A market trader with her wares in Dar es Salaam, Tanzania. Photo: UN Women/Daniel Donald, CC BY-NC-ND 2.0

Chapter 1

Looking ahead: gender and inclusion in food, land and water systems in 2050

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TOWARD 2050:
New opportunities are emerging, but equality remains out of reach under current trajectories

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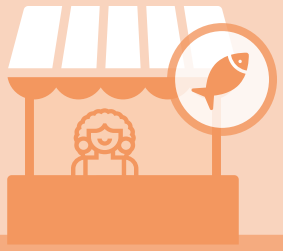
Livelihoods are shifting to **OFF-FARM OPPORTUNITIES** but progress toward decent work and earnings is slow and uneven.



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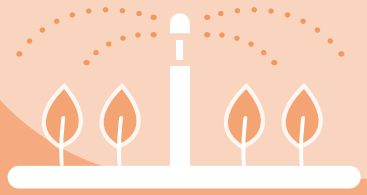
PERSISTENT INEQUALITIES in access to land and water and in resource governance continue to limit productivity, resilience and adaptive capacity.



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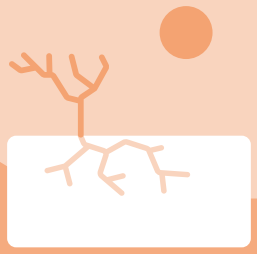
CLIMATE CHANGE AND CONFLICT are reshaping migration and agrifood labor markets with unequal impacts on women and youth.



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DIGITAL TECHNOLOGIES can expand opportunities, but digital divides mean the benefits will not be equally distributed.

Food, land and water systems are already transforming, as are underlying gender and generational relations.

Key messages

- Projections to 2050 show growing opportunities for women and youth to benefit from food, land and water systems — but only if entrenched inequalities are deliberately dismantled.
- Women's participation in agrifood systems is projected to increase, though progress will be slow and uneven across and within regions. As economies grow, women and youth are expected to move from primary agriculture into off-farm jobs. With the right policies and solutions in place, this could mean higher incomes and better working conditions.
- As digital innovation accelerates, it could deliver outsized returns for women, expanding their access to markets, finance and employment — provided the digital divide that currently excludes them is closed.
- At the same time, the polycrisis will disrupt food, land and water systems, with women and youth set to pay the highest price. Without careful correction, the structural inequalities that currently prevent women and youth from accessing land and water resources and effectively responding to shocks and stressors will persist.
- Actors in food, land and water systems must build on positive trends for equality and inclusion. That means ensuring decent work for people moving into off-farm employment and applying the solutions set out in the thematic chapters so that women, youth and currently excluded groups can lead the transition toward more equitable, resilient and productive food, land and water systems by 2050.

1.1. INTRODUCTION

Foresight research has not fully explored **gender equality** as a possible outcome of changes in FLWS over time, nor has it examined how gender inequalities hinder the transformation of these systems.[1,2] Current trends suggest that only marginal progress is being made to address gender inequalities in **food, land and water systems** (FLWS), and this lack of progress will make it more difficult for women to participate in, benefit from and contribute meaningfully to **FLWS transformation** into the future. Young people also face considerable barriers to full participation in FLWS, such as lack of access to land and other resources, and limited economic opportunities.[3]

While progress has been real, it remains incremental because most interventions in FLWS have focused on women's access to resources, services and participation, while insufficient attention has been paid to underlying structural factors, such as biases in institutions, unequal governance and decision-making structures and restrictive social norms that perpetuate inequalities.[4,5] Progress is also uneven. While advancements are being made in some areas, such as closing the gender **digital divide**[6] and integrating gender into the design of policies and interventions, other trends, such as intensifying climate change and conflict proliferation are eroding progress or even exacerbating inequalities. Moreover, these general trends and patterns vary both across and within regions and backsliding on progress toward gender equality can occur, particularly following major geopolitical shifts and global shocks — as is currently evident in the ongoing **polycrisis**.[7]

Given the slow rate of progress in closing gaps related to economic participation and opportunity, educational attainment, health and survival and political empowerment, the World Economic Forum[8] estimates that it will take 123 years to achieve full gender parity, with gaps related to economic participation and political empowerment remaining the largest. Should women and **youth** remain marginalized in FLWS through lack of economic opportunities, ability to participate in governance and decision-making and capacity to adapt to change, it is unlikely that we will achieve global development goals, including gender equality and women's **empowerment**.

Addressing unequal gender relations is not only a moral imperative — it can also catalyze **FLWS transformation**. Foresight modeling and participatory foresight exercises can identify key drivers of gender equality and **social inclusion** in FLWS and highlight potential solutions and spillover effects.[9] Such analyses can inform policies and investments when participatory approaches and gender and social inclusion considerations are well integrated into policy processes.[10] Although some research explores how food system drivers affect gender equality into the future and how closing gender gaps may improve food system outcomes, many gaps remain.

This chapter explores key drivers of gender (in)equality and youth inclusion in FLWS to 2050 by region under different scenarios, considering optimistic, pessimistic and business-as-usual trends in terms of demographic shifts and economic growth, drawing on historical trends over the past 20 years. Unequal outcomes, such as gender-related earnings gaps, reflect unequal power relations embedded within FLWS that also shape the process of agricultural transformation (**box 3**). While power relations are not directly observed in the projections presented in this chapter, these underlying and evolving dynamics also determine the degree to which it is possible to achieve gender parity by 2050. Other key drivers of transformation, such as gaps in rights to natural resources, migration trends and the growth of digital technologies, are not directly included in the projections because of limited available data. These topics are, therefore, treated as special cases.

Box 3. Chapter 1 key terms

Agrifood systems: AFSs encompass the entire range of actors and interconnected activities involved in the production, aggregation, processing, distribution, consumption, and disposal of food and agricultural products. These include primary crop, livestock, fisheries and forestry production, as well as related off-farm activities such as storage, postharvest handling, transport, processing and marketing.[11]

FLWS transformation: A deliberate and ongoing process of changing how FLWS function with the goal of achieving sustained improvement in multiple, interconnected outcomes at scale.[12,13] Within CGIAR, these outcomes are defined in terms of five key impact areas: (1) climate adaptation and mitigation, (2) environmental health and biodiversity, (3) gender equality, youth and social inclusion, (4) nutrition, health and food security and (5) poverty reduction, livelihoods and jobs. Generally, this process is associated with a shift from a high prevalence of subsistence-oriented production to highly productive and commercially viable production and an increase in the environmental and social sustainability of FLWS.

Agricultural transformation: The reallocation of economic activity away from primary farming toward higher-value manufacturing and services of off-farm activities as part of a larger process by which an economy transitions from a traditional, labor-intensive, agricultural economy to a modern, capital-intensive industrial economy.[14,15]

A woman in rural Cambodia uses renewable energy solutions to support her livelihoods. Photo: UN Women/Ploy Phutpheng, CC BY-NC-ND 2.0

1.2. WOMEN'S AND YOUTH ROLES IN TODAY'S AGRIFOOD SYSTEM

Agrifood systems[i] extend beyond the farm. They include downstream processing, the transport of products between farms, firms and markets and the sale of food ingredients and ready-made meals to consumers. Figure 2 shows 2025 CGIAR estimates of agrifood incomes and employment for high-income countries (HICs) and for low- and middle-income countries (LMICs) and regions (East Asia and the Pacific [EAP] to sub-Saharan Africa [SSA]). The AFS accounts for 20% of LMIC economies — measured using gross domestic product (GDP) — and 42% of employment.[ii,16] In SSA, where per capita GDP is lowest, AFSs account for a third of the economy and three-fifths of employment. The AFS is far less important for HICs, but is much larger in absolute terms (i.e., US$54 billion compared to US$38 billion in LMICs).

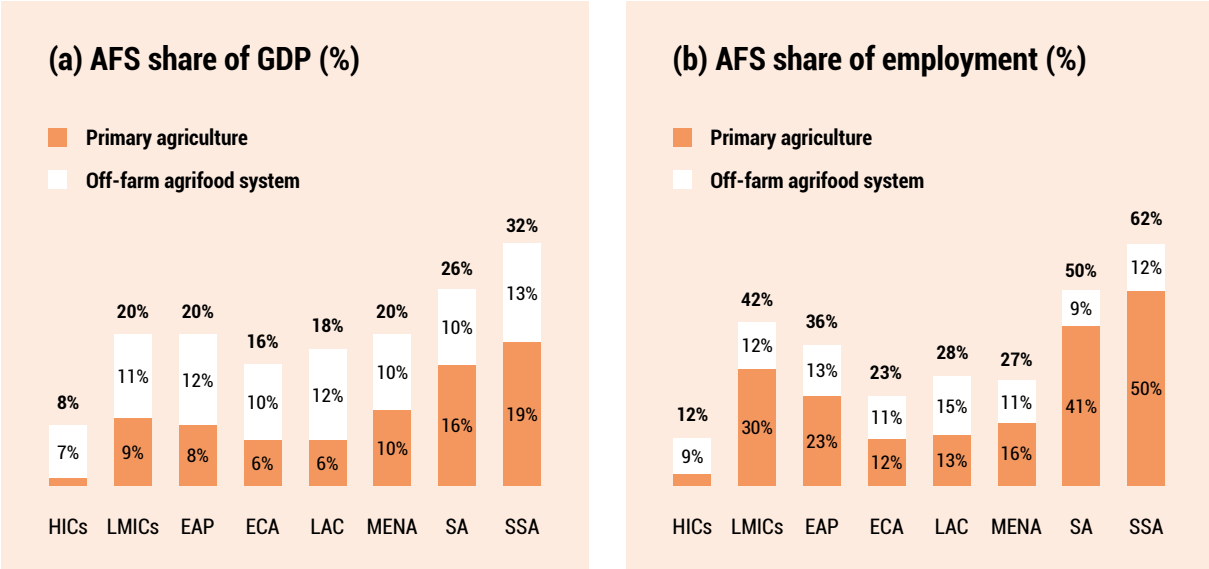


Figure 2. AFS incomes (by GDP) and employment (2025)

Source: Authors' projections using the data and estimation procedure described in Thurlow et al.[16]
Note: High-income countries (HICs); low- and middle-income countries (LMICs); within LMICs — East Asia / Pacific (EAP), Europe / Central Asia (ECA), Latin America / Caribbean (LAC), Middle East / North Africa (MENA), South Asia (SA), sub-Saharan Africa (SSA).

The **off-farm** components of the AFS become more important as countries develop. Figure 2 shows that only one out of every eight dollars of agrifood GDP in HICs is generated within **primary agriculture** (i.e., crops, livestock, forestry and fishing). Even in SSA and SA, where agriculture dominates, the off-farm components account for almost half of agrifood GDP. Agricultural employment shares are larger, because GDP per worker is much higher off the farm. As workers move out of primary agriculture — either pushed by climate and conflict or pulled by the prospect of higher earnings — they raise average labor productivity across the economy as part of the process of AFS transformation.

Women are an important part of the global AFS. Figure 3 shows the share of women in total employment in 2025. Two-fifths of agricultural workers in LMICs are women — slightly higher than their share of overall employment. Women are particularly important for the off-farm AFS, especially retail food trade and the sale of ready-made meals. In SSA, for example, women workers account for almost three-fifths of employment in agrifood trade and four-fifths in food services. However, this is not

i) This report uses the term food, land and water systems (FLWS) to emphasize the importance of the natural resources and diverse ecosystems upon which AFSs rely. However, the projections in this chapter refer more narrowly to AFSs.

ii) AFS estimates include formal and informal incomes and work, and home-produced goods (e.g., subsistence farming), but excludes home-produced services (e.g., childcare and meal preparation). See Thurlow et al.[16] for details on definitions and data sources.

true everywhere. Low female labor force participation in SA and MENA explains why women workers account for only a small share of employment. Participation rates for women are low because many women work exclusively within the household, often on activities related to food systems, such as preparing family meals. Moreover, there is significant underreporting of women's employment in the labor force survey data, particularly considering that much of women's work on family farms, off-farm enterprises and subsistence agriculture is not counted.[11] This service-oriented work within the home and other **unpaid care work** are *not* captured in the employment numbers.

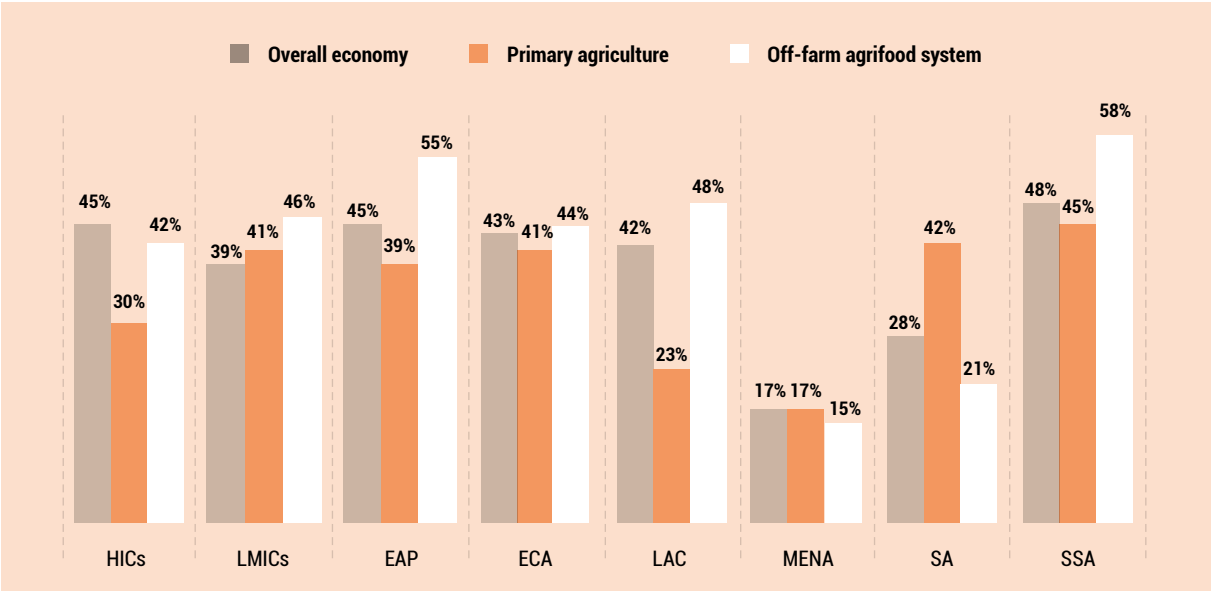


Figure 3. Share of women in total employment (2025)

Source: Authors' projections using the data and estimation procedure described in Thurlow et al.[16]

Women account for a smaller share of AFS incomes than their share of employment. As a result, their earnings per worker are lower than those of men. On average, women workers across LMICs earn only 46% of what male workers earn.[iii] This is only partly explained by differences in hours worked and employment patterns. Much of the difference in earnings is attributable to endowment gaps (e.g., unequal access to assets and education) and structural discrimination in the workplace and broader society, such as women's lack of access to information, training and credit, workplace harassment and the uneven distribution of unpaid care work.[11,17] Closing these earnings gaps (and increasing labor force participation) would greatly increase the benefits to women working in global AFSs.[iv,18] It would also determine whether future agricultural growth and transformation are inclusive.

Youth are essential for the intergenerational transition within AFS, and AFS are also an important source of employment for rural youth. Across LMICs, 36% of working youth were employed in agriculture in 2025, compared to 30% of working adults. More young women (37%) rely on agricultural employment compared to young men (35%), and are especially reliant on off-farm activities within AFS.[3] Other research shows that there is substantial variation in youth employment patterns in farming, off-farm activities and non-AFS employment between urban, peri-urban and rural areas.[19] Rural youth are more heavily engaged in the agriculture sector in countries where the AFS is characterized by labor-intensive practices, limited input use and limited market integration. They tend to transition away from the AFS as it transforms, particularly in places where **climate risks** are expected to increase, for a variety of reasons, including limited access to productive resources, rising education levels and aspirations, declining productivity and poor working conditions.[3]

iii) Historical earnings gaps are from FAO.[3]

iv) See FAO[16] and Escalante and Thurlow[18] for recent estimates.

Box 4. Chapter 1 methods

Although we have data on what FLWS look like today, we have little information on how these systems might change in the future. We use an econometric modeling framework that draws on historical cross-country data to estimate AFS GDP and gender-disaggregated employment. Given different scenarios about future economic growth and demographic change, the model estimates how women, men and youth will participate in and benefit from their engagement in future AFSs. Simply put, the model takes assumptions about future GDP and employment patterns for the overall economy and then decomposes these into AFS-level GDP and employment levels, disaggregated by sex and age group.

Projections are run for three scenarios: a **business-as-usual** development path, as well as more **optimistic** and **pessimistic** futures. Each scenario is informed by 20 years of historical data on economic and population growth. The business-as-usual scenario assumes trends observed over the past two decades continue to 2050. The more optimistic scenario assumes a faster rate of economic growth and job creation and slower population growth leading to a smaller population by 2050. The more pessimistic scenario assumes the opposite (i.e., slower economic growth and higher population growth). These scenarios provide a range of possible future outcomes, but do not represent a complete set of possible future development pathways.

Results are presented by region, using the World Bank's classification, with HICs separated from LMICs. We recognize that there is a lot of heterogeneity within these broad regions, and therefore the results presented in this chapter are somewhat coarse. Regions with greater heterogeneity, such as ECA, EAP and MENA, are more affected by our regional grouping.

Note that the model uses country-level datasets with global coverage. Such data are not available for certain drivers of women's and youth participation in AFS, such as access to natural resources, migration and digital technologies. These are, therefore, treated as special topics later in the chapter, where we provide a narrative discussion on these trends based on the existing data and literature. The model is also limited to projecting economic indicators, such as incomes and employment. It therefore overlooks some dimensions important for women, such as their roles and contributions within the household and in unpaid and informal work.

Note: For more details on the modeling framework see online Supplementary material: Chapter 1, *https://hdl.handle.net/10568/185637*

A woman with her livestock in Khulna, Bangladesh. Photo: Felix Clay/WorldFish, CC BY-NC-SA 2.0

1.3. FOOD, LAND AND WATER SYSTEMS IN 2050

The role of women in global FLWS is changing over time, alongside the pace and pattern of economic development. Expectations about what FLWS will look like in the future influence which issues, policies and investments should be prioritized today. Since the future is uncertain, we develop three projections reflecting different development pathways: a "business-as-usual" scenario, an "optimistic" scenario, and a "pessimistic" scenario (outlined in box 4).

Figure 4 shows population and GDP growth rates — panels (a) and (b), respectively. The black circles indicate historical annual growth rates for 2000–2023 and the orange dots indicate future growth (2025–2050) under the business-as-usual scenario. Population growth is slowing across the world and will be close to zero in HICs under the business-as-usual scenario, shown in panel (a).[v] Even with this slowdown, however, populations continue to grow rapidly in MENA and SSA (i.e., at more than 1% and 2% per year, respectively) although fertility rates are declining in both regions, particularly in MENA.[20,21] Population growth interacts with economic growth to determine *per capita* GDP, shown in panel (b). Per capita GDP growth in EAP remains high under the business-as-usual scenario but will decelerate in the future along with slower population growth that becomes negative by 2050. Per capita GDP rises faster in the optimistic scenario (black diamonds) and slower in the pessimistic scenario (grey triangles). Overall, the share of LMICs in the global economy will increase toward 2050, led by more rapid growth in SA and SSA.

The share of the AFS in total GDP declines as countries develop, creating fewer jobs and income opportunities for the population dependent on AFSs for their livelihoods. Figure 5 shows agrifood GDP and employment growth in the business-as-usual scenario — panels (a) and (b), respectively. Growth in the AFS is below growth in the overall economy, even in SSA, whose economy and population are expected to grow rapidly, as shown in panel (a). Across LMICs, the off-farm components of the AFS are growing faster than primary agriculture. However, this is not happening everywhere. In SSA, for example, agriculture is growing rapidly, but downstream food processing and trade are not keeping up.

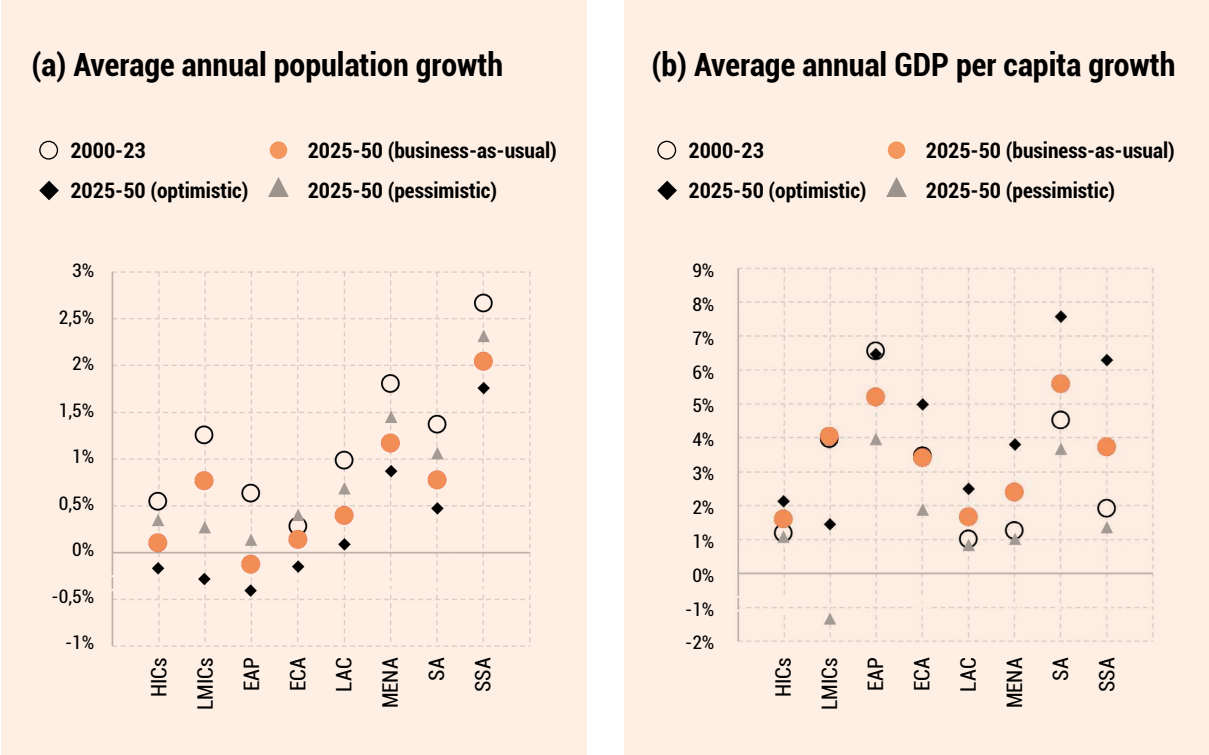


Figure 4. Population and economic growth projections (2025–2050)

Source: Authors' projections using data and statistical models from Thurlow et al.[16]

v) Population growth is based on median, high and low projections from UNDESA.[66]

The same is happening in LAC — a region where the AFS is barely keeping up with population growth. Overlaying economic growth with changes in employment patterns, shown in panel (b), points to emerging policy priorities. Employment in primary agriculture is falling rapidly in all regions, except SSA. Maintaining agricultural growth, despite falling employment, is a challenge that may require more laborsaving and precision technologies (e.g., mechanization or digitalization), investments in infrastructure, expanding access to inputs and services and building resilience to climate change and other stressors that contribute to resource degradation and reduce productivity. At the same time, employment in the off-farm AFS is expanding, even in regions where off-farm incomes are lagging behind farm incomes. Because off-farm growth is often associated with migration to cities, towns and peri-urban areas, expanding downstream AFS activities, such as food processing, logistics, wholesale, retail and food services, to accommodate the growing labor force in these areas is an important policy priority.[22]

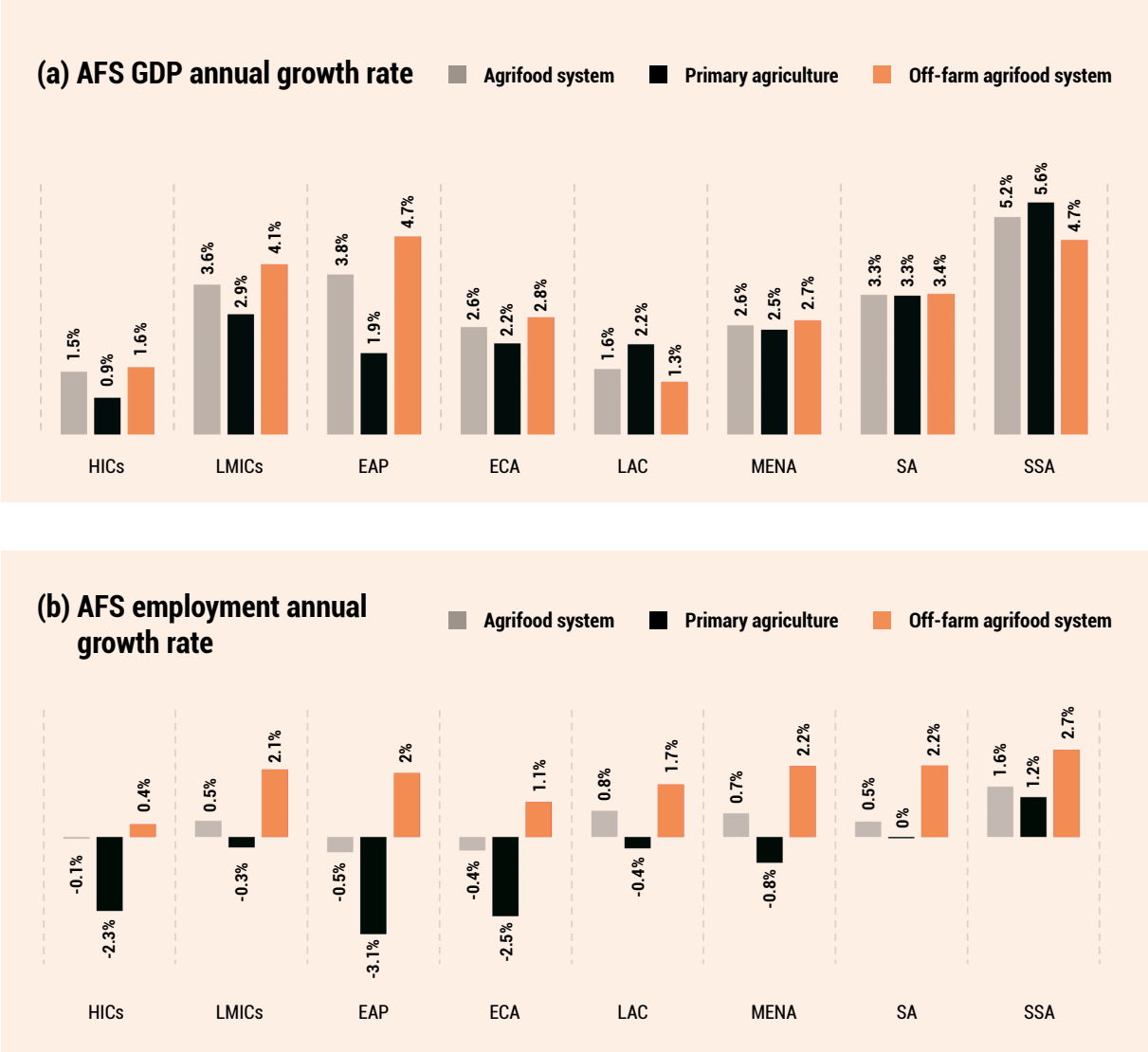


Figure 5. AFS GDP growth projections, business-as-usual scenario (2025–2050)

Source: Authors' projections using data and statistical models from Thurlow et al.[16]

1.4. PROJECTION RESULTS: WOMEN'S AND YOUTH ROLES IN AGRIFOOD SYSTEMS IN 2050

Increasing female labor force participation is one driver that contributes to accelerating agricultural transformation, particularly when women's labor productivity and earnings are also increasing and when they have access to **decent employment** opportunities in the off-farm components of the AFS. Figure 6 shows projected female employment-to-population ratios and gender earnings gaps for the three scenarios in 2050 (from 2025). Employment of women is already growing quicker than the female population, leading to higher employment-to-population ratios in the business-as-usual scenario (orange dots). Female labor force participation rates continue to lag in MENA and SA, constraining employment growth both within and outside the AFS. In contrast, employment of women in EAP and LAC is expected to continue growing, despite slow or declining population growth. This leads to large increases in the share of women in these regions who are working outside the household. This has implications for female earnings gaps, which historical trends indicate are improving in all regions, but by more in LAC and HICs.

Projections show continued reductions in gender earnings gaps to 2050 across most regions and scenarios, with the largest reductions in HICs, LAC and SA. Despite the improvement in SA, gender earnings gaps remain larger than in most other regions (apart from MENA) in 2050. In ECA, the earnings gap declines only under the optimistic scenario. Across all LMICs, gender earnings gaps remain unchanged in 2050 under the pessimistic scenario.

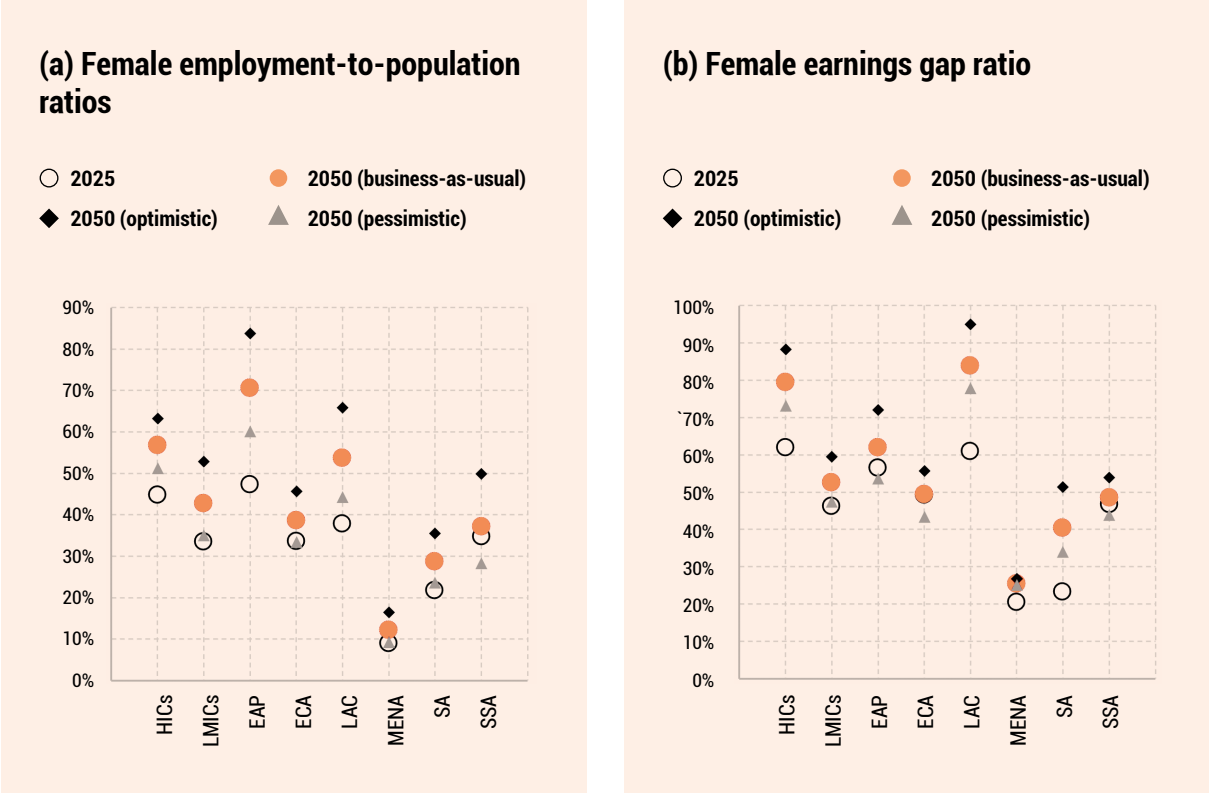


Figure 6. Female labor force participation and earnings gap projections (2025–2050)

Source: Authors' projections using data and statistical models from Thurlow et al.,[16] and earnings gap data from the FAO.[3]
Note: Earnings gap is the ratio of women to men's average earnings per worker.

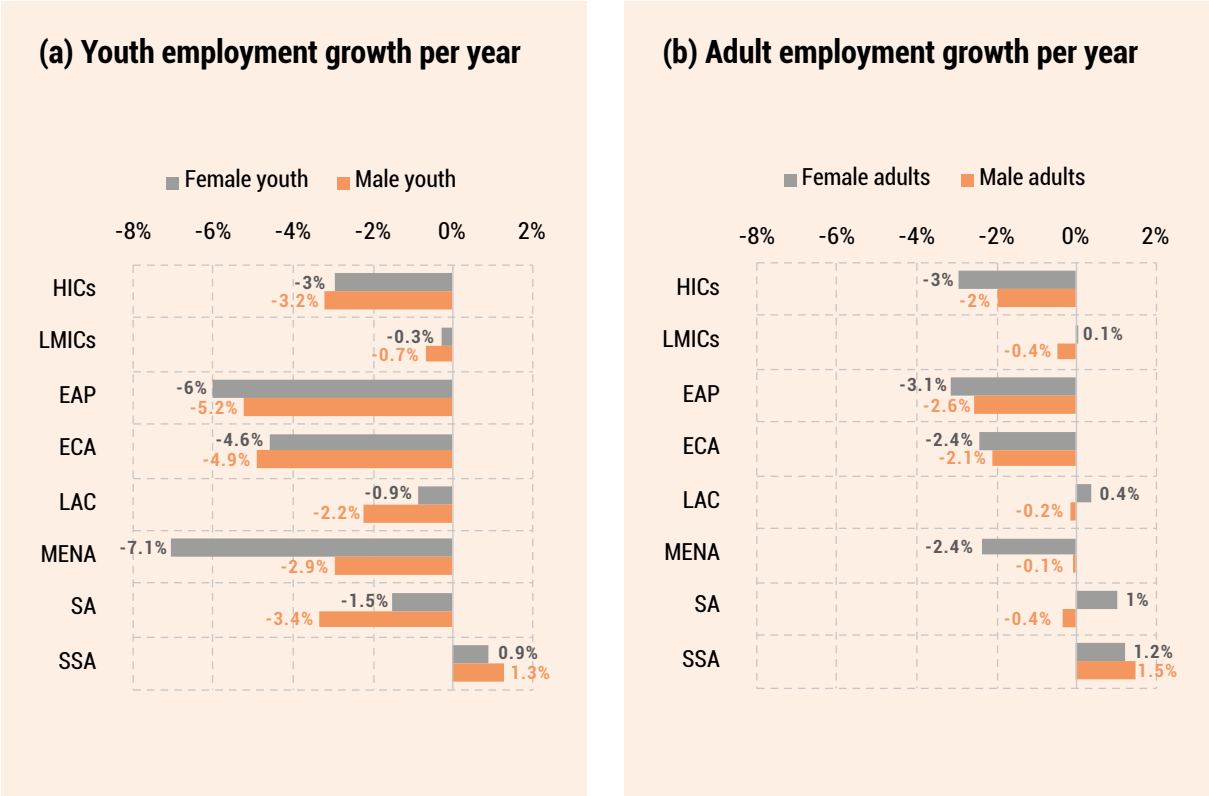


Figure 7. Youth and adult agricultural employment growth projections (2025–2050)

Source: Authors' projections using data and statistical models from Thurlow et al.[16] and youth employment data from FAO.[3]
Note: Youth are 15–24 years and adults are 25+ years.

Finally, the share of young women and men working in agriculture is falling rapidly. Figure 7 shows projected annual agricultural employment growth rates (2025–2050) for youth and adults, shown in panels (a) and (b), respectively. Youth employment in the AFS is falling in all regions, except SSA. It is also falling faster than adult employment in all regions, except perhaps HICs, representing an aging of the agricultural workforce. Since regions are at different stages of their **demographic transition** (i.e., the timing of their "youth bulges"), differences in population growth rates cannot entirely explain declining youth employment in agriculture. Rather, it may reflect the difficulties youth face in getting access to land and other resources, or youth's ambitions to work outside agriculture.[3] The negative agricultural employment growth for youth in nearly all regions may also be explained by trends in the temporary or seasonal agricultural workforce that are not adequately captured by labor force surveys, or by the withdrawal of young people from the labor force due to schooling. In the case of the MENA region, young women may withdraw due to marriage and adherence to socially ascribed roles for married women.

These projections underscore the need for improving working conditions in agriculture (e.g., through the adoption of laborsaving technology or expansion of information and financial services, including insurance), and for faster growth and job creation outside of primary agriculture, including in the off-farm components of the AFS. The latter would be particularly beneficial for young women, who are more likely to work in informal trade and food services. However, even in **off-farm work**, ensuring that women have access to decent jobs that are less **vulnerable** to shocks, and where they are not subject to harassment, gender-based violence, health hazards or poor working conditions, will be important.

Projection results are limited in that they present results by broad regional categories, while there are likely to be important differences in future trends and outcomes within these regions. The projections are also unable to account for several key drivers of AFS transformation. Ideally, projections to 2050 would integrate trends in natural resource access and rights, migration and technological advancements, such as the digitization of the agriculture sector. However, historical data on these topics are scarce, making it difficult to predict future trends. Despite these limitations, the following sections attempt to characterize current gender gaps in each of these areas and to extrapolate how these gaps may influence women's and youth participation and inequalities in FLWS into the future.

A small business owner runs her fishing company and stall at the Apia fish market in Samoa. Photo: Asian Development Bank, CC BY-NC-ND 2.0

1.5. TRENDS IN NATURAL RESOURCE ACCESS AND RIGHTS — WITH A FOCUS ON LAND AND WATER

Women, youth and other **socially excluded groups** tend to have fewer rights and less access to natural resources, and resource gaps are likely to grow as population growth, climate change and competition from private industry intensify. Unless efforts are made to address gaps in access to natural resources, women and youth's participation in and contributions to FLWS will remain constrained, limiting the environmental, social and economic benefits derived from FLWS.

Limited data are available on gendered access to and control over natural resources. Moreover, measuring rights to natural resources is complicated, as these are better understood as a *bundle of rights* that includes rights of access, withdrawal, management, exclusion and alienation, with these rights varying under different types of **tenure** arrangements (informal to formal, customary to statutory).[23,24] Measures of gender gaps in rights to land largely focus on ownership, with limited data available for customary lands.[25] The Demographic Health Surveys collected intrahousehold data on self-reported ownership of land (alone[vi], jointly[vii] or both) from 38 countries. Using data from the most recent year available across these countries, on average, 7.6% of women reported owning land alone and 14.8% reported owning land jointly; while for men, these figures were 21.2% and 13.5%, respectively.

Thus, as shown in figure 8, men are more likely to report owning land alone, while women are slightly more likely to report joint ownership, particularly in some countries. Notably, joint ownership does not represent equal rights — women are likely to have less influence over decisions involving joint property.[26] Gender disparities are even more pronounced in agricultural land ownership. For the 49 countries reporting on

vi) Women who own land alone (% of women age 15–49) is the percentage of women age 15–49 who only solely own land that is legally registered with their name or cannot be sold without their signature.
vii) Women who own land jointly (% of women age 15–49) is the percentage of women age 15–49 who only jointly own land that is legally registered with their name or cannot be sold without their signature, with someone else. "Only jointly" implies the woman doesn't own a land on her own, but instead jointly owns one with someone else.

SDG indicators 5.a.1 (a) and (b),[viii] "In nearly 80% of countries..., fewer than half of women have ownership or secure rights to agricultural land [and] in almost half these countries, men are at least twice as likely to own land as women."[25,27 (p17)] Few young people own any land, with ownership among rural youth somewhat more common (although landholdings tend to be smaller).[3] This may be driven by the fact that many young people still live with their parents and contribute to family-owned farms. The gap between young women and men in land ownership is less stark — gender differences in land ownership increase with age.[3] However, young women may be more likely to feel insecure compared to young men regarding their future access to land, given the prevailing laws and informal norms regarding inheritance and land ownership rights.

Beyond ownership, perceptions of tenure security also matter for women's ability to engage effectively in FLWS. PRINDEX data from over 100 countries collected in 2020 and 2024, show that only 40% of women claim ownership rights to land and housing property, compared to 48% of men in 2024, and this gender gap has doubled over the previous five years.[28] While perceptions of tenure insecurity increased from 19% in 2020 to 23% in 2024, with younger adults more likely to feel insecure, there were no significant differences by gender apart from in particular countries.[28]

Water is another essential resource for agricultural production, yet gender-disaggregated data on access to water for productive purposes are generally unavailable at the national level and across countries. Case study evidence suggests women lack access to land equipped for irrigation as well as irrigation equipment, such as motorized pumps, while often providing labor for irrigation using manual, time-intensive methods.[29,30,31]

More data are available on domestic water collection and access to water, sanitation and hygiene (WASH) services, which have implications for women's

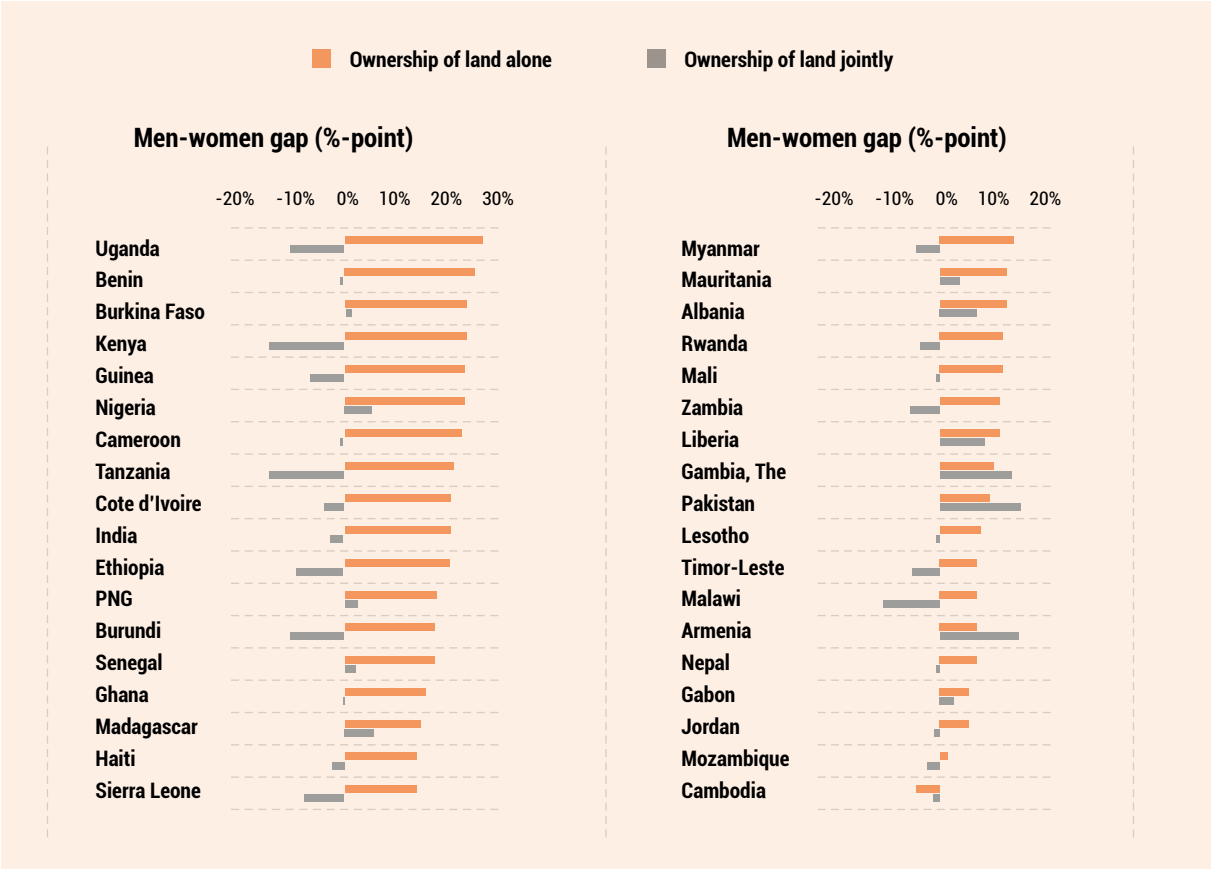


Figure 8. Gender gap in land ownership alone and jointly

Source: Demographic Health Surveys, available at: https://genderdata.worldbank.org/en/indicator/sg-own-ld

viii) SDG indicator 5.a.1 is defined as (a) Proportion of total agricultural population with ownership or secure rights over agricultural land, by sex; (b) share of women among owners or rights-bearers of agricultural land, by type of tenure. As Tier 2 indicators, these data are not collected regularly.

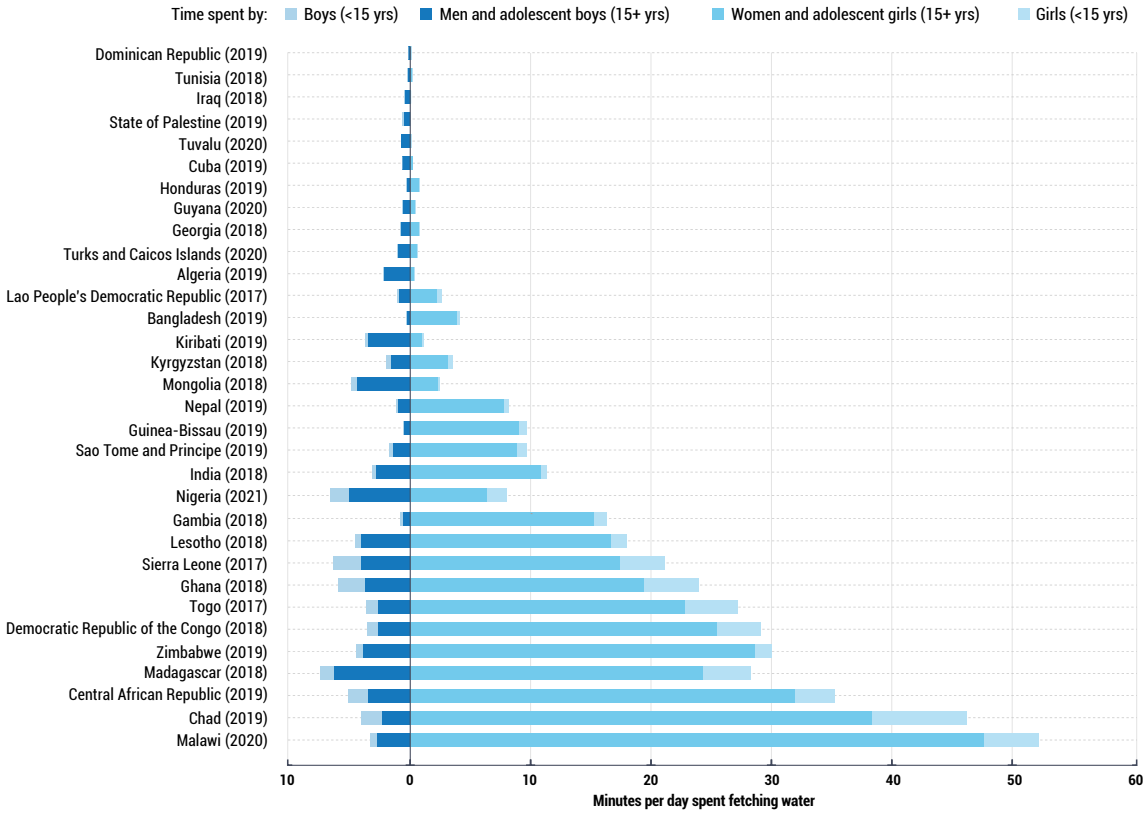


Figure 9. Average time spent collecting water by women, men, girls and boys, by country (2012–2022)

Source: UNICEF and WHO[32]

participation in FLWS. SDG indicators show progress toward both universal access to basic WASH services and investment in WASH infrastructure is slow, with one in four women and girls lacking access to safe drinking water and two in five lacking access to safely managed sanitation.[32] In almost all countries with comparable data, the burden of water collection falls primarily on women and girls (see figure 9), increasing their unpaid care burden.[32]

Many factors and trends shape access to natural resources, including the legal and policy context, tenure regime, and governance structure.[33] Legal frameworks often fail to fully recognize and protect women's land rights[25] and significant legal barriers remain (e.g., laws in 43 countries still do not grant equal inheritance rights to surviving husbands and wives).[34] Equitable policies are often not implemented on the ground because of patriarchal norms that limit women's effective control over land and water resources.[25,35] Slavchevzka et al.[36] find no strong correlation between the number of legal protections and gender parity in actual land ownership or secure rights to land across the 32 countries for which data are available; however, specific policy measures, such as mandatory joint titling, are associated with lower gender gaps. On customary lands, women have secure tenure when their rights are legally recognized and enforceable and when they have strong participation in communal land and **resource governance**.[33] In some cases, formal land registration initiatives can reduce tenure security for women and other marginalized community members who previously had more rights under customary arrangements.[37]

There are also gender disparities in **representation** in resource governance institutions, such as water governance bodies, where women's participation remains low, despite evidence showing that women's inclusion results in more equitable laws and norms governing resource use.[38,39] While global average scores on gender mainstreaming in water resources management[ix] show a slight increase from 54% in 2020 to 58% in 2023, 15% of countries still had no gender mainstreaming mechanisms, and 31% of countries had limited implementation, budget or monitoring of their

ix) Based on SDG 6.5.1, which tracks the degree of women's participation in integrated water resources management, including through the existence of gender mainstreaming objectives in water-related laws, policies, plans or strategies, and the effectiveness of their implementation.

gender mainstreaming mechanisms.[40,41] Thus, women perform many of the unpaid tasks related to managing water for their households yet remain excluded from decision-making regarding the productive use of water and broader water resource management.

Other drivers of (in)equitable access to resources include climate change, demographic and migration trends and corporate resource extraction, such as land and water grabbing and the proliferation of **artificial intelligence** (AI) data centers.[24,42,43,44] For example, climate change will exacerbate water access challenges by heightening competition over increasingly scarce water resources and increasing the amount of time women spend collecting water by up to 30%.[45] At the same time, as agricultural transformation progresses and more people move away from primary agriculture, competition for resources in rural areas may decrease, while demand for resources from other sectors, such as industry, may increase.

These trends suggest that rising competition and increasing land and water scarcity will potentially exacerbate exclusion by 2050, especially for women and youth, if intentional efforts to reduce inequalities in access to natural resources are not intensified. If policies, investments and interventions directed at this challenge succeed in closing gender gaps in **access to and control over resources**, evidence suggests this would have far-reaching benefits. Securing women's land tenure, for instance, is associated with increased adoption of climate-smart practices, greater food security and women's empowerment, among other outcomes.[46]

1.6. MIGRATION TRENDS

Women account for around half of international migrants (48%) and **internally displaced persons** (IDPs) (49%).[47] Driven by a complex mix of economic aspirations, educational pursuits and the need to escape gender-based violence or harmful practices, women's movement is further intensified by structural inequalities, conflict and climate change.[40] The countries with the highest share of women among IDPs at the end of 2024 were Malawi (58.8%), Chad (58.3%), Madagascar (58%), Mali (57.9%) and Democratic Republic of the Congo (57.8%).[47] Across all countries, the majority of IDPs were displaced by conflict and violence. Yet all countries that recorded conflict displacements also registered movements triggered by disasters.[48] Internal migration (including seasonal, circular and rural-to-rural migration) remains more common than international migration and there is a clear gendered pattern of movement across the rural-urban continuum, although data remain limited.[49]

The number of IDPs has doubled since 2018. By the end of 2024, internal displacement reached 83.4 million people[x] across 117 countries and territories, as compared to 40.6 million in 2018, with women and girls accounting for half of the displaced population. The largest increases in the number of IDPs were observed in EAP and in SA.[xi,48] Regarding the number of **internal displacements**, 70% in 2024 were caused by disasters, totaling 45.8 million. Of these disaster-driven displacements, 29% occurred in SSA, 25% in EAP, 22% in the Americas, and 14% in SA. Furthermore, more than three-quarters of the people internally displaced by conflict and violence by the end of 2024 were living in countries with high or very high vulnerability to climate change.[48]

Projections in figure 11 show that SA could average 35.7 million internal **climate migrants** by 2050 under a pessimistic scenario of high emissions and unequal development.[xii] Increased rainfall variability and destructive precipitation events uniquely threaten SA's agriculture-dependent workforce, driving rural-to-urban migration following climate shocks.[50] The region also has one of the largest food-insecure populations[xiii] and projections suggest SA will continue to have the largest numbers of food-insecure people by mid-century.[50] East Africa could see internal climate migrants average 10.1 million by mid-century under the pessimistic scenario, up from 2.6 million in 2020. Regional trends show the Horn of Africa becoming hotter and drier, while southern regions face increased drying due to rising temperatures and declining precipitation. High dependence on rainfed agriculture makes these areas acutely sensitive to rainfall

x) Of the 83.4 million IDPs at the end of 2024 globally, 73.5 million were displaced by conflict and violence and 9.8 million by disasters. Chad saw 1.2 million internal displacements from disasters — the second highest globally — while the Democratic Republic of Congo ranked fourth for conflict-driven displacement with 6.2 million.
xi) In EAP, the number of IDPs went from 0.8 million in 2018 to 5.2 million in 2024 and in SA, from 3.7 million in 2018 to 7.1 million.
xii) The report models internal climate migration under three scenarios, "pessimistic" (high greenhouse gas emissions combined with unequal development pathways); "more inclusive development" (similarly high emissions but with improved development pathways); and "more climate-friendly" (lower global emissions combined with unequal development). This is the expected number of internal climate migrants under the pessimistic scenario.
xiii) Acute food insecurity affects 16 million in Bangladesh, 15 million in Afghanistan and 11 million in Pakistan.

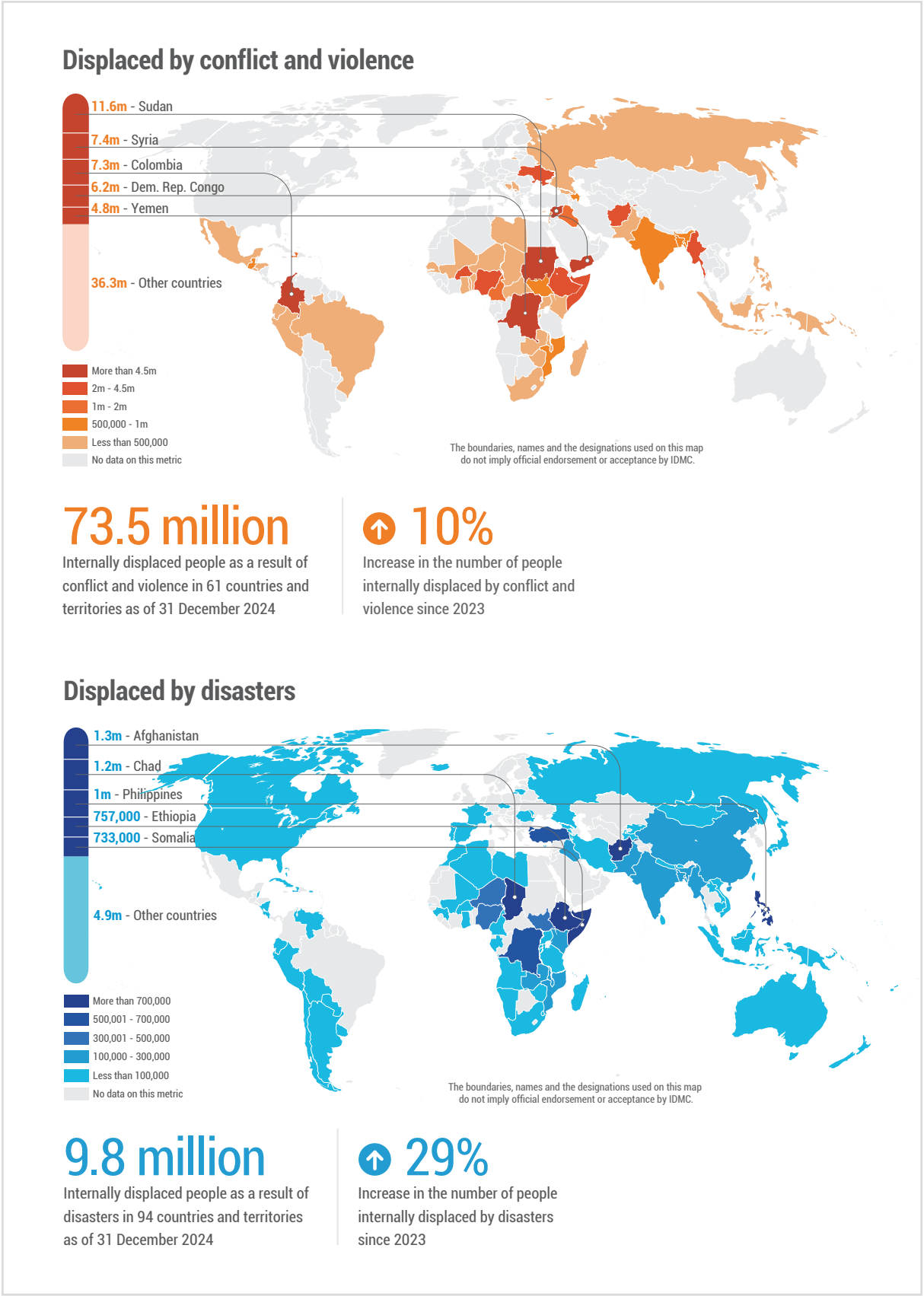


Figure 10. IDPs at the end of 2024

Source: Internal Displacement Monitoring Center[48]

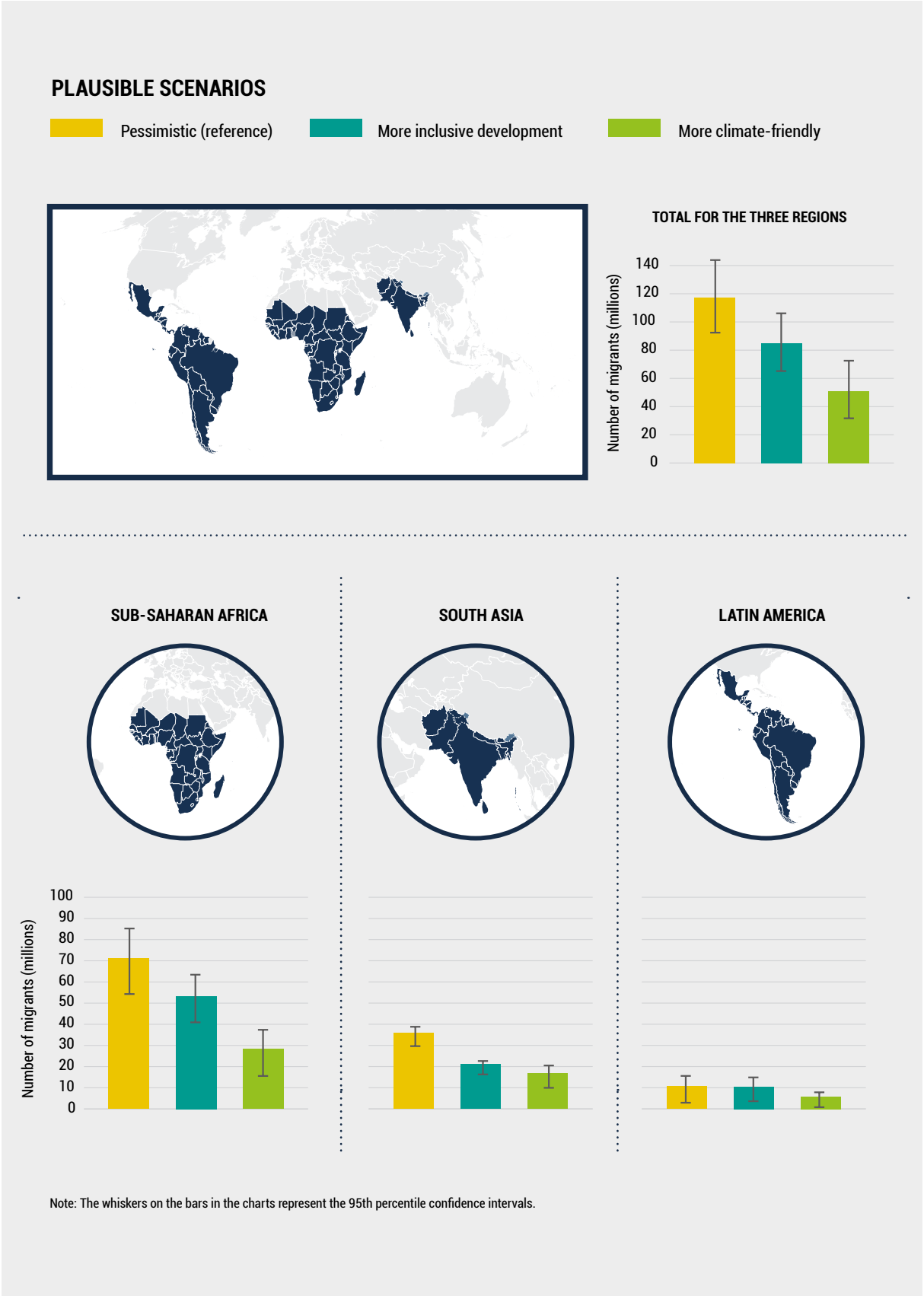


Figure 11. Projected number of climate migrants in sub-Saharan Africa, South Asia and Latin America under three scenarios by 2050

Source: Rigaud[50]

variability and drought, driving rural-to-urban and **circular migration**.[50] Mexico and Central America could see 1.4–2.1 million internal climate migrants by 2050. **Outmigration** will drive population declines in rainfed cropping areas, while pastoral areas see increases. These shifts could cause significant economic losses for smallholder farmers growing commercial crops such as coffee.[50] Combined with violence and structural economic challenges, these stressors are expected to worsen food insecurity, while rising migration flows continue to strain humanitarian capacities.[51]

Without intervention, this projected scenario will disproportionately affect women and youth, compounding existing gender inequalities. Social restrictions and caregiving responsibilities often prevent women from migrating; those who do move face significant constraints in securing viable livelihoods.[52,53] For those remaining, heavy domestic and agricultural burdens intensify as they must travel further to fulfill care roles, while low-socioeconomic status women face higher disaster-related mortality and increased risks of postdisaster violence and mental health issues.[50] Climate shocks can also widen gendered labor gaps among youth. Extreme heat pushes young women out of the workforce, while droughts further concentrate them in household farm work.[54] Restrictive norms and inequalities continuously limit women's **adaptive capacities**,[55] a vulnerability worsened by household food hierarchies that prioritize boys and men in regions like SA.[56] Furthermore, despite women's active participation in agriculture, a widespread lack of land ownership prevents them from being recognized as producers.[57] This limits their ability to adopt adaptation strategies or benefit from climate interventions.

While off-farm work can serve as an initial step toward labor migration, helping households diversify income and reduce climate exposure, opportunities for profitable off-farm agrifood employment remain highly uneven across regions. On the other hand, migration can alter the size and composition of the agrifood workforce, land use and agricultural production. When migration reduces the household labor supply, women and youth may have to increase their own farm labor time, and if they are left to manage plots without clear tenure security, they may face higher risks. These shifts occur within and beyond national boundaries, adding another layer of complexity regarding future trends in FLWS. Importantly, remittances can play a key role in navigating these shifts. Evidence shows they can be used to transition from low-value subsistence crops to higher-value commercial crops or market-oriented production, to hire contract labor or to invest in laborsaving technologies.[58]

Farmers and researchers in Kiboko, Kenya, use a new digital seed quality verification platform. Photo: Jerome Bossuet/CIMMYT, CC BY-NC 4.0

1.7. TRENDS IN DIGITAL INCLUSION

Advances in digital technology are rapidly transforming the global economy and reshaping the opportunities to participate in FLWS. Digital tools can lower barriers to information, reduce information asymmetries and increase access to finance and markets, leading to enhanced agricultural productivity along the value chain.[59] As a lever of change, closing gender gaps in **digital inclusion** has the potential to produce outsized returns for women. However, deeply entrenched **structural barriers** can also magnify gender and other types of inequalities, where digitally advantaged social groups capture a majority of the benefits while digitally disadvantaged social groups are left further behind.

Current state of digital inclusion

Having a mobile phone and reliable internet is now part of everyday life. Online interactions are becoming the default mode of engagement for connecting with friends and social groups, accessing news and information, conducting business transactions and accessing government services. As of 2024, data from the nationally representative Global Findex surveys show that 86% of adults globally and 84% in LMICs own a mobile phone. Basic phones continue to dominate in many SA and SSA markets, which constrains internet and app-based use. However, poorer adults are eight percentage points less likely to own any phone, rural residents are 12 percentage points less likely to own any phone compared with urban residents and these gaps widen for smartphone ownership.[60]

In LMICs, women are nine percentage points less likely than men to own a phone, but the largest gaps are concentrated in a handful of populous countries (e.g., Bangladesh, Egypt, Ethiopia, India, Pakistan), accounting for at least 300 million women without phones.[60] These findings are consistent with those reported by the global mobile operators group, GSMA, in the 2026 Mobile Gender Gap Report. They find that in LMICs, women are 7% less likely to own a mobile phone, 13% less likely to own a smartphone and 12% less likely than men to use mobile internet in 2025.[6] While these gender gaps have been narrowing since 2017, progress has been slow with the largest gaps in the SA and SSA regions (see figure 12).

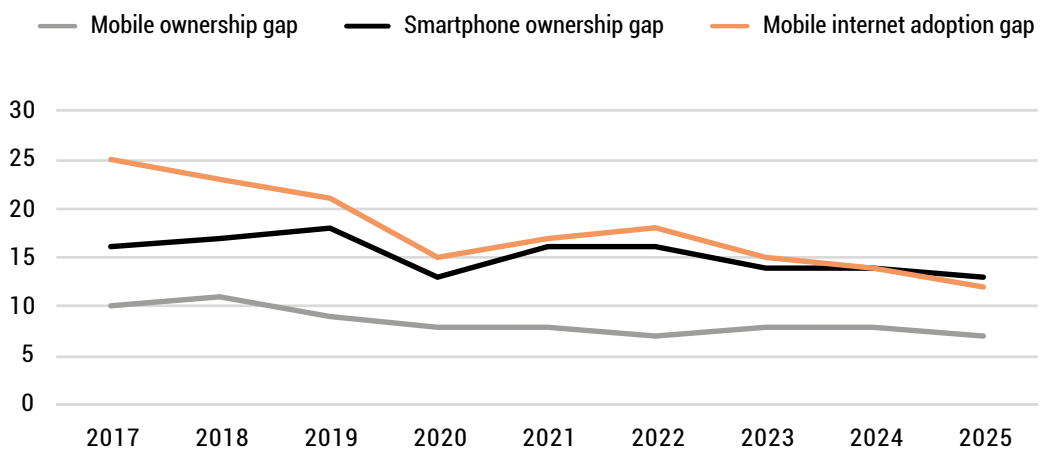
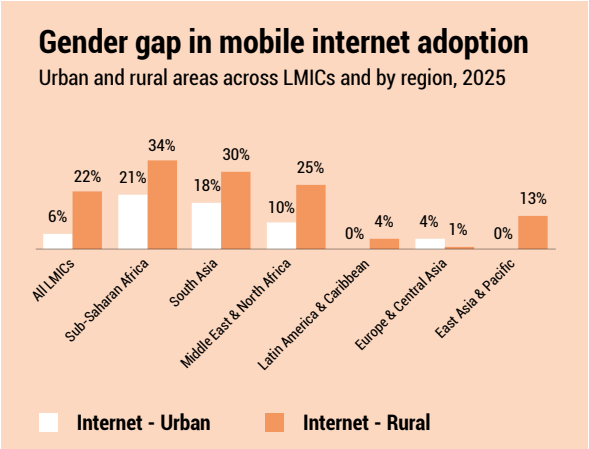


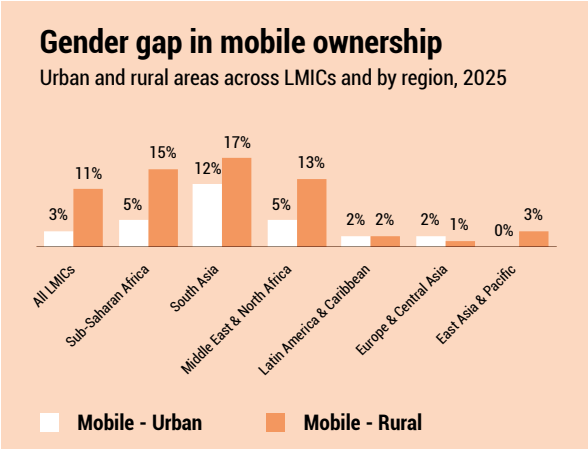
Figure 12. Gender gaps in mobile access in LMICS, 2017–2024 (%)

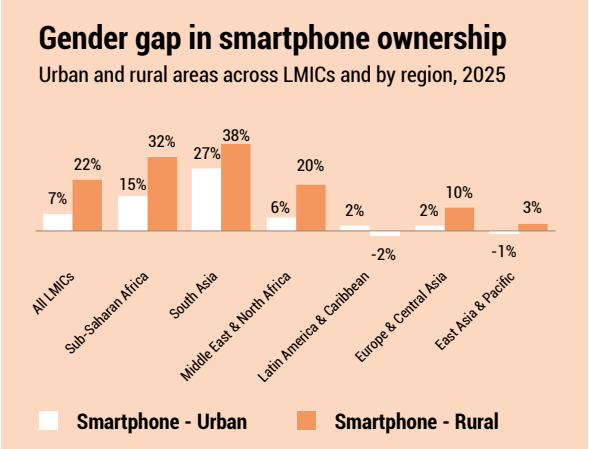
Source: GSMA[6]

Rural women remain the least likely to own a mobile phone, own a smartphone and use mobile internet, and the mobile internet gender gap is also wider in rural areas than urban areas (see figure 13).[6] Apart from access to mobile internet, the GSMA data also show that even among daily users of mobile internet, rural women tend to use it for fewer use cases compared to their urban counterparts and men. Across all groups, the top barriers reported include affordability of internet-enabled handsets, literacy and digital skills and safety and security concerns.

In contrast, the International Telecommunication Union reports that in 2025, youth in low-income countries are 1.9 times more likely to use the internet than the rest of the population (see figure 14). This generational gap is observed across all regions, although it has been slowly shrinking over the past four years.







Notes:

Mobile ownership is defined as having sole or main use of a SIM card (or a mobile phone that does not require a SIM) and using it at least once a month.

Mobile internet use is defined as having used the internet on a mobile phone at least once in the past three months. Mobile internet users do not have to personally own a mobile phone.

The gender gap in mobile ownership, smartphone ownership and mobile internet use refers to how much less likely a woman is to own a mobile (or a smartphone) or to use mobile internet than a man.

Figure 13. Gender gaps in urban and rural areas across LMICs and by region, 2025 (among total adult population)

Source: GSMA[6]

Beyond ownership, the name under which a mobile SIM card is registered directly influences women's control and autonomy over devices and accounts. Having one's name registered directly can confer additional benefits to an individual because this can often be used to access mobile money and other digital financial services that require personal information. According to the Global Findex Database 2025, 23% of phone owners in LMICs use a SIM not registered in their own name, often exceeding 40% in some SSA/MENA/SA markets. In most regions, women are less likely than men to have a SIM in their own name and the largest gender gaps are found in MENA and ECA.[60]

While most global datasets measure ownership, this does not capture who actually controls the device, who can use it freely or who makes decisions about digital use within households. Even when women's names are used in SIM registration data, they may still lack privacy, autonomy or freedom to use it. For example, Alvi et al.[61] find that 65% of women respondents in India and 61% of women and 59% of men respondents in Nepal had their phone on speaker during a phone survey. They also find that speakerphone use was associated with lower reported **agency** among women regarding their own income and their spouse's income, while the opposite pattern was observed among men.

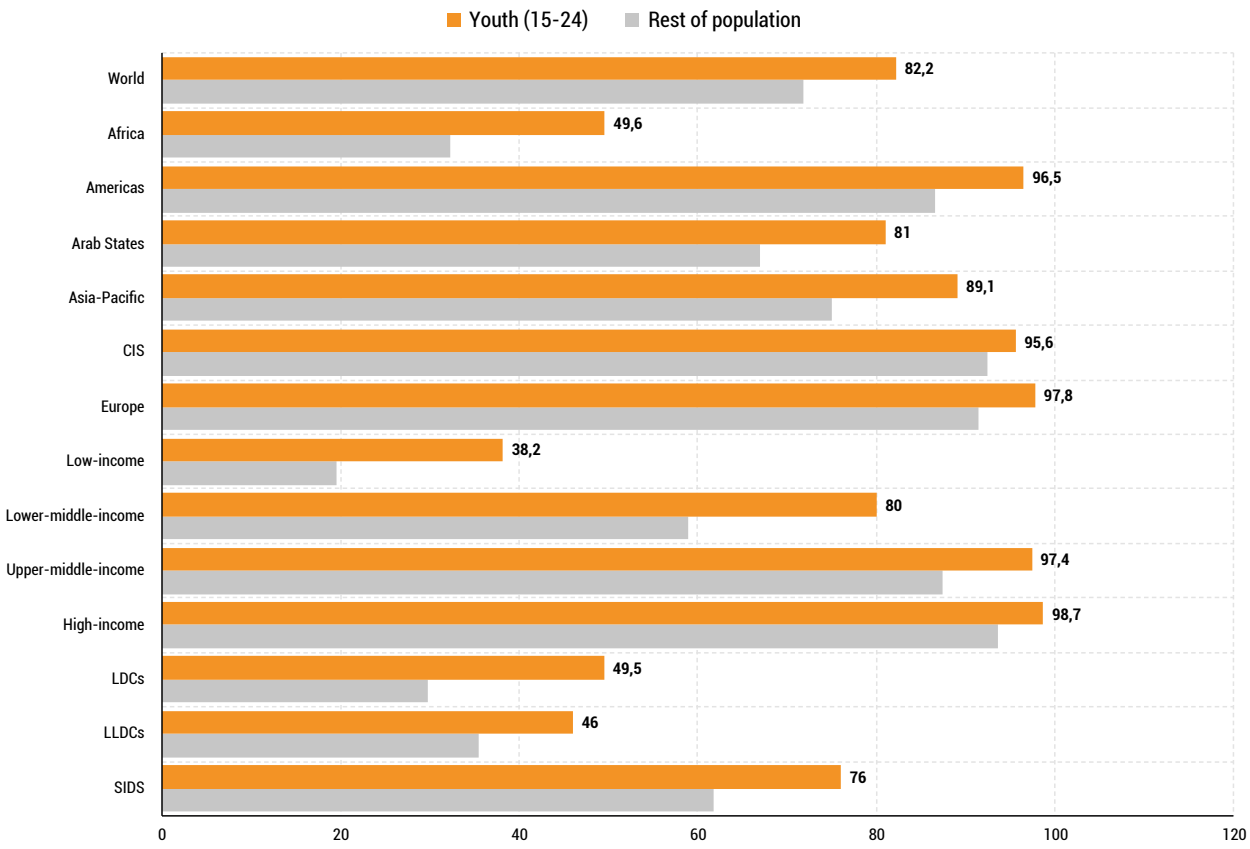


Figure 14. Percentage of individuals using the internet by age group, 2025

Source: International Telecommunication Union[64]
Note: Commonwealth of Independent States (CIS), least developed countries (LDCs), land-locked developing countries (LLDCs) and small island developing states (SIDS).

Additionally, gender-disaggregated data on digital agricultural extension, platform participation and AI-enabled services, especially in LMICs and rural areas, are limited.

Measurement challenges and data gaps

Despite the growth in global datasets tracking digital inclusion, longitudinal and comparable disaggregated data (by gender, age, location) remain sparse, especially in rural LMICs. The data cited rely primarily on mobile phone ownership and internet use, which do not fully capture meaningful use or empowerment. At the same time, informal, shared or intermittent digital use tends to be systematically undermeasured, which may underestimate women's digital participation. This discussion draws on the best available data, but should be interpreted with caution, given data gaps, heterogeneity of the digital landscape across countries and uncertainties around future technologies. Closing these data gaps will be critical for ensuring that digital transformation in FLWS advances, rather than undermines, gender equality and social inclusion.

A Bolivian vegetable vendor stocks diverse kinds of potatoes in Cochabamba. Photo: Bioversity International\A. Lane, CC BY-NC-ND 2.0

1.8. DISCUSSION AND CONCLUSION

The process of FLWS transformation is well underway, with agriculture declining as a share of GDP, more labor shifting toward off-farm work across most regions and efforts being made by governments and other actors to increase the sustainability and equity of FLWS as they transform. These trends create opportunities for deepening inclusion and equality in FLWS if the right policies and solutions are put in place to ensure that women and youth benefit from these changes. Projections show that AFSs in LMICs are already growing and transforming in ways that are likely to increase women's participation and the benefits they receive, albeit unevenly both across and within regions. While women's AFS labor force participation rates have generally been lower, these are rising rapidly, as is labor productivity. Gender earnings gaps are also declining in most regions under most scenarios, with notable advances in some regions such as LAC.

On the other hand, progress toward equality is slow, and projections show that many regions will be far from gender parity in 2050. Underlying structural inequalities and unequal gender and generational power dynamics persist, limiting the extent to which women, youth and other socially excluded groups can benefit from FLWS transformation. To illustrate how underlying power dynamics hinder progress toward equality, a recent study shows that the incidence of gender-based violence has remained relatively unchanged over the past decade, and this pernicious phenomenon has considerable social and economic costs.[62] Thus, while the situation of women in FLWS will slowly improve if current trends continue, women will remain disadvantaged in the workplace even by 2050 unless underlying dynamics change more dramatically. These challenges are especially pronounced in regions such as MENA and SA, where even optimistic trends

suggest progress toward gender parity in agrifood employment and wages will be limited by 2050.

Projections also indicate growing representation of women in off-farm agrifood employment; however, evidence shows that such activities (e.g., street vending) are predominantly informal, low-paid and vulnerable to shocks.[11] Much like young men, young women are increasingly exiting primary agriculture for off-farm opportunities or moving outside the food sector entirely. Consequently, without a concerted focus on job quality, women and youth risk either being trapped in low-productivity, insecure segments of FLWS or leaving these systems altogether.

Youth employment in agriculture is falling faster than adult employment in agriculture, indicating that the agricultural workforce will continue to age until 2050. This trend is not entirely negative if it represents increased investment, at this formative stage of life, in skills training and education, and if young people have decent employment opportunities in other sectors. At the same time, as FLWS transformation progresses, new **off-farm employment** opportunities may emerge in sectors such as processing, logistics and retail, particularly in small towns, intermediate-sized cities and peri-urban spaces. These opportunities may be attractive for youth. However, women, including young women, are likely to require targeted policies and interventions that enable them to engage in these opportunities.

Projected trends are also threatened by the polycrisis. Evidence from past crises, such as the COVID-19 pandemic, shows that there are significant gendered impacts of shocks and stressors, such as a growing gender gap in food insecurity, and potential backsliding in progress toward gender equality goals.[63] While trends usually recover, this may not be the case going forward — particularly if interventions to address overlapping crises do not build long-term adaptive capacities of women, youth and other socially excluded groups or consider differences in how men, women and youth respond to uncertainty. Therefore, some of the shifts we are observing today may represent fundamental breaks from the business-as-usual trends — for example, conflicts may become more frequent and protracted, climate change may make entire regions uninhabitable, let alone capable of sustaining agricultural production and migration may accelerate as a result, leading toward greater insecurity and uncertainty.

The projection results are also limited by a lack of historical data to integrate many of the key drivers of (in)equality in FLWS. The sections focused on natural resources, digital technologies and migration trends aim to fill some of these gaps by providing a snapshot of the challenges that inequalities in these areas pose for women's and youth's participation in FLWS. Inequalities in women's and youth access to natural resources such as land and water are foundational constraints to their participation in FLWS, particularly in farming. Failure to address these challenges will hinder improvements in labor participation and earnings as well as the ability of women and youth to cope with shocks or adapt to climate change. Internal migration has doubled over the past decade due to conflict and climate change. Driven by global geopolitical uncertainty and intensifying climate shocks, this trend is set to accelerate, leaving women and youth increasingly trapped in low-productivity activities and constrained in their capacity to cope. The explosion of digital technologies represents a huge opportunity for FLWS transformation and for accelerating equality. However, without deliberate action, there is a risk of deepening exclusion and inequality along gender and rural divides.

Addressing these challenges and taking advantage of the opportunities provided by FLWS transformation will require strong adaptive governance, collective action and coordinated investments in global data infrastructure for gender- and age-disaggregated data to guide effective policies. FLWS transformation does not automatically support women's and youth inclusion or equality, yet gender equality and youth inclusion are foundational conditions for resilient, productive and sustainable FLWS by 2050. Emphasizing missed opportunities and the need to avoid underperforming investments may convince decision-makers who are having to "make do with less" that addressing gender equality is essential for FLWS transformation. The solutions presented in subsequent chapters highlight evidence-based options, approaches and bundles that show promise for accelerating progress toward gender equality and youth inclusion in future FLWS.

A Fulani woman stores cattle milk in gourds. Photo: ILRI

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An Andean woman prepares a huatia, a traditional earth oven for cooking potatoes and other tubers. Photo: CIP