Food and Agriculture Organization of the United Nations

September 2025

Empowering women in Egypt's livestock and dairy subsectors

A gender-transformative approach to climate resilience and economic inclusion

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Food and Agriculture Organization of the United Nations
Cairo, 2025

Required citation:

Abdel Monem, M., Elmoshneb, L., Nelson, S., Ngugi, S. & Abouzeid, F. 2025. *Empowering women in Egypt's livestock and dairy subsectors – A gender-transformative approach to climate resilience and economic inclusion* . Cairo, FAO. https://doi.org/10.4060/cd6465en

ISBN 978-92-5-140014-2

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Acknowledgements

This report, titled Empowering Women in Egypt's Livestock and Dairy Subsectors – A gender-transformative approach to climate resilience and economic inclusion, was authored by Mohamed Abdel Monem (Senior Advisor, Climate Change and Rural Development), Laila Elmoshneb (Advisor on Gender and Social Inclusion), Sibyl Nelson (FAO/OCBD), Sophia Ngugi (FAO/RNE) and Fatma Abouzeid (FAO/Egypt).

This work was conducted under the 'Scaling up Climate Ambition on Land Use and Agriculture' (SCALA) programme, a joint FAO-UNDP initiative implemented through nationally determined contributions (NDCs) and National Adaptation Plans (NAPs). The programme is generously funded by the German Federal Ministry for the Environment, Nature Conservation, Nuclear Safety and Consumer Protection (BMUV) through the International Climate Initiative (IKI) and aims to address climate challenges while enhancing resilience in agriculture and land-use sectors.

The authors wish to express their deepest gratitude to the Ministry of Agriculture and Land Reclamation (MoALR) of Egypt and local authorities for their invaluable support in organizing field visits and facilitating the surveys. These efforts were crucial to the successful execution of the study.

Special thanks go to the dedicated rural women who manage livestock and dairy production, and who participated in the surveys conducted for this study across the governorates of Beni Suef, Menya, Suhag, Behera, Monofya, and Sharqia. Their cooperation, insights, and stories were fundamental to the outcomes of this report.

We also extend our sincere appreciation to Fidaa Haddad (FAO/RNE) as well as Mohamed Yaqoub (FAO/Egypt), for their continuous support and guidance. Special recognition is given to Aly El Sherie and Mohamed Yousef (Dcode Economic & Financial Consulting) for their expertise and diligent follow-ups which were instrumental in shaping the research and its findings.

Further gratitude is owed to the Climate Vision Consulting Company (CVC) team for their exceptional contributions and collaborative efforts during this study. We are particularly thankful to Sirine Johnston (FAO - SHARP+ coordinator) and Kamal Allam, along with his data collection team, for their comprehensive work in ensuring the quality of data collection. Additionally, our heartfelt thanks go to the communication team—Rawya Eldabi (FAO/Egypt) and Rebecca AbiKhalil (FAO/OCBD)—for their outstanding efforts in enhancing the report's accessibility and dissemination.

Abbreviations

CAPMAS	Central Agency for Public Mobilization and Statistics
FAO	Food and Agriculture Organization of the United Nations
FPE	feminist political ecology
GAF	Gender-sensitive Agricultural Frameworks
GAP	Gender Action Plan
GBV	gender-based violence
GHG	greenhouse gas
ICT	Information and Communication Technology
IFAD	International Fund for Agricultural Development
ILO	International Labour Organization
ILRI	International Livestock Research Institute
KJWA	Koronivia Joint Work on Agriculture
NAPs	National Adaptation Plans
NCW	National Council for Women
NDCs	nationally determined contributions
NENA	Near East and North Africa
SDGs	Sustainable Development Goals
SHARP+	Self-evaluation and Holistic Assessment of climate Resilience of Farmers and Pastoralists
STEM	Science, technology, engineering, and mathematics
UNFCCC	United Nations Framework Convention on Climate Change
WELI	Women's Empowerment in Livestock Index

Executive summary

This report, titled Empowering Women in Egypt's Livestock and Dairy Subsectors - A gender transformative approach to climate resilience and economic inclusion, investigates the critical role of women in Egypt's livestock and dairy industries amidst escalating climate change pressures. It provides an in-depth gender analysis, focusing on women's economic participation, challenges, and climate adaptation strategies within these vital agricultural subsectors. While the study acknowledges the importance of household power dynamics and social norms, its primary focus is on resource access and women's roles as foundational elements for broader gender-transformative change aimed at dismantling systemic inequalities.

The research primarily aims to assess the gender-specific impacts of climate change on Egypt's livestock and dairy subsectors. It seeks to pinpoint barriers to women's effective engagement in climate-related initiatives and to propose gender-sensitive adaptation strategies. Specific objectives include evaluating women's access to resources, their decision-making authority and adaptive capacities, as well as formulating evidence-based policy recommendations to advance gender equity in climate resilience programmes.

Employing a mixed-methods approach, the research integrates primary data from two field surveys: the SHARP+ Survey, which engaged 1,036 participants across six governorates (Behera, Monofya, Sharqia, Beni Suef, Menya, and Suhag) representing approximately 50 percent of Egypt's national livestock population, and a structured women's survey targeting 300 women active in livestock and dairy activities in the same regions. These primary data are complemented by an extensive literature review. The analysis is guided by theoretical frameworks such as feminist political ecology (FPE), Climate Resilience Frameworks, and Gender-Sensitive Agricultural Frameworks, providing context for understanding women's experiences in climate-stressed agricultural systems. The deliberate focus on women addresses a significant gap in detailed data concerning their unique contributions and challenges within Egypt's livestock and dairy subsectors.

Key findings underscore women's pivotal role in the livestock and dairy sectors, which form 37.5 percent of Egypt's total agricultural production value, generating approximately USD 8 billion annually. Women comprise 45 percent of the official agricultural labor force and are often engaged in critical tasks: 77.3 percent are involved in feeding livestock, 76.7 percent in milking, 82.7 percent in cleaning animal shelters, and 74.7 percent in processing dairy products like ghee, particularly in regions such as Behera. In the dairy subsector, small-scale farms, where women are predominant, produce 75 percent of Egypt's milk; 45 percent of this milk is consumed within households, while 55 percent is sold through informal channels. Despite these substantial contributions, women face significant obstacles: only 5.2 percent of rural women own agricultural land compared to 27 percent of rural men, and just 26 percent of female-headed rural households' own livestock, versus 30 percent of male-headed households. Furthermore, men control decision-making in 81 percent of households. Women hold autonomy in merely 4.7 percent of decisions regarding livestock numbers or fodder cultivation, and only 49.3 percent in smaller-scale decisions such as selling milk products.

Climate change exacerbates these existing challenges, disproportionately impacting women due to their primary responsibilities in livestock care. Rising temperatures, observed by 65.3 percent of surveyed women, alongside extreme heat and cold variations noted by 24.9 percent, diminish livestock productivity, with heat stress significantly reducing dairy output during summer months. In Nile Delta governorates like Behera and Sharqia, 81.7 percent of women reported noticeable climate shifts, identifying heat stress and disease outbreaks as major concerns. Moreover, livestock and dairy activities often serve as a supplementary income source, with 57 percent of women surveyed deriving less than 25 percent of their income from these activities, and 37 percent earning between 26 and 50 percent. Dairy operations are particularly vulnerable to climate-related stresses.

The report identifies urgent needs for women, including improved access to veterinary services (prioritized more in the Delta Region than Upper Egypt), adoption of climate-smart technologies like solar-powered cooling systems, enhanced financial support (as only 27 percent of women have financial accounts compared to 38.7 percent of men), and training in resilient livestock management practices. Market access remains constrained; for instance, 92 percent of surveyed women in Behera rely exclusively on direct sales to consumers. Regional disparities are stark: women in Suhag (Upper Egypt) participate across the entire dairy value chain, whereas in Behera, 62 percent are limited to low-return milk collection. Social and cultural barriers, including the heavy burden of unpaid labor (women spend 22.4 percent of their

day on domestic work compared to 2.4 percent for men) and restrictive norms further impede women's economic engagement and adaptive capacity.

Recommendations advocate for a gender-transformative approach to address the root causes of inequality through targeted interventions. These include ensuring secure access to land and livestock ownership, expanding access to tailored credit facilities (currently, only 2 percent of women access agricultural credit), and embedding gender-responsive strategies within national climate and agricultural policies. Training programmes should cover climate resilience measures (e.g. heat stress mitigation for livestock), value addition in dairy production (such as cheese-making, an area of untapped potential in Sharqia in which only 18 percent of surveyed women are involved), and leadership skills development, offered with flexible schedules and in women-only sessions to ensure accessibility. Engaging men as allies is crucial for challenging discriminatory norms, as is encouraging women's cooperatives—currently an underutilized coping mechanism in surveyed areas—to improve market bargaining power and resource sharing. While not directly examined, policies supporting digital inclusion and health infrastructure are noted as complementary for building resilience.

In conclusion, empowering women in Egypt's livestock and dairy subsectors demands comprehensive, multi-dimensional strategies that tackle both practical obstacles and deep-seated inequalities. This is particularly pertinent given that in the agricultural sector, women represent 58.35 percent of skilled agricultural workers, while men account for 41.65 percent, demonstrating a significant presence of women in this field. Policymakers are urged to prioritize gender-transformative interventions, supported by consistent gender-disaggregated data collection and collaborative partnerships spanning government, civil society, and international stakeholders. This report establishes a foundation for creating inclusive, resilient agricultural systems that fully leverage women's substantial contributions to achieve sustainable economic and environmental progress for rural Egypt.

CHAPTER 1. Objectives, approach and methodology

1.1 Objectives

↗ Main objective

- This study aims to conduct a comprehensive gender analysis of the impacts of climate change on Egypt's dairy and livestock subsectors, focusing on women's economic participation and household dynamics. The study acknowledges the critical role of women in livestock and dairy production, recognizing that despite their significant contributions, women often face barriers to resource access, decision-making, and economic benefits. The analysis seeks to identify barriers to women's involvement in climate-related actions, develop gender-sensitive adaptation strategies, and create guidelines to enhance climate resilience through improved gender integration. While this study does not directly examine power dynamics or social norms within households and communities, it analyzes critical factors such as access to resources, roles and decision-making power. These factors offer valuable entry points into broader gender-transformative approaches which aim to challenge and shift the underlying social norms, power relations, and institutional structures that perpetuate gender inequalities.

↗ Specific objectives

- To assess gender-specific vulnerabilities and barriers in the dairy and livestock subsectors by evaluating women's access to resources, decision-making power, and adaptation capabilities in response to climate change.
- To formulate evidence-based policy recommendations that promote gender equity in climate action, focusing on practical measures to enhance women's participation in dairy and livestock subsector resilience programmes.
- The findings of the study are intended to guide the development and implementation of gender-transformative climate adaptation strategies ensuring equitable participation and integration of women in climate action within the livestock and dairy subsectors in Egypt. The proposed strategies vary based on the conducted capacity needs assessments. They include specific interventions like designing targeted training programmes as well as broader interventions that address the gaps in women's participation in decision making and leadership.

1.2 Methodology and analytical framework

The design of this study facilitates an in-depth exploration of women's contributions, challenges, and adaptation strategies within Egypt's livestock subsector in the context of climate change. By examining women's roles in livestock management, the barriers they face, and their coping mechanisms, the study offers critical, evidence-based insights into the impacts of climate change on women. These findings aim to inform and support the development of gender-transformative policies and interventions, ultimately enhancing women's resilience, empowering their participation in climate action, and promoting equitable, sustainable adaptation strategies within the agricultural sector.

This study draws on the Framework for Gender-Responsive Livestock Development (FAO, 2023a), which offers a structured approach for integrating gender considerations into livestock policies, programmes, and investments (Box1). The framework emphasizes several key principles, two of which are particularly relevant to the objectives of this study. First, it recognizes the existence of gender disparities in the livestock subsector and highlights the need to address these disparities to enhance productivity and sustainability. Second, it stresses the importance of collecting and analyzing gender-disaggregated data to inform evidence-based policymaking. Additionally, the framework underscores that inclusivity and gender equality are fundamental to building a sustainable livestock subsector, fostering equitable livelihoods, and achieving long-term impact.

Figure 1. Team member interviewing a woman in Menya on livestock and dairy activities

Although this study aligns with the framework's broader principles, it is important to note that the structured survey focused exclusively on women. Therefore, the analysis does not use gender-disaggregated data in a comparative sense. Instead, the study contributes to the framework's goals by providing a detailed examination of women's needs and experiences. This study employed a mixed-methods approach, integrating primary and secondary research data,

↗ **Primary data collection:** The results of the following two field surveys were used.

- **SHARP+ Survey:** SHARP+ is a tool designed to evaluate the resilience of farmers and pastoralists to climate change at the household level, employing a holistic approach that integrates socioeconomic, environmental, and agronomic factors (FAO, 2023). It identifies vulnerabilities, establishes resilience baselines, and includes a participatory self-assessment component to help farmers prioritize areas for improvement. In this study, SHARP+ was used to assess vulnerability and climate risks within Egypt's livestock systems. Data was collected from 1,036 participants, comprising both male and female livestock managers, across six governorates: Behera, Monofya, and Sharqia (Nile Delta region), as well as Beni Suef, Menya, and Suhag (Upper Egypt region). The governorates collectively represent approximately 50 percent of the national livestock population (CAPMAS, 2021). Detailed findings and analysis of the SHARP+ survey is reported in Abdel Monem *et al.* (2025).
- **Structured women's survey:** A structured questionnaire (Annex 1) was developed to gather primary data exclusively from women involved in livestock and dairy-related activities. While the SHARP+ survey included both men and women, the focused survey targeted only women with the objective of documenting the specific needs of women, their perceptions, and adaptation strategies — offering important evidence to inform gender-responsive and ultimately gender-transformative policies. Conducted in the same six governorates, 50 women were surveyed in each, resulting in a total sample of 300 participants (Figure 1). The survey addressed several key topics, including women's roles in livestock management and the dairy value chain, young girls' involvement, perceptions of climate change and coping mechanisms, the impact of climate change on household income, access to resources, and training needs for gender-sensitive support mechanisms.

↗ **Secondary data collection:** Literature review.

- A literature review was done of existing research and frameworks relevant to the livestock/dairy production and gender-climate nexus. This review identifies gender disparities within the agricultural sector and examines the socioeconomic roles of women in livestock and dairy production. Recognizing that climate change impacts are not gender-neutral, the study highlights the distinct climate-related barriers faced by women in agriculture, including limited access to resources, decision-making opportunities, and participation in climate programmes. This analysis of existing frameworks and policies informs the development of recommendations for gender-responsive climate adaptation strategies.

Box 1. Gender-transformative approaches

Gender-transformative approaches are crucial for achieving sustainable improvements in gender equality. These approaches challenge unequal gender relations and discriminatory norms by targeting the systems that perpetuate inequality, rather than merely working around them. Transformative methodologies, often participatory in nature, engage agents of social change, including local and religious leaders, to shift discriminatory gender relations. By employing information, reflection, social pressure, sanctions, incentives, and symbolic shifts, these approaches aim to change individual attitudes and social expectations. Furthermore, they strive to foster more egalitarian power dynamics between women and men by transforming harmful masculinities into positive norms of manhood. Finally, gender-transformative approaches also address institutional, policy, and legislative constraints that hinder empowerment (FAO 2023).

CHAPTER 2. Theoretical framework for gender analysis in livestock/dairy production and climate adaptations

To understand more about gender in livestock/dairy production and its intersection with climate adaptation, it is helpful to look at the work done earlier to establish a framework for the study on Egypt.

2.1. The feminist political ecology approach: examining how gender intersects with environmental change and resource accessfanne

Feminist Political Ecology (FPE) emerged in the mid-1990s (Bonilla Anariba *et al.*, 2024) as a theoretical framework for analyzing the intersectionality of gender with environmental change, resource access, and decision-making within agricultural systems (Ross, 1997). This approach recognizes gender as a critical determinant of access to and control over natural resources, highlighting how it interacts with multiple social factors to shape processes of environmental change, livelihoods, and development trajectories. FPE underscores that men and women often experience unequal control over ecological systems due to their differing social and cultural roles. Grounded in feminist theory, FPE examines how power dynamics and gender relations influence environmental outcomes, while addressing how environmental challenges and policies can disproportionately affect men and women (Bonilla Anariba *et al.*, 2024).

In the context of climate adaptation within livestock systems, FPE provides valuable insights into how gendered power relations shape resource distribution and determine the capacity to respond to environmental stressors. It highlights the imbalanced gender-based entitlements to resources, as well as the unequal rights over space and access to social and political power. Through this lens, FPE explores how structural gender differences influence interactions with and management of the environment. For instance, men often specialize in specific economic activities, while women tend to adopt more integrative roles in economic activity and resource management, reflecting their distinct positions within the social and environmental hierarchy (Ross, 1997).

2.2. Climate resilience frameworks that integrate gender considerations in adaptation

The gendered impacts of climate change on rural livelihoods were examined by Nagasha *et al.* (2019), focusing specifically on livestock-based systems. Their study emphasizes that the effects of climate change are not gender-neutral, as men and women experience these impacts differently due to their distinct societal roles and responsibilities. To address these disparities, this study proposes a comprehensive, gender-sensitive analytical framework to assess gender-specific attitudes, adaptation mechanisms, and barriers to resilience-building within livestock-based livelihoods. By acknowledging the unique challenges faced by men and women in the context of climate change, this framework provides a better understanding of the social and cultural dynamics that shape adaptation processes, highlighting how gender affects access to resources, decision-making power, and the capacity to implement climate resilience strategies. In line with this, the present study focused on women's experiences, given the limited availability of detailed data on their roles and needs within Egypt's livestock and dairy subsectors.

2.3. Gender sensitive Agricultural Frameworks (GAF): integrating gender, climate change adaptation, and food security strategies

Gender-sensitive Agricultural Frameworks (GAF) are essential for addressing the intersection of gender inequality, climate change adaptation, and food security. Continued gender disparities limit women's adaptive capacities, as they often face systemic barriers, such as reduced access to land, credit, extension services, and agricultural technology. These constraints hinder their ability to effectively respond to climate-related challenges. Howland *et al.* (2019) highlight gender-specific challenges in key areas such as water management, livestock rearing, and agricultural decision-making, all of which are critical for successful adaptation to climate change. Institutional shortcomings, including the absence of gender-responsive policies and weak enforcement mechanisms, further deepen these inequalities.

The lack of gender integration in food security and nutritional policies exacerbates systemic inequalities in agricultural development. While many global and national frameworks identify gender equality as a priority, the implementation of gender-sensitive policies — which recognize but do not necessarily act upon gender differences — remains limited across regions. This gap is due to factors such as insufficient gender-disaggregated data, institutional resistance, and inadequate financial allocation. These limitations obscure the critical roles women play in achieving household food security and in meeting their unique nutritional needs.

Many development programmes have shifted toward gender-responsive approaches which go beyond awareness to actively address gender-based barriers through targeted interventions. However, gender-blind policies continue to persist, undermining progress toward equitable food systems (Njuki *et al.*, 2016). To achieve lasting change, it is critical to move beyond gender-responsive programming toward gender-transformative approaches. These approaches aim to challenge and shift the underlying social norms, institutional practices, and power relations that sustain gender inequality. They emphasize the transformation of agency, power dynamics, and discriminatory social institutions across individual, community, and systemic levels (Hillenbrand *et al.*, 2015; FAO, IFAD & WFP, 2023).

This report draws on gender-sensitive and gender-responsive evidence while advocating for a gender transformative shift. Although it focusses specifically on women, it serves as a foundation for broader structural change by highlighting women's priorities and resilience strategies. Ultimately, integrating gender-transformative frameworks into agricultural and climate adaptation policies can foster more inclusive, equitable, and sustainable food systems. To address these challenges, gender-sensitive agricultural frameworks must integrate strategies that account for women's needs, the roles they play and the barriers they face. Such frameworks are vital for fostering inclusive and sustainable agricultural systems that enhance the resilience and well-being of both men and women while promoting equitable climate adaptation strategies.

In light of the theoretical frameworks explored, this study advocates for a gender-transformative perspective to better understand how women experience and respond to climate-stressed livestock and dairy systems, and how they can be empowered within these. While the frameworks emphasize the importance of examining power dynamics and collecting gender-disaggregated data, this study focuses specifically on women's experiences and adaptive strategies, given the scarcity of comprehensive data on their roles in Egypt's livestock and dairy subsectors. This approach enhances understanding of the barriers women face and provides an entry point for future research that could further explore comparative dynamics with male counterparts.

CHAPTER 3. International and national institutional frameworks for gender-responsive climate action in agriculture

At the international level, the UNFCCC recognizes the vital role of women in agriculture and the disproportionate impacts of climate change they face. The Enhanced Lima Work Programme on Gender and its Gender Action Plan (GAP), are essential frameworks for promoting gender-responsive approaches in the implementation of gender-related decisions and mandates in the UNFCCC processes. This includes the Koronivia Joint Work on Agriculture (KJWA) and its continuation in the Sharm el-Sheikh joint work on implementation of climate action on agriculture and food security (SJWA). The KJWA was a landmark decision, established at COP23, to share relevant scientific and technical knowledge on six key topics in the field of agriculture and climate change, including women's roles. The SJWA, established at COP27, represents a crucial step towards the implementation of these outcomes, providing a key space within the UNFCCC to apply these strategies with a gender perspective, and to ensure that women's contributions are recognized and their voices heard in decision-making processes.

Additionally, the GAP includes training programmes for female agricultural experts, equipping them to engage effectively in UNFCCC negotiations, such as under the KJWA and SJWA. These training sessions are vital for building capacity and ensuring that women's perspectives are integrated into agricultural policies and climate change discussions. Moreover, the SJWA is tasked with developing and promoting gender-responsive policies in agriculture, which aligns with the GAP's objectives to prevent climate actions from reinforcing gender inequalities and instead promoting equity and empowerment for women. This synergy fosters collaboration among various stakeholders, including civil society organizations and government bodies, to enhance the effectiveness of gender-responsive climate actions in agriculture. Overall, the alignment of the Enhanced Lima Work Programme on Gender and the GAP with the KJWA and SJWA is crucial for addressing the unique challenges faced by women in the agricultural sector and ensuring their active participation in climate action.

At the national level, Egypt's Vision 2030 identifies female empowerment as a core driver of sustainable development and inclusive economic growth. It highlights the long-term benefits of women's economic participation, and recognizes that gender equity in economic development contributes to sustainable growth by leveraging the potential of half the population. As Egypt is committed to the Sustainable Development Goals (SDGs), female empowerment corresponds to SDG 5 on gender equality and SDG 10 on reducing inequalities. In addition, achieving gender equality contributes to the broader Agenda 2063 for Africa, which envisions a people-driven development strategy that actively includes women and youth. (Ministry of Planning and Economic Development, 2023).

Additionally, the National Strategy for the Empowerment of Egyptian Women (2017-2030) identifies climate change as a pressing issue affecting women in agriculture. The strategy highlights several key features of women in agriculture. It underscores the economic empowerment of rural women and acknowledges the need for innovative and environmentally friendly agricultural practices to enhance rural women's resilience to climate-induced challenges (NCW, 2017).

Egypt Climate Strategy 2050 outlines five goals. Goal two of the strategy is 'enhancing resilience and the adaptive capacity to climate change and alleviating the associated negative impacts'. One of the objectives under this goal is to enhance women's response considerations to help them adapt to climate change. The strategy proposes the need for policies that provide a framework for addressing the unique challenges faced by women in agriculture, such as limited access to land, credit, and extension services, and aims to promote their active participation in climate-resilient agricultural practices. It promotes considering gender difference in mitigation and adaptation programmes, technology transfer and capacity building. Moreover, the strategy affirms the need for integrated planning across different national and sectoral strategies, for example, Egypt Vision 2030 and the Sustainable Agricultural Development Strategy towards 2030 (Ministry of Environment of Egypt, 2022).

The Sustainable Agricultural Development Strategy towards 2030 aims to improve livelihoods of the rural poor through the efficient and sustainable use of natural resources and the introduction of innovative policies and programmes, including promoting the role of women in different fields of rural development (FAO, 2009). The above strategies and institutional frameworks provide a framework for addressing women in agriculture at large and women in livestock and dairy production at a subsector level allowing for the opportunity to design and implement initiatives to promote their active participation in climate-resilient agricultural practices. It is noteworthy to mention here that despite the existing national policy framework and efforts of the Ministry of Agriculture and Land Reclamation aimed at improving conditions of women in agriculture, implementation gaps persist, particularly in ensuring women's access to land ownership and financial resources for climate adaptation (FAO, 2020).

CHAPTER 4. Gender dynamics in the agricultural sector in Egypt

4.1. Global and regional dimensions of women's roles in agrifood systems

Globally, the livestock sector has high potential to foster both economic development and gender equality. Empowering women within this subsector significantly contributes to livestock development, while advancements in livestock provide important opportunities to promote gender equity. Women's active participation in livestock-related activities, including production, processing, and marketing, has been associated with increased productivity and improved food security. Furthermore, livestock development serves as a powerful avenue to tackle systemic gender inequalities, offering women greater access to resources, income, and decision-making authority. FAO, ILRI, IFAD, and the World Bank (2023) reported that livestock also acts as a "mobile bank," providing women with a source of savings or collateral that can be sold in times of need, offering a critical safety net for families. During crises, such as conflicts or natural disasters, livestock can be transported and sold, ensuring economic resilience and independence, even after domestic disputes or divorce. Additionally, livestock provides a daily source of income and nutrition through products like milk, eggs, and meat, which improve household food security and child nutrition, especially when women control these resources.

At the global level, women play important roles in agrifood systems, ranging from farmers and unpaid contributing family workers to retailers, wage laborers and entrepreneurs. Women comprised 38 percent of all agricultural workers in crop, livestock, fisheries and forestry primary production around the world (Costa *et al.*, 2023). The off-farm segments of agrifood systems (the economic activities beyond primary production in agriculture that include crop, livestock, fisheries and forestry) are an important source of livelihood for women at global level with women comprising 41 percent of all workers in the off-farm segment of agrifood (Costa *et al.*, 2023).

Economically, women's contributions to agrifood systems are critical yet undervalued. On average, women earn only 82 cents for every dollar earned by men in agricultural wages. The gender gap in land productivity is 24 percent, with female-managed farms producing less than those managed by men due to unequal access to inputs like land, seeds, fertilizers, and irrigation. Similarly, the gender gap in labor productivity stands at 35 percent, reflecting structural barriers such as limited access to training, extension services, and mechanization. Eliminating the gender gap in farm productivity and closing the wage disparity in agrifood-system employment could boost global gross domestic product by 1 percent, or nearly USD 1 trillion. Globally, women own livestock in 25 percent of cattle-keeping households, and an estimated 80 million women are engaged in dairy farming (FAO, 2016).

In the Near East and North Africa (NENA) region, women's participation in agrifood systems is more concentrated in specific activities, but their overall share of the agricultural workforce is smaller compared to other regions. Women's employment in agrifood systems in the NENA region was 20 percent in 2019, significantly lower than the global average of 36 percent. Overall, women's participation in the labor force remains low at 19 percent, compared to men's participation of 77 percent and a global average of 49 percent. In 2019, nearly 25 percent of employed women worked in agriculture, compared to 17.6 percent of employed men. However, women own less than 7 percent of agricultural land in the region (FAO, 2024a).

Cultural norms and social restrictions in the NENA region often limit women's ability to work outside the home, although their involvement in off-farm activities, such as food processing and retailing, has been growing in certain countries. Despite these gains, women in this region face some of the largest gender gaps in wages and productivity globally, earning significantly less than men for similar work. Their economic contributions are often undervalued, particularly in unpaid family roles or within the informal economy (Costa *et al.*, 2023).

Despite their active engagement in agriculture, women in the NENA region own significantly less land compared to men and their land is often smaller, less fertile, and lacks infrastructure such as irrigation. This limits their ability to mechanize their farming practices and improve yields, further exacerbating gender disparities in the sector. Rural women, and especially young rural women, face high levels of unemployment in the NENA region. In some countries, unemployment rates among young women aged 15–24 approach 50 percent, compared to 10–20 percent for young men. This inequality is attributed to weak support systems, such as limited public transportation and childcare services, wage discrimination, and lack of educational opportunities (FAO, 2024b).

4.2. Role of women in the agricultural sector in Egypt

The agricultural sector accounts for 11 percent of Egypt's GDP and provides livelihoods for 57.2 percent of the population (FAO, 2022). Despite representing half of the population, women's participation in the labor force remains relatively low at an estimated 18 percent, equating to 5.44 million women out of the 30.22 million-strong total labor force in 2021. Analyses show that increasing women's participation in the labor force by 10 percent could potentially add an additional $1 billion to Egypt's GDP, emphasizing the importance of addressing barriers to women's employment (Balbaa, 2024).

Egypt has made significant strides in gender equality. In recent years, female political representation has improved markedly, with substantial increases in women holding seats in national parliaments and ministerial-level positions, surpassing constitutionally-mandated targets. The Women on Boards Indicator also saw a significant rise, reflecting a growing presence of women in leadership roles. Additionally, the number of female microfinance beneficiaries nearly doubled that of males, though with a slightly smaller share of funding balances. Maternal mortality rates and female illiteracy have also decreased, and the gender gap in school enrollment has been eliminated (World Bank, 2024) . However, labor force participation rates for women remain low, and women are significantly more likely to be unemployed and in informal employment than men. Data presented in Table 1 summarizes the status of gender in Egypt across various domains, showing that women also carry the burden of unpaid domestic and care work, which affects their economic empowerment. In entrepreneurship, women have minimal ownership of firms and hold fewer top management positions. Additionally, women face high rates of violence and social issues impacting their overall well-being and opportunities.

Table 1. State of Gender Equality in Egypt

Domain	Indicator	Women	Men
Education	Literacy rate of adults aged 15 and above (2017), %	65.5	76.5
	School enrolment, tertiary (% gross)	39.8	38.0
	Science, technology, engineering and mathematics (STEM) graduates (2016)	36.9	63.1
Labor Force Participation	Labor force participation rate (% of female/male population ages 15+) (2021)	15.4	67.1
	Unemployment rate (modeled ILO estimate) (2021), %	24.3	5.9
	Share of youth not in education, employment or training (% of youth population) (2020)	44.0	17.2
	Proportion of informal employment in total non-agricultural, %	62.4	38.2
	Proportion of time spent on unpaid domestic and care work (% of 24-hour day) (2015)	22.4	2.4
Entrepreneurship & Productive Assets	Firms with female majority ownership (% of firms) (2020)	5.2	-
	Firms with female top managers (% of firms) (2020)	6.3	-
	Account ownership at a financial institution or with a mobile money service provider, female/male (% of population ages 15+) (2017)	27.0	38.7
Women's Voice and Agency	Proportion of women subjected to physical and/or sexual violence in the last 12 months (% of ever-partnered women ages 15–49) (2021)	17.1	-
	Prevalence of early marriage (married before the age of 18, of girls ages 15 to 19) (2017)	11.0	-
	Adolescent fertility rate (births per 1,000 women ages 15–19) (2020)	51.6	-
	Female genital mutilation prevalence (%) (2021)	85.6	-
	Proportion of women in ministerial level positions (%) (2020)	24.2	-
	Proportion of seats held by women in national parliaments (%) (2020)	27.4	-

Source: World Bank. 2024. Egypt - Gender Equality and Climate Change: Background Note to the Climate Change and Development Report (English). Washington, D.C.: World Bank Group. http://documents.worldbank.org/curated/en/099030624132518802/P17729214528ef0e519b70128ca49297467

Women contribute significantly to the agricultural sector, accounting for 45 percent of the official agricultural labor force (FAO, 2022). Their roles extend beyond traditional tasks to include responsibilities like irrigation, planting, and land preparation, which are critical to maintaining agricultural productivity (Balbaa, 2024). Women are more likely to work in low-paying, part-time, and seasonal jobs, as well as in subsistence farming and unpaid family roles, compared to other sectors (UN Women, 2018). The agricultural sector is particularly unequal in terms of women's working conditions even compared to other sectors, with higher rates of women in vulnerable employment in rural areas which is reflected along the entire agrifood value-chain. Women comprise 32.44 percent of the overall workforce across all occupations in Egypt, compared to 67.56 percent for men, as shown in Table (2). However, in the agricultural sector, women represent 58.35 percent of skilled agricultural workers, while men account for 41.65 percent, indicating a significant presence of women in this field.

Table 2. Occupations by gender across all sectors

Occupation	Male (%)	Female (%)
Managers	85.77	14.23
Professionals	60.67	39.33
Technicians and associates	77.18	22.82
Clerical support work	63.38	36.62
Service and sales workers	83.15	16.85
Skilled agricultural workers	41.65	58.35
Crafts and traditional handicrafts	97.31	2.69
Plant and machine operators	95.36	4.64
Elementary occupations	86.44	13.56
Total	**67.56**	**32.44**

Source: ILO. 2024. The gender wage gap in Egypt. International Labour Office. ISBN: 9789220406335. https://creativecommons.org/licenses/by/4.0/.

Women play a crucial yet undervalued role in Egypt's agricultural sector, accounting for 45 percent of the official agricultural labor force (FAO, 2022). Their contributions are especially prominent in labor-intensive tasks such as planting, weeding, fertilizing, harvesting, post-harvest processing, and storage. Informally, over 50 percent of rural women are engaged in agricultural activities such as irrigation, livestock care, and marketing, which are largely unpaid and unrecognized in official economic statistics (FAO, 2022; UN Women, 2018). By contrast, rural men are more likely to access paid opportunities and formal recognition for their contributions, highlighting a significant gender disparity in the sector.

Despite women's significant involvement, societal norms and systemic biases undervalue their contributions, leading to persistent cycles of economic marginalization. Women perform informal and unpaid labor on family farms or small-scale enterprises, with 71 percent of rural women working in unprotected informal jobs compared to just 13 percent of urban women (Hassanein, 2023). This severely limits their access to social protections such as health insurance and pensions, further entrenching economic inequality.

4.3. Barriers to women's empowerment in agriculture

Women in Egypt face significant structural barriers that limit their ability to achieve better results in agriculture. For instance, women spend 12 times more hours on unpaid domestic and care work than men, limiting the time they can contribute to productive agricultural activities (Selwaness and Helmy, 2020). Restricted mobility, limited access to education, and deeply rooted social norms further exacerbate these challenges. Access to essential agricultural resources, such as land, water, credit, and extension services, is biased in favor of men. While 27 percent of rural men own agricultural land, only 5.2 percent of rural women are landowners (FAO, 2022). This inequality undermines women's ability to independently manage agricultural production or secure loans for investment, maintaining their dependence on male family members.

The lack of access to agricultural extension services is another significant barrier. Women comprise a low percentage of agricultural extension workers in Egypt (Fahmy, 2004). This absence of female representation in key agricultural services limits women's ability to access training, technical knowledge, and market information tailored to their needs. Furthermore, women are often excluded from decision-making processes in rural organizations and agricultural cooperatives, leaving their needs and priorities unaddressed in policy and programme design.

The economic marginalization of women in agriculture has great implications for poverty reduction and food security in Egypt. Women are more likely than men to own less productive and lower-value assets, reducing their ability to invest in modern agricultural technologies or increase productivity. For instance, only 2 percent of Egyptian women have access to agricultural credit (FAO, 2021). This lack of financial inclusion limits their capacity to expand their agricultural projects or participate in formal markets, continuing cycles of poverty and economic dependence.

CHAPTER 5. Gender interactions within egypt's climate-stressed livestock and dairy subsectors

5.1. Livestock production systems, economic importance, and climate change interactions

Egypt's livestock subsector is a cornerstone of the agricultural economy, supporting the livelihoods of millions, particularly small-scale farmers and rural families, while playing a vital role in food security by supplying essential products such as milk, meat, and manure. Livestock farming in Egypt is structured around three main production systems: traditional smallholder systems, semi-intensive systems, and large-scale commercial operations. Smallholder systems dominate the sector, particularly in Upper Egypt and the Nile Delta, where farmers integrate livestock rearing with crop production to maximize resource efficiency (Abdel Monem *et al.*, 2025). Semi-intensive systems are more prevalent in peri-urban areas, while commercial operations are concentrated near urban centers, catering to a growing demand for food in cities. Each system contributes differently to the economy, with smallholders playing a particularly critical role in ensuring food and income security for rural communities.

Livestock farming generates approximately USD 8 billion annually, with cattle and buffaloes being the primary sources of milk and meat. Egypt produces around 6 million tonnes of milk and 0.5 million tonnes of meat each year, with over 1.8 million households engaged in livestock farming (FAO, 2022). For smallholder farmers, livestock offers more than just income—it serves as a critical safety net against economic hardship and climate-induced shocks (FAO 2020). Animals provide a source of financial security, food, manure for crop production, and a means of wealth storage. Livestock farming is particularly significant for women in rural areas, who are often responsible for care and management, making it a key contributor to household resilience and social stability (FAO, 2016).

The livestock subsector faces mounting threats from climate change. Rising temperatures, erratic rainfall, and an increasing prevalence of livestock diseases are already affecting productivity. Heat stress significantly reduces milk yields, meat production, and reproductive success, particularly during the summer months. Conception rates in dairy cattle can drop by as much as 20-27 percent during extreme heat periods, directly impacting the economic stability of smallholders (Abdel Monem *et al.*, 2025). Feed availability is also a growing concern, as climate change reduces local feed crop yields by 10-20 percent globally, forcing Egypt to rely heavily on imported feed, which is both expensive and unsustainable. Water scarcity further compounds the issue, particularly in Upper Egypt, where livestock farmers struggle to meet the water demands of their animals. Smallholders practicing crop-livestock integration are particularly vulnerable, as the success of these systems depends on access to water and feed, both of which are becoming increasingly scarce.

In addition to being affected by climate change, livestock production contributes significantly to greenhouse gas (GHG) emissions. Globally, livestock accounts for 14.5 percent of total greenhouse gas (GHG) emissions, with cattle contributing 42 percent (2.9 Gt CO_2 eq) from meat production and 20 percent (1.4 Gt CO_2 eq) from milk production. Methane emissions from enteric fermentation represent 54 percent of total livestock emissions. (FAO, 2022a). Feed production is a major driver of emissions, particularly when reliant on imported grain and crop residues, as it involves energy-intensive processes. In Egypt, inefficient feed systems exacerbate emissions, as waste from poorly managed feed resources adds to the environmental burden (Gerber *et al.*, 2013). Methane emissions from manure and enteric fermentation remain a significant challenge, particularly for smallholders who lack access to advanced waste management systems. Feed innovations, including the use of agricultural waste, the production of silage, and the introduction of new sustainable feed supplements, offer promising solutions to reduce feed-related costs and emissions. Improved manure management and biogas production can also mitigate methane emissions while providing renewable energy for rural communities. Addressing feed shortages, enhancing feed efficiency, and scaling up sustainable practices are critical to reducing the sector's climate footprint while ensuring its long-term economic viability for smallholder farmers.

Egypt's livestock subsector is at a critical juncture, with climate change posing significant risks to its productivity and sustainability. However, by focusing on resource efficiency, feed innovation, and sustainable practices, the subsector can enhance its resilience while continuing to support small-scale farmers and contribute to food security in the face of growing challenges.

5.2. Egypt's dairy subsector and climate change

Egypt's dairy value chain is composed of three distinct milk production systems: large-scale, medium-scale, and small-scale farms, each contributing uniquely to the sector. Large-scale farms, which account for only 5 percent of the country's dairy animal inventory, produce 10 percent of the national milk supply. These farms typically house over 100 imported Holstein cows, which are highly efficient, producing 32-35 kg of milk per cow daily, thanks to advanced technologies such as automated feeding and milking systems. Small-scale farms dominate the sector, involving 90 percent of producers and contributing 75 percent of the country's milk production (ILO 2020). These subsistence-level farms, with 1-10 animals per household, primarily consume milk locally or sell it through informal channels. While all three systems are essential to the sector's overall functionality, they face varying levels of vulnerability to climate change and resource constraints.

The impacts of climate change are particularly severe across all three milk production systems, with heat stress posing a critical challenge. Imported breeds like Holstein cows, which thrive in cooler climates (4°C–20°C), are especially vulnerable to Egypt's extreme heat, with 120 days annually experiencing temperatures between 30°C and 45°C. This heat stress reduces milk yields, fat content, and cattle health, while increasing mortality rates. Large-scale farms attempt to mitigate these effects through costly cooling solutions such as air conditioning, ceiling fans, and cold-water showers, straining water, energy, and labor resources. Medium and small-scale farms, often operating on tighter budgets, lack the financial capacity to adopt such adaptive measures, making them more susceptible to climate-related risks. Additionally, feed availability—a critical input for all farms—is being impacted by climate-induced droughts and rising global feed prices, further threatening the productivity and resilience of the sector.

Economically, the dairy subsector plays a critical role in Egypt's agricultural economy, contributing 31 percent of the animal production value, equivalent to USD 4.51 billion in 2022. Domestic milk production, estimated at 6.5 million tonnes, satisfies only 74.7 percent of national demand, leaving a supply gap that necessitates imports. Despite its economic importance, the subsector faces low productivity, with local cattle breeds producing only 456-580 kg of milk per year compared to the 2,296-3,258 kg achieved by imported Holstein breeds. This productivity gap highlights the urgent need for improved genetics, feed quality, and management practices to enhance the sector's competitiveness and to meet growing domestic demand, driven by population growth and rising per capita consumption of dairy products.

Climate-smart interventions are essential to addressing these challenges and ensuring the long-term resilience of Egypt's dairy value chain. Large-scale farms are taking steps to adopt innovative technologies, such as solar-powered cooling systems, to offset climate risks. However, medium and small-scale farms require more targeted support, including access to affordable financing, technical assistance, and capacity-building programmes, to adopt similar adaptive measures. De-risking tools, such as climate risk insurance, affordable loans, and subsidies for climate-smart technologies, can mitigate investment risks and encourage farmers to transition to more sustainable practices. Moreover, collaborative efforts involving government agencies, private subsector actors, and international organizations are critical to fostering innovation and building resilience. Policies that incentivize climate-smart investments and promote private subsector engagement will be vital to bridge the gap between supply and demand while ensuring sustainable growth for the sector.

Beyond its economic contributions, the dairy subsector is also closely tied to social and environmental outcomes in Egypt. Small-scale farms, which dominate milk production, provide livelihoods for millions of rural households, particularly women, who play a significant role in dairy farming. The subsector also supports broader food security goals, as milk and dairy products are essential sources of nutrition for the population. However, the environmental footprint of the sector, including greenhouse gas emissions from dairy animals, needs to be addressed. Strategic investments in improving feed use efficiency, herd management, and sustainable farming practices can reduce emissions while enhancing productivity. By adopting a holistic approach that integrates climate-smart technologies,

private subsector investments, and supportive government policies, Egypt's dairy subsector can not only strengthen its economic value but also contribute to national food security, rural development, and environmental sustainability.

5.3. Women's contributions and empowerment in climate-impacted livestock and dairy subsector systems

↗ 5.3.1. Empowering women through livestock development

Women play a critical yet often underappreciated role in livestock and dairy production in Egypt, contributing significantly to household food security and rural economies. Their involvement spans various activities, including livestock management, milk production, and the processing of dairy products, particularly within traditional and small-scale farming systems. Despite their indispensable contributions, women face significant barriers, including limited access to resources and markets, and a lack of decision-making authority, as well as structural gender disparities that hinder their full participation and recognition in the sector.

In Egypt, livestock plays a critical role in women's economic autonomy, where it is often one of the few assets they own or control, contributing to both food security and emergency income. This is a crucial resource in a context where 71 percent of rural women work in unprotected informal jobs compared to 38 percent of men, and where many women provide unpaid labor in family businesses (World Bank, 2024). Livestock offers women economic opportunities through the sale of milk, eggs, and meat, however on a larger scale, only 5.2 percent of firms in Egypt are majority women-owned.

In Egypt, livestock ownership differs from land ownership, with women often having individual or shared control over livestock with their husbands. Livestock is traditionally gifted to women during major life events like marriage or childbirth. Social norms assign women the responsibility of ensuring household food security, and livestock and poultry are preferred because they can be easily sold for cash, like jewelry or gold. Investing in livestock provides women with opportunities to enhance climate resilience, diversify livelihoods, and engage in rural entrepreneurship. Additionally, livestock can be used as collateral to improve financial stability (Najjar *et al.*, 2020).

↗ 5.3.2. Women and livestock management systems in Egypt

Survey findings offer a valuable perspective on how rural women experience and respond to climate-related pressures. As explained in Chapter One, the study does not use gender-disaggregated data to compare men and women, therefore, the absence of comparative data on men limits the ability to assess whether these impacts are gender-specific or reflect broader rural or poverty-related vulnerabilities.

In Egypt's diverse agricultural landscape, livestock management systems demonstrate significant regional variation, shaped by distinct cropping patterns, socioeconomic conditions, and crop-livestock integration levels. Women play indispensable roles across these systems, particularly in traditional family farming where they manage multi-species herds including cattle, buffaloes, sheep, goats, and poultry. According to the SHARP Survey, women's contributions are especially vital in regions like Monofya, Sharqia, and Menya, where they maintain high levels of crop-livestock integration through activities such as feeding livestock with crop residues, processing milk for household consumption or informal sales, and managing manure for fertilizer production. These roles not only ensure food security but also enhance the sustainability of smallholder farming households.

In rural Egypt, smallholder and semi-intensive systems dominate livestock production, relying heavily on female labor for tasks such as feeding, milking, and managing livestock health. However, women's contributions in these systems are often informal, unacknowledged, and unpaid, thus restricting their access to resources, training, and decision-making power. Smallholder systems, particularly in the dairy value chain, produce 75 percent of Egypt's total milk, of which 45 percent is consumed within households and 55 percent is sold through informal markets (ILO, 2020). Additionally, women are responsible for cleaning animal shelters and processing dairy products like cheese, cream, and butter, which are critical for household nutrition and income. In smallholder systems, livestock provides a critical safety net, especially during economic crises or crop failures. Notably, women frequently manage livestock without possessing ownership rights, limiting their autonomy over livestock-related income (FAO, 2022). Socio-cultural norms further exacerbate this issue; traditional perceptions often relegate women to supportive roles, discouraging

them from owning livestock and participating in formal agricultural activities (Saad, 2024). This is reflected in the low percentage of rural female-headed households owning livestock, which is recorded at only 26 percent, compared to 30 percent for male-headed households (FAO, 2021).

In Upper Egypt, where buffalo farming is a major source of livelihood, women's engagement in dairy production is significant. For instance, 94 percent of buffalo farmers use raw milk to produce dairy products, with women leading these efforts (Fahim *et al.*, 2018). These products are either consumed at the household level or sold in local markets, providing a critical income stream and enhancing household resilience during periods of economic instability or crop failure. Women's dairy production activities, alongside their broader livestock management efforts, are indispensable to rural livelihoods and food security. Despite their immense contributions, however, these roles are often undervalued and remain outside formal economic structures, creating barriers to their empowerment and equitable participation.

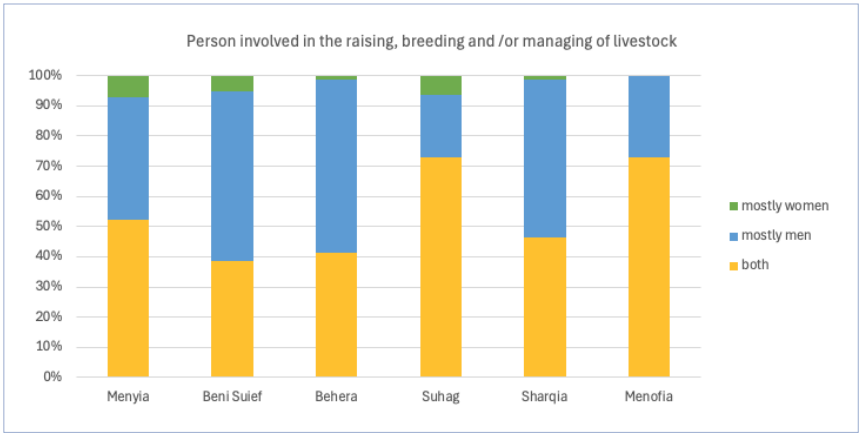
Rural women involved in cleaning animal sheds had the highest participation, with 82.7 percent of women involved (Figure 2) , followed by feeding and caring for livestock or poultry (77.3 percent), milking animals (76.7 percent), and preparing milk products like ghee (74.7 percent) according to study by Rihan (2018) in Behera governorate. Women had more autonomy in smaller-scale decisions, such as selling milk or milk products (49.3 percent), however only 4.7 percent of women made independent decisions on the number of livestock to keep or the cultivation of fodder. Decisions involving large livestock, such as selling or purchasing cows and buffaloes, were mostly made jointly with husbands (64 percent), reflecting limited autonomy in economically significant areas.

Figure 2. Woman milking a cow in a rural setting, Menyia governorate

In Egypt, women face significant gender gaps when it comes to agricultural and animal resource decision-making. About 29 percent of households in rural Egypt own livestock, with only 26 percent of rural female-headed households owning livestock compared to 30 percent for rural male-headed households. Rural women are more likely to be primary caretakers of livestock than rural men, with FAO estimating that Egyptian women spend about 70 percent of their working time in agriculture on animal husbandry (FAO, 2022). In rural Egypt, women are central to livestock management. Dairy production in Upper Egypt involves a high level of female participation, with 94 percent of buffalo farmers engaging in dairy product processing to supplement their income (FAO, 2022). Livestock serves as a source of food, income, and social security, particularly for smallholder households, and women are often the backbone of these operations.

Despite their significant contributions, women face substantial barriers. In our SHARP+ survey, results revealed that women represent only 7 percent of the surveyed livestock farmers, and men dominate decision-making in 81 percent of households (Figure 3). This limited decision-making role restricts women's ability to influence key aspects of livestock production, such as breed selection, feed procurement, and veterinary care. Additionally, women's access to resources such as land, livestock ownership, credit, and extension services is severely constrained. These disparities hinder not only women's economic empowerment but also the overall progress of Egypt's livestock sector.

Figure 3. Gender-disaggregated level of involvement in livestock management province, results of the SHARP survey



Source: Johnston, S., Lepers, L. & Abdel Monem, M. 2024. Livestock and dairy farming households' resilience: assessment report of livestock and dairy farming households, using the SHARP+ methodology (internal report). [Unpublished].

The survey of 300 women engaged in livestock management in Egypt revealed that poultry ownership is predominant, followed by cattle, buffalo, sheep, goats, and a minimal percentage owning donkeys and camels. Women's involvement in managing cattle and buffalo underscores their role in the dairy value chain, where returns are influenced by product processing and market access. The data highlights the centrality of poultry and dairy animals to livelihoods, with sheep and goats serving niche roles.

Women's comprehensive engagement in livestock management, encompassing feeding, milking, cleaning, processing, and selling, was reported by 104 out of the 300 surveyed, representing nearly a third of the sample. The highest engagement in these activities was reported in Suhag and Beni Suef. The survey indicated a higher involvement of women in Upper Egypt (75 women) compared to the Delta (29 women) in the full spectrum of tasks, suggesting regional variations in women's comprehensive engagement in livestock management. Tasks such as feeding, milking, and cleaning are labor-intensive, with most women spending 4-6 hours daily on these activities.

The survey also explored regional variations in the dairy subsector. In Suhag, women participate across the entire dairy value chain, from milk collection to the production and marketing of cheese, butter, and ghee. In contrast, in Behera, 31 out of 50 women are limited to milk collection, a low-return, labor-intensive activity. In Sharqia, 14 out of 50 women combine milk collection with direct marketing, while only 9 are involved in production stages like cheese-making, indicating untapped potential. Monofya shows 19 out of 50 women engaged in the full value chain, including packaging. Menya and Beni Suef demonstrate diverse task engagement by women. Regionally, women in the Delta are more involved in storage and packaging than those in Upper Egypt.

Direct selling to consumers and local markets is the predominant channel for dairy product sales. In Behera, 46 out of 50 respondents rely exclusively on direct sales, while Suhag utilizes a combination of direct sales and local markets. Few respondents use milk collection centers or other channels indicative of centralized supply chains.

Challenges faced by women in dairy processing include price fluctuations, a lack of proper equipment, and market access. The survey identified training needs in hygienic milk handling and new product development as top priorities, followed by quality improvement. There is a noted lack of interest in marketing and management skills training, suggesting a lack of awareness of the potential benefits these skills could offer. Available resources include clean water and electricity, while refrigerated transportation, processing equipment, and storage-refrigeration are less accessible. Income is primarily derived from fresh milk sales and processed dairy products.

The survey also highlighted the involvement of young girls under 18 in livestock management, with an overall participation rate of 20.3 percent across both regions, higher in the Delta (26 percent) than in Upper Egypt (14.7 percent). Feeding and cleaning are common tasks among young girls in both regions (Figure 4) with milking and selling activities more prevalent in the Delta. Dairy processing, the least common activity, was reported by only 2.7 percent of young girls across both regions.

Figure 4. A young girl surveyed in Behera engaged in livestock management

5.3.3. Women's participation in dairy production in Egypt

In Egypt, the role played by women is different according to the dairy production system. In the subsistence system, which constitutes the majority of Egypt's animal inventory, micro-landholders or landless farmers typically manage 1–10 cows per household. Women are primarily responsible for milking and preparing dairy products for household consumption, with surplus milk sold through intermediaries or informal markets, and contributing to household nutrition, local food security, and income generation. In traditional farming systems, where households manage 11–100 cows, women play a central role, undertaking tasks such as feeding, milking, and managing milk sales. These activities provide essential cash income and support the transition from subsistence to semi-commercial production, bridging the gap between smallholder and market-oriented systems. In the informal dairy sector, which dominates Egypt's milk production, women's labor is critical for milk handling and processing into traditional products like cheese and ghee, widely consumed in both rural and urban areas (Figure 5).

Figure 5. Woman processing milk into traditional dairy products in the Sharqia Governorate

5.3.4. Rural women's vulnerability and adaptation to climate change in Egypt

Climate change has a disproportionate impact on the gender equality gap in rural populations at the global level, with female-headed households experiencing significantly greater economic losses than male-headed households. While there is limited data in Egypt on the impact of climate change on men and women, at a global level, there is evidence that it accounts for an 8 percent loss of female-headed households' annual income relative to male-headed households (FAO, 2024a).

Rural women in Egypt are among the most vulnerable groups to climate change impacts, given their dependence on climate-sensitive livelihoods like smallholder farming, which includes crop cultivation, livestock rearing, and fisheries (FAO, 2021). Their vulnerability is exacerbated by unequal access to crucial resources such as land, water, and agricultural inputs, as well as limited access to education and extension services (FAO, 2021). These constraints hinder their adaptive capacity in the face of rising temperatures, water scarcity, and erratic weather patterns, forcing them to shoulder the burden of household food security amidst declining agricultural productivity and escalating environmental challenges (FAO, 2021).

Climate change impacts disproportionately affect rural Egyptian women, particularly where it comes to water resources, agriculture, and energy access. Women are traditionally responsible for household and agricultural water collection and management (FAO, 2021). As climate change intensifies water scarcity, this task becomes more demanding, reducing their time for income generation or education (FAO, 2021). Furthermore, the degradation of natural resources like soil and rangeland, vital for women's subsistence farming and livestock rearing, significantly impacts their livelihoods (FAO, 2021). Despite their crucial role in resource management, women's voices are often marginalized in climate adaptation and resource management decision-making processes (FAO, 2021).

Women are indirectly impacted by the impacts of climate change, particularly in governorates within the Nile Delta, such as Behera, Kafr El Sheikh, and Gharbia, where a change in climate patterns has disrupted existing livelihoods and driven male emigration. As a result, women in these vulnerable communities have taken on an increasingly critical role, with their workload intensifying significantly. In addition to their traditional agricultural tasks—such as sowing seeds, weeding, cultivating, harvesting crops, and selling surplus produce—women are now undertaking responsibilities traditionally associated with male farmers. These include irrigation, planting, land preparation, fertilization, insecticide application, plowing, and other labor-intensive farming activities (FAO, 2021).

Women in Egypt, particularly in rural areas, are more vulnerable to climate change due to gender gaps in access to resources, education, employment opportunities, and decision-making processes.

Women are affected by climate shocks, particularly in agriculture, water, and food security. For example, heatwaves in 2021 led to mango and olive crop failures in Ismailia and Marsa Matrouh, with female farmers facing greater losses due to existing inequality. Women also play a critical role in climate resilience as household managers and food producers, with 60 percent of food for household consumption and local sale produced by women (World Bank, 2024). Women, especially those who are pregnant or lactating, are identified as requiring special attention due to their heightened vulnerability to climate-induced health risks (Ministry of Environment 2022).

In our field survey, the majority of respondents (81.7 percent) recognized changes in the climate, with rising temperatures being the most commonly observed change. Menya stood out from other governorates, reporting higher percentages of respondents who were either unsure about or denied the existence of climate change. Among the reported changes, rising temperatures accounted for 65.3 percent of responses, followed by changes in summer heat and winter cold extremes at 24.9 percent. Severe cold was less frequently mentioned (8.6 percent), while changes in wind or rainfall were the least reported at just 1.2 percent. Heat stress and increased disease outbreaks emerged as the two most significant climate-related impacts affecting livestock management.

Climate change poses significant threats to livestock production in Egypt, disproportionately affecting women due to their roles as primary caregivers for livestock.

- Heat stress reduces livestock productivity by lowering milk yields, fertility rates, and growth rates. Sejian *et al.* (2016) found that heat stress can cause a 20–27 percent decline in dairy cow conception rates during summer months. Women, who are responsible for milking and caring for livestock, often face increased workloads to maintain productivity.

- Climate change reduces the availability and quality of animal feed due to declining forage crop yields. Women, who are often responsible for preparing and sourcing feed, bear the brunt of these challenges. Studies suggest that global feed crop yields could decline by 10–20 percent due to climate change (Cheng et al., 2022).
- Warmer temperatures and changing precipitation patterns increase the prevalence of vector-borne diseases such as Rift Valley Fever, West Nile Virus, and Bluetongue (FAO, 2015). Women, as primary caregivers for livestock, face health risks when handling sick animals. The economic burden of disease outbreaks also falls heavily on women, who must manage reduced livestock productivity and increased veterinary costs.

5.3.5. Women in livestock management's strategies for coping with climate change

The findings of the field survey identified mechanisms women utilize to cope with the impacts of climate change. the survey focused on collecting information on women and consequently the observed impacts might also be caused by wider rural vulnerabilities.

The field survey identified coping mechanisms used by women to deal with the impacts of climate change, with adjusting housing for livestock and changing feeding practices emerging as the top two. Some also mentioned using veterinary services to combat or prevent disease. It is interesting to note that collaborating with other women/families was not considered under this question, which may reflect the broader limitations women face in livestock decision-making and leadership roles within their communities, and inhibits their participation in collective actions. This might indicate the need to encourage strong women-centred co-operatives in these areas which can help women identify and engage in coping mechanisms or adaptation strategies that are suitable to their environment.

The implementation of coping mechanisms is hindered by various barriers, with financial constraints and the lack of information being the most commonly cited. This suggests that women are both willing and ready to adopt additional coping strategies if provided with adequate funding for climate-smart technologies and access to knowledge on climate adaptation.

Regarding the impact on income, the survey indicates a general decline in the last 5 years; however, the majority reported only a slight reduction. This may suggest that the measures currently in use are somewhat effective. Nevertheless, these measures may not be sufficient in the long term if climate stress intensifies, potentially leading to progressive income declines. Furthermore, the data shows that 57 percent of respondents derive less than 25 percent of their income from livestock and dairy activities, indicating that these are supplementary rather than primary sources of income. On the other hand, 37 percent of respondents reported earning between 26–50 percent of their income from these activities. The areas most affected by climate stresses are dairy-related activities, particularly milk production and the sale of processed dairy products.

On the question regarding actions taken to adjust income sources due to the rising levels of heat stress associated with climate change, most participants reported they had not adopted any specific measures. However, some respondents reported reducing household expenses and seeking alternative income sources. The emphasis on reducing expenses suggests that, for many, cutting costs is currently a more practical solution than developing new strategies to enhance resilience to the effects of climate change. Notably, it was rarely mentioned that they would abandon livestock or dairy management, highlighting the central importance of this activity to the livelihoods of rural women in Egypt.

Training and access to credit or loans were identified as the most important types of support that women believed could enhance their family income from livestock and dairy. The emphasis on financial support aligns with earlier sections of this report, where limited access to finance was highlighted as a significant challenge for women in agriculture. Similarly, the demand for training underscores its role as a critical prerequisite for adopting climate-smart strategies to increase income from livestock and dairy management.

CHAPTER 6. Challenges faced by women in Egypt's livestock and dairy subsectors: a needs assessment and training guidelines for promoting gender inclusion

Although the study focuses on constraints and institutional gaps, it recognizes that gender equality in climate adaptation requires building the capacity of women to enhance their participation in climate action within Egypt's livestock and dairy subsectors. The findings presented in this chapter highlight the priorities identified by female participants (without comparative data from men). The training recommendations presented in this chapter serve as a stepping-stone toward gender-transformative change. While they primarily address practical and institutional barriers, they are designed to empower women with the knowledge, skills, and support systems needed to challenge restrictive norms, gain agency, and influence decision-making structures. In line with the analytical framework discussed in Chapter1, the training recommendations are drafted taking into consideration the gender-transformative change targeting power relations, social norms and institutional structures. The proposed guidelines ensure that training is not only skills-based but also enables broader structural shifts.

These recommendations promote women's leadership, foster community-driven change, and encourage inclusive systems that recognize women as equal stakeholders in climate-resilient agricultural development. Training programmes can be designed and implemented through the collaborative efforts of CSOs, donor organizations and the government. Key training areas may include climate change awareness, climate-resilient livestock management practices, dairy value chain enhancement, financial literacy and business management, leadership and empowerment, and information and communication technology.

In line with the analytical framework discussed in Chapter 1, the training recommendations are drafted taking into consideration the gender-transformative change targeting power relations, social norms and institutional structures. The proposed guidelines ensure that training is not only skills-based but also enables broader structural shifts. Building on the insights gained, the report advocates for a gender-transformative approach that addresses the root causes of inequality — including social norms, institutional barriers, and structural power imbalances — to create inclusive and lasting climate resilience.

6.1. Challenges faced by women in livestock and dairy management

Women in Egypt's livestock and dairy sub-sectors face multiple barriers that restrict their economic participation. Access to critical resources remains limited. The following are highlights of these challenges:

- **Unequal decision-making power:** Decision-making in livestock and dairy management remains male-dominated, with women having limited autonomy over key economic decisions. While women are actively involved in tasks such as feeding, milking, and processing dairy products, decisions regarding livestock sales, breed selection, or veterinary care are predominantly made by men. Women may have some control over smaller-scale decisions, such as selling milk or milk products, but their influence in larger, economically significant choices is minimal. This imbalance not only undermines women's agency but also reduces their ability to shape the direction of livestock production and adapt to challenges, such as climate change or market fluctuations. Addressing these disparities requires targeted efforts to empower women as equal stakeholders in household and community decision-making processes.
- **High burden of unpaid labor:** In rural Egypt, women dedicate a significant portion of their time to unpaid labor in livestock and dairy management, and are often responsible for essential tasks. For example, women in

subsistence farming systems carry out 94 percent of dairy processing activities, such as making cheese, ghee, and yogurt, yet their contributions are often considered an extension of household responsibilities rather than valued as economic labor. This unpaid workload not only limits women's ability to engage in income-generating opportunities but also exacerbates gender inequalities by keeping them confined to informal and undervalued roles.

- **Climate change impacts and increased workload:** Climate change exacerbates the challenges faced by women in livestock and dairy management. For instance, with rising temperatures and a lack of access to advanced cooling technologies, livestock become highly vulnerable. This is challenging in both the Nile Delta, Upper Egypt, and in the rainfed areas of the North Coast.
- **Access to finance:** Despite their significant contributions, women's economic participation in the livestock and dairy sectors is constrained by access to financial and market barriers. Women face significant challenges in accessing financial resources, with only 27 percent of women having accounts at financial institutions or mobile money services, compared to 38.7 percent for men. Female entrepreneurs make up just 15 percent of business owners, and in 2020, only 5.2 percent of firms had female majority ownership.
- **Market barriers:** Women dominate informal dairy systems, which account for 75 percent of Egypt's total milk production**, yet they face limited access to formal markets due to inadequate quality control and regulatory constraints. Most milk produced in informal systems is sold without proper value addition, reducing its economic potential. Additionally, women's lack of access to education, training, and financial tools restricts their ability to adopt modern livestock practices or engage in higher-value market activities, such as processing and marketing value-added dairy products. These barriers not only limit women's economic empowerment but also impede the sector's overall growth and sustainability.
- **Educational, legal and social constraints:** While gender gaps in school enrollment have disappeared, women represent only 36.9 percent of STEM graduates, compared to 63.1 percent for men. This limits women's access to high-demand jobs in the green economy. Despite legislative efforts, such as Law No. 219 of 2017 on inheritance rights, women face societal barriers to land ownership and entrepreneurship. This limits their ability to adapt to climate change and participate in the formal economy. Gender-based violence and Social Norms (GBV) , early marriage, and restrictive gender norms further limit women's mobility, education, and employment opportunities, reducing their resilience to climate risks.

The field survey results indicate that land, followed by veterinary services, are the resources most accessible to respondents. A significant proportion of the women, or their households, are either landowners or leaseholders, which is critical for effective livestock management. However, while veterinary services were identified as accessible, the survey did not evaluate the quality or affordability of these services. Notable regional disparities in resource access were observed. Access to veterinary services was significantly higher in the Delta, with 42 percent respondents reporting access, compared to only 13 percent in Upper Egypt. Access to technology was minimal across both regions, and access to loans and training workshops remained scarce. Regarding decision-making, most respondents reported that decisions are typically made jointly by men and women within households. Nevertheless, women encounter several barriers that hinder their active participation in decision-making processes, including limited access to information, inadequate training opportunities, and entrenched cultural norms that traditionally position men as the primary decision-makers.

6.2. Needs assessment and proposed interventions for women in livestock and dairy production

The field survey conducted with the women involved in livestock and dairy activities across the six Egyptian governorates in the regions of the Delta and Upper Egypt revealed crucial insights into their capacity needs for climate change adaptation, that can be summarized as:

- **Access to Veterinary Services:** Veterinary services were identified as a top priority by women in the livestock and dairy subsectors. Women highlighted the need for affordable and accessible veterinary care to manage livestock health effectively, particularly in the face of climate-induced challenges such as disease outbreaks and heat stress. Mobile veterinary clinics and subsidized vaccination programmes could address mobility and financial barriers, especially in rural areas. The Delta region showed a higher demand for veterinary services compared to Upper Egypt, reflecting regional differences in livestock management needs.
- **Access to Modern Technologies:** Women emphasized the importance of adopting climate-smart technologies to enhance livestock productivity and reduce vulnerability to climate risks. These include improved livestock housing to mitigate heat stress, alternative feeding techniques during feed shortages, and renewable energy solutions like solar-powered cooling systems. Access to such technologies would enable women to better cope with extreme weather events and resource constraints, ultimately improving their livestock management practices and income generation. Dissemination of information through mobile apps, radio, or community meetings, and improving women's access to technology, would help women make informed decisions about livestock care during extreme weather events .
- **Access to Credit and Financial Support:** Financial constraints were cited as a significant barrier to implementing adaptive measures. Women in Upper Egypt in particular prioritized access to credit and finance to invest in livestock, improve housing, and adopt modern technologies. Gender-sensitive microfinance programmes, subsidized credit schemes and other financial products tailored to women's needs could empower them to expand their economic activities and increase resilience to climate change impacts.
- **Training on Climate-Resilient Livestock Management:** Women expressed a strong interest in acquiring skills to adapt to climate change. Key training areas include disease prevention and treatment, sustainable feeding practices, and efficient water and resource management. Localized early warning systems and climate advisory services tailored for women in livestock that could be linked to already existing services accessible to women in the community would empower them to be prepared. Such capacity-building programmes would enable women to anticipate and mitigate the effects of climate stressors, such as heatwaves and feed shortages, on their livestock.
- **Improved Market Access:** Women's economic activities are often restricted to selling fresh milk and other products directly to consumers or in local markets. Limited access to formal markets reduces their earning potential and ability to scale their businesses. Training in marketing, combined with improved infrastructure and access to markets, would enable women to expand their reach and increase their incomes. Supporting women's collective action through group support like women-led cooperatives can empower women to negotiate better market terms and access formal markets.
- **Entrepreneurial Training for Value Addition:** Many women identified the need for training in entrepreneurial skills, such as marketing, business management, and value addition through dairy processing. These skills would enable them to move beyond subsistence farming and participate in higher-value activities within the dairy value chain, such as producing and packaging cheese, butter, and yogurt. Expanding women's roles in value-added activities could significantly enhance their incomes and economic empowerment.
- **Flexible Training Programmes and Gender-Sensitive Approaches:** Time constraints, primarily due to household responsibilities, were identified as a major barrier to accessing training. Flexible training schedules and women-only sessions were suggested as effective solutions. Additionally, financial incentives and community support groups were recommended to encourage participation and address cultural sensitivities that limit women's mobility and participation in public programmes.

- **Establishment of Community Support Groups and Cooperatives:** The lack of existing support networks was a recurring issue in the assessment. Women emphasized the need for cooperatives or community-based organizations to provide access to training, resources, and market linkages. Such organizations could also facilitate knowledge-sharing, negotiate better terms in local markets, and support women in integrating into higher-value activities within the dairy sector. In the Delta, community support groups were particularly valued as a means of overcoming social and cultural barriers. Gender transformative approaches that enable community members to discuss and seek solutions e.g. Dimitra clubs can offer opportunities for women and men to address social barriers to women's participation and benefit from livestock farming.
- **Policy Changes for Education and Financial Inclusion:** Women identified the need for policies that improve access to education, training, and financial support. In the Delta, education and training were prioritized, while Upper Egypt respondents favored incentives for sustainable practices. Policies that promote gender-sensitive financial inclusion and incentivize climate-smart practices would empower women to adapt to climate change and contribute more effectively to the livestock and dairy subsectors.
- **Support for Balancing Household Responsibilities:** Women highlighted the need for community-based assistance programmes, such as childcare support and flexible training schedules, to help them balance their household responsibilities with livestock and dairy activities. Such support would enable women to participate more actively in capacity-building programmes and economic activities without compromising their caregiving roles. Gender transformative approaches would further contribute to bringing about discussions and addressing social norms. Approaches like gender discussion series promote dialogue among families and community members on sharing of roles and responsibilities, gender norms, power dynamics, community and family decision making and can be adapted to the cultural context.
- **Awareness and Knowledge Dissemination:** Lack of awareness about available training opportunities and support programmes was a significant challenge. Targeted awareness campaigns and outreach initiatives, possibly through local cooperatives or women's groups, would ensure that women are informed about the resources and opportunities available to them. These can be amplified through use of radio, mobile platforms, and community meetings to share information on training and support programmes.

It is worth mentioning that the assessment revealed notable regional differences in needs. Women in the Delta prioritized access to veterinary services and community support groups, while those in Upper Egypt emphasized financial support and incentives for sustainable practices. Tailored interventions that address these regional disparities would ensure that resources are allocated efficiently and effectively to meet the specific needs of each area.

6.3. Training guidelines to promote inclusion and overcome social barriers to effective climate action

The following are the elements of a comprehensive framework for designing and implementing gender-responsive and climate-resilient training programmes in the livestock and dairy sectors. This framework highlights key guiding principles, priority training areas, and strategies for addressing social barriers to ensure that women are empowered as active participants and leaders. By adopting a gender-transformative approach, engaging men as allies, and tailoring interventions to local contexts, these trainings aim to build inclusive, effective, and sustainable solutions that enhance both community resilience and gender equality.

↗ I. Guiding principles for trainings

- **Gender transformative approach:** Training should not only equip women with practical skills but also challenge the social norms and power dynamics that hinder their full participation. This involves advancing women's leadership potential, and engaging men as allies in promoting gender equality (see Box 1).
- **Engaging men:** It is essential to actively engage men as allies in all activities, ensuring their support for women in their community. Integrating men into training and awareness programmes can challenge traditional divisions of roles and highlight the shared benefits of women's increased economic participation and decision-making. These measures support a gender-transformative approach that position men as agents of change who challenge negative stereotypes and deeply entrenched social norms that perpetuate inequalities.

- **Contextualization to the region:** The survey revealed distinct priorities between the Delta and Upper Egypt regions, requiring targeted interventions. Training content and delivery methods should be tailored to the specific needs and contexts of different regions, considering variations in livestock systems, climate risks, and the different socio-cultural dynamics. Content and delivery methods must be adapted to reflect the unique needs and priorities of each region to ensure relevance .

- **Accessibility and inclusivity:** Trainings should be accessible to all women, taking into considerations the different literacy levels, economic status, or social background while taking into consideration the gender dynamics including women's roles and burden of care. This requires flexible scheduling, convenient and accessible locations, and potentially utilizing diverse formats, including visual aids and practical demonstrations.
- **Participatory approach:** Trainings should be participatory and interactive, encouraging women to share their experiences, knowledge, and perspectives and promoting peer to peer learning from practical experiences.
- **Collaboration and Partnership:** Training programmes should be developed and implemented in collaboration with relevant stakeholders, including government agencies, NGOs, community organizations, and research institutions including women-led organisations.

II. Key training areas

- **Climate change awareness and impacts:** Build a foundational understanding of climate change, its specific impacts on livestock and dairy production (e.g. heat stress, disease outbreaks, feed shortages), and the importance of gender-responsive adaptation.
- **Climate-resilient livestock management practices:** Provide practical training on adaptive strategies, such as:
  - Heat stress mitigation techniques.
  - Sustainable feeding practices.
  - Animal waste management and renewable energy.
  - Disease prevention and management.
- **Dairy value chain enhancement:** Equip women with skills to participate in higher-value activities within the dairy value chain, such as:
  - Hygienic milk handling and storage.
  - Value-added dairy processing.
  - Packaging and marketing of dairy products.
- **Business management:** Enhance women's economic empowerment through training on:
  - Basic financial management skills.
  - Accessing credit and financial services.
  - Developing business plans and marketing strategies.
- **Information and communication technology (ICT):** Bridge the digital divide and empower women to access information and markets through trainings on:
  - Basic computer skills and internet usage.
  - Mobile technologies for livestock management and marketing.
  - Accessing online resources and training materials.

↗ III. Addressing social barriers

- **Promote women's participation in decision-making:** Facilitate discussions on gender roles and decision-making within households and communities. Encourage joint decision-making and resource control related to livestock and dairy management.
- **Engage men as allies:** Conduct awareness-raising sessions with men on the benefits of gender equality and women's empowerment in climate action. Encourage their active participation in supporting women's involvement in livestock and dairy management.
- **Strengthening community support systems:** Support the establishment or strengthening of women's groups and cooperatives, resource sharing, and collective action opportunities. These groups can also serve as platforms for disseminating information and advocating for women's needs.

6.4. Recommendations to promote gender inclusion and overcome social barriers to effective climate action

To address the identified challenges and needs, these recommendations are provided for policy makers to direct local and national authorities on promoting gender inclusion and enhancing women's participation in climate action within Egypt's livestock and dairy subsectors. The guidelines are structured around guiding principles, key training areas, and strategies for addressing social barriers. They emphasize a gender-transformative approach (Box 1), regional specificity, accessibility and inclusivity, a participatory approach, and collaboration and partnership. Key training areas cover climate change awareness, climate-resilient livestock management practices, dairy value chain enhancement, financial literacy and business management, leadership and empowerment, and information and communication technology. Strategies to overcome social barriers include promoting women's participation in decision-making, addressing mobility constraints, providing childcare support, engaging men as allies, and strengthening community support systems.

CHAPTER 7. Summary for policy makers

To effectively tackle the climate challenges facing Egypt's livestock and dairy sectors, policymakers must move beyond short-term fixes and mere provision of inputs or training for women. The findings of this report strongly emphasize the importance of investing in gender-transformative interventions that address systemic inequalities and foster long-term resilience.

Women's crucial role: Women are indispensable to Egypt's livestock and dairy sectors, frequently managing essential tasks such as feeding, milking, processing dairy products, and marketing. Their contributions are vital for household financial stability, yet they face significant hurdles, including restricted access to land, livestock ownership, credit facilities, technological education, and training. These barriers limit their capacity to enhance productivity and adopt innovative practices. Cultural norms that favor men's roles in public and economic domains further marginalize women, despite their substantial impact on household and community welfare. Addressing these issues requires engaging men as allies in all initiatives, ensuring their support through participation in training programmes and awareness campaigns as outlined earlier. Promoting intergenerational dialogues can help instill an appreciation for women's roles among younger generations, driving a cultural shift toward gender equality from an early age. Moreover, establishing mentorship programmes where seasoned women in the sector guide newcomers can build a supportive network, fostering community and empowerment among women.

Climate change Impacts: Climate change intensifies the vulnerabilities of women in Egypt's livestock and dairy sectors. As primary caregivers for livestock, women bear a disproportionate burden of rising temperatures, water scarcity, and increased disease outbreaks, all of which undermine livestock productivity and health. Their responsibilities for collecting water and fodder become increasingly labor-intensive as resources diminish. Climate-induced disasters like floods and droughts can decimate livestock populations, leaving women with fewer assets and heightened vulnerability. Initiatives supporting women in livestock management should align with national programmes such as Hayah Karima and Takaful wa Karama to maximize impact. Collaborating with national efforts to enhance financial inclusion for women is equally critical, empowering them to manage finances and conduct secure transactions. Policymakers must prioritize funding and resources to train women in integrating climate-resilient practices, such as drought-resistant fodder and water-efficient irrigation systems, enabling them to adapt to evolving environmental conditions.

Empowerment strategies: Empowering women in these sectors demands a holistic, multi-faceted approach. Essential strategies include securing access to land and livestock ownership, broadening access to customized credit and financial services, and bolstering women's decision-making power within households and communities. Access to veterinary services, gender-transformative training programmes, and climate-smart technologies will equip women with necessary tools to confront environmental challenges. Promoting women's networks and associations can offer mutual support and advocacy, enabling knowledge sharing, resource access, and collective action against issues like gender-based violence and discrimination. Embedding gender-sensitive education in school curricula can nurture equitable attitudes in future generations, while encouraging women's participation in local governance and decision-making bodies ensures policies reflect their priorities. Although this study centers on women's roles, resources, and adaptation within livestock and dairy subsectors, broader research underscores the importance of digital inclusion and health infrastructure for resilience. Enhancing digital literacy and connectivity for rural women can improve access to critical information such as climate forecasts, market data, and veterinary services. Similarly, bolstering reproductive health services supports overall well-being, facilitating fuller participation in agricultural and economic activities. Though not directly examined here, these elements are integral to a comprehensive gender-transformative framework.

Climate-smart solutions: Enhancing women's economic opportunities involves easing their entry into formal markets and supporting participation in higher-value dairy activities. Establishing women's cooperatives can enhance bargaining power, lower transaction costs, and strengthen market connections. Introducing climate-smart technologies, such as solar-powered cooling systems and sustainable feeding practices, can boost productivity and resilience. Financial incentives like climate risk insurance and affordable loans can spur adoption of these technologies and reduce risks. Building capacity in value addition—processing and packaging dairy products—can elevate income and open entrepreneurial avenues. Infrastructure development, including rural roads and storage facilities, can minimize post-harvest losses and improve product quality. Training in business management and entrepreneurship will enable women to seize new market opportunities and diversify income sources. Success hinges on collaboration among

diverse stakeholders, including banks, microcredit facilities, private sector entities, government, civil society, and international partners. For instance, partnerships with larger agribusinesses can connect women to broader markets and supply chains, enhancing economic prospects. Shared research and knowledge forums can drive experience exchange, aiding the design, funding, and implementation of initiatives. Furthermore, branding and marketing strategies that spotlight women's unique contributions can increase recognition and fetch premium prices for their products.

Policy recommendations: To empower women in Egypt's livestock and dairy sectors, robust and targeted policy interventions are essential. These policies must address systemic barriers and harness women's significant contributions to drive sustainable agricultural development. The following key recommendations outline a strategic framework for achieving gender equity and climate resilience:

- **Secure land and livestock ownership with gender-sensitive policies:** Establishing policies that support women's rights to land and livestock ownership is a foundational step. This can unlock economic potential by providing women with assets to leverage for credit and investment. Such measures address a critical barrier, as only 5.2 percent of rural women currently own agricultural land compared to 27 percent of rural men.
- **Expand access to tailored financial services and credit:** Enhancing access to customized credit facilities and financial services is vital, especially since only 2 percent of women access agricultural credit. This support will enable women to invest in their operations, adopt climate-smart technologies, and scale their enterprises. Initiatives should include low-interest loans and microcredit tailored to women's needs.
- **Integrate gender-responsive strategies into national policies:** Embedding gender-responsive approaches within national climate and agricultural policies ensures women's needs are prioritized in broader development agendas. This includes promoting women's leadership in rural initiatives and strengthening community support systems to amplify their influence. Regular gender reviews of policies and programmes can further ensure alignment with equity goals.
- **Enhance participation through supportive infrastructure and data collection:** Offering flexible training programmes that can remove practical barriers to women's participation in agricultural activities. Additionally, consistent collection and analysis of gender-disaggregated data, supported by tools like the Women's Empowerment in Livestock Index (WELI), are crucial for tracking progress and refining interventions. Research must also address critical issues like violence against women and control over income to prevent deepening inequalities.
- **Empower women's expertise through partnerships and representation:** Recognizing that women represent 58.35 percent of skilled agricultural workers compared to 41.65 percent for men, policymakers should prioritize investments in women's education, technical training, and leadership development to connect their expertise for sector-wide transformation. Establishing a dedicated task force for women's empowerment, fostering international partnerships to learn from gender-inclusive models, creating a national fund for women's agricultural initiatives, and encouraging public-private partnerships can provide resources and accountability. These efforts will catalyze economic growth, enhance climate resilience, and ensure women are leaders in shaping a sustainable agricultural future in rural Egypt.
- **Need for gender-disaggregated research:** To fully grasp the distinct ways climate change affects men and women in rural Egypt, further gender-disaggregated research is imperative. This research is critical for exposing how environmental changes impact gender-specific roles, responsibilities, and vulnerabilities within agricultural communities. It can also clarify how climate impacts intersect with existing social inequalities, such as men's greater access to finance and technology compared to women's increased health risks during climate disasters due to caregiving duties. Additionally, this research should investigate how cultural norms influence adaptive strategies for men and women, potentially uncovering opportunities for joint interventions that promote mutual support and resilience. By outlining these unique impacts, policymakers can create targeted and equitable interventions that address the specific needs and strengths of each gender, ensuring climate adaptation strategies neither neglect men's challenges nor deepen women's marginalization. Additionally, long-term studies monitoring how climate change uniquely affects men and women over time could reveal changing roles and help create adaptable policies that promote gender equality and strengthen community resilience in rural Egypt.

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ISBN 978-92-5-140014-2

9 789251 400142

CD6465EN/1/10.25