thematic analysis identified interpretive patterns related to technical and productive capacity building, organizational participation, economic autonomy, and food security. Through the coding and triangulation of testimonies, field notes, and participant observation, five main categories emerged, associated with the participants' experiences during the intervention process.

4.5.1. Strengthening Technical Capacities and Appropriation of Knowledge

To explore participants' perceptions regarding the effects of the intervention on their technical competencies, semi-structured individual interviews included the following guiding question: "How has the training process influenced your technical knowledge and productive skills related to pig production and food processing?"

The participants reported that the training process strengthened previously limited knowledge related to agroindustrial processing, hygienic food handling, and the production of pork-based products. Several women indicated that, prior to the intervention, they had practical experience in pig farming activities but lacked technical knowledge regarding food processing, food safety, and product standardization.

"We knew how to work with pigs, but we didn't know how to make well-organized products or follow hygiene measures." (Participant 7)

Participants also emphasized that the combination of theoretical and practical activities increased their confidence in participating in productive processes and applying the acquired knowledge in both household and community settings "We learned things we didn't know before, and now we have more confidence to work and teach other colleagues." (Participant 12).

The interviews revealed that knowledge acquisition extended beyond technical learning and contributed to greater self-confidence and active engagement in productive activities. Women frequently associated the training process with increased autonomy in performing agroindustrial tasks and a greater willingness to share knowledge with other members of the association.

Field observation records supported these perceptions, showing a progressive increase in active participation, practical application of technical knowledge, and collaborative learning during agroindustrial transformation activities. Participants demonstrated greater familiarity with hygienic food handling procedures, product standardization practices, and basic food safety principles throughout the intervention process.

These findings are consistent with the quantitative results, which identified technical capabilities as the dimension exhibiting the greatest improvement following the intervention. The convergence of quantitative and qualitative evidence suggests that participatory training processes can effectively strengthen technical competencies and contribute to the productive empowerment of rural women in post-conflict contexts.

4.5.2. Organizational Participation and Collective Leadership

The collective dynamics developed during the intervention strengthened spaces for interaction, mutual support, and organizational participation within the association. Participants reported feeling more involved in meetings, group activities, and decision-making processes related to community production. To examine organizational participation and leadership development, participants were asked: "Have you noticed any changes in

your participation in meetings, collective activities, or organizational decision-making processes?"

"Before, we hardly spoke in meetings, now we participate more and give our opinions."
(Participant 4)

However, some women pointed out that strategic decisions continue partly consist in traditional leadership figures and previously established family dynamics.

4.5.3. Economic Autonomy and Structural Limitations

Although the participants acknowledged progress in productive capacities and the generation of opportunities, perceptions related to economic dependence and difficulties in accessing financial resources and their own means of production persisted.

To explore perceptions of economic empowerment, participants were asked: "To what extent has your participation in the association contributed to your economic autonomy and income-generating opportunities?"

"We learned a lot, but we still need support to be able to produce and sell more." (Participant 15)

The testimonies showed that economic limitations continue to condition the sustainability of rural productive initiatives, especially in households with unstable incomes and multiple family responsibilities.

4.5.4. Food Security and Resilience Strategies

The participants described community and family strategies aimed at sustaining basic access to food, including self-consumption, support networks, and small-scale agricultural production.

To understand household food security practices, participants were asked: "How do you currently manage food access and food security within your household?"

"Sometimes you help each other out as neighbors or with the little that is produced on the farm." (Participant 19)

Likewise, several women perceived that the technical-productive strengthening could represent a future opportunity to improve household income and food security.

4.5.5. Gender Barriers and Care Burden

Barriers related to unequal distribution of time and domestic responsibilities persisted. Several participants reported difficulties in consistently attending training sessions due to family caregiving responsibilities and unpaid domestic work. To identify persistent barriers affecting participation, participants were asked: "What barriers limit your participation in productive or training activities?"

"Many times we couldn't come because we had to take care of the house and the children."
(Participant 8)

These findings show that gender inequalities continue to limit women's full participation in processes of productive strengthening and economic autonomy.

4.6. Triangulated Integration of Results

Convergent methodological triangulation integrated the results obtained through the A-WEAgI index, the HFIAS, Spearman's exploratory analysis, and the findings derived from the reflective thematic analysis, allowing for the identification of convergences between the quantitative and qualitative dimensions of the study.

The quantitative results revealed low levels of empowerment in dimensions related to income, access to resources, technical skills, and time use. This was consistent with the participants' testimonies, who reported persistent limitations associated with economic dependence, marketing difficulties, and restrictions stemming from domestic and caregiving responsibilities. The correlations observed between income, resources, and food security were consistent with the qualitative perceptions, where the women identified economic autonomy and access to productive means as key factors for improving household food security.

The technical skills dimension showed a particularly important convergence between the quantitative and qualitative results. Following the intervention, participants demonstrated improvements in knowledge related to Agroindustry processing and food safety, while testimonies and participant observation records reflected greater confidence and practical appropriation of knowledge in community-based productive activities.

Although the leadership dimension showed a limited statistical association with food security, the qualitative findings revealed progress in organizational participation, expression of opinions, and the strengthening of collective dynamics within the association. This suggests that some social dimensions of empowerment can generate progressive transformations that are not necessarily immediately reflected in economic or food indicators.

The time-use constraints showed consistency between the statistical results and the participants' accounts, who indicated that domestic and caregiving responsibilities continue to limit their participation in productive and educational processes. Overall, the triangulation revealed that women's empowerment and food security are multidimensional and interdependent processes, conditioned by economic, productive, and sociocultural factors in post-conflict rural contexts.

5. Discussion

The results of this study demonstrate that women's empowerment and food security are multidimensionally related in post-conflict rural contexts, where factors associated with economic autonomy, access to productive resources, technical skills, and organizational participation significantly influence household food resilience. The findings obtained using the adapted A-WEAgI index, the HFIAS, and qualitative analysis suggest that rural women involved in agricultural production processes have made significant progress in productive participation and organizational strengthening; however, structural limitations related to resource control, economic stability, and the unequal distribution of domestic work persist.

The baseline revealed predominantly low levels of empowerment in dimensions related to income, access to resources, and technical skills, consistent with recent studies conducted in Latin America, where rural women continue to face historical restrictions in accessing land, productive capital, and economic autonomy. Research in Latin American rural systems has demonstrated that women's effective access to productive resources significantly contributes to improving food security and the economic sustainability of households.

The results obtained align with international evidence indicating that women's empowerment within food systems can have positive effects on food availability, economic access, and household nutritional stability. According to a recent systematic review, interventions aimed at strengthening women's empowerment have significant impacts on food security when they simultaneously integrate economic, productive, and organizational components [66–68].

In the evaluated context, the income and resource dimensions showed moderate negative associations with the HFIAS score, indicating that higher levels of economic autonomy tended to be related to lower levels of food insecurity. These results support

theoretical approaches that consider economic empowerment a central mechanism for increasing decision-making capacity regarding consumption, production, and access to food within rural households [69,70].

One of the most significant findings of the study was the strengthening of technical capacities following the intervention process. The improvements observed in knowledge related to Agroindustry processing, food safety, and the practical application of knowledge reflect that participatory training processes can significantly contribute to strengthening the functional and productive capacities of rural women [71]. This finding aligns with recent research on agri-food value chains, which has shown that programs focused on technical and organizational strengthening promote economic empowerment and women's participation in rural production systems [72].

However, the results also showed that women's productive participation does not necessarily translate into full economic autonomy or effective control over strategic resources. Although the participants showed progress in leadership and organizational participation, limitations persisted related to access to capital, marketing, and the economic sustainability of their productive initiatives. This finding aligns with studies conducted in rural Latin American contexts, where women actively participate in agricultural and agri-food activities but continue to occupy less favorable positions within production and marketing chains [73].

Additionally, the time dimension showed consistent associations between domestic workload and food insecurity, demonstrating that caregiving responsibilities continue to represent a structural barrier to strengthening rural women's empowerment. Several studies have indicated that increased female participation in productive activities can coexist with excessive workloads and time constraints that affect women's well-being and food security. In the present study, several participants reported difficulties in sustaining training and entrepreneurship processes due to unpaid domestic responsibilities, which indicated the persistence of gender inequalities in the distribution of care work [74,75].

From a territorial perspective, these findings are particularly relevant given the post-conflict context of Santa Rosa del Sur, Bolívar, where rural vulnerability, economic exclusion, and productive transformation continue to limit development opportunities for rural women. Recent research in areas affected by armed conflict in Colombia has indicated that rural productive transformations often coexist with persistent food insecurity and socioeconomic inequality [76]. In this context, associative processes and technical-productive strengthening can represent important mechanisms for community reconstruction, resilience building, and strengthening local capacities [75].

The results also suggest that women's empowerment should be understood as a gradual, relational, and multidimensional process, extending beyond purely economic or productive indicators. Although some dimensions showed improvements after the intervention, structural changes related to economic autonomy, resource control, and the reduction in gender inequalities require sustained processes of institutional support, organizational strengthening, and effective access to rural economic opportunities. This interpretation aligns with contemporary approaches to women's empowerment in agriculture, which emphasizes that the effects of empowerment depend largely on the social, institutional, and cultural context in which interventions take place [77,78].

Among the main limitations of the study are the small sample size and the specific territorial nature of the case study, which limits the statistical generalizability of the results. The correlational analysis developed using Spearman's rank correlation coefficient should be interpreted as exploratory rather than causal. However, the integration of quantitative analysis, qualitative evidence, and methodological triangulation strengthens the contextual

validity of the findings and provides relevant evidence of women's empowerment and food security in post-conflict rural settings in Colombia, which are understudied.

Finally, the results highlight the need to promote comprehensive policies and interventions that integrate technical and productive capacity building, economic inclusion, access to resources, and the reduction in gender gaps as strategies to improve the food resilience of rural women. In particular, the findings suggest that interventions based solely on productive participation are insufficient if they are not accompanied by mechanisms aimed at strengthening economic autonomy, control of resources, and recognition of care work within rural agri-food systems.

6. Conclusions

This study demonstrated that women's empowerment and food security are multidimensionally related among rural women belonging to the Association in Santa Rosa del Sur, Bolívar. The results showed that the main limitations of empowerment were associated with access to resources, economic autonomy, technical skills, and constraints stemming from domestic responsibilities—factors that directly influenced the conditions of food vulnerability identified using the HFIAS.

WEAgI index, Spearman's rank correlation coefficient, and qualitative triangulation revealed that higher levels of technical skills, access to resources, and income were associated with lower levels of food insecurity. The empirical evidence also demonstrates the technical and productive intervention process contributed to strengthening the participants' Agroindustry skills, organizational participation, and practical knowledge acquisition.

However, the findings showed that women's productive participation alone does not guarantee full economic autonomy or a structural transformation of gender inequalities. Limitations related to access to capital, economic sustainability, and the unequal distribution of care work persisted, confirming that women's empowerment is a gradual, relational process conditioned by structural factors specific to post-conflict rural contexts.

The findings suggest that rural empowerment strategies with a gender focus should simultaneously integrate technical training, economic inclusion, organizational strengthening, and recognition of care work to sustainably contribute to improving the food security and socioeconomic resilience of rural women.

It is recommended that future research expand the sample size and develop longitudinal follow-up studies to assess the sustainability of the observed changes in women's empowerment and food security in the medium and long term. To provide a more nuanced understanding, it is pertinent to incorporate comparative analyses between rural associations and different territorial contexts affected by armed conflict, in order to strengthen the understanding of the sociocultural and economic factors that influence the processes of rural women's empowerment.

Author Contributions: Conceptualization, L.C.O.-A.; methodology, S.M.M.-R.; software, I.P.Q.-L.; validation, S.M.M.-R., A.M.S.-B.; formal analysis, L.C.O.-A.; investigation, L.C.O.-A.; resources, I.P.Q.-L. data curation, I.P.Q.-L.; writing—original draft preparation, L.C.O.-A.; writing—review and editing, L.C.O.-A.; visualization, S.M.M.-R.; supervision, A.M.S.-B.; project administration, O.O.P.-A. All authors have read and agreed to the published version of the manuscript.

Funding: This research was funded by Ministerio de Ciencia, Tecnología e Innovación de Colombia, for funding the project “Strengthening the pork processing link as a sustainable strategy for the Association in the municipality of Santa Rosa del Sur, Bolívar” (Project No. 109779, Call 948/2024) through the Orquídeas Program “Women in Science 2024”.

Institutional Review Board Statement: This research adhered to the ethical standards for social science research involving human participants and complied with the Colombian regulatory framework

established in Resolution 8430 of 1993. The study was classified as minimal-risk research because it involved surveys, interviews, and participatory activities without biomedical intervention or exposure to physical or psychological harm. All participants voluntarily agreed to participate through informed consent procedures. To ensure confidentiality and data protection, personal identifiers were removed during data processing and analysis. No sensitive personal or clinical information was collected. Consequently, additional Institutional Review Board (IRB) approval was not required for the present study under the applicable institutional and national ethical provisions (AIA-031-25).

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Data Availability Statement: The data supporting the findings of this study are original and were collected specifically for this research. However, these datasets are not publicly available due to the sensitive nature of the information and the privacy agreements established with the participants. Access is restricted to ensure confidentiality and anonymity, in accordance with institutional protocols and ethical guidelines.

Acknowledgments: The authors acknowledge the University Institute of Peace for execution, methodology and support within the project's scope. The authors also acknowledge the Ministry of Science, Technology and Innovation of Colombia for funding the project "Strengthening the pork processing link as a sustainable strategy for the Association in the municipality of Santa Rosa del Sur, Bolívar" (Project No. 109779, Call 948/2024) through the Orquídeas Program "Women in Science 2024".

Conflicts of Interest: The authors declare no conflicts of interest.

Abbreviations

The following abbreviations are used in this manuscript:

A-WEAgI	Women's Empowerment in Agriculture
HFIAS	Food Security Access Scale
CS	Coeficiente Spearman
GMP	Good Manufacturing Practices
SMMLV	Current Monthly Minimum Wage

References

1. Ogwu, M.C.; Izah, S.C.; Ntuli, N.R. *Food Safety and Quality in the Global South*; Springer: Singapore, 2024.
2. Leblang, D.; Smith, M.D.; Wesselbaum, D. Food Insecurity across Age: Evidence from a Global Study. *Glob. Food Secur.* **2025**, *47*, 100891. [[CrossRef](#)]
3. Mane, E.; Macchioni Giaquinto, A.; Cafiero, C.; Viviani, S.; Anríquez, G. Closing the Gender Gap in Global Food Insecurity: Socioeconomic Determinants and Economic Gains in the Aftermath of COVID-19. *Glob. Food Secur.* **2025**, *45*, 100850. [[CrossRef](#)]
4. Food and Agriculture Organization of the United Nations. *The State of Food Security and Nutrition in the World*; Food and Agriculture Organization of the United Nations: Rome, Italy, 2025.
5. Basurko, C.; Savy, M.; Galindo, M.S.; Gatti, C.; Osei, L.; Nacher, M.; Dramé, M. Prevalence of Food Insecurity during Pregnancy in Latin American and the Caribbean Countries: A Systematic Review. *J. Nutr.* **2025**, *155*, 250–259. [[CrossRef](#)] [[PubMed](#)]
6. World Food Programme. *Saving Lives Changing Lives*; World Food Programme: Rome, Italy, 2025.
7. Diana Deere, C.; Alvarado, G.E.; Twyman, J. Gender Inequality in Asset Ownership in Latin America: Female Owners vs. Household Heads. *Dev. Change* **2012**, *43*, 505–530. [[CrossRef](#)]
8. Schling, M.; Pazos, N. Effective Land Ownership, Female Empowerment, and Food Security: Evidence from Peru. *World Dev.* **2024**, *181*, 106680. [[CrossRef](#)]
9. Haque, S.; Salman, M.; Hasan, M.M.; Prithi, A.A.; Hossain, M.E. Women's Empowerment and Its Role in Household Food Security to Achieve SDGs: Empirical Evidence from Rural Bangladesh. *Sustain. Dev.* **2024**, *32*, 4297–4314. [[CrossRef](#)]
10. Arrieta Flórez, R.; Córdoba Girado, L.L.; Marín Uparela, K.; Sayas Contreras, R. La Participación Política Como Resistencia: El Caso de La Agencia de Derechos Humanos En Montes de María, Colombia. *Rev. Int. Pensam. Político* **2020**, *14*, 131–151. [[CrossRef](#)]
11. Estrada, S.; Pasaje, M.; Botache, J.P.; Méndez, F.; Estrada, S.; Pasaje, M.; Botache, J.P.; Méndez, F. La Lucha Por La Alimentación En Medio de La Inequidad Social y La Violencia: Inseguridad Alimentaria En El Piedemonte Amazónico En Caquetá. *Biomédica* **2025**, *45*, 542–557. [[CrossRef](#)] [[PubMed](#)]

12. DANE (Departamento Administrativo Nacional de Estadística) Encuesta Nacional de Presupuestos de Los Hogares (ENPH). Available online: <https://webapps.ilo.org/surveyLib/index.php/catalog/8828> (accessed on 14 May 2026).
13. Seff, I.; Meinhart, M.; Sarraf, D.; Abu Zuhair, A.; Sofia, J.; Atuheire, R.; Lee, J.; Ahmed, N.; Poulton, C.; Stark, L. Women's Collectives and Social Support: Exploring Pathways and Impacts among Forcibly Displaced Women. *Front. Sociol.* **2024**, *9*, 1409332. [CrossRef] [PubMed]
14. Vesco, P.; Baliki, G.; Brück, T.; Döring, S.; Eriksson, A.; Fjelde, H.; Guha-Sapir, D.; Hall, J.; Knutsen, C.H.; Leis, M.R.; et al. The Impacts of Armed Conflict on Human Development: A Review of the Literature. *World Dev.* **2025**, *187*, 106806. [CrossRef]
15. Fertő, I.; Bojnec, Š. Gender Equality and Green Entrepreneurship in Farms. *Sustain. Dev.* **2025**, *33*, 3985–4008. [CrossRef]
16. Wei, W.; Sarker, T.; Żukiewicz-Sobczak, W.; Roy, R.; Monirul Alam, G.M.; Rabbany, M.G.; Hossain, M.S.; Aziz, N. The Influence of Women's Empowerment on Poverty Reduction in the Rural Areas of Bangladesh: Focus on Health, Education and Living Standard. *Int. J. Environ. Res. Public Health* **2021**, *18*, 6909. [CrossRef] [PubMed]
17. Castro, I.; Vibanco, M.; Martinez-Beltran, T.; Doria-Arrieta, J.; Gonzalez-Navarro, R.M.; Villareal-Blanco, V. Territory in Dispute and Forced Displacement in Southern Bolívar—Magdalena Medio (2020–2024): An of Emerging Conflict Dynamics in the Post-Agreement Context. *Rev. Jurídica* **2025**, *17*, 101–124.
18. Malagón-Castro, L.E.; Vázquez-Parra, J.C.; Valencia-González, G.C.; Restrepo-Jaramillo, L.G. Innovation and Resignification: Social Entrepreneurship for Reincorporating Women into Peace Communities. *Adm. Sci.* **2025**, *15*, 245. [CrossRef]
19. Ragsdale, K.; Read-Wahidi, M.R.; Wei, T.; Martey, E.; Goldsmith, P. Using the WEAI+ to Explore Gender Equity and Agricultural Empowerment: Baseline Evidence among Men and Women Smallholder Farmers in Ghana's Northern Region. *J. Rural Stud.* **2018**, *64*, 123–134. [CrossRef]
20. Hillesland, M.; Kaaria, S.; Mane, E.; Alemu, M.; Slavchevska, V. Does a Joint United Nations Microfinance 'plus' Program Empower Female Farmers in Rural Ethiopia? Evidence Using the pro-WEAI. *World Dev.* **2022**, *156*, 105909. [CrossRef]
21. DeJaeghere, J.; Pellowski Wiger, N.; Le, H.; Luong, P.; Ngo, N.T.H.; Vu, T.T.; Lee, J. Why Do Aspirations Matter for Empowerment?: Discrepancies between the A-WEAI Domains and Aspirations of Ethnic Minority Women in Vietnam. *World Dev.* **2022**, *159*, 106057. [CrossRef]
22. FAO; IFAD; UNICEF; WFP; WHO. *The State of Food Security and Nutrition in the World 2024: Financing to End Hunger, Food Insecurity and Malnutrition in All Its Forms*; FAO: Rome, Italy, 2024. [CrossRef]
23. Salinas-Roca, B.; Carrillo-Álvarez, E.; Tecchia, L.; Rubió-Piqué, L.; Lecube, A. Food Insecurity, Obesity, and Lifestyle in Spanish Food Aid Recipients. *BMC Public Health* **2026**, *26*, 67. [CrossRef]
24. Bhagat, A. Experimental Financial Inclusion as Refugee Management: Shelter Insecurities at the Bottom of the Pyramid in Kenya. *Int. J. Hous. Policy* **2021**, *21*, 484–504. [CrossRef]
25. George, J.; Adelaja, A. Forced Displacement and Agriculture: Implications for Host Communities. *Sustainability* **2021**, *13*, 5728. [CrossRef]
26. Bar-Tal, D.; Diamond, A.H.; Nasie, M. Political Socialization of Young Children in Intractable Conflicts: Conception and Evidence. *Int. J. Behav. Dev.* **2017**, *41*, 415–425. [CrossRef]
27. George, J.; Adelaja, A. Armed Conflicts, Forced Displacement and Food Security in Host Communities. *World Dev.* **2022**, *158*, 105991. [CrossRef]
28. Adhikari, P. Conflict-Induced Displacement, Understanding the Causes of Flight. *Am. J. Pol. Sci.* **2013**, *57*, 82–89. [CrossRef]
29. Kabeer, N. Resources, Agency, Achievements: Reactions on the Measurement of Women's Empowerment. *Dev. Change* **1999**, *30*, 435–464. [CrossRef]
30. Holland, C.; Rammohan, A. Rural Women's Empowerment and Children's Food and Nutrition Security in Bangladesh. *World Dev.* **2019**, *124*, 104648. [CrossRef]
31. Ghosh, S.; Sen, L.C.; Mali, S.K.; Islam, M.M.; Bakchi, J. The Role of Rural Women in Household Food Security and Nutrition Management in Bangladesh. *Asian J. Women's Stud.* **2021**, *27*, 441–459. [CrossRef]
32. Malapit, H.; Quisumbing, A.; Meinzen-Dick, R.; Seymour, G.; Martinez, E.M.; Heckert, J.; Rubin, D.; Vaz, A.; Yount, K.M. Development of the Project-Level Women's Empowerment in Agriculture Index (pro-WEAI). *World Dev.* **2019**, *122*, 675–692. [CrossRef] [PubMed]
33. Quisumbing, A.; Meinzen-Dick, R.; Malapit, H. Women's Empowerment and Gender Equality in South Asian Agriculture: Measuring Progress Using the Project-Level Women's Empowerment in Agriculture Index (pro-WEAI) in Bangladesh and India. *World Dev.* **2022**, *151*, 105396. [CrossRef] [PubMed]
34. Smith, M.D.; Rabbitt, M.P.; Coleman- Jensen, A. Who Are the World's Food Insecure? New Evidence from the Food and Agriculture Organization's Food Insecurity Experience Scale. *World Dev.* **2017**, *93*, 402–412. [CrossRef]
35. Capitán-Moyano, L.; Arias-Fernández, M.; Yáñez, A.M.; Bennasar-Veny, M.; Castro-Sánchez, E. Environmental Factors of Food Insecurity in Adolescents: A Global Scoping Review. *J. Adolesc. Health* **2026**, *78*, 35–44. [CrossRef] [PubMed]
36. Mahase-Forgenie, M.; Forgenie, D. Chronic Food Insecurity in Caribbean SIDS: The Role of Income, Globalization, and Financial Institution Access. *Food Humanit.* **2025**, *5*, 100772. [CrossRef]

37. Appiah-Twumasi, M.; Asale, M.A. Crop Diversification and Farm Household Food and Nutrition Security in Northern Ghana. *Environ. Dev. Sustain.* **2024**, *26*, 157–185. [\[CrossRef\]](#)
38. Cafiero, C.; Viviani, S.; Nord, M. Food Security Measurement in a Global Context: The Food Insecurity Experience Scale. *Measurement* **2018**, *116*, 146–152. [\[CrossRef\]](#)
39. Braun, V.; Clarke, V. Conceptual and Design Thinking for Thematic Analysis. *Qual. Psychol.* **2021**, *9*, 3–26. [\[CrossRef\]](#)
40. Clark, R.S.; Plano Clark, V.L. The Use of Mixed Methods to Advance Positive Psychology: A Methodological Review. *Int. J. Wellbeing* **2022**, *12*, 35–55. [\[CrossRef\]](#)
41. Byrne, D. A Worked Example of Braun and Clarke’s Approach to Reflexive Thematic Analysis. *Qual. Quant.* **2022**, *56*, 1391–1412. [\[CrossRef\]](#)
42. Suárez-Baquero, D.F.M.; Bejarano-Beltrán, M.P.; Champion, J.D. Rural Women in Colombia, Facing the Postconflict: A Qualitative Synthesis. *Trauma Violence Abus.* **2022**, *23*, 1302–1316. [\[CrossRef\]](#)
43. Sinclair, K.; Thompson-Colón, T.; Sara Eloísa Del Castillo, M.; Olaya, E.; Melgar-Quinonez, H. Food Insecurity Among the Adult Population of Colombia Between 2016 and 2019: The Post Peace Agreement Situation. *Food Nutr. Bull.* **2022**, *43*, 251–270. [\[CrossRef\]](#) [\[PubMed\]](#)
44. Morimoto, A.; Furuki, H.; Sugita, N.; Hayashi, R.; Sonoda, N. Associations of Total Daily Working Hours Encompassing Unpaid Care and Domestic Work with Nonrestorative Sleep and Mental Health in Middle-Aged Japanese Men and Women: A Cross-Sectional Study. *Soc. Sci. Med.* **2026**, *392*, 118965. [\[CrossRef\]](#) [\[PubMed\]](#)
45. Morimoto, A.; Koh, C.; Yasumoto, R.; Furuki, H.; Watanabe, K.; Tsuzuki, C.; Sonoda, N. Relationship between Communicative and Critical Health Literacy, Health Information Sources, and Participation in Health Checkups among Middle-Aged Japanese Community Residents. *Prev. Med.* **2022**, *161*, 269–274. [\[CrossRef\]](#) [\[PubMed\]](#)
46. Lachance-Grzela, M.; Bouchard, G. Why Do Women Do the Lion’s Share of Housework? A Decade of Research. *Sex Roles* **2010**, *63*, 767–780. [\[CrossRef\]](#)
47. Craig, L.; Churchill, B. Dual-Earner Parent Couples’ Work and Care During COVID-19. *Gend. Work. Organ.* **2021**, *28*, 66–79. [\[PubMed\]](#)
48. Doss, C.; Gottlieb, C. Gendered Patterns of Labor in Agriculture. *Agric. Econ.* **2025**, *56*, 431–445. [\[CrossRef\]](#)
49. Ferrant, G.; Thim, A. *Measuring Women’s Economic Empowerment*; OECD: Paris, France, 2019; p. 16. [\[CrossRef\]](#)
50. Olumakaiye, M.F.; Popoola, B.R.; Abioye, B. Influence of Women’s Empowerment on Household Food Security. *Int. J. Home Econ.* **2019**, *12*, 45–54.
51. Aziz, N.; He, J.; Raza, A.; Sui, H. A Systematic Review of Review Studies on Women’s Empowerment and Food Security Literature. *Glob. Food Secur.* **2022**, *34*, 100647. [\[CrossRef\]](#)
52. Dione, M.; Seymour, G.; Ferguson, N.; Malapit, H. Calculating the Women’s Empowerment in Agriculture Index (WEAI) Using Stata. *Stata J.* **2024**, *24*, 746–765. [\[CrossRef\]](#)
53. Sraboni, E.; Malapit, H.J.; Quisumbing, A.R.; Ahmed, A.U. Women’s Empowerment in Agriculture: What Role for Food Security in Bangladesh? *World Dev.* **2014**, *61*, 11–52. [\[CrossRef\]](#)
54. Quisumbing, A.; Cole, S.; Elias, M.; Faas, S.; Galiè, A.; Malapit, H.; Meinzen-Dick, R.; Myers, E.; Seymour, G.; Twyman, J. Measuring Women’s Empowerment in Agriculture: Innovations and Evidence. *Glob. Food Secur.* **2023**, *38*, 100707. [\[CrossRef\]](#) [\[PubMed\]](#)
55. Leeson, K.; Bhandari, P.B.; Myers, A.; Buscher, D. Measuring the Self-Reliance of Refugees. *J. Refug. Stud.* **2020**, *33*, 86–106. [\[CrossRef\]](#)
56. Santos, M.P.; Brewer, J.D.; Lopez, M.A.; Paz-Soldan, V.A.; Chaparro, M.P. Determinants of Food Insecurity among Households with Children in Villa El Salvador, Lima, Peru: The Role of Gender and Employment, a Cross-Sectional Study. *BMC Public Health* **2022**, *22*, 717. [\[CrossRef\]](#) [\[PubMed\]](#)
57. Doss, C.; Meinzen-Dick, R.; Quisumbing, A.; Theis, S. Women in agriculture: Four myths. *Glob. Food Secur.* **2018**, *16*, 69–74. [\[CrossRef\]](#) [\[PubMed\]](#)
58. Kehinde, M.O.; Shittu, A.M.; Adeyonu, A.G.; Ogunnaike, M.G. Women Empowerment, Land Tenure and Property Rights, and Household Food Security among Smallholders in Nigeria. *Agric. Food Secur.* **2021**, *10*, 25. [\[CrossRef\]](#)
59. Bernal, J.; Martínez, A.A. Measurement of Food-Nutrition Insecurity, Hunger and Coping Strategies in Children and Adolescents in Medellín-Colombia. *Arch. Latinoam. Nutr.* **2020**, *70*, 20–29. [\[CrossRef\]](#)
60. Pertuz-Guzmán, D.L.; Chams-Chams, L.M.; Valencia-Jiménez, N.N.; Arrieta-Díaz, J.; Luna-Carrascal, J. Comprender la Inseguridad Alimentaria En Familias Rurales: Un Estudio de Caso En Pueblo Nuevo (Córdoba, Colombia). *Atención Primaria* **2025**, *57*, 103109. [\[CrossRef\]](#) [\[PubMed\]](#)
61. Alkire, S.; Meinzen-Dick, R.; Peterman, A.; Quisumbing, A.; Seymour, G.; Vaz, A. The Women’s Empowerment in Agriculture Index. *World Dev.* **2013**, *52*, 71–91. [\[CrossRef\]](#)
62. Ntsoane, R.P.; Tekana, S.S.; Mbombo-Dweba, T.P. Women Empowerment and Food Security among Urban Crop Farmers in Ekurhuleni, South Africa. *Asian Dev. Policy Rev.* **2025**, *13*, 486–506. [\[CrossRef\]](#)

63. Brucker, D.L.; Jajtner, K.; Mitra, S. Does Social Security Promote Food Security? Evidence for Older Households. *Appl. Econ. Perspect. Policy* **2022**, *44*, 671–686. [\[CrossRef\]](#)
64. Quisumbing, A.; Ahmed, A.; Hoddinott, J.; Pereira, A.; Roy, S. Designing for Empowerment Impact in Agricultural Development Projects: Experimental Evidence from the Agriculture, Nutrition, and Gender Linkages (ANGeL) Project in Bangladesh. *World Dev.* **2021**, *146*, 105622. [\[CrossRef\]](#) [\[PubMed\]](#)
65. Quisumbing, A.R.; Meinzen-Dick, R.; Malapit, H.J.; Seymour, G.; Heckert, J.; Doss, C.; Johnson, N.; Rubin, D.; Thai, G.; Ramani, G.; et al. Enhancing Agency and Empowerment in Agricultural Development Projects: A Synthesis of Mixed Methods Impact Evaluations from the Gender, Agriculture, and Assets Project, Phase 2 (GAAP2). *J. Rural Stud.* **2024**, *108*, 103295. [\[CrossRef\]](#) [\[PubMed\]](#)
66. Ruel, M.T.; Quisumbing, A.R.; Balagamwala, M. Nutrition-sensitive agriculture: What have we learned so far? *Glob. Food Secur.* **2018**, *17*, 128–153. [\[CrossRef\]](#)
67. Essilfie, G.; Sebu, J.; Annim, S.K.; Asmah, E.E. Women’s Empowerment and Household Food Security in Ghana. *Int. J. Soc. Econ.* **2021**, *48*, 279–296. [\[CrossRef\]](#)
68. Asadullah, M.N.; Kambhampati, U. Feminization of Farming, Food Security and Female Empowerment. *Glob. Food Secur.* **2021**, *29*, 100532. [\[CrossRef\]](#)
69. Frongillo, E.A.; Nguyen, H.T.; Smith, M.D.; Coleman-Jensen, A. Food Insecurity Is More Strongly Associated with Poor Subjective Well-Being in More-Developed Countries than in Less-Developed Countries. *J. Nutr.* **2019**, *149*, 330–335. [\[CrossRef\]](#) [\[PubMed\]](#)
70. Frongillo, E.A.; Nguyen, H.T.; Smith, M.D.; Coleman-Jensen, A. Food Insecurity Is Associated with Subjective Well-Being among Individuals from 138 Countries in the 2014 Gallup World Poll. *J. Nutr.* **2017**, *147*, 680–687. [\[CrossRef\]](#) [\[PubMed\]](#)
71. Hernandez, M.A.; Alarcon, C.; Berrospi, M.L.; Lopera, D.; Quintero, D.; Reyes, B.; Olivet, F. Cultural and economic barriers and opportunities for the participation of women in agricultural production systems: A case study in Guatemala. *Front. Sustain. Food Syst.* **2023**, *7*, 1185756. [\[CrossRef\]](#)
72. Fafchamps, M.; Kebede, B.; Quisumbing, A.R. Intrahousehold Welfare in Rural Ethiopia. *Oxf. Bull. Econ. Stat.* **2009**, *71*, 567–599. [\[CrossRef\]](#)
73. Pyburn, R.; Slavchevska, V.; Kruijssen, F. Gender Dynamics in Agrifood Value Chains: Advances in Research and Practice over the Last Decade. *Glob. Food Secur.* **2023**, *39*, 100721. [\[CrossRef\]](#)
74. Presta-Novello, D.; Salazar-Camacho, N.A.; Delgadillo-Mirquez, L.; Hernández-Sarabia, H.M.; del Álvarez-Bustos, M.P. Sustainable Development in the Colombian Post-Conflict—The Impact of Renewable Energies in Coffee-Growing Women. *Sustainability* **2023**, *15*, 1618. [\[CrossRef\]](#)
75. Castaño Orozco, C.S. Horizontes de Sentido Del Territorio Campesino e Implementación Del Acuerdo Final de Paz En El Suroccidente Colombiano. *Eleuthera* **2023**, *25*, 63–81. [\[CrossRef\]](#)
76. Firth, J.; Gangwisch, J.E.; Gangwisch, J.E.; Borisini, A.; Wootton, R.E.; Wootton, R.E.; Wootton, R.E.; Mayer, E.A.; Mayer, E.A. Food and Mood: How Do Diet and Nutrition Affect Mental Wellbeing? *BMJ* **2020**, *369*, m2382. [\[CrossRef\]](#) [\[PubMed\]](#)
77. Cavatassi, R.; Phillips, L.M.; Maggio, G.; Anteneh, Z.; Mabiso, A. Enhancing Households’ Livelihoods in Agrifood Systems: The Role of Women’s Empowerment. *Glob. Food Secur.* **2025**, *45*, 100856. [\[CrossRef\]](#)
78. Bonis-Profumo, G.; Stacey, N.; Brimblecombe, J. Measuring Women’s Empowerment in Agriculture, Food Production, and Child and Maternal Dietary Diversity in Timor-Leste. *Food Policy* **2021**, *102*, 102102. [\[CrossRef\]](#)

Disclaimer/Publisher’s Note: The statements, opinions and data contained in all publications are solely those of the individual author(s) and contributor(s) and not of MDPI and/or the editor(s). MDPI and/or the editor(s) disclaim responsibility for any injury to people or property resulting from any ideas, methods, instructions or products referred to in the content.