Navigating Two Decades of High Poverty and Charting a Course for Change in Madagascar

Poverty and Equity Assessment

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List of acronyms

ACTP	Argent Contre Travail Productif
BDI	Burundi
BGD	Bangladesh
CAF	Central African Republic
CE	Cours Élémentaire
CM	Cours Moyen
COD	Democratic Republic of Congo
COVID	Coronavirus Disease
CP	Cours Préparatoire
DHS	Demographic and Health Survey
ENSOMD	Enquête Nationale sur les Objectifs Millenaires du Développement (National Survey on the Millennium Development Goals)
EPM	Enquete Permanent auprès des Ménages
EU	European Union
FID	Fonds d'Intervention pour le Développement
FOFIFA	Foibem-pirenena momba ny Fikarohana ampiharina amin'ny Fampandrosoana ny eny Ambanivohitra (National Centre of Applied Research and Rural Development)
FRAM	Fikambanan'ny Ray Aman-drenin'ny Mpianatra (Association des parents d'élèves)
GDP	Gross Domestic Product
GEL	Groupement des Exportateurs de Litchi
GFF	Global Financing Facility for Women, Children and Adolescents
GIS	Geographic Information System
GRADE	Global Rapid Damage Estimation
HCI	Human Capital Index
HFPS	High Frequency Pulse Surveys
HH	Household
HTI	Haiti
ICT	Information and Communication Technology
IFPRI	International Food Policy Research Institute
ILO	International Labour Organisation
INSTAT	Institut National de la Statistique
IOE	International Organisation of Employers
KHM	Cambodia
LIC	Low Income Country
LPG	Liquefied Petroleum Gas
MDG	Madagascar
MGA	Malagasy ariary
MICS	Multiple Indicator Cluster Survey
MINAE	Ministère de l'Agriculture et de l'Élevage
MPO	Macro Poverty Outlook

MSME	Micro, Small and Medium Enterprise
MTDLS	Ministry of Territorial Development and Land Services
NDVI	Normalized Difference Vegetation Index
NER	Niger
NGO	Non Governmental Organization
NPK	Nitrogen, Phosphorus, and Potassium
ODA	Official Development Aid
OECD	Organization for Economic Cooperation and Development
OLS	Ordinary Least Squares
OPHI	Oxford Poverty and Human Development Initiative
PASEC	Programme on the Analysis of Education Systems
PCER	Per capita real consumption
PEM	Plan Emergence Madagascar
PMT	Proxy Means Test
PPP	Purchasing Power Parity
RAI	Rural Access Index
RFMS	Rapid and Frequent Monitoring System
RWA	Rwanda
SALAMA	Centre d'Achats de Médicaments Essentiels et de Matériel Médical de Madagascar (Medical Procurement Agency)
SCD	Systematic Country Diagnostic
SDI	Service Delivery Index
SFA	Stochastic Frontier Analysis
SGBV	Sexual and Gender Based Violence
SOE	State Owned Enterprise
SSA	Sub-Saharan Africa
SWIFT	Survey of Well-Being through Instant and Frequent Tracking
TFP	Total Factor Productivity
TMDH	Transfert Monétaire pour le Développement Humain
TZA	Tanzania
UGA	Uganda
UN	United Nations
UNDP	United Nations Development Programme
UNICEF	United Nations Children's Fund
US	United States
WDI	World Development Indicators
WFP	World Food Programme
WHO	World Health Organisation

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Executive summary

Breaking the curse of high poverty and low growth

For too long, Madagascar has struggled with low and fluctuating GDP per capita, which fell by almost half between 1970 and 1990 and has remained below US$500 since. Consistently, brief periods of positive growth have been interrupted by political crises and climate shocks which have time and again set back any socio-economic progress. In the past decade, a modest economic recovery between 2013 and 2019 was followed by the pandemic-induced economic crisis, causing GDP per capita to fall by 2.3 percent over the 2012-2022 period.

This report provides an account of the evolution of poverty and living conditions in the decade 2012-2022. It finds that at the national level monetary poverty essentially stagnated while urban poverty—admittedly a much smaller in absolute and relative terms—dramatically increased. In 2022, monetary poverty affected about 75 percent of the population, a share slightly above the 73 percent in 2012.[1] Rural poverty remained roughly unchanged at about 80 percent of the rural population, but urban poverty increased from 42 to 56 percent over the decade.[2] The increase in poverty was especially dramatic in secondary cities, where poverty increased from 46 to 61 percent (Chapter 1).

A closer look at the drivers of poverty reveals that the trends of the last decade are explained by market and governance failures, climatic shocks and the COVID pandemic. Structurally, stubbornly high rural poverty in particular is the legacy of long-term infrastructure underinvestment, isolation, and low internal demand (World Bank Group, 2022). But since 2013, this structural failure to launch has also affected urban employment and living conditions as private investment has persistently declined and competition was suffocated by special interests.[3] Moreover, the COVID pandemic—which caused an exceedingly long border closure and wiped out tourism revenues until mid-2022—and a repeated string of cyclones wreaked havoc on the service economy, destroying as many as a quarter of jobs and slashing urban incomes (Chapter 3). At the national level, a decline in inequality occurred driven by a reduction of welfare in urban rather than an improvement in the historically much poorer rural areas. This is a major concern as it implies that urban areas are unable to serve as engines for growth and poverty reduction for the country as standard development theories would suggest.

Monetary poverty rates are alarmingly high but, they fail to capture the scope of the deprivation faced by poor households. About three-quarters of the population suffers from food insecurity, and this share has remained broadly unchanged for a decade or more. Most households, especially in rural areas, lack access to reliable electricity, safe water, or adequate sanitation. Access to healthcare is inadequate while high fertility, teenage pregnancy (about one-third of girls 15-19 is a mother already) and low education completion (only about half of all children complete primary school) erode future human capital (Chapter 4). Weak road connectivity leaves rural communities isolated from markets and public services. As an illustration, regional differences in rice prices have widened substantially over the past 15 years, suggesting that domestic markets are becoming less integrated over time (Chapter 2).

Looking forward, the country needs a radical change in its growth trajectory to make a real dent on poverty. With an underdeveloped private sector mostly in subsistence agriculture and highly exposed to the effects of climate change; low and falling agricultural productivity; and an inadequate supply of infrastructure and essential services including education; a rapidly growing population will find itself always more trapped in poverty and exert increasing pressure on public goods and natural resources, potentially threatening social and political stability. Despite the increasingly difficult external conditions, Madagascar has an opportunity to break free from the cycle of low growth and weak governance. To avert a new crisis, the government must implement a comprehensive reform agenda that establishes the necessary conditions for rapid employment growth in urban areas and renewed productivity gains in the agricultural sector.

Paid employment growth is an urgent priority. A weak enabling environment for the private sector discourages job creation, trapping a large share of the country's workforce in low-productivity agriculture. Almost 90 percent of employment is infor-

[1] However, the national poverty headcount is not statistically significantly different between the two years.
[2] This trend appears to precede 2012, as the last Poverty Assessment (Osborne et al. 2016) already noted that urban poverty increased between 2010 and 2012 by close to 6 percentage points.
[3] Private investment as a share of GDP is well below the average for peer countries and has been declining since 2009.

mal, and most workers are either self-employed or engaged in household enterprises (Chapter 3). Informal employment is often precarious and marked by low pay and poor job quality, while household enterprise labor is mostly unpaid. Meanwhile, a small elite group controls a large share of the economy and fiercely resists competition, which has reduced private investment to an all-time low of 17 percent of GDP as of 2021. Such "elite capture" has created a hostile environment for employment creation, further narrowing the path to prosperity for urban residents. By building consensus around an ambitious agenda for private-sector growth and job creation, the government could rapidly improve employment quality in the urban economy while encouraging competition and expanding the tax base. The development of the formal labor market will become increasingly critical as the urban population continues to grow.

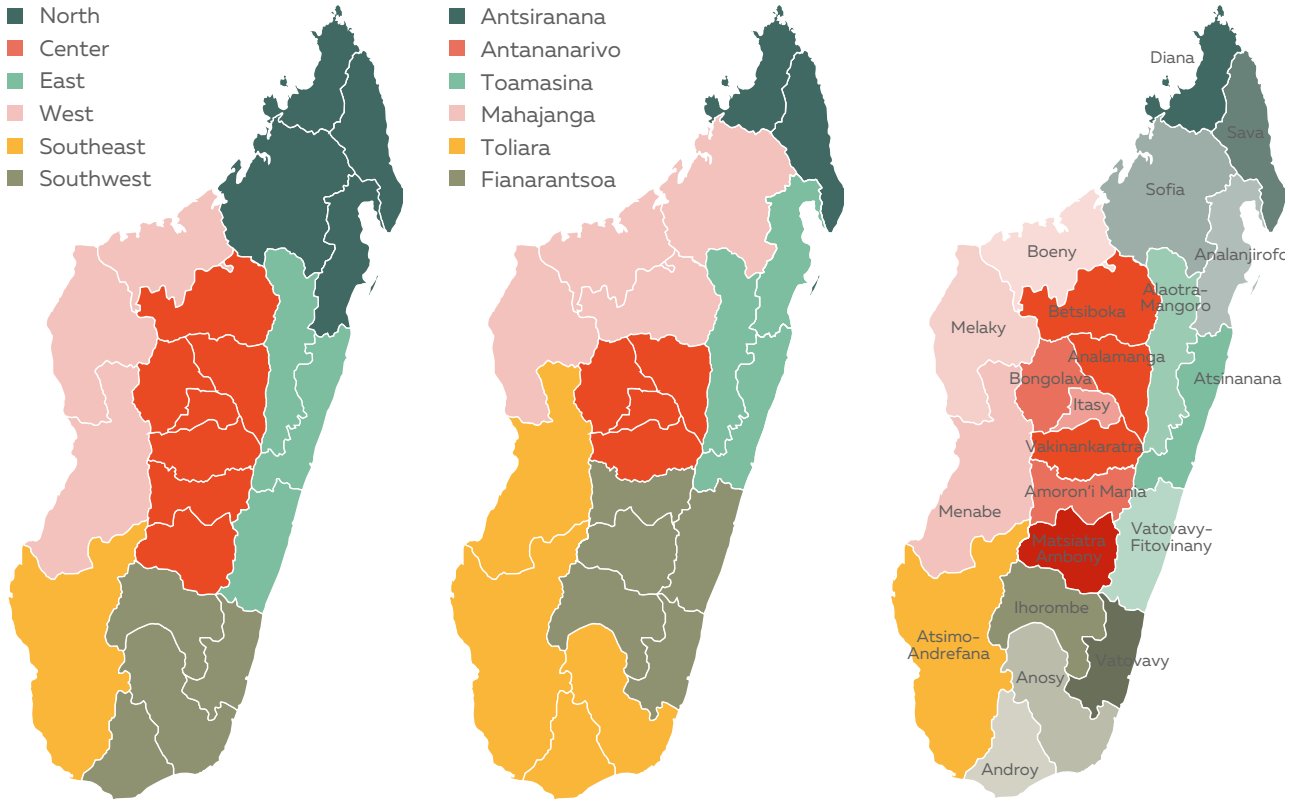
Rural development will be vital to reduce poverty rates and ease pressure on urban labor markets. Agriculture provides livelihoods for two-thirds of Madagascar's workforce, including a large majority of poor households. The limited use of improved seeds and fertilizers, slow technological uptake among smallholder farmers, and weak commercialization capacity undermine agricultural productivity, while deteriorating transportation networks inhibit access to input and output markets. As a result, about 80 percent of rice production is not marketed but consumed directly by producers (Chapter 2). Investment in rural infrastructure—especially the dilapidated road system, including new feeder roads—will be a crucial first step in addressing agricultural market failures and reducing rural poverty.

Climate resilience is a cross-cutting challenge. Madagascar is highly vulnerable to extreme weather events such as tropical cyclones, heavy rains, droughts, and heatwaves (Chapter 5). On average, natural disasters cost the economy an estimated 1 percent of GDP each year and inflict devastating losses on poor communities, especially in rural areas along the Eastern Coast. Extreme weather events have repeatedly prevented gains in poverty reduction, and the six tropical cyclones that hit Madagascar in early 2022 reduced per capita consumption among affected households by an estimated 30 percent while destroying valuable productive assets. Good governance is essential to climate resilience, as Madagascar's public sector will need to manage an expanding range of climate-related shocks in the coming years.

Breaking the vicious cycle of underinvestment, slow growth, and weak governance will require building a pro-growth coalition focused on developing the institutional framework necessary for a robust and competitive private sector. Firms and investors require a stable, predictable, and impartial public administration that provides essential infrastructure and services while imposing limited and reasonable regulatory requirements. Unless the government can establish these conditions, employment growth will remain insufficient to reduce poverty, and Madagascar will face another decade of missed opportunities.

With different data sources, we revisit poverty across its multiple definitions. The new Census (2018), Demographic Health Survey (DHS, 2021), and Multiple Indicator Cluster Survey (MICS, 2018), Afrobarometer (2015 & 2018), the Enquête Nationale sur les Objectifs Millenaires du Développement (ENSOMD 2012) and the 2021/2 Enquete Permanent aupres des Menages (EPM) are used in this report to look at trends and deliver a detailed snapshot of different dimensions of welfare, exploiting the geographic granularity of the 2018 Census. For the analysis, administrative delimitations at the province, regional, district, and communal level will be used (as delineated in Map 1).

Map 1: Madagascar by geographical areas, regions, and provinces



Source: mapchart.net

Overview

1. Long-term and recent developments that stifled poverty reduction

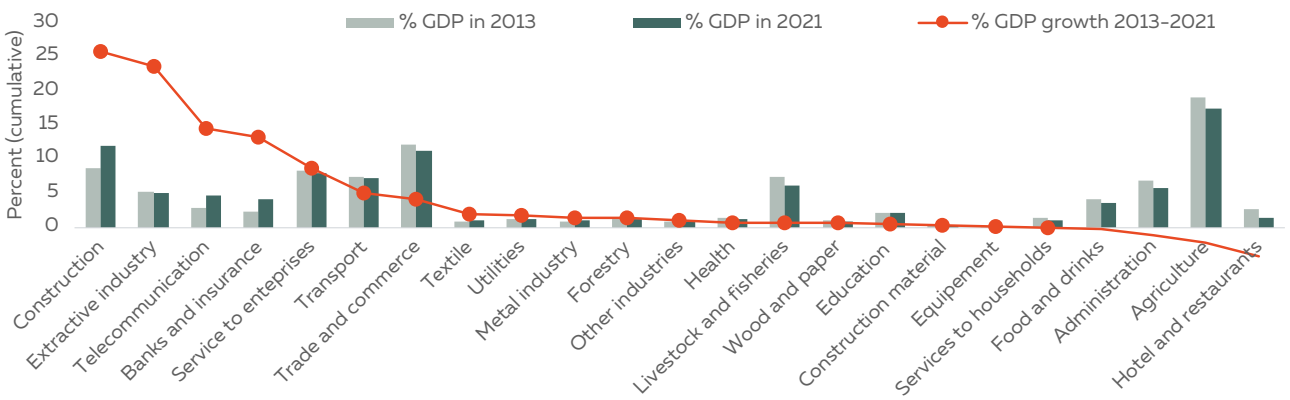
Madagascar is among a few countries that have experienced long-term decline in real GDP per capita, without experiencing civil wars (Razafindrakoto et al., 2020). Short periods of relative stability allowed some gains, but these were unfortunately reversed by crises such as political instability in 2001-02, 2009-12, and the COVID-19 pandemic in 2020. While real GDP per capita saw modest growth between 2013-2019, it later fell dramatically, resulting in an average decline of 2.3 percent over the 2012-2022 period.

The slow pace of structural transformation in the economy is evident as agriculture and livestock still represented almost 25 percent of GDP in 2021, with much of it being subsistence farming (Figure 1). Despite its negative contribution to GDP growth, agriculture employs about two-thirds of the workforce and absorbs more new workers than industry and services combined. However, construction, extractives, and services (excluding tourism) are growing more rapidly and creating more job opportunities, indicating a potential for structural transformation.[4] The growth in these sectors suggests a potential to shift employment from agriculture to industry and services, which could help to diversify the economy, boost GDP growth, and promote sustainable development. However, job creation in these sectors is still too slow to trigger large shifts in employment, as private investment is restricted by the poor business environment. Therefore, policies and strategies prioritizing structural transformation are necessary to drive economic growth and development.

Weather-related shocks have been recurrent over the past two decades, including eight floods, five severe droughts and almost 40 cyclones, including three major ones in the past four years alone.[5] These events have had a devastating impact on rural communities and agriculture-based activities, particularly along the Eastern Coast, which are now among the poorest regions of the country. On average, natural disasters are estimated to cost the economy about 1 percent of GDP each year, and up to 8 percent for once-in-a-century events (World Bank Group, 2022). The poorest households are especially vulnerable to such shocks, with many located in areas affected by recent cyclones.

In addition to weather shocks, the COVID-19 pandemic also hit the economy hard (World Bank Group, 2022). Export revenues and private investment have collapsed, leading to a contraction of income per capita by 9.8 percent. The situation was compounded by historic droughts in the South, which left 1.3 million people in a state of acute food insecurity.

Figure 1: Agriculture represents close to one-fifth of GDP but contributes negatively to growth

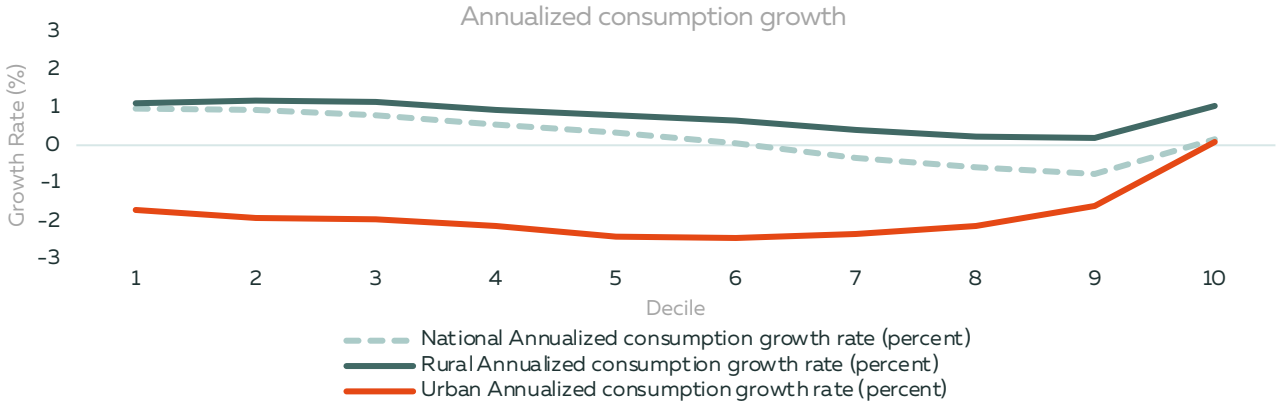


Source: Author's calculations with data from Ministry of Finance.

[4] The service sector contributed 55 percent to GDP growth during the 2013-2019 period, while construction and public works also made a significant contribution as public investments increased. Commerce, the largest service subsector, grew slowly as it remained dominated by small informal companies and constrained by subdued consumer demand and limited incentives for formalization. Industry, including manufacturing and the extractive sector, grew at 8.6 percent and contributed about half of GDP growth during 2013-2019. This expansion was driven mainly by two large mining projects. An assessment of the impact of those mining projects on welfare revealed that in poorer and less educated regions, the opening of a mine increased the average wealth score, while in more developed regions, it decreased the local wealth score and average education level due to the influx of lower skilled migrants (Keller, 2022).

[5] Madagascar ranks 12th on the 2000-2019 Global Climate Risk index (2021), better than Bangladesh but slightly worse than Cambodia. The Climate Risk Index (CRI) indicates a level of exposure and vulnerability to extreme events. In the CRI 2021, data from 180 countries were analyzed. See Eckstein, Künzel and Schäfer (2021).

Figure 2: Between 2012 and 2022 urban consumption fell along the distribution, while rural consumption improved more among the poorest



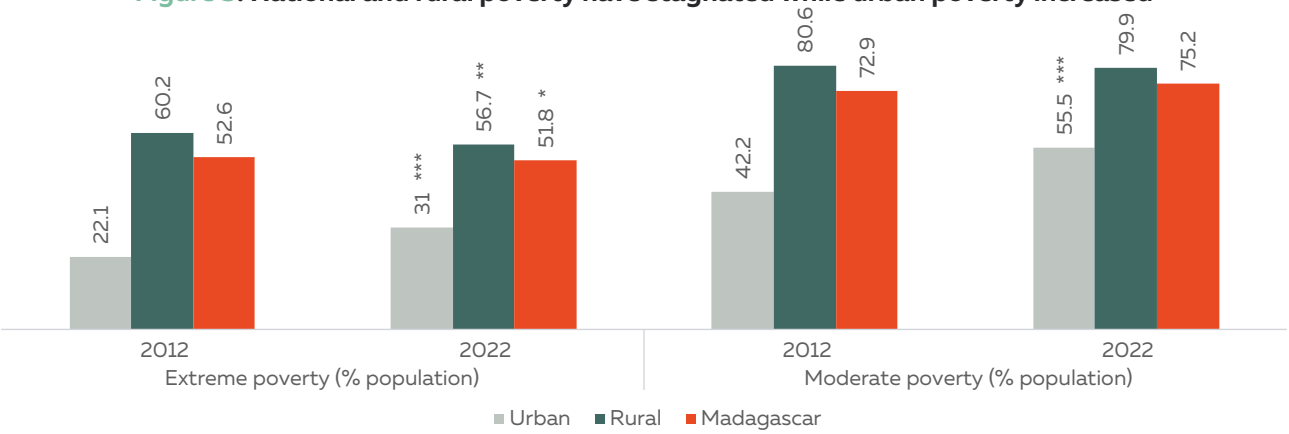
Source: World Bank estimates based on 2012 ENSMOD and 2022 EPM data.

During the past decade (2012-2022), urban consumption declined while rural consumption barely increased. Almost all the urban population suffered income losses, in part due to COVID-19, which led 25 percent of households to experience job loss. Overall consumption growth was positive but low for the bottom 60 percent and negative or close to zero for the top 40 percent at the national level. However, the overall consumption of poor Malagasy increased slightly more, as the growth incidence curve (GIC) slopes downwards between decile 1-9 (Figure 2). This pro-poor trend is driven by rural areas, where the GIC is sloping downwards between decile 2 and 9. On the other hand, in urban areas consumption fell in the past decade (it remained unchanged for the wealthiest decile). The strongest consumption losses affected deciles 3 to 6, followed by deciles 1 - 6. Altogether, the evolution of consumption is consistent with a simultaneous reduction in extreme rural poverty and an overall deterioration of urban living standards.

Accordingly, poverty at the national level increased slightly (the change is not statistically significant), with differences in trends across urban and rural areas (Figure 3). In 2022, 75.2 percent of the national population was poor (79.9 percent for rural and 55.5 percent for urban areas). This is a slight (non-statistically significant) increase from the 72.9 percent estimated for 2012. Rural poverty decreased from 80.6 percent in 2012 to 79.9 percent in 2022 (a statistically insignificant change). At the same time, poverty significantly increased in urban areas, from 42.2 percent in 2012 to 55.5 percent in 2022. The largest increases in urban poverty took place in secondary cities (from 46 to 61.1 percent), while in the capital poverty increased slightly from 33.3 to 34.8 percent (not a statistically significant change).

Over the past decade, there has been a slight reduction in national inequality due to the narrowing of the urban/rural wealth gap (Table 1). In contrast to the 2005-2012 period, inequality fell during the last decade, despite the little variation in poverty nationally. This decline in inequality is the result of a deterioration in welfare along the urban income distribution, which has brought urban incomes closer to rural ones. At the same time, urban ine-

Figure 3: National and rural poverty have stagnated while urban poverty increased



Source: World Bank estimates based on 2012 ENSMOD and 2022 EPM data.
*Note: *, **, *** denote significantly different from 2012 numbers at the 10%, 5% and 1% levels, respectively.*

Table 1: Inequality has declined as the urban/rural wealth gap narrowed

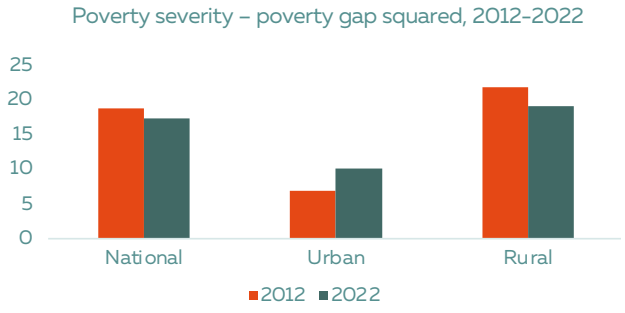
	2012 [a]	2022
	Gini index	
Madagascar	38.2	36.8
Urban	36.0	39.4
Rural	34.6	34.1

Notes: (a) Revised from the numbers reported in "Shifting Fortunes" Poverty Assessment, 2016, to ensure data comparability over time. Urban estimate is the weighted average of capital city & other urban areas. Inequality measures are the average across 100 imputations. Source: EPM 2012, 2022.

quality increased slightly and rural inequality fell significantly, thanks to a significant reduction in rural extreme poverty. The narrowing of the gap between rural and urban areas reflects a reduced economic advantage of urban over rural areas.

The latest data suggests that poverty has become less deep and severe at the national level, while the opposite occurs in urban areas between 2012 and 2021 (Figure 4).[6] The national improvement is driven by a reduction in poverty depth and severity in rural areas. However, urban poverty has become more severe and deeper, with lower asset ownership at the household level. This trend in urban poverty pre-dates the pandemic but was likely worsened by it, as well as from rural migration into urban areas. Still, even if urban poverty has worsened, rural poverty remains deeper.

Figure 4: Poverty severity increased in urban areas and fell in rural areas



Source: World Bank estimates based on 2012 ENSMOD and 2022 EPM data.

Significant spatial variation in poverty and inequality persists, with Southern provinces showing vastly more acute poverty and deprivation levels. Southern regions continue to experience higher levels of poverty and extreme poverty. They also face the highest rates of multidimensional poverty. Conversely, inequality tends to be higher in certain northern regions. Finally, small-area estimations reveal that some of the fertile areas in the high-plateaus of the center suffer the most from "hidden hunger" reflected in higher-than-average stunting rates despite apparent high food security.

Multidimensional poverty stood at 69 percent in 2021, among the highest globally. Madagascar is the 8th poorest country in the world in multidimensional headcount. Deprivations are highest for clean cooking fuel (69 percent), improved sanitation (68 percent), safe housing (62 percent), electricity (55 percent), clean drinking water (53 percent) and education (50 percent). The multidimensional poverty headcount ratio dropped from 76 percent in 2008 to 67 percent in 2018 but then increased slightly between 2018 and 2021, when the share of electricity and adequate nutrition deprivations increased after the country suffered multiple shocks. The deterioration of nutrition occurred in rural and urban areas, returning close to its 2008 level, despite a steady improvement in stunting among children under 5.

Multiple deprivations explain persistently high monetary and multidimensional poverty. First, most people are employed in subsistence low-productivity agriculture, which is uneconomic due to lack of inputs, infrastructure and favorable institutions. In this sector, 90 percent of households are poor. Second, a slow accumulation of human capital has prevented people from escaping poverty through more productive and higher paying employment. Child vulnerability is extremely high, with high malnutrition among children (39.8 percent stunting), child labor and high rates of early marriages and teenage pregnancies, all of which reinforce the intergenerational transmission poverty. Other factors that predict household poverty include household size, illiteracy of the household head, lack of ownership of land or livestock, and absence of electricity, water, sanitation, paved roads, transport, internet, and cellphone networks. Finally, repeated weather shocks, including floods and droughts, destroy infrastructure, crops and livestock, and the recent external shocks (COVID-19 and the Ukraine invasion) have affected prices and urban labor markets, diminished employment and earnings opportunities.

Malagasy household heads express a sense of constant struggle to make ends meet and lack of aspirations for the future, citing multiple causes of poverty in their society. The primary factors identified by respondents of a focus group study include the lack of jobs (43.5 percent), inflated cost of living (13.1 percent), limited access to land (9.1 percent), low salaries (7.8 percent), and insufficient education (6.2 percent). The scarcity of employment opportunities severely hampers the ability of poor households to

[6] The poverty gap is a measure of poverty that quantifies the depth of poverty in a population by calculating the average shortfall of the total population's income or consumption from the poverty line. The poverty line is typically set as the minimum amount of income or consumption needed to afford a basic standard of living. The poverty gap indicates how much additional income or consumption would be required for those living below the poverty line to reach it, on average. The poverty gap square is a related measure that adds further weight to those who are further below the poverty line. It is calculated by squaring the difference between the income or consumption of each poor individual and the poverty line, and then adding up these squared differences across all poor individuals in the population. The poverty gap square provides a more nuanced measure of poverty than the poverty gap alone, as it accounts for the severity of poverty experienced by each individual.

generate sustainable income, while the soaring cost of living makes it increasingly difficult to afford basic necessities. Limited access to land restricts engagement in productive activities, low salaries leave them unable to cover essential expenses, and insufficient education undermines their prospects for better employment. These firsthand insights underline the complex nature of poverty and highlight the priorities of poor households to address the challenges they face.

2. Low agricultural productivity and lack of basic services still trap 8 in 10 rural people in poverty

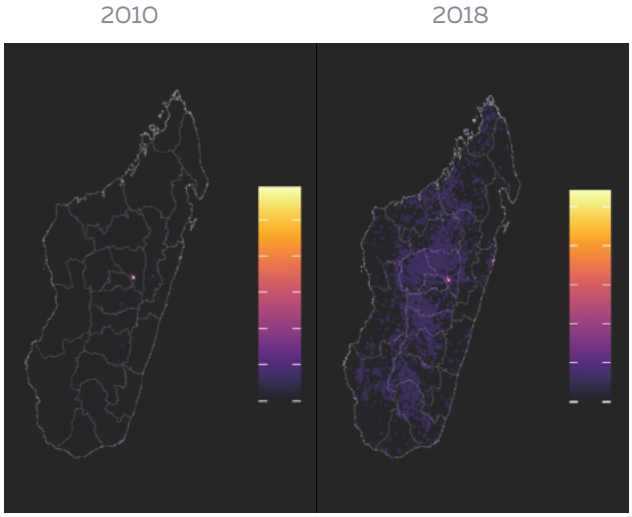
For most of the 80 percent of the population (rural and some urban) whose main activity is agriculture, generating enough income to exit poverty is beyond their reach. Subsistence farming is prevalent and explains why 90 percent of agriculture workers are poor. Rice, the main crop in the country, accounts for 70 percent of total agricultural production, 40 percent of cultivated land, and all of the irrigated land. The average national annual rice yield is approximately 2.5 t/ha, similar to other East African countries, but very low compared with the major rice-producing regions in Asia and the available irrigation.

Agricultural productivity severely lags comparators, with both land and labor productivity remaining low over the past decade. Production growth in recent years was not driven by increased land productivity but by farmland expansion through slash and burn. Agricultural labor productivity is significantly lower in Madagascar than the Sub-Saharan African average and has dropped by 31 percent since 1991. The low quantity and quality of inputs broadly explain low productivity, including low mechanization (5-10 percent) and low use of agrochemicals and improved seeds (fewer than 10 percent use fertilizers/pesticides and 11.9 percent use improved seed types). Inequitable distribution of land and weak ownership rights exacerbate the problem. At the same time, few agricultural workers have formal education or technical training. Farmers lack access to finance (to purchase better inputs) and insurance, which further block the adoption of more productive technologies. Finally, farmers use inefficient storage methods, as half of unsold produce is either stored in suboptimal conditions (on house roofs) or not stored at all, leading to financial losses and food insecurity.

Limited market access has also compromised profitability in the agricultural sector. Many rural areas face a major challenge with poor road connectivity, especially during the rainy season. This makes it difficult to transport goods and access essential services. Unfortunately, the infrastructure quality has been declining over the past decade, resulting in a ranking of 106 out of 131 countries in the 2020 Global Innovation Survey (Cornell University et al., 2020). Only 11.4 percent of the rural population has access to good quality road networks (World Bank, 2021a). The lack of connectivity is isolating rural populations and limiting their access to economic opportunities and essential services. Large rice price differences across regions show weak market integration, mostly due to prohibitively high transport costs.

Access to basic services, such as electricity, water, and sanitation, remains a major challenge. While there has been some progress in improving access to electricity (Map 2), only about 15 percent of the population is connected to the electricity grid (World Bank, 2023), significantly below the Sub-Saharan Africa average of 47 percent, and fewer than 10 percent rural households have electricity. Limited access to electricity also affects the use of water pumps, storage facilities, milling, and cold chain facilities, which could help decrease post-harvest losses. In addition, access to water and sanitation remains low, lagging behind most of the country's peers and other low-income countries. These challenges hinder the country's ability to improve its human capital and economic growth.

Map 2: Electricity coverage has improved along the highlands but remains limited



Source: Madagascar Poverty Targeting Indicator Available at https://datanalytics.worldbank.org/mdgPT/

3. Failing labor markets and recent shocks explain rising and deeper urban poverty

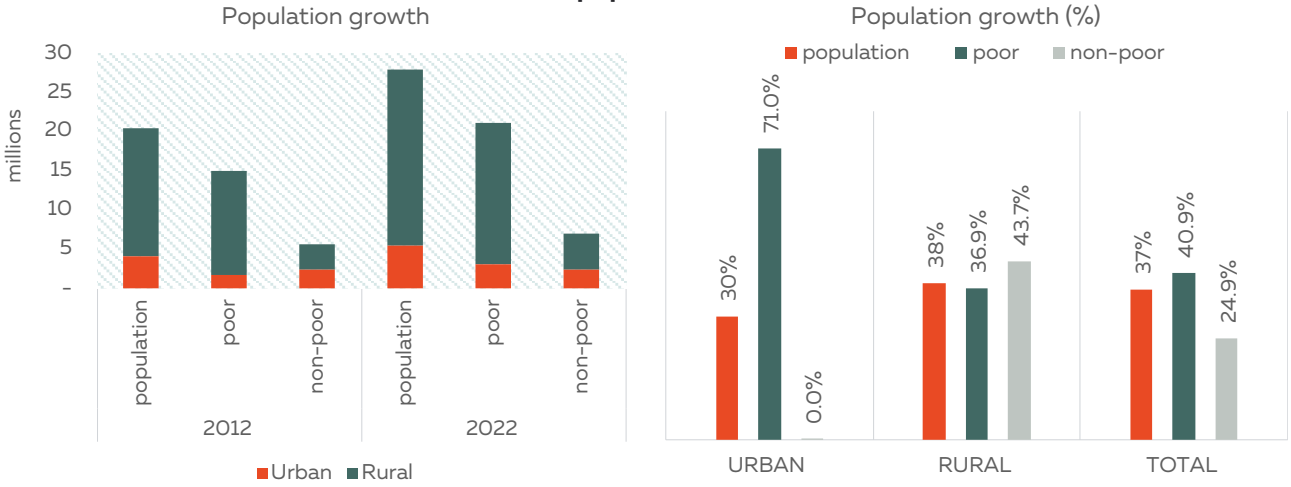
Urban poverty increased from 42.2 percent in 2012 to 55.5 percent in 2022. This represents a 31.5 percent increase in a decade. In the capital city of Antananarivo, poverty increased minimally, from 33.3 to 34.8 percent, but in secondary cities it rose from 46 percent in 2012 to 61.1 percent in 2022. Consumption dropped for virtually all households along the urban income distribution, particularly those in middle deciles. Going further back, urban poverty increased in 2001-2005, 2010-2012, and 2012-2022, which follow closely the 2002, 2009, and 2020 crises. This confirms that urban areas are vulnerable to political and external crises, whereas rural areas are more sensitive to weather-related shocks.

While the country remains rural, urban population growth in the last decade has been driven by growth in the number of poor people.[7] In urban areas the number of impoverished individuals surged by more than 70 percent over the last decade (Figure 5). This rise in urban poverty stems from several factors, including higher fertility rates among the poor, recent economic downturns and income losses, as well as in some cases, the migration of impoverished individuals from rural to urban areas. Although rural areas have higher fertility rates, the number of poor rural individuals increased less quickly than the number of non-poor, in contrast to the urban case.

Growth in urban poverty can be attributed to a combination of factors. Firstly, the impacts of the 2009-2013 crisis, which mostly affected urban areas, still lingered as private investment and job creation never fully recovered. Secondly, the limited growth which was achieved was driven by mining and public works, which had limited impacts outside of mostly rural mining towns. Market concentration further exacerbated the situation as dominant firms maximized rents and avoided competition. Market capture in key sectors such as telecommunications, petroleum and agricultural exports ended up increasing prices and worsening the quality of services for consumers. Thirdly, the pandemic in 2020/21 had a larger impact on urban populations through economic losses in the services sector. Finally, slow but continuous migration from rural to urban areas due to high poverty and high rural fertility also contributed to the problem.

Between 2008 and 2018, multidimensional living standards improved overall, but in urban areas, these standards worsened due to the factors mentioned above (Figure 6). The increase in multidimensional poverty in urban areas was primarily caused by declines in access to education and living conditions indicators, with access to water being the most severely affected. The disproportionate impact of the pandemic on urban households further increased urban poverty. Despite a relatively low number of COVID-19 cases, the country experienced a deep recession, causing a significant contraction in GDP and income per capita. The government's border closures and restrictions on public gatherings helped control the spread of the virus but negatively impacted urban households, particularly those dependent on trade, transport, hospitality, as well as informal labor. The measures affected livelihoods and the gradual recovery of incomes was observed only after the reopening of the country's borders in early 2022.

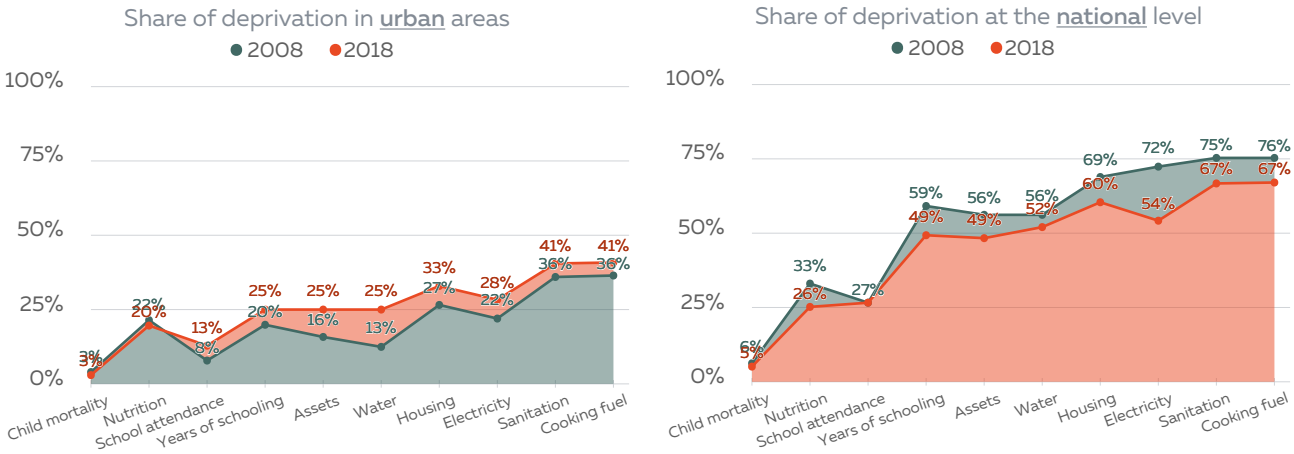
Figure 5: Urban population growth between 2012-2022 is explained by growth in urban poor population



Source: World Bank estimates based on 2012 ENSMOD and 2022 EPM data.

[7] According to the definition of urban/rural poverty used in the Population and Housing Census 1993 and 2018.

Figure 6: Living conditions have deteriorated in urban areas while they improved nationally



Source: World Bank estimates based on 2008 DHS and 2018 MICS data.

Low quality employment is pervasive in urban areas. At the national level, over one-third of total employment in 2022 was still composed of unpaid workers either within family enterprises or in subsistence agriculture. Among women, subsistence farming was the largest employment category (Figure 7). In urban areas, labor markets look slightly better but the quality is overall still low. According to Census data, employment rates in urban areas are below those of rural areas (56.6 percent vs. 76.6 percent of the population 15-59 years-old), which indicates lower pressure to participate in economic activity but also fewer opportunities. Moreover, only 32 percent of urban jobs are relatively stable wage jobs (Figure 7), which is still low but much higher than in rural areas (6 percent) and only 12 percent of employed workers have social security coverage.

Returns to education have been declining in recent years. Like most countries, returns to education in Madagascar are generally higher for individuals with more education and those who live in urban areas (Psacharopoulos & Patrinos, 2018). Each year of schooling is associated with a 4.9 percent increase in earnings at the national level and 5.6 percent in urban areas, against 4.2 percent in rural areas. Further, regression analysis also shows that, controlling for experience and other observable characteristics, returns to education are higher for older cohorts, indicating that there is likely a fall in the education premium (possibly also combined with a compounded effect of education and experience). This effect is particularly strong among women. The decline in returns to education can be the result of a decline in quality (whereby more years of schooling are needed to achieve similar productivity), or an oversupply of skills, which would be the case if employment creation is slow, such as has been the case in Madagascar.

Lack of opportunities and low aspirations are intertwined factors contributing to urban poverty. Insufficient investment in education, healthcare and urban infrastructure limits human capital

Figure 7: Self-employment and family work are the largest employment categories

Source: RGPH (INSTAT, 2021a).

development and economic activity and increases poverty traps. Low real income reduces access to finance and investment opportunities. The dominance of the elite in political and economic spheres creates a sense of hopelessness among the urban population, leading to diminished aspirations. Low education and weak social cohesion further hinder individuals' ability to demand government services and participate in their communities, exacerbating the poverty trap. According to focus group discussions, there is a widespread belief that the system is designed to maintain the status quo and preserve resource distribution for the benefit of the elite. This has led to a feeling of hopelessness and a sense that individuals are powerless to change their situation (Mulangu, 2023). Consequently, people have low expectations of government services and limited aspirations for productive work and high income. This implies that people's ambitions are being limited by the perception of limited opportunities and inequality in society.

4. Progress in long and short-term poverty drivers is mixed

According to the World Bank's Human Capital Index (HCI) and other data sources, Madagascar faces significant challenges in terms of human capital development. A child born in Madagascar just before the pandemic is projected to be 39 percent as productive as they could be with complete education and good health. This places Madagascar slightly below the average for Sub-Saharan Africa and just above the average for Low Income Countries (LICs). However, when considering recent data on school enrollment and child survival, the adjusted HCI drops to 34 percent. Although child survival rates and school enrollment are relatively favorable, educational outcomes are low and declining. Test scores indicate that students in Madagascar perform below average compared to other regions. Additionally, over 90 percent of 10-year-old children suffer from "learning poverty," defined as being able to read and understand a simple text. There is also a significant disparity in HCI between the richest and poorest children, with the gap in future productivity being larger than the global average. These findings highlight the pressing need for investment in education and health to improve Madagascar's human capital.

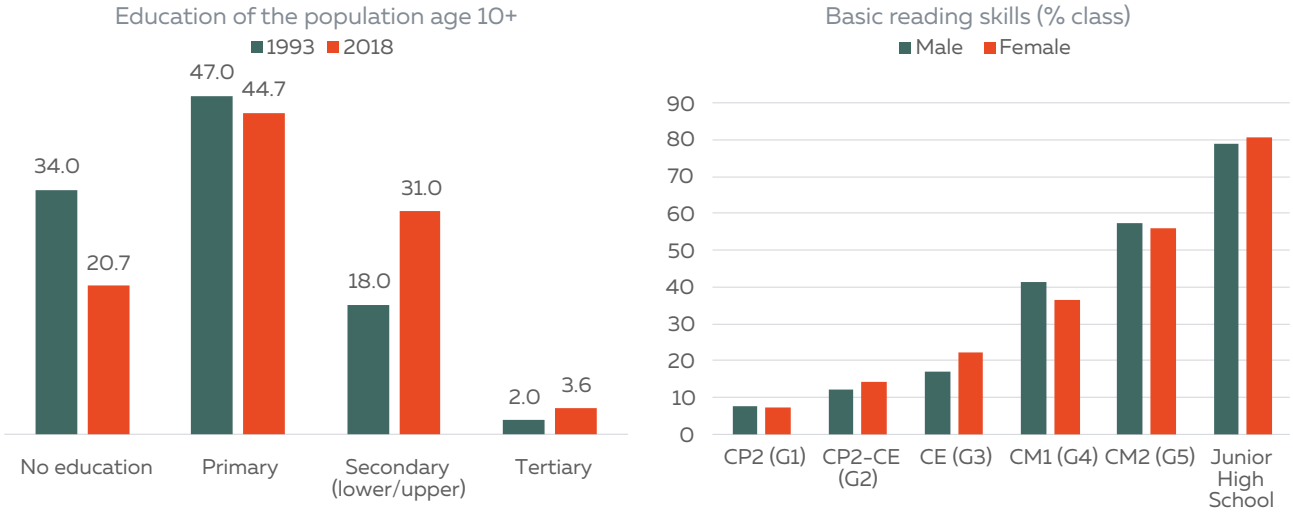
High fertility rates in low-income households contribute to chronic poverty by overburdening households, hindering educational attainment, and limiting income generation opportunities. High fertility rates in low-income households can lead to overburdened households, lower educational attainment, reduced opportunities for income generation, and thus perpetuate a cycle of poverty. Data from the Multiple Indicator Cluster Survey (MICS 2018) reveals that women in the poorest quintile have three times higher fertility rates (6.6 children per woman) than those in the richest quintile (2.7 children per woman) and 48 percent of teenagers aged 15-19 in the poorest quintile have already been pregnant, against 12 percent of those in the richest quintile. Although Madagascar has made some progress in enhancing access to healthcare, education, and family planning, further investment is necessary to overcome challenges such as limited resources, cultural and social barriers, and lack of awareness.

Madagascar stands out with one of the highest child marriage rates, a pressing issue that demands attention. Shockingly, 40 percent of women aged 20-24 were married before the age of 18. The prevalence of child marriages is most pronounced in the poorest regions, where vulnerable communities struggle to escape the cycle of poverty. Although higher rates of child marriage are found in rural areas alarmingly high rates are found in urban areas as well. There is a strong correlation between the prevalence of child marriage and other detrimental practices like child labor and high numbers of out-of-school children. The districts with the highest occurrence of child marriage are also the ones with high illiteracy rates, highlighting the interconnection between these issues and the urgent need for effective strategies to combat them. If left unaddressed, intergenerational decision-making perpetuates the vicious cycle of poverty, ensnaring future generations.

Child mortality and infant mortality have been decreasing but remain above those of peer countries and the overall LIC average. While child mortality levels have improved compared to the 2000s, the gains have been smaller than in countries like Cambodia, Rwanda, and Uganda. These countries started with similar or higher levels but have achieved substantially lower child mortality rates than Madagascar. Infant mortality, specifically deaths occurring before the first year of life, remains a significant issue across peer countries, although it is still lower in Madagascar compared to the overall LIC average.

The prevalence of stunting remains extremely high at 39 percent of children under 5, although it has decreased over the past 10 years. Regions where health and nutrition projects were implemented have experienced a faster decline in stunting, indicating the effectiveness of donor-financed programs. Regions where health and nutrition projects

Figure 8: Education attainment has increased but quality remains low



Source: Source: Madagascar, INSTAT (RGPH, 2018) and MICS (2018).

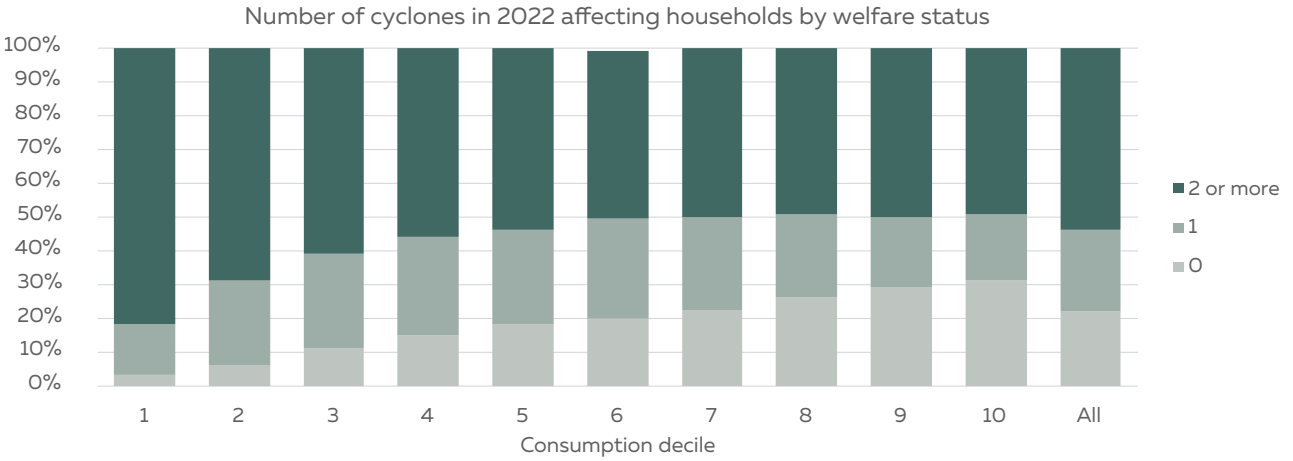
were implemented experienced a faster decline in stunting than the country as a whole, indicating that donor-financed health and nutrition programs were well-targeted and effective. Nonetheless, Malagasy households often struggle to provide the nutrition, healthcare and hygiene conditions to allow children to grow, further emphasizing the importance of continued investment in health and nutrition.

Progress in education attainment has been limited, with incremental advancements in secondary education attainment from 18 percent to 31 percent from 1993 to 2018. Conversely, the proportion of individuals with no schooling has reduced from 34 percent to 21 percent. Nevertheless, the completion of primary education remains low, as only 47 percent of children complete primary schooling on time.[8] Moreover, teacher absenteeism and natural disasters disrupt attendance for over 80 percent of children in a given year, and although learning outcomes such as basic reading skills tend to increase as children advance in their grade, by grade 5 fewer than 60 percent of children enrolled in school have acquired basic skills in reading (Figure 8) and fewer than 20 percent in math. Child labor remains a significant challenge, with one-third of children aged 5-11 engaged in labor and over 60 percent of children aged 12-14 employed.

5. Repeated shocks wipe out income gains and asset accumulation

The country is particularly vulnerable to weather shocks, and the number of people affected increased significantly in recent years. For centuries, Madagascar has been ravaged by cyclones and droughts. On average, weather shocks are estimated to cost the economy about 1 percent of GDP each year. Poor households are especially vul-

Figure 9: Poor households were disproportionately hit by cyclones in 2022



Source: World Bank estimates based on 2022 EPM data.

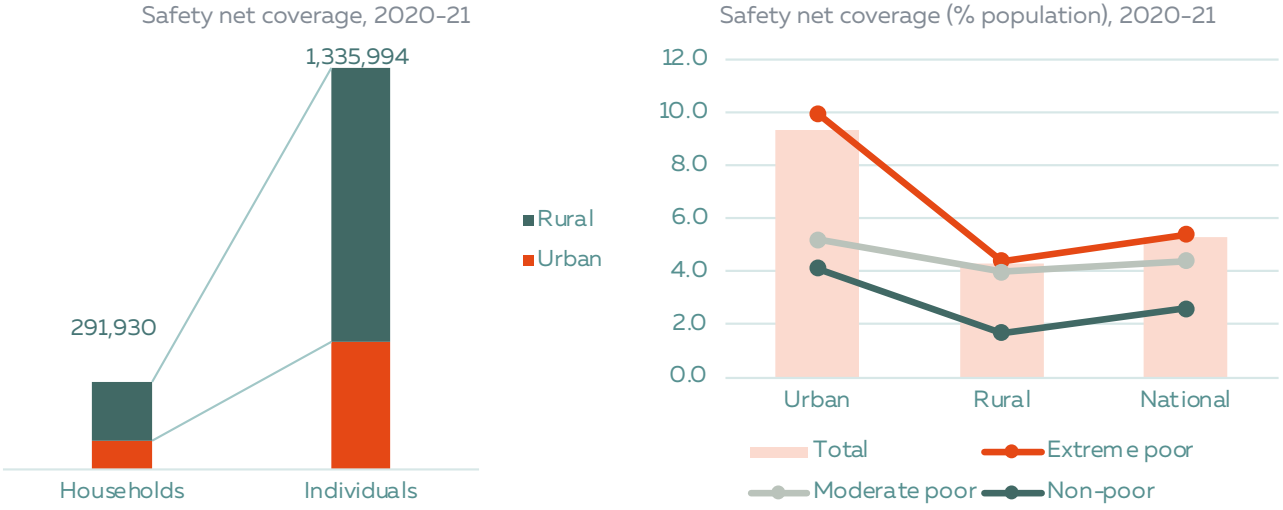
[8] The Population Census reports that in 2018, the completion rate at the primary level was 46.9 percent overall, 44.1 percent for boys and 49.8 percent for girls. This relatively low rate (half of the children did not complete the cycle) could be due to late entry, high dropout rate, late completion, or a high repetition rate (INSTAT, 2021b).

nerable and particularly ill-equipped to cope with these shocks. Drought, irregular rains, and tropical storms are the most frequent and severe systemic shocks faced by households. Each had an impact on household wealth (income and assets), agricultural output (crops and livestock) and food (purchases and stock). Weather shocks tend to affect poorer households more frequently than richer ones. For instance, in 2022, over 60 percent of households in the richest quintile were not hit by any cyclones, against 9.7 percent of households in the poorest quintile (Figure 9). At the same time, about 30 percent of households in the poorest decile suffered more than three cyclones, versus only 3 percent of household across the rest of the distribution. The observed pattern indicates that wealthier households tend to live in better protected areas from cyclones and its secondary consequences. In contrast, poor households are more likely to live in areas especially vulnerable to cyclones—usually remote areas with minimal access to infrastructure and poor drainage.

Apart from these systemic shocks which affect whole communities and sometimes the entire nation, households also suffer idiosyncratic shocks which also affect poverty. The loss of jobs and salaries had the most adverse effect on households. In the absence of employment, people sell assets, crops, and livestock in order to meet their needs. Many households often lack an immediate coping strategy, and when they have one it frequently consists of buying cheaper food, soliciting help from relatives and friends, or using their savings. Out of the 68 percent of respondents that had experienced an increase in the price of major food items usually consumed by their household, 46 percent reduced their consumption to cope with the shock.

Public transfers and subsidies have remained at less than 3.5 percent of GDP, which is similar to peer countries but extremely low compared to the extent of poverty in the country. Between 2020 and 2021, the main safety nets (Figure 10) covered close to 300,000 households, equivalent to 5.3 percent of the national population (9.3 percent of urban and 4 percent of rural population). Despite its low coverage, safety nets appear to be relatively well targeted, as they cover a larger percentage of extreme poor and moderate poor than non-poor populations (5.4 percent, 4.4 percent and 2.6 percent, respectively). Targeting efficiency seems to be more accurate in rural areas, which is consistent both with the higher difficulty of targeting the urban poor and with the reference period (during the pandemic) when urban coverage was a priority. Benefits received by extreme poor households represent about one-quarter of their overall consumption, which reflects the importance of these transfers for the extreme poor and suggests that more effective targeting could raise consumption among more extreme poor households. Finally, despite the educational conditionality on the cash transfers, there is little evidence that among cash transfer beneficiaries, children are improving their school attendance rates and health outcomes.

Figure 10: Coverage of safety nets is extremely low in rural areas



Note: Safety nets include the main cash transfer program, cash for work and pregnant women/infant care program. Program coverage is the percentage of population in each group that receives the transfer. Extreme poor are households below the food poverty line, moderate poor are households between the food and the moderate poverty line. Coverage data might differ from administrative data due to survey design. Source: EPM 2022.

6. Policies to break the curse of low growth and high poverty

The evidence on the drivers of poverty, both urban and rural, point to a systemic lack of conditions to improve labor and investment returns. This obeys to a low level of infrastructure and human capital and to a lack of basic services that can sustain private sector growth and employment creation. As a result, poverty will not fall sustainably unless there are conditions in place for broad based and sustained growth. An overview of these recommendations is briefly discussed here, and in detail in Chapter 6.

Promote competition, market contestability, and improvement of the business climate: Madagascar needs to improve its business environment by removing barriers to entry in key sectors of the economy. This can be achieved by improving and enforcing the Competition Law, creating a Competition Council and regulatory bodies that are independent, simplifying and digitizing administrative rules and procedures.

Improve connectivity and access to energy and digital services: Madagascar needs to invest in its infrastructure to improve the quality of its road network and increase access to electricity and digital services. This can be achieved by improving the public investment execution process, increasing resources for road maintenance, strengthening logistical support infrastructure, and improving rail and air competitiveness. It is also important to ensure the financial sustainability of the national electricity company (JIRAMA) and promote open and competitive private investments in digital infrastructure by reducing licensing costs.

Boost agricultural productivity and protect against reoccurring risks. Rice productivity is in decline, and approximately just 20 percent of domestically grown rice is marketed. To address this issue, the country needs to deepen current investments in rural connectivity, expand rice-farming areas, and strengthen land tenure security. It is also important to reduce trade distortions (customs duties exemptions/export restrictions) and encourage exports of high-value products like vacuum-packed vanilla, lychees, ylang-ylang, and livestock. It is also important to protect rice farmers against the reoccurring risks of climate shocks with insurance. However, these tools must be used in a market friendly manner by indirectly protecting the farmers through an aggregator to reduce the often-high cost associated with supplying insurance to smallholder farmers.

Invest in and protect the quality of human capital. Human capital accumulation has been slow due to malnutrition, lack of access to education, vulnerability to climatic shocks and high food insecurity. To address this issue, the country needs to improve the education system by enforcing merit-based recruitment for teachers as well as aligning the academic calendar with the agricultural season. It is also important to improve teacher pay in rural areas (they are paid by parents), improve health and nutrition services, increase safety net coverage (in a fiscally sustainable way), improve targeting, and consider strengthening conditionality on education and health.

In conclusion, addressing poverty in Madagascar requires a multi-faceted approach that focuses on improving the conditions for broad-based and sustained growth. This means promoting competition, market contestability, and improving the business climate, as well as investing in infrastructure to improve connectivity and access to energy and digital services. Boosting agricultural productivity and protecting against reoccurring risks with index insurance and investing in and protecting the quality of human capital are also crucial steps. By implementing these recommendations, Madagascar can create an environment that enables private sector growth, employment creation, and poverty reduction that will benefit the entire population. Detailed strategies for implementing these recommendations are discussed in Chapter 6.

Chapter 1

Two decades of poverty stagnation against a modest growth performance

Key findings

In 2022, 75.2 percent of the national population was poor (79.9 percent for rural and 55.5 percent for urban areas). This is a slight (non-statistically significant) increase from the 72.9 percent estimated for 2012. Rural poverty decreased from 80.6 percent in 2012 to 79.9 percent in 2022 (a statistically insignificant change), while average consumption among the rural poor increased by 1-percent per year.[9] At the same time, poverty significantly increased in urban areas, from 42.2 percent in 2012 to 55.5 percent in 2022. The largest increases in urban poverty took place in secondary cities (from 46 to 61.1 percent), while in the capital poverty increased slightly from 33.3 to 34.8 percent (not a statistically significant change).

National inequality declined over the past decade as urban welfare deteriorated and rural welfare slightly improved. In contrast to the 2005-2012 period, inequality fell during the last decade, despite the little variation in poverty nationally. This decline in inequality is the result of a deterioration in welfare along the urban income distribution, which has brought urban incomes closer to rural ones. At the same time, urban inequality increased slightly, and rural inequality fell significantly, thanks to a significant reduction in rural extreme poverty.

Significant spatial variation in poverty and inequality persists, with Southern provinces showing vastly more acute poverty and deprivation levels. Southern regions continue to bear a higher proportion of poor and extreme poor households. They also face the highest rates of multidimensional poverty. Conversely, inequality tends to be higher in certain northern regions. Finally, small-area estimations reveal that some areas in the high-plateaus suffer from "hidden hunger" reflected in higher-than-average stunting rates despite apparent high food security.

Multidimensional poverty stood at 69 percent in 2021, among the highest globally. Madagascar is the 8th poorest country in the world in multidimensional headcount. Deprivations are highest for clean cooking fuel (69 percent), improved sanitation (68 percent), safe housing (62 percent), electricity (55 percent), clean drinking water (53 percent) and education (50 percent). The multidimensional poverty headcount ratio dropped from 76 percent in 2008 to 67 percent in 2018 but then increased slightly between 2018 and 2021, when the share of electricity and adequate nutrition deprivations increased after the country suffered multiple shocks. The deterioration of nutrition occurred in rural and urban areas, returning close to its 2008 level, despite a steady improvement in stunting among children under 5.

Multiple deprivations explain persistently high monetary and multidimensional poverty. First, most people are employed in subsistence low-productivity agriculture, which is uneconomic due to lack of inputs, infrastructure and favorable institutions. In this sector, 90 percent of households are poor. Second, a slow accumulation of human capital has prevented people from escaping poverty through more productive and higher paying employment. Child vulnerability is extremely high, with high malnutrition among children (39.8 percent stunting), child labor and high rates of early marriages and teenage pregnancies, all of which reinforce the intergenerational transmission poverty. Other factors that predict household poverty include household size, illiteracy of the household head, lack of ownership of land or livestock, and absence of electricity, water, sanitation, paved roads, transport, internet, and cellphone networks. Finally, repeated weather shocks, including floods and droughts, destroy infrastructure, crops and livestock, and the recent external shocks (COVID-19 and the Ukraine invasion) have affected prices and urban labor markets, diminished employment and earnings opportunities.

Malagasy household heads express a sense of constant struggle to make ends meet and lack of aspirations for the future, citing multiple causes of poverty in their society. The primary factors identified by respondents include the lack of jobs (43.5 percent), inflated cost of living (13.1 percent), limited access to land (9.1 percent), low salaries (7.8 percent), and insufficient education (6.2 percent). The scarcity of employment opportunities severely hampers

[9] Approximately 80 percent of Madagascar's population dwells in rural areas.

their ability to generate sustainable income, while the soaring cost of living makes it increasingly difficult to afford basic necessities. Limited access to land restricts engagement in productive activities, low salaries leave them unable to cover essential expenses, and insufficient education undermines their prospects for better employment. These first-hand insights underline the complex nature of poverty and highlight the priorities of poor households to address the challenges they face.

1. Poverty against broader political and economic trends

Since the start of the 21st century, significant economic and political shocks have trapped Madagascar's population in poverty.[10] Madagascar continues to have one of the highest poverty rates in the world, particularly in rural areas, where 80 percent of the population resides. Persistent high poverty has deteriorated not only the economy but is also risking its very social fabric, with malnutrition, poor health, low education attainment, and social cohesion being worse in areas with high poverty.

The past decade was volatile. While the political instability of 2009–2013 was followed by a relatively calmer period, the economy swung between a surge in mining investments, the reengagement of development partners and increased foreign aid on the positive side, and multitude of geopolitical (following Russia-Ukraine-war-induced price shocks), climatic (cyclones and droughts), and health crisis (COVID-19 pandemic) shocks on the negative side. At the same time, the lack of a detailed survey on monetary welfare did not allow to monitor poverty more closely, but evidence on living conditions, from the Census of 2018, and MICS 2018 showed little progress regarding human capital, access to basic services, and employment conditions. The analysis presented in this chapter provides an update to complement this evidence, assessing the evolution of poverty and inequality across time and space – using the 2022 EPM & 2012 ENSOMD - linking it to the larger macro trends as well as (lack of progress on multidimensional dimensions of welfare using a variety of sources, including DHS 2008/9, Housing and Population Census of 2018, MICS 2018, DHS 2021.

The objective of this chapter is to provide a profile of poverty and inequality in Madagascar and an indication of recent trends. This report uses various poverty indicators such as poverty incidence, depth and severity of poverty, multidimensional poverty, and subjective poverty, concepts of vulnerability, the human opportunity index, and advanced analytical tools including survey-to-survey imputation to address lack of comparability of consumption data between 2012 and 2022 (Jarotschkin, Vincent, et al., 2023; Jarotschkin, Yoshida, et al., 2023).[11] Latest small-area poverty estimation methods to estimate poverty levels at the commune level are also presented. All of the above provide a more nuanced and granular understanding of the spatial and temporal trends in poverty and inequality in the country, enabling the prioritization of interventions areas and programs to alleviate poverty and inequality.

The analysis suggests that while poverty remains predominantly a rural phenomenon, urban areas outside of the capital city have also been slipping quickly. Urban poverty, outside the capital city, has been on the rise in recent years. In line with declining average consumption levels, which can be attributed to a range of factors including political instability, low private investment, the COVID-19 pandemic and rising food and fuel prices, limited employment opportunities, and inadequate social safety nets. The increase in urban poverty is particularly concerning, with many people migrating from rural areas to cities in search of better economic opportunities, a trend that will only last with the immensely high rural poverty rates. Thus, tackling poverty in both rural and urban areas will require different approaches as the analysis speaks to, but a focus on both is paramount for achieving inclusive and sustainable economic growth in Madagascar.

2. While the number of poor increased by 50 percent in 10 years, inequality decreased for the wrong reason

In the last two decades, poverty in Madagascar has fluctuated above 70% of the population. The updated national poverty line is estimated at MGA 1,477,565 ($335.81)/person/year. This poverty line represents the cost of basic needs: covering the cost of a basic consumption basket to reach 2133 kcal intake per day, and a small amount of additional funds for non-food items, such as shelter. 75.2 percent of Malagasy do not see their cost of basic needs covered, meaning they could not afford this basket in 2022 and are therefore considered poor. This is higher than the previous estimate of 72.9 percent in 2012 (Table 2), 71.7 percent in 2010, 73.2 percent in 2005, and 70.8 percent in 2001.[12] In the capital city, there is no difference in the poverty rate between 2012 and 2022, while in other urban areas, driven by secondary cities, poverty has been increasing notably, from 42.2 percent (based on imputed expenditures) in 2012 to 55.5 percent in 2022. Ever so

[10] Osborne et al. 2016.
[11] Consumption data from the ENSOMD series until 2012 are not comparable with those of EPM 2022. The EPM 2022 consumption data contain an updated survey instrument collecting far more food consumption items than the ENSOMD series and recording consumptions in local non-standard units for the first time. To overcome the incomparability in consumption data from the ENSOMD 2012 and EPM 2022 surveys, a survey-to-survey methodology was used to impute household expenditures data in the ENSOMD 2022 comparable to the EPM 2022 data. (Jarotschkin, Vincent, et al., 2023; Jarotschkin, Yoshida, et al., 2023.) The imputed expenditure data are used to estimate poverty rates for 2012 in table 2.
[12] Poverty lines were set at MGA 525,000 person/year in 2012, MGA 381,791 person/year in 2010, MGA 289,169 person/year in 2005, and MGA 192,733 person/year in 2001.

Table 2: Poverty incidence steadily increased in the last 20 years

Poverty headcount ratio	2001	2005	2010[13]	2012[14]	2022
National (%)	70.8	73.2	71.7	72.9	75.2
Rural (%)	77.7	79.6	80.1	80.6	79.9
All urban (%)	34.1	40.8	29.8	42.2	55.5
Capital city (%)				33.3	34.8
Other urban without capital city (%)				46.0	61.1

Source: World Bank analysis based on ENSMOD, 2001, 2005, 2010, 2012; and EPM, 2022.
Notes: Poverty line estimated from 2010 EPM survey and adjusted for inflation in each year.

minorly, poverty decreased in rural areas during the same reference period. Overall, the period between 2012 to 2022 has been marked by very limited progress in rural areas, keeping high poverty prevalence a continued problem while underlining the need for a renewed focus on urban areas outside of the capital city where poverty has been importantly rising (Figure 11).

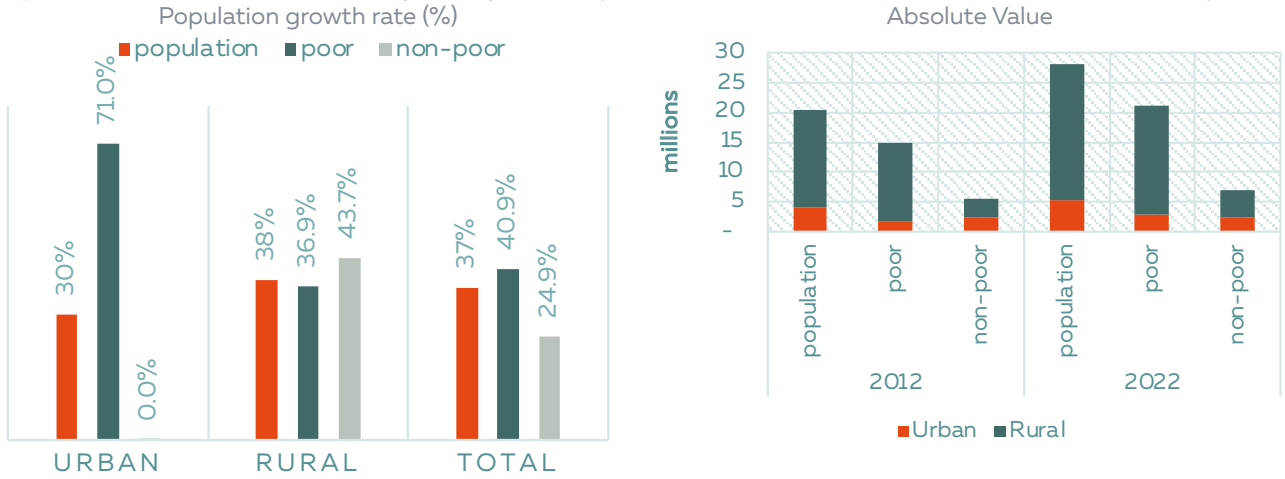
Average consumption levels among the extreme poor rose from 2001 to 2005. Consumption growth was positive for households in the bottom 40 percent of the consumption distribution during this time, while tapering off for the middle class. Conversely, the average consumption rate declined for the top 60 percent of the distribution – indicating that wealthier households, mainly based in urban areas, reduced their consumption during this period. This finding is consistent with the observed increase in urban poverty between 2001 and 2005.

Urban poverty dropped between 2005 and 2010 but deteriorated thereafter. During this time, consumption levels increased in households above the 60th percentile and declined among poorer households. Then, from 2010 to 2012, households across the distribution suffered a decline in real consumption, with minimal gains confined to a handful of middle-class families. As a result, between 2001 to 2012, real consumption increased overall for households in the bottom half of the consumption distribution and declined for wealthier and predominantly urban households. The latter group was especially affected by macroeconomic instability due to political unrest between 2009 and 2012, the effects of which persisted into the following decade.

The poor urban population grew significantly between 2012 and 2022. Although the absolute number of rural poor in Madagascar remains six times as large as that of the urban poor, the poor urban population rose twice as fast as the poor rural one during this time (Figure 11). The increase in the number of urban poor is explained by higher fertility rates among the poor, economic shocks and income losses, and – in some cases – the migration of rural poor to the cities. Meanwhile, in rural areas, the non-poor population grew slightly faster than the poor population.

Considering substantial population growth in the past decade, the number of poor has grown substantially more than the poverty rate. The recent Population Census was a big reveal that the population had grown by a lot more than initially presumed. De facto, between the two censuses (1993 and 2018), the population had doubled. At a 72.9 percent poverty rate as of 2012, 15.4 million of people were considered poor whereas in 2022, the number of poor now towers at 21.1 million – 50 percent higher. This brings home that for a country growing as fast as Madagascar, poverty reduction strategies need to be bold to have a chance of reducing the number of poor in the medium term.

Figure 11: Urban poor population grew significantly in 2012-2022, but the poor remain predominantly rural



Source: World Bank analysis based on 2012 and 2022 EPM data.

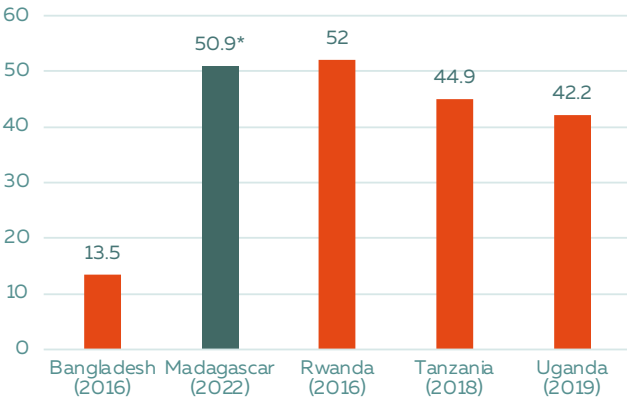
[13] Pre-2012 numbers are not comparable with post-2012 numbers.
[14] Revised from the numbers reported in Osborne et al. 2016, to ensure data comparability over time (Jarotschkin, Vincent, et al., 2023). Urban estimate is the weighted average of capital city and other urban areas.

Among its peers, Madagascar remains one of the poorest countries. Madagascar's poverty rate measured at the international poverty line of $2.15 (in 2017 PPPs) per day per capita is 50.9 percent.[15] As shown in Figure 12, Madagascar remains poorer than the neighboring countries and an international comparator, like Bangladesh. However, there are a few caveats on this international poverty rate. First, since the consumption data of the EPM 2022 are not comparable to those of the ENSOMD 2012, this number should not be compared to the poverty rate previously reported for 2012.[16] Second, the 2022 number should be seen as preliminary because the PPP for Madagascar is currently under review and the international poverty estimate could change. Third, if the current 2017 PPP conversion rate is used, the international poverty line is MGA 995,932.8 per person per year, covering just about two thirds of the national poverty line that was estimated to cover the cost of basic needs (consisting of 2133 kcal per day and small amount of additional funds for non-food items). As a result, the international poverty line would fall substantially short of the WHO-recommended 2133 kcal daily food intake. Therefore, beyond international comparisons, the poverty estimates measured at the national poverty line are more appropriate as a measure for tracking poverty over time and policy making in Madagascar.

Subdued economic growth with frequent crises flattened and reversed short episodes of progress in poverty reduction with differential impacts in rural and urban areas

Subdued economic growth with frequent crises flattened and reversed short episodes of poverty progress. First, economic growth in Madagascar has been too slow to create opportunities for its people. While economic growth averaged 3.5 percent per annum in the past decade, it was barely surpassed population growth. In addition, different economic fallouts have affected Madagascar in the past two decades. And most recently, in addition to home-made crises, Madagascar has been hit by different exogenous crisis, ranging from world-wide pandemic (COVID-19), geo-political rifts, and climate (droughts and cyclones). All of the above have made a dent into any modest progress

Figure 12: Madagascar remains among the poorest countries globally



Source: World Development Indicators (last updated: 16/09/2022) & EPM2022.

** Subject to change after forthcoming review of PPP.*

The pandemic had an adverse effect on households headed by salaried employees or business owners. The COVID-19 pandemic induced a GDP contraction of 7.1 percent year-on-year, which was followed by an increased price of rice, the staple food that accounts for more than 50 percent of the caloric intake of the average Malagasy and a series of disasters including a major drought in the south. According to the World Bank (2021), "...the COVID-19 shock reversed more than a decade of modest gains in poverty reduction." The World Bank's High Frequency Phone Survey shows that 77 percent of Malagasy households experienced a drop in their business income in June 2020 (with similar percentages across rural and urban areas – 79 percent and 73 percent, respectively). By this point, 8 percent of the working Malagasy population had lost their jobs. The loss in employment and income translated into decreased consumption and a 16 percent increase in food insecurity across the population.

More recently, high inflation prompted by Russia's invasion of Ukraine, is also estimated to have reduced consumption. The invasion that began in February 2022 interrupted the post-pandemic economic recovery by triggering increases in the prices of food, fuel, and fertilizers. The latter two are farming inputs and their inflated prices increase the cost of food production for rural farming households, which ultimately leads to food inflation. Urban households, which are less involved in subsistence farming and tend to buy most of their food, are especially affected. Inflation has reached double digits at 11.4 percent today and as a result urban poverty is expected to rise further.

Inclement weather exacerbated poverty trends and disrupted economic growth. Madagascar's geography makes it vulnerable to climate shocks, and the past decade has been riddled with natural disasters. Between 2015 and 2022, the country experienced two severe droughts that plunged 1.3 million people into food insecurity and triggered rural urban migrations. In addition, the country was hit by two to three cyclones per year. This caused repeated flooding, made 2.4 million people poor, and resulted in losses equivalent to 6 percent of

[15] Purchasing Power Parity.
[16] The sources of non-comparability are discussed in the footnote 2.

GDP, leading affected households to reduce their consumption by more than 30 percent (Keller & Mulangu, 2023).

Extreme poverty and severity of poverty slightly improved in rural areas but worsened in urban areas

Some improvements in rural areas are noted, yet ending extreme poverty remains a tall order with much of the population living below the food poverty line, and urban populations slipping quickly. At the national level, extreme poverty has remained quasi-unchanged, with more than 1 in 2 Malagasies living in below the food poverty line, which represents the costs of a basic food consumption basket covering 2,133 kcal per person per day or MGA 1,005,974 (Table 3). In rural areas, some improvements have been noted, with an almost four-percentage point decrease. Yet, 56.7 percent of Malagasies in rural areas continue not being able to fulfill their basic daily caloric needs. Concurrently, in urban areas, 3 in 10 Malagasies live below the extreme poverty line as of 2022 but marking a dramatic slip of roughly 1 in 10 urban households below the food poverty line. Importantly, extreme poverty remained the same in the capital city, with negative changes in urban areas attributable to populations residing in the country's other big cities, but also its secondary cities.

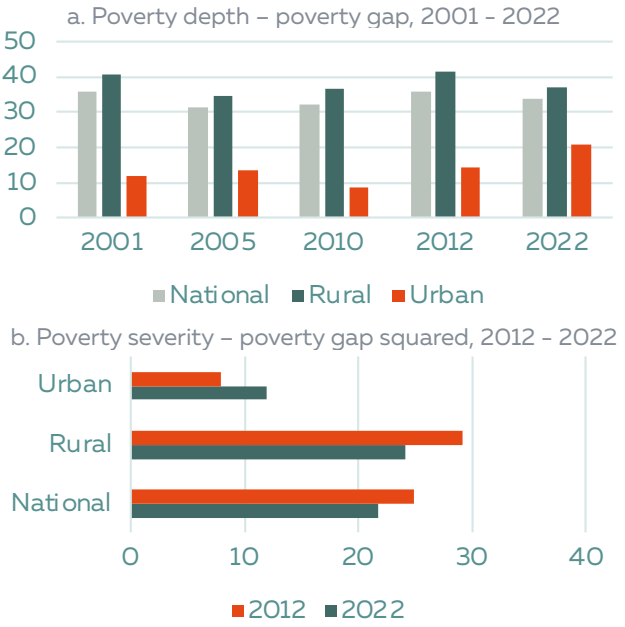
Table 3: Evolution of extreme urban poverty is most significant in secondary cities

	National	Capital city	Other urban	All urban	Rural
2012[17]	52.6%	15.6%	24.9%	22.1%	60.2%
2022	51.8%	13.3%	35.7%	31.0%	56.7%
difference	0.9%	2.3%	-10.8%	-8.8%	3.5%
significance			***	***	***

Source: World Bank analysis based on 2012 ENSMOD and 2022 EPM data.

Driven by improvements in rural areas, poverty depth has remained unchanged, yet poverty severity has decreased nationally, while poverty depth and severity have been sharply increasing in urban areas. The poverty gap reflects the intensity of poverty in a country, and at national level, the depth of poverty has not changed. The depth of poverty in urban areas has been alarmingly increasing in the past decade: while in 2012, the consumption of the average poor urban household experienced a shortfall of 14 percent of the poverty line (Figure 13a). This shortfall has now almost doubled in 2022. In rural areas, the depth of poverty has decreased slightly but continues to be almost twice as high as in urban areas overall. As of 2022, the shortfall of average consumption in rural areas in comparison

Figure 13: Poverty Gap and Poverty Gap square have declined



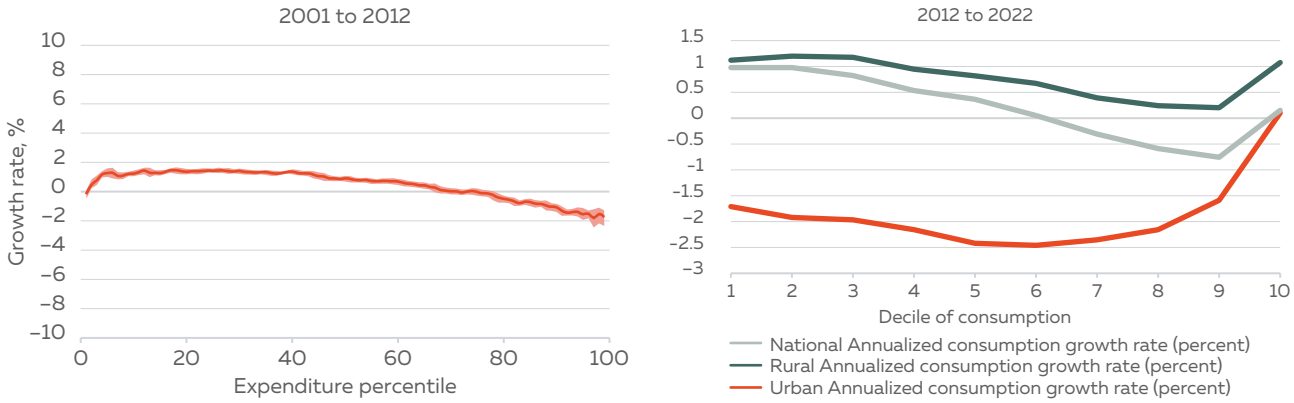
to the poverty line has been 37 percent. The poverty gap square index (poverty severity) is more sensitive to incomes of those furthest away from the poverty line. And poverty severity has been decreasing at the national level, driven predominantly by decreases in rural areas (Figure 13b). Simultaneously, in urban areas poverty severity has been picking up. In rural areas, poverty has been stagnant and high, as has been poverty depth. Yet, poverty severity in rural areas has been decreasing. While stable over time, the alarming levels of poverty in rural areas command attention as slipping much further is beyond tragic. Simultaneously, the improvements among the poorest of the poor have been a welcome development. Concurrently, poverty in urban areas has been increasing, as have its depth and severity, imposing renewed focus on urban areas particularly outside the capital city for interventions to stop this fast-paced negative trend.

Inequality trends: regional variations over the past 20 years suggest reducing rural poverty is key

Consumption growth and contraction have been spatially unequal, following a reverse and repeat pattern during the past 20 years. Between 2001 and 2005, consumption growth was positive for households in the bottom 40 percent of the consumption distribution during this time, while tapering off for the middle class. Conversely, growth in the average consumption rate was negative for the top 60 percent of the distribution – indicating that wealthier households, mainly based in urban areas, diminished their consumption during this period.

[17] Revised from the numbers reported in Osborne et al. 2016, to ensure data comparability over time. Urban estimate is the weighted average of capital city and other urban areas.

Figure 14: Consumption growth was higher among the poorest households between 2001-2022



Source: World Bank analysis based on ENSMOD, 2001, 2005, 2010, 2012; and EPM, 2022.

Table 4: National inequality slightly declined over the period 2012-2022 (Gini index and shares of total consumption at the extremes of the consumption distribution in %, 2005–22)

	National			Rural			Urban		
	Gini	Lowest quintile	Top quintile	Gini	Lowest quintile	Top quintile	Gini	Lowest quintile	Top quintile
2005	38.9	6.9	46.6	35.4	7.6	43.5	39.2	6.5	45.9
2010	42.7	6.0	49.7	37.9	6.9	45.4	38.6	6.6	45.4
2012	41.0	5.9	47.6	37.3	6.5	44.3	38.4	6.3	45.1
2022	36.7	7.2	44.6	33.9	6.4	47.2	39.9	6.4	47.2

Source: World Bank estimates based on 2005, 2010, 2012 ENSMOD and 2022 EPM data.

Between 2005 and 2010 consumption levels increased among households above the 60th percentile and declined among poorer households. Yet following political unrest between 2009 and 2012 – with persistent effect in the years after- consumption declined for wealthier and predominantly urban households and increased overall for households in the bottom half of the consumption distribution overall (Figure 14). Between 2012 and 2020, a similar pattern transpired, particularly heightened by exogenous crisis but also homemade ones.

Inequality broadly declined during the past two decades. Starting from a value of 46.9 in 2001, Madagascar's Gini index dropped to 38.9 in 2005, rose to 42.7 in 2010, then steadily diminished to its current value of 36.7 (Table 4). The consumption shares of the lower quintile of the consumption distribution (mainly comprised of rural households) rose, while the consumption share of the upper quintile (mostly urban households) decreased, leading to a decline in overall inequality. However, while inequality within the rural population decreased, inequality within the urban population increased.

The decrease in national inequality can be decomposed into to an increase in urban inequality, a decrease in rural inequality and a slight decline in inequality between rural and urban incomes. Table 5 provides a breakdown of the Gini index in 2022 by geography, first by urban/rural status and then by region. Within-group inequality refers to the inequality that exists within either urban or rural areas. In this case, the within-group inequality for either urban or rural areas was 22. This suggests that there is a relatively high level of inequality within either urban or rural areas. The between-group inequality for urban and rural areas was 8.3. This indicates that there is a moderate level of inequality between urban and rural areas, with urban areas having higher levels of income than rural areas. The overlap component of 6.4 indicates the degree of overlap between the income distributions of urban and rural areas.

Regional inequality reflects the heterogeneity in socio-economic conditions across the country. Table 5 provides within/between-group inequality across urban and rural areas, and also across regions.

Table 5: Inequality is largest within broader geographic areas and between regions

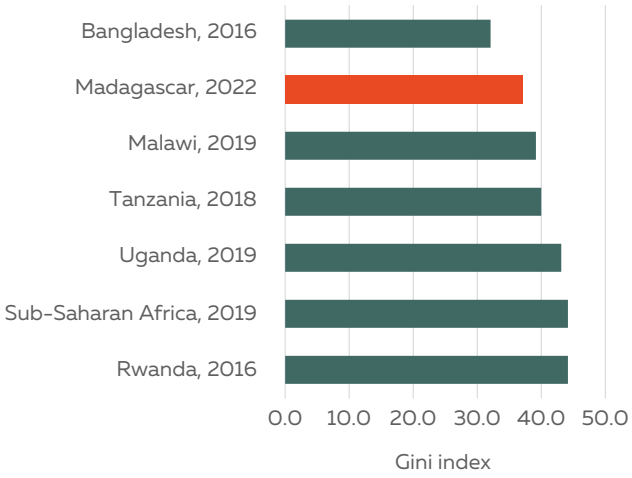
Total	**36.8**
Urban / rural	
Within-group inequality	22.0
Between-group inequality	8.3
Overlap	6.4
Region	
Within-group inequality	2.4
Between-group inequality	13.8
Overlap	20.6

Source: Author's calculations based on 2022 EPM data.

Within-group inequality by region was relatively low at 2.4, indicating relatively equal income distribution. Between-group inequality was much higher at 13.8, indicating that there is significant income inequality between different regions of Madagascar, which is not surprising given the heterogeneity in geography, urbanization, and vulnerability across regions.

Inequality remains lower than among aspirational peer countries and other countries with similar poverty rates (Figure 15). For example, Madagascar has lower inequality than Tanzania, Uganda, and Rwanda, and similar to Malawi and Niger, which also have high poverty rates. However, the relatively lower inequality is the result of consumption falling among urban households, together with slightly better consumption among the rural poor.

Figure 15: Madagascar's inequality level remains below peer countries'



Source: World Bank Staff estimates based on 2022 EPM data and WDI Online.

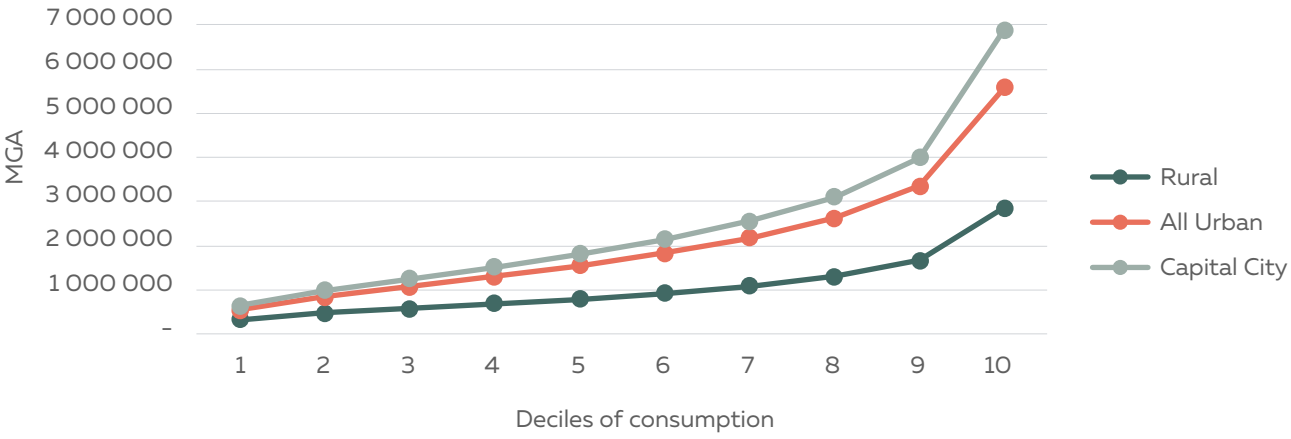
Consumption gaps between urban and rural households widen when moving from lower to higher deciles. Figure 16 illustrates inequality patterns by comparing consumption across consumption deciles. Except among the poorest, households in the capital city and other urban areas consume more than their rural counterparts. Even though they constitute most of the population, rural households only consume 34 percent of overall food and non-food resources in Madagascar, while urban households account for 66 percent of consumption.

Poverty and inequality across space

Monetary poverty in rural areas touches more than 8 in 10 households, with the Grand South showing some of the highest rates, but with secondary cities counting as many as 7 in 10 households among the poor. Poverty is twice as prevalent in rural areas (80 percent), compared with the capital city (35 percent) or other urban areas (43 percent). Yet the gap between secondary cities, with those agglomerations that count between 5k-100k twice as many poor as the capital city, counting almost 67 percent among the poor, and are thus substantially more comparable to rural areas than bigger cities. Simultaneously, poverty rates across regions also show relevant variation. Western regions and particularly those in the Grand South display some of the highest rates, with Androy region having the near totality of its population living below the national poverty line, followed by three other regions where more than 9 in 10 households are poor. Partially, this is explained by the high rural population shares in these regions, with Androy, Vatovavy, and Atsimo Atsinanana having more than 90 percent of its population mired in poverty. Yet other factors matter also: these regions are far from the capital city and its relatively superior infrastructure and are often hit by natural disasters such as locust infestations and

Figure 16: Urban-rural consumption gap widens for richer deciles

Average household consumption by decile



Source: World Bank Staff Estimates based on 2022 EPM data.

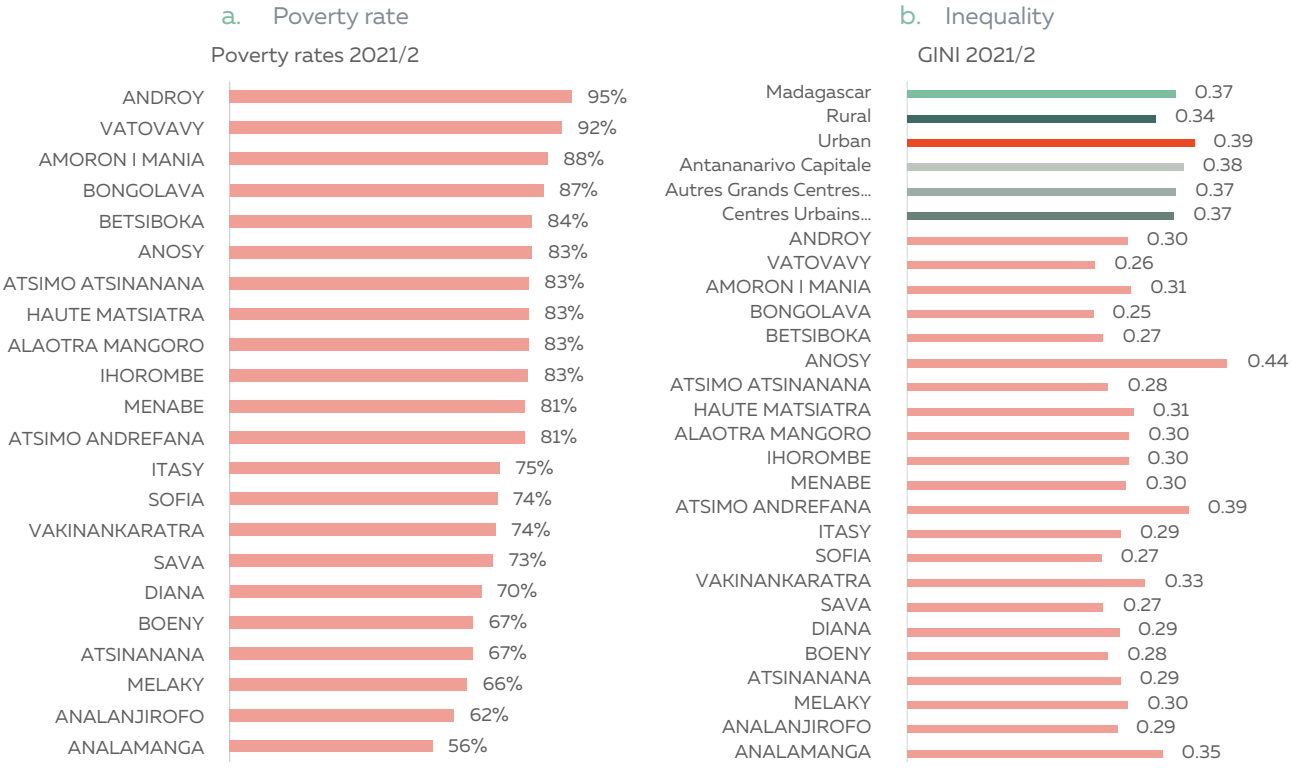
droughts. Northern regions benefit from greater economic activity, including in tourism and vanilla production, and the incidence of poverty is therefore noticeably lower. The eastern side of the country has become an area of high poverty as cyclones often make landfall in the east, leaving trails of destruction and loss of assets among households. Further local spatial heterogeneity is revealed by the small areas estimates poverty map (Map 3) following Corral et al. (2022). In Atsimo Andrefana, one of the poorest regions, there are pockets of lower poverty rates in some communes. Simultaneously, some districts in wealthier regions display on average lower poverty rates, such as in Betsiboka, Alaotra Mangoro or in Atsinanana. Lagging regions with particularly high poverty rates and depth will require targeted and tailored interventions as they lack in basically everything.

Different regions face different challenges: Androy in the South has the highest poverty headcount rate, while Analamanga region, displays a lower poverty rate but higher levels of inequality. Androy's poverty rate is a staggering 95 percent (Figure 17a). Additionally, the poverty gap in Androy is the highest in the country, with the average shortfall of the poor from the poverty line at 50.6 percent. The squared poverty gap in Androy is also the highest among all regions, indicating poverty severity at 31.7 percent. These statistics suggest that the people of Androy are among the most economically vulnerable, lacking in almost everything, and require cross-sectional interventions to move the needle on poverty there. Analamanga region, where the capital city of Antananarivo is located, has a low poverty headcount rate of 53.7 percent. However, the high Gini index of 40 percent indicates that income inequality is more pronounced than elsewhere, implying that a significant proportion at the bottom end of the distribution of the population still struggles to make ends meet. (Figure 17b) The Anosy region has the highest inequality with a Gini index of 42, but this is expected due to its mining activities and enclave economy, which have rendered a small share of the population substantially better off.

3. Multidimensional poverty: Urban areas are slipping on nutrition

Multidimensional poverty declined significantly in the 2008-2018 decade and increased slightly between 2018 and 2021 after the country suffered multiple shocks.[18] The multidimensional poverty headcount ratio dropped from 76 percent in 2008 to 67 percent in 2018 (Figure 18), an 8-percentage point decline. However, multidimensional poverty then increased slightly between 2018 and 2021 (Figure 18).

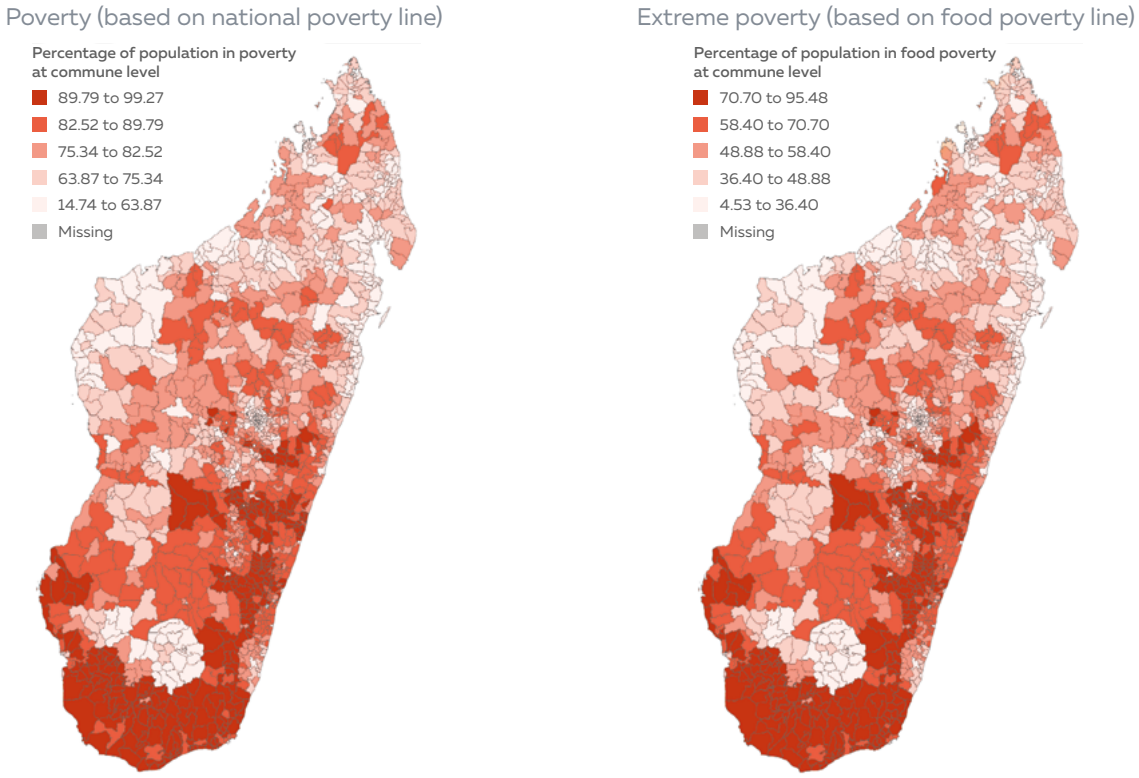
Figure 17: Poverty and Inequality varies widely across regions



Source: EPM 2022.

[18] See definition in Annex 1.

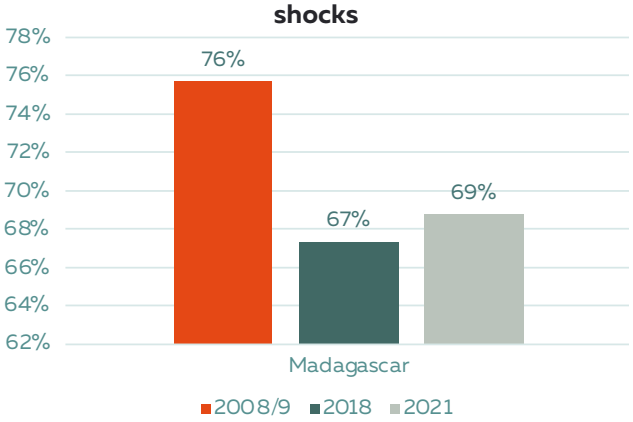
Map 3: There is a large North-South poverty divide at the commune level



Source: Author's calculations based on 2022 EPM data.

Between 2018 and 2021, most areas of the multidimensional poverty index remained stable, except for the nutrition indicator, which deteriorated. Between 2008 and 2018, there were large improvements in several living standards indicators, including sanitation, cooking fuel, housing, access to electricity, adequate nutrition and years of schooling.[19] Deprivation rates in all these indicators decreased by 7-10 percentage points in the 2008-2018 period. The smallest improvements were in access to improved water sources, child mortality, and school attendance. Peer countries outpaced Madagascar's progress on multidimensional living standards indicators such as access to electricity of access to clean water and improved housing metrics by important margins. And while Madagascar's advances in nutrition standards were noticeable, all peer countries were able to improve on this metric more substantially. By 2021, the effect of the pandemic and several weather shocks was reflected in an increased share of electricity and adequate nutrition deprivations. The latter in particular fell back to its 2008 level. The deterioration of nutrition is observed in rural and urban areas where it returned close to its 2008 level (Figure 19). Importantly, this deterioration was not driven by stunting among children under 5, which has improved (declined) steadily.

Figure 18: Multidimensional poverty fell significantly since 2008, despite the recent shocks

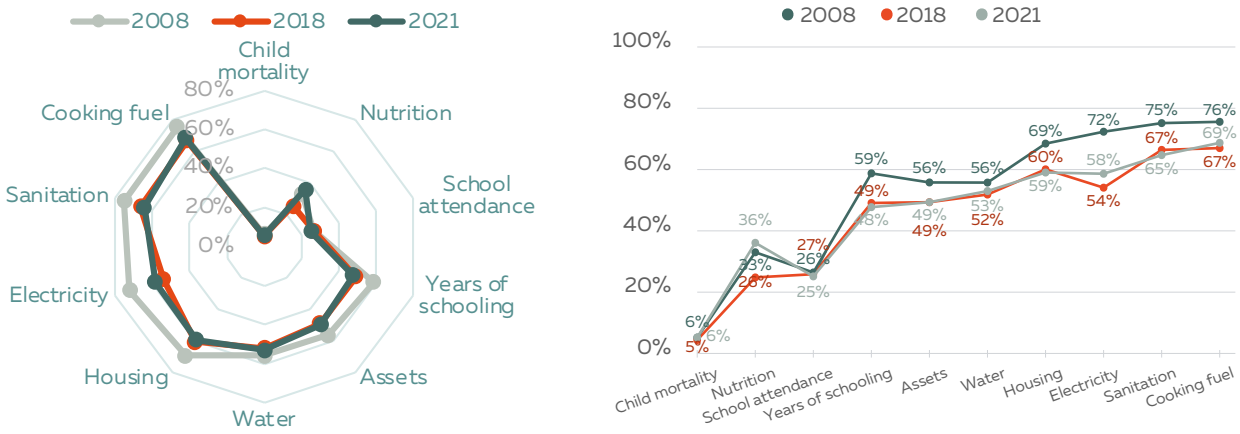


Note: Multidimensional poverty captures acute deprivations in health, education, and living standards that Malagasy people can face simultaneously in a given household. Source. OPHI. Madagascar corresponds to 2008, 2018, 2021 with harmonized scores for 2018 & unharmonized score for 2021.[20]

Deprivations among the poor remain a predominantly rural phenomenon, but with urban areas also slipping on nutrition deprivation while not recovering on other indicators. Overall level of deprivations in rural areas are two to three times higher than those observed in urban areas (Figure 20). In 2021, deprivation in nutrition among rural households are 39 percent, compared to 23 percent in urban areas. Water deprivations are experienced by 2 out 10 individuals in urban areas, compared to 6 in 10 in rural areas. However, between 2008 and

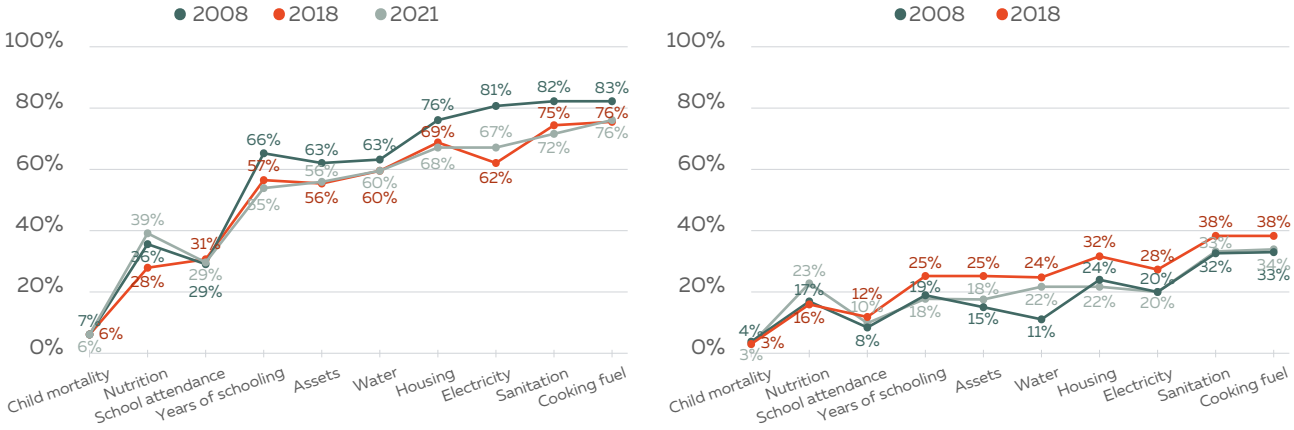
[19] A household is considered deprived in adequate nutrition if it has a child under 5 whose height-for-age or weight-for-age is more than two standard deviations below the median, or if it has a teenager with BMI-for-age that is under two standard deviations below the median, or if it has adults with a BMI below 17.
[20] OPHI (2022).

Figure 19: Nutrition deprivation increased between 2018 and 2021



Source: OPHI & Authors' own calculations.

Figure 20: Indicators of deprivation in Madagascar over time in rural (left) and urban (right) areas



Source. Censored headcount ratios, OPHI & authors' calculations based on DHS 2021.

2018 levels of deprivation on several indicators have been increasing in urban areas. Among the poor in rural areas, deprivations in electricity and cooking also decreased furthermore. Mostly, urban areas never fully recovered back to 2008 levels. Simultaneously, the small wins booked among the poor in rural areas between 2008 and 2018 have not been entirely eroded. Yet, this may not be the end of it in either rural or urban areas. Nutrition tends to adjust more quickly than other markers as cutting food consumption is one of the most common coping strategies among the poor. These negative adjustments tend to further translate and show into other deprivations over time, including health and education markers, but also asset decreases as households continue to engage in both human capital and asset depletion to weather particularly long-lasting shocks.

Multidimensional poverty and its correlates

Multidimensional poverty is very high across Malagasy territory, with more than 7 out of 10 people in Madagascar living amid multiple deprivations. According to the 2018 Census, 74 percent of the Malagasy population is considered multidimensionally poor in 2018, experiencing deprivations in more than three dimensions.[21,22] This translates into 19.04 million poor across the Malagasy territory. Overall, these census-based calculations mirror the results using Demographic and Health Survey (DHS) information. The share of the population experiencing deprivations across either of the multidimensional poverty dimensions is generally higher than 50 percent. Whereas access to some of the indicators is experienced by the near totality of the Malagasy population, such as access to improved sources of cooking fuel (99 percent), improved sanitation (88 percent), and improved water (84 percent). In addition, around half of the population lives in severe poverty, experiencing more than 50 percent of weighted deprivations. And 15 percent of the Malagasy population is considered vulnerable and at risk of falling into multidimensional poverty, cementing ubiquity of multidimensional poverty in the country.

[21] Small disparities in the multidimensional poverty rate between INSTAT's published report and the one presented in this report are due to minor differences in calculation regarding education and child mortality.

[22] For the calculation of the multidimensional poverty index using the Census 2018 information, nutrition and child mortality are not included. Nutrition was not collected as part of the census and child mortality requires additional information not available to the WB team. Please see information in Annex 1 on calculation and comparison with DHS/ MICS calculations.

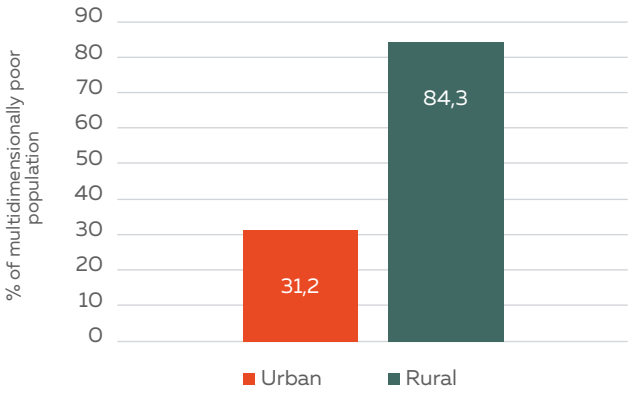
The largest overlap of different multidimensional poverty dimensions is to be found in rural areas as well as in the country's Southern and Western regions. The urban-rural divide runs deep in Madagascar: the population living in rural areas being almost three times as likely of being multidimensionally poor, when compared to those living in urban areas.[23] To put this into perspective: 1.54 million of poor reside in urban areas, 17.5 million of poor reside in rural areas. Moreover, there is a strong relationship of the incidence of poverty, and the intensity of poverty across different communes. More than 90 percent of the population faces multidimensional poverty in the regions of Vatovavy Fitovinany (92 percent), Atsimo Atsinanana (95 percent), Melaky (92 percent) and Androy (95 percent; Figure 21 and Map 4).

Multidimensional poverty is higher among households with a younger head. The incidence of poverty is 80 percent among the population living in a household with a head aged between 15 and 24 years, compared to 74 percent or less for those living with older heads. With an economy structured around primary sector activities, population growth will mean that already scarce resources will be divided among more individuals, leaving continuously fewer resources for the next young generations.

Multidimensional poverty is furthermore higher among households with 7 or more members. Individuals living in larger households are more likely to be multidimensionally poor. The incidence of poverty is 71 percent among individuals living in households with one to six members (Table A1.5). And the poverty rate is 9 percentage points higher among those living in households with 7 or more members. Poor households have more household members because they tend to have a larger number of children aged 0-10: on average 1.5 among poor households compared to 0.9 for non-poor ones. With more dependents, these households are more vulnerable to shocks that may arise due to poor health, death, or other environmental circumstances. Larger households also show other levels of multidimensional poverty not directly considered in the multidimensional poverty calculation, such as number of household members per room. Larger households tend to have more members per room.

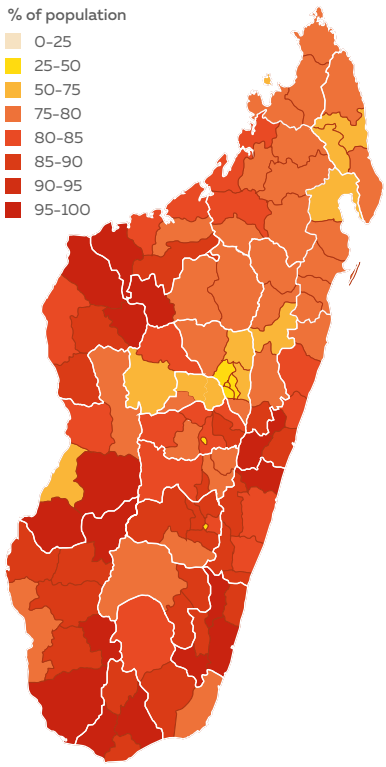
The association between migration and poverty in Madagascar is heterogeneous in function of initial reasons for migration. According to the Census, 13 percent of the population was born in one district and now resides in another. Among these 3.4 million migrants, the reasons for migration were heterogenous (Table A1.4 in the Annex 1), ranging from different pull factors, such as looking for employment and following studies for example, to push factors, such as droughts, insecurity, other family or health reasons.[24] According to these definitions, a very diverse association between migration and poverty unfolds. Individuals who came because they are looking for employment in a given district, display a multidimensional poverty rate of 39 percent, which is still higher than the average urban resident. When looking at those having left due to family reasons, we witness that 42 percent live in poverty among those individuals. Yet when zooming in on those having left their initial place of residence due to

Figure 21: Multidimensional poverty is mostly rural



Source: Authors' calculations based on 2018 Madagascar Census.

Map 4: Multidimensional poverty is higher in the South



Note: The solid white line outlines the boundaries of regions.
Source: Authors' calculations based on 2018 Madagascar Census.

[23] Unless otherwise indicated, this report uses multidimensional poverty headcount ratios from the 2018 Census.
[24] One third did not respond to their reasons for migration.

classic push factors, such as insecurity or drought occurrences, flooding, the poverty rates among those individuals equal those in rural areas, at a rate of 82 percent.

Literacy status is strongly associated with multidimensional poverty. Literacy is highly correlated with education, a direct component of the multidimensional poverty measure. But literacy measures an additional concept that captures capacity to read and write, irrespective of school attendance. With extremely high poverty rates across the country, it comes as no surprise that even among households with a literate head, the poverty rates are as high as 66 percent. Yet, when looking at households in which the head is illiterate, in any of the languages spoken in Madagascar, the share of those in poverty is at a frightening 97 percent. Simultaneously, a rate of 23 percent illiterate population is high in comparison to other countries (Figure 22).

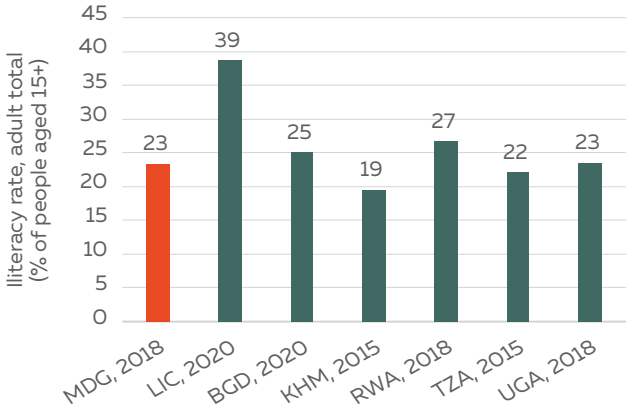
Primary sector workers are also more likely to be multidimensionally poor. Malagasy households whose head is employed in the primary sector, face a higher poverty toll with 89 percent. Meanwhile, households with a head engaged in the non-primary sector are less likely to live in poverty. When splitting further up by sectors, it is apparent that among the non-poor, employment in the primary sector is much less prevalent. The lion's share of non-poor employment is taken up by the secondary (14 percent) and tertiary sector (31 percent), as well as other (20 percent). Whereas among the poor, employment in these sectors is minimal, with a combined share of 6 percent in total (Figure 23).

The Human Opportunity Index

Inequalities experienced early on in life may have detrimental impacts on outcomes later on life. The Human Opportunity Index (HOI) measures how individual circumstances (i.e., characteristics – such as place of residence, gender, and education of the household head – that should not determine access to basic goods and services) can affect a child's access to basic opportunities such as water, education, electricity, and sanitation. The index is a measure of the coverage rate of an opportunity, discounted by inequality in its distribution across circumstances groups. And it delivers a measure that reflects how far a society is from universal access to an essential good or service, and how equitably access is distributed across individuals with different initial circumstances.[25]

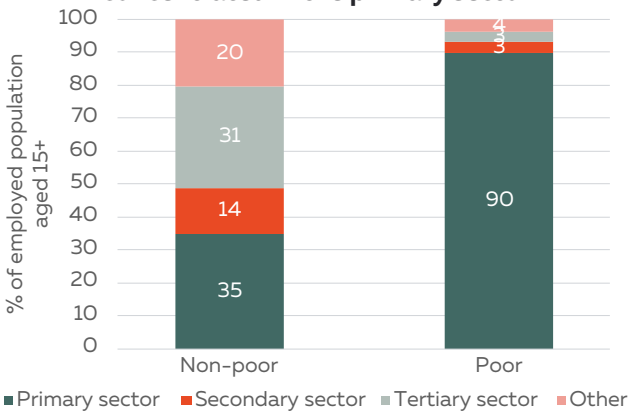
The largest inequalities observed among children in Madagascar is to live in homes that are not multidimensionally poor and have access to electricity (Figure 24). The HOI looks at how some groups of people face different chances in life because of their conditions at birth. If access to opportunities differs according to certain conditions, the HOI goes down. In Madagascar, among children aged 6-16, the largest registered inequality is whether children live in a home that is not multidimensionally poor. For instance, among children between 6 and 16 the probability of living in a non-multidimensionally-poor household is not equally distributed; instead, some children face a higher probability of poverty. Hence, while the overall multidimensional poverty rate is 22 percent for this group, their HOI is 15 percent, a 7 percentage-point penalty. Moreover, 33 percent of children live in homes with access to electricity. Yet, due to its uneven distribution along circumstances, the HOI is 28, after the application of a 5-percentage points penalty factor.

Figure 22: A quarter of Madagascar's population is illiterate



Note: BGD Bangladesh, KHM Cambodia, MDG Madagascar, RWA Rwanda, TZA Tanzania, UGA Uganda, LIC average of low-income countries. In all cases the graph presents the latest available year. N/A not available.
Source: World Development Indicators.

Figure 23: Multidimensional poverty is concentrated in the primary sector

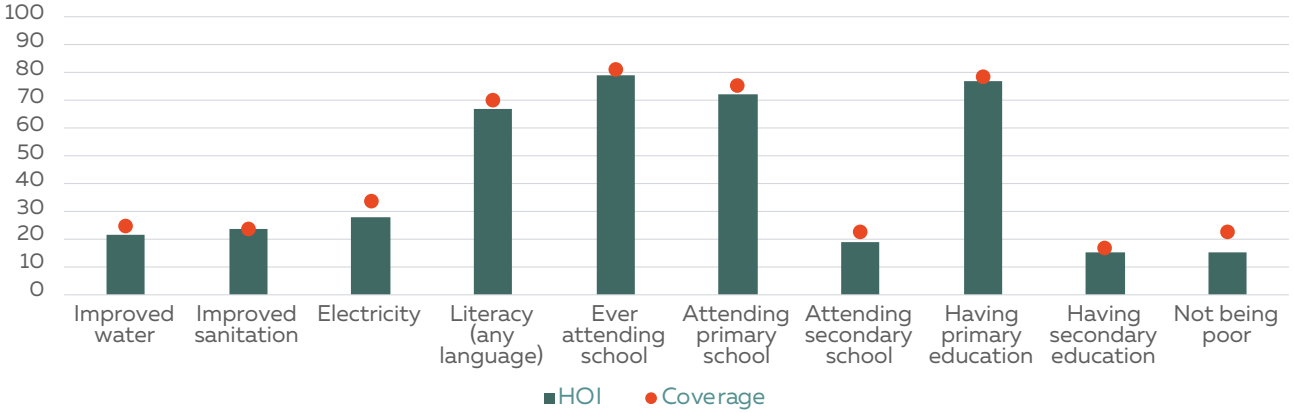


Source: Author's calculation based on the 2018 Census.

Spatial and inter-generational factors tend to explain the largest variation in the inequality of

[25] The methodology and the variables used as circumstances and opportunities for Madagascar.

Figure 24: The Human Opportunity Index for children aged 6-16 is below the coverage rate



Source: Authors' calculations based on 2018 Madagascar Census.

opportunities among children (Figure 25). Location characteristics, such as residing in a rural or urban area, or in a given region, head of household characteristics, such as gender or existing literacy in any language, but also socio-economic status, reflected by the asset index quintile of a household explain the largest share of variation across opportunities. Location factors explain up to 54 percent of disparities in access to improved sanitation, 37 percent regarding access to improved water, and 36 of not being poor, followed by 36 and 33 percent in having literacy in any language or having ever attended school respectively. Socio-economic factors as proxied by the asset index, capture 51 percent in disparities regarding access to electricity, 45 percent in disparities in the opportunity of not being multidimensionally poor, as well as 49 percent of having some primary schooling. Characteristics of the head of household, such as their own literacy and sex, explain 41 and 40 percent in explaining disparities observed among children in literacy in any language and ever having attended any schooling. As a result, improving income-generating opportunities but also intervening to ensure children do not end up not going to school because their parents did not, particularly in disadvantaged regions and rural areas, will be important. In addition, laying a particular focus on children in school whose parents are not literate will also be important to improve literacy rates among younger generations.

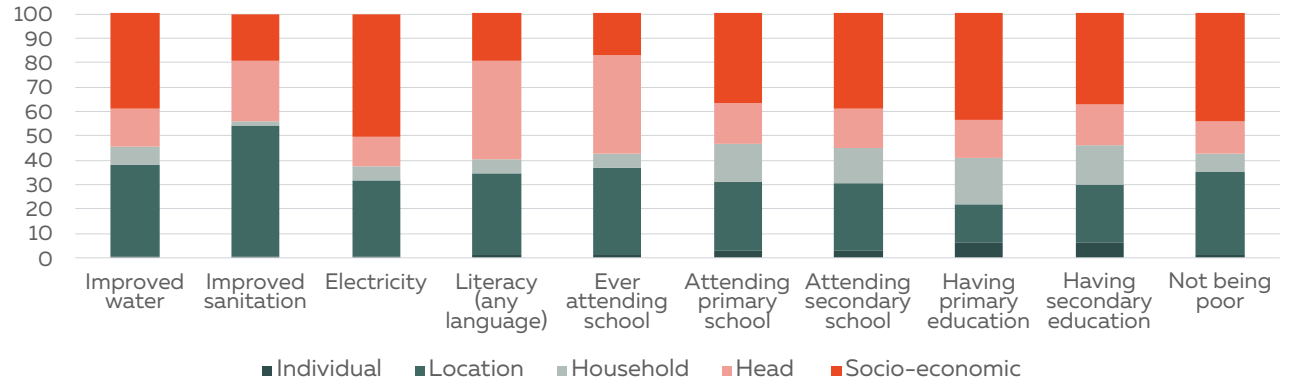
4. Characteristics of the poor, poverty vulnerability, and subjective poverty

Household characteristics and rural community features predict monetary poverty the most

It is important to understand which characteristics are on average associated with monetary poverty. For Madagascar, spatial dimensions play a big role. But other socio-demographic correlates also matter and understanding which ones can help tailor interventions that target people versus places.

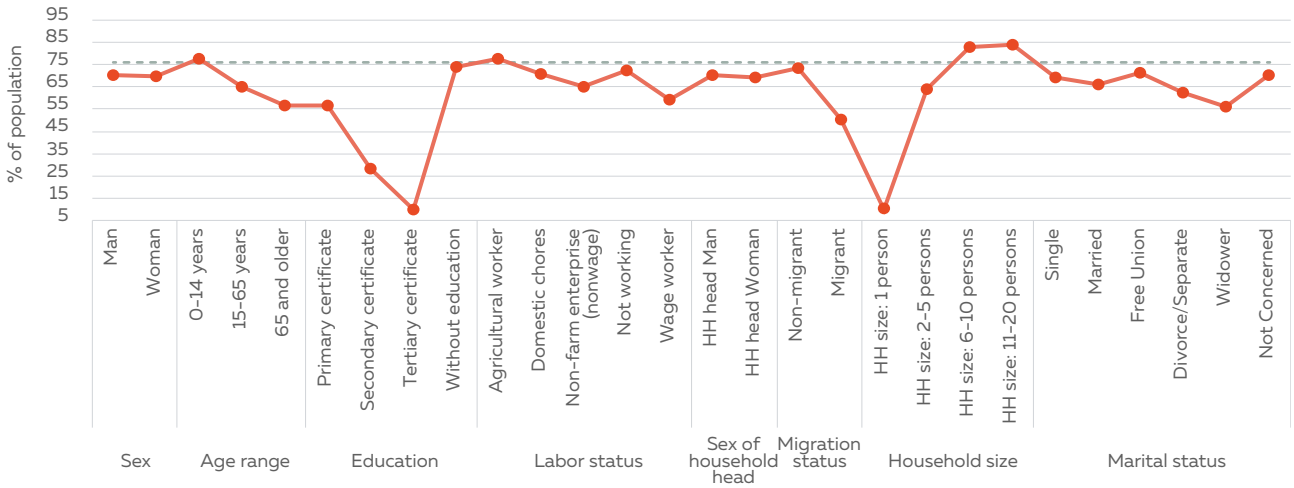
Education, household size, age, and formal work are on average associated with lower poverty (Figure 26). Given the pervasive nature of poverty in the country, it is little surprising that poverty attains

Figure 25: Location and assets explain most disparities in access to opportunities for children aged 6-16



Source: Authors' calculations based on 2018 Madagascar Census.

Figure 26: Larger households with children and agricultural work are associated with higher poverty



Source: EPM2022.
Note: Dashed line is poverty rate.

individuals from households with different characteristics similarly. Gender, or the gender of the head of household make very limited difference and observed poverty rates are almost identical across these groups. Children are poorer, as are households with more individuals, pointing to limited returns to additional children even in this highly (subsistence) agriculture reliant country. While access to good work has been one of the main drivers of poverty reduction around the world, work makes only very limited difference in Madagascar as formal or good jobs are very limited. Nonetheless, while wage work in Madagascar is rare, this group's poverty rate is 10 percentage points lower than the national average, at 69 percent. The mainstay work of Malagasies, which is in agriculture, the poverty rate is above the national average at 87 percent. Education on the other hand is strongly associated with lower rates of poverty: among households with a head in access to primary education, the poverty rate is substantially lower. Heads with a head of household with a secondary certificate or even tertiary education have an average poverty rate of 45.8 and 16.6 percent respectively. Moreover, in Madagascar, migrants are on average wealthier. Importantly, this category captures anybody who has been born in one place and is now living in another. As a result, it does not only encompass those individuals who have been forcibly displaced against their will but also (predominantly) those who may have self-selected into new locations to find jobs and better education. As such, it is not entirely surprising that the observed average poverty rate among migrants is 61 percent and well below the national average.

Using simple regression design confirms these results. Results are presented in Table 6 and A2 (in the appendix). In major urban centers, consumption decreases at an accelerating rate as the head of the household grows older. The second significant variable is household size: each extra household member lowers consumption per capita by at least 35 percent, depending on location, and increases the likelihood of poverty in the household by more than 60 percent. Third, number of adult females is positively correlated with consumption per capita in the household (in secondary cities, the boost amounts to 2.3 percent). Fourth, number of adult household members has the opposite effect, negatively correlated with consumption levels – for example, in rural areas, each extra elderly person is correlated with a 5.5 percent consumption reduction and increases the likelihood of poverty in the household by 9.5 percent. Fifth, the consumption levels of female-headed households in rural areas are 2.8 percent higher than those of male-headed households, and it lowers the likelihood of poverty by 11 percent. The sixth significant characteristic is the marital status of the head of household, but the effect depends on location: in major cities, households with a married head have a 10 percent lower consumption, in secondary cities, their consumption is 4 percent higher and the likelihood of poverty drops by 8.5 percent. Finally, households with educated heads consume more and are less likely to be poor, but the effect is not statistically significant, other things equal.

Certain indicators of living standards are strongly related to household consumption. For instance, in secondary cities, households who live in larger homes tend to consume more, with each extra room corresponding to a 1 percent increase in consumption. In rural areas, using electricity is a costly exercise, leading to a 3.9 percent drop in consumption and a 12 percent increase in the likelihood of poverty. Electricity is expensive in rural areas because demand is low. However, communities where an

electricity network is available tend to host more affluent households with higher consumption levels and there is a lower likelihood of being poor in areas without electricity. Sanitation is another key welfare indicator. In rural areas, households without toilet facilities have lower levels of consumption than those with them. In secondary cities and rural areas, households in communities with piped water networks have higher consumption levels and are less likely to be poor. In major urban centers, being connected to the piped water network corresponds to 31.2 percent less consumption and a 66 percent increase in the probability of poverty (likely due to the cost of water rates). Other significant infrastructural variables with a positive effect on consumption include access to paved roads, frequently available transport, and cellular telephone networks: households in communities where these utilities are available tend to exhibit higher levels of consumption and a lower probability of poverty.

Other important determinants of household welfare relate to agriculture. Households that own land tend to consume more and are less likely to be poor, and the intensity of the effect increases with the size of the plot. On the other hand, the likelihood of rural poverty grows with the price of rice. While this finding might appear counter-intuitive—since most rural households practice agriculture and should benefit from high rice prices—it is explained by the limited market participation of the majority of farmers, who only sell a small share of their production. The proceeds from sales of crops and livestock contribute to greater consumption and a lower probability of poverty among households in secondary cities. Moreover, in communities where agricultural inputs such as fertilizers and pesticides are available, consumption decreases as the distance to the source of the inputs increases. Then in agricultural communities, which comprise 80 percent of the population, the effect of salaries differs by the gender of the worker. The salary of a male farm worker is associated with lower consumption in households and higher poverty levels. The opposite is true for the salary of female farm workers. The average salary for a male farm worker in the major urban centers is MGA 1,186; in secondary cities it is MGA 5,096; and in rural areas it is MGA 4,539. The average salary for a female farm worker in the major urban centers is MGA 1,167; in secondary cities it is MGA 4,539; and in rural areas it is MGA 4,232. Though lower than their male counterparts, female salaries tend to be associated with higher consumption and lower household poverty. This is consistent with literature which shows that female workers often come from wealthier households (Karoly and Burtless, 1995).

Table 6: Demographic and agricultural variables drive poverty

VARIABLES	Ordinary Least Squares			PROBIT		
	Major Urban Centers	Secondary Urban Centers	Rural	Major Urban Centers	Secondary Urban Centers	Rural
	Dependent variable:			Poor		
Age of HH head	-0.078	0.026	-0.006	0.102	0.032	0.050
	-0.056	-0.027	-0.020	-0.118	-0.070	-0.056
Age of HH head Squared	0.0115*	-0.002	0.001	-0.016	-0.006	-0.005
	-0.007	-0.003	-0.002	-0.014	-0.009	-0.007
HH Size	-0.390***	-0.345***	-0.364***	0.624***	0.692***	0.747***
	-0.044	-0.023	-0.016	-0.096	-0.056	-0.055
# of Adult Male in HH	-0.040	-0.002	0.006	0.083	0.010	0.011
	-0.027	-0.014	-0.009	-0.059	-0.034	-0.028
# of Adult Female in HH	0.018	0.0234*	0.012	-0.069	-0.012	-0.022
	-0.025	-0.014	-0.011	-0.059	-0.034	-0.030
# of Children in HH	-0.003	0.004	-0.006	0.032	-0.007	-0.003
	-0.012	-0.006	-0.005	-0.028	-0.015	-0.013
# of Elderly in the HH	0.043	0.028	-0.0546***	-0.151	-0.044	0.0948*
	-0.046	-0.028	-0.018	-0.119	-0.063	-0.054
HH head is female	-0.050	-0.013	0.0297*	0.069	0.057	-0.110**
	-0.044	-0.026	-0.018	-0.103	-0.058	-0.051
HH Head is Married	-0.0995**	0.0404*	-0.010	0.112	-0.0845*	0.016
	-0.040	-0.021	-0.015	-0.091	-0.050	-0.043
Years of School of HH head	0.008	0.000	0.001	-0.009	0.000	0.001
	-0.005	-0.003	-0.002	-0.011	-0.006	-0.005
HH Head is an employee	-0.035	0.000	0.025	0.054	0.040	-0.076
	-0.048	-0.025	-0.018	-0.109	-0.063	-0.052

HH Head is in Business	-0.049	-0.003	0.010	0.144	-0.011	-0.032
	-0.046	-0.024	-0.017	-0.109	-0.058	-0.050
# of Rooms in the HH	-0.016	0.0107*	-0.004	0.024	-0.021	-0.007
	-0.015	-0.006	-0.004	-0.035	-0.014	-0.013
HH has a water pipe	-0.142	-0.031	-0.014	0.180	0.084	-0.016
	-0.143	-0.047	-0.038	-0.240	-0.126	-0.108
HH has Electricity	0.010	0.032	-0.0386**	-0.057	0.041	0.124***
	-0.042	-0.025	-0.017	-0.098	-0.060	-0.048
HH has Internet	0.274	0.027	-0.034	-0.177	-0.219	0.224
	-0.181	-0.084	-0.065	-0.447	-0.232	-0.216
HH has No Toilet	-0.033	0.007	-0.0285*	0.025	0.006	0.035
	-0.044	-0.023	-0.017	-0.095	-0.058	-0.047
HH has a Flush Toilet	0.032	-0.018	0.0474*	-0.116	-0.184*	-0.152**
	-0.079	-0.037	-0.025	-0.209	-0.096	-0.073
HH is Accessible	-0.031	0.025	-0.020	0.034	-0.001	0.031
	-0.038	-0.021	-0.015	-0.088	-0.049	-0.042
Land size	0.000959**	0.000	-0.000343***	-0.00222*	0.000	-0.00112**
	0.000	0.000	0.000	-0.001	0.000	-0.001
Price of rice	0.000	0.000	0.000	0.000	0.000	2.30e-07***
	0.000	0.000	0.000	0.000	0.000	0.000
Livestock Sales Revenue	0.000	8.15e-09**	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
Crop Sales revenue	0.000	3.05e-10***	0.000	0.000	-2.82e-08*	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
Travel Time to nearest city	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
Commune has Paved Road	0.089	0.023	0.0619***	-0.264	0.036	-0.0958*
	-0.070	-0.026	-0.020	-0.161	-0.067	-0.054
Commune has Frqnt Transport	0.070	0.0547**	0.0659***	-0.243**	-0.148**	-0.175***
	-0.058	-0.026	-0.018	-0.119	-0.063	-0.049
Commune has Electricity Ntwk	0.300***	0.214***	0.165***	-0.531***	-0.453***	-0.290***
	-0.079	-0.027	-0.025	-0.203	-0.069	-0.063
Commune has Pipe Water Ntwk	-0.312***	0.0535**	0.0808***	0.661***	-0.039	-0.148***
	-0.075	-0.024	-0.019	-0.184	-0.063	-0.050
Commune has telecom Ntwk	-0.183	0.003	0.0893***	0.465*	0.027	-0.191***
	-0.123	-0.038	-0.017	-0.249	-0.095	-0.052
Price of Cereals in Commune	-0.024	-0.0538**	0.0646***	0.278	0.048	-0.036
	-0.094	-0.026	-0.022	-0.204	-0.069	-0.056
Org fertilizer avg price	-0.189*	0.018	-0.106***	0.152	0.009	0.125*
	-0.110	-0.028	-0.027	-0.245	-0.067	-0.073
Non-org fertilizer avg price	0.317***	-0.140***	-0.004	-0.373	0.253***	-0.013
	-0.119	-0.032	-0.028	-0.255	-0.072	-0.074
Pesticide avg price	-0.255***	-0.028	-0.0988***	0.422**	0.057	0.225***
	-0.088	-0.023	-0.019	-0.183	-0.057	-0.056
Water flow all year	-0.004	0.005	0.022	0.040	0.075	-0.058
	-0.114	-0.026	-0.015	-0.286	-0.063	-0.044
Avg salary for male	-0.00103***	0.000	-4.30e-06**	0.00230***	0.000	0.000
	0.000	0.000	0.000	-0.001	0.000	0.000
Avg salary for female	0.00102***	7.72e-06***	1.45e-05***	-0.00233***	-1.46e-05*	-2.67e-05***
	0.000	0.000	0.000	-0.001	0.000	0.000
Constant	15.36***	14.42***	14.55***	-1.516***	-0.232	-0.346**
	-0.153	-0.079	-0.053	-0.364	-0.194	-0.154
Observations	2291	5567	8664	2291	5567	8664
R-squared	0.157	0.293	0.247			

Source: Author's calculations based on 2022 EPM data
Notes: Robust standard errors in below coefficients.
*Significance level: *** p<0.01, ** p<0.05, * p<0.1.*

Vulnerability

Vulnerability combines the concepts of poverty, exposure to risks, and risk management in order to predict the probability that a household or individual will be poor in the future. Vulnerability is a forward-looking measure that reflects the probability of poverty in the future, and thus closely linked to coping and consumption smoothing capacity, if it is built on a consumption measure (Klasen and Waibel 2015). Looking into the future is more uncertain than evaluating poverty in the cross-section. Optimally, panel data is employed to capture welfare dynamics and exposure to shocks of a given household. In many countries, panel data is not available, rendering alternative strategies necessary (Chaudhuri, Jalan, and Suryahadi 2002; Günther and Harttgen 2009). Following Chaudhuri, Jalan, and Suryahadi (2002), the next section estimates vulnerability in four steps: 1. In the first step, the main correlates of the household's consumption level are identified to assess the strength of the relationships between different characteristics and household welfare, and household consumption is regressed on a set of independent variables which include household composition and demographics, livelihoods, and regional and geographic control variables. Secondly, the relationship between the household characteristics and the risk of welfare shocks is estimated, and the variation in household consumption that is not explained by the estimation model in step 1 includes the household's risk of shocks. This variation is used to test which characteristics are associated with the risk of welfare shocks. Thirdly, and based on step 1 and 2, a household's future level of consumption and variation of consumption is predicted. Ultimately, we determine households' probability of falling into at any stage over the next 2 years. Those with a probability of over 50 percent are classified as vulnerable (following Günther and Harttgen 2009). Importantly, this approach is based on several assumptions about the distribution of risks. Employing cross-sectional data means that we observe households only during one period and thus assume that household's variation of consumption is constant over time. As a result, large but rare shocks that do not occur in every year go unaccounted for. Other important assumptions include the absence of measurement error in consumption reports, and assumptions on the distribution of risks and the validity of ordinary least square estimates (see Klasen and Povel 2013) for a more detailed discussion).

Vulnerability focuses on poverty dynamics, combining concepts of poverty, and the risk in the near future. Given high consumption volatility of households in risky environments over time, a concept that assesses not only today's poverty status but also a household's probability to fall below a certain poverty threshold needs to be assessed. For policy design, particularly in a low-income context like Madagascar, it makes sense to focus on a short time horizon. As such, following Günther and Harttgen (2009), in this analysis, we define a household as vulnerable if their predicted probability to fall under the poverty line within coming two years is greater than 50 percent.

Vulnerability rates in 2022 are higher than poverty rates, reaching quasi-totality in rural areas overall and steep rates in regions with high share of rural populations. Albeit high poverty rates, vulnerability rates are even higher since even among the non-poor Malagasy population, there are those who are vulnerable to falling into poverty in the near future. The vulnerability numbers are staggering, in particular in rural areas where the quasi-totality of individuals is either poor or prone to falling into poverty. It is further notable that in urban areas, where poverty has been on the rise between 2012, an even larger share, another 20 percent, of individuals are currently non-poor but prone to fall into poverty in the following two years, which is true for the largest part of the population. Given the high poverty rates and high shares of rural populations living in each of Madagascar's region, the vast majority of the Malagasy population is vulnerable, illustrating the enormous needs for intervention to heave populations out of structural poverty but also shield those that are at risk of falling into poverty in the near future.

Vulnerability remains much higher in rural areas but particularly in secondary cities is catching up, given more comparable consumption levels. Figure 27, Map 5 and Figure 28 show the cumulative proportion of the rural and urban populations, split into capital city, other grand urban centers, and secondary urban conglomerations, against consumption levels relative to the poverty line. 80 percent of the population living in rural areas display the largest share of the population with consumption levels below the poverty line. Yet, among the 11.6 percent of the population residing in secondary urban areas, the situation is catching up quickly. Here, a large share of the population has been consuming close to the poverty line and is more similar to the rural populations in terms of consumption levels than to the other big urban areas, let alone the capital city.

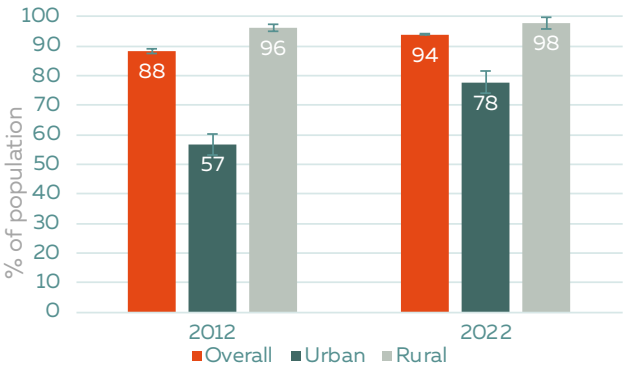
In addition to rural-urban variation, some groups are more prone to be vulnerable, underlining in particular the role of education and demographic transition. Among households where the head

declares no education at all are the most likely to be vulnerable to poverty. Among this group, the unconditional vulnerability rate is 98 percent (Figure 28), where heads of household report no education at all. It is important to note that the situation among younger cohorts has been improving, but particular emphasis on high quality educatoin remains key. 8 percent of households have a head with lower secondary education. Among this group, vulnerability is already considerably lower at 80 percent. Among those, whose heads of household attained higher secondary education or more, the vulnerability rate drops to 56 percent (who constitute another 6.5 percent among Malagasy's population). 56 percent of Malagasy households report 5 or more households. Among this group, 97 percent are vulnerable. Demographic dividends have been widely discussed in other SSA ocutnries and it remains important to keep the dialogue going to propel next generations to becomore more aware of the benefits of smaller family sizes and give reproductive control mechanisms to families and women alrady requesting them today.

Gender gaps are strongly related to poverty

Despite having higher educational attainment than men, women have lower access to paid employment. School completion rates are higher among females than males. EPM 2022 data reveals that the secondary school completion rate for females (37.1 percent) is higher than that for males (36.8 percent), and in junior high school, females score higher in reading exercises than males. Even so, the absolute number of employed females (5.4 million) is lower than that of males (6 million). Moreover, women have very different types of employment than men. Fewer than 30 percent of women are either wage employees or employers, compared to 41 percent

Figure 27: Rural vulnerability is significantly higher



Source: Author's calculations based on 2022 EPM data.

Map 5: Vulnerability is greatest in the South

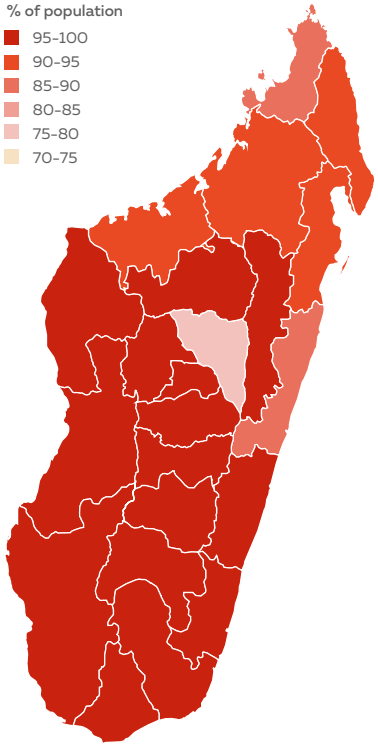
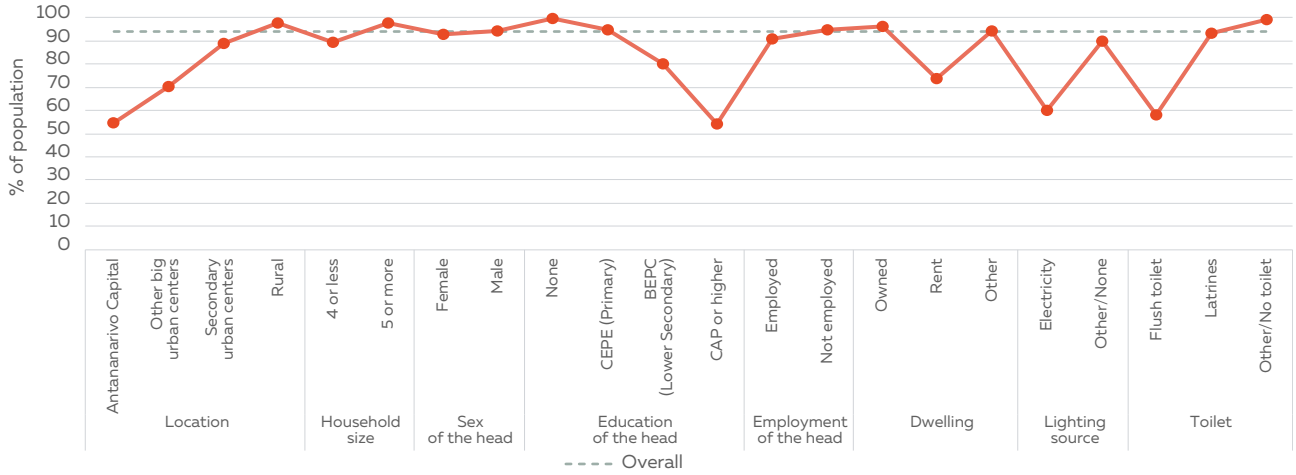


Figure 28: Rural, large households with no education are the most vulnerable



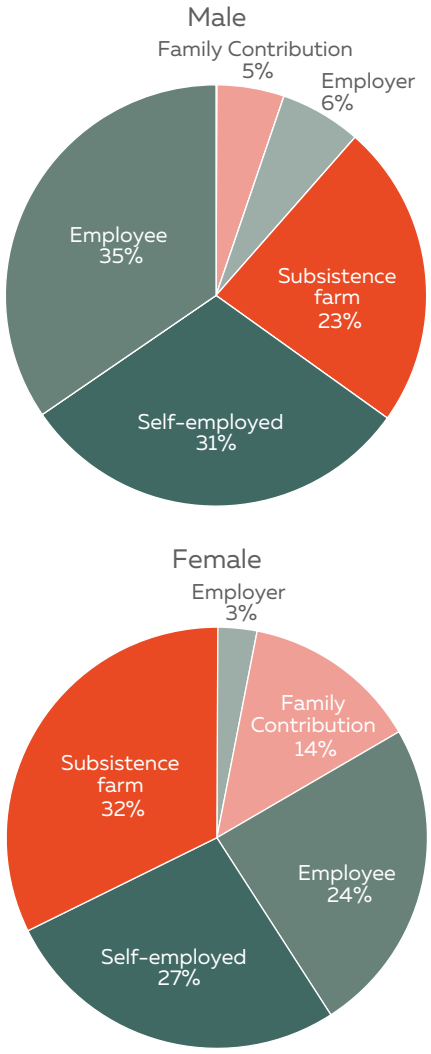
Source: Author's calculations based on 2022 EPM data.

of men. In contrast, women are overrepresented among family contributors, subsistence farmers and the self-employed (Figure 29). Looking at multivariate correlations, regression results from Table 6 show that, controlling for demographic characteristics including household size, education of the household head, access to basic services, and use of agricultural inputs, rural households headed by women have higher consumption, as well as households that have more female adults (especially in secondary urban centers). The salary of female agricultural workers is also associated with higher consumption and lower probability of poverty. However, compared to household size, which is strongly linked to fertility, the magnitude of the correlation on gender is relatively small.

Males are dominant in most employment sectors, except for the professional, crafts, services, and sales sectors (Figure 30). Among those who report a specific occupation (mostly wage employees), women and men have similar shares of employment among professionals, clerical and support workers, craft, and trade workers, but men are overrepresented among skilled agricultural workers, plant and machine operators, managers, and unskilled workers, whereas women are more likely than men to work in sales and services. This is consistent with the hypothesis that women who are wage employees are also more likely to be urban, skilled workers.

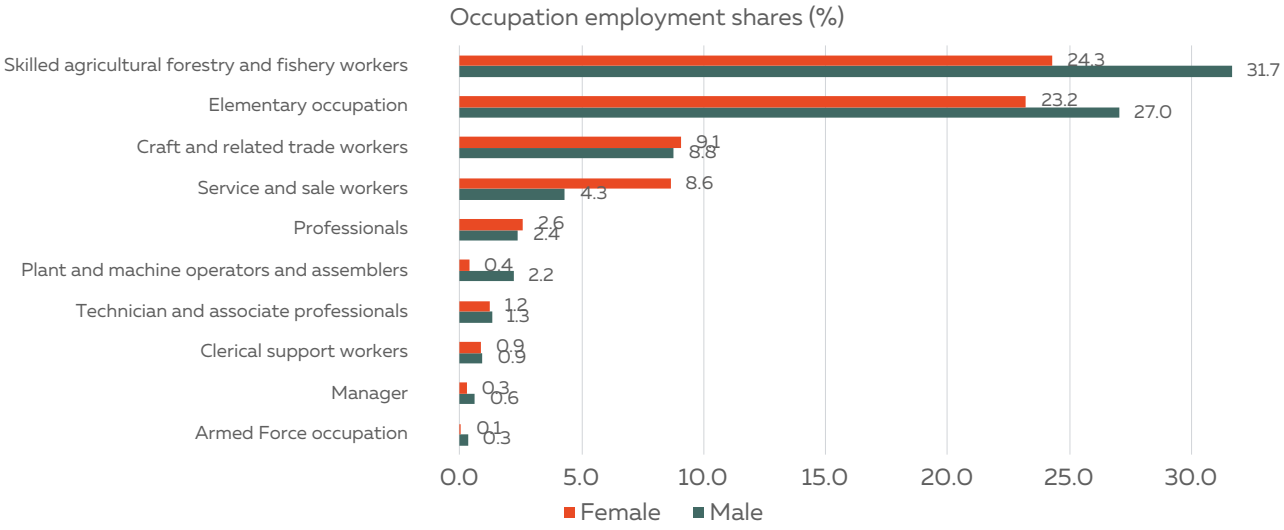
Women tend to work fewer hours than their male counterparts (Table 7). Among women, close to 70 percent report working less than 35 hours per week, with a majority (45 percent) working between 25 and 34 hours. By contrast, 56.4 percent of men report working less than 35 hours on average. This

Figure 29: Women are relatively more likely to work as family workers and in subsistence farming



Source: Author's calculations based on 2022 EPM data.

Figure 30: Services tend to employ relatively more women



Source: Author's calculations based on 2022 EPM data.

Table 7: Women tend to work fewer hours than men
(employment shares by hours of work per week, %)

	Male	Female
<25	19.8	24.5
25-34	36.6	44.9
35-39	8.3	6.8
40-48	20.2	13.6
49-59	8.2	5.4
>=60	6.9	4.8
Total	100.0	100.0

Source: Author's calculations based on 2022 EPM data.

reflects the gender gap in time-use among adults linked to care activities and housework. Likewise, female wages are lower than male wages. As seen in Figure 30 above, men have a higher proportion of employees (35 percent) than women (24 percent), while women are more likely to work in subsistence farming, which brings low returns.

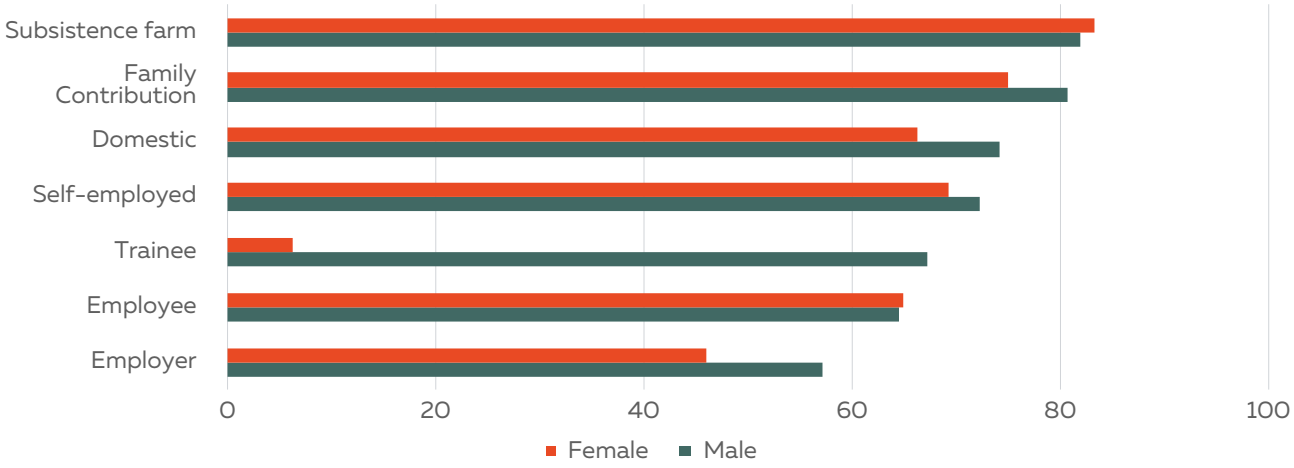
Among the working population 72.1 percent have earnings below the poverty line. Figure 31 shows the type of employment of workers whose earnings are below the poverty line. Interestingly, there is relatively little variation in the share of working poor across types of employment, showing how low earnings are for the vast majority of workers, even those who are relatively better off. For instance, among subsistence farmers, over 80 percent are working poor, but among employers (the category with the smallest share of working poor) the share is still 57 percent for men and 46 percent for women. Also noteworthy is the fact that working poverty among the self-employed is extremely high, which reflects the lack of paid employment opportunities.

Self-reported perceptions of poverty and well-being reveal most people "struggle"

Globally, subjective poverty results reconcile with observed monetary poverty measures. Asked how their household ranked on the welfare scale relative to society at large, 62.6 percent of household heads said that they were struggling economically, while 9.7 percent perceived themselves as poor (Figure 32). This is consistent with the 2022 EPM data, which shows that 75.2 percent of households are below the national poverty line. Subjectively, another 27 percent thought their poverty status was average. The rich constitute 0.56 percent of the sample, and the highest category of "richer" households constitute 0.06 percent of the sample.

Despite stark observed spatial differences in monetary welfare and overall living standards, the vast majority of Malagasies deem themselves struggling. To a large extent, this result speaks to important peer effects of what people believe to make a decent living. Residents in rural areas declare most frequently that they either struggle or are poor, which reconciles with rural poverty being the most prevalent phenomenon in the country. Residents in urban areas closely follow in the same pattern. Yet, residents in Tana more often than in secondary cities perceive themselves to be struggling. In part, this comes back to the anchoring effect whereby even richer residents when surrounded by other better off residents will level their minimum needs at a higher level than someone who is objectively and observably poorer. If that was not the case, one would have expected more variation in the distribution between locations rather than the vast majority of Malagasies declaring to be struggling (Figure 33).

Figure 31: Most workers earn poverty wages, regardless of type of employment
Share of working poor by employment status (%)

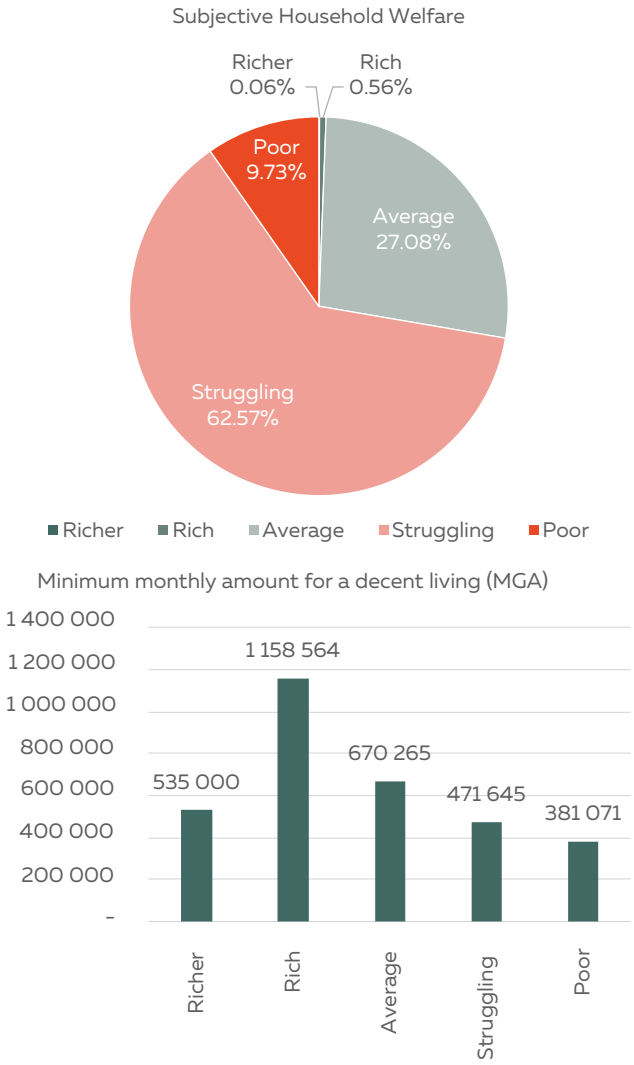


Source: Author's calculations based on 2022 EPM data.

Strikingly, the minimum expenditure that the average household in each self-reported category considered necessary for a decent living is below the poverty line. The mean minimum required amount was below the food poverty line of MGA1.15 million for all categories, except for the rich, who needed slightly more in order to have a decent living. This implies that the majority of households do not have enough income to afford basic necessities for a decent standard of living and are struggling to afford even basic food.

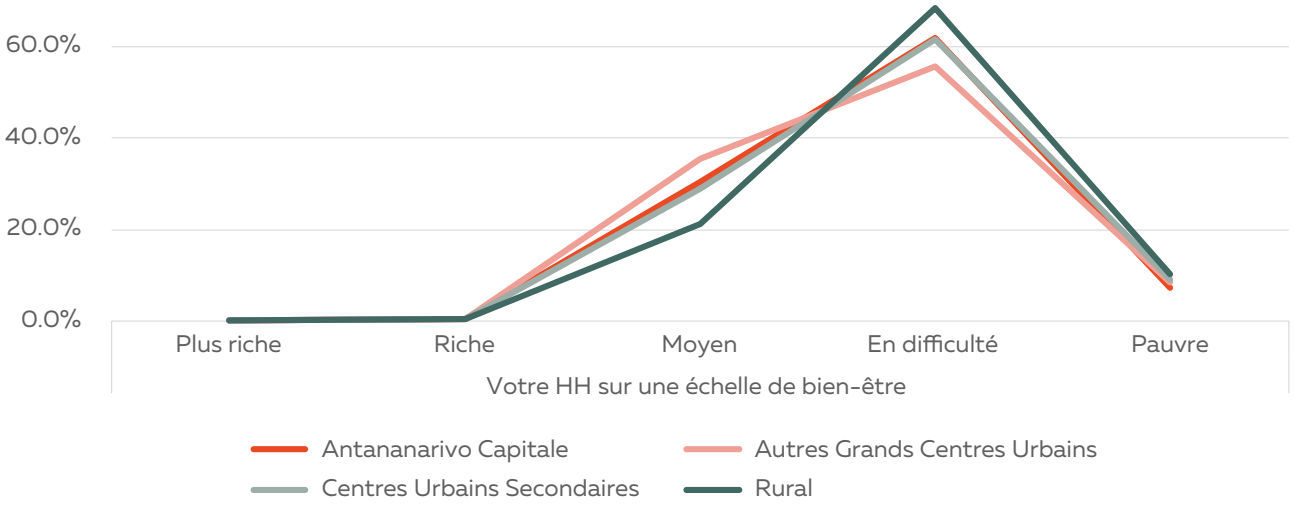
Elaborating on the main causes of poverty in their society, household heads cited a lack of jobs (43.5 percent), the inflated cost of living (13.1 percent), a lack of land (9.1 percent), low salaries (7.8 percent), and insufficient education (6.2 percent). Such perceptions were similar across the consumption distribution (Figure 34). Among the main perceived causes of poverty, the highest proportion of households that suffered from a lack of jobs was in the fifth quintile. Cost of living affected a greater proportion of households in the second quintile. The lack of land was equally problematic for those in the first and fourth quintiles. Low salaries affected more households in the second quintile. Insufficient education was a more prevalent problem among households in the third quintile. Lack of livestock was a greater problem among households in the fourth quintile. Poor roads affected households in the third and fifth quintiles more than others. Droughts and floods affected more households in the fifth quintile.

Figure 32: Most people report to be struggling financially



Source: Author's calculations based on 2022 EPM data.

Figure 33: Perceptions of financial difficulty are higher in rural areas



Source: Author's calculations based on 2022 EPM data.

Figure 34: Lack of jobs is the main perceived cause of poverty

Main perceived causes of poverty, by consumption quintile

Source: Author's calculations based on 2022 EPM data.

5. Conclusion

High poverty prevalence remains predominantly a rural phenomenon but with urban areas slipping quickly, warranting renewed focus as well. In 2022, 75.2 percent of the Malagasy population could not afford the minimum amount required to cover basic needs, which is estimated at MGA 1,477,565 person/year. Rural poverty remained very high, while urban poverty increased significantly from 42.2 percent in 2012 to 55.5 percent in 2022, with the increase more severe outside the capital. The COVID-19 pandemic, high prices of staple food, natural disasters, and a soaring population of urban poor, particularly outside the capital city, contributed to the increase in poverty. The pandemic caused a decline in business income, loss of employment, decreased consumption, and an increase in food insecurity. This adds to the evidence that recent crises really affected the urban population in terms of consumption losses. At the same time, it needs to be borne in mind that rural populations, have very limited coping strategies as they start off at higher poverty levels to begin with.

Inequality fell between 2012 and 2022, with the Gini index dropping from 38.2 in 2012 to its current value of 36.7, mainly owed to impoverishment of urban population. The consumption shares of the lower quintile of the consumption distribution (mainly comprised of rural households) rose, while the consumption share of the upper quintile (mostly urban households) decreased, leading to a decline in overall inequality. Inequality between urban and rural areas overall are retained, and moderate levels of inequality between urban and rural areas, with urban areas having higher levels of consumption than rural areas remain. As a result, Madagascar's low Gini, including compared to its peer countries, is little reason for joy and is a result of a rising urban poor population.

Poverty across Madagascar is heterogeneous across, with some regions lacking in almost everything while others displaying higher levels of inequality, but also household characteristics. Poverty rates are more comparable between rural areas (80 percent) and secondary cities, counting as many as 7 in 10 households among the poor, and twice as high, compared with the capital city (35 percent) or other urban areas (43 percent). Yet the gap between secondary cities, with those agglomerations that count between 5k-100k twice as many poor as the capital city, counting almost 67 percent among the poor, and are thus substantially more comparable to rural areas than bigger cities. Western regions and particularly those in the Grand South display some of the highest poverty rates. Androy in the South has the highest poverty headcount rate. High rural population shares and other factors, such as distance from capital city (and its relatively superior infrastructure), but also their exposure to natural disasters (locust infestations and droughts) are some of the common culprits of extremely high poverty prevalence. Northern regions benefit from greater economic activity, including in tourism and vanilla production, and the incidence of poverty is therefore noticeably lower. The eastern side of the country has become an area of high poverty as cyclones often make landfall in the east, leav-

ing trails of destruction and loss of assets among households. Simultaneously, Analamanga region, displays a lower poverty rate but higher levels of inequality. These regional disparities suggest that targeted interventions are needed to address the specific challenges faced by different regions in Madagascar.

High poverty is not only monetary but also multidimensional, affecting more than two-thirds of its population. Madagascar is the eighth poorest country in multidimensional poverty, at 67 percent nationally with 77.3 percent of its rural population and 41.2 percent of its urban population affected. In addition, 45.5 percent of the population suffers from severe multidimensional poverty, i.e., they are deprived in 50 percent or more of the 10 indicators. According to the Population Census more than 7 out of 10 people in Madagascar living amid multiple multidimensional deprivations, with the largest overlap of different multidimensional poverty dimensions found in the country's Southern and Western regions and being twice as high in rural areas (81.4 percent), compared to urban ones (31.2 percent). However, between 2008 and 2018, deprivation rates in most multidimensional metrics had decreased by 7-10 percentage points. All of the above had come to a hard stop in 2021, following the compound crises that hit Madagascar. Between 2018 and 2021, urban areas never fully recovered back to 2008 levels, all while small wins booked among the poor in rural areas between 2008 and 2018 have not been entirely eroded. Yet, this may not be the end of it in either rural or urban areas, as coping strategies pertaining to selling assets can unfold over many years and importantly decrease households' resilience to weather future and particularly long-lasting shocks, resulting in further slips on multidimensional poverty metrics.

Monetary and multidimensional poverty prevalence importantly varies by household characteristics, all while spatial and inter-generational factors tend to explain the largest variation in the inequality of opportunities among children. Monetary poverty prevalence is on average associated with education, household size, age, and formal work. Children are poorer, as are households with more individuals, pointing to limited returns to additional children even in this highly (subsistence) agriculture reliant country. While access to good work has been one of the main drivers of poverty reduction around the world, work makes only very limited difference in Madagascar as formal or good jobs are very limited. Heads with a head of household with a secondary certificate or even tertiary education have an average poverty rate of 45.8 and 16.6 percent respectively, compared to the national average of 75.2 percent. Multidimensional poverty is higher among households with a younger head (80 percent among those living with 80 percent with older heads of household). Multidimensional poverty is furthermore 9 percentage points higher among those living in households with 7 or more members, with 7 or more members. Among 3.4 million migrants, the reasons for migration are heterogenous ranging from different pull factors, such as looking for employment and following studies for example, to push factors, such as droughts, insecurity, other family or health reasons. Those coming to cities for employment, on average display higher poverty rates than the average observed for urban areas, at 39 percent. When zooming in on those having left their initial place of residence due to classic push factors, such as insecurity or drought occurrences, flooding, the poverty rates among those individuals equal almost everyone, at a rate of 82 percent. Literacy status is another important correlate of multidimensional poverty: its poverty prevalence among heads of household illiterate in any of Madagascar's language is a startling 97 percent. Employment in Madagascar does not guarantee escape from (multidimensional) poverty, with 76 percent of the employed living in poverty. This is particularly striking when compared to the unemployed, those searching for work or other of whom are less likely to be living in multidimensional poverty, shedding an important light on quality of employment in Madagascar. Meanwhile, households with a head engaged in the non-primary sector are less likely to live in poverty, while heads of household employed in the primary sector face a higher poverty toll with 89 percent. We furthermore learn that inequalities experienced early on in life may have detrimental impacts on outcomes later life. And in in Madagascar, location factors explain up to 54 percent of disparities in access to improved sanitation, 37 percent regarding access to improved water, and 36 of not being poor, followed by 36 and 33 percent in having literacy in any language or having ever attended school respectively. Socio-economic factors, as proxied by the asset index, capture 51 percent in disparities regarding access to electricity, 45 percent in disparities in the opportunity of not being multidimensionally poor, as well as 49 percent of having some primary schooling. Investing in stronger human capital accumulation and creating higher-quality jobs for the Malgache population will be key.

Vulnerability remains much higher in rural areas but particularly in secondary cities is catching up, with more alike consumption levels. Vulnerability rates in 2022 are higher than poverty rates, reaching qua-

si-totality in rural areas overall and steep rates in regions with high share of rural populations. Vulnerability focuses on poverty dynamics, combining concepts of poverty, and the risk in the near future. Vulnerability is a forward-looking measure closely linked to coping and consumption smoothing capacity. Vulnerability remains much higher in rural areas but particularly in secondary cities is catching up, with more alike consumption levels. Here, a large share of the population has been consuming close to the poverty line and is more similar to the rural populations in terms of consumption levels than to the other big urban areas, let alone the capital city. If secondary cities are to become a vehicle for transformation, it will be important to diligently monitor progress on monetary and multidimensional metrics in these agglomerations as different interventions are being rolled out.

Eliciting subjective poverty prevalence, the majority of Malagasies deem themselves struggling, while a lack of jobs is cited as the main cause of poverty by 43.5 percent of household heads. Despite stark observed spatial differences in monetary welfare and overall living standards, the vast majority of Malagasies deem themselves struggling, with 62.6 percent of household heads stated that they were struggling economically, and 9.7 percent perceived themselves as poor. Elaborating on the main causes of poverty in their society, 43.5 percent of household heads cited a lack of jobs, 13.1 percent the inflated cost of living, 9.1 percent a lack of land, 7.8 percent low salaries, and 6.2 percent insufficient education

In conclusion, Madagascar is facing significant and persistent challenges in poverty and inequality. Many structural and cyclical factors have made matters worse for the Malagasy population, with differential impacts across rural and urban areas, but also across the country's overall territory. Madagascar's face of poverty is not only monetary but also multidimensional, affecting more than two-thirds of its population. The regional disparities suggest that targeted interventions are needed to address the specific challenges faced by different regions in Madagascar. In addition, the country needs to importantly accelerate human capital accumulation by bettering different metrics, including improving educational outcomes. Major slips among the urban population into poverty is a cause for concern, indicating overall poor economic activity and the lack of good jobs. Particularly with poor populations migrating from rural to urban areas in search for better opportunities, this issue warrants attention. Given the very high poverty prevalence in rural areas, it is also clear that this agenda cannot lose policy focus either. To address these challenges, a high-level policy implication would be to prioritize targeted interventions and investments in human and physical capital development, job creation, and social protection programs.

Annex 1

1. GDP Changes due to crises

Table A1.1: Countries which experienced a decline in income

Country	GDP per capita – 1960 (Constant 2015 US$)	GDP per capita – 2020 (Constant 2015 US$)
HTI – Haiti	1,714.10	1,322.80
COD – Democratic Republic of Congo	1,254.70	487.40
NER – Niger	744.00	519.70
MDG – Madagascar	818.30	433.80
CAF – Central African Republic	583.60	375.20
BDI – Burundi	290.70	263.40
CAF – Central African Republic	583.60	375.20
BDI – Burundi	290.70	263.40

Source: World Bank, World Development Indicators Database.

2. Estimating poverty line

Details about the approach used to estimate the consumption aggregate and the poverty line are listed in the background paper entitled "Inequality and Poverty in Madagascar: Estimates based on 2021-22 EPM". The report provides details about the data cleaning exercise, the consumption aggregation approach, and the determination of the poverty line.

3. Detection of errors in the conversion rate of nonstandard units to standard units

Household surveys in Africa use nonstandard units when collecting consumption data since standard units like litter and gram are not used in many rural areas and remote places. However, if consumption is reported in a nonstandard unit, we need to convert them to a standard unit to estimate calorie intake from consumption because the calorie conversion table is not available for nonstandard units. Since calorie conversion is essential when estimating food poverty lines, this conversion of nonstandard units to standard units needs to be accurate. However, the number of nonstandard units in a typical African country is large. Worse, in some countries, the conversion rate of a nonstandard unit to a standard unit can differ by region. As a result, in Madagascar, the conversion table includes more than 4000 different rates. Even if the conversion table is carefully developed, the probability of having errors in the conversion table is likely to be non-negligible.

This note proposes tests to identify possible errors in the conversion table and also possible corrections. This note includes two approaches – one uses unit values, and the other uses calorie values.

(i) Detection of outliers using unit values

The unit value is the ratio of expenditure to quantity. To detect outliers, we calculate unit values in a standard unit. To do this, we convert consumption from a nonstandard unit to a standard one. We then estimate a unit value by dividing an expenditure of this item by its quantity in the standard unit. Even in a developing country where integration of markets is limited in rural and remote areas, it is difficult to think a unit value is more than ten times bigger or less than the national median unit value. So, if we find such an outlier, it is likely that the unit value is wrong because the conversion rate of the nonstandard unit to the standard unit is wrong.

Below, we demonstrate this idea mathematically.

We calculate the unit values, uv_{ij}^{o} (unit value of household i, item j) by dividing the expenditure for this item, E_{ij}, by the quantity in a nonstandard unit, Q_{ijn}, after converted to a standard unit using the original conversion rate, C_{jn}^{o}.

$$uv_{ij}^{o} = \frac{E_{ij}}{Q_{ijn} * C_{jn}^{o}} \quad (1)$$

Suppose the true (unobserved) unit value is uv_{ij}^{*} (unit value of household i, item j), which can be calculated with the true conversion rate C_{jn}^{*}:

$$uv_{ij}^{*} = \frac{E_{ij}}{Q_{ijn} * C_{jn}^{*}} \quad (2)$$

The ratio of the unit values based on the original conversion rate to the true unit value can be presented as a ratio of the conversion rates:

$$\frac{uv_{ij}^{o}}{uv_{ij}^{*}} = \frac{C_{jn}^{*}}{C_{jn}^{o}} \quad (3)$$

This equation shows that if the original conversion rate overestimates the true conversion rate, the unit value is also overestimated. For example, if the original conversion rate is 100 times larger than the true rate, then the unit value based on the original rate is 100 times bigger than the true unit value. Therefore, if we see too large a unit value, it can be because the original conversion rate is wrong.

However, in reality, we do not see the true unit value and conversion rate. So, we cannot directly see the magnitude of error in the conversion rate. Instead, we construct the ratio of the unit value based on the original conversion rate to the median unit value. This ratio can be shown as a multiplication of the ratio of the original conversion rate $(\frac{C_{jn}^{o}}{C_{jn}^{*}})$ to the true one with the ratio of the true unit value to the median unit value $(\frac{uv_{ij}^{*}}{uv_{j}^{m}})$ (see equation below).

$$\frac{uv_{ij}^{o}}{uv_{j}^{m}} = \frac{uv_{ij}^{o}}{uv_{ij}^{*}} \frac{uv_{ij}^{*}}{uv_{j}^{m}} = \frac{C_{jn}^{*}}{C_{jn}^{o}} \frac{uv_{ij}^{*}}{uv_{j}^{m}} \quad (4)$$

where uv_{j}^{m} refers to the median unit value of item j.

As stated above, even though market integration is limited in rural and remote areas, the second component should be between 0.1 and 10. But, if there is a mistake in the conversion rate, the first component is not one; thus, the full effect could be far more than 100 times less or bigger than the median value. So, whenever we see the ratio of unit value to the median unit value is more than ten times or less than 0.1 than the median value, we suspect the possibility of error in the conversion rate.

Lastly, an outlier can happen due to a reporting error of a specific sample household, not due to an error in the unit conversion rate. But if such outliers frequently happen when a specific nonstandard unit is used, we suspect that it is not due to reporting errors but a systematic error like an error in the nonstandard conversion rate. Therefore, if outliers in unit values are detected for more than 50 percent of observations using a specific nonstandard unit, we recommend the nonstandard unit conversion rate be reviewed.

Identification of potentially problematic nonstandard unit conversion rates (Rule 1)

Assuming 10 > $(\frac{uv_{ij}^{*}}{uv_{j}^{m}})$ > 0.1, we identify the unit values are outliers if $\frac{uv_{ij}^{o}}{uv_{j}^{m}}$ > 10 or $\frac{uv_{ij}^{o}}{uv_{j}^{m}}$ < 0.1. If such outliers are detected for more than 50 percent of observations using a specific nonstandard unit, we recommend that the nonstandard unit conversion rate be reviewed.

A possible correction of the nonstandard unit conversion rate based on Rule 1

If we see clear outliers, we should contact the National Statistics Office to review the nonstandard unit conversion rate. But it is sometimes useful to show possible corrections of the conversion rate, which reduces the diversion from the median unit value. We recommend the following correction.

Let uv_{j}^{om} refer to the median unit value of item j among outliers detected in the above rule 1. Then, we modify the nonstandard unit conversion rate from C_{jn}^{o} to $C_{jn}^{o\prime} = C_{jn}^{o} * (\frac{uv_{j}^{m}}{uv_{j}^{om}})$. If this new conversion rate $C_{jn}^{o\prime}$ is used, the diversion from the median unit value declines to the diversion from the median unit values among outliers, which is $\frac{uv_{ij}^{o}}{uv_{j}^{om}}$.

(ii) Detection of outliers using calorie intake per day per capita

We can do a similar analysis using each item's calorie intake per day per capita. The idea is that if a calorie intake from an item is too big or too low and such outliers are concentrated in specific nonstandard units, there is a high likelihood that the outliers are created due to errors in the nonstandard unit conversion rates. Below, we present this idea more formally.

Calorie intake per day per capita based on the original NSU conversion table can be written as:

$$K_{ij}^{o} = \frac{Q_{ijn}}{C_{jn}^{o}} * a_{j} \quad (5)$$

where a_{j} refers to the calorie conversion table for food item j in a standard unit, like gram. Calorie intake per day per capita based on the true nonstandard unit conversion rate can be written as:

$$K_{ij}^{*} = \frac{Q_{ijn}}{C_{jn}^{*}} * a_{j} \quad (6)$$

If the original NSU conversion rate is over-estimated, the calorie intake per day per capita will be under-estimated:

$$\frac{K_{ij}^{o}}{K_{ij}^{*}} = \frac{C_{jn}^{*}}{C_{jn}^{o}} < 1 \quad (7)$$

Again, since the true unit conversion rate is unknown, we compare the calorie intake per capita calculated after converting a nonstandard unit with the median value. If the calorie intake per day per capita is much higher than the median of the food item, the difference is unlikely to be explained by actual quantity differences but likely to be explained at least partly by the underestimation of the conversion rate.

Here is the formula

$$\frac{K_{ij}^{o}}{K_{j}^{m}} = \frac{K_{ij}^{o}}{K_{ij}^{*}} \frac{K_{ij}^{*}}{K_{j}^{m}} = \frac{C_{jn}^{*}}{C_{jn}^{o}} \frac{K_{ij}^{*}}{K_{j}^{m}} \quad (8)$$

$\frac{K_{ij}^{*}}{K_{j}^{m}}$ is the true difference, which is the same as the ratio of quantity in the standard unit. The above equation shows that the ratio will be over-estimated if the NSU conversion rate is under-estimated ($\frac{C_{jn}^{*}}{C_{jn}^{o}}$>1).

A possible correction of the nonstandard unit conversion rate based on Rule 2

Identification of potentially problematic nonstandard unit conversion rates (Rule 2)

We identify outliers if $K_{ij}^{o} > K_{j}^{m}$+3*standard deviation of K_{ij}^{o} or $K_{ij}^{o} < K_{j}^{m}$-3*the standard deviation of K_{ij}^{o}. If such outliers are detected for more than 50 percent of observations of a specific nonstandard unit, we recommend that the nonstandard unit conversion rate be reviewed.

Like before, if we see clear outliers, we should contact the National Statistics Office to review the nonstandard unit conversion rate. But it is sometimes useful to show possible corrections of the conversion rate, which reduces the diversion from the median daily calorie intake per capita from item *j*. We recommend the following correction.

Let K_{j}^{om} refer to the median daily calorie intake per capita of item *j* among outliers detected in the above Rule 2. Then, we modify the nonstandard unit conversion rate from C_{jn}^{o} to $C_{jn}^{o\prime} = C_{jn}^{o} * (\frac{K_{j}^{m}}{K_{j}^{om}})$ If this new conversion rate $(C_{jn}^{o\prime})$ is used, the diversion from the median daily calorie intake per capita declines to the diversion from the median daily calorie intake per capita among outliers, which is $\frac{K_{ij}^{o}}{K_{j}^{om}}$.

(iii) Applications to the Madagascar 2021/22 data

We applied the above two rules to the Madagascar 2021/22 data. Good news is that we identified a relatively limited number of nonstandard unit conversion rates that produce many outliers. We identified 38 and 3 nonstandard unit conversion rates that might need corrections based on Rules 1 and 2, respectively. These potentially problematic nonstandard units and possible corrections presented above were shared with the Madagascar NSO. Also, we estimated the impact of possible corrections on the poverty headcount rates and other key statistics and found that the corrections have a minimum impact of them.

4. Iterative poverty line estimation

When we estimate a food poverty line, we need to determine a basket of food items and prices for them. To select the food basket, Ravallion (1998) recommends we define a reference group and use their average consumption pattern to estimate a cost to consumer a calorie threshold, which is usually around 2200 kcal per day per capita. To do this, for Madagascar, Edo, Mancini, and Vecchi (2022) estimate the cost per calorie from the reference group's food consumption and expenditures and multiply it with 2200 to estimate the food poverty line. Mathematically, we can represent the derivation of the food poverty line by Edo et al. (2022) as follows:

1. Calculate average daily calorie intake per capita $(\overline{C}^{r})$ of a reference group $G^{r} = \{i^{r} = 1^{r},,, I^{r}\}$

$$\overline{C}^{r} = \frac{1}{I^{r}} \sum_{i=1}^{I^{r}} \sum_{j=1}^{J} c_{i^{r}}^{j} * a^{j}$$

where $c_{i^{r}}^{j}$ refers to daily consumption of household i^{r}'s item *j* per capita, and a^{j} refers to a calorie conversion coefficient for item *j*.

2. Calculate the average daily household food expenditure per capita of this reference group $(\overline{E}^{r})$

$$\overline{E}^{r} = \frac{1}{I^{r}} \sum_{i=1}^{I^{r}} \sum_{j=1}^{J} c_{i^{r}}^{j} * p_{i^{r}}^{j}$$

where $p_{i^{r}}^{j}$ refers to the price or unit value of item *j* faced by household i^{r}.

3. Calculate the cost per calorie for this reference group

$$k^{r} = \frac{\overline{E}^{r}}{\overline{C}^{r}}$$

4. Calculate a food poverty line by multiplying the cost per calorie with a calorie threshold (here, 2200 kcal per day per capita)

$$Z_{f}^{r} = k^{r} * 2200$$

The food poverty line calculated with the reference group (G^{r}) differs by the welfare level of households in the reference group. This is because (i) there are some quality differences in each item, (ii) richer households tend to buy higher quality of goods within the same item, and (iii) richer households tend to buy more of items whose price per calorie is high than poorer households.

For example, suppose 80 percent of the reference groups G^1 and G^2 have the same households but the rest of G1 are significantly richer than the rest of G2. If the unmatched households in G1 pay higher prices than the unmatched households in G2 to some item j':

$$p_{i1}^{j'} > p_{i2}^{j'}$$

Then, even though the consumption patterns are identical, the cost per calorie of the reference group 1 is higher than that of the reference group 2.

$$k^1 > k^2 \text{ and } Z_f^1 > Z_f^2$$

Also, richer households' consumption patterns can differ systematically from those of poorer households. For example, richer households tend to consume more for food items, whose prices per calorie are high, and less for those whose prices per calorie are low, than poorer households. If so, as the reference group becomes richer, the cost per calorie becomes higher.

For example, suppose for items j and j' such that $\frac{p_{i1}^{j}}{a^j} > \frac{p_{i2}^{j'}}{a^{j'}}$

$$c_{i1}^{j} > c_{i2}^{j'}$$

Otherwise,

$$c_{i1}^{j} \leq c_{i2}^{j'}$$

If so, the cost per calorie of G1 is higher than the cost per calorie of G2.

$$k^1 > k^2 \text{ and } Z_f^1 > Z_f^2$$

These two conditions are not necessarily satisfied, but it is often the case that the food poverty line becomes higher as the reference group becomes richer even though the calorie threshold is fixed.

Ravallion (1998)'s iterative poverty line approach

The food poverty line differs by the welfare level of the reference group. If the reference group is raised, the food poverty line also tends to rise. The relationship is not certain, but it is observed in many countries and surveys. This means that the food poverty line is not uniquely set by the calorie threshold but affected by the calorie threshold and the reference group.

Ravallion recommends that the selection of the reference group and the identification of poor households should be consistent in that the basket and prices of the food poverty line should reflect those whose food expenditures are close to the food poverty line. For example, suppose no household in the reference group is poor, then the food poverty line reflects the prices and consumption patterns of households who are significantly richer than the poor. Suppose all households in the reference group are poor, then the food poverty line reflects the prices and consumption patterns of those whose food consumptions tend to be lower than the food poverty line. Ideally, we would like to set the reference group that includes households who spends for food items a similar amount to the food poverty line.

However, there is no guarantee that this matching takes place when estimating a food poverty line. If the matching does not happen, Ravallion recommends the following iterative process. If the food poverty line is bigger than food expenditures of all households in the reference group, then we move up the reference group (see Figure 35). Since raising the reference group usually increases the food poverty line and the poverty rate. If the food poverty line is lower than food expenditures of all households in the reference group, then we can move

Figure 35: An example for the iterative process if the reference group is too low

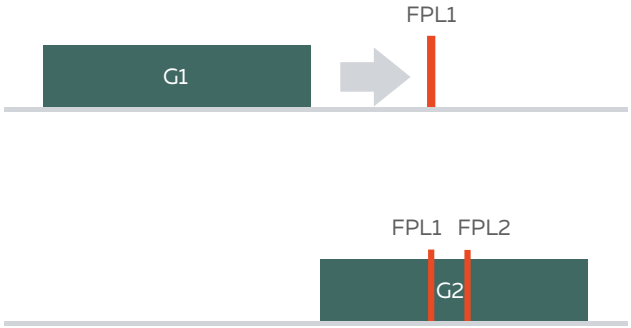


Figure 36: An example for the iterative process if the reference group is too high

Note. G1 is the original reference group and FPL1 is the original food poverty line. G2 is the adjusted reference group and FPL2 is the new food poverty line. The axis shows the size of food household expenditures per capita.

down the reference group, which reduces the food poverty line (see Figure 36). Unlike the contraction mapping theory, there is no guarantee that this iterative process converges to the reference group whose median household spends the food poverty line as their food expenditures, but we usually see a reasonably good correspondence between the food poverty line and the reference group.

Facilitate the convergence

To facilitate this convergence, we can calculate the average daily calorie intake per capita by deciles of household expenditure per capita (or per adult equivalence) and see what decile's average daily calorie intake per capita is close to the calorie threshold and use this group as the reference group. By construction, this group's average calorie intake per day per capita should be close to the calorie threshold and the food poverty line, therefore, become close to the average household expenditure per capita of the select decile.

Here is a special case if a reference group is the 8th decile and their average daily calorie intake per capita is 2200 kcal. In this case, $\overline{E^r}$ is the average food expenditure per capita of the 8th decile, say Madagascar Ariary 1 million, and $\overline{C^r}$ is 2200. Therefore, the food poverty line is the mean of the reference group, which is Madagascar ariary 1 million.

$$Z_f^r = \frac{\overline{E^r}}{\overline{C^r}} * 2200 = \overline{E^r} = 1{,}000{,}000$$

In this way, the food poverty line is guaranteed to be inside the reference group. In reality, the mean daily calorie intake per capita of any decile is not exactly the same as the threshold. For example, in the case of Madagascar 2021/22 data, Table A1.2 lists the average daily calorie intake for each decile of household food expenditure per capita. Except for the first three deciles, we can see the cost per calorie increases as households become richer.[26]

If the calorie threshold is set at 2200 kcal per day per capita, since it is higher than the mean of the 7th decile and lower than the mean of 8th decile, we can choose the 7th and 8th deciles. Or since this Madagascar 2020/21 data's sample is large and the calorie threshold is close to the mean of the 8th decile, we can simply choose the 8th decile as the reference group. If the former approach is taken, the food poverty line is estimated to be Madagascar Ariary 990,411, which is almost identical to the mean of annual food expenditure per capita of the 8th decile, Madagascar Ariary 1,003,194.

Table A1.2: Average daily calorie intake per capita and cost per calorie for each decile of annual food expenditures per capita

Decile	Calorie per day per capita	cost per calorie	FPL	mean annual food expenditure per capita
1	655	1.16	990,411	245,312
2	1,045	1.10	990,411	384,102
3	1,312	1.08	990,411	480,597
4	1,477	1.12	990,411	562,944
5	1,671	1.14	990,411	644,141
6	1,834	1.20	990,411	738,493
7	2,010	1.27	990,411	856,188
8	2,213	1.35	990,411	1,003,194
9	2,547	1.49	990,411	1,270,753
10	3,575	2.12	990,411	2,324,365

Source. Author's calculations using the Madagascar 2021-22 EPM data.

Consistency between the food poverty line and the upper poverty line

Lanjouw and Lanjouw (2001) show that under normal conditions, the poverty headcount rate measured by comparing food expenditure per capita with a food poverty line is close to that measured by comparing household expenditure per capita with an upper poverty line. To obtain this result, the upper poverty line should be estimated from the food poverty line using the cost of basic needs methodology (Ravallion, 1998.) We now test whether this is indeed the case.

We set the calorie threshold at 2200 kcal per day per capita. If we estimate the poverty headcount rate using food expenditures per capita and the food poverty line, it is 74.9 percent. If we estimate it using household expenditures per capita and the upper poverty line, it is 74.6 percent. Therefore, Lanjouw and Lanjouw (2001)'s theorem holds in this dataset.

5. Survey to survey imputation approach

The national statistics office of Madagascar collected a household budget survey, L'Enquête Nationale sur le Suivi des indicateurs des Objectifs du Millénaire pour le Développement (ENSOMD), in 2012 and a household poverty survey (EPM) in 2022. If raw consumption data from ENSOMD 2012 and EPM 2022 and an official poverty line of the upper poverty line in 2022, the national poverty rate declined from 99.1 percent to 79.7 percent. However, EPM 2022 used an improved questionnaire for collecting consumption expenditure data by largely increasing the

[26] The deviations from this in the first three deciles might reflect that the quality of data in the first two deciles might not be good.

number of consumption items. Beegle et al. (2010) show that increasing the number of items tends to expand household expenditures. As a result, the consumption data from ENSOMD 2012 are not directly comparable to those from EPM 2022.

To restore the comparability of consumption data between ENSOMD 2012 and EPM 2022 data, the household expenditures in ENSOMD 2012 were imputed using the SWIFT (Survey of Wellbeing via Instant and Frequent Tracking) methodology. The SWIFT methodology imputes household expenditures in ENSOMD 2012 using the urban, capital city, and rural imputation models trained in EPM 2022 data. According to Yoshida et al. (2023), the imputed household expenditures in ENSOMD 2012 data are comparable to raw consumption expenditures in EPM 2022 data.

For this Madagascar study, we trained a model for each stratum (capital city, other urban areas, and rural areas) using EPM 2022 data and applied the stratum-specific model to ENSOMD 2012 data to impute household expenditures comparable to those of EPM 2022 and estimated poverty and inequality statistics of 2012. Below is the list of concrete steps.

First, we prepared common variables in ENSOMD 2012 and EPM 2022. Since the questionnaires of ENSOMD 2012 and EPM 2022 are different, we constructed common variables by matching the definitions of variables. The common variables include household socio-demographic and economic characteristics (e.g., household size, age of the head of household) and fast-changing variables such as food and nonfood consumption based on their predictive power of actual consumption expenditure in the dataset.

Second, we conducted cross-validation to search for the optimal p-value for the stepwise regressions to minimize the risk of overfitting and other small sample biases. The cross-validation includes the following steps:

I. Randomly split data from one stratum in the EPM 2022 dataset into ten sub-samples with an equal sample size. Each subsample is called a "fold."

II. Construct a training dataset using nine folds and a testing dataset with the remaining fold.

III. Run a stepwise regression in the training dataset with a threshold p-value of 0. 5 percent, impute household expenditures in the testing dataset using the model, and estimate the mean squared error and the absolute difference between the actual and imputed poverty rate in the testing dataset.

IV. Repeat the above exercise by changing the selection of folds for the training and testing datasets.

V. Average 1o mean squared errors and absolute differences. These numbers are identified as the mean squared errors and absolute differences between actual and imputed poverty rates corresponding to a threshold p-value of 0.5 percent for the stepwise regression.

VI. Repeat the above three exercises (3 – 5) by increasing the threshold p-value by 0.5 percent at a time until the p-value reaches 10 percent.

VII. Select an optimal p-value by looking at the distributions of the mean squared errors and absolute differences between actual and imputed poverty rates

VIII. Repeat steps 1 to 7 to identify the optimal p-value for all three strata

Third, using the optimal p-value for each stratum, we conducted a stepwise regression analysis to finalize a SWIFT model for the stratum.

Fourth, using the SWIFT model, we ran multiple imputations to impute household expenditures 20 times in ENSOMD 2012 and estimated the point estimates and standard errors of poverty and inequality statistics using the imputed expenditures.

Several quality checks and other simulations are performed to ensure that the simulated poverty rate in the appended data differs by less than one percentage point from the absolute poverty rate in the household survey data. We also checked the adjusted R2 values of the final models, guaranteed that the poverty correlates have the expected signs, and dropped variables whose coefficients are unreasonable. The model is also validated by comparing the kernel density of household consumption for the actual and imputed series.

6. Small areas poverty estimation approach

A sample size of household surveys is typically too small to produce reliable estimates below a certain geographical level. The 2022 EPM household survey in Madagascar is only representative at the regional level and thus producing reliable district-level pov-

erty rates from it requires supplementing the survey with census data using small area estimation. The district-level poverty rates produced for this report are computed based on the Empirical Best Prediction (EBP) approach using a variant of the R EMDI package.[27] The team first identified and harmonized a common set of household-level variables that exist both in the 2022 EPM household survey and 2018 Population Census. To carry out the estimation, the team first estimate a prediction model using the 2022 EPM survey that relates per capita consumption to a subset of common variables. The estimated model parameters were then used to simulate welfare in the census one hundred times. These simulated consumption aggregates from the census are then used to compute district-level poverty rates.

The set of indicators used in the prediction model of per capita consumption – which was selected using a Least Absolute Selection and Shrinkage Operator (LASSO) to minimize BIC - included the following:

- Indicators for five of the six provinces
- An urban dummy
- Household size
- The number of persons in the household above 64 and the dependency ratio
- The number of adults employed
- Age and sex of the head
- The marital status of the head
- Educational attainment of the head
- Characteristics of the house, including wall material, type of roof, and type of floor
- The type of energy used for cooking
- The type of energy used for lighting
- Ownership of household assets including radio, TV, video player, stove, refrigerator or freezer, washing machine, sewing machine, computer, internet equipment, car, air conditioner or fan, motorcycle, landline telephone, mobile phone, and bicycle.

The marginal R2 of this model was 0.57 and the conditional R2 was 0.62. The district-level poverty rates and standard errors associated with the resulting estimates are reported in Map 3.

7. Multidimensional poverty index

The Multidimensional Poverty Index (MPI) identifies multiple deprivations experienced by households in three dimensions: education, health and living conditions. The health and education dimensions are based on two indicators each, while six indicators are applied to the living conditions dimension. The MPI methodology requires to group variable modalities per dimension (Table A1.3).

All the indicators necessary to calculate the MPI for Madagascar are taken from the census. Each individual household is assigned a score based on the number of deprivations faced per household for each of the component indicators. The maximum score is 100, each dimension is weighted equally (33.33 percent). The health dimension is based on two indicators, each of these components has a value of 1/6 or 16.66 percent. Drinking water has been used as an indicator of health in the absence of information on nutrition. Education comprises two indicators, each component of which has a value of 16.66 percent. The standards of living dimension is based on five indicators, each component is equal to 1/15, or 6.66 percent.

To determine multidimensional poverty, the deprivations of each household are summed to obtain the level of deprivation per household. The threshold value of 33.33 percent, which corresponds to one third of the weighted indicators, is used to distinguish between the poor and the non-poor. A household (and each person in it) is considered to be multidimensionally poor if its level of deprivation is equal to, or greater than 33.33 percent. A household with a deprivation level between 20 percent and 33.33 percent is vulnerable to multidimensional poverty or is at risk of finding itself in such a situation. Households with a level of deprivation greater than or equal to 50 percent are in a situation of extreme multidimensional poverty.

The poverty ratio, H, represents the proportion of households in multidimensional poverty:

$$H = \frac{q}{n}$$

where q is the number of households in multidimensional poverty and n is the total number of households.

Poverty intensity (A) reflects the proportion of component-weighted indicators in which, on average, poor people experience deprivation. The higher the level of deprivation (the value of A), the more intense the poverty. For poor households only, the sum of

[27] Molina and Rao 2010. Household consumption was log-transformed. Sampling weights are applied in the consumption prediction model following Guadarrama et al. (2018), as described in Skarke and Kreutzmann (2020). Household size was used as additional weights to aggregate poverty headcount estimates across households, using the EMDI plus package available at: https://github.com/SSA-Statistical-Team-Projects

Table A1.3: Variables of the MPI

Indicator	Variable	Modalities of the variable	Modalities of the questionnaire variable
No access to drinking water	Source of water supply	1: No access to drinking water	7. Protected well; 8. Unprotected wells; 9. Protected spring water; 10. Unprotected spring water; 11. Surface water; 12. Rainwater; 13. Tanker truck; 14. Water seller; 15. Bottled water; 16. Other
		0: Otherwise	1. Running water at home; 2. Individual faucet in the course; 3. Common faucet in the course; 4. Public fountain/pump terminal; 5. Drilling; 6. Human motor pump wells
Cooking fuel	Type of cooking fuel	1: Unclean cooking method	1. Charcoal; 2. Firewood; 3. Oil; 6. Dung; 8. Other
		0: Otherwise	4. Gas; 5. Electricity
Sanitation	Type of sanitation facilities	1: No access to adequate sanitation facilities	1. No installation/In nature; 5. Latrine with wooden platform, earth; 6. Pit; 7. Other
		0: Otherwise	2. Latrine with chair (flush or not); 3. Latrine without chair (flush or not); 4. Toilet with smooth concrete platform, porcelain, fiberglass
Electricity	Light source	1: No electricity	2. Kerosene lamp/Petromax; 3. Candle; 4. Tallow/Seeds; 8. Other
		0: Otherwise	1. Electricity (Grid, group, solar, wind)
Housing	Type of floor	1: Rudimentary materials	1.Bare soil/ Earth/ Sand; 2. Stem/Leaf/Bamboo; 3. Mat; 4. Rudimentary board; 8. Other
		0: Otherwise	5. Parquet/Waxed wood; 6. Cement; 7. Vinyl, Tile, Carpet
	Type of roof	1: Rudimentary materials	4. Bozaka; 5. Stem/Leaf; 6. Recovered material; 8. Other
		0: Otherwise	1. Tile; 2. Sheet metal; 3. Cement/Fibro-cement
	Type of wall	1: Rudimentary materials	2. Clay/Uncooked brick; 3. Stem/Leaf; 4. Sheet metal; 5. Board; 6. Bozaka; 7. Recovered material; 8. Other
		0: Otherwise	0. Cinder block, stone; 1. Baked brick

Table A1.4: MPI dimensions and indicators

MPI dimension	Indicators	weight
Health *(Weight=1/3)*	No access to drinking water	1/6 = 16.66%
	One or more children under the age of 18 died in the household	1/6 = 16.66%
Education *(Weight=1/3)*	No individual aged 11 and above completed five years of schooling in the household	1/6 = 16.66%
	At least one school-age child (6-10 years) does not attend to school in the household	1/6 = 16.66%
Living standards *(Weight=1/3)*	Unclean cooking fuel	1/15 = 16.66%
	No access to adequate sanitation facilities	1/15 = 16.66%
	No electricity	1/15 = 16.66%
	Dwelling with a floor or roof or wall made of rudimentary materials	1/15 = 16.66%
	The household does not own a car, van, or similar motor vehicle, but owns at most one of the following goods: bicycle, motorcycle, radio, refrigerator, telephone or television	1/15 = 16.66%
Total		**100%**

the deprivation level will be related to the total number of poor households.

$$A = \frac{\sum_1^q c}{q}$$

where c corresponds to the level of deprivation suffered.

The MPI value is the product of two measures, the multidimensional poverty ratio (H) and the poverty intensity (A).

$$IPM = H * A$$

The MPI reflects the level of deprivation of the poor supported by the entire population.

$$IPM =$$

8. Additional tables and graphs

Table A1.5: Poverty by characteristic of the household head

Characteristic	Poverty rate (%)	Contribution to poor population (million)	Population share (%)
Overall	74.1	19.0	100
Area			
Urban	31.2	1.5	19.3
Rural	84.4	17.5	80.7
Household size			
1-3 members	71.4	4.1	22.3
4-6 members	71.6	9.0	48.9
7 or more members	80.5	5.9	28.8
Gender			
Female	73.8	3.6	19.0
Male	74.2	15.4	81.0
Age group			
15-24 years	79.7	1.8	8.7
25-54 years	74.1	13.7	72.1
55-65 years	70.7	2.4	13.1
66 years or more	73.4	1.1	6.0
Disabled			
Yes	82.5	0.1	0.6
No	74.1	18.9	99.4
Open defecation			
Yes	95.7	10.2	41.4
No	58.9	8.8	58.6
Ever attended school			
Yes	66.6	12.8	74.9
No	96.4	6.2	25.1
Literacy status			
Illiterate	96.7	6.5	26.0
Literate	66.2	12.6	74.0
Formal education			
None	96.4	6.2	25.1
Some	66.6	12.8	74.9
Educational level			
Primary	83.5	9.3	60.2
Secondary	45.8	2.8	33.3
Technical or higher	16.6	0.2	6.5
Employment status			
Employed	75.8	17.7	90.9
Unemployed	51.1	0.1	0.2
Searching for work	58.7	0.1	0.6
Other	57.4	1.2	8.4
Employment sector			
Primary	89.2	15.9	76.4
Non-primary	32.5	1.8	23.6
Migration status			
Migrant	43.6	2.0	17.8
Non-migrant	80.7	17.0	82.2

Migration reason			
Employment	41.4	0.85	62.3
Studies / apprenticeship	10.9	0.02	5.9
Famine/ floods	82.2	0.02	0.8
Insecurity	67.1	0.01	0.6
Family	50.4	0.44	26.4
Health	43.8	0.01	0.5
Housing	20.0	0.01	1.3
Other	29.2	0.02	2.3
Migration reason and location			
Urban areas			
Employment	17.8	0.164	28.1
Studies / apprenticeship	7.1	0.012	5.0
Famine/ floods	50.0	0.002	0.1
Insecurity	30.2	0.001	0.1
Family	21.6	0.062	8.7
Health	25.3	0.002	0.2
Housing	15.4	0.001	0.2
Other	22.9	0.003	0.3
Rural areas			
Employment	60.8	0.68	34.2
Studies / apprenticeship	32.1	0.01	0.9
Famine/ floods	86.6	0.02	0.7
Insecurity	76.8	0.01	0.4
Family	64.4	0.37	17.7
Health	53.7	0.01	0.3
Housing	21.0	0.01	1.1
Other	30.3	0.02	2.0
Marital status			
Single/never married	71.0	1.0	5.6
Married/co-habiting	74.1	15.4	81.0
Separated/divorced	78.2	1.5	7.4
Widowed	71.8	1.1	6.0
Marital status and sex			
Women			
Single/never married	75.8	0.73	3.7
Married/co-habiting	69.9	0.78	4.4
Separated/divorced	77.5	1.20	6.1
Widowed	71.3	0.89	4.9
Men			
Single/never married	61.7	0.30	1.9
Married/co-habiting	74.4	14.63	76.6
Separated/divorced	81.4	0.27	1.3
Widowed	73.8	0.22	1.1
Marital status, sex and location			
Women in urban areas			
Single/never married	38.7	0.09	0.9
Married/co-habiting	29.9	0.09	1.1
Separated/divorced	38.2	0.13	1.4
Widowed	30.5	0.09	1.2

Men in urban areas			
Single/never married	31.5	0.06	0.7
Married/co-habiting	30.0	1.04	13.5
Separated/divorced	39.2	0.02	0.2
Widowed	29.0	0.02	0.2
Women in rural areas			
Single/never married	87.8	0.64	2.8
Married/co-habiting	84.2	0.69	3.2
Separated/divorced	89.0	1.07	4.7
Widowed	84.6	0.80	3.7
Men in rural areas			
Single/never married	79.2	0.24	1.2
Married/co-habiting	83.8	13.60	63.2
Separated/divorced	90.5	0.25	1.1
Widowed	84.8	0.20	0.9

Source: Authors' calculations based on 2018 Madagascar Census.

Table A1.6: Stunting across national, rural, and urban areas in 2018 and 2021

Stunting	National	Rural	Urban
2018	41.6	42.6	37.7
2021	39.8	40.5	35.5

Source: Demographic and Health Surveys (2018, 2021).

Table A1.7: Full regression analysis—Determinants of household welfare

VARIABLES	Observations			PROBIT		
	Major Urban Centers	Secondary Urban Centers	Rural	Major Urban Centers	Secondary Urban Centers	Rural
	Dependent variable			Poor		
Age of HH head	-0.078	0.026	-0.006	0.102	0.032	0.050
	-0.056	-0.027	-0.020	-0.118	-0.070	-0.056
Age of HH head Squared	0.0115*	-0.002	0.001	-0.016	-0.006	-0.005
	-0.007	-0.003	-0.002	-0.014	-0.009	-0.007
HH Size	-0.390***	-0.345***	-0.364***	0.624***	0.692***	0.747***
	-0.044	-0.023	-0.016	-0.096	-0.056	-0.055
# of Adult Male in HH	-0.040	-0.002	0.006	0.083	0.010	0.011
	-0.027	-0.014	-0.009	-0.059	-0.034	-0.028
# of Adult Female in HH	0.018	0.0234*	0.012	-0.069	-0.012	-0.022
	-0.025	-0.014	-0.011	-0.059	-0.034	-0.030
# of Children in HH	-0.003	0.004	-0.006	0.032	-0.007	-0.003
	-0.012	-0.006	-0.005	-0.028	-0.015	-0.013
# of Elderly in the HH	0.043	0.028	-0.0546***	-0.151	-0.044	0.0948*
	-0.046	-0.028	-0.018	-0.119	-0.063	-0.054
HH head is female	-0.050	-0.013	0.0297*	0.069	0.057	-0.110**
	-0.044	-0.026	-0.018	-0.103	-0.058	-0.051
HH Head is Married	-0.0995**	0.0404*	-0.010	0.112	-0.0845*	0.016
	-0.040	-0.021	-0.015	-0.091	-0.050	-0.043

Years of School of HH head	0.008	0.000	0.001	-0.009	0.000	0.001
	-0.005	-0.003	-0.002	-0.011	-0.006	-0.005
HH Head is an employee	-0.035	0.000	0.025	0.054	0.040	-0.076
	-0.048	-0.025	-0.018	-0.109	-0.063	-0.052
HH Head is in Business	-0.049	-0.003	0.010	0.144	-0.011	-0.032
	-0.046	-0.024	-0.017	-0.109	-0.058	-0.050
# of Rooms in the HH	-0.016	0.0107*	-0.004	0.024	-0.021	-0.007
	-0.015	-0.006	-0.004	-0.035	-0.014	-0.013
HH has a water pipe	-0.142	-0.031	-0.014	0.180	0.084	-0.016
	-0.143	-0.047	-0.038	-0.240	-0.126	-0.108
HH has Electricity	0.010	0.032	-0.0386**	-0.057	0.041	0.124***
	-0.042	-0.025	-0.017	-0.098	-0.060	-0.048
HH has Internet	0.274	0.027	-0.034	-0.177	-0.219	0.224
	-0.181	-0.084	-0.065	-0.447	-0.232	-0.216
HH has No Toilet	-0.033	0.007	-0.0285*	0.025	0.006	0.035
	-0.044	-0.023	-0.017	-0.095	-0.058	-0.047
HH has a Flush Toilet	0.032	-0.018	0.0474*	-0.116	-0.184*	-0.152**
	-0.079	-0.037	-0.025	-0.209	-0.096	-0.073
HH is Accessible	-0.031	0.025	-0.020	0.034	-0.001	0.031
	-0.038	-0.021	-0.015	-0.088	-0.049	-0.042
# of farm asset owned	0.000	0.000	0.000	0.000	0.000	1.37e-10**
	0.000	0.000	0.000	0.000	0.000	0.000
Land size	0.000959**	0.000	-0.000343***	-0.00222*	0.000	0.00112**
	0.000	0.000	0.000	-0.001	0.000	-0.001
Price of rice	0.000	0.000	0.000	0.000	0.000	2.30e-07***
	0.000	0.000	0.000	0.000	0.000	0.000
Livestock Sales Revenue	0.000	8.15e-09**	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
Crop Sales revenue	0.000	3.05e-10***	0.000	0.000	-2.82e-08*	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
Travel Time to nearest city	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
Commune has Paved Road	0.089	0.023	0.0619***	-0.264	0.036	-0.0958*
	-0.070	-0.026	-0.020	-0.161	-0.067	-0.054
Commune has Frqnt Transport	0.070	0.0547**	0.0659***	-0.243**	-0.148**	-0.175***
	-0.058	-0.026	-0.018	-0.119	-0.063	-0.049
Commune has Electricity Ntwk	0.300***	0.214***	0.165***	-0.531***	-0.453***	-0.290***
	-0.079	-0.027	-0.025	-0.203	-0.069	-0.063
Commune has Pipe Water Ntwk	-0.312***	0.0535**	0.0808***	0.661***	-0.039	-0.148***
	-0.075	-0.024	-0.019	-0.184	-0.063	-0.050
Commune has telecom Ntwk	-0.183	0.003	0.0893***	0.465*	0.027	-0.191***
	-0.123	-0.038	-0.017	-0.249	-0.095	-0.052
Price of Cereals in Commune	-0.024	-0.0538**	0.0646***	0.278	0.048	-0.036
	-0.094	-0.026	-0.022	-0.204	-0.069	-0.056
Org fertilizer avg price	-0.189*	0.018	-0.106***	0.152	0.009	0.125*
	-0.110	-0.028	-0.027	-0.245	-0.067	-0.073

Non-org fertilizer avg price	0.317***	-0.140***	-0.004	-0.373	0.253***	-0.013
	-0.119	-0.032	-0.028	-0.255	-0.072	-0.074
Pesticide avg price	-0.255***	-0.028	-0.0988***	0.422**	0.057	0.225***
	-0.088	-0.023	-0.019	-0.183	-0.057	-0.056
Water flow all year	-0.004	0.005	0.022	0.040	0.075	-0.058
	-0.114	-0.026	-0.015	-0.286	-0.063	-0.044
Avg salary for male	-0.00103***	0.000	-4.30e-06**	0.00230***	0.000	0.000
	0.000	0.000	0.000	-0.001	0.000	0.000
Avg salary for female	0.00102***	7.72e-06***	1.45e-05***	-0.00233***	-1.46e-05*	-2.67e-05***
	0.000	0.000	0.000	-0.001	0.000	0.000
Vakinankaratra		-0.356***	-0.120***		0.752***	0.130*
		-0.095	-0.027		-0.269	-0.069
Itasy		-0.138**	-0.107**		0.160	-0.011
		-0.054	-0.047		-0.120	-0.129
Bongolava		-0.0992*	-0.227***		-0.064	0.620***
		-0.060	-0.032		-0.139	-0.102
Haute Matsiatra	0.111	-0.274***	-0.273***	-0.108	0.036	0.416***
	-0.084	-0.084	-0.048	-0.200	-0.204	-0.150
Amoron I Mania		-0.210***	-0.382***		0.256*	0.707***
		-0.057	-0.040		-0.135	-0.140
Vatovavy		-0.0934*	-0.223***		0.030	0.586***
		-0.049	-0.030		-0.115	-0.111
Ihorombe		0.114**	-0.127***		-0.413***	0.216*
		-0.056	-0.041		-0.135	-0.114
Atsimo Atsinanana		-0.015	-0.033		-0.036	0.136
		-0.073	-0.045		-0.159	-0.133
Atsinanana	-0.045	-0.055	0.188***	0.130	0.221	-0.159
	-0.080	-0.063	-0.039	-0.189	-0.196	-0.109
Analanjirofo		0.306***	0.233***		-0.697***	-0.372***
		-0.047	-0.038		-0.117	-0.103
Alaotra Mangoro		0.142***	-0.260***		-0.270**	0.625***
		-0.051	-0.040		-0.117	-0.133
Boeny	-0.074	0.214***	0.205***	0.152	-0.449***	-0.129
	-0.082	-0.063	-0.052	-0.189	-0.166	-0.147
Sofia		0.256***	0.017		-0.514***	0.061
		-0.045	-0.035		-0.112	-0.098
Betsiboka		-0.028	-0.115***		-0.036	0.433***
		-0.050	-0.043		-0.131	-0.140
Melaky		0.384***	0.0893**		-0.811***	-0.169
		-0.059	-0.042		-0.141	-0.106
Atsimo Andrefana		-0.606***	-0.260***		0.833***	0.190**
		-0.063	-0.040		-0.162	-0.094
Androy		-0.484***	-0.401***		0.540***	0.652***
		-0.060	-0.055		-0.176	-0.204
Anosy		-0.365***	-0.187***		0.495***	-0.044
		-0.051	-0.066		-0.126	-0.130
Menabe		0.030	-0.0525*		-0.157	0.136
		-0.043	-0.030		-0.106	-0.084
Diana	0.047	0.070	0.033	-0.158	-0.246**	0.089
	-0.089	-0.049	-0.038	-0.210	-0.120	-0.104
Sava		0.322***	0.052		-0.722***	0.069
		-0.046	-0.037		-0.115	-0.105

51o.Atsimo Andrefana	-			-		
Constant	15.36***	14.42***	14.55***	-1.516***	-0.232	-0.346**
	-0.153	-0.079	-0.053	-0.364	-0.194	-0.154
Observations	2291	5567	8664s	2291	5567	8664
R-squared	0.157	0.293	0.247			

Source: Author's calculations based on 2022 EPM data.

Chapter 2

Low agricultural productivity and market access trap rural households in a poverty cycle

Key findings

Agriculture is the backbone of Madagascar's rural economy. With more than 80 percent of the population involved in farming, agriculture is the main source of livelihoods in rural and some urban areas. However, agriculture only constitutes 25 percent of Madagascar's GDP. Subsistence farming is prevalent and explains why 90 percent of agriculture workers are poor. Only 27 percent of farmers practice commercial agriculture and 17 percent produce cash crops. Smallholder farmers (who on average cultivate on less than 1 ha. of land) produce 45 to 90 percent of the commercialized vegetables, peanuts, sugar cane, fruits, vanilla, coffee and spices (some of which rank among the best worldwide). Still, rice accounts for 70 percent of total agricultural production, 40 percent of cultivated land, and all of the irrigated land. The average national annual rice yield is approximately 2.5 t/ha, similar to other East African countries, but very low compared with the major rice-producing regions in Asia.

Low agricultural productivity is a key contributor to the stubbornly high rural poverty rate. Agricultural labor productivity in Madagascar is significantly lower than the Sub-Saharan African average and has dropped by 31 percent since 1991. The low quantity and quality of inputs broadly explain low productivity. First, mechanical inputs such as irrigation systems and tractors are unaffordable for most farmers: only an estimated 5 to 10 percent use tractors and power tillers, irrigation accounts for 40 percent of cultivated areas, but technology is mostly obsolete. Second, chemical inputs such as improved seeds and fertilizers are not used by most farmers, yet they are significant determinants of yield levels. Only 7.4 percent of farmers use fertilizers, 4.5 percent use pesticides, and 11.9 percent use improved seed types. Third, land and skilled agricultural workers are limited. Production growth in recent years was not driven by increased land productivity but by farmland expansion through slash and burn. Inequitable distribution of land and weak ownership rights exacerbate the problem. At the same time, few agricultural workers have formal education or technical training. Finally, farmers lack access to finance (to purchase better inputs) and insurance, which further block the adoption of more productive technologies.

Limited market access and increasing price variability have also compromised profitability in the agricultural sector. Large rice price differences across the regions show weak market integration, mostly due to prohibitively high transport costs made worse by dilapidated roads. Only 11.4 percent of the rural population has access to good road networks, as a result, only 61.2 percent of farmers who sell their production travel to market to sell them and fetch higher prices. Unsold produce is stored for future sales, to consume at home or use as seed. However, half of this unsold produce is either stored in suboptimal conditions (on house roofs) or not stored at all, leading to post harvest losses of up to 35 percent.

1. The link between agricultural productivity and poverty

Farming, fishing, and forestry are the foundations of Madagascar's economy. Agriculture is the primary source of livelihood for about 80 percent of the country's population. Seventy-eight percent of households in the country practice agriculture, with 71 percent raising livestock and 18 percent involved in fishing. Mixed crop-livestock systems are the most common type of farming (practiced by 61 percent of farmers), followed by crop-livestock-fish (10 percent) and mixed crop-fish systems (1.5 percent) (INSTAT, 2021a). Subsistence farming is prevalent, with only 27 percent of farmers practicing commercial agriculture and 17 percent focusing on cash crops. However, smallholder farmers are responsible for the majority of commercial agricultural production in the country: they largely sell their crops to the market except for cash crops such as vegetables, peanuts, sugar cane, vanilla, coffee, fruits, and spices—with the latter four crops ranking among the country's top agricultural exports – are largely sold to traders. Only 2.1 percent of households practice beekeeping, but the share rises to 10.6 percent in the Androy region. Small-scale inland fishing is the most common type of fishing, practiced by 10.9 percent of households, followed by fish-farming in ponds (4.8 percent) and rice-fish farming (3.8 percent).[28]

[28] The latter two types of fishing are starting to gain ground in the regions of Vakinankaratra, Itasy, and Amoron'i Mania.

Although agriculture is a major contributor to the economy, sustained growth in the sector has proved to be elusive. Agriculture accounts for 70 percent of total employment, but its shares of total exports (37 percent) and GDP (25 percent) are relatively small. Agricultural labor productivity is significantly lower than the Sub-Saharan African (SSA) average and has dropped by 31 percent since 1991. Despite the abundance of productive land and water resources and significant untapped potential, the agricultural sector has failed to drive structural economic transformation and growth in Madagascar to the same extent as elsewhere in Africa and the wider developing world. Low productivity, vulnerability to shocks, poor post-harvest techniques, limited storage and logistical capabilities, ecosystem degradation, and underdeveloped road networks that impede farmers' access to markets are among the critical bottlenecks hindering the sector's performance and growth prospects.

Rice is the main crop grown in Madagascar, accounting for 70 percent of total agricultural production, 40 percent of cultivated land, and all the irrigated land. High annual rainfall and abundant freshwater resources provide favorable conditions for water-intensive rice production in various regions, including the rainfed central highlands, the irrigated and terraced lowlands, and the semi-flooded coastal zones. About 80 percent of agricultural households in Madagascar grow rice, largely for subsistence, on small holdings, and rely on family labor. Most such households, however, suffer from chronic food insecurity, as low productivity prevents them from diversifying their diet. Despite the high availability of water, rice-farming productivity in Madagascar is on par with the levels of other SSA countries, significantly lower than the world average, and even lower compared with East Asia. Small-scale schemes account for 86 percent of land under controlled water management, while medium-scale schemes account for 13 percent and large-scale schemes for 0.4 percent. Insufficient maintenance and weak management capacity among user groups often plague irrigation schemes, resulting in unreliable water supply, insecure land tenure, limited extension and input supply networks, poor connectivity to downstream markets, and low farm gate prices, which discourage farmers from using improved, productivity-enhancing technologies such as high-yielding seeds, fertilizers, and machinery. The rice sector's performance has been hindered by stagnant yields and structural deficiencies, as well as recurrent negative shocks.

Albeit some variation, all primary sector occupations are highly affected by poverty (Table 8). The average deprivation rate as measured by multidimensional poverty rate among those working in the primary sector at 88.7 percent, way higher than the average population rate. Irrespective of horticulture, livestock, or fishing, poverty rates among populations engaging in these workstreams are very high. As a result, almost unsurprisingly, there is very little variation in poverty rates across the specific activities people engage in. Poverty is high among those who engage in farming cash crops (86.9 percent), and almost equally high among those who are engaged in rice farming (84.9 percent) or other fruits and vegetables (84.3 percent). From a policy perspective, this speaks to very low returns in these sectors as well as potential shortcomings of value chains whereby producers obtain substantially less than middlemen who might be the ones selling products to markets, the next distributors.

Table 8: Multidimensional poverty is highly correlated with agricultural activity

Activity	Group	Poverty rate (%)	Population (Million)	Number of poor (Million)
Agriculture	Rice	84.9	18.4	15.7
	Other cereals	86.8	12.8	11.1
	Tubers	87.5	15.7	13.8
	Legumes	86.4	10.5	9.1
	Industrial crops	86.7	7.8	6.8
	Cash crops	86.9	4.6	4.0
	Other fruit & vegetables	84.3	8.0	6.7
Livestock	Cattle	87.2	10.6	9.2
	Small ruminants	92.4	2.4	2.2
	Pigs	81.3	6.4	5.2
	Poultry	82.2	16.8	13.8
	Bees	88.2	0.6	0.6
	Silkworms	87.2	0.1	0.1
Fishing	Inland small-scale fishing	89.8	3.0	2.7
	Small-scale marine fishing	85.0	0.6	0.5
	Marine aquaculture	84.6	0.1	0.0
	Fish farming in ponds	82.4	1.5	1.2
	Fish farming in cages	83.0	0.2	0.1

Source: Authors' calculations based on 2018 Madagascar Census.

The link between agriculture and poverty in rural Madagascar is complex and multifaceted, with a wide range of factors contributing to the challenges faced by rural communities. Understanding these challenges is important for implementing effective interventions to improve the livelihoods of rural communities and reduce poverty. This chapter aims to explore the link by examining the obstacles

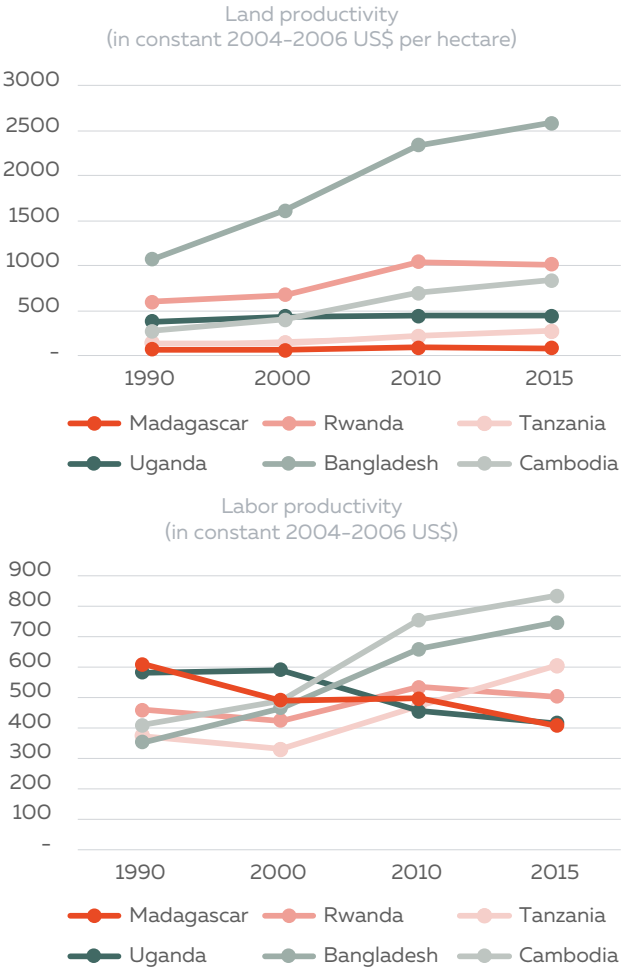
that farmers face and the interventions that can be implemented to address these challenges. We aim to provide insights into the complexities of the issue and offer recommendations how to improve the livelihoods of rural communities and break the stubbornly high poverty levels in rural areas. Agriculture is the backbone of livelihoods in Madagascar.

Increasing agricultural productivity and crop prices can dramatically improve welfare for rural households. Rice price has an important link to rural poverty, as demonstrated by the strong correlation shown in Table A1.7 in the previous chapter. The table illustrates that the price of rice is strongly connected to the poverty status of rural households. Additionally, simulations conducted as part of a technical report for an agricultural project in Madagascar have indicated that even small changes in productivity and prices could result in substantial increases in production and reductions in imports, ultimately leading to improvements in welfare. For instance, a 10 percent increase in rice productivity can lead to a corresponding 10 percent increase in rice production (equivalent to 287 thousand tons of milled rice) if markets function optimally and prices remain at import parity levels. Due to these reasons, rice value chain policies in Madagascar are often seen as strategic for poverty reduction.

Increasing agricultural productivity is key to reducing poverty and promoting economic growth in developing countries. Higher productivity expands the availability of food for both consumption and sale. This enables farming households to save money and allocate more labor to other industries, pushing up their income. In turn, rising incomes in rural areas boost demand for a wider range of products, leading to growth in processing, packaging, transportation, trading, and other non-farming activities. Ultimately, urbanization, non-farming activities, and non-agricultural income become major drivers of development, with both urban and rural consumers driving demand for agricultural products through value chains that connect rural areas to cities and towns.

Agricultural productivity in Madagascar is lower than in comparator countries (Figure 37). While land productivity (i.e., total output relative to total agricultural area) has remained low but steady over the past 30 years, labor productivity (i.e., total output relative to the number of persons economically active in agriculture) has been deteriorating significantly. Multiple factors might explain this trend: for example, farmers may use ineffective or outdated production practices as they lack knowledge of more productive methods and technologies;

Figure 37: Agricultural productivity is below peer countries and declined in the last 30 years

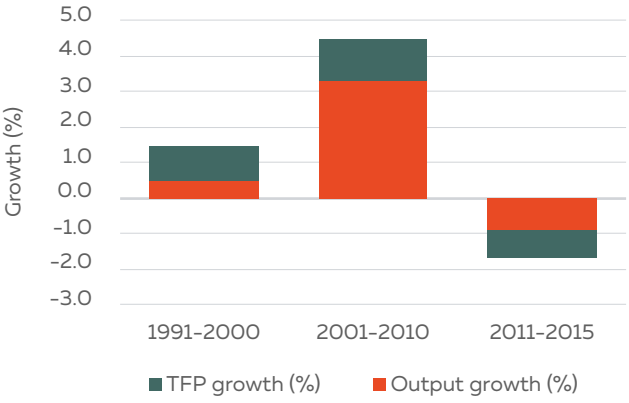


Source: IFPRI, 2019.

or if they know about the latter, they may lack the financial means to acquire the necessary inputs or to shoulder the high initial cost of their implementation. Moreover, farmers in Madagascar often face a range of market failures in relation to inputs, outputs, finance, and insurance, which exacerbate the cost and risk of adopting more productive technologies.

Limited use of inputs and poor technological adoption among smallholder farmers are the main reasons for low Total Factor Productivity (TFP) in Malagasy agriculture. We take a closer look at production efficiency and output growth to understand Madagascar's agricultural productivity deficit. Specifically, we calculate TFP—an indicator of how efficiently agricultural land, labor, capital, and materials (agricultural inputs) are used to produce crops and/or livestock (agricultural output)—as the ratio of total agricultural output to total production inputs. When more output is produced from a constant number of resources (i.e., resources are used more

Figure 38: While TFP and outputs grew util 2010, they fell thereafter



Source: IFPRI, 2019.

efficiently) TFP increases (Figure 38), shows that the growth rate of agricultural TFP in Madagascar had remained steady between 1991 and 2010, then dropped until 2015—a time when the country was in the midst of a deep political crisis. Output grew, especially between 2001 and 2010, but it then fell between 2011 and 2015. Madagascar's agricultural productivity deficit is due to an inefficient use of resources, as indicated by the decline in the TFP growth rate and output growth during the period 1991–2015, particularly after 2010.

Agricultural productivity is higher in certain areas of Madagascar that enjoy access to irrigation and proximity to markets. The green revolution in Asia and Latin America relied heavily on a combination of improved seeds, fertilizers, irrigation, and farming education that allowed for higher yields of crops such as wheat, rice, and maize. In Madagascar too, yields benefit when inputs are readily available. For example, in Alaotra-Mangoro—the country's second-most important rice-producing region, with more than 136,000 hectares of land dedicated to this crop – annual rice yields reach up to 4 tons per hectare (t/ha), versus the national average of 2.5 t/ha. Access to functional irrigation and proximity to both Antananarivo and Toamasina, the two largest urban centers in the country, have been key to achieving higher yields.[29]

Other structural constraints are also at the root of low agricultural productivity. The country's rural population is also characterized by high levels of illiteracy and limited access to education, healthcare, and other basic services. These factors create a vicious cycle of poverty, where poor health, lack of education, and limited opportunities perpetuate economic hardship and further exacerbate the challenges faced by rural communities. In addition to the socio-economic challenges faced by rural communities, environmental degradation and climate change also pose significant threats to agricultural productivity and livelihoods in Madagascar. Deforestation, soil erosion, and declining soil fertility are major environmental challenges that negatively impact crop yields and limit the ability of farmers to earn a decent income. The effects of climate change, such as increased frequency and severity of droughts in the South and floods caused by repeated cyclones on both the East the Center, also have a significant impact on agricultural productivity, rural livelihoods, and poverty.

2. Agricultural inputs and low agricultural productivity

The equity and efficiency of land use

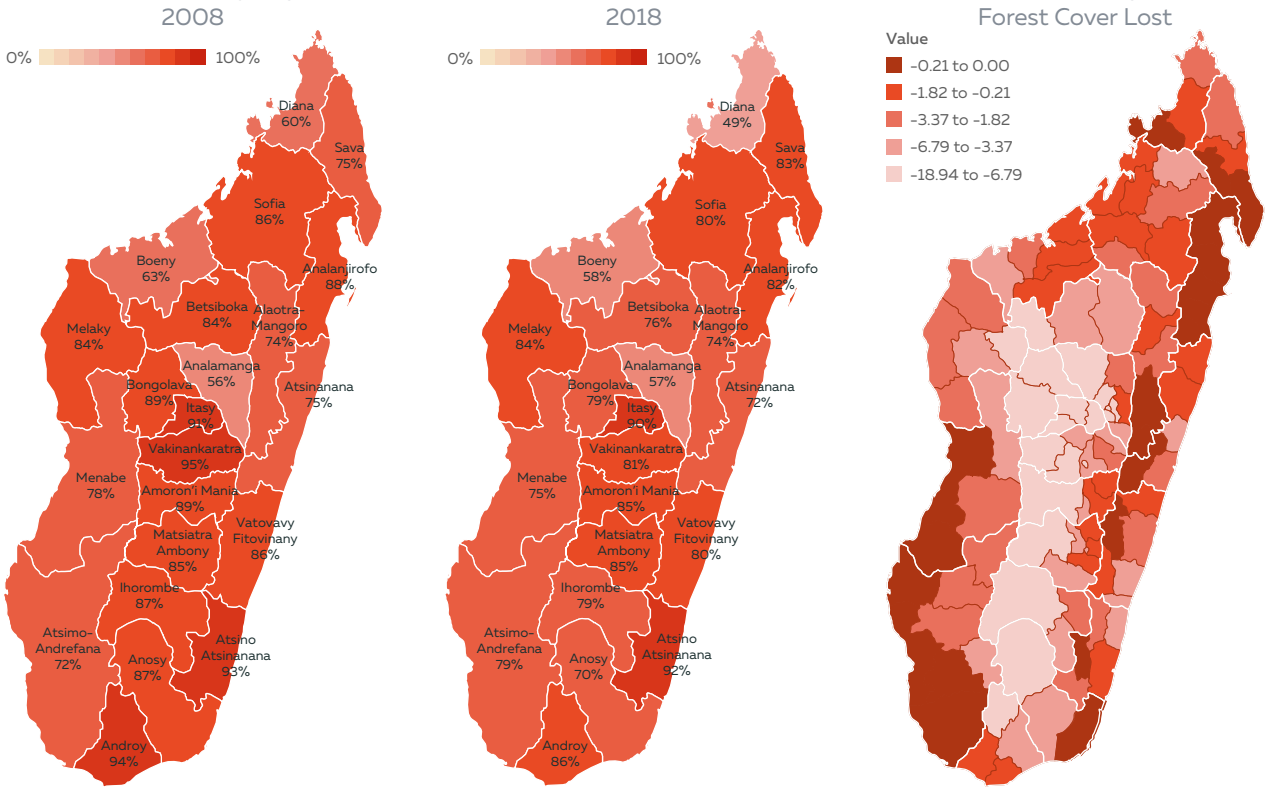
Two land property rights regimes operate in Madagascar: an official but highly circumscribed titling system, and a more common unofficial system. In the latter system, access to land (with the possible exception of village commons) is controlled not by the community but largely by individuals. In areas with greater commercial activity, such as Lac Alaotra, land can even be sold to outsiders without approval from traditional authorities. In this system, however, land ownership claims continue to draw their legitimacy from communal institutions, some of which were invented or adapted for precisely this purpose (Jacoby and Minten 2006).

Access to land is unequally distributed across gender and age, and in the wake of population growth is increasingly coming at the expense of deforestation. As a finite resource amid a growing population, land is shared among fewer households (Map 6). Households headed by women are less likely to own land than those headed by men, with a larger gap for younger cohorts. This provides indicative evidence of unfair inheritance rights (Figure 39), and the overall lower availability of land to younger generations. Importantly, this measure observes the extensive and not the intensive margin, hence not showing by how much the average plot size may have decreased but simply that fewer households are reporting acccess when compared to 2008. Nonetheless, in some regions, higher access rates are reported than previously, hinting at important deforestation to increase access to land (for farming). Atsimo Adrenafana as well as Melaky, but also Sava, have a higher share of households reporting access to land in 2018 compared to 2008. Simultaneously, particularly in areas of Atsimo Adrenafana appear to show important forest cover loss. What's clear from the forest cover loss map is that even in areas that report decreases in access to land (i.e. Analanjirofo), latter are much smaller than one

[29] Source: Ministère de l'agriculture et l'élevage, Division Statistique Agricole.

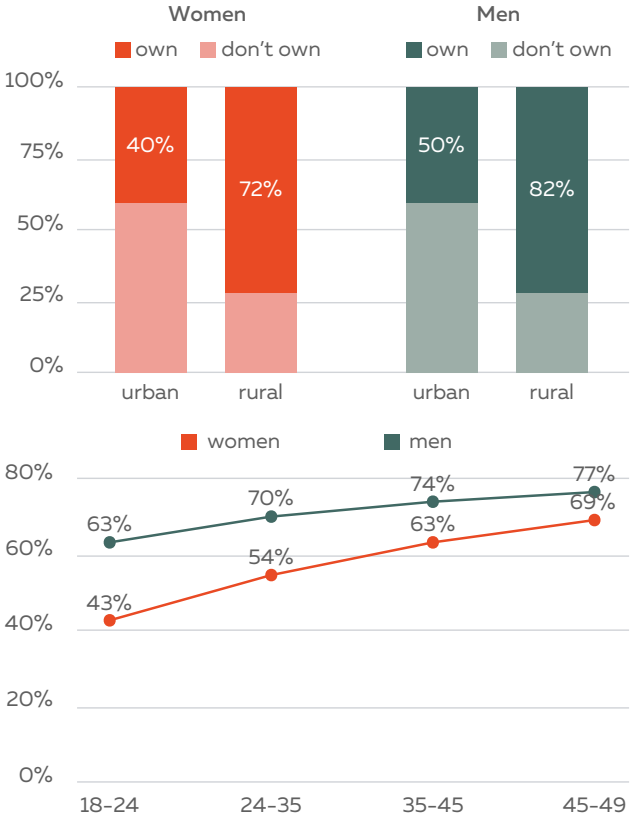
Map 6: Agriculture land use is widespread and is increasingly unsustainable

Land ownership by regions (households where at least one member owns land usable for agriculture)



Source: Author's calculations based on 2018 Census data.

Figure 39: The gender gap in agricultural land ownership diminishes with age



Source: Author's calculations based on the 2018 Census data.

would expect in the wake of population growth, and this is likely due to further encroachment in those regions also. Southern regions of Toliara and Fianarantsoa are at the forefront to bear the brunt of drought risks and are more exposed to floods due to long coastlines. Given the importance of forest for livelihoods, including protection from soil erosion, the short-term solution to encroach on land is creating untenable living conditions for the future in an already harsh environment.

The EPM survey for 2021–22 shows that land cultivated by households is primarily owned by its users and largely allocated to growing rice. More than half of arable land is used to grow rice (Figure 40), with the remaining 45 percent largely dedicated to tubers, cash crops, and other cereals. Approximately 72 percent of the land allocated to rice and other cereals is owned by those who farm it, 20 percent is used by farmers at no cost, and the remainder is rented. Similarly, 66 percent of the land used to grow legumes, tubers, and vegetables is owned by those who farm it, 20 percent is on a free loan, and 7 percent is rented. The land most likely to be owned by its farmers is that used to grow cash crops (such as vanilla) and fruits, often for export. Only 13 percent of such land is on a free loan, and 2 percent is rented.

More than 70 percent of farmers across the consumption distribution own their land, 22.7 percent use it on a free loan, and 6.3 percent are tenants. In the first quintile of the consumption distribution, 74 percent of landholders own their plots, 5 percent pay rent, and 21 percent use borrowed land without paying for it. The shares are similar among landholding households in the richest quintile: 77 percent are owners, about 17 percent use borrowed land for free, and 6 percent pay rent. The average land area held is smallest among households in the first quintile and tends to grow among those in higher quintiles (Table 9).

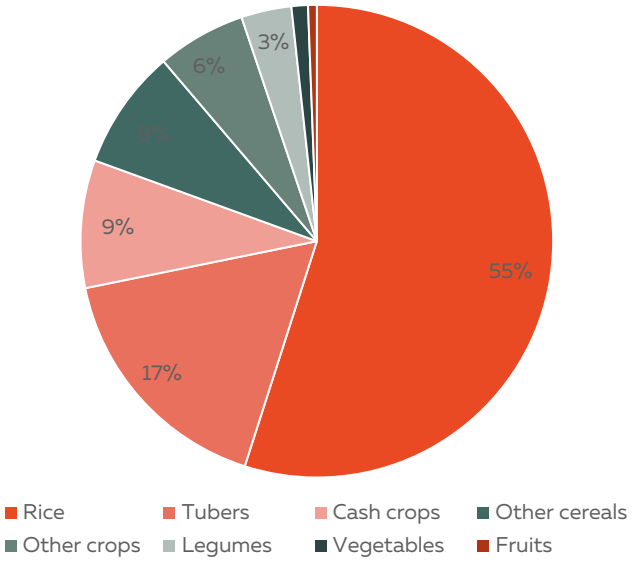
The correlation between employment status and land area cultivated varies across the consumption distribution. Notably, households in the richest quintile have less land on average than those in the fourth, as members of the former are more likely to have formal jobs in the industrial or services sectors. Indeed, Figure 41, that welfare tends to increase with employment. Many households in the third and fourth quintiles have self-employed heads, usually active in farming—thus, they make major use of land for agriculture. On the other hand, households in the fifth quintile have the highest percentage of heads in salaried employment. Most of the poor work in agriculture and produce their own food, while wealthier households are comparatively less active in this sector—and when they operate in it, they tend to engage in commercial farming of cash crops and rice.

Labor requirements by crop

To diversify their risk exposure, households grow a range of crops that entail varying degrees of labor intensity. Figure 42 shows the number of laborers involved in key farming tasks across various crops, broken down into family and non-family members in agricultural enterprises. Preparing the land for planting takes almost as much effort as harvesting, while intermediary tasks such as weeding, applying fertilizers, and spraying chemicals are less labor-intensive. In most cases, families tend to their crops with minimal involvement of non-family members.

Rice requires both the highest number of workers overall, and the largest amount of non-family labor. The number of non-family members involved in rice farming is high across all production phases; hence, rice is mainly grown by wealthier households who can afford paying for non-family labor (Figure 42). Although households across income quintiles seem to produce a variety of agricultural products such as rice, tubers, legumes, vegetables, and fruits, there are relatively few differences in crop diversification

Figure 40: Rice occupies over half of arable land



Source: Author's calculations based on 2021–22 EPM data.

Table 9: Most agricultural households own their land

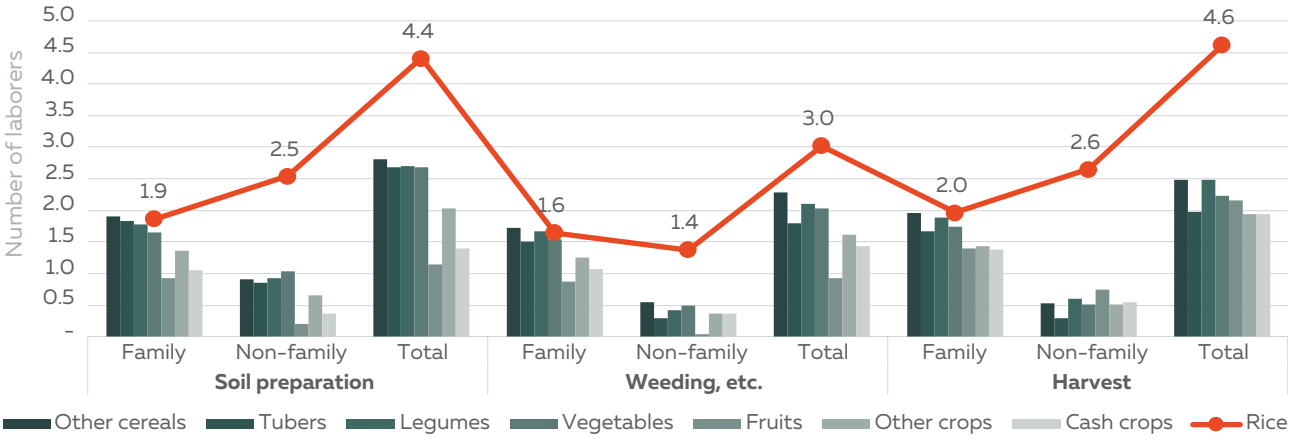
Quintile	Land area (hectare)	Owned (%)	Free loan (%)	Tenancy, sharecropping or other (%)
Poorest	0.20	74.1	21.0	4.9
2	0.27	65.2	27.8	7.0
3	0.30	71.6	21.7	6.8
4	0.50	66.8	26.3	6.9
Richest	0.35	77.3	16.7	6.0
Average	0.30	70.6	23.0	6.4

Source: Author's calculations based on 2021–22 EPM data.

Figure 41: Self-employed household heads tend to cultivate larger land areas, relative to wage employed heads, except for the richest 20 percent

Source: Author's calculations based on 2021–22 EPM data.

Figure 42: Rice utilizes more labor than any other crop



Source: Author's calculations based on 2021–22 EPM data.

Table 10: Agricultural households diversify production across crops

Quintile	Rice	Other cereals	Tubers	Legumes	Vegetables	Fruits	Other crops	Cash crops	Total
Poorest	85.0	67.2	77.3	79.2	91.3	70.3	69.5	71.8	79.2
2	88.1	81.3	79.3	89.3	83.6	95.0	66.2	80.6	84.1
3	89.3	83.8	80.9	87.4	93.2	76.4	82.5	86.8	86.1
4	90.4	85.3	82.2	88.3	89.6	74.9	89.8	80.3	86.8
Richest	90.9	86.5	83.8	89.3	91.4	91.5	81.8	82.3	87.9
Average	89.0	81.2	80.5	87.1	90.0	82.5	78.1	81.7	85.0

Source: Author's calculations based on 2021–22 EPM data.

between income groups (Table 10). This suggests that there may not be significant barriers to entry in agriculture based solely on income levels (Table 10).

Fertilizer, chemicals, and improved seeds

Malagasy farmers make little use of modern inputs such as chemical fertilizers, pesticides, and certified seeds. Imports of chemical fertilizers (mainly NPK and urea) increased by about 6 percent per year between 2016 and 2020, from 42,000 tons to 58,000 tons per year.[30] Almost all domestically made inorganic fertilizer (about 130,000 tons of ammonium sulfate per year) is produced by the Ambatovy mining company for export.[31] Another firm, GUANOMAD, sells about 2,500 tons of guano on the domestic market and 1,500 tons to international buyers every year.[32] According to the National Strategy for Fertilizer Use Development (MINAE, 2006), the government targeted doubling rice production through the intensive use of up to 125,000 tons of chemical fertilizers by 2030. Annual consumption of chemical fertilizers across all crops almost tripled between 2006 and 2020, from 20,000 to 58,000 tons, but remains well below target.[33]

Fewer than 12 percent of households report using improved or certified seeds. Only 15.1 percent use organic fertilizer products, mainly manure, while 3.4 percent resort to inorganic fertilizers. A mere 17 percent apply chemicals to their crops (12.5 percent use pesticides; 2.6 percent, herbicides; and 1.2 percent, fungicides). Notably, only 12 percent of farming households use new seeds to start their crops (Table 11).

Table 11: Fertilizer and other input use is minimal across the welfare distribution (% households)

Quintile	Fertilizer	Pesticides	Improved or certified seeds	Total
Poorest	5.5	2.4	10.6	7.6
2	6.2	2.8	10.6	7.9
3	7.1	4.5	11.9	9.1
4	8.2	6.0	12.6	10.1
Richest	10.0	6.7	14.0	11.5
Weighted average	7.4	4.5	11.9	9.2

Source: Author's calculations based on 2021–22 EPM data.

[30] COMTRADE, ITC, retrieved October 2021.
[31] Ambatovy website, retrieved August 2021.
[32] The Malagasy government, in collaboration with Morocco, also has started to build a 200,000-ton chemical fertilizer plant in Alaotra (NPK and Super-Phosphate), but the factory was not yet operational as of the end of 2021.
[33] COMTRADE, retrieved November 2021.

There is a positive correlation between household income and use of fertilizers and pesticides, suggesting that cost may be the key constraint to their wider adoption. Moreover, supply-side research reveals that 40 percent of inputs are self-produced, which explains the strikingly low proportion of households using improved or certified seeds. Few farmers buy new seeds, while the rest use those stored from their previous harvest. Approximately 29 percent of households use inputs sourced on the market, while 10 percent rely on inputs supplied by other farming households. Table 12 shows that self-production of inputs is a function of poverty: households in the lower quintiles of the income distribution are more likely to produce their own inputs, and less likely to buy them on the formal market.

Table 12: Most households produce their own agricultural inputs

Quintile	Fertilizer	Pesticides	Improved or certified seeds	Total
Poorest	5.5	2.4	10.6	7.6
2	6.2	2.8	10.6	7.9
3	7.1	4.5	11.9	9.1
4	8.2	6.0	12.6	10.1
Richest	10.0	6.7	14.0	11.5
Weighted average	7.4	4.5	11.9	9.2

Source: Author's calculations based on 2021–22 EPM data.

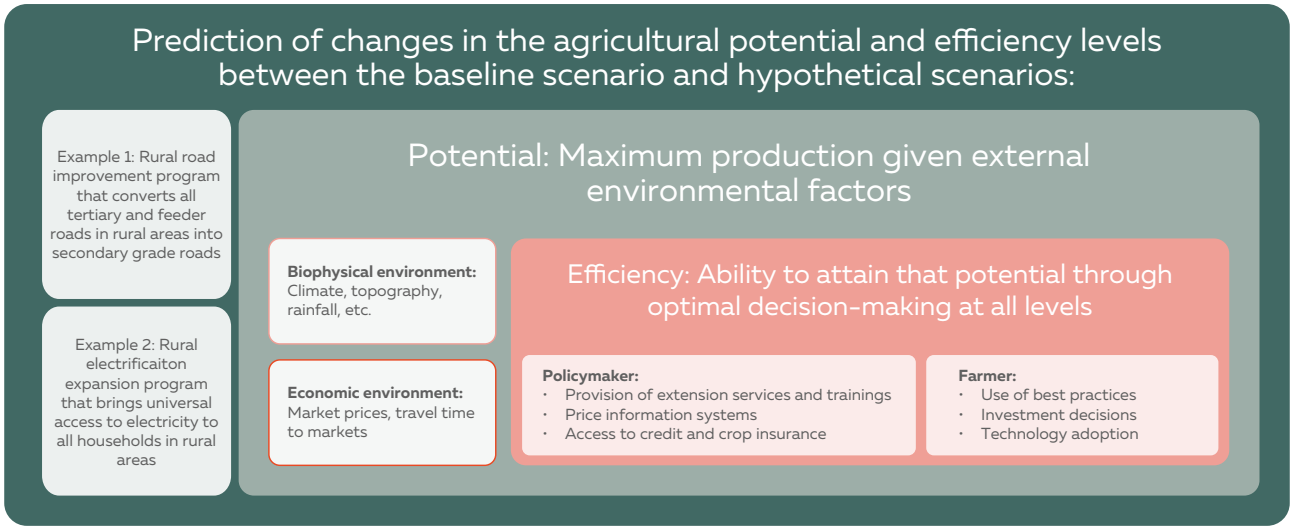
3. Agricultural potential and efficiency: the productivity gap

Stochastic frontier analysis (SFA) is used to estimate productivity, agricultural potential gap, and farm efficiency following Maruyama et al. (2018). The approach utilizes SFA to estimate smallholders' agricultural potential under optimal conditions and compares it with their current performance to assess their efficiency levels. SFA allows the econometric exploration of the notion that, given fixed local agroecological and economic conditions in a region and the occurrence of random shocks that affect agricultural production, the decisions made by farmers and policymakers translate into higher or lower production, revenues, and profits. Inefficiency is then defined as the loss incurred by operating away from an ideal production frontier. By estimating where this frontier lies, and how far each producer is from it, SFA helps to identify local potential and efficiency levels to construct the typology.

This approach allows the comparison between estimated agricultural potential and efficiency levels under current conditions and hypothetical investment scenarios, which can be used to calculate the agricultural profit gains linked to each case. These results can be extrapolated at the regional level for the whole country combined them with GIS data on local agroecological conditions, topography, and road infrastructure to construct a typology to assess where investments in agriculture would be more effective in bringing rural households out of poverty, and how different types of investments can increase rural household income through an increase in the profitability of smallholder agriculture. A schematic illustration of this approach is illustrated in Figure 43.

The core component of the typology construction generates region- and district-specific agricultural potential and efficiency estimates (Map 7).

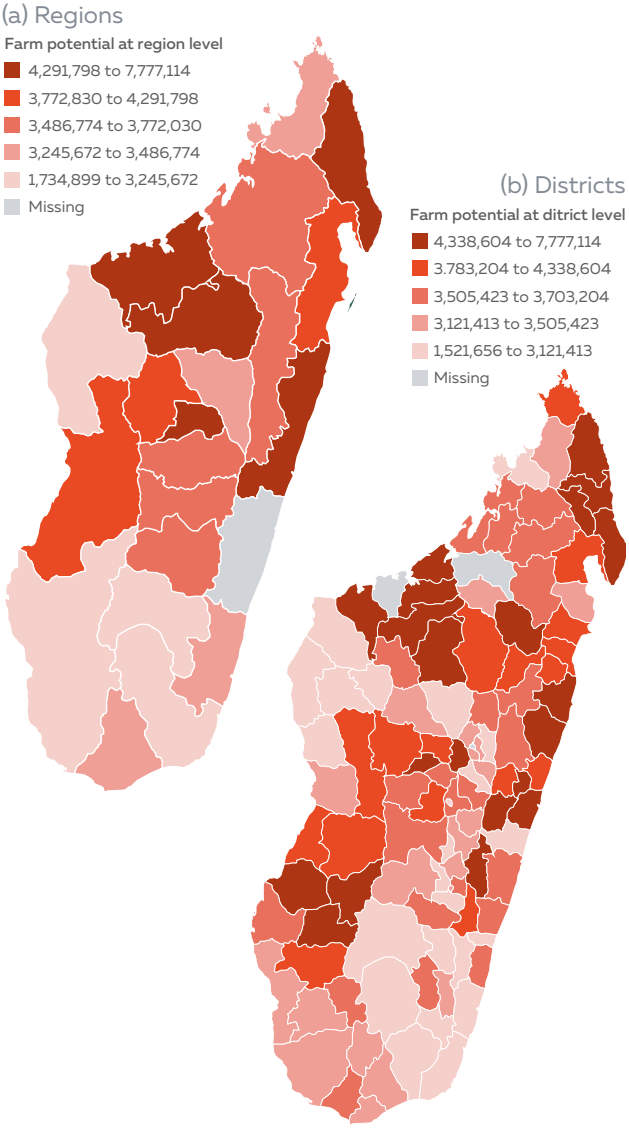
Figure 43: A conceptual framework to understand macro and micro drivers of agricultural efficiency



Source: Maruyama et al., 2018.

The agricultural potential map generated by this component shows differences in crop production potential across different regions of Madagascar. The estimated potential is low in regions such as Anosy, Androy, Melaky, and Diana, which are vulnerable to droughts. On the other hand, regions in the east—such as Atsinanana, Atsimo Atsinanana, and Sava—have high agricultural potential due to frequent tropical storms and higher rainfall volume. The Boeny and Itasy regions also have high potential, thanks to their soil type and a dry tropical climate that is suitable for jujube trees, baobabs, and mango trees (Map 7).[34] The Sava region has the highest potential farm revenue, with a value of MGA 7,777,114 per year. This may be due to the region's favorable climate and soil conditions for growing high-value crops such as vanilla, coffee, and cocoa. Other regions with relatively high farm revenue potential include Atsinanana (MGA 5,576,601), Menabe (MGA 4,139,082), Boeny (MGA 4,415,828), and Analanjirofo (MGA 4,016,485). On the other hand, some regions have much lower farm revenue potential compared to the rest. For example, the Anosy region has the lowest potential farm revenue with a value of MGA 1,734,899 per year. This may be due to the region's arid climate and limited arable land. Melaky (MGA 1,973,229) and Anosy are other regions with relatively low farm revenue potential. Overall, the differences in farm revenue potential across the regions can be attributed to a range of factors, including climate, soil conditions, available infrastructure, access to markets, and the types of crops grown. Additional differences are further noted at the district level to help better target interventions.

Map 7: Northern and Eastern regions have the highest agricultural revenue potential



Source: Author's calculations based on 2021–22 EPM data.

Unlocking agricultural potential depends on the region's potential and requires different interventions. A one-size-fits-all approach is unlikely to be effective. Policymakers need to tailor their interventions to suit the specific needs of each region. In areas with high agricultural potential, the focus should be on providing farmers with the essential resources they need to maximize productivity, such as quality inputs, access to credit, and reliable extension services. Investments in these areas are likely to produce relatively quick and tangible results, leading to increased yields, incomes, and economic growth. In contrast, low potential areas may require more substantial investments in infrastructure, such as irrigation systems and roads, to support agricultural development. These areas may also require longer-term investments in research and development to identify suitable crops and technologies that can thrive in the local environment. Therefore, targeted policies are needed to ensure that investments are directed towards the most appropriate areas, based on their unique potential and needs. This can help to ensure that resources are used effectively, and that agricultural development is sustainable and inclusive, leading to long-term growth and poverty reduction.

4. Agricultural productivity: the case of rice

Most farmers across Madagascar grow rice, the country's staple food. Rice is grown by 80 percent of agricultural households; it is cultivated over an area of 1.3 million hectares—79 percent of its production is irrigated, 8.4 percent is rainfed, and 13 percent comes from slash-and burn systems. The average national annual yield is approximately 2.5 t/ha, similar to other East African countries, but very low compared with the major rice-producing

[34] The farm revenue potential values provided are in Malagasy ariary (MGA) per year.

regions in Asia. Yields are highest in the irrigated lowlands (between 3.9 and 4.3 t/ha), and much lower in the rainfed uplands (from 1.8 to 2.7 t/ha). Alaotra-Mangoro, Sofia, and Vakinankaratra are the most productive regions.

Smallholder farmers keep less than 1 hectare of rice fields on average. Rice is typically grown following traditional practices, either in rotation with maize, vegetables, or legumes, or in double cropping where irrigation systems are available. Only an estimated 5 to 10 percent of households use agricultural machinery such as tractors and power tillers, mostly in Alaotra, while zebu cattle are commonly used for tillage in other regions. Better-off farming households tend to hire labor for transplanting and harvest.

Production is essentially aimed at local markets. Domestic consumption of rice per capita ranks among the highest in the world, with an average of about 100 kg per year (2012-17). Rice accounts for about 50 percent of the total caloric intake of the average Malagasy. Supply chains are short, typically including only one or two intermediaries—collectors and wholesalers. Small or medium-sized processing units exist at farm level, and rice collectors use large hulling machines. The main products include white rice, parboiled or converted rice with greater nutritional value, husked and polished rice for luxury consumption and export, husked rice for local consumption, and dry grains ground into flour or semolina. Rice bran, broken rice, and straws are fed to pigs and poultry, while rice husks are used to manufacture organic fertilizers and as fuel.

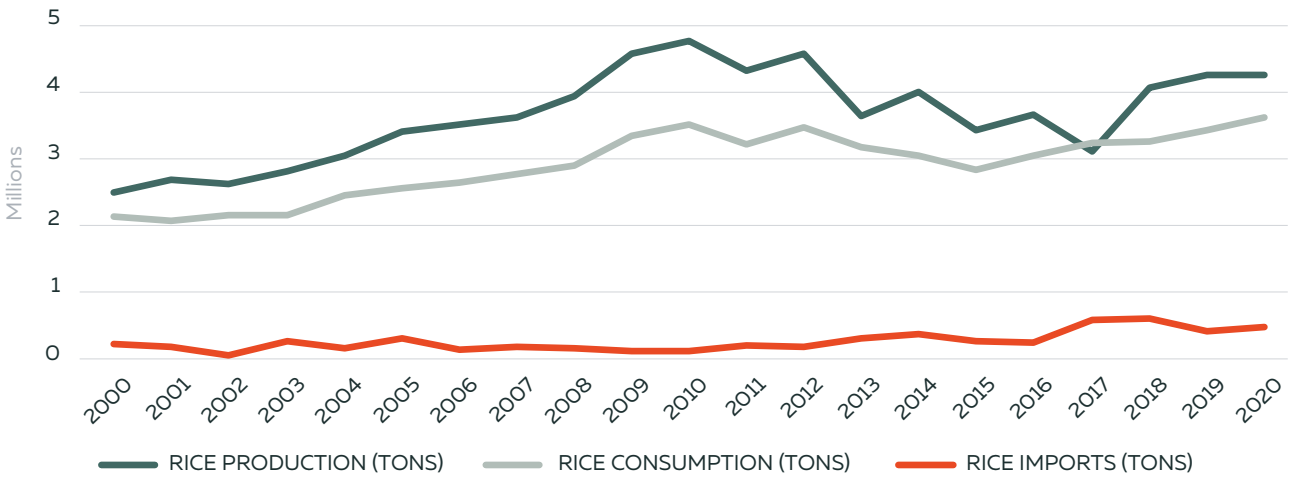
National rice production has been falling since 2009. Both rice production and consumption increased between 2000 and 2010 (Figure 44). Abundant domestic output meant that imports were low during that period and decreased from 2005 to 2010. However, a major structural break in the 2010 farming season resulted in falling production and consumption from 2011 to 2016. In 2017, when demand for rice exceeded the domestic supply, imports soared and have remained relatively high since, with the exception of 2020 when the pandemic adversely affected trade. Although domestic production increased in 2020, it has not recovered to the levels of the previous decade.

Both poverty rates and rice yields are highly correlated with access to markets in rural areas. Panel (a) of Figure 45 shows a significant negative correlation between the Rural Access Index (RAI) and poverty at the district level, while panel (b) Figure 45 illustrates that rice yields decrease as the distance from markets increases. Market access incentivizes the adoption of improved farm management practices and technology, which are necessary for increasing yields. Improving agricultural productivity and market access in rural areas is essential for reducing poverty and food insecurity in Madagascar. Achieving these goals requires investment in modern farming techniques and equipment, improved infrastructure, and policies that support local farmers and promote fair trade.[35]

Use of inputs in rice production

The allocation of land to rice production varies by region. Most domestic production is concentrated

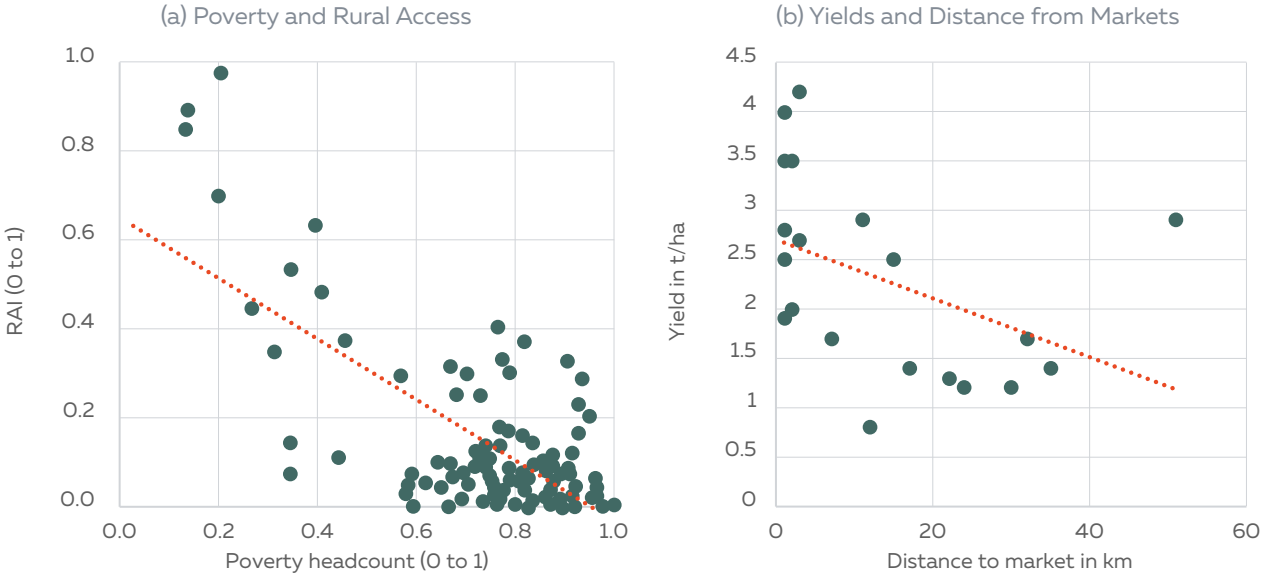
Figure 44: Domestic rice production systematically exceeds consumption, but production has fallen since 2009



Sources: World Bank, World Development Indicators Database; United States Department of Agriculture.

[35] The RAI measures the proportion of the rural population who live within 2 km of an all-season road.

Figure 45: Rice yields, poverty and connectivity are highly correlated



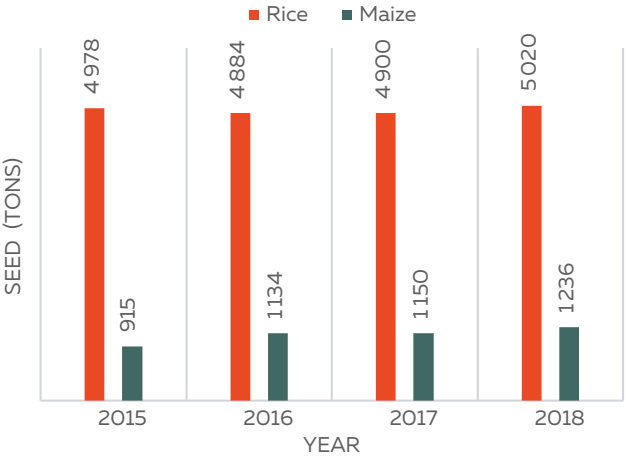
Source: Author's calculations with World Bank (2021).

in the Central Highlands, particularly around the capital city of Antananarivo. This region is known for its fertile soils and high rainfall, ideal for rice cultivation. In coastal and southern regions of the country, where conditions are not as favorable, less land is typically allocated to rice. According to online data from FAOSTAT, approximately 1.6 million ha of land were consistently used for rice production between 2019 and 2021, which equals a little higher than 50 percent of total arable land (3 million ha).

Fertilizer use is highest in rice cultivation. In 2020, more than 50,000 out of the 58,000 tons of fertilizer used in Madagascar were dedicated to rice production, with deployment by rice farmers up from 27,553 tons in 2015. Nitrogen-based fertilizers accounted for 80 percent of total consumption (Table 13), followed by phosphate- and potash-based products (approx. 10 percent each). Demand increased at similar rates for all types of fertilizer between 2015 and 2020.

The use of improved rice seed grew slowly between 2015 and 2018 (Figure 46). The quality of seed is a significant determinant of rice yields. Notably, the utilization of improved seed for rice cultivation was four times greater than for maize. The government of Madagascar, in collaboration with international organizations and local NGOs, has implemented several programs aimed at increasing the adoption

Figure 46: Improved rice seed use remains low



Source: Ministère de l'agriculture et l'élevage, Division Statistique Agricole.

Table 13: Nitrogen-based fertilizer use has doubled since 2015

Parameter/sub-parameter (Tons)	2015	2016	2017	2018	2019	2020
1. Total fertilizer consumption (N+P, N+P+K) in Tn, Fc	27,553	42,092	47,446	49,818	54,576	50,279
1a. Consumption of nitrogen-based fertilizers (N, FAOSTAT code 3102) in Tn, Fc1	21,267	33,463	37,957	39,854	44,039	40,076
1b. Consumption of fertilizers made from phosphate (P, FAOSTAT code 3103) in Tn, Fc2	2,735	4,312	4,745	4,982	4,982	4,982
1c. Consumption of fertilizers made from potash (N, FAOSTAT code 3104) in Tn, Fc3	3,550	4,317	4,745	4,982	5,555	5,221

Source : Ministère de l'agriculture et l'élevage, Division Statistique Agricole.

of improved seed varieties. These programs have focused on developing and distributing high-yielding and disease-resistant rice seeds to farmers, particularly those in remote and disadvantaged areas. However, yields remain low in these areas which implies that there is still a need for further investment and support in the rice sector, particularly in the areas of research and development, seed production, and distribution.

Rice yields by region

Rice production levels vary significantly across the regions. Across the country, rice production was low in 2017 and increased in subsequent years. Between 2017 and 2020, the top producing region was Alaotra-Mangoro, followed by Vakinakaratra and Sofia, in the highlands. On the contrary, production was lowest in Androy, Ihorombe, and Betsiboka (Figure 47).

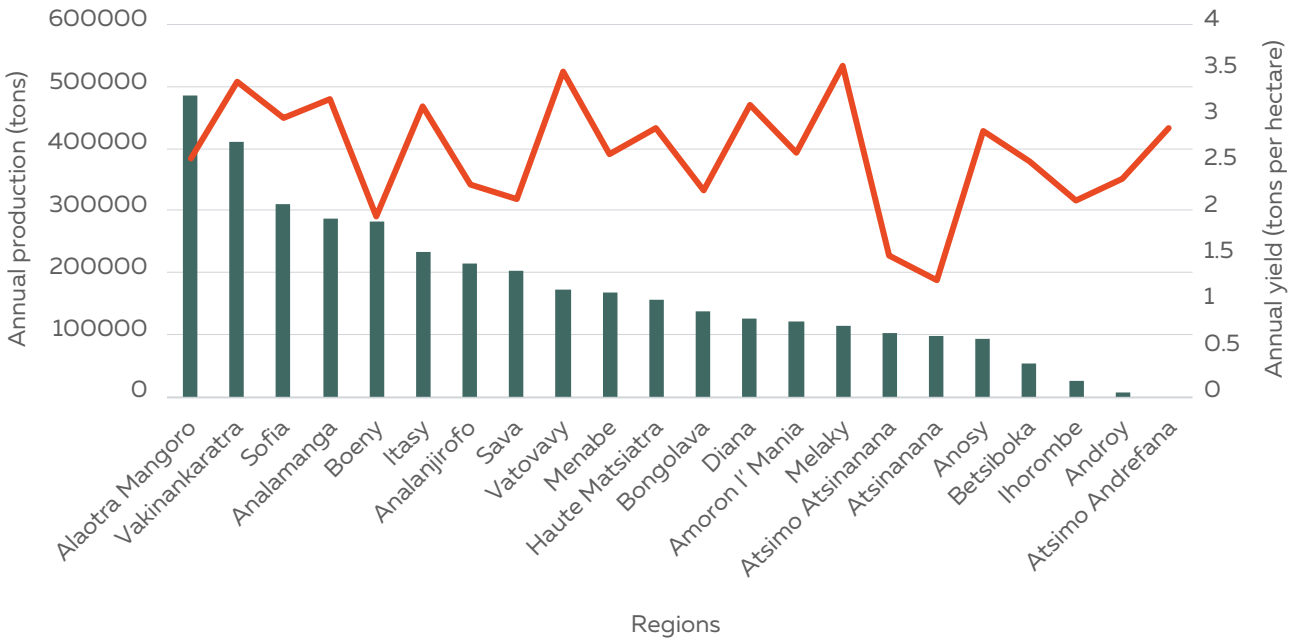
Rice production tends to be higher where more land is allocated to it, as in Alaotra-Mangoro and Vakinakaratra. However, this is not the case everywhere. For instance, although more land is allocated to rice in Ihorombe than in Sofia, production in the latter region is significantly higher. This is a consequence of regional differences in yields that are related to factors such as quality of soil and seed, access to irrigation, and climate. Notably, certain high-production regions only have average yields (Figure 47) indicating significant room to increase their output.

Rice yields have been stagnating around an average of less than 2.5 t/ha. Production growth in recent years was mostly driven by increased allocation of land. On the other hand, yield growth has been held back by the poor state of irrigation infrastructure and damaged by repeated cyclones and siltation (as most irrigation schemes lack functional sediment extraction at the head of the main canal).

Rice marketing

Rice production is highly seasonal, reflecting the inability of the sector to prices. The vast majority of rice farmers rely on a single harvest, usually in May and June, and sell most of their output immediately (Minten et al., 2006; Barrett, 1996, 1997).

Figure 47: Rice production in highland regions is significantly larger than elsewhere (average 2012 – 2015)



Source: Ministère de l'agriculture et l'élevage, Division Statistique Agricole.

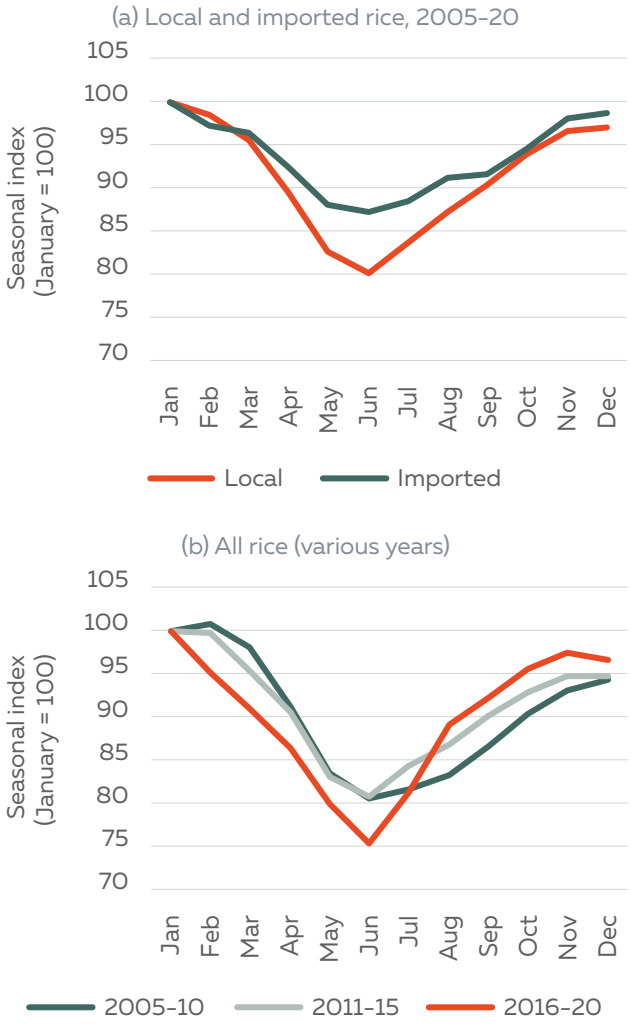
Water access and temperature prevent second or third cropping seasons, which are common in other rice-growing countries.[36] The seasonal nature of rice production and sales is reflected in various attendant costs—e.g., storage—which prompt substantial seasonal fluctuations in prices (Figure 48). On average, between 2005 and 2020, seasonal rice prices on the local market oscillated by 20 percent—peaking in January and bottoming out in June, when most rice is sold (Minten et al., 2006).

More concerning, prices also vary on a regional basis. Figure 49 shows how local rice prices across various regions compare with the price in the major rice-producing area of Alaotra-Mangoro. Notably, average rice prices are comparatively higher in areas more distant from this major producing hub—including in southern regions such as Anosy (+18 percent), Androy (+26 percent), and Atsimo Atsinanana (+15 percent), and in northern regions such as Diana (+24 percent) and Sava (+22 percent). This implies that no arbitrage opportunities are being exploited because of artificial market restrictions.

Large price differences across regions are consistent with previous analyses showing a lack of market integration in Madagascar. For example, using community-level rice price data, Moser et al. (2009) estimated that the integration of markets across regions was poor, mostly due to prohibitively high transportation costs. The analysis showed that while markets were well integrated at the sub-regional level, rural market fragmentation was significant at the regional and national levels. This pattern has become more apparent in the past decade (Figure 50).

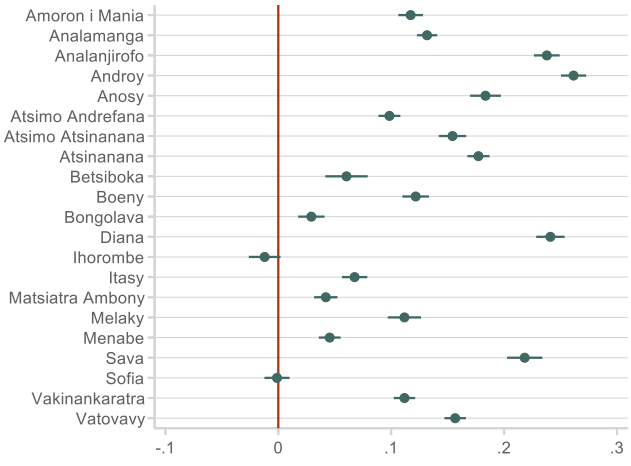
Regional rice price differentials rose substantially between 2005 and 2020, as deteriorating road conditions contributed to weakening market integration. Dorosh et al. (2022) analyze price differentials between various regions and Alaotra-Mangoro over time, splitting price data from the *Observatoire du Riz* (OdR) into five-year intervals. Such differentials increased over time, indicating that marketing costs across the country increased, in percentage terms, relative to the same costs in Alaotra-Mangoro (Figure 50a). For example, while rice prices in Itasy were 3.9 percent higher than in Alaotra between 2005–10, the difference increased to 6.8 percent from 2011–15, and to 13.5 percent between 2016–20. A largely consistent pattern emerges when considering absolute differences in price levels (Figure 50b). Among the regions analyzed, only one experienced a decline in relative prices from 2016–20 compared with 2005–10, while absolute differences declined in three regions.

Figure 48: Rice prices bottom up at mid-year



Source: IFPRI, 2022.

Figure 49: Price variation is substantial across regions, reflecting lack of arbitrage

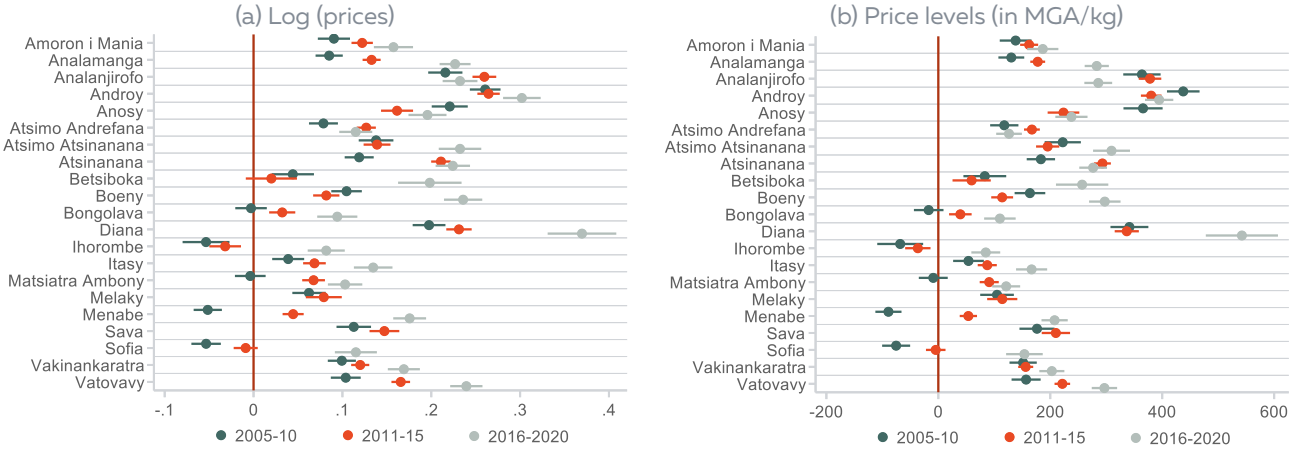


Note: Difference in regional rice prices relative to price in Alaotra-Mangoro, 2005-2020. The scale (e.g., 0.1) on the x-axis indicates a 10 percent difference with the price in Alaotra-Mangoro.

Source: IFPRI, 2022.

[36] Functional irrigated areas exist in Madagascar where multiple rice crops are harvested each year, but they only account for a small share of the total land allocated to rice.

Figure 50: Regional price variation has widened in the last 5-10 years



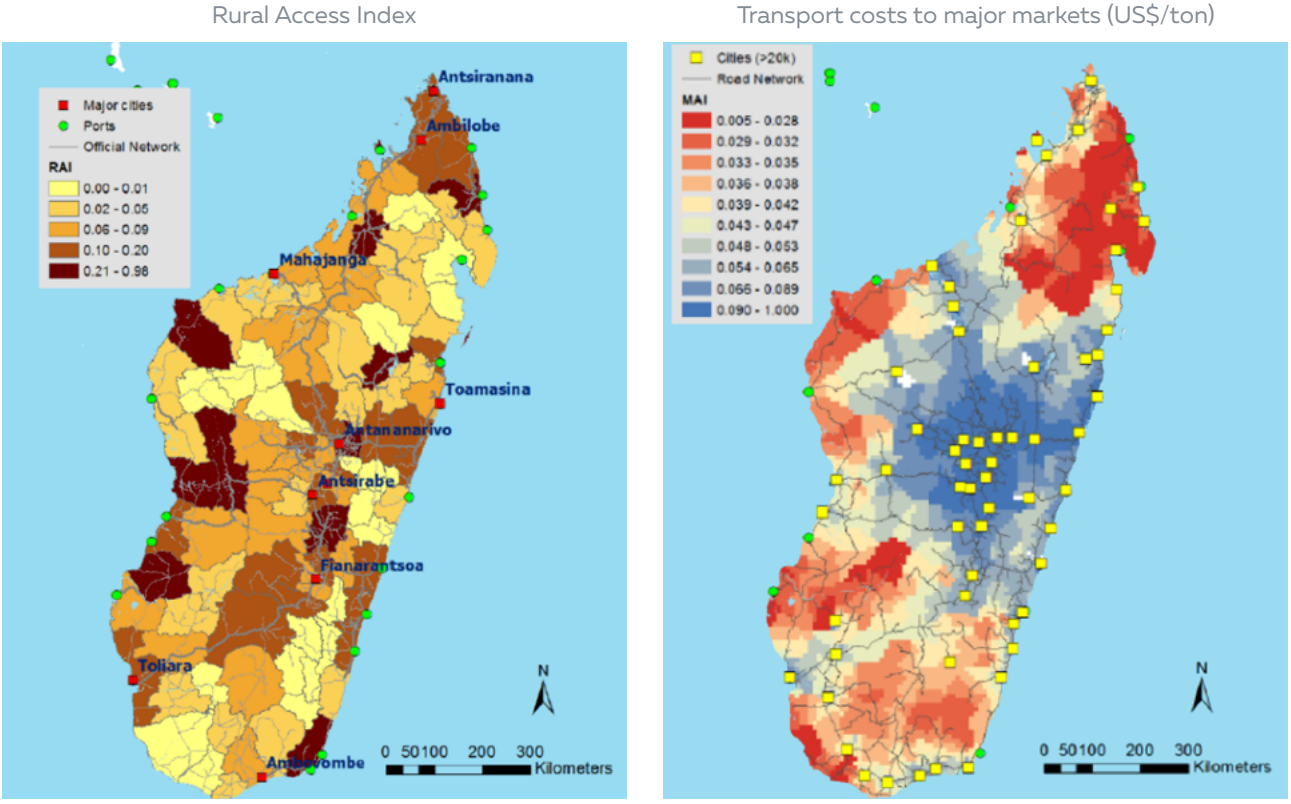
Note: Difference in regional rice prices relative to price in Alaotra-Mangoro from 2005–10, 2011–15, and 2016–20 Source: IFPRI, 2022.

5. Marketing and post-harvest management

Market access and marketed surplus

Market access is a major constraint for agrarian communities in Madagascar. In Madagascar, limited transport connectivity is a common constraint across all sectors. The country possesses important transport infrastructure, including roads, railways and ports. However, their quality is generally poor due to past underinvestment and under-maintenance. Only 11.4 percent of the rural population has access to good road networks (Map 8). This is lower than the previous estimate in 2006, which was 25 percent. Rural accessibility differs significantly between semi-urban areas and the rest of the country. RAI is estimated at greater than 80 percent in Toamasina, Mahajanga and Antsiranana Districts. In most rural districts, rural accessibility is less than 5 percent.

Map 8: Rural access and transport costs are correlated



Note: The higher the RAI value, the greater the proportion of the rural population who live within 2 km of an all-season road. Source: World Bank, Madagascar Urban Transport Report, 2021.

Table 14: Most sales, except for cash crops, take place through markets

Sales (%)	Market	Households/ Individuals	Cooperatives	Intermediaries	Others
Rice	61.0	21.3	1.3	15.9	0.4
Other cereals	59.5	12.0	1.1	27.1	0.3
Tubers	71.3	16.1	0.5	11.9	0.3
Legumes	74.3	9.6	0.7	14.5	0.9
Vegetables	76.8	10.6	1.4	10.9	0.4
Fruits	67.0	14.0	1.5	14.2	3.3
Other crops	45.6	25.3	5.5	21.4	2.2
Cash crops	21.8	17.8	6.0	53.8	0.7
Average	61.2	17.2	1.7	19.4	0.6

Source: Author's calculations based on 2021–22 EPM data.

Table 15: Farmers lack basic storage solutions for most of their crops

Storage type (%)	Rice	Other cereals	Tubers	Legumes	Vegeta-bles	Fruits	Other crops	Cash crops	Total
Granary (inside house)	3.8	5.9	13.0	2.3	11.8	12.7	9.0	3.6	7.1
Granary (outside house)	13.9	7.5	5.5	7.6	9.2	7.3	3.9	13.8	9.9
Store	7.1	1.8	2.5	2.8	1.1	3.7	4.2	8.6	4.7
Shed	4.8	6.1	3.7	5.5	2.1	7.0	2.6	2.5	4.4
Roof of house	26.4	38.6	18.3	35.4	10.7	5.3	7.2	4.8	23.2
No storage	25.7	26.4	48.6	33.5	58.7	57.0	62.7	50.9	37.1
Other	18.2	13.8	8.4	13.0	6.5	7.0	10.4	15.8	13.6
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: Author's calculations based on 2021–22 EPM data.

Sales outlets vary across crop types. Vegetables, legumes, fruits, and cereals such as rice are generally sold through markets, while cash crops such as vanilla are often sold to third-party intermediaries (Table 14). Direct sales to households or individuals are another major channel, while less than 3 percent of all fruits and vegetables are sold to cooperatives and other buyers.

Storage dynamics

Most agricultural produce in Madagascar is not stored properly. Unsold produce should ideally be stored for household consumption, or for replanting in the following season. However, as shown in Table 15, over half of unsold produce is either stored in suboptimal conditions on house roofs, or not stored at all. More affluent households can store their unsold produce in granaries, placed either inside the house (often used for tubers, fruits, and vegetables), our outside (mainly used for rice, cash crops, and vegetables).

Limited storage capacity will lead to spoilage, food insecurity, and low food diversity. The limited storage capacity for farmers can have serious implications on food security and spoilage. In fact, early result from a seed system assessment in the South of Madagascar estimated that 35 percent of harvest is spoiled due to poor storage.[37] Spoilage is a major problem when farmers do not have access to appropriate storage infrastructure to keep their produce fresh for a longer period of time. This results in significant losses and reduces the availability of food for both the farmers and consumers. Moreover, limited storage infrastructure can also affect food security, particularly in regions where food production is the primary source of income for many households. Inadequate storage facilities make it difficult for farmers to preserve their produce and sell them at a later time when prices are higher. This can lead to a surplus of produce during peak harvest season, which lowers prices and reduces the income of farmers. Additionally, limited storage infrastructure can also lead to a lack of diversity in the types of crops that farmers grow. When farmers do not have access to appropriate storage methods, they may be forced to focus on crops that can be sold quickly, rather than those that require longer-term storage. This can limit the variety of food available in the market, which in turn can affect the overall nutritional value of people's diets.

[37] The is a result of a presentation by Seed System at the Madagascar World Bank Office in June 8th as part of an ongoing study of emergency seed system funded by the agricultural practice group.

Chapter 3

As urban markets fail, urban poverty rises

Key findings

Urban poverty increased from 42.2 percent in 2012 to 55.5 percent in 2022. This represents a 31.5 percent increase in a decade. In the capital city of Antananarivo, poverty increased minimally, from 33.3 to 34.8 percent, but in secondary cities it rose from 46 percent in 2012 to 61.1 percent in 2022. While rural consumption grew mostly among the poor, it dropped for virtually all urban households, particularly those in middle deciles. Going further back, urban poverty increased in 2001-2005, 2010-2012, and 2012-2022, which follow closely the 2002, 2009, and 2020 crises. This confirms that urban areas are vulnerable to political and external crises, whereas rural areas are more sensitive to weather-related shocks.

Even before the pandemic, urban markets suffered a steady deterioration which ultimately resulted in higher monetary and multidimensional poverty. In the last decade, declining economic opportunities and an unfriendly business environment eroded private investment, firm productivity and economic growth. Market concentration further exacerbated the situation as dominant firms maximized rents and avoided competition. Market capture in key sectors such as telecommunications, petroleum and agricultural exports ended up increasing prices and worsening the quality of services for consumers. Ultimately, urban households saw increasing deprivation in education and living standards, partly due to inadequate infrastructure and services, and to lack of employment opportunities.

The disproportionate impact of the pandemic on urban households further increased urban poverty. Despite a relatively low number of COVID-19 cases, the country experienced a deep recession, causing a significant contraction in GDP and income per capita. This resulted in an estimated 2.4 million people falling below the international poverty line. The government's border closures and restrictions on public gatherings helped control the spread of the virus but negatively impacted urban households, particularly those dependent on trade, transport, hospitality, as well as informal labor. The measures affected livelihoods and the gradual recovery of incomes was observed only after the reopening of the country's borders in early 2022.

Against the backdrop of failing labor markets, returns to education are declining. The country has made progress in primary and secondary school enrollment rates, but net secondary completion rates still remain below the low-income country average. Education is positively correlated with earnings and the returns to education, especially post-secondary, continue to be high, especially for men. However, regression analysis shows that returns to education are significantly higher for older cohorts than for younger ones. This suggests that education is less likely to bring people out of poverty fast, either because education has lost quality or because there are so few jobs in the market that most educated people end up in low paid employment.

Lack of opportunities and low aspirations are intertwined factors contributing to urban poverty. Insufficient investment in education, healthcare and urban infrastructure limits human capital development and economic activity and increases poverty traps. Low real income reduces access to finance and investment opportunities. The dominance of the elite in political and economic spheres creates a sense of hopelessness among the urban population, leading to diminished aspirations. Low education and weak social cohesion further hinder individuals' ability to demand government services and participate in their communities, exacerbating the poverty trap.

1. Defining poverty in an urban context

Urban living conditions had been deteriorating in the last decade and worsened further with the COVID-19 pandemic. In 2020, GDP contracted by 7.2 percent and average income per capita fell by 9.8 percent, with a disproportionate impact on urban households. Job losses in sectors such as transport, tourism, and trade, delayed salary payments, and declining revenues in the informal sector hurt urban workers disproportionately. However, urban centers had been suffering even before the pandemic (Jarotschkin, 2023; OPHI, 2022; UNDP and OPHI, 2022). A deteriorating business environment,

where few firms dominate key sectors, discouraged private investment and depressed firm productivity and job creation. Since the early 2000s, high taxes and government bureaucracy have impeded growth in the business sector in Madagascar (Cadot and Nasir, 2001).

Urban poverty rose significantly between 2012 and 2022, particularly in secondary cities, where it jumped from 46 percent to 61 percent. This trend stemmed from an overall drop in income among urban households, which was especially acute for those in the middle of the income distribution. While declining consumption levels in urban areas boosted urban inequality, rural consumption increased, resulting in a slight reduction of rural inequality.[38]

The increase in urban poverty has significant implications as the share of urban population is projected to increase further. According to the official definition of an urban area (INSTAT, 2021c) urbanization has been relatively slow in the country between 1975 and 2018, going from 16 to 19 percent. However, by other accounts, the urban population could be close to 40 percent (Box 1). Indeed, the World Urbanization Report (United Nations, 2018) suggests a definite upward trend where the population residing in urban areas increased from 7.8 in 1950 to 37 percent in 2022. Against a backdrop of potentially faster urbanization than in other Sub-Saharan African countries, urban poverty is set to become a pressing issue in Madagascar.

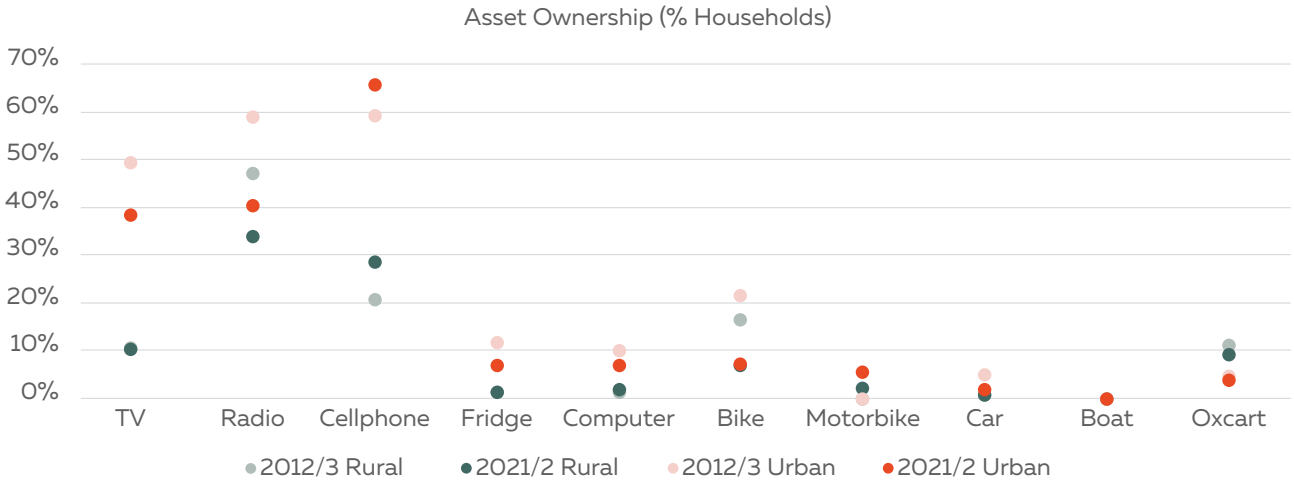
Asset ownership, and mobile phone ownership in particular, is inequitably distributed across space and gender. On average, households own only two out of 15 main assets across Madagascar.[39] Ownership is even more limited in rural areas, where the majority of households own less than two assets. Overall, radio is the most commonly owned asset (61 percent of households), followed by mobile phones (47 percent), TV (22 percent), and bicycle (19 percent). Some spatial variation, even among rural areas is noticeable, with fewest assets owned in Androy region, Toliara province (Figure 51). In parallel, men-headed households own disproportionately more assets than women-headed ones. Inequities along gender and space particularly hold for mobile phone ownership. The latter has been linked to higher important productivity gains, due to improved information on prices, and better connectedness to relevant markets. Yet, mobile phone ownership was very low in Madagascar in 2008 overall, except for the capital city. The share of households with access to at least one mobile phone improved across different regions in 2018. Yet, the spatial pattern with more Southern regions being disadvantaged in terms of access rates, both in 2008 as well as in 2018, prevailed. At least 4 in 10 households had a mobile phone in the central and northern regions, whereas 2-3 households in 10 reported access to at least one mobile phone. In general, urban households were more likely than rural ones to own a mobile phone with households headed by men more often having a mobile phone than those headed by women (Table 16). And finally, younger generations in the 18-24 age bracket reported lower access rates than older individuals (24 through 49).

Box 1: Urban and Rural definitions for poverty analysis

Several definitions of what constitutes an urban area are used for analysis in Madagascar. The *Institut National de la Statistique* (INSTAT), which carries out the National Population and Housing Census, uses commune boundaries as reference,[40] and defines as urban any commune with a population of at least 20,000. According to INSTAT, as of 2018, 19 percent of Madagascar's 25.7 million inhabitants were urban residents. However, the *Ministry of Territorial Development and Land Services* (MTDLS), which oversees urban development, adopts a more granular definition of urban area in line with the EU-OECD standard. Using satellite imagery, the MTDLS defines cities as agglomerations characterized by a continuity of buildings, with a population of at least 5,000, and density of at least 1,500 inhabitants per km^2. Based on this definition, Madagascar's estimated urbanization rate in 2018 was 30 percent. Finally, the World Bank's World Development Indicators (WDI) define urban areas based on the criteria of the UN World Urbanization Prospects and estimate the country's urbanization rate at 37 percent. These projections are based on the 1993 Census, which is considered less accurate. The poverty assessment uses the INSTAT definition, as it informed the construction of the sample for the 2022 EPM survey. For this reason, our estimates should be considered a lower boundary.

[38] As discussed in Chapter 1, rural inequality decreased because the increase in consumption during this period was highest among the poorest rural households and much lower in upper deciles.
[39] List of main assets: Bicycle, computer, radio, sewing machine, mobile phone.
[40] The Ministry of the Interior and Decentralization oversees the definition of the administrative status of communes.

Figure 51: Asset ownership fell in urban and rural areas



Source: Author's calculations using 2021/2 EPM data.

Table 16: Asset ownership is heavily urban and male

	Head	Mobile (%)	Computer (%)	Radio (%)	Sewing machine (%)	Bicycle (%)
Overall	Men	48.2	4.7	64.1	4.8	21.0
	Women	43.9	3.7	50.0	5.4	11.0
Urban	Men	77.2	16.4	77.3	10.3	23.5
	Women	73.3	11.3	66.3	10.0	13.2
Rural	Men	41.0	1.9	60.9	3.5	20.4
	Women	34.0	1.2	44.5	3.8	10.3
Antananarivo	Men	57.8	9.6	77.6	6.3	28.2
	Women	53.8	9.1	68.1	7.2	11.7
Fianarantsoa	Men	35.6	2.1	59.6	3.3	11.0
	Women	33.7	2.0	45.9	3.9	6.5
Toamasina	Men	43.7	3.5	63.8	5.6	22.7
	Women	44.8	3.5	50.3	6.6	13.0
Mahajanga	Men	47.8	2.6	59.9	3.4	15.3
	Women	43.9	2.1	48.9	4.2	9.4
Toliara	Men	38.7	1.7	41.6	2.8	17.2
	Women	30.8	1.1	28.8	3.0	10.6
Antsiranana	Men	66.1	3.9	71.5	6.8	28.3
	Women	61.5	2.9	58.7	7.9	16.3

Source: Authors' calculations based on 2018 Madagascar Census.

Staggering changes in well-being and the role of secondary cities

Deteriorating access to basic services and infrastructure undermine the potential and well-being in urban communities. Urban areas have better access to transportation and communication networks, including roads and telecommunication services.[41] This comparative advantage is the reason why the urban areas are often considered growth poles since their superior amenities attract key industry around which linked industries develop mainly through direct and indirect effects. However, deteriorating access to basic services are a growing concern, especially in medium and small cities. Urban transport services are mostly "informal" and loosely regulated.[42] Solid waste management remains underdeveloped as most cities do not have a sufficient supply of landfills, creating serious environmental and public health concerns.[43] Access to direct water, sanitation and electricity remains concentrated in the capital city and the six large cities (Ansiranana, Antsirabe, Toliara, Mahajanga, Toamasina, and Fianarantsoa).[44] Both medium- and small-size cities are deprived of these amenities, making them comparable to rural areas (Table 17). Moreover, asset ownership declined in urban areas in the last decade, possibly as households used their assets to cope with income losses (Figure 51).

[41] For instance, only 10 percent of the rural population has access to electricity, compared with 50 percent of the urban population.
[42] Transport services are often overconcentrated where the demand is high, increasing traffic congestion in urban areas, while less populated, often poor, areas or remote suburban areas are left unserved (Iimi, 2022; Iimi et al., 2022). Urban residents use different types of transport modes, such, minibus, also called "taxibe", tuktuk and rickshaw bicycle (Iimi, 2022). These transport services are largely "informal" and loosely regulated. Because of limited urban space for road and the informality of the sector, their operations are generally inefficient and unsafe, though perhaps cheap. In Antananarivo where the people's mobility is most constrained, half of the residents still just walk, not using any public transportation. An average trip in Antananarivo takes 46 minutes one way, twice longer than those in other secondary cities where people commute 15-25 minutes. Because of the lack of efficient and reliable transportation, people are currently missing opportunities to be paid better, which are concentrated in the center of the city.

Table 17: There are wide gaps in access to services between large and small cities

	Capital City	Major Cities	Secondary Cities	Rural Towns
Electricity in dwelling*	33.64	31.19	31.22	30.79
Piped water in dwelling	5.03	4.01	3.69	3.04
Paved roads in community	86.47	73.09	41.98	15.27
Regular daily transport in community	89.19	70.30	47.59	21.16

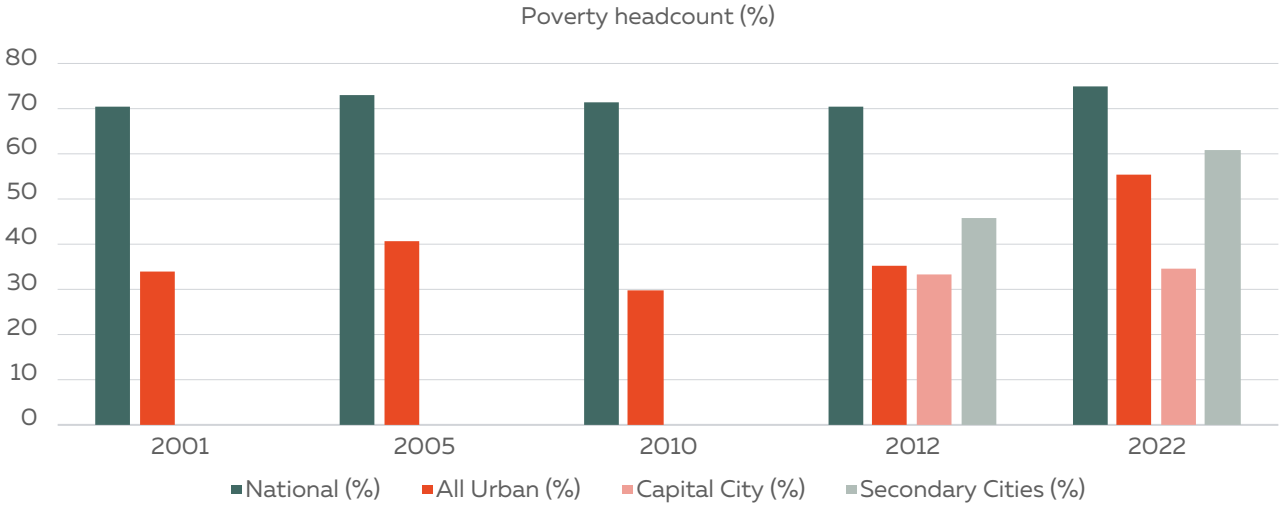
Source: Author's calculations using 2021/2 EPM data.
**Connection to electricity includes direct connection, connection via neighbor, and solar panels.*

Although economic activity is concentrated in urban areas, most employment remains informal and precarious. While agriculture contributes to approximately 25 percent of Madagascar's GDP while employing more than 70 percent of the population (World Bank Group, 2022) urban areas benefit from a wider range of economic activities—including manufacturing, construction, and services—that in principle offer more employment opportunities and higher incomes. Indeed, cities with more than 100,000 inhabitants host most private sector salaried employment, as they are home to most large firms and MSMEs. Not surprisingly, about 75 percent of the country's GDP is estimated to come from cities (IOE, 2023). Still, the urban labor market is largely informal, with only 12 percent of the country's urban labor force being formally employed, often in low-wage jobs that offer little social protection.[45] The unemployment rate is low, and the labor market participation rate (75.4 percent) is on par with comparator countries—indicating that a significant proportion of the working-age population is economically active. However, most jobs offer low pay, and poverty rates among low earners remain very high.

Moreover, cities are vulnerable to natural hazards that can lead to massive damages and the reversal of developmental gains and coastal cities are especially exposed. Thirty percent of urban communes are coastal cities (70 percent of medium size cities). Soalala, Morondava, and Toliary on the west coast are projected to be amongst the total proportion of built-up areas exposed to sea level rise. Mahajanga, Toamasina and Manakara are also located within coastal erosion zones and the latter is highly exposed to cyclone. Unfortunately, exposure to sea-level rise will increase if global climate mitigation efforts fail to substantially reduce greenhouse gas emissions. As Iimi (2019) shows, climate disasters can also adversely affect the economic outcomes in Antananarivo in a significant way.

In contrast to rural poverty, which is sensitive to weather shocks, urban poverty is sensitive to political and external shocks. The urban poverty rate rose from 42 percent in 2012 to a staggering 56 percent in 2022, and even more in secondary cities, where it soared from 46 percent to 61 percent (Figure 52). Urban poverty increased between 2001 and 2005, from 2010 to 2012, and from 2012 to 2022, which corresponds closely to the 2002, 2009, and the 2020 crises. In a way this means that urban areas are vulnerable to crises, but unlike rural areas that are vulnerable to weather shocks, urban areas are vulnerable to political and most recently pandemic-related crises. The impact of these shocks is amplified by poor urban planning and delayed policy implementation.

Figure 52: Secondary cities drive the expansion of urban poverty, 2001–22

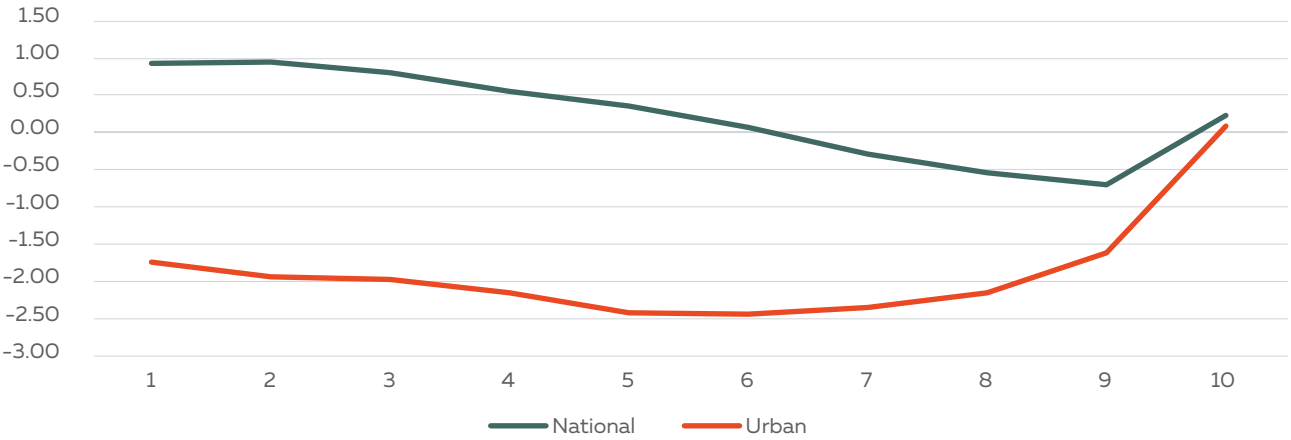


Source: Author's calculations using 2021/2 EPM data.

[43] Antananarivo has only one landfill, Andralanitra, where 3,000 waste pickers live and was created in 1960.
[44] Throughout this chapter we will distinguish major urban center from secondary urban centers. Major urban centers often include the capital cities with the six cities with more than 100,000 inhabitants and secondary cities refers to both medium- and small-size cities between 5,000 and 100,000 inhabitants. There circumstance in the chapter when Major urban centers are separated from the capital city and explicitly mentioned.
[45] We define formally employed if an employee is registered with the national pension system CNAPS.

Figure 53: Urban consumption fell throughout the distribution

Annualized consumption growth rate (%) across consumption deciles



Source:Author's calculations based on 2021–22 EPM data.

The rise in urban poverty stems from a broad decline in income among urban households. Between 2012 and 2022, consumption growth at the national level was low, and income gains were concentrated among the very poor in rural areas and those in the wealthiest decile. While consumption grew in rural areas in a way that generally benefited the poor, it dropped among urban households (Figure 53). This indicates that income losses were felt most acutely by urban households, particularly those in the middle-income bracket, leading to an increase in the prevalence of urban poverty.

Urban poverty has become increasingly deep and severe. Between 2012 and 2022, the urban poverty gap increased from 14.6 to 20.6 (i.e., the average poor urban household lives on 20.6 percent less than the amount equivalent to the poverty line), and the urban poverty gap square went from 6.9 to 10.1, implying increased poverty severity (Table 18). Decreasing asset ownership in urban areas reflects the greater depth and severity of poverty. In fact, urban households owned fewer televisions, radios, fridges, computers, bikes, and cars in 2022 than in 2012 (Figure 51). Other factors such as the use of more advanced technical gadgets like smartphones might have contributed to the observed changes, but that applies to a very small percentage of the urban subgroup.

Table 18: Poverty gap and poverty gap squared increased in urban areas

	2012	2022	2012	2022
	Poverty gap		Squared poverty gap	
National	33.4	32.5	18.7	17.3
Urban	14.6	20.6	6.9	10.1
Rural	38.1	35.3	21.7	19.0

Source: Author's calculations based on 2021–22 EPM data.

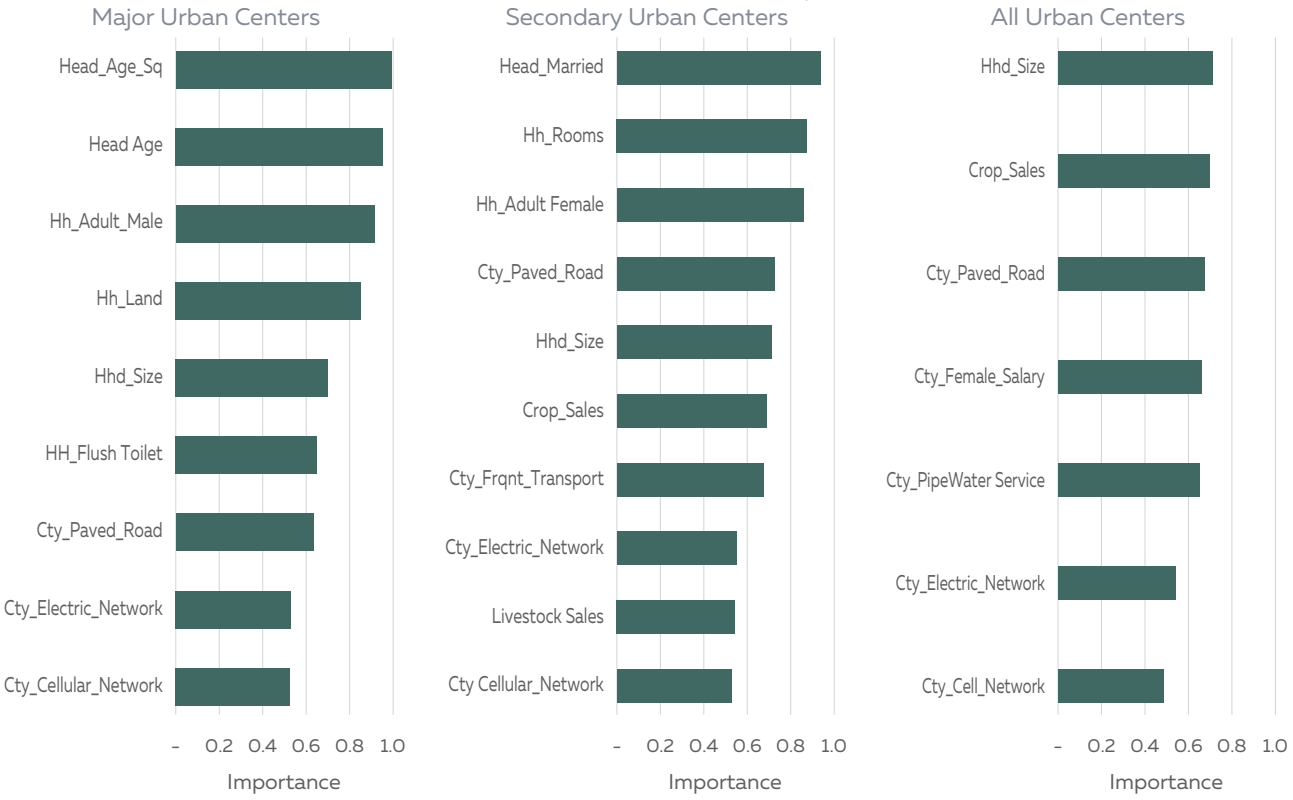
How do urban poor households distinguish themselves from rural poor households?

Urban poverty is linked to both household-level characteristics and community-level access to services. A random forest analysis (Box 2) of poverty predictors is presented in ranking each indicator by importance, from top to bottom (Figure 54). For all urban areas, household size and revenue from crop sales are the most important household-specific predictors of poverty, while access to paved roads, piped water, the electricity grid, and mobile network coverage are crucial community-specific predictors. As stated in Chapter 1, women's casual wage rate in the community is an important predictor of urban poverty.

Box 2: Predicting poverty through Random Forest Analysis

Using the 2021/2022 EPM data, the estimation distinguishes between household-specific characteristics that can be used for instance to inform the design of proxy means testing for urban social assistance programs; and community-specific characteristics, whose patterns can help prioritize investment policies. The analysis encompasses all urban areas, and separate assessments for major and secondary cities—with the latter emerging as hotbeds of urban poverty. It is important to note that the figures reported are not regression coefficients but express the relative importance of each indicator. All indicators are statistically significant determinants of urban poverty, but some have a greater effect/importance than others.

Figure 54: Demographic characteristics, infrastructure and economic opportunity are the main predictors of urban poverty



Source: Author's calculations based on 2021–22 EPM data.

The poor who live in major cities have different features from those in secondary urban centers. Key predictors of poverty in major urban centers—such as Antananarivo, Toamasina, Antsirabe, Tolear, Fianarantsoa, Mahajanga, and Antsiranana—include household characteristics such as the age of the household head, the number of adult males in the household, land size, household size, and whether the house has a flushing toilet (Figure 54). In contrast, the key household-specific predictors of poverty in secondary urban centers (encompassing small and medium-sized cities with a population between 5,000 and 100,000) are the marital status of the household head, the number of rooms in the household, the number of adult women in the household, household size, and revenues from the sale of crop and livestock. The major community-specific predictors of poverty related to access to key infrastructure (e.g., transportation networks, the electricity grid, and mobile cellular networks) and were similar across all urban centers.

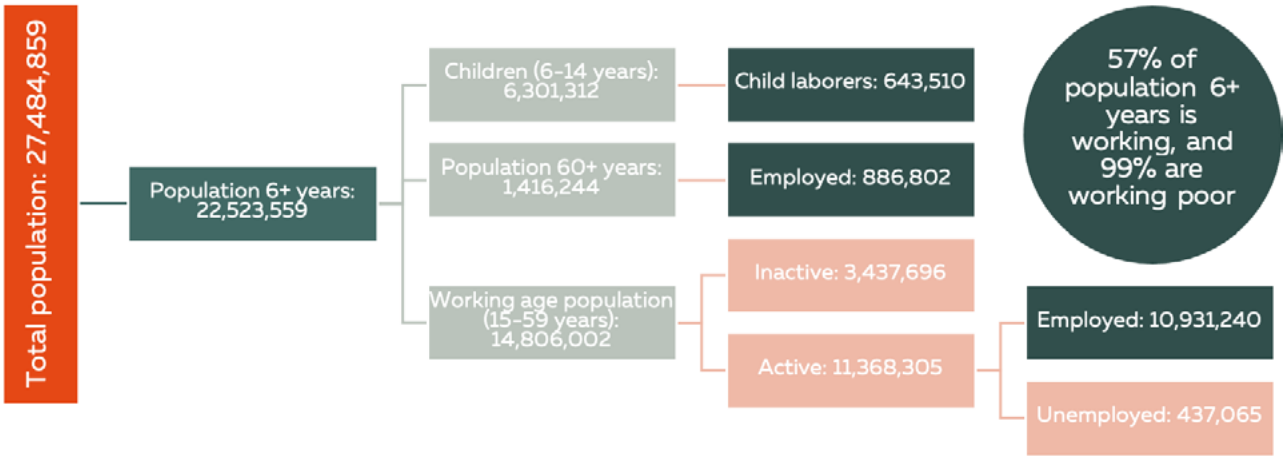
In conclusion, household size, revenue from crop sales, access to paved roads, piped water and the electricity grid, and mobile network coverage are crucial predictors of urban poverty across all urban areas. Major and secondary cities exhibit different household-specific predictors but share similar community-level characteristics. Based on these findings, a typical poor urban household has a large number of members, low revenue from agricultural activities, and limited access to basic utilities such as paved roads, water, and electricity. Higher female casual wage rate is also an important predictor of urban poverty on average, highlighting the link between women's empowerment and urban poverty. These results can help guide policymakers in designing more effective poverty alleviation programs and investment policies for different types of urban centers.

Urban labor market dynamics and their poverty impact

At the national level, most of the working population is in the informal sector, earning low wages. Figure 55 shows that out of the estimated population of Madagascar (27.5 million), 2.3 percent are child laborers, 3.2 percent are employed elders beyond the age of 60 and 39.8 percent are workers aged 15 to 59 years. Among the 10,931,240 individuals in the working age population who are working, only 760,000 are registered in the national pension fund. This implies that only 7 percent of workers are formal. The rest are in the informal sector and generally underpaid. Indeed, an analysis of the 2021/22EPM data shows that 99.8 percent of employed individuals are working poor.[46] The work-

[46] An individual is classified as working poor if he or she is (a) employed and (b) living in a household with per capita consumption or income below the poverty line. The working poverty rate is the proportion of working poor in total employment: working poverty rate = number of employed persons living in a household with per capita consumption or income below the poverty line/total employment * 100 (Pietschmann et al., 2016).

Figure 55: Over half the population 6+ years old needs to work



Source: Author's calculations using 2021/2 EPM data.

ing poverty rate is highest in the agriculture and mining sectors at 100 percent and lowest at 91.8 percent for technical and scientific professionals.

Likewise, the urban labor market features high rates of informality and a significant gender gap in employment opportunities. According to the World Bank's urbanization review (World Bank, 2021a) as of 2021, trade accounts for the largest share of urban employment, followed by services—such as transportation, restaurants, and retail—and manufacturing, which is dominated by textile. Unfortunately, since wages in manufacturing such as textile are kept low, most urban poor do not make a decent living from urban employment since most jobs are considered unskilled (Nicita, 2006).

The average urban worker earns significantly more than their rural counterpart, but wages remain low, particularly in the informal sector. According to a 2020 report by the International Labor Organization, the median monthly wage for urban workers in Madagascar was around MGA 200,000 (approximately US$48), compared with around MGA 100,000 (approximately US$24) for rural workers (ILO, 2020). However, most urban workers in Madagascar earn less than the national minimum wage, currently set at MGA 200,000 per month.

Data from the 2021/22 EPM survey shows a relatively tight labor market, with the urban unemployment rate at 8.2 percent. The employment-to-working-age-population ratio was 73.8 percent, indicating that a large proportion of the working-age population was employed (Table 19). However, most wage earners are considered low wage earners as they earn wage below the poverty line after adjusting for the dependency rate —with the poverty rate among low-earners reaching 72.6 percent. The share of low earners who worked long hours was 30 percent, and 11.7 percent of workers had two or more jobs. The Gini index for earnings was 63.8, indicating high income inequality in 2021/2.

Low earners in urban areas are more likely to work long hours than those in rural areas. Table 20 presents a comprehensive breakdown of the proportion of low earners engaged in full-time or more work,

Table 19: Labor market outcomes show most people work for very low wages

Urban unemployment rate	8.2
Employment-to-working-age-population ratio	73.8
Working age population as a fraction of total population	53.9
Child labor rate	10.2
Median earnings (MGA)	150,000
Median hourly earnings	1,226.6
Working poverty (% employed living in poor HH)	99.8
Poverty rates among low earners	72.6
Poverty rate among the unemployed	61.8
Share of low earners who have low earnings due to short hours	2.7
Share of low earners who work long hours	30
Share of non-low earners who escape low earnings due to long hours	8.6
Share of workers with two or more jobs	11.7
Share of workers with formal contract	17.3
Gini index for earnings	63.8

Source: Author's calculations based on 2021–22 EPM data.

Table 20: Close to half of urban low earners work full-time or more

Low earners who work full-time of more (% low earners)	29.9
Gender	
Male	35.4
Female	23.9
Age group	
15-24	25.0
25-54	32.7
55-64	26.3
Area of residence	
Urban	47.5
Rural	26.1

Source: Author's calculations using 2021/2 EPM data.

Table 21: Poverty among the working-age population is higher in rural areas

Poverty rate of working-age population (%)	
Employed	
Urban	50.2
Rural	73.5
Total	69.3
Unemployed	
Urban	45.2
Rural	68.7
Total	58.9
Inactive	
Urban	44.0
Rural	74.0
Total	65.7
Total working age population	
Urban	48.0
Rural	73.5
Total	68.1
Total population	
Urban	52.9
Rural	77.6
Total	72.9

Source: Author's calculations using 2021/2 EPM Data.

segmented by gender, age, and residential location. The number of hours worked by low earners holds significance because it sheds light on the reasons behind the persistent poverty among "wage earners". The hours worked, along with an already low income, contribute to their low standard of living. Interestingly, the statistics reveal a higher percentage of low earners working long hours in urban areas (47.5 percent) than in rural areas (26.1 percent). Additionally, men (35.4 percent) tend to work longer hours than women (23.9 percent), while workers aged between 25-54 years (32.7 percent) exhibit the highest proportion of long-hour work, followed by those aged 55-64 years (26.3 percent) and 15-24 years (25.0 percent). These outcomes suggest that there is a greater demand for low-skilled workers in urban regions, mainly in the retail, hospitality, and transportation sectors.

Poverty among the working-age population is more prevalent in rural than in urban areas. Table 21 presents the poverty rate of the working-age population in in 2021/2, disaggregated by employment status and across urban and rural areas. The poverty rate for the entire working-age population is 69.3 percent, but it is much higher in rural areas (73.5 percent) than in urban areas (50.2 percent).

Among the working-age population, the poverty rate for the employed is higher than for the unemployed or inactive. In urban areas, the poverty rate among the employed stands at 50.2 percent, versus 45.2 percent and 44.0 percent, respectively, for the unemployed and inactive. This is explained in part by the long working hours of employed people. In rural areas, the poverty rate among the employed stands at 73.5 percent, which is a higher than among the unemployed and almost on par with inactive population. These statistics suggest that while employment opportunities remain critical to reducing poverty, working people in Madagascar are so severely underpaid that they are often worse-off than those who do not work, especially in urban areas—i.e., the cost of supplying labor frequently exceeds the benefit.

2. Key drivers of increasing urban poverty

Several factors explain the rise in urban poverty. First, a long-standing decline in firm productivity has reduced opportunities in urban areas, which in turn suffer from lower returns to higher education than rural areas. The COVID-19 pandemic has exacerbated this issue in the short term. Second, a small elite controls a large share of the economy and fiercely resists competition, with a resulting drop in private investment to an all-time low of 17 percent of GDP as of 2021. Such "elite capture" has created a hostile environment for entrepreneurship and private sector growth, further narrowing the path to prosperity for urban residents. Finally, a lack of opportunities and limited social mobility have contributed to forming low aspirations among many urban households, which can potentially aggravate urban poverty.

The disproportionate impact of the pandemic on urban households

Despite a comparatively modest number of COVID-19 cases, the pandemic triggered a recession about three times deeper in Madagascar than in the rest of Sub-Saharan Africa. Export revenues and private investment collapsed in 2020, as GDP contracted by 7.2 percent and income per capita by 9.8 percent. As a result, an additional 2.4 million people are estimated to have fallen below the international poverty line in 2020, bringing the poverty rate to an all-time high of 80.7 percent. Rising poverty reflected job losses in sectors such as transportation, tourism, and trade, delayed payments of salaries (part of which is often remitted to poor relatives in rural areas), and declining revenues in the informal sector.

The first three COVID-19 cases, all imported, were confirmed on March 20, 2020, prompting the declaration of a state of emergency the next day. The state of emergency was lifted on October 18, 2020, after the end of the first wave which had reached its peak in July/August. The state of emergency was reinstated in early April 2021 due to the second wave. It was lifted again on September 4, 2021. The epidemiological situation worsened during the second wave, as the Beta variant of the virus hit Madagascar in March–April 2021—resulting in over 600 new daily cases on average and peaking with 854 new cases on April 14, 2021. The daily number of confirmed deaths dropped from a peak of 12.86 in December 2021 to 0.14 as of August 2022.

Major containment measures helped curb the spread of COVID-19 but had a negative impact on the economic welfare of many households. The state of emergency entailed the closure of borders, churches, and mosques; the prohibition of public gatherings; mandatory mask-wearing and handwashing; and curfews. While most measures were lifted along with the state of emergency, borders remained closed until March 2022. Unfortunately, the stringent measures affected livelihoods, especially among urban households reliant on activity in tourism, transport, and hospitality, as well as on informal labor.

To monitor changes in livelihoods, the government launched a series of High-Frequency Phone Surveys (HFPS). The HFPS were part of a wider initiative launched by the World Bank and several countries to track changes in household welfare as the pandemic evolved. The purpose was to provide a real-time understanding of the effects of the pandemic that could inform interventions and policy responses. The HFPS aimed to obtain information on dimensions including knowledge of COVID-19, access to basic services, household employment, and the subjective well-being of households. The survey aimed to track the same households over time, with selected respondents (typically the household heads) periodically completing a phone interview. Four rounds were conducted in the country. In the first round, 1,240 households were interviewed in June 2020. In August 2020, 1,580 households were surveyed—different from those surveyed in the first round. In the third and fourth rounds, 1,580 and 1,345 households were interviewed in November 2020 and May 2021, respectively. The results of the survey are representative at the national level for households with access to a telephone.

The onset of the pandemic caused a significant increase in unemployment worldwide, and Madagascar was no exception. According to the United Nations, "by 2020, the global unemployment rate reached 6.5 percent, up 1.1 percentage points from the previous year.[47] The number of people unemployed worldwide increased by 33 million, reaching 220 million." In Madagascar, the unemployment rate rose from 2.5 to 12.2 percent in 2020, starting with the declaration of the first state of emergency and the associated restrictive measures. In June 2020 alone, 7 percent of workers interviewed lost their jobs. The loss of jobs was greater in urban areas than in rural areas. However, the rate of job loss, which was high at the beginning of the pandemic, tapered off with time (Table 22).

Table 22: Urban households were disproportionately affected by pandemic-related job losses

Households that experienced job loss due to the pandemic (%)	June 2020	August 2020	November 2020	May 2021
Urban	15.3	8.5	0.9	0.8
Rural	6.3	3.2	0.1	0.3
All	7.0	4.4	0.3	0.5

Source: High Frequency Phone Survey 2020–21.

Malagasy households experienced a protracted period of income losses, probably linked to the closure of borders and its effects on the tourism industry—especially hotels, restaurants, and transport. In both June and August 2020, a large majority of households experienced a decline in income (Table 23). Although incomes had largely stabilized by November 2020, more than 30 percent of respondents still reported a decrease in income that month—likely due to the continued closure of the country's borders and its impact on tourism. Incomes started to rise for a minority of households after November 2020, pointing to a recovery in economic activity. The country eventually reopened its borders in early 2022.

[47] https://unstats.un.org/sdgs/report/2021/goal-08/#:~:text=COVID%2D19%20has%20led%20to,33%20million%2C%20reaching%20220%20million.

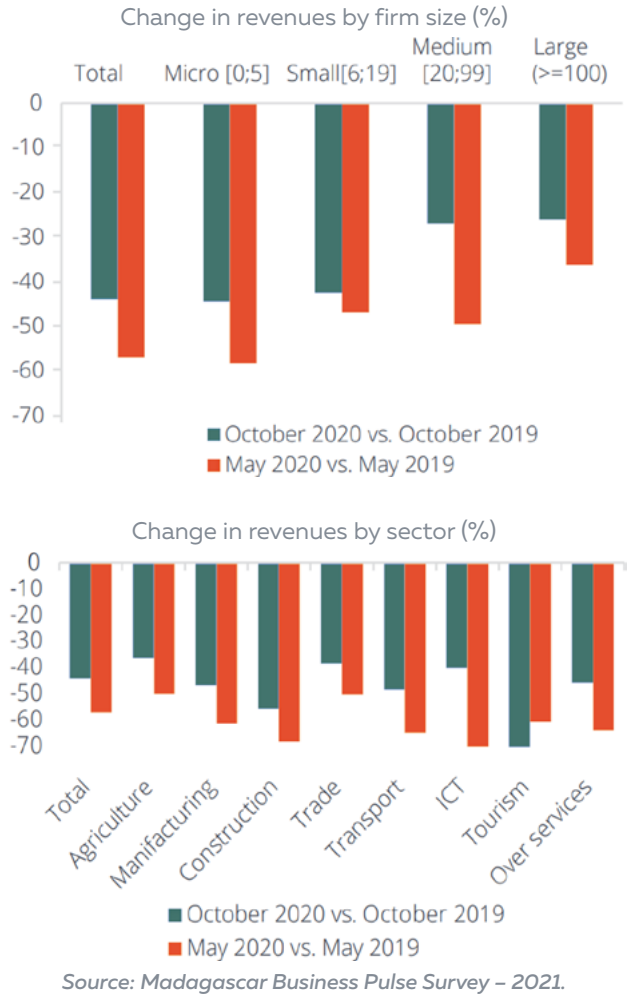
Table 23: Two-thirds of households lost income in 2020

Percentage of households (%)	June 2020	August 2020	November 2020	May 2021
Increase	3.5	2.0	6.5	4.9
Remained the same	27.8	29.2	58.8	57.1
Decrease	67.4	65.4	33.8	36.5
N/A	1.3	3.4	0.9	1.5

Source: High Frequency Phone Survey 2020–21.

The Business Pulse Survey (World Bank, 2022) shows that COVID-19 adversely affected business activity. First, there was a drastic and significant drop in demand. Between May 2019 and 2020 an average firm lost 56 percent of sales. In turn, sales revenues declined significantly (Figure 56). Second, there were negative supply side effects such as input shortages, which were experienced by 10 percent of firms. The most severely affected were smaller firms in the transport, construction, warehousing, and tourism industries. Up to 25 percent of workers in these industries lost their jobs during the pandemic. Layoffs were a survival mechanism for firms. Another coping mechanism, mainly adopted by large firms, was changing the product mix structure towards mostly digital solutions. Most firms desired support from government in the form of money transfers and tax reductions but only 33 percent benefited. As a result, most resorted to letting employees go and adjusting loan repayment terms.

Figure 56: Micro firms were most affected by the pandemic



Source: Madagascar Business Pulse Survey – 2021.

Deteriorating business environment leads to lost competitiveness

Urban poverty was already worsening before the pandemic. Although multidimensional poverty—which encompasses 10 indicators across three categories (health, education, and living standards)—decreased at the national level between 2008 and 2018, it rose in urban areas when considering education and living standards. A potential reason for this trend was the growth in urban population that was not accompanied by supply for adequate urban infrastructure and services, accompanied by a 70 percent increase in the number of urban poor. Factors that contributed to this trend include the high fertility rate among the poor, a series of economic shocks that reduced incomes, and—in some cases—the migration of rural poor towards cities, many of whom were fleeing frequent droughts in the South or repeated cyclones in the West.

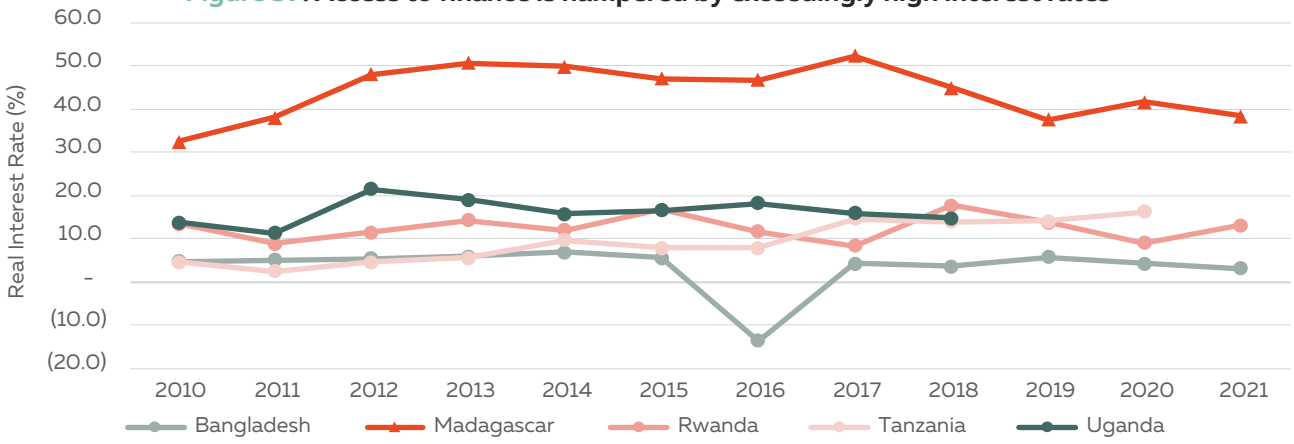
More fundamentally, urban poverty has been on the rise due to an ever more acute shortage of economic opportunities, as declining private investment led to a deterioration in firm productivity. Private investment as a share of GDP has been steadily dwindling—from more than 25 percent in 2010 to less than 17 percent in 2021. This drop appears connected to a negative trend in firm productivity. Reasons for the decline over the past decade include inadequate infrastructure, limited access to finance, and weak institutions. While access to infrastructure such as electricity, water, and sanitation decreased, access to finance has remained exorbitant as real interest rates have remained above 30 percent over the past decade—well above the rates in comparator countries (Figure 57). This has resulted in low economic growth, which has not been sufficient to create the jobs and opportunities needed to lift the growing number of rural-urban migrants out of poverty.

Increasing market concentration exacerbated the decline in firm productivity across manufacturing and services, and therefore the rise in urban poverty. An analysis of surveys of formal firms conducted in 2009, 2013, and 2022 shows that both values added per worker and Total Factor Produc-

tivity (TFP) deteriorated significantly over the past decade (Figure 58). The negative trend in productivity started before the pandemic but was exacerbated by the lockdowns and other measures implemented to control the spread of COVID-19. This forced many formal firms to shut down or reduce their operations—with a likely increase in informality. For example, the disruption of supply chains affected commercial agriculture more than subsistence agriculture, while turbulence in global demand mostly impacted trade-related sectors featuring higher productivity and better-paying jobs. However, the underlying reason for lower private investment was the consolidation of key sectors, which constrains the competitiveness of firms whose owners have limited access to the country's elites. Such consolidation creates an environment that favors a small group of firms and makes it difficult for others to compete, resulting in lower private investment and overall productivity.

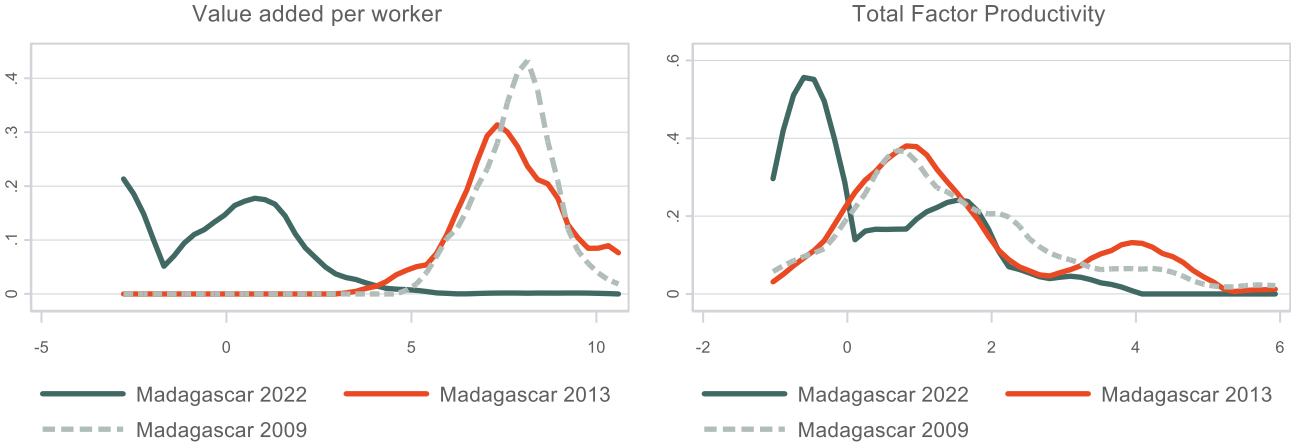
Lack of competition can distort wages and prices, reducing the potential for growth and hurting the poor disproportionately. Dominant firms have the power to set wages below a level that adequately reflects the productivity of the labor force (Deb et al., 2022). Workers struggle to find alternative jobs (due to frictions in mobility across geographical locations and industries) and are effectively captive. In turn, low wages depress local demand. Sectoral dominance by one or few firms does not necessarily distort the wider labor market—especially if the sector is small relative to the size of the economy—but it is more likely to do so in small, underdeveloped economies such as Madagascar. Even when labor markets are competitive, excessive market power can have a detrimental impact on society through its effect on prices: high price markups can generate rents for dominant firms, which then have an incentive to maintain their market power by setting barriers to entry—including by means of corruption. In addition, market capture exacerbates inequality (Feldman et al., 2021; Khan and Vaheesan, 2016; Commanor and Smiley, 1975), with potential long-term consequences on political, social, and economic stability. Overall, market capture by a handful of firms can have significant impacts on local economies and communities. In Madagascar, for exam-

Figure 57: Access to finance is hampered by exceedingly high interest rates



Source: World Bank, World Development Indicators Database.

Figure 58: Productivity among formal firms suffered a dramatic decline since 2009



Source: World Bank Enterprise Surveys, 2009, 2013, and 2022.

ple, the concentration of market power among a few agricultural exporters curtails the bargaining power of producers of key export products, such as vanilla and lychees.

Most sectors in Madagascar feature a small number of dominant firms. The telecommunications industry is comprised of four major operators: Telma, Orange, Airtel, and Gulfsat (Blueline). Telma, the former telecoms monopolist, has a strong presence in all segments of the broadband value chain, controlling international connectivity (along with Orange), the national backbone and backhaul networks, and more than 60 percent of the last-mile network. Similarly, four major players control petroleum import and distribution, with Jovena—majority owned by Telma—holding the largest market share. Two companies—Galana Refinery and Petroleum Logistics Company—dominate petroleum storage and transportation. The Groupement des Exportateurs de Litchi (GEL) sells more than 90 percent of Madagascar's lychees to two European importers. In the vanilla industry, Symrise holds a 70 percent market share in vanilla extract, and four export companies—most of them owned by a single conglomerate—market about half of the country's vanilla beans.

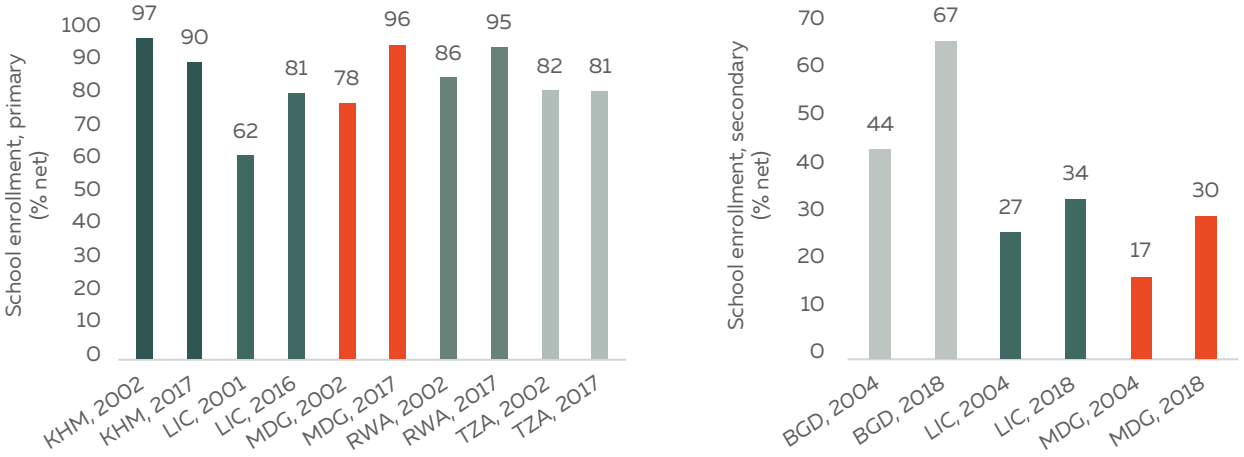
Declining returns to higher education in urban areas

Madagascar has made commendable improvements in primary enrollment over time, accruing to cohorts across all of Madagascar's regions. Madagascar has made a lot of progress over a 14-15-year period in terms of increasing primary and secondary enrollment rates (Figure 59). Madagascar's net enrollment in primary school is commendable and generally falls in line or above those of peers, with a rate of 96 percent. And when looking at enrollment rate increases among the cohort of 12–18-year-olds, progress when compared to the previous cohort is easily traceable across most districts in Madagascar (Figure 60).

Moreover, important progress has been made on secondary schooling enrollment also, increasing overall enrollment rates from 17 to 30 percent. Yet, when compared to its peers, net secondary schooling rates remain below LIC average of 34 percent. And when looking at a map, it is apparent that predominantly regions in the Center and North-East have benefitted from recent surges in secondary schooling enrollment. In all other regions, progress across cohorts regarding secondary schooling has been limited (Figure 60).

Literacy is higher in urban areas and positively correlated with average shares of population in secondary schooling. Figure 61 shows that districts with higher education show higher levels literacy overall. On the bright side, it is noteworthy that even regions with the lowest levels of literacy have been showing increases across cohorts. Proportionally, some of the largest improvements in literacy rates have been witnessed in regions with lowest total rates. At the same time, it's startling to see how very low literacy and educational attainment are among older cohorts, particularly Southern regions where literacy levels are as low as 30 percent among the 26–64-year-old population. Nonetheless, with the overall expansion in primary and secondary schooling, one might expect more improvements than witnessed.

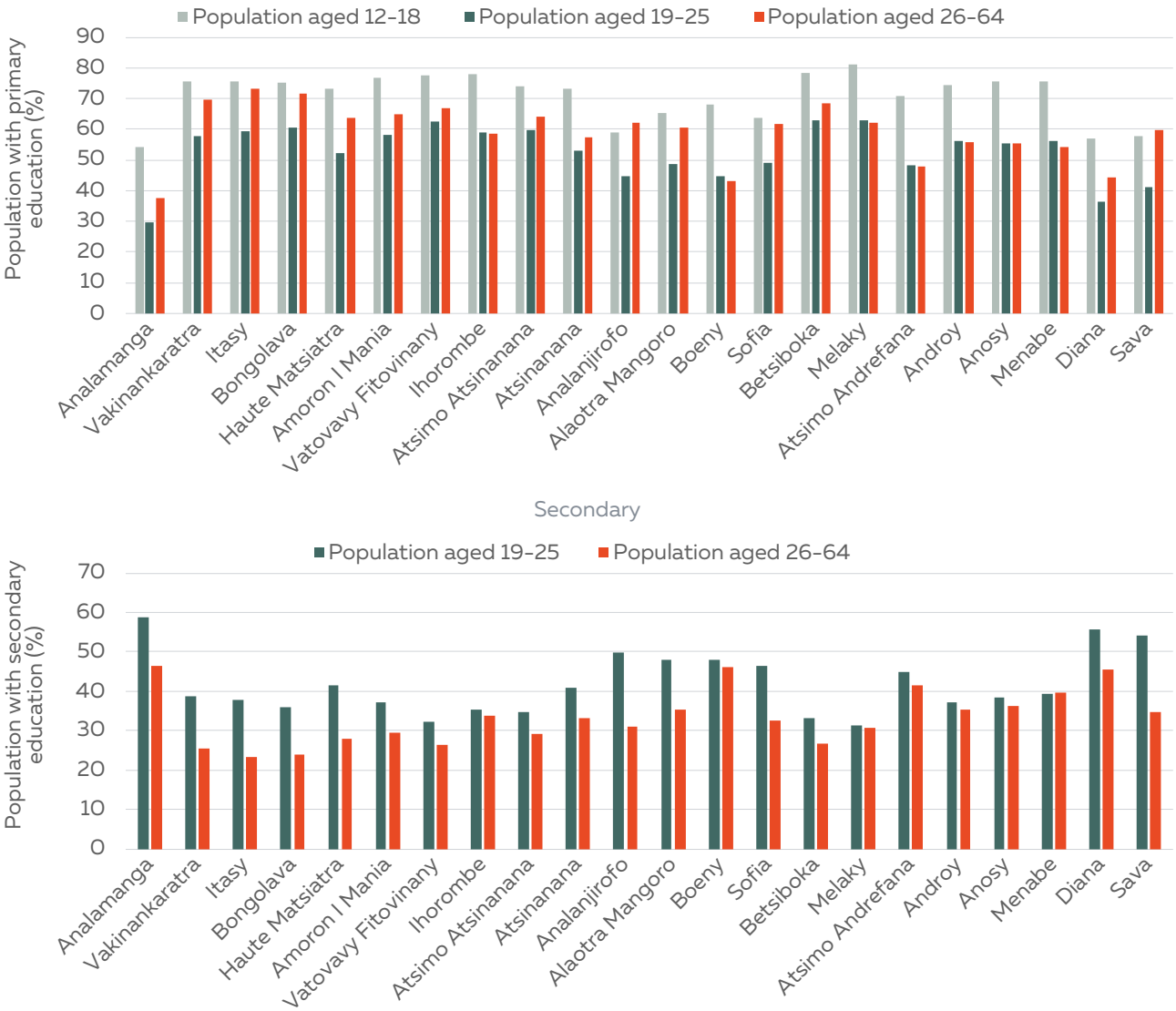
Figure 59: School enrollment increased over time



Note: BGD Bangladesh, KHM Cambodia, MDG Madagascar, RWA Rwanda, TZA Tanzania, UGA Uganda, LIC average of low-income countries. In all cases the graph presents the latest available year. N/A not available.

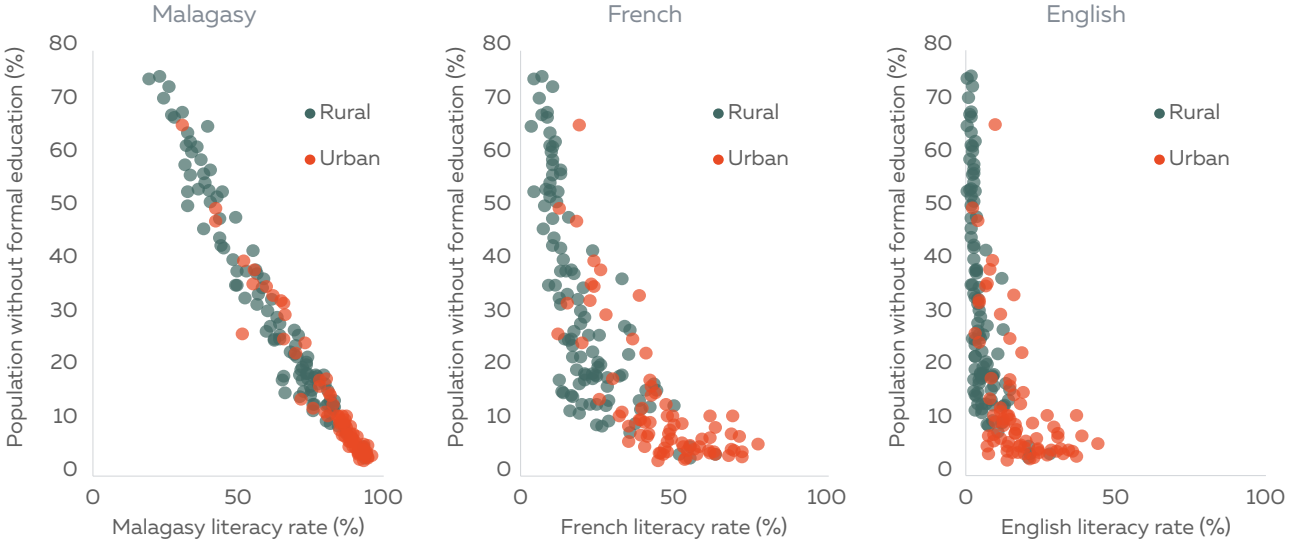
Source: World Development Indicators.

Figure 60: Primary and secondary education have increased in most regions



Source: Authors' calculations based on 2018 Madagascar Census.

Figure 61: Malagasy literacy increases with educational access; less so for French and English



Source: Authors' calculations based on 2018 Madagascar Census.

More than 28 percent of Malagasies over the age of three have no formal education, and 44.4 percent have only completed primary education, according to the 2018 Census. Only 2.8 percent of the population has university-level education. A gender gap in education exists, as men tend to be more educated than women, but it is not very significant. Education levels are generally higher in urban locations. Approximately 32 percent of the rural population has no formal education compared to 13 percent in cities. Of those living in the countryside only 47.3 percent have completed primary education, versus 32.3 percent of city dwellers. Only 1.1 percent of the rural population areas have earned a university degree, compared with 9.8 percent in urban areas.

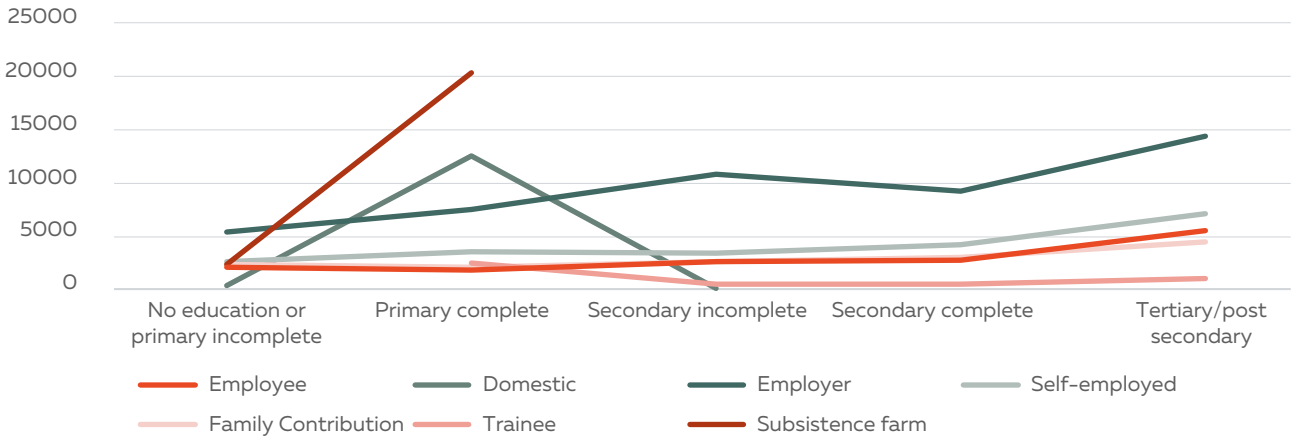
Years of schooling are positively correlated with income, but the magnitude of the effect varies across education levels. Across all age groups, individuals with higher levels of education tend to earn higher wages then their less-educated counterparts (Figure 62). However, the degree of remuneration by education level varies considerably depending on employment type. For instance, education did matter for subsistence farmers but its effect on wages is only significant up to the primary school level. On the contrary, education really matters in formal employment as salaries are highest for those with tertiary or university level training. These findings imply that while investing in education at all levels can lead to increased earnings potential, higher education beyond the secondary level offers the best chance of achieving financial prosperity in the long term.

Returns to education tend to increase with the level of education and are often higher for men than women. Table 24 shows the wage premium associated with additional years of education. It illustrates that returns to education are also generally higher for individuals from wealthier households, and for those living in households whose heads are themselves more educated. Moreover, overall returns are higher in urban areas than rural. Considering the total effect of education on earnings (i.e., the combined effect of primary education and more than four years of higher education), each year of schooling is associated with a 4.9 percent increase in earnings at the national level and 5.6 in urban areas, but only a 4.2 percent increase in rural areas. In general, it is apparent that tertiary education makes a difference but its value in terms of wage increase is decreasing as older people with tertiary education earn more than younger with tertiary education while accounting for experience through age. This means that that value of tertiary education is decreasing. The few jobs available in the market are being taken by the older and more experienced workers.

Returns to education in urban areas decreased across all education levels. Return on education in urban areas (Model 4 in Table 24) is unambiguously higher for urban areas. This is the case for all education levels when using no education or incomplete primary education as the reference point. When we interact education with age group to proxy for change in returns to education overtime, we note that the interaction term of tertiary education completion with age group 50 – 64 is the only statistically significant variable which is also lower than for the entire sample under model 3. The remaining interaction terms are not statistically different than the reference interaction term – no education between 15 and 29 years old, implying a reduction in returns to education across both age categories and education level in urban areas.

Figure 62: Earnings barely increase with education levels

Non-agriculture, 2021



Source: Author's calculations using 2021/2 EPM data.

Table 24: Returns to education are higher among older cohorts

Dependent variable: hourly earnings	Population			
R2 adjusted	0.2391	0.2395	0.2415	0.2422
Dependents variables	**Model 1**	**Model 2**	**Model 3**	**Model 4 (Urban)**
Sex				
Male	reference			
Female	-0.1906***	-0.1634***	-0.1864***	-0.1710***
Household head				
No	reference			
Head	0.1608***	0.1615***	0.1641***	0.2256***
Level of education completed				
No education or primary incomplete	reference			
Primary complete	0.2320***	0.2311***	0.1832***	0.2051***
Secondary incomplete	0.4324***	0.4307***	0.3044***	0.3960***
Secondary complete	0.5959***	0.5937***	0.4361***	0.5701***
Tertiary/post secondary	1.2060***	1.2033***	1.0148***	1.0159***
Age groups				
15-29	reference			
30-49	0.1900***	0.1958***	0.1167***	0.2174***
50-64	0.1075***	0.1639***	0.0023	0.1648**
Household head				
Rural	reference			Urban sample Only
Urban	0.1852***	0.1861***	0.1836***	
Employment status				
Employee	0.0081428	0.0072	0.0075	-0.0072
Domestic	-0.5417**	-0.5479**	-0.5546**	0.5220
Employer	0.2790***	0.2772***	0.2810***	0.3376**
Self-employed	-0.0328	-0.0340	-0.0291	0.0257
Family contribution	-0.3405***	-0.3434***	-0.3463***	-0.1408
Trainee	-1.4360***	-1.4410***	-1.3901***	-1.3315***
Subsistence farm	0.1270*	0.1257*	0.1248*	-0.1647
Employment sector				
Agriculture	reference			
Industry	0.4098***	0.4117***	0.4100***	0.4912***
Service	0.4137***	0.4150***	0.4141***	0.4667***
Others	-0.1568***	-0.1578***	-0.1559***	-0.1085**
Constant	11.3440***	11.3330***	11.3907***	11.4107***
Interactions between age and sex				
30-49#Female	Not defined	-0.0141	Not defined	
50-64#Female		-0.1346***		
30-49#Men		0.0141		
50-64#Men		0.1346***		
Interactions between age and education				
15-29#No education or primary incomplete	Not defined		reference	
30-49#Primary complete			0.0815**	0.0292
30-49#Secondary incomplete			0.1914***	0.0835
30-49#Secondary complete			0.2425***	0.1121
30-49#Tertiary/post-secondary			0.1938***	0.1085
50-64#Primary complete			0.0626	-0.0339
50-64#Secondary incomplete			0.2402***	-0.0028
50-64#Secondary complete			0.3373***	0.0321
50-64#Tertiary/post-secondary			0.5534***	0.4096***

Source: Author's calculations using 2021/2 EPM data.

Low aspirations due to lack of opportunities

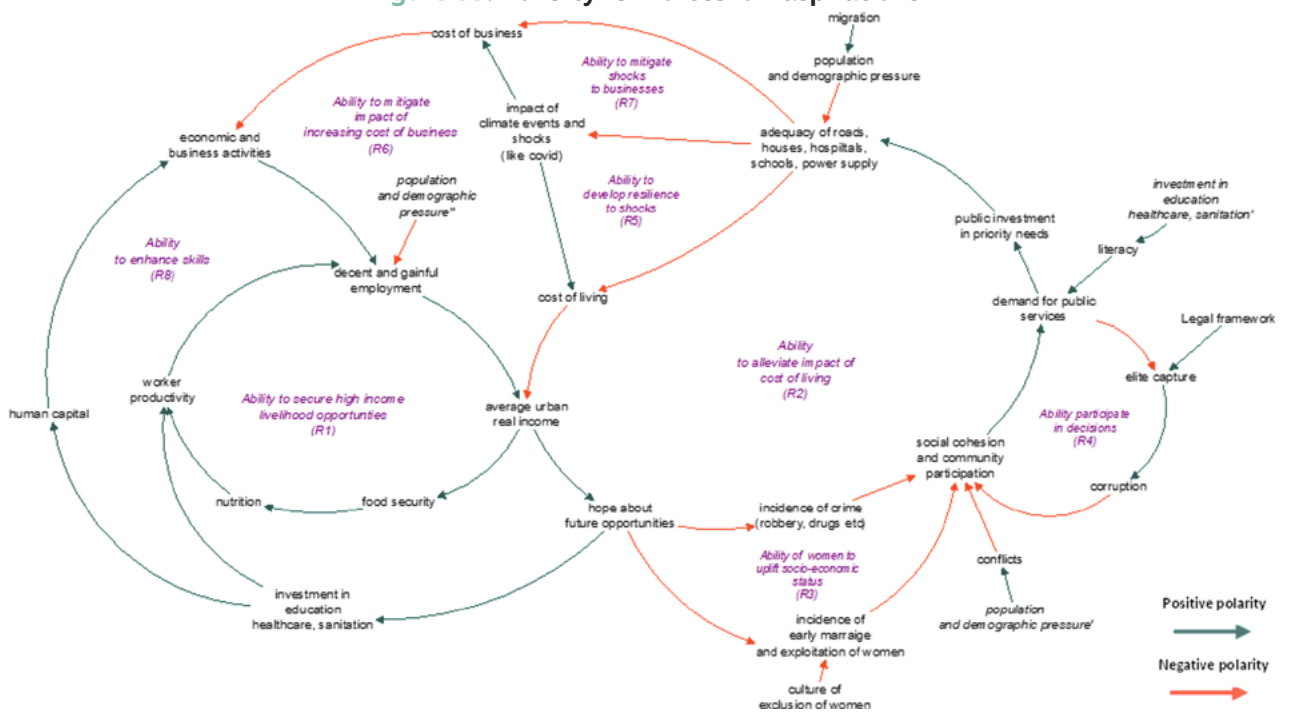
A series of focus groups in six urban communes suggests several perceived root causes and sub-causes of poverty in those areas. Using a six-step methodology, 75 problem trees identify key binding constraints and their respective root-causes and sub-causes (Mulangu, 2023). Through a system dynamics approach, we then analyzed the relationships between causes and sub-causes across problem trees. Eight self-reinforcing and interconnected loops create a poverty trap that inhibits urban households from improving their welfare (Figure 63).

Political and economic capture by the elite depresses aspirations among urban households. Economic literature highlights that the aspirations of individuals are influenced by their social environment and their expectations about future opportunities. When individuals observe that the elite control a majority of resources and opportunities, they may become discouraged and lower their aspirations, preventing their utility function from experiencing the distinct jump predicted by literature (La Ferrara and Novak, 2022). This is particularly true for those living in poverty, who may not have access to the same information or networks as the elite. In Madagascar, the dominant economic position of a handful of families of aristocratic origin has created a sense of hopelessness and despondency among the urban population, which in turn contributes to perpetuating the poverty trap.

Low literacy rates and weak social cohesion are other critical contributors to lack of aspiration and urban poverty. Without adequate literacy, individuals may not have the skills or knowledge necessary to demand government services, thus limiting their ability to participate in their community and advocate for themselves. Moreover, weak social cohesion can undermine community mobilization and collective action, reducing the power of individuals to demand change. These factors help explain the inadequacy of public investment in infrastructure, which exacerbates vulnerability to climate events and shocks, and hinders the accumulation of assets that could prevent households from falling into poverty.

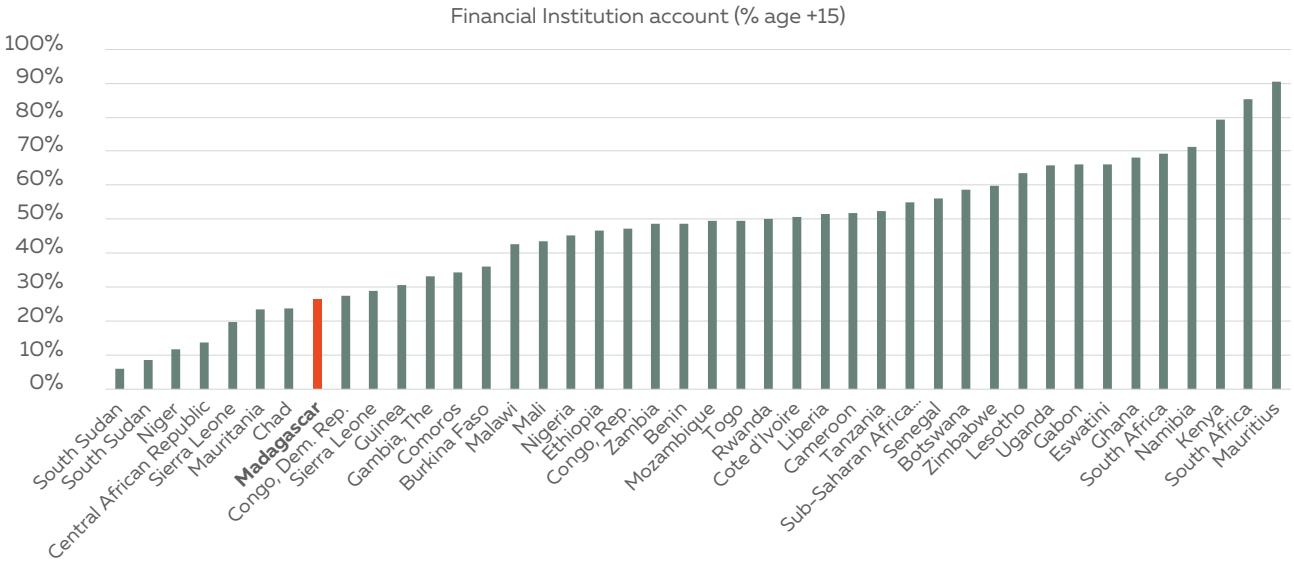
Finally, scarce investment in education, healthcare, and sanitation hinders the availability of productive human capital for the economy. By constraining economic activity, the shortage of human capital lowers the return to education, which can exacerbate the lack of aspiration among the population. Tackling these challenges requires addressing the root causes of inequality, particularly elite capture, and enhancing community participation in demanding public services from the government. Empowering individuals to advocate for their needs, and addressing the constraints that perpetuate the urban poverty trap, can help create a more equitable and prosperous future for those living in Madagascar's cities.

Figure 63: Poverty reinforces low aspirations



Source: Mulangu, 2023.

Figure 64: Madagascar has one of the lowest rates of financial inclusion



Source: Global Findex Data.

Low real income has also contributed to low financial inclusion and independence. Historically, Madagascar's financial inclusion rate has been one of the lowest in Sub-Saharan Africa. The Global Findex Database (2021) shows that in 2017, 10 percent of people aged 15 years and above had an account in a financial institution (Figure 64). This group has since increased to 14 percent, out of which 28 percent use the internet or a mobile phone to make payments, purchases and transfer funds to other individuals. This resonates with Monnier (2021) who credits the increased financial inclusion to the introduction of mobile money platforms. Now 24 percent of the population have made or received a digital payment. In the group that remains unbanked, the main reasons cited are insufficient funds (68 percent), long distance to banks (52 percent), lack of necessary documentation (50 percent) and high expenses of financial services (47 percent).

Chapter 4

Low human capital limits options for escaping poverty

Key findings

According to the World Bank's Human Capital Index (HCI) and other data sources, Madagascar faces significant challenges in terms of human capital development. A child born in Madagascar just before the pandemic was projected to be 39 percent as productive as they could be with complete education and good health. This placed Madagascar slightly below the average for Sub-Saharan Africa (SSA) and just above the average for Low Income Countries (LICs). However, when considering recent data on school enrollment and child survival, the adjusted HCI drops to 34 percent. Moreover, scores indicate that students in Madagascar perform below average compared to other regions. There is also a significant disparity in HCI between the richest and poorest children, with the gap in future productivity being larger than the global average. These findings highlight the pressing need for investment in education and health to improve Madagascar's human capital.

High fertility rates in low-income households contribute to chronic poverty by overburdening households, hindering educational attainment, and limiting income generation opportunities. However, research suggests that providing essential healthcare, education, and family planning services can lead to a rapid decrease in fertility rates. By improving access to these services, women can make informed decisions about when and how many children to have, resulting in improved maternal and child health outcomes, increased educational attainment, and reduced poverty rates. Although Madagascar has made some progress in enhancing access to healthcare, education, and family planning, further investment is necessary to overcome challenges such as limited resources, cultural and social barriers, and lack of awareness.

Despite the decline in stunting prevalence over the past decade due to investments in health and nutrition, stunting remains a significant issue. However, regions where health and nutrition projects were implemented have experienced a faster decline in stunting, indicating the effectiveness of donor-financed programs. The country also faces high adolescent fertility rates, which contribute to increased risks for adolescent girls, reduced educational opportunities, and limited competitiveness in the job market. Although female school enrollment has improved over the past two decades, the primary completion rate remains low, and learning outcomes are poor. Gender disparities exist in attendance rates and literacy skills across urban and rural areas. Child labor, particularly among boys, further hampers education participation and outcomes, with a significant proportion of children involved in economic activities, mainly in agriculture.

Child mortality and infant mortality have also been decreasing, but the rates remain higher than those of peer countries and the overall LIC average. While child mortality levels have improved compared to the 2000s, the gains have been smaller than in countries like Cambodia, Rwanda, and Uganda. These countries started with similar or higher levels but have achieved substantially lower child mortality rates than Madagascar. Infant mortality, specifically deaths occurring before the first year of life, remains a significant issue across peer countries, although it is still lower in Madagascar compared to the overall LIC average.

Caloric intake is low. In rural areas, the poorest decile has an individual average intake of 707 kcal/day, while individuals in the richest decile consume 3,827 kcal/day, indicating a significant disparity in nutrition across socioeconomic levels. A similar pattern is observed in urban areas, although the disparity is less pronounced. The average calorie intake for the country is 2,112 kcal/day in rural areas and 2,227 kcal/day in urban areas. However, focusing solely on caloric intake fails to account for hidden hunger, which refers to a chronic lack of vital micronutrients. Combining data from household and health surveys, areas with high hidden hunger are identified, primarily in the high plateau region with some pockets in the south.

In comparison to its peer countries, Madagascar stands out with one of the highest child marriage rates, a pressing issue that demands attention. Shockingly, 40 percent of girls aged 20-24 in the country have already been married before the age

of 18. The prevalence of child marriages is most pronounced in the poorest regions, where vulnerable communities struggle to escape the cycle of poverty. Although higher rates of child marriage are found in rural areas, it is impossible to ignore the alarmingly high rates in urban areas as well. Disturbingly, there is a strong correlation between the prevalence of child marriage and other detrimental practices like child labor and high numbers of out-of-school children. The districts with the highest occurrence of child marriage are also the ones with high illiteracy rates, highlighting the interconnection between these issues and the urgent need for effective strategies to combat them. If left unaddressed, intergenerational decision-making perpetuates the vicious cycle of poverty, ensnaring future generations.

1. Human capital development and poverty

Human capital is lagging

According to the World Bank's Human Capital Index (World Bank, 2020), a child born in Madagascar just before the pandemic would be 39 percent as productive as an adult as she could be if she enjoyed complete education and full health (Figure 65). This is just below the average for the SSA region (40 percent) and just above the average for LICs (38 percent). However, adjusting for recent data on school enrollment (MICS 2018) and child survival (DHS 2021) yields an HCI of just 34 percent. In terms of the different components of the HCI, 95 percent of children born in Madagascar survive to age 5, and children who start school at age 4 can expect to complete 6.1 years of school by their 18th birthday.[48] The most recent harmonized test scores (PASEC 2015) showed that students in Madagascar scored on average 351/625 points, significantly below SSA and LIC average and lower than earlier tests. As for health indicators, across Madagascar, 80 percent of 15-year-olds are expected to survive until age 60 (a proxy for health risks), while only 58 percent of children are growing free of malnutrition.

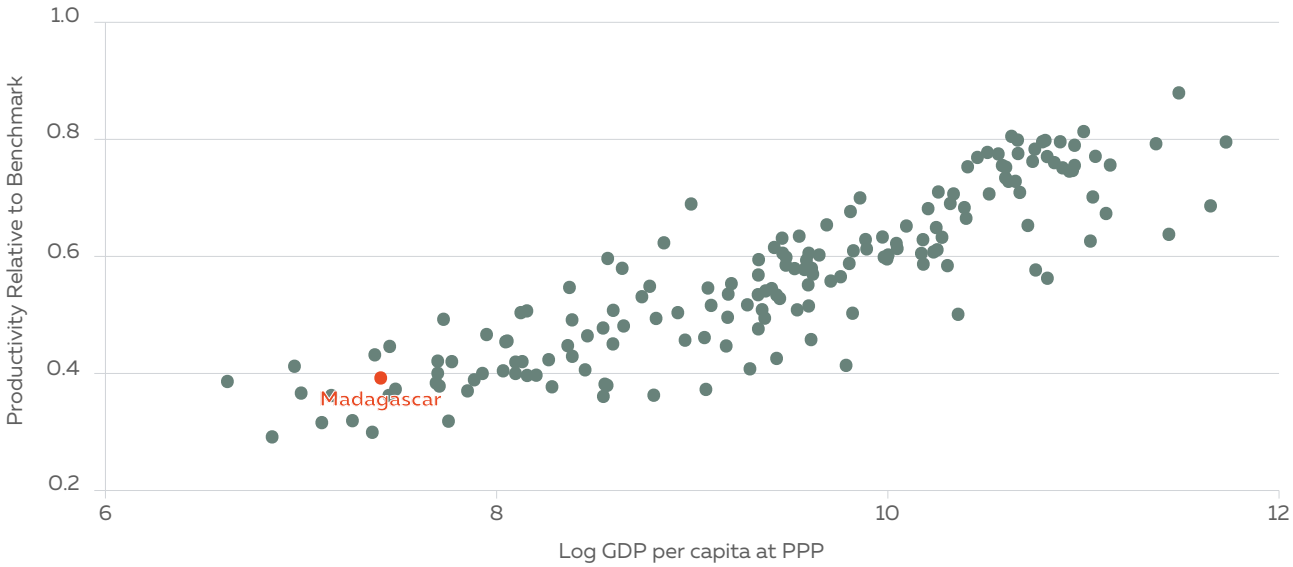
Regarding complementary HCI indicators, Madagascar stands out for lower-than-average school enrollment and worrisome youth-related outcomes (Figure 66). While basic child health indicators seem to be at their predicted level for its GDP per capita or even slightly better, educational outcomes are still low and they are deteriorating.[49] Besides having significantly lower predicted years of schooling than the SSA region and any other region, in 2019, 95 percent of 10-year-olds are defined as "learning poor," compared to 78 percent in SSA and 89 percent among LICs.[50] Moreover, the adolescent fertility rate (births per 1000 women aged 15-19) was 143 in 2021 (DHS). This is higher than both the average for SSA (93) and LICs (95).

Figure 66: Expected years of school in Madagascar are well below Sub-Saharan Africa's and South Asia's average

Note: Expected years of school at age 18 among children enrolled by age 4.
Source: Human Capital Index, World Bank

Figure 65: A child born in Madagascar can only reach 39 percent if their potential productivity as an adult

Human Capital Index 2020



[48] The revised expected years of school calculated with the latest data are 6.1 years on average, compared to the official HCI estimate of 8.4 years. The large drop in expected achievement is due to a much lower primary enrollment rate than previously estimated.
[49] The neonatal mortality rate was 20 per 1,000 live births in 2020, below both the regional average of 25 and the LIC group average of 26. In 2018, 79 percent of children 0-23 months had adequate meal frequency, above the regional share of 44 percent and the LIC share of 43 percent.
[50] Learning poverty means being unable to read and understand a simple text by age 10. This indicator brings together schooling and learning indicators: it begins with the share of children who haven't achieved minimum reading proficiency (as measured in schools) and is adjusted by the proportion of children who are out of school (and are assumed not able to read proficiently).

Finally, Madagascar shows a large gap in HCI (2018) between the poorest and the richest children. The ratio in HCI between the richest and poorest 20 percent of the population is 1.44, whereas globally this ratio is 1.35. In 2018, the gap in future productivity between a child born in the poorest quintile and one born in the richest quintile was 18 percentage points. This gap is larger than the typical gap across the 50 countries (15 percentage points).

The Human Capital Index (HCI) measures the human capital that a child born today can expect to attain by age 18, given the risks to poor health and poor education that prevail in the country where she lives. The HCI quantitatively illustrates the key stages in this trajectory and their consequences for the productivity of the next generation of workers, with three components: ***Component 1: Survival.*** This component is measured with survival to age 5. ***Component 2: School.*** This component of the index combines information on the quantity and quality of education measured as the number of years of school a child can expect to obtain by age 18 given the prevailing pattern of enrollment rates and harmonized test scores from major international student achievement testing programs. ***Component 3: Health.*** Two proxies for the overall health environment are used: ***Adult survival rates,*** measured as the share of 15-year-olds who survive until age 60, and ***healthy growth among children under age 5,*** measured using stunting rates. The components of the HCI are combined into a single index by first converting them into contributions to productivity. Multiplying these contributions to productivity gives the overall HCI.

Source: Human Capital Index, World Bank. https://datacatalog.worldbank.org/search/dataset/0038030/human-capital-index

Human capital and poverty are tightly linked

Investment in human capital has the potential to increase consumption and reduce poverty among Malagasy households. We consider variables pertaining to health and education to assess human capital in Madagascar. The previous Poverty Assessment (World Bank 2016) found that the time necessary to reach a health facility had a strong positive correlation with extreme poverty in the country. The report also showed that health shocks, such as sudden illness and death of household members, were among the key determinants of decreased household consumption between 2005 and 2010. Table 25 shows that the incidence of health shocks reduced from 2005 to 2012 but spiked thereafter. Most of the cases of illness (59.7 percent) and death (52.9 percent) were in urban centers. This indicates the need for greater investment in healthcare for the benefit of household welfare, especially in urban areas.

Table 25: The incidence of health shocks more than doubled in 2012-2022

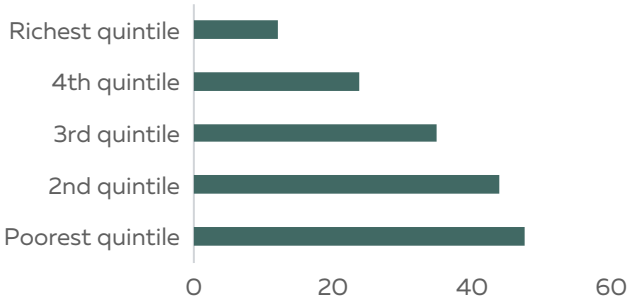
Health Shocks	2005	2010	2012	2022
Illness of adult household member	6.54	2.47	2.35	5.03
Illness of another household member	4.37	1.41	1.16	2.46
Death of adult household member	1.25	0.64	0.87	4.79
Death of another household member	1.58	0.9	1.74	1.85

Source: World Bank analysis based on 2005, 2010, 2012 ENSMOD and 2022 EPM data.

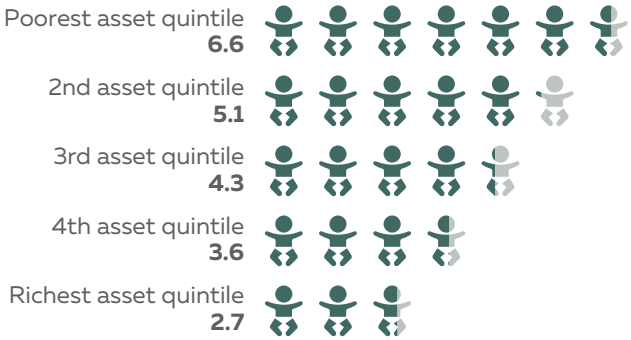
The MICS (2018) data for Madagascar shows that fertility is high in poor households (Figure 67), which often contributes to chronic poverty. High fertility rates in low-income households can lead to overburdened households, lower educational attainment, and reduced opportunities for income generation, all of which perpetuate a cycle of poverty. However, research suggests that fertility rates can fall rapidly in low-income countries when essential health care, education, and family plan-

Figure 67: Fertility among the poor is much higher, including among adolescents

Pregnant women: ages 15-19(%)



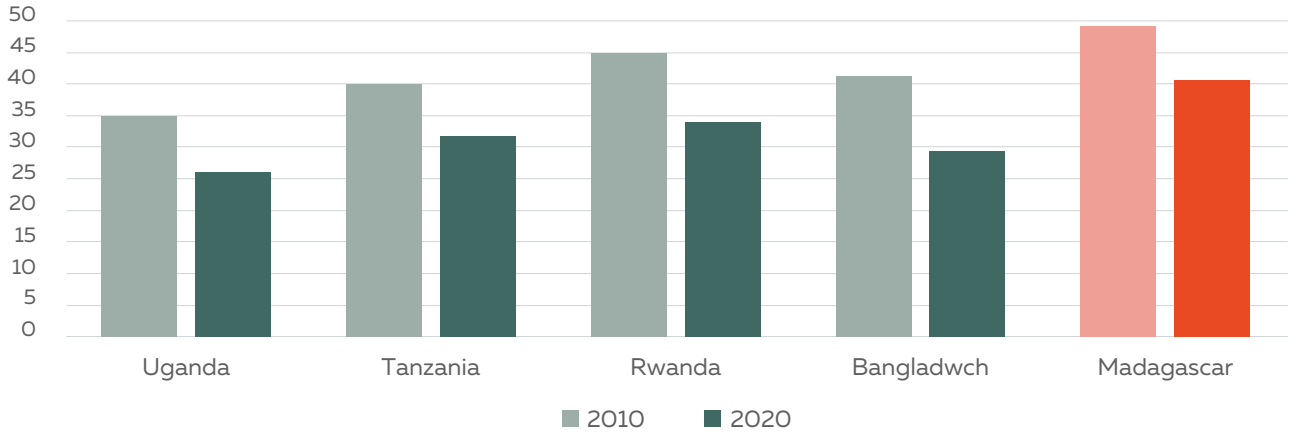
Fertility rate by asset quintile, 2018



Source: MICS 2018.

Figure 68: Stunting remains high compared to peer countries

Incidence of stunting (%) among children under the age of 5. 2010 and 2020



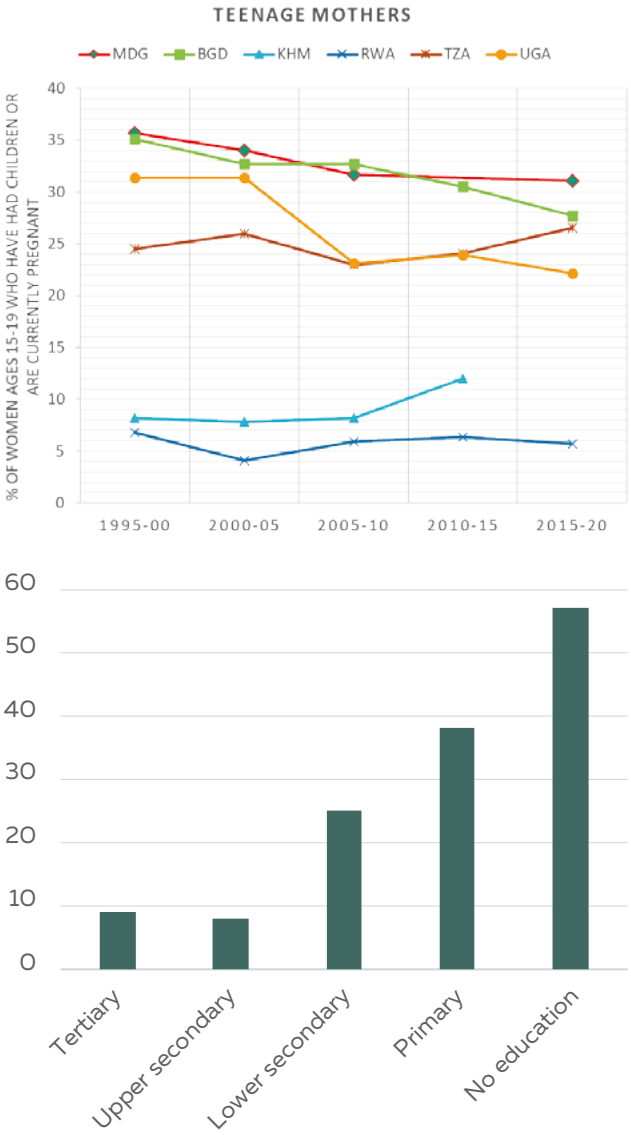
Source: Latest Demographic and Health Surveys and MICS for each country.

ning services are made wisely available. Improving access to health care and education, along with providing family planning services, can help break the cycle of poverty by enabling women to choose when to have children and how many children to have. This can lead to improved maternal and child health outcomes, increased educational attainment and income generation opportunities, and reduced poverty rates. In Madagascar, efforts to improve access to health care, education, and family planning services have been made, but significant challenges remain, including limited infrastructure and resources, cultural and social barriers, and lack of awareness about the benefits of family planning. However, continued investment in these areas can help improve the well-being of the people of Madagascar and contribute to sustained economic growth and development.

The prevalence of stunting has gone down over the past 10 years but remains high. Figure 68 shows that stunting is common in Madagascar, although its prevalence has been declining over the past 10 years due to major investments in health and nutrition. A study by the World Bank's Independent Evaluation Group (Independent Evaluation Group, 2022) found that regions where health and nutrition projects were implemented tended to have high initial stunting rates but experienced a faster decline in stunting than the country as a whole—suggesting that donor-financed health and nutrition programs were both well-targeted and effective.[51]

The high fertility rate among adolescents is of concern in Madagascar, although it has been decreasing (Figure 69). Almost a third (31 percent) of girls between the ages of 15 and 19 have children or are pregnant, while 2018 Census data indicates that the share reaches 26 percent among girls between

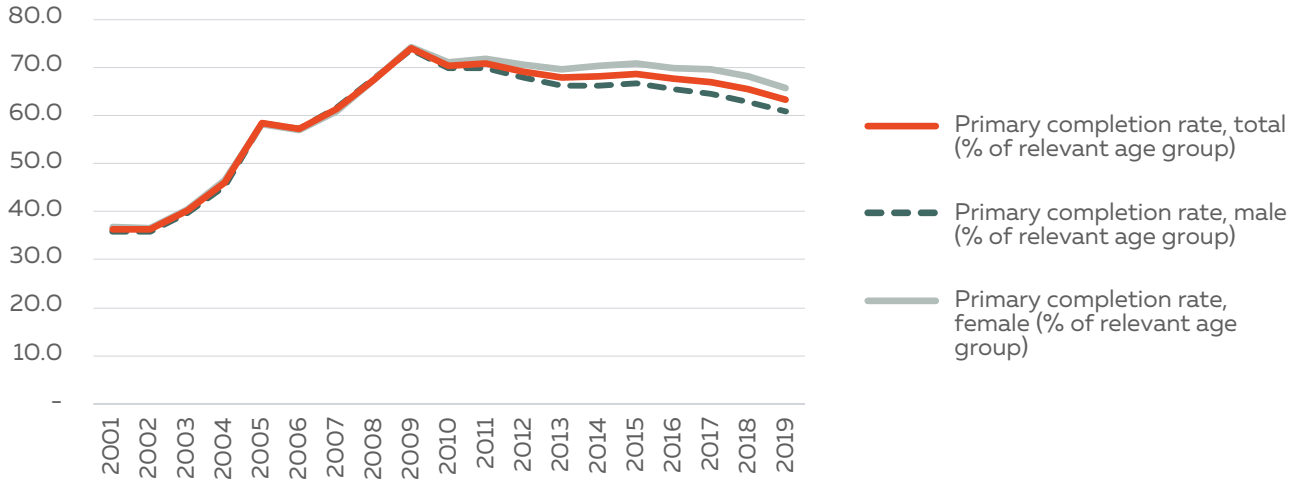
Figure 69: Teenage pregnancy is strongly related to education



Source: MICS 2018.

[51] https://ieg.worldbankgroup.org/evaluations/world-bank-group-madagascar/chapter-5-world-bank-group-support-fostering-development

Figure 70: Primary school completion improved considerably between 2000-2010 and slightly declined thereafter



Source: World Bank, World Development Indicators Database Online.

the ages of 12 and 17. The adolescent fertility rate in Madagascar is high at 108 births per 1,000 women aged 15 to 19, compared to SSA with an average of 101 births and the global average of 42 per 1,000.[52] Early childbirth exacerbates the risk of death among adolescent girls, and considerably reduces their current educational opportunities and future competitiveness in the marketplace.

Female school enrolment has risen over the past two decades. Primary enrolment is almost universal, and educational attainment and literacy rates have improved. However, the primary completion rate remains low, although it has increased since 2001 (Figure 70).[53] Moreover, learning outcomes are still poor: among children enrolled in fifth grade, only 6 out of 10 have basic reading skills, and fewer than 2 out of 10 have basic math skills. Though more girls finish primary school than boys, poverty precludes females from proceeding to secondary school and often they end up in unpaid employment and early family formation.

Educational outcomes vary by location across gender. Table 26 presents data on school attendance of males and females in urban, rural, and national areas. The attendance is categorized into three types: never attends, frequently attends, and currently attends. The data shows the percentage of both males and females currently attending in all areas, with urban areas having the highest percentage of currently attending males at 62.8 percent and currently attending females at 59.6 percent. Furthermore, the data suggests that there is a significant difference in attendance between rural and urban areas, with rural areas having higher percentages in the 'never attends' and 'frequently attends' categories compared to urban areas. The national level, on the other hand, seems to have a more even distribution of attendance across all categories. Additionally, the data shows that females have slightly lower attendance rates compared to males across the 'currently attends' category in all areas, except for the frequently attends category where females have a slightly higher percentage than males.

Literacy skills and reading comprehension skills increase as students progress through school. As illustrated in Table 27, the percentage of students who correctly read 90 percent of the words in a story, answer comprehension questions correctly, and demonstrate basic reading skills tends to increase as they advance from CP2-CE to CM2 and then to junior high school. For example, in CM2, 88.4 percent of male students and 92.3 percent of

Table 26: Attendance is much lower in rural areas, but the gender gap is small (attendance rates of population aged 3 to 15, by location)

	Urban		Rural		National	
	Male	Female	Male	Female	Male	Female
Never attends	10.3	9.4	29.1	28.6	25.7	25.0
Frequently attends	27.0	31.0	29.4	31.0	28.9	31.0
Currently attends	62.8	59.6	41.5	40.3	45.3	43.9

Source: Madagascar, INSTAT (RGPH 2018).

[52] World Development Indicators, World Bank. https://data.worldbank.org/indicator/SP.ADO.TFRT?locations=MG-ZG
[53] Discrepancies in primary completion rates between the 2018 Census and the World Bank estimates are due to the fact that World Bank estimates are projected from survey data.

Table 27: Fewer than 6 in 10 children finish primary education with basic reading skills

	Male					Female				
	Percentage who correctly read 90% of the words of a story in Malagasy or French	Percentage who answered the comprehension questions correctly		Percentage having demonstrated basic reading skills	% of children aged 7-14	Percentage who correctly read 90% of the words of a story in Malagasy or French	Percentage who answered the comprehension questions correctly		Percentage having demonstrated basic reading skills	% of children aged 7-14
		Three literals	Two inferential				Three literals	Two inferential		
CP2-CE	37.2	23.2	15.5	12.0	33.5	39.6	23.7	18.4	14.4	31.8
CP2	23.8	14.9	9.0	7.7	17.9	20.7	14.2	8.9	7.4	16.9
CE	52.6	32.8	23.0	16.9	15.6	61.1	34.6	29.2	22.4	14.8
CM1	83.4	63.1	46.6	41.4	12.9	77.2	54.5	45.2	36.6	11.9
CM2	88.4	68.7	67.1	57.2	10.3	92.3	76.2	62.6	55.9	11.3
Junior High School	96.5	88.3	82.4	79.0	9.8	96.9	89.4	85.2	80.5	13.3

Source: MICS Madagascar (2018).

Table 28: Over one-third of children under 11 are engaged in economic activity

			Percentage of children aged 12 to 14 involved in economic activities for:			Percentage of children aged 15 to 17 involved in economic activities for:		
	% of children aged 5-11 engaged in economic activities for at least one hour	% of children aged 5-11	Less than 14 hours	14 hours or more	% of children aged 12-14	Less than 43 hours	43 hours or more	% of children aged 15-17
Total	35.8	100.0	32.4	31.5	100.0	56.7	10.3	100.0
Male	38.3	50.4	29.6	38.0	49.0	57.2	14.8	53.2
Female	33.4	49.6	35.1	25.2	51.0	56.1	5.2	46.9
Urban	23.1	19.0	24.7	18.9	21.0	40.9	5.1	25.9
Rural	38.8	81.0	34.4	34.9	79.0	62.3	12.1	74.1

Source: MICS Madagascar (2018).

female students correctly read 90 percent of the words in a story, compared to 96.5 percent and 96.9 percent, respectively, in junior high school. Similarly, the percentage of students who answered comprehension questions correctly and demonstrated basic reading skills generally increased from CP2-CE to junior high school. It is worth noting that there are still some gender disparities in literacy and reading comprehension, but the disparities vary across grades and subjects.

The prevalence of child labor contributes to lowering education participation and outcomes, especially among boys (Table 28). Approximately one-third of children aged 5-11 and more than 60 percent of those aged 12-14 work, with the proportion of boys involved in economic activities higher than that of girls. This is especially common in rural areas, where 62.3 percent of children (mostly boys) work between one and 43 hours a week or more. An intensive use of child labor, mainly in agriculture, hinders human capital development by contributing to poor educational outcomes, high teenage pregnancy rates, and malnourishment among children (Bau et al. 2020). Other issues that compromise educational outcomes include teacher absenteeism and climate disasters. Marchetta et al. (2019) found that cyclones reduce the probability of attending school, reduce average French and Math test scores, and increase the probability of young people, especially girls, entering the work force. Girls in Madagascar, especially in the regions of Sofia and Atsimo-Atsinanana, contribute notably to agricultural work.

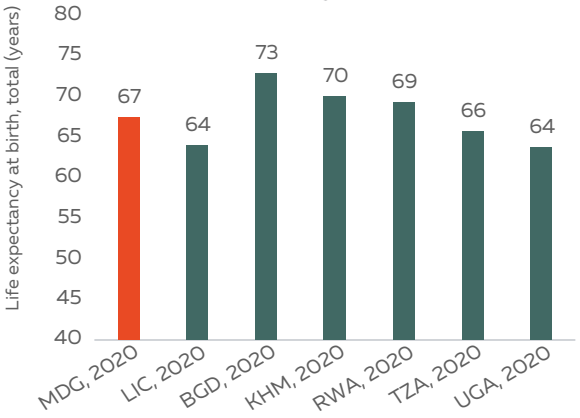
2. Health and sanitation

Overall life expectancy at birth has been improving over the past 20 years. Life expectancy among the Malagasy population is 67 years. This is above the overall LIC average of 64 years, as well as expectancy in Tanzania (age of 66) and Uganda (age of 64). Over time, life expectancy has improved in Madagascar from 59 years in 2000 but the pace of improvements is below that of Rwanda, Tanzania and Uganda (Figure 71 and Figure 72). In sum, while life expectancy has been improving in Madagascar, it's persistently been at a slower pace than in other countries.

Child mortality has been decreasing slowly, remaining at higher rates than peers but below overall LIC averages, similarly as infant mortality. Child mor-

Figure 71: Life expectancy at birth has risen steadily but slower than among peers

Figure 72: Life expectancy level is above the LIC average



Note: BGD Bangladesh, KHM Cambodia, MDG Madagascar, RWA Rwanda, TZA Tanzania, UGA Uganda, LIC average of low-income countries. In all cases the graph presents the latest available year. N/A not available.
Source: World Development Indicators.

tality levels, since the 2000s, have consequently remained lower, when compared to overall LIC levels, which is encouraging (Figure 73 and Figure 74). Yet, when compared to select peer countries, gains have been smaller in the past 20 years. Notably, Cambodia, Rwanda, Uganda had started out with higher or equal levels, and now experience substantially lower child mortality rates than Madagascar, at 25 to 43 child deaths per 1000 live births. Particularly for infant mortality, deaths occurring before the first year of life remain highest across peer countries, at 36 per 1000 live births, yet remaining at lower levels that the overall LIC average (47 percent).

Madagascar's population has doubled in 15 years, creating important strains on access to health services. Madagascar's population doubled between 1993, the time of the last Census, and 2018 to 26 million, according to the 2018 Census. Overall, population growth has increased pressure on service provision in Madagascar, compared to some of the peer countries, where the total number of births per woman has fallen more since 1960, such as Bangladesh, Cambodia and Rwanda. Taking the number of hospital beds per 1000 people, Madagascar remains below peer countries' and LIC averages with 0.2 hospital beds per 1000 people, which is less than half the hospital bed coverage than these countries (Figure 75).[54] At the current birth rate, Madagascar's population could reach 36 million by 2030, further increasing pressure on health services.[55]

Access to sexual and reproductive health services has been improving slowly, and there are signs it declined since the pandemic. Contraceptive use prevalence increased between 2009 and 2018, when 39 percent of women 15-49 reported using modern contraceptive methods, against 29 percent in 2009. Yet, 16 percent of women reported unmet needs for contraception, which explains in

Figure 73: Child mortality has declined at a slower pace than among SSA peers

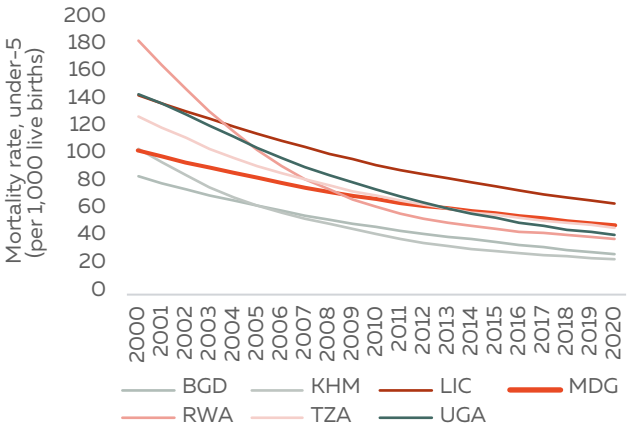
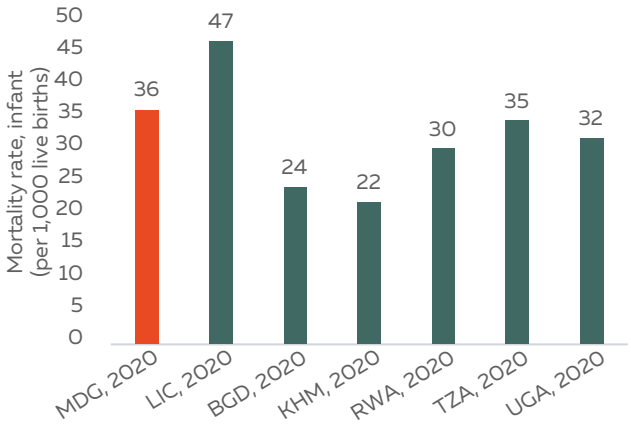


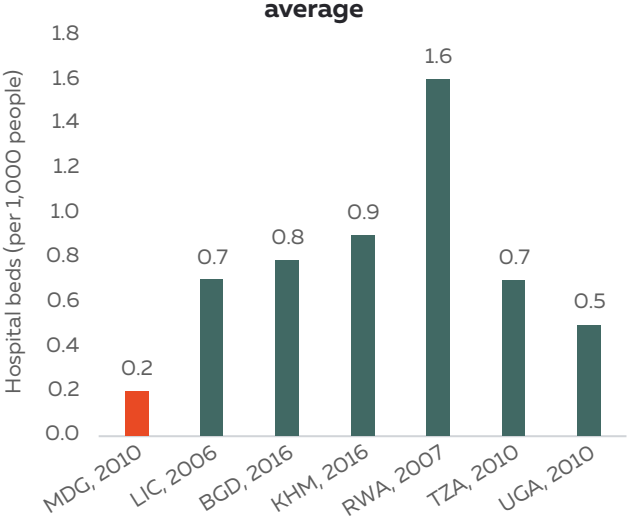
Figure 74: Infant mortality is higher than among peer countries, but below LIC average



Note: BGD Bangladesh, KHM Cambodia, MDG Madagascar, RWA Rwanda, TZA Tanzania, UGA Uganda, LIC average of low-income countries. In all cases the graph presents the latest available year. N/A not available.
Source: World Development Indicators.

[54] Reference years differ. Except for Bangladesh and Cambodia, reference years date further back.
[55] https://data.worldbank.org/indicator/SP.POP.TOTL?locations=MG

Figure 75: Madagascar has less than half the hospital beds than its peer countries and LIC average



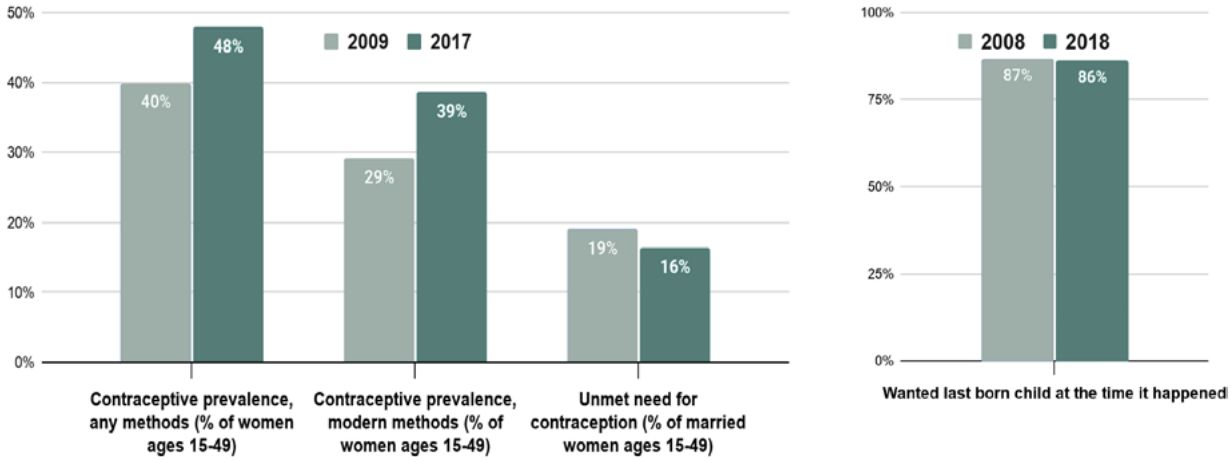
Note: BGD Bangladesh, KHM Cambodia, MDG Madagascar, RWA Rwanda, TZA Tanzania, UGA Uganda, LIC average of low-income countries. In all cases the graph presents the latest available year. N/A not available.

Source: World Development Indicators.

part why 14 percent of women still had unwanted births (Figure 76). According to the Global Financing Facility for Women, Children and Adolescents (GFF 2020), the mortality rate of children under 5 is estimated at 60 per 1,000 live births without disruption of services and 65 per 1,000 live births with disruption of services. Updated models suggest that large service disruptions during the pandemic could have left as many as 81,600 women without access to facility-based deliveries, and 645,100 fewer women receiving family planning services. The results of these disruptions would be lethal, with an 18 and 12 percent increase in infant and maternal mortality respectively.

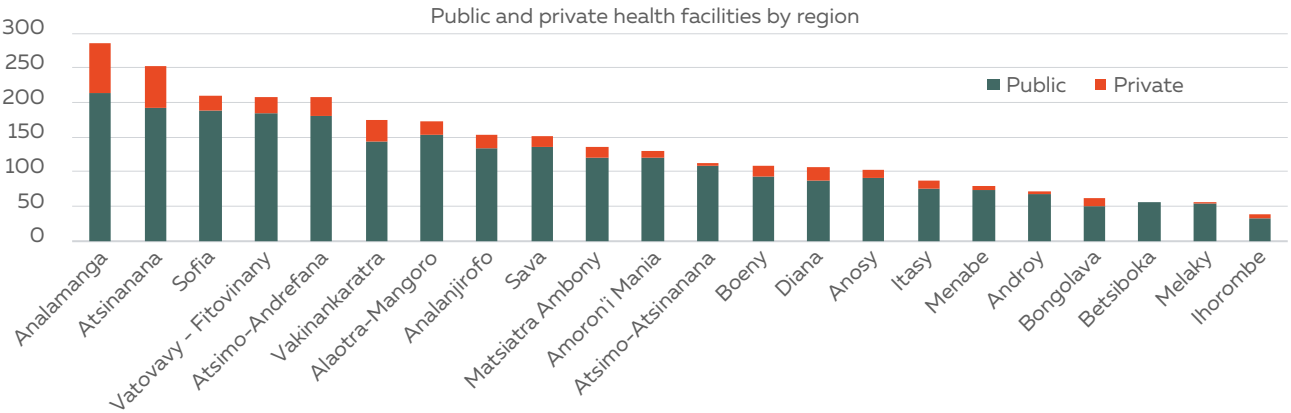
Health facilities are more prevalent in richer regions (Figure 77). It is well established that access to health facilities has tremendous implications for human capital and productivity (Thomson et al. 2009). Arguably, health service provision is always important but particularly so for more vulnerable individuals such as children under five and pregnant

Figure 76: Modern contraceptive use has increased, but 16 percent of women still lack access to any contraception



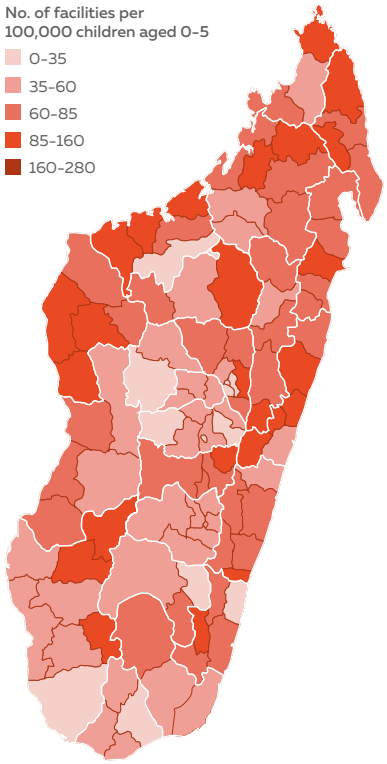
Source: Contraceptive prevalence and unmet need for contraception from World Development Indicators, World Bank. Wanted fertility from DHS 2008 and MICS 2018.

Figure 77: Richer regions have slightly more health facilities

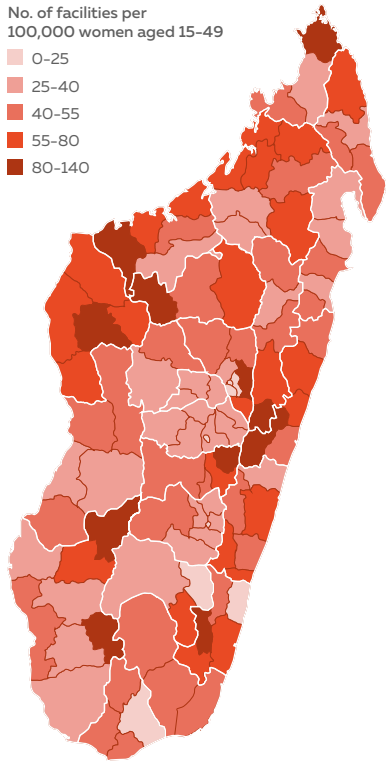


Source: Authors' calculations based on 2018 Madagascar Census.

Map 9: The South has the lowest number of health facilities per children aged 0-5



Map 10: The South and the Capital have the lowest number of health facilities per women aged 15-49



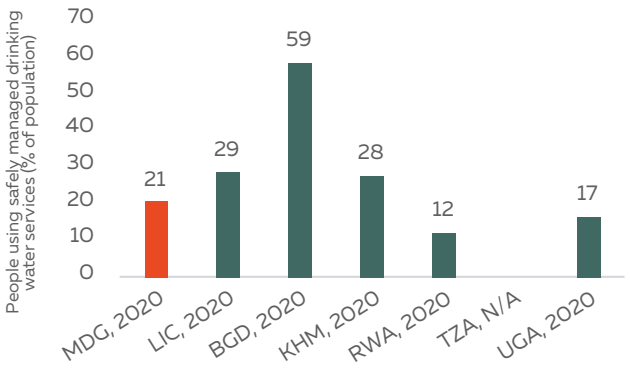
Note: The solid white line outlines the boundaries of regions.
Source: Authors' calculations based on 2018 Madagascar Census.

women. The 2018 Census enumerated public and private health facilities, which appear to be more frequent in richer and more populated regions. While this information does not contain quality or size indicators, it is a rough measure of access.

However, when looking at facilities per capita, even the capital shows limited access. Regions like Androy, Ihorombe, Bongolava and Vakinankaratra are least-serviced in terms of number of facilities per 0–5-year-old children (Map 9) while Analamanga shows very limited number of facilities per 15–49-year-old women (Map 10), though it is possible that the latter also has larger institutions of higher quality. Similarly, districts right around the capital city appear heavily under-serviced by public institutions, while displaying strong coverage by private institutions. This could be pointing toward important inequalities along the income distribution with excellent services for wealthier individuals seeking out private institutions, and important under-provision of the less well-off and poor with limited access to public facilities, with important bottlenecks.

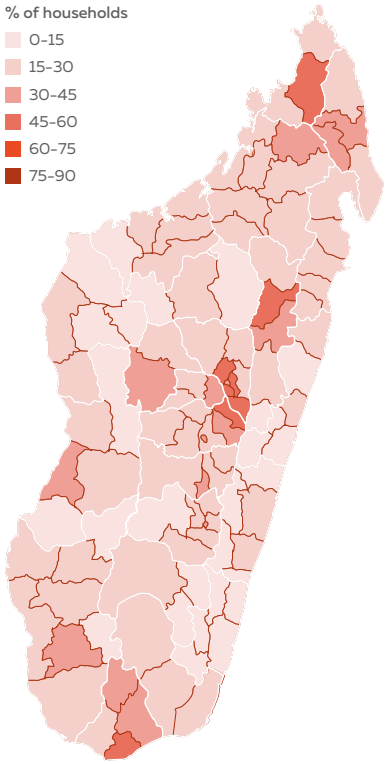
Health outcomes are affected by low quality of health services and low safe water and sanitation coverage. The Afrobarometer 2015 (Afrobarometer and Transparency International 2015) reported that a large share of the Malagasy population has limited access to treatments due to costs even in public facilities, shortages of supplies, absenteeism of staff, long waits, and poor infrastructure. Lack of access appears more acutely in the Grand South. Additionally, provinces particularly in the Southern but also Eastern regions reported in 2018 that access to service delivery deteriorated, when compared to previous years. This is corroborated by the recent Health Service Delivery Index reports (World Bank 2017, 2024).

Figure 78: Madagascar has lower access to drinking water than the average LIC

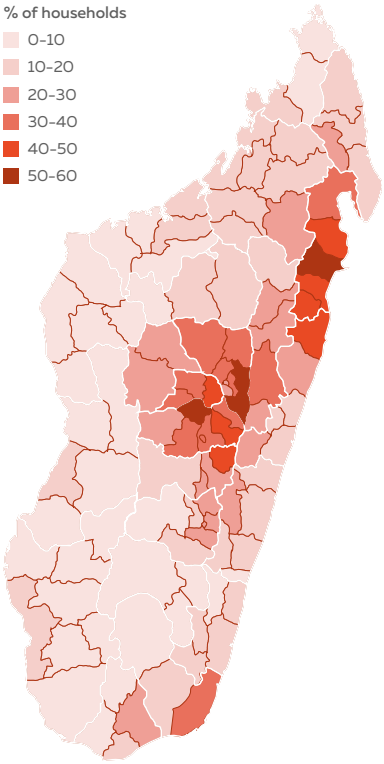


Note: BGD Bangladesh, KHM Cambodia, MDG Madagascar, RWA Rwanda, TZA Tanzania, UGA Uganda, LIC average of low-income countries. In all cases the graph presents the latest available year. N/A not available.
Source: World Development Indicators.

Map 11: 4.4 million households lack access to improved sources of water



Map 12: 4.7 million households lack access to improved sanitation

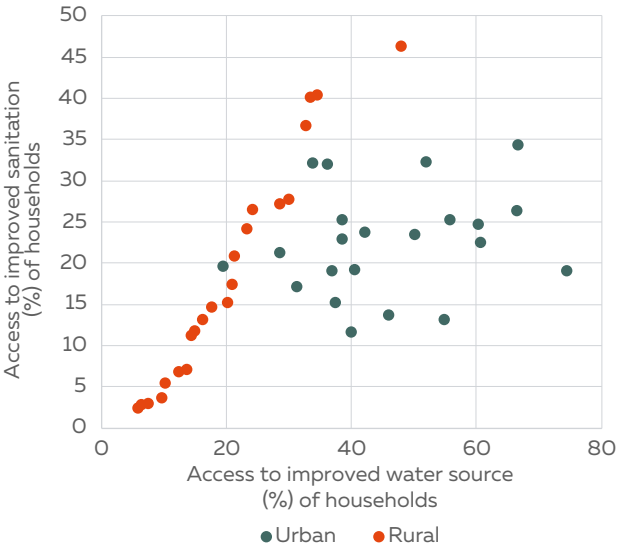


Note: The solid white line outlines the boundaries of regions.
Source: Authors' calculations based on 2018 Madagascar Census.

Few areas of Madagascar have good access to safe water. Other key services linked to health outcomes include water and sanitation. Access to improved water and sanitation has been linked to improved nutrition and lower stunting due to less exposure fetching water or sharing toilets (Skoufias, Vihna and Sato 2019). The proportion of households with access to clean drinking water in Madagascar is significantly lower than the average in LICs and in the mid-range of its peer countries (Figure 78). In 44 districts, fewer than 15 percent of households have access to safe water and overall, about 4.4 million households across the country lack access to safe water (Map 11).

Access to improved sanitation is concentrated in central Madagascar and select coastal regions. At national level, 4.72 million households lack access to improved sanitation (Map 12). And in most districts, fewer than 10 percent of households have access to improved sanitation. The districts with the lowest access are in Fianarantsoa and Toliara. In the capital city, 1.66 million out of the total 2.37 million residents lack access to sanitation. Access to improved sources of water is positively correlated with access to improved sanitation, with the pattern being more salient in rural areas (Figure 79).

Figure 79: Access to improved water and sanitation are highly correlated in rural areas



Source: Authors' calculations based on 2018 Madagascar Census.

3. Food security

Food security, defined as the availability, access, and utilization of sufficient, safe, and nutritious food, is a critical concern in Madagascar. One of the key indicators of food security is the caloric consumption of a population. Table 29 showcases the distribution of calorie intake in urban and rural areas of Madagascar, shedding light on the disparities across the country. Analyzing caloric consumption patterns is vital for understanding the challenges and opportunities related to food security. By examining the variations in calorie intake across different deciles, policymakers and organizations can identify areas with inadequate nutrition and implement targeted interventions to ensure equitable access to nourishing food, ultimately striving to achieve sustainable food security for all.

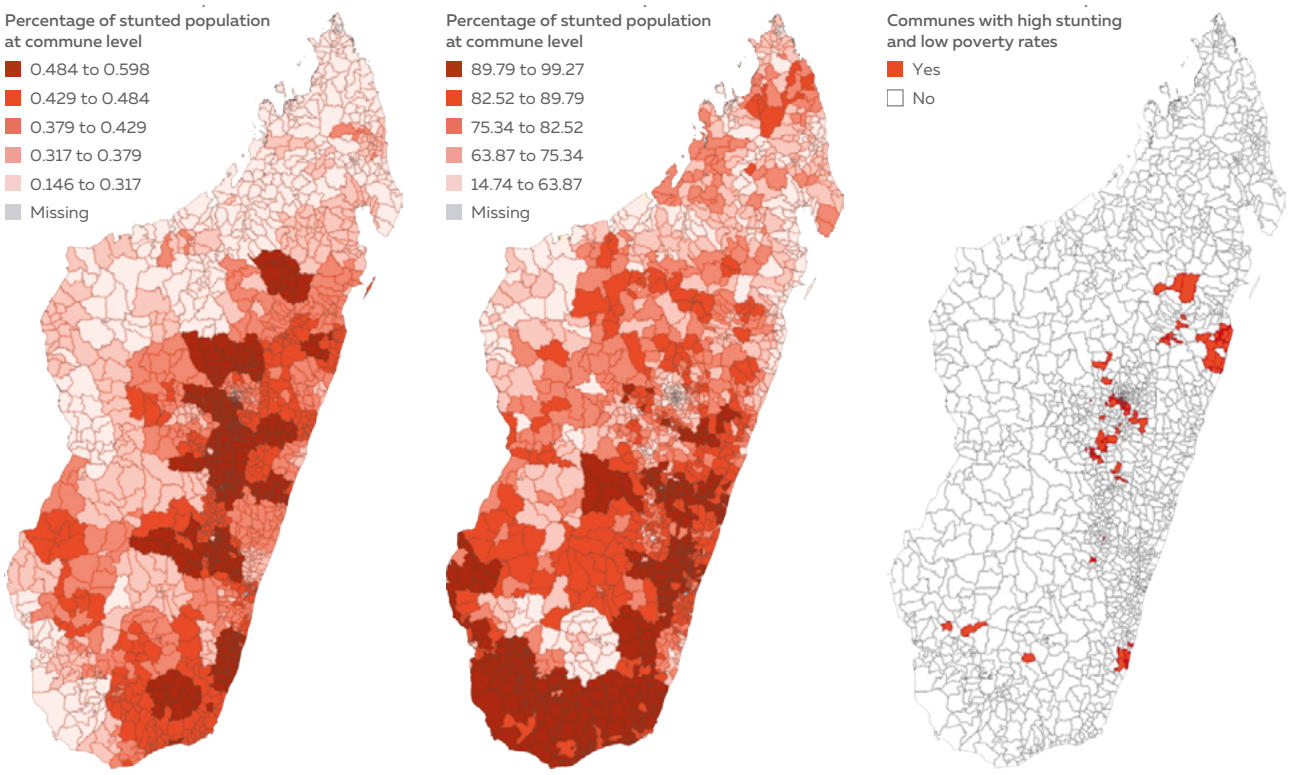
Table 29: Urban average calorie consumption is higher than rural

Distribution of calorie intake (kcal/person/day), 2021-22

PCER deciles	Rural	Urban	Madagascar
Poorest	707	669	696
2	1,120	1,051	1,098
3	1,380	1,211	1,330
4	1,596	1,415	1,535
5	1,793	1,540	1,700
6	1,983	1,709	1,868
7	2,203	1,776	2,010
8	2,487	2,046	2,253
9	2,859	2,309	2,543
Richest	3,827	3,451	3,572
Madagascar	**2,112**	**2,227**	**2,167**

Average caloric intake differs widely across the distribution, but less between rural and urban areas. Table 29 provides information on the distribution of calorie intake in rural and urban areas of Madagascar for the year 2021-22, as well as the overall figures for the country. The data is categorized according to the national per capita real consumption (PCER) deciles, which divide the population into ten equal groups based on their total consumption. Within the poorest decile, rural individuals have an average calorie intake of 707 kcal per person per day, against 669 kcal per person per day in urban areas. Within the richest decile, rural individuals consume 3,827 kcal and urban individuals consume 3,451 kcal per person per day. While rural consumption is slightly higher for rural individuals within each decile, rural individuals are concentrated in poorer deciles, thus the average rural consumption is lower in rural (2,112 kcal) than in urban areas (2,227 kcal).

Map 13: Hidden hunger is largely located in the high plateau with a few pockets in the south



Source: Authors' estimation using 2021/2 EPM data.

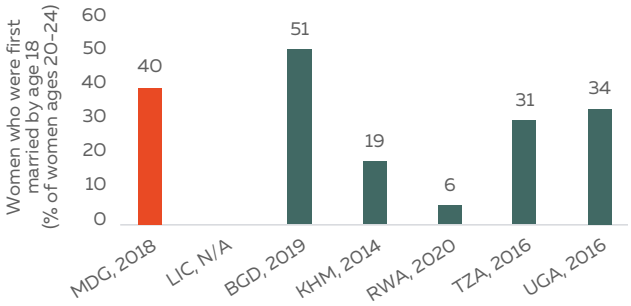
Hidden hunger, which may occur despite sufficient caloric intake, is prevalent in the High Plateau with pockets in the South. Caloric intake is not a sufficient indicator of food security as individuals may lack essential vitamins and minerals, a concept called hidden hunger. Hidden hunger refers to the chronic lack of vital micronutrients, such as iron, zinc, iodine, vitamin A, and vitamin D, in an individual's diet which can lead to a wide range of long-term health complications. Combining small area poverty estimates from the 2022 household survey (EPM) and 2018 Census with stunting data from DHS provides a picture of households with hidden hunger, that is, where enough caloric intake per capita and stunting (a result of micronutrient deficiency) are present (Map 13). Hidden hunger is largely present in the high plateau with a few pockets in the south. Communes in red have high hidden hunger. They are located between the regions of Analamanga and Vakinankaratra with a few communes in Alaotra-Managoro and Atsinanana in the East.

4. Child marriage is a key determinant of intergenerational poverty

Madagascar's child marriage rate is among the highest in the world. In comparison to its peer countries, Madagascar has one of the highest child marriage rates with 40 percent of girls aged 20-24 having been married by the age of 18 (Figure 80). The only country with even higher rates is Bangladesh where as many as 51 percent are married in the same age bracket. Up to 37 percent of young women in SSA are married before the age of 18 (UNICEF 2020) and one in four young women have their first child by this age. Among these high rates overall, Madagascar is at the misfortunate helm of it, with 40 percent of girls at the age of 15-19 being child-married. Unlike women, adolescent girls are still developing cognitively and biologically, and must navigate the formation of agency through norms of age, in addition to gender. On all accounts, child marriage is not only interfering with a young woman's life, it also puts her in life-threatening situation of childbearing which has a higher morbidity rate among its youngest mothers.

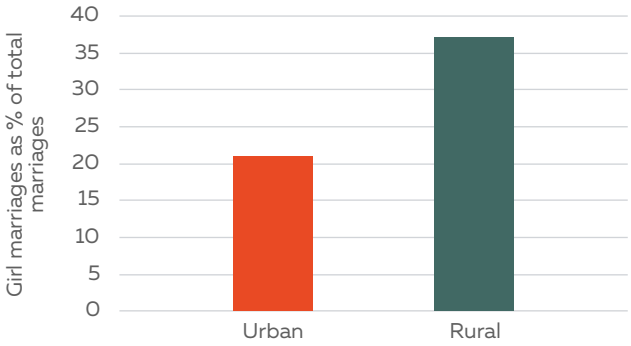
The highest shares of child marriages among women are in the poorest regions especially in rural areas. In the 2018 Census, we observe child marriages across all age cohorts. As of 2018, 37 percent of all marriages in rural areas were the result of child marriages (Figure 81) and 21 percent of all marriages in Madagascar involved girls under the age of 18. The highest shares are in the Southern regions and Western cone of Melaky. In those areas, child

Figure 80: Child marriage is prevalent in Madagascar ...

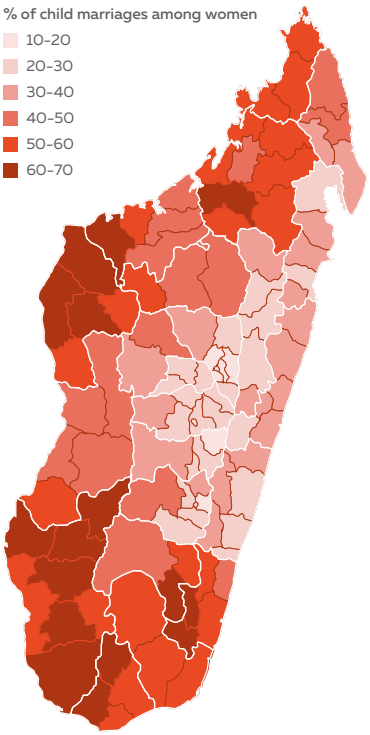


Note: BGD Bangladesh, KHM Cambodia, MDG Madagascar, RWA Rwanda, TZA Tanzania, UGA Uganda, LIC average of low-income countries. In all cases the graph presents the latest available year. N/A not available.
Source: World Development Indicators.

Figure 81: ... it is more common rural areas



Map 14: Child marriage is higher in the West and South

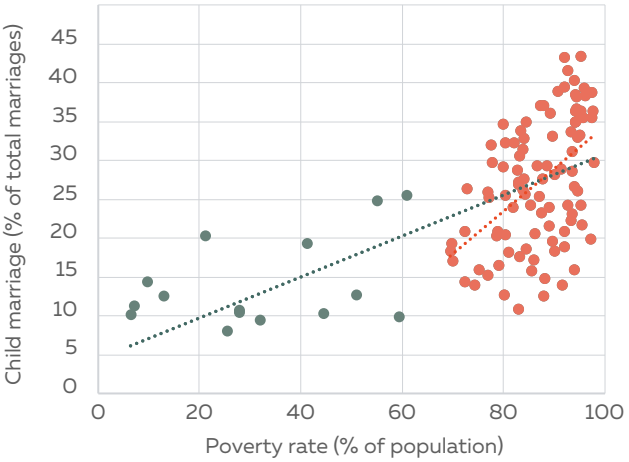


Note: The solid white line outlines the boundaries of regions.
Source: Authors' calculations based on 2018 Madagascar Census.

marriages are as high as 60-70 percent (Map 14). The tragedy can be barely overstated and creates clear alarm bells for policy with dire need for intervention to break this inter-generationally persistent practice.

There is a strong correlation between multidimensional poverty prevalence and child marriage occurrences across districts. Figure 82 plots child marriage rates against multidimensional poverty rates at the district level. There is a clear positive correlation between them. In fact, taking the poorest districts together, a slightly higher multidimensional poverty is associated with a disproportionately larger rate of child marriage. Child marriage and poverty are linked in various ways. Poor families make difficult choices for survival, including marrying off girls as young as possible, either to receive a dowry or to reduce the number of dependents at home. In turn, young girls who marry early lack education and work experience. They start childbearing and -rearing early, which increases their risk of maternal mortality, and they are more likely to have stunted children (Efevbera et al, 2017) who in turn will be less productive as adults. Geographically, there is a strong overlap between multidimensional poverty map and the prevalence of child marriage at the district level (Map 4 and Map 14), with the poorest areas in the country displaying the highest rates of child marriage. Households with child marriage are overrepresented among the poor in both urban and rural areas (Table 30). Nationally, child-married households represent 56.3 percent of the multidimensionally poor population, while they represent 34.7 percent of overall population. In urban areas 45.4 percent of households with spouses married as a child are in multidimensional poverty and in rural areas 90.2 percent.

Figure 82: Child marriage is higher in districts with high multidimensional poverty



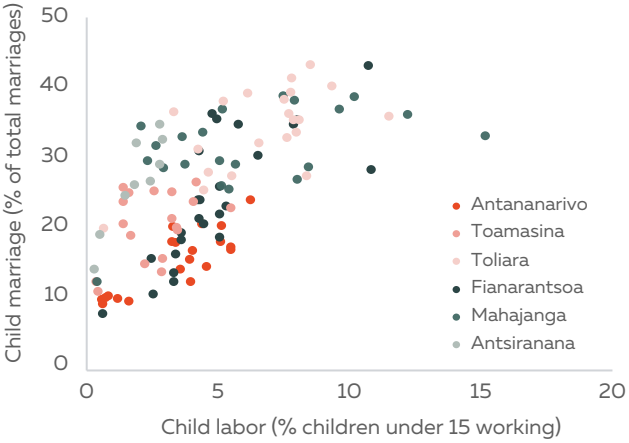
Source: Authors' calculations based on 2018 Madagascar Census.

Table 30: Poverty is higher for households with child marriage, 2021-22

Location	Child married women	Poverty rate (%)	Contribution to poor population (%)	Population share (%)
Overall				
Urban	Yes	45.4	18.8	4.3
	No	25.2	10.5	15.2
Rural	Yes	90.2	37.5	30.4
	No	80.0	33.2	50.1
Province				
Antananarivo	Yes	67.9	7.3	7.0
	No	49.9	5.4	22.5
Fianarantsoa	Yes	94.1	10.2	7.4
	No	84.7	9.2	14.3
Toamasina	Yes	83.1	9.0	4.3
	No	69.9	7.6	10.2
Mahajanga	Yes	87.3	9.4	5.4
	No	71.8	7.8	6.5
Toliara	Yes	91.9	10.0	7.7
	No	80.1	8.7	7.6
Antsiranana	Yes	79.7	8.6	2.9
	No	63.4	6.9	4.2
Region				
Analamanga	Yes	44.9	1.3	2.8
	No	28.8	0.8	12.1
Vakinankaratra	Yes	85.5	2.4	2.3
	No	76.7	2.2	6.0
Itasy	Yes	79.7	2.3	1.0
	No	71.7	2.0	2.6
Bongolava	Yes	82.0	2.3	0.9
	No	72.4	2.1	1.7
Haute Matsiatra	Yes	90.1	2.6	1.6
	No	78.8	2.2	4.5
Amoron I Mania	Yes	90.2	2.6	0.9
	No	81.6	2.3	2.6
Vatovavy Fitovinany	Yes	95.6	2.7	1.8
	No	89.9	2.5	3.9
Ihorombe	Yes	93.3	2.6	0.8
	No	77.9	2.2	0.8
Atsimo Atsinanana	Yes	97.5	2.8	2.3
	No	92.9	2.6	2.4
Atsinanana	Yes	83.1	2.4	1.8
	No	64.6	1.8	3.9
Analanjirofo	Yes	81.2	2.3	1.3
	No	72.5	2.1	2.7
Alaotra Mangoro	Yes	85.1	2.4	1.3
	No	73.7	2.1	3.6
Boeny	Yes	82.7	2.3	1.4
	No	58.9	1.7	2.3
Sofia	Yes	86.9	2.5	2.7
	No	77.0	2.2	2.8
Betsiboka	Yes	90.7	2.6	0.6
	No	79.6	2.3	0.9
Melaky	Yes	95.5	2.7	0.6
	No	87.2	2.5	0.5
Atsimo Andrefana	Yes	90.4	2.6	3.5
	No	76.0	2.2	3.2
Androy	Yes	96.5	2.7	1.6
	No	92.5	2.6	1.4
Anosy	Yes	93.1	2.6	1.5
	No	81.1	2.3	1.5
Menabe	Yes	88.7	2.5	1.1
	No	75.9	2.2	1.5
Diana	Yes	80.5	2.3	1.4
	No	57.3	1.6	1.9
Sava	Yes	78.9	2.2	1.5
	No	68.3	1.9	2.4

Source: Authors' calculations based on 2018 Madagascar Census.

Figure 83: Child labor and child marriage are correlated across districts



Source: Authors' calculations based on 2018 Madagascar Census.

There is also a positive correlation between child marriage and child labor across districts. Certain districts in Toliara, Fianarantsoa, and in Mahajanga are among the most affected by the triple challenges of high out-of-school, child labor, and child marriage rates, risking their future human capital (Figure 83). In 6 districts, child labor counts for more than 10 percent of the employed population and 36 percent of marriages are underage. These districts are predominantly rural have higher average household sizes and people work mostly in agriculture and livestock rearing.

In addition, districts with high child marriage have lower educational attainment and literacy. Child brides are more likely to be illiterate and to marry an illiterate spouse. In the literature, education has been heralded as an important tool against child marriage, with multiple potential mechanisms. Secondary schooling helps to delay marriage and increases economic opportunities and agency for young women. Parental education is also more likely to reduce child marriage. In the absence of parental education data to be linked to child marriage, district level measures of education are plotted against child marriage (Figure 84 and Figure 85). Districts with higher literacy and number of secondary schools have lower child marriage. When looking at simultaneous correlates of child marriage, secondary education, higher education of male spouse, rural area, the sex and age of the household head, and household size are the most significant. In addition, looking at the simultaneous correlates of not attending primary or secondary school (Table 31), education of the head of household is a key determinant. At the same time, because child marriages often involve non-educated spouses and brides, the likelihood that their children will have lower education increases.

Table 31: Geography, literacy and education of head of household are associated with not attending school

Dependent variable: not attending school

Variable	Not attending primary school	Not attending secondary school
Total population in the commune	0.274***	-0.018
Urban population	-0.046***	-0.082***
Household member is female	-0.021***	0.0131***
Age of household member	-0.015***	0.082***
Household head is female	0.004***	-0.01
Age of head of household	-0.000***	-0.003***
Literacy rate of head of household (any language)	-0.078***	-0.071***
Education of the head: None	Reference group	
Education of the head: Pre or Primary	-0.152***	-0.063***
Education of the head: Secondary	-0.202***	-0.167***
Education of the head: Technical or Higher	-0.179***	-0.188***
Household size	0.001	-0.004***
Room density (no. people per room)	0.011***	0.008***
Household has access to improved water sources	-0.036***	-0.042***
Household has access to electricity	-0.038***	-0.070***
Improved wall materials	-0.013***	-0.044***
Improved roof materials	-0.091***	-0.102***
Improved floor materials	-0.004	-0.000***
Observations	4,141,640	4,444,680
R-squared	0.19	0.43

Source: Jarotschkin (2023).

Figure 84: Child marriage is higher in districts with low literacy

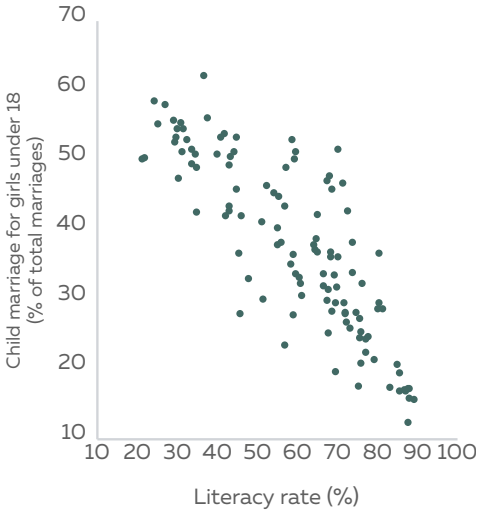
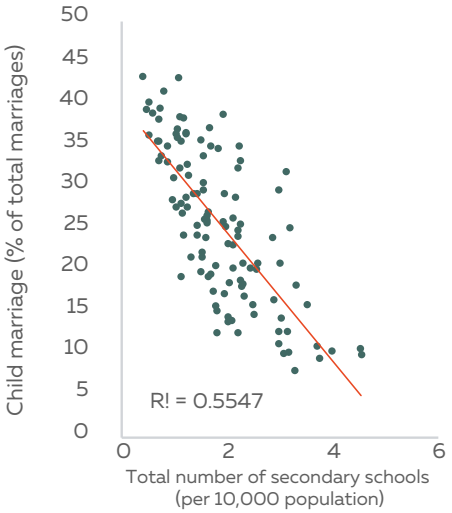


Figure 85: Child marriage is higher in districts with fewer secondary schools



Child marriage of girls and education levels of population across districts

Chapter 5

High vulnerability to shocks drives short term poverty but has long term consequences

Key findings

Madagascar's vulnerability to recurrent shocks, including climate disasters, political instability, and global crises, negatively impacts economic output, household well-being, and poverty levels. For centuries Madagascar has been ravaged by cyclones and droughts. The nation is also exposed to the effects of global crises such as the COVID pandemic and rising commodity prices. In addition to these exogenous shocks, within its borders, Madagascar has experienced political instability multiple times. Climate shocks damage infrastructure while political and economic shocks disrupt productivity. Regardless of type, at a national level, shocks suppress economic output and growth. At the household level, property, livestock, and crops are damaged; the value of real income declines; consumption decreases and poverty increases. For example, poverty increased by 2.5 percent during the COVID pandemic. Food insecurity also increases during such times, especially in the Grand Sud region.

Drought, irregular rains, tropical storms, and high food prices are the most severe systemic shocks faced by households. Each had an impact on household wealth (income and assets), agricultural output (crops and livestock) and food (purchases and stock). Sixty-eight percent of households that experienced food inflation deemed it the most severe shock they had suffered and those affected by it have not returned to their pre-shock consumption levels.

Apart from shocks which affect whole communities households also suffer idiosyncratic shocks that increase poverty. In 2022, households experienced illness (5.6 percent), death (4.7 percent), theft (3.7 percent), divorce (3 percent), job loss (2.8 percent), income loss (1 percent) and bankruptcy (0.8 percent) and other forms of misfortune. The loss of jobs and salaries had the most adverse effect on households. In the absence of employment, people sell assets, crops, and livestock in order to meet their needs. Many households often lack an immediate coping strategy, and when they have one it frequently consists of buying cheaper food, soliciting help from relatives and friends, or using their savings. Out of the 68 percent of respondents that had experienced an increase in the price of major food items usually consumed by their household, 46 percent reduced their consumption to cope with the shock.

Madagascar canhelp vulnerable households better cope with repeated shocks and reduce their chances falling further into poverty. Climate-smart investments and index insurance are two ways to enhance agricultural productivity and reduce vulnerability to shocks which can be implemented quickly and at scale. These policies must be accompanied by productive and adaptive safety nets..

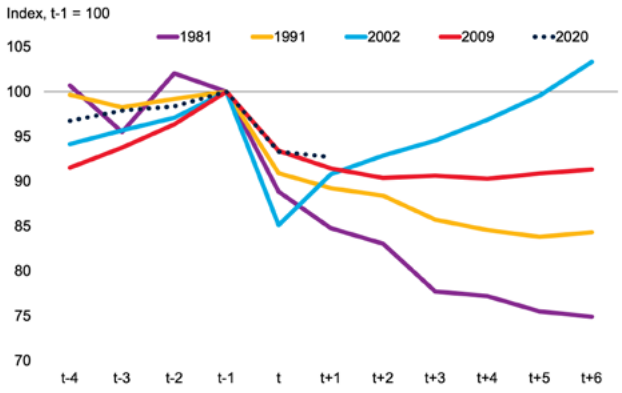
1. An overview of recent shocks and challenges to recovery

Madagascar has been vulnerable to shocks since before it became an independent country, with droughts in the south causing acute food insecurity since the late 1800s. In addition, since gaining independence in 1960, Madagascar has experienced several episodes of political unrest, often instigated by power struggles among elites. The latest such crisis, in 2009, resulted in cuts to external aid and a period of isolation from donor partners. Climate change has exacerbated Madagascar's vulnerability to weather shocks, increasing the severity of cyclones, locust infestations, and droughts. The country has historically struggled to recover from such episodes. Notably, Madagascar is the only country globally whose GDP per capita in 2020 was lower than in 1960 without experiencing a civil war in that interval (Figure 86). Its poverty rate is among the highest in the world.

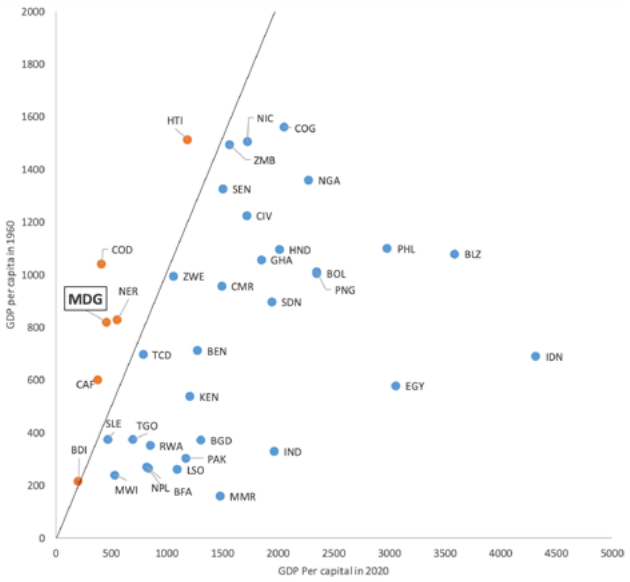
The country was hit by multiple disasters in recent years, including the recession caused by the COVID-19 pandemic and five storms and tropical cyclones that damaged food crops, livestock, and infrastructure. The cyclones affected over two-thirds of the country and caused direct damages of more than US$658 million, equivalent to 4.8 percent of GDP. In addition, Russia's invasion of Ukraine has impacted the supply and pricing of essential goods such as fuel, edible oils, and grains. While

Figure 86: Shocks have repeatedly set back GDP growth in Madagascar

a) GDP per capita... in Madagascar around major shocks



b) ... in 2020 vs in 1960, select countries



Note: in b), orange dots indicate countries where GDP per capita in 2020 was lower than in 1960. For example, GDP per capita in Haiti was US$1,714 in 1960 and US$1,323 in 2020.[56]

Source: Authors based on WDI.

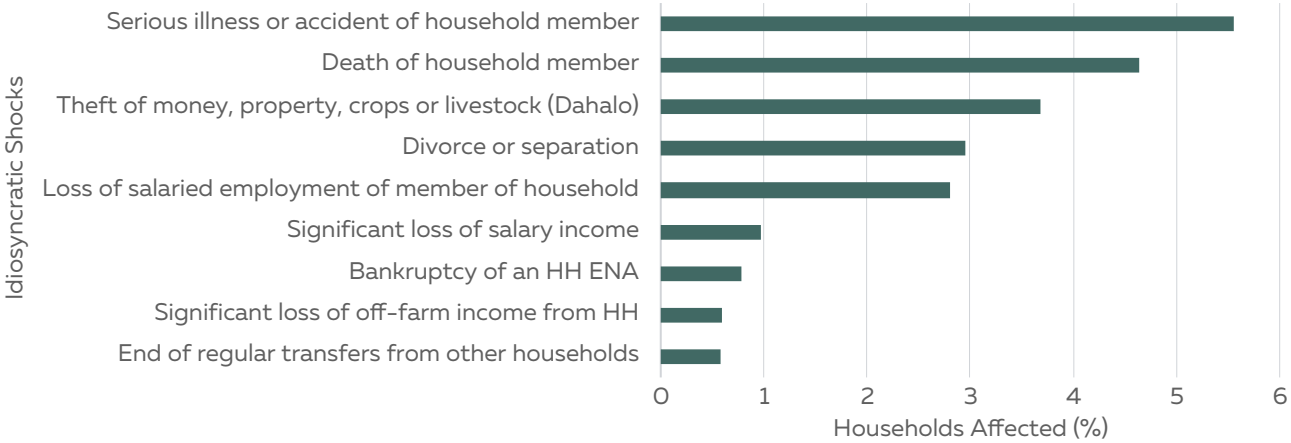
such shocks disproportionately affected vulnerable households, inflationary pressures are felt by all residents, and particularly by those whose food basket primarily comprises imported goods.

Prolonged droughts have caused a severe famine in southern Madagascar. The Grand Sud area of the country experienced the worst drought in a decade during the 2019-2020 agricultural season, resulting in the loss of up to 60 percent of the crop yield in three of the area's most populated districts.[57] Specifically, maize, cassava and rice yields declined (ACAPS, 2022). According to a November 2021 report by the Integrated Food Security Phase Classification (IPC 2021), an estimated 37 percent of the population in the 10 hardest-hit districts—or 1.64 million out of 2.7 million people—faced acute food insecurity and required emergency assistance between October and December 2021. This included over 500,000 people facing emergency (IPC Phase 4), and an additional 28,000 people facing famine conditions (IPC Phase 5). At least 405,000 children under the age of five suffered from acute malnourishment, with 110,000 of them in need of urgent lifesaving assistance.[58]

2. Types of shocks and coping mechanisms

Households in Madagascar face idiosyncratic shocks that are either social or economic in nature (Figure 87). Social shocks, which affect incomes indi-

Figure 87: Illness and death are the most frequent idiosyncratic shocks (Self-reported)



Source : Author's calculations based on Enquête Permanente Auprès des Ménages (EPM) data, 2022.

[56] See Table A1 in the Appendix for a full contrast of GDP in the countries that experienced a decline.
[57] The Grand Sud area is the southern part of Madagascar, consisting of Androy, Anosy and Atsimo-Andrefana regions. It is very vulnerable to climate shocks because of its geographic position in proximity to the Indian Ocean. According to Radi (2023), "The livelihood of 95 percent of the population in the Grand Sud depends on agriculture, raising livestock, and fishing. https://kujenga-amani.ssrc.org/2023/01/13/the-impact-of-climate-change-on-the-food-crisis-in-the-grand-sud-of-madagascar/. The Grand Sud witnessed a long drought period that began in 2019 and continued until January 2022, which led to crop failure. The droughts caused the suffering of more than 1.6 million people in the Grand Sud at the beginning of 2022 as a result of high food insecurity levels."
[58] https://www.wfp.org/news/malnutrition-among-children-expected-quadruple-southern-madagascar-drought-worsens-warn-unicef

rectly, include illness/accident or death of a household member, and divorce/separation. Economic shocks have a more direct impact on incomes and include: theft of money, property, livestock (*Dahalo*) or crops; loss of salaried employment; significant loss of salary income; bankruptcy of a household enterprise; loss of off-farm income; and the end of regular transfers from other households in their social network.[59]

More households experienced social shocks than economic shocks. The combined share of households affected by social shocks was 13.15 percent of the population, of which 5.56 percent suffered from the serious illness/accident of a household member, 4.64 percent from the death of a household member, and 2.95 percent went through a divorce or separation. On the other hand, 9.42 percent of households experienced direct economic shocks: 3.68 percent lost money, property, livestock, or crops to theft; 2.81 percent had a member who lost a salaried job; 0.97 percent lost salary income; 0.79 percent had a household enterprise that went bankrupt; 0.59 percent lost non-agricultural income; and 0.58 percent stopped receiving transfers from other households.

Loss of salaried employment and the significant loss of salary income had the most profound adverse impact on households. Theft caused a loss of income, assets, crops, and livestock for 83, 87, 64, and 57 percent of the affected households, respectively, while fewer than 15 percent of the households that experienced such theft were not materially affected by it. The shock with the largest adverse impact on households was loss of salaried employment. Households where a member lost a job experienced a decline in assets, crops and livestock. In these households, food purchases decreased by 85 percent and food stocks by 62 percent. Among households that lost salary income, there was no significant change in the structure of their asset portfolios, but the quantity of assets decreased. Approximately 8 percent of these households did not see a change in the size of their agricultural production or livestock, but 32 percent experienced a decline in purchases and stocks of food. Food purchases and stocks also decreased significantly for households that lost a significant part of their salary and those that suffered theft of money, property of agricultural output.

As households face various shocks, they adopt several strategies to cope with them. Table 32 shows different ways in which households attempt to adapt to shocks. Many households resort to buying cheaper food, soliciting help from relatives and friends, or using their savings. A much smaller group of households change their consumption habits, having acknowledged that recovering from the shock might take time. Less frequent but costlier coping mechanisms include selling property, assets, and food, or inducing children in the household to work or get married. Worryingly, certain households cut healthcare and education expenditures to cope with shocks, which can have negative long-term effects on human capital.

Systemic shocks affect more people than idiosyncratic shocks. Only 1.25 percent of households in Madagascar suffered from systemic social shocks: 1.02 percent were affected by armed conflict, violence, or insecurity; and 0.23 percent experienced farmer-herder conflict. Conversely, systemic economic shocks affected 28.5 percent of the sampled households, led by high food prices (affecting 24.62 percent of households) ahead of low prices for agricultural produce (2.51 percent) and high prices for agricultural inputs (1.37 percent). Natural hazards affected 42.93 percent of households, broken down as follows: drought, 17.68 percent; tropical storms, 10.24 percent; irregular rains, 9.29 percent; floods 2.56 percent; crop and animal diseases, 1.86 percent; locust and pest attacks, 0.67 percent; fires, 0.51 percent; and landslides, 0.12 percent.

Table 32: Households have few mechanisms to cope with idiosyncratic shocks (Self-reported)

Percentage of households that used each coping mechanism

	Mobilize savings	Seek help from relatives / friends	Change consumption habits	Buy cheaper food	No strategy	Other
Salary loss	8.33	13.64	8.33	21.21	15.91	32.58
Salaried job loss	11.98	13.54	9.11	20.31	16.67	28.39
Illness/accident	11.56	18.79	6.18	9.07	21.42	32.98
Death	8.86	11.99	6.62	10.25	37.85	24.61
Divorce/separation	7.18	16.83	6.68	8.17	37.62	23.52
Theft	4.57	7.55	8.15	7.55	40.76	31.42

Source: Author's calculations based on 2022 EPM data.

[59] 'Dahalo' is a native term referring to cattle rustling / theft. The New Humanitarian (2012) explains the cultural context. https://www.thenewhumanitarian.org/analysis/2012/07/18/madagascar-s-unforgiving-bandit-lands

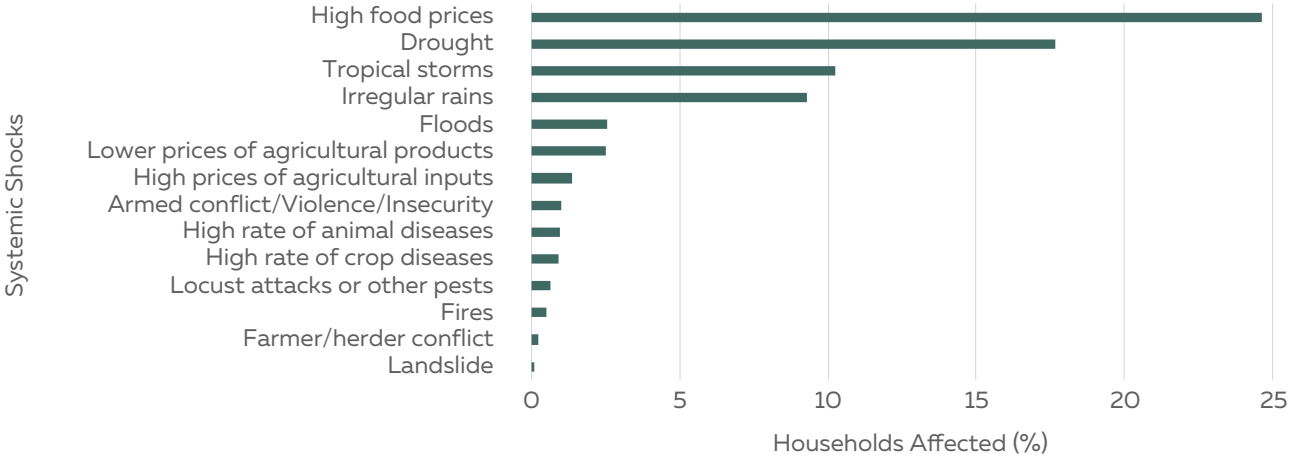
High food prices are the most common systemic economic shock, and those affected pre-shock consumption levels. Sixty-eight percent of households that experienced food inflation deemed it the most severe shock they had suffered, while 25 percent ranked it second and 7 percent ranked it third. Low prices of agricultural output affected 2.51 percent of households, and none recovered. Fifty-nine percent of them considered this the most severe shock they had experienced, while 29 percent ranked it second and 12 percent ranked it third. Finally, inflation of agricultural inputs affected 1.36 percent of households. None of them recovered and 34 percent of them deemed it the most severe shock they had experienced, with 41 percent ranking it second and 25 percent ranking it third.

Droughts are the most common natural hazard. Among households affected by drought, 83 percent said it was the most severe shock they had experienced, while 13 percent ranked it second and 4 percent ranked it third (Figure 88). This last subgroup recovered after five months, whereas the others never recovered. Tropical storms adversely affected 10.24 percent households, which never recovered. In this group, 71 percent of households considered it the most severe shock they had suffered, while 23 percent ranked it second and 5 percent ranked it third. The last significant natural hazard was irregular rains, which affected 9.28 percent of the population. None of these households recovered and 56 percent described this as the most severe shock they had experienced. Thirty-six percent ranked this shock second while 7 percent ranked it third.

Drought, irregular rains, tropical storms, and high food prices are the most severe systemic shocks. Among households affected by irregular rains, 90 percent reported a decrease in income and agricultural produce, while 67 and 35 percent said that their assets and livestock numbers had fallen. Approximately 25 percent reported no change in assets and livestock—less than 10 percent had no change in income, and a meagre 1 percent (probably made up of the few farmers who use irrigation systems) saw no change in their agriculture production. It is therefore not surprising that food purchases and stocks decreased for many of these households. Similarly, tropical storms resulted in lower income for 92 percent of households, a smaller livestock herd for 35 percent of households, and a decrease in assets and agricultural output for nearly 75 percent. In the group affected by tropical storms, most households reduced food purchases and stocked less food for future consumption. Among households affected by drought, 94 percent saw a decrease in income, 88 percent harvested less agricultural produce, 70 percent had fewer assets, and 41 percent suffered a decrease in the number of livestock they owned. Food purchases and stocks were also adversely affected. Indeed, food inflation emerged as the most severe systemic shock.

Households are ill-equipped to cope with systemic shocks. Table 33 presents the main coping mechanisms by which households adjust to four major shocks—food inflation, drought, tropical storms, and irregular rains. It is apparent that households are better able to cope with food inflation and drought than with tropical storms and irregular rains. Moreover, households have more room for maneuver to adjust to food inflation than to the other three shocks. The most common coping strategies involve reducing food consumption or using savings, followed by soliciting help from relatives and friends. In many cases, however, households lack any strategy to deal with shocks.

Figure 88: Food price and weather shocks are the most common aggregate shocks (Self-reported)



Source: Author's calculations based on 2022 EPM data.

Table 33: Households have few mechanisms to cope with aggregate shocks (Self-reported)

Coping mechanisms	High food prices	Drought	Tropical storms	Irregular rains
Mobilizing savings	1.51	1.05	0.59	0.75
Help from relatives or friends	1	1.23	0.38	0.36
Government/State aid	0.13	0.47	0.11	0.1
Help from religious organizations or NGOs	0.08	0.45	0.07	0.18
Marry off children	0.01	0.07	0.01	-
Change in consumption habits	5.21	1.98	0.77	1.01
Buy cheaper food	8.5	2.3	1.37	1.16
Employed household members took additional jobs	0.05	0.01	0.03	0.01
Members >=15 years inactive or unemployed took jobs	0.04	0.03	0.04	0.04
Children <15 years were made to work	0.1	0.12	0.04	0.04
Children taken out of school	0.11	0.06	0.01	0.04
Migration of household members	0.07	0.07	0.1	0.01
Reduced health/education expenditure	0.35	0.15	0.07	0.13
Obtaining a loan / credit	0.1	0.08	0.07	0.03
Sale of agricultural assets	0.04	0.17	0.01	0.07
Sale of household durable assets	0.23	0.15	0.04	0.04
Sale of land/buildings/houses	0.05	0.11	0.01	0.01
Sale of food stock	0.18	0.14	0.1	0.1
Increased fishing activities	0.04	0.01	0.01	0.01
Sale of livestock	0.31	0.7	0.12	0.28
Entrusting children to other households	0.05	0.02	0.03	-
Engagement in spiritual activities	0.18	0.08	0.07	0.06
Practice of off-season cultivation	0.29	1.13	0.37	0.86
No strategy	5.29	6.34	5.5	3.77

Source: Author's calculations based on 2022 EPM data.

To summarize, households in Madagascar are particularly vulnerable to food inflation and inclement weather, which are among the worst systemic shocks they face. On the other hand, salary loss and job loss, while infrequent, are the most devastating idiosyncratic shocks. Unfortunately, households often struggle to recover from these shocks due to the lack of effective coping mechanisms available to them. This highlights the pressing need for better support and resources to help households weather the many systemic and idiosyncratic shocks they may face.

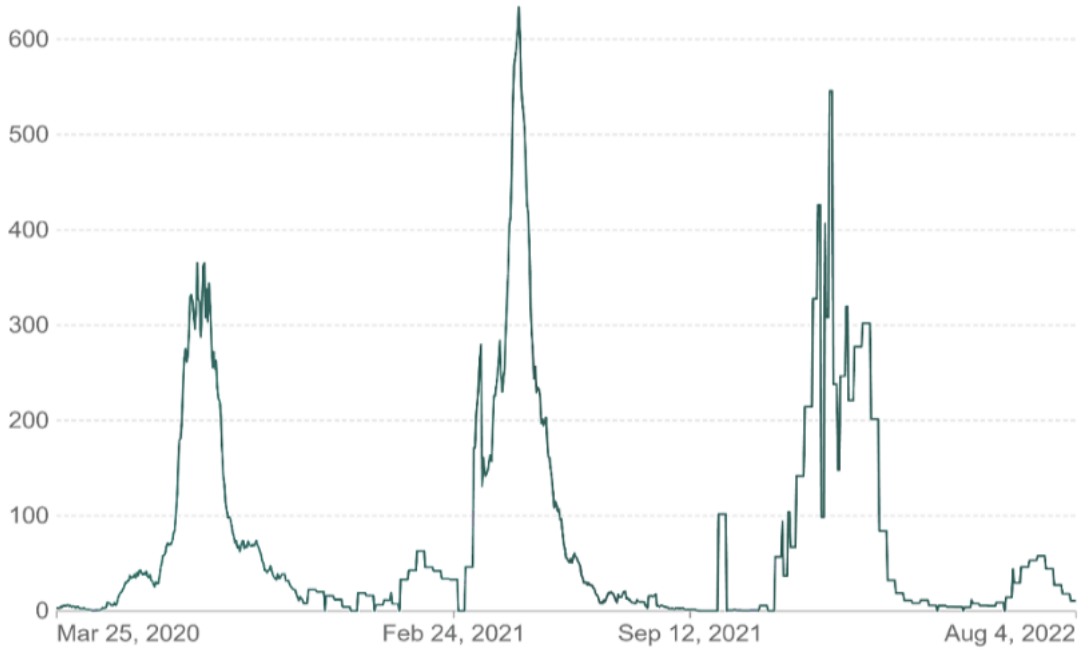
3. Systemic shocks and their effects on welfare in urban and rural settings

Systemic shocks are important drivers of poverty. As systemic shocks are significantly more frequent and touch a large share of the population, the discussion below focuses on the three most recent and disruptive shocks that affected the country. While no conclusions are drawn regarding causal effects, the analysis highlights the correlations between income or consumption level and the frequency or intensity of shocks. The three recent systemic shocks include the COVID-19 pandemic and the recession it created; food and fuel price increases ignited by Russia's invasion of Ukraine; and weather patterns which resulted in cyclones in parts of the country.

COVID-19 and its effect on labor, consumption, services and poverty

The COVID-19 pandemic started in early 2020, with the first three cases confirmed on March 20. This prompted the declaration of a state of emergency the next day which was lifted on October 18, 2020, after the first wave of the pandemic had peaked in July/August. The state of emergency was reinstated in early April 2021 and lifted again on September 4, 2021. The epidemiological situation worsened during the second wave from March–April 2021, resulting in over 600 new daily cases and peaking on April 14, 2021, with 854 new cases (Figure 89). The daily number of confirmed deaths dwindled from a peak of 12.86 in December 2021 to 0.14 as of August 2022.

Figure 89: Several COVID-19 waves hit Madagascar in 2020/2021 but the country's borders fully opened only in late 2022



Note: COVID-19 cases in Madagascar during the pandemic (daily new confirmed cases).
Source: Johns Hopkins University CSSE COVID-19 Data.

Major containment measures to curb the spread of COVID-19 had a negative impact on welfare. The state of emergency entailed the closure of borders, churches, and mosques; the prohibition of public gatherings; mandatory wearing of masks and handwashing; and curfews. Although most measures were lifted when the state of emergency ended, borders remained closed until March 2022. The stringent measures affected livelihoods, especially among urban households, dependent on tourism, transport, hospitality, restaurants, and informal labor.

To monitor changes in livelihoods, the government launched a series of high-frequency phone surveys (HFPS). The HFPS were part of a wider initiative by the World Bank and participating countries to track household welfare changes as the pandemic evolved. The purpose was to provide a contemporaneous understanding of the effects of the pandemic and inform policy responses. The HFPS aimed to obtain information on various dimensions, including knowledge of COVID-19, access to basic services, household employment, and the subjective well-being of households.[60] The results of the surveys are representative at the national level for households with access to a telephone.

Labor income

The onset of the pandemic caused a significant increase in unemployment worldwide, and Madagascar was not exempt from this trend. According to the United Nations, "by 2020, the global unemployment rate reached 6.5 percent, up 1.1 percentage points from the previous year.[61] The number of people unemployed worldwide increased by 33 million, reaching 220 million." In Madagascar, the unemployment rate increased from 2.5 to 12.2 percent in 2020, starting from the declaration of the first state of emergency. In June 2020 alone, 7 percent (15 percent in urban areas) of interviewed workers lost their jobs. The loss of jobs was greater in urban areas than in rural areas, but the rate of job loss tapered off with time (Table 34).

Table 34: Urban job losses due to the pandemic far outnumber rural job losses

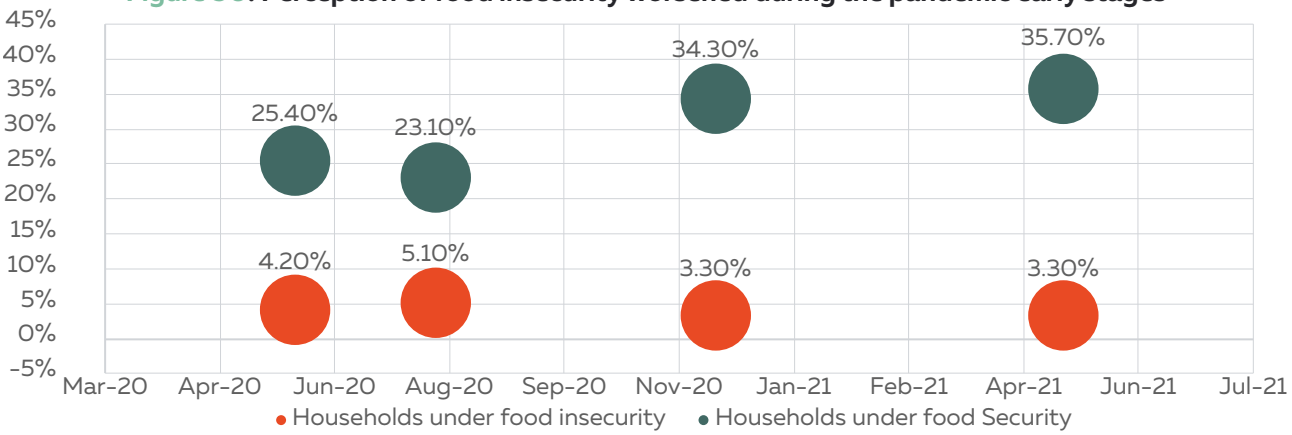
	June 2020	August 2020	November 2020	May 2021
Urban	15.3	8.5	0.9	0.8
Rural	6.3	3.2	0.1	0.3
All	7	4.4	0.3	0.5

Source: Authors based on 2020/1 HFPS data.

Many individuals lost their income due to job loss or salary reduction. In both June and August 2020, a majority of households experienced a decline in income. But by November 2020, household incomes were stable and increased for a minority of households after, suggesting a recovery in economic activity (Table 34).

[60] In Madagascar, four rounds were conducted. In the first round, 1,240 households were interviewed by telephone in June 2020. In the second round, additional respondents were added to reach 1,580 households in August 2020. In the third and fourth rounds 1,580 and 1,345 households were interviewed in November 2020 and May 2021, respectively.
[61] https://unstats.un.org/sdgs/report/2021/goal-08/

Figure 90: Perception of food insecurity worsened during the pandemic early stages



Source: World Bank, High Frequency Phone Survey, 2020 and 2021.

Effect on consumption

As labor incomes declined, household budgets became more constrained, and lifestyles changed. For example, expenditure on healthcare and education lessened while households adopted a survival mode and spent a larger share of their incomes on food. Notably, food security deteriorated for many at the height of the pandemic, especially among households reliant on daily wages from informal activities. The situation improved by November 2020 as the pandemic subsided. To illustrate this point, 4.2 percent of households claimed to be in a situation of food insecurity in June 2020 due to COVID restrictions. This is an addition to the people already in chronic food insecurity condition. By May 2021, 3.3 percent of households said they were in a situation of food insecurity (Figure 90).

Service disruption

Medical services were not significantly disrupted by the pandemic. The rapid response by the government to the medical emergency meant that most households that needed medical services (and could afford to pay) reported having access to them, in both urban and rural areas. Moreover, this access increased as the pandemic evolved (Table 35).

Access to education was initially reduced, but schools quickly reopened. Access to education was severely disrupted during the second wave, with 40 percent of households reporting that their children were not going to school—a sharp increase from June 2020, when only 24 percent of households made that claim. By November 2020 schools had fully reopened, and all households reported that their children were back to school (Table 36).

Table 35: Access to health services remained high and increased during the pandemic

	June 2020	November 2020	May 2021	May 2021
Urban	82.35	83.50	89.40	0.8
Rural	90.10	81.30	97.50	0.3
All	88.50	81.80	96	0.5

Source: Author's calculations based on 2022 EPM data.

Table 36: Access to education services was interrupted only briefly in 2020

	June 2020	August 2020	November 2020	May 2021
Urban	18.75	32.60	0	0
Rural	24.60	42.40	0	0
All	23.90	39.90	0	0

Source: Author's calculations based on 2022 EPM data.

Poverty

The COVID-19 pandemic increased the poverty rate by more than 2.5 percentage points between 2019 and 2020. As a result of the economic downturn caused by the pandemic, 81.93 percent of households were estimated to be poor in 2020 based on the (World Bank, 2022), from 21.4 million people in 2019 to 22.7 million in 2020. Some of the increase in poverty was transitory—by 2021, the poverty rate had declined to 2.12 percentage points above its pre-pandemic level. The severity of poverty and inequality also worsened due to the pandemic.

The households that became poor because of the pandemic have different characteristics from those that were already poor. The newly poor households had younger household heads, were more likely to live in urban areas, had fewer members and were better educated. Furthermore, the newly poor were more reliant on the services sector for employment, and their household heads more likely to participate

in the labor force. This data underscores that poverty increased during the pandemic due to employment losses.

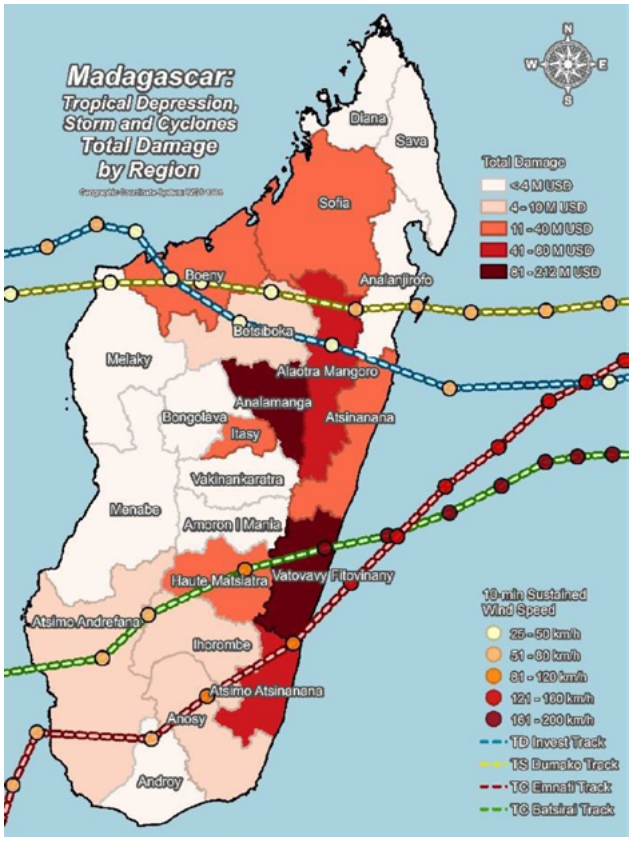
Cyclones and their effect on household consumption levels and welfare

In addition to the pandemic, households were hit by several tropical storms and cyclones. In 2022 alone, five cyclones—Ana, Batsirai, Dumako, Emnati, and Gombi—damaged food crops, livestock, and infrastructure, with many households directly affected by one or more of them (Map 15).

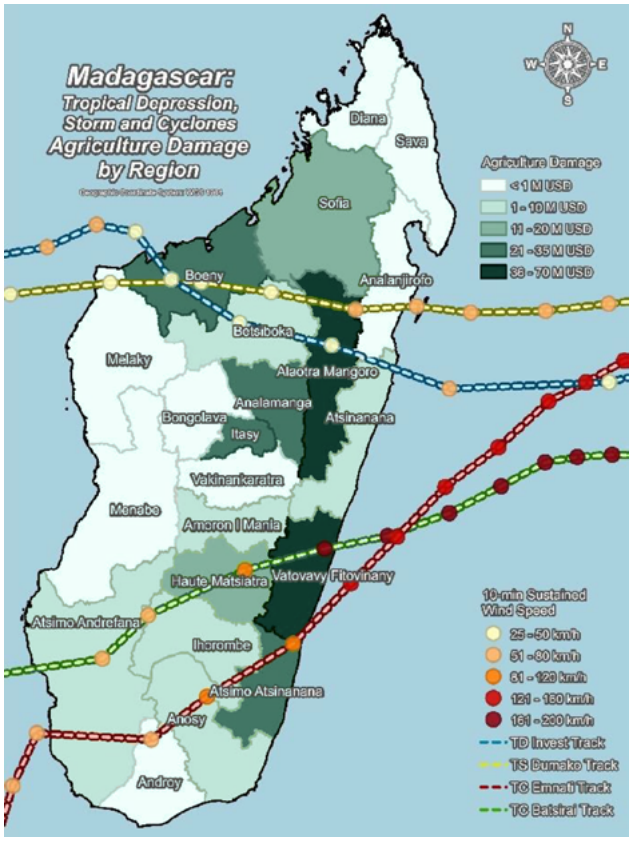
Poor households were more likely to be hit by multiple cyclones. The storms had different impacts on households across consumption and income distributions (Figure 91). Combining geo-referenced data on cyclone trajectories with household location data from the EPM survey, households that lived along the cyclones' paths, the number of times they were hit by cyclones, and their consumption levels could be traced. More than 60 percent of households in the top 20 percent of the consumption distribution were not hit by any cyclones in 2022, versus only 9.7 percent of households in the bottom 20 percent. Households hit by one cyclone tended to be middle-class, but comparing households hit by two cyclones reveals another marked difference in the frequency of cyclone impact between the rich and the poor: approximately 81 percent of households in the bottom 10 percent, and more than 50 percent of those in the bottom half of the consumption distribution were hit by cyclones twice, compared with only 46.5 percent of households in the top decile and less than 48 percent of those in the top half of the distribution. An even starker trend emerges among households hit by three cyclones: approximately 30 percent of households in the bottom decile of the consumption distribution experienced this ordeal, versus only 3 percent of those across the rest of the distribution. The location of the dwellings of poor households contributes to their poverty, by exacerbating their vulnerability to cyclones. The observed pattern indicates that wealthy households tend to live in areas less vulnerable to the physical effects of cyclones and tropical storms. On the contrary, the data strongly suggests that poor households are more likely to live in parts of the country especially vulnerable to cyclones—usually remote areas with minimal access to infrastructure.

Map 15: Recent cyclones have affected the East of the island more significantly

Spatial distribution of total economic damages, 2022

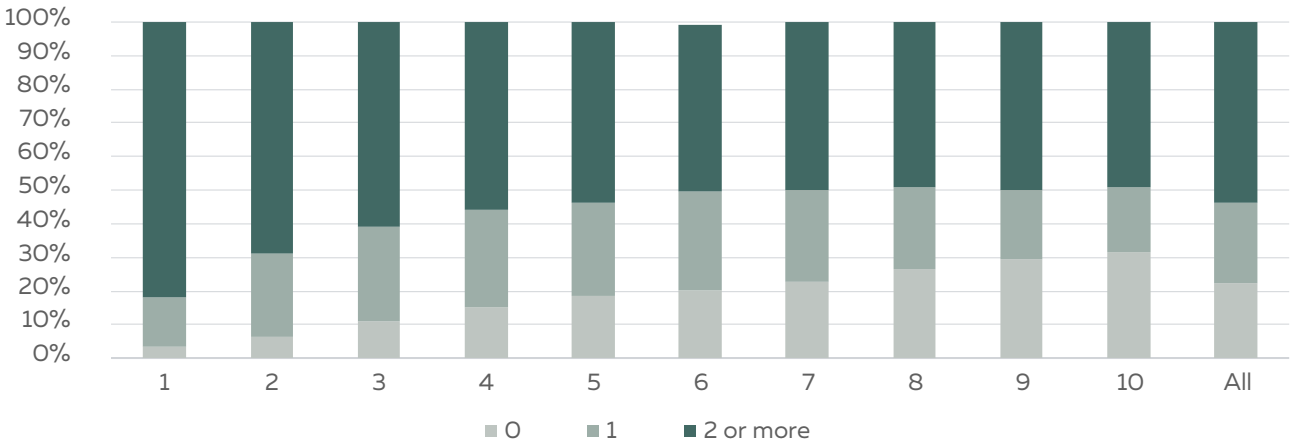


Agricultural damage, 2022



Source: 2022 Madagascar Global Rapid Damage Estimation (GRADE) Report.

Figure 91: Poor households were disproportionately affected by cyclones in 2022



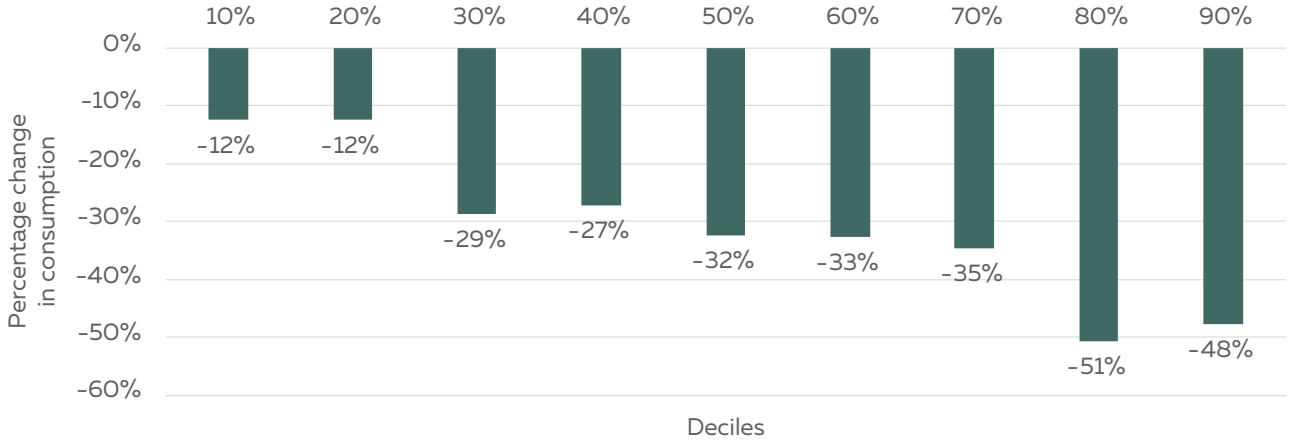
Note: Geographical trajectory of cyclones cross-referenced with household location data.
Source: Author's calculations based on 2022 EPM data.

This report estimates the economic impact of the 2022 cyclones on households. Data collection for the 2020 EPM survey was interrupted due to the pandemic and could only resume in 2022. This interruption provided two survey rounds instead of one and, by coincidence, between the two rounds Madagascar was hit by five cyclones. To estimate the economic impact of the cyclones on affected households, affected clusters were matched with non-affected clusters, using propensity score matching to make the treatment and control groups equal in terms of geographical characteristics. Subsequently, difference-in-differences estimation techniques were used to estimate the impact of the cyclones by household quantile.

Cyclones appear to have had a devastating impact on expenditure, food consumption and poverty. The total expenditure of an affected household decreased by 34 percent on average, while its probability of poverty rose by 27 percent. The reduction in expenditure also compromised food security: on average, an affected household consumed 409 fewer calories per day than before the cyclones, and the range of foods it consumed shrank by nine items (from 30 to 21).

Cyclones also had a proportionally larger negative impact on richer households. Figure 92 shows the aggregated impact of the cyclones on average household expenditure at each decile, both in percentage terms and in absolute terms measured in local currency (MGA). The impact was negative across the distribution with an increasing trend, i.e., smaller for those in the poorer deciles than for those in the richer. Average monthly household expenditure decreased by between 12 percent (MGA 76,764) and 48 percent (MGA 3,138,807), bringing down inequality for the wrong reason.

Figure 92: Controlling for household characteristics, richer households suffered larger losses



Note: Impact of cyclones on average household expenditure, by decile. Bold values indicate significance at the 10 percent level, non-bold values and hollow bars indicate an insignificant coefficient.
Source: Author's calculations based on 2022 EPM data.

Extreme weather events and cyclones also led to negative impacts on human capital. Using panel data from the Young Lives project, Marchetta et al. (2019) investigate how temperature and precipitation variations affect educational attainment and labor force participation. The findings suggest that extreme weather events, such as droughts and floods, significantly disrupt schooling and increase the likelihood of engaging in work activities among young adults in Madagascar. These weather shocks not only impede educational progress but also lead to an early transition into the labor market, potentially compromising long-term human capital development and socioeconomic outcomes for this population. The study highlights the importance of considering climate factors in policies aimed at improving educational and employment opportunities for young adults in developing countries like Madagascar.

How the Ukraine invasion affected inflation and food-scarcity

The economy has been adversely affected by the ongoing Russian invasion of Ukraine. Both Russia and Ukraine are essential grain exporters to Africa, and many countries—including Madagascar—have been experiencing war-induced food scarcity and price hikes that are expected to exacerbate poverty (Figure 93). Fertilizer costs have also been rising, as Russia is the world's largest exporter of nitrogen-based fertilizers and the second largest for phosphorous- and potassium-based fertilizers.

The inflation rate has been on the rise and is largely driven by food products. The annual rate of inflation has doubled since 2020, reaching an average of 8.2 percent in 2022. Inflation has largely been driven by food items which experienced a 9.5 inflation rate and contribute to 64 percent of the inflation basket. In 2022, inflation increased particularly rapidly in July when the government increased fuel prices by nearly 40 percent. This led to a short term transportation cost increase which in turn affected food prices later in the year. This situation was exacerbated by deteriorating road infrastructure due to frequent rains.

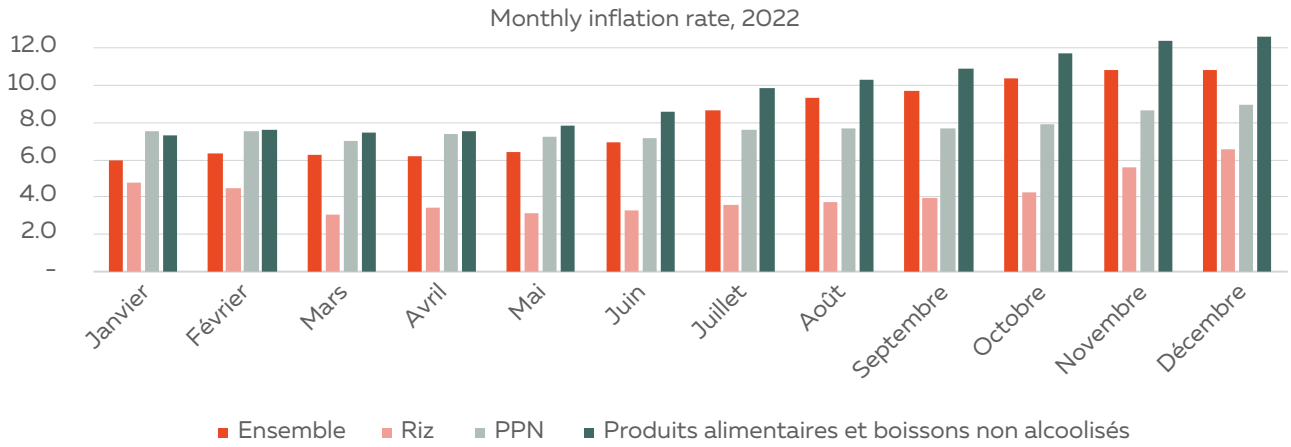
Table 37: A small percentage of households was not able to buy cooking oil or rice even before the price

Item	Households needing item (%)	Households needing item and able to buy it (%)	Households needing item and unable to buy it (%)
Cooking Oil	88.7	82.5	6.25
Rice	81.6	76.9	4.65
Sugar	73.1	69.9	3.16
Meat	62.5	60.2	2.25
Beans	56.5	55.8	0.66
Fish	54.4	51.7	2.67
Bread	41.6	41.2	0.42
Potatoes	41.0	40.5	0.51
Eggs	39.8	39.5	0.32
Pasta	36.6	36.5	0.12
Lentils	18.3	17.5	0.84
Butter	14.9	14.5	0.38
Flour	14.7	14.0	0.72
Cooking Gas (LPG)	2.4	2.0	0.37

Source: Author's calculations based on 2022 High Frequency Phone Survey data.

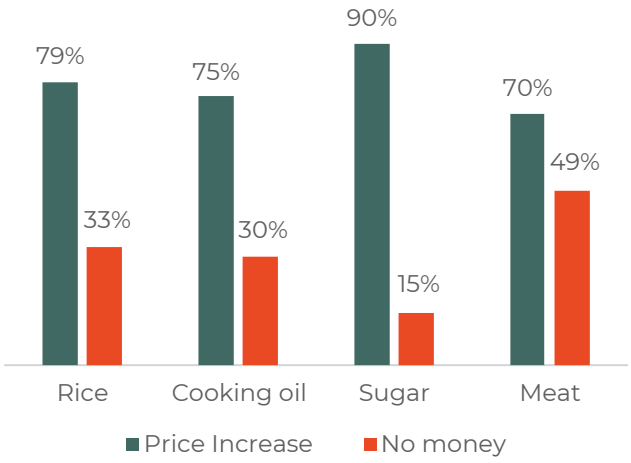
Respondents to the HFPS reported cutting consumption of the most frequently purchased food items. Respondents to the HFPS conducted in June 2022 listed the most frequently needed and purchased items over the previous 30 days (Table 37). At the top of the list are cooking oil (89 percent),

Figure 93: Food prices have increased sharply since 2022



Source: INSTAT, April 2023.

Figure 94: Price increase is the main reason for not being able to buy basic staples



Source: Author's calculations based on 2022 High Frequency Phone Survey data.

rice (82 percent), sugar (73 percent), and meat (63 percent). Out of 89 percent of households that reported needing cooking oil, 6 percent did not have the ability to buy it. For rice this was 82 percent needing and 5 percent unable to buy. Such gaps in purchasing ability were likely due to pricing, as inflation rates were higher for the goods most in demand.

Price increases were the most common reason why households were unable to buy key items (Figure 94). During the 30 days prior to the survey prices had risen by 10 percent on average, and flour, potatoes, and fish increased by more than 50 percent (see Table A5.2 in Annex 5). Rising prices were reported as the main obstacle by 90 percent of households unable to buy sugar, 79 percent of those unable to buy rice, 75 percent of those unable to buy cooking oil, and 70 percent of those who could not buy meat. The second most common barrier was that households did not have sufficient money to purchase those items irrespective of inflation, showing a deterioration in the purchasing power of households.

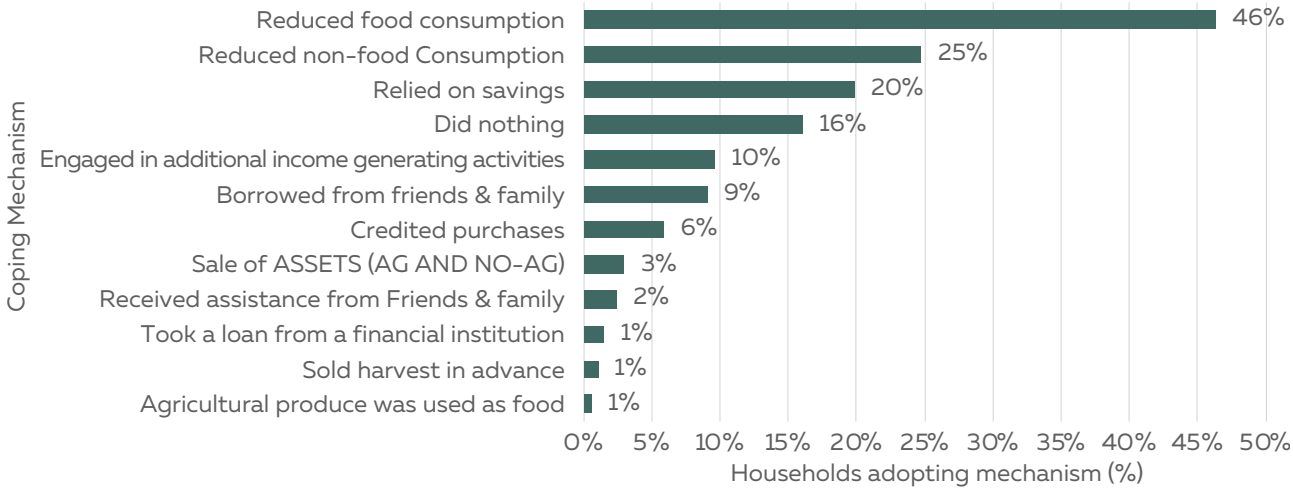
Coping mechanisms against rising prices

Reducing consumption is the most frequent coping strategy against price increases. Among the 68 percent of respondents that reported an increase in the price of major food items usually consumed by their household, 46 percent reduced their food consumption, a quarter reduced non-food consumption, and one in five relied on savings. Sixteen percent did nothing to cope with the shock (Figure 95). Similarly, out of the 46 percent of respondents who reported an increase in the price of major non-food items consumed by their household, 45 percent reduced non-food consumption, twenty-two percent opted to reduce their food consumption, 14 percent did not enact any coping strategy, and 13 percent relied on savings (Figure 96).

Projected changes in the poverty rate

Estimates of the effect of Russia's invasion of Ukraine show a limited short-term impact on poverty. Direct evidence of the impact of the Ukraine invasion is limited due to a lack of data. A combination of macro level data (World Bank 2022) with the EPM and HFPS conducted in 2022 was done to estimate changes in consumption resulting from the price hikes and subsequent impacts on poverty.[62] Madagascar's poverty rate in 2024 is expected to rise by less than 0.2 percentage points relative to

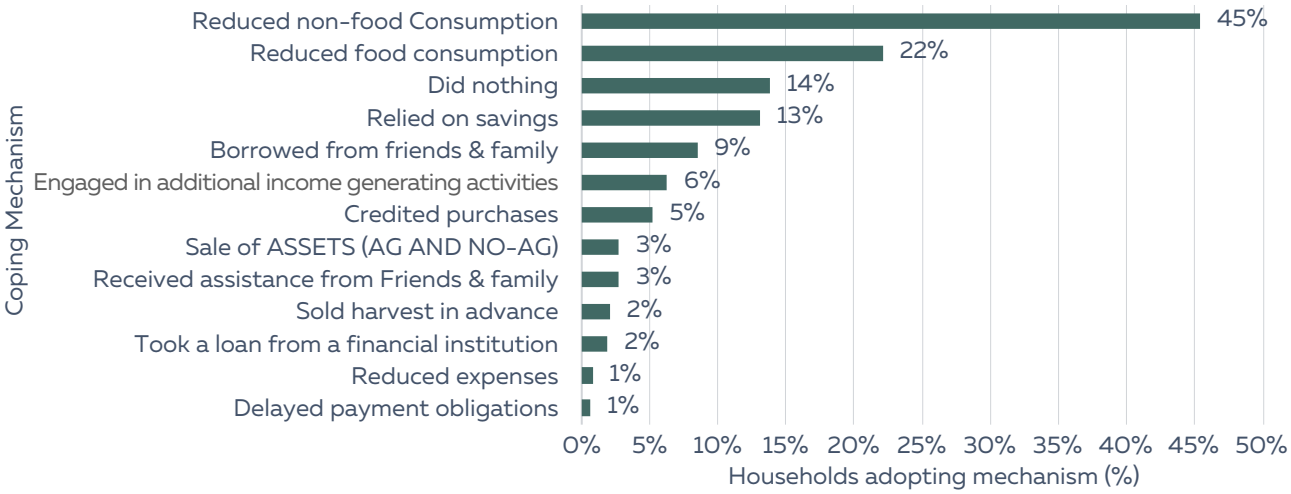
Figure 95: Reducing food consumption is the most common coping mechanism against food price increases



Source: Authors based on 2022 High Frequency Phone Survey data.

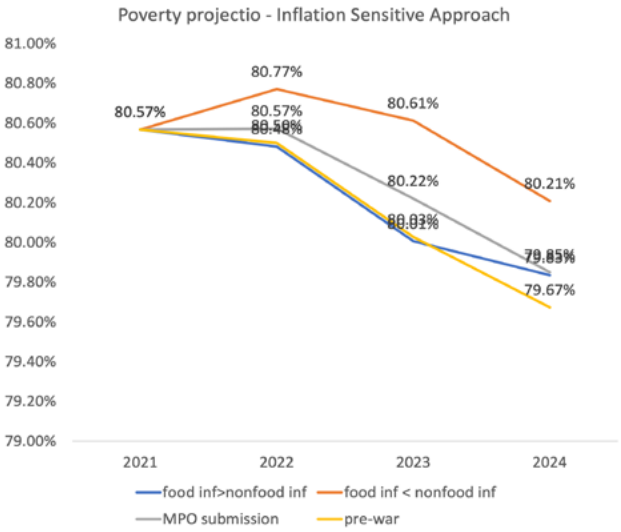
[62] The World Bank regularly prepares projections of key national accounts statistics for 185 countries, using a growth projection model called MFMOD. The Macro Poverty Outlook published in the Spring 2022 (World Bank 2022) incorporated the impact of Russia's invasion of Ukraine and the resulting inflationary pressures, and well as projected inflation from 2022 to 2024.

Figure 96: Reducing non-food consumption is the most frequent way of dealing with non-food price shocks



Source: Author's calculations based on 2022 EPM data.

Figure 97: Poverty is expected to increase further due to inflation



Source: Wu and Yoshida, 2022.

the pre-war scenario (Figure 97). The country's nominal GDP per capita is projected to outgrow inflation, and thus the growth rate of real GDP per capita is anticipated to remain positive in 2023 and 2024. A slightly more pessimistic scenario could materialize if food prices increase faster. Wu and Yoshida (2022) estimate that if food inflation rises twice as fast as non-food inflation due to the invasion of Ukraine, poverty in 2024 will be 0.6 percentage points higher than in the pre-war scenario. However, if the opposite occurs (i.e., if non-food inflation rises twice as fast as food inflation), the uptick in the country's poverty rate in 2024 will only amount to 0.2 percentage points relative to the pre-war scenario.

Annex 2

Table A2.1: Only 6 countries have suffered a secular income decline since independence

Country	GDP per capita – 1960 (Constant 2015 US$)	GDP per capita – 2020 (Constant 2015 US$)
HTI – Haiti	1,714.10	1,322.80
COD – Democratic Republic of Congo	1,254.70	487.40
NER – Niger	744.00	519.70
MDG – Madagascar	**818.30**	**433.80**
CAF – Central African Republic	583.60	375.20
BDI – Burundi	290.70	263.40

Source: World Bank, World Development Indicators Database.

Table A2.2: Median variation in prices for food and cooking items

Item	Unit of measurement	Median unit price (in MGA) 30 days before survey	Median unit price (in MGA) at time of survey	Change in median unit price (%)
Rice	Kg	2,300	2,400	4.3
	Packet	100,000	100,000	0
	Tin/Kapoaka	650	650	0
	Gram	6	6	0
Cooking Gas (LPG)	Kg	8,333.33	8,333.33	0
	Cylinder (gas)	40,000	40,000	0
Cooking Oil	Liter	9,000	10,000	11.1
	Packet	500	500	0
Meat	Kg	12,000	14,000	16.7
	Gram	12	12	0
Fish	Kg	10,000	10,000	0
	Packet	2,000	3,000	50
	Batch	2,700	3,000	11.1
	Gram	10	10	0
Sugar	Kg	4,000	4,000	0
	Packet	1,200	1,200	0
	Tin/Kapoaka	1,200	1,500	25
	Gram	4	4.8	20
Potatoes	Kg	2,000	2,200	10
	Packet	1,000	1,500	50
	Batch	500	500	0
	Tin/Kapoaka	900	900	0
	Gram	2	2	0
Butter	Kg	6,000	6,000	0
	Packet	4,000	4,000	0
	Gram	16	16	0
Pasta	Kg	3,000	3,500	16.7
	Packet	1,200	1,200	0
Bread	Kg	1,000	1,000	0
	Packet	500	600	20
Lentils	Kg	3,400	3,500	2.9
	Tin/Kapoaka	800	1,000	25
Flour	Kg	3,800	4,000	5.3
	Packet	1,500	1,500	0
	Tin/Kapoaka	1,200	1,200	0
	Gram	5	8	60
Eggs	Packet	600	650	8.3
	Batch	600	700	16.7
Beans	Kg	4,100	4,800	17.1
	Packet	1,200	1,500	25
	Tin/Kapoaka	1,000	1,200	20

Source: Author's calculations based on 2022 EPM data.

Table A2.3: Food inflation coping mechanisms adopted by households, by province (%)

	Antananarivo	Fianarantsoa	Toamasina	Mahajanga	Toliara	Antsiranana	Total
Reduced food consumption	49	38	44	50	50	51	46
Reduced non-food Consumption	30	13	28	31	24	23	25
Relied on savings	28	23	7	21	18	11	20
Did nothing	14	20	18	16	11	18	16
Additional income generating activities	5	14	6	10	14	10	10
Borrowed from friends & family	11	5	14	8	6	11	9
Credited purchases	6	8	4	5	7	3	6
Sale of assets	4	1	3	6	4	1	3
Assisted by friends & family	3	3	1	2	4	0	2
Took a loan from a financial institution	0	1	1	3	4	0	1
Sold harvest in advance	0	2	2	1	0	1	1
Agricultural produce was used as food	0	2	0	0	0	0	1

Source: Author's calculations based on 2022 EPM data.

Table A2.4: General inflation coping mechanisms adopted by households, by province (%)

	Antananarivo	Fianarantsoa	Toamasina	Mahajanga	Toliara	Antsiranana	Total
Reduced non-food Consumption	42	41	49	48	56	43	45
Reduced food consumption	28	17	23	11	19	27	22
Did nothing	11	19	15	11	10	24	14
Relied on savings	18	12	2	24	10	12	13
Borrowed from friends & family	11	4	7	11	8	10	9
Additional income generating activities	5	11	5	2	8	4	6
Credited purchases	7	7	6	5	0	2	5
Sale of assets (AG AND NO-AG)	3	3	2	5	2	0	3
Assisted by friends & family	3	5	1	6	0	2	3
Sold harvest in advance	0	3	0	8	2	6	2
Took a loan from a financial institution	1	1	4	3	2	4	2
Reduced expenses	0	1	0	3	2	0	1
Delayed payment obligations	1	0	0	0	2	0	1

Source: Author's calculations based on 2022 EPM data.

Chapter 6

Charting a course for change

Madagascar's domestic and global challenges make reducing poverty a daunting task, but the cost of inaction is too big to overlook. Domestic challenges include political instability, elite capture, high population growth, and resource depletion. Combined with climate change, growing volatility of prices and other global challenges, these obstacles deepen the country's poverty trap. This context increases the urgency for effective and consensus-driven public policy interventions to lay the foundation for sustainable development and resilience. Better infrastructure, support to job creation and agricultural productivity, and stronger human capital investment and assistance can play a crucial role in reducing poverty. To be effective, such policies need a better quality of governance.

To this end, the government launched the "Plan Emergence Madagascar" (PEM). The PEM is structured around three pillars: social, economic, and environmental to attract investment and address long-standing development issues. The PEM comprises 13 commitments ("Velirano") to grow real GDP by 8 percent per year over the next 17 years and reduce poverty from 75 to 35 percent by 2040. Despite relying on optimistic macroeconomic assumptions, the PEM is well-structured, with a clear strategy to mobilize public and private resources for investment, precise result indicators, and measures to enhance dialogue with development partners, the private sector, and civil society.

Implementing the PEM requires a radical departure from the historical performance of government policies in the country. To start, government spending reached a high of 16.7 percent of GDP in 2020 (it then fell to 14.2 percent in 2021), remaining below most aspirational peers, with fiscal space structurally constrained by a small revenue base, spending inefficiencies, limited capacity, and large transfers to poorly managed SOEs (World Bank, 2023). As a result, investments to improve connectivity infrastructure and essential public services have been insufficient to boost growth. In recent years, institutional and governance weaknesses have intensified. For instance, budget execution rates, which are structurally low, fell further during the COVID-19 crisis, while the selection of investment projects became opaquer and more centralized, indicating intensifying budget management challenges and illustrating the impact of increasingly cumbersome budget authorization procedures.

As the latest Systematic Country Diagnostic points out, constraints to growth and poverty reduction are closely interlinked (World Bank Group, 2022). These constraints can be grouped in four categories: (i) weak governance; (ii) low investment in physical (i.e., infrastructure), human and natural capital, (iii) low productivity and stagnant structural social and economic change; (iv) high and rising vulnerability to shocks. Each of these constraints prevents broad-based development and reinforces the others, so that single-sector approaches are not enough to make a real impact on growth and poverty reduction. The resulting priorities from the analysis follow in a similar organizing framework: enhance economic opportunities, improve service delivery, build resilience, and improve governance (Box 3).

This chapter focuses on additional policy recommendations to complement the priorities outlined in the SCD Update. The chapter outlines policy recommendations supported by economic literature and evidence from other low-income countries to tackle the barriers to reduce poverty in rural and urban areas, considering their drivers in each case.

1. Improving agricultural productivity, market connectivity and resilience

Agricultural productivity in Madagascar is lower than in comparator countries, due to the scarce use of inputs and deteriorating irrigation infrastructure. Annual yields of rice, the staple crop, do not exceed 3 t/ha even in fertile highland regions. While extreme weather events such as floods and droughts pose a recurring challenge, the limited utilization of inputs—e.g., fertilizers, chemicals, and improved seeds—is a key issue. Less than 12 percent of farmers purchase new seeds for planting, and less than 17 percent apply pesticides, herbicides, or fungicides. As a result, both yields and produce quality tend to be low.

Box 3: Policy priorities from the Systematic Country Diagnostic Update

To reduce poverty, improve living standards, and catch up with peers, Madagascar's government needs to maintain a 7-percent annual GDP growth rate. This is achievable by implementing holistic policy reforms grouped under the following three objectives: (i) mobilizing productivity-enhancing investments; (ii) boosting human capital and resilience to shocks of the poor; and (iii) strengthening citizen engagement.

Mobilize productivity-enhancing investments to accelerate economic and spatial transformation. Attracting private investment requires improved market access and contestability of incumbent companies. This entails reducing barriers to business creation, prohibiting cartels, ensuring greater consistency of rules applying to private investments across various sectors and special regimes, and easing processes for land acquisition and transfer. Connecting undeserved rural areas, supporting agglomeration around secondary cities, and developing effective industrial poles are key priorities to accelerate spatial transformation, and will require renewed efforts to support private investments in the power, water, ICT and transport sectors, alongside much needed reforms of public entities operating in these sectors.

Boost human capital and resilience to shocks of the poor to improve their welfare. Improving health and learning outcomes will require the mobilization of additional domestic resources and reforms. Considerable efficiency gains in education and health sectors are possible in the short term, including through reforms in human resources, public financial management, results-based financing, and decentralization. Greater access to prenatal care, assisted deliveries, and effective nutrition programs will be key to reduce the incidence of child and maternal mortality as well as to reduce high stunting rates, while improved access of adolescent girls to secondary education will contribute to reduce high fertility rates in underserved areas. Strengthening social protection systems will ensure greater resilience to shocks and can help stimulate better nutrition outcomes and increase the demand for health, education, and water services, so as to improve human development outcomes.

Strengthen engagement of citizens to deliver better policy outcomes and limit state capture. Making the state more responsive to the needs of citizens, especially the poor, requires regulatory reforms to increase the separation of private interests from public policies, stronger mandates and independence of anti-corruption institutions, the judiciary, and the court of accounts, better enforcement of rules on asset declarations, asset recovery, and whistleblower protection, and international tax transparency. Greater autonomy and control of decentralized entities are also critical to improve service delivery and reinforce the link between public policies and citizens. Finally, community-driven solutions can help deliver better infrastructure and social services, particularly in more remote areas of the country where the state presence is limited.

Build resilience and maintain macroeconomic stability. To build resilience to future shocks the country needs scaled up interventions in nutrition, safety net programs and connectivity infrastructures. Given the limited fiscal resources, selectivity, planning, and execution of public investment projects need to be improved, together with reforms to accelerate domestic resource mobilization and to ensure prudent debt management and an independent monetary policy.

Source: World Bank Group (2022).

Access to markets complicates the low productivity challenge. The market for cash crops is highly protected and only accessible to 20 percent of farmers, while the rest are relegated to the horticulture market. The market for rice is relatively accessible, but prices vary significantly across regions, largely due to high transport costs made worse by the deteriorating transport infrastructure.

Many farmers lack appropriate infrastructure to store their harvest, leading to significant losses from spoilage. Over half of unsold produce is either stored on roofs or set aside for immediate use. Only 10 percent of farmers have access to more secure storage methods, such as storehouses and sheds. This then exposes farmers to high spoilage, food insecurity, and poor diet due to lack of production diversity.

Transforming agriculture and food systems in Madagascar hinges on three key priorities:

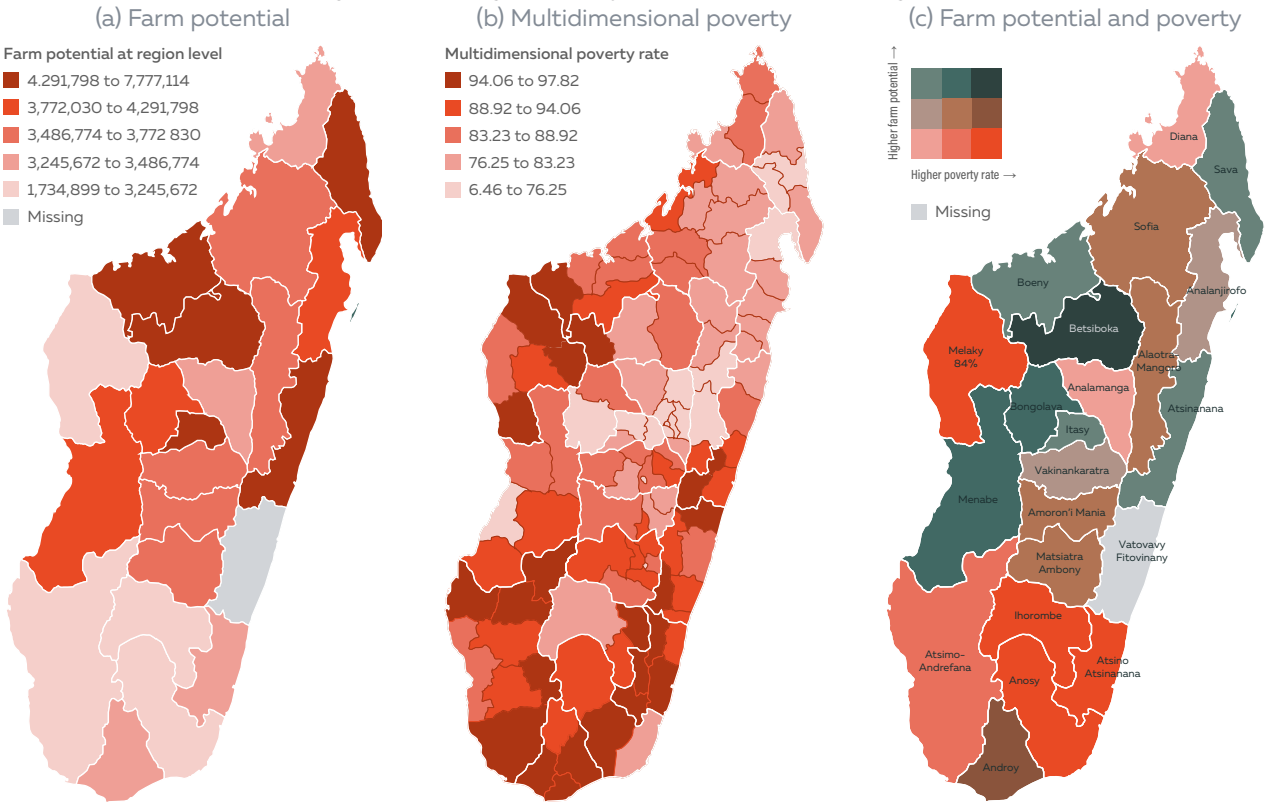
1. intensifying and diversifying food production,
2. improving rural connectivity and the efficiency of domestic markets, and
3. making agriculture more financially resilient to climate change.

Effective interventions require a targeted spatial approach. The analysis for (1) and (2) considers the untapped agricultural potential of each region described in Section 3 of Chapter 2, to identify an optimal combination of investments in feeder roads and irrigation projects by region. A stochastic frontier analysis predicts the agricultural potential of a region under optimal conditions compared to its current performance. The difference is the "untapped potential"—defined as the upper limit to realistic returns from development programs and policies in that region.

Overlaying crop potential with poverty rates reveals the regions where agricultural investment can make the greatest impact on poverty reduction. Agricultural investment can be grouped into low-cost and high-cost infrastructure investment, as discussed in Chapter 2. For areas with high potential, the most efficient policy is to undertake low-cost investment, including access to inputs such as fertilizers, improved seeds, finance, insurance, and extensions services. These low-cost investments should help farmers tap into existing potential by increasing their efficiency levels. For low potential areas, the most efficient policy is to invest in high-cost infrastructure that alters the production possibilities' frontier. These investments include feeder roads, irrigation schemes, and developing agricultural value chains.

Map 16 **provides an overview of the regions where low-cost and high-cost investments could be prioritized.** Betsiboka, which features both high crop potential and high poverty is a typical region where low-cost investment could reduce poverty (Map 16, panel c). Investments into improved agricultural efficiency in this region are expected to yield the highest return in terms of poverty reduction. The second-highest level of priority would be investments in the regions of Sofia, Menabe, Alaotra-Mangoro, Bongolava, Amonon'i Mania, Haute Matsiatra, Menabe, and Androy where the correlation between crop potential and poverty rate is average. For the case of high-cost investments, priority reigions include Melaky, Ihorombe, Anosy, Atsimo-Atsinanana, and Atsimo-Andrefana.

Map 16: Some regions with high poverty also have untapped agricultural potential



Source: Authors' estimation.

Intensifying and diversifying food production entails better irrigation systems

The rehabilitation, effective operation and maintenance of irrigation infrastructure is necessary for water availability and management. This is critical for maintaining food security, particularly by increasing rice output. Additionally, promoting the use of improved inputs—such as climate-resilient seeds and fertilizers—and conservation practices can unlock significant yield gains. Small-scale, water-efficient irrigation technologies can also boost food production beyond rice. In dryland areas, low-cost water harvesting technologies—such as sand dams and water reservoirs—can capture and store rainfall water for human consumption and productive use.

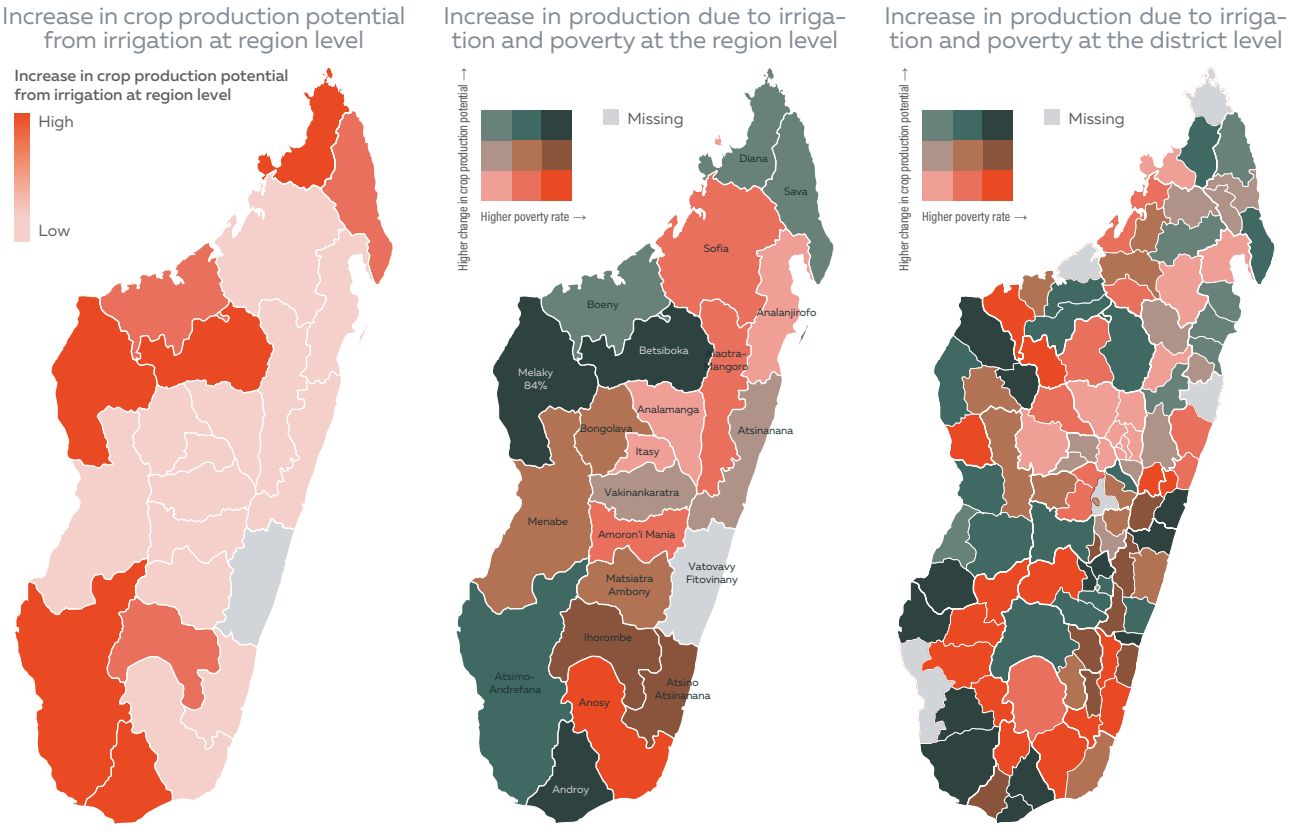
To prioritize irrigation investment, low agricultural potential and high poverty areas are overlaid. The analysis estimates first the effects of expanding access to irrigation (via river diversion) on crop potential. The potential gains are then correlated with poverty rates in the regions with low potential, which results in priority regions for irrigation investment including Melaky, Atsimo-Andrefana, Ihorombe, Anosy, and Atsimo-Atsinanana (Map 17). This exercise can also be done at the district level.

Improving rural connectivity and the efficiency of domestic markets is crucial

Gains in yield and enhancements to land use methods will only be sustainable if appropriate market structures incentivize them. Feeder road investments need to be targeted strategically to ensure that markets offer a sufficient return on investment. Moreover, improved transportation can help make a greater variety of produce available to consumers, which in turn can result in healthier diets.

Starting from data on farm revenue, the impact of investments in feeder-road infrastructure on travel time to markets is estimated. Unlike the previous analysis, farm potential as opposed to crop potential is the outcome of interest, since farmers also produce livestock that they would like to sell. Farm potential captures the potential holistic impact of market access. The basic assumption is that the relationship between farm revenue and travel time is negative—i.e., longer travel time to markets result in lower revenues, either because they cannot effectively reach markets, or because they must bear high transportation costs. However, the assumption of a negative relationship may not hold if a significant portion of farms primarily produce for self-consumption, or if only a limited number of

Map 17: Large gains in agricultural productivity can be obtained through improved irrigation



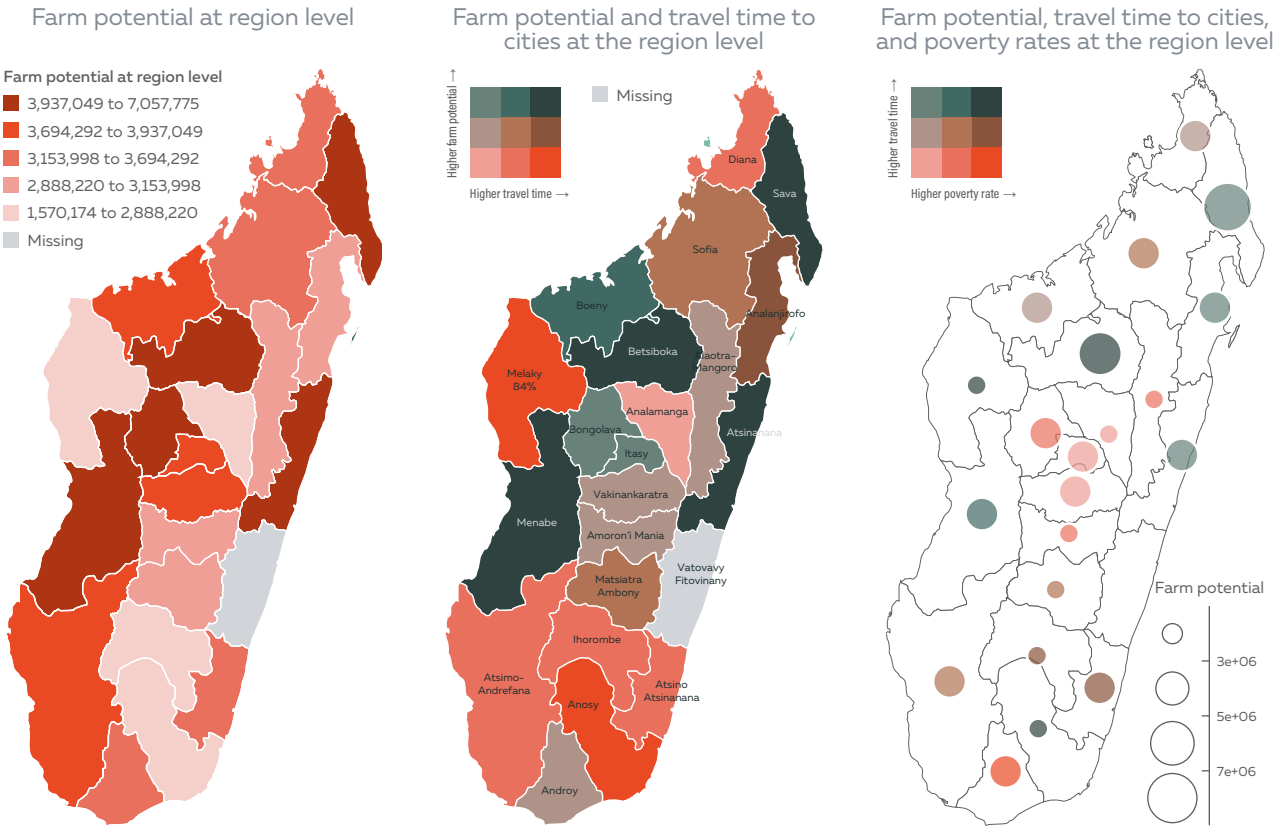
Source: Authors' estimation.

markets offer price premiums. Taking farm potential, travel time, and poverty rates allows to identify regions where road infrastructure investments would improve market access and reduce poverty the most (Map 18). The highest-priority region is Betsiboka, followed by all regions in the South (except Anosy), Menabe (known for its isolation), and Sofia (the country's second-largest rice-producing region, which is known for its limited access to markets).

To conclude, investing in irrigation and rural road infrastructure will have the largest impact on agricultural output and poverty reduction in Bestiboka, Menabe, Androy, Atsimo-Andrefana, and Atsimo-Atsinanana. Priority regions for investment in irrigation are Melaky, Bestiboka, and Androy, followed by Atsimo-Andrefana, Menabe, Bongolava, Haut Matsiatra, Ihorombe, and Atsimo-Atsinanana, with availability of surface water a critical determinant. Similarly, the priority regions for investment in road infrastructure are Betsiboka, Sofia, Menabe, Androy, Atsimo-Andrefana, and Atsimo-Atsinanana. A combined investment in irrigation and road infrastructure in Bestiboka, Menabe, Androy, Atsimo-Andrefana, and Atsimo-Atsinanana can lead to significant poverty reduction by increasing yields and improving market access. Therefore, targeted investments in these regions can play a vital role in promoting agricultural development and poverty reduction.

Five climate-smart agriculture packages were identified through expert consultation and data analysis.[63] The first package includes measures that can improve access to quality seed for diverse crops. This involves establishing decentralized variety testing networks involving the rice research center FOFIFA and partners such as NGOs and development organizations, supporting local seed producer groups, and reviewing FOFIFA's budget allocations and facilities for seed production and storage to meet varietal demand. Second, improving access to irrigation during drought events can be done by introducing (solar) pumps for nurseries to ensure timely preparation of rice seedlings, installing drip irrigation for off-season vegetable farming, and developing an early warning system on rain anomalies to anticipate irrigation needs. Third, crop nutrition management can be improved through tailored extension programs that include decision-support tools for a more effective use of fertilizers and precision agriculture. Post-harvest losses and distress sales can be reduced by establishing community

Map 18: Regions with high poverty and high development potential should be prioritized for feeder roads investment



Source: Authors estimation.

[63] The process began by collecting information on climate risks and their impacts on agricultural value chains, as well as coping mechanisms and supporting interventions used by value chain actors in the Lake Alaotra and Sofia regions. This was done through expert interviews and literature review. A consultative workshop was then organized to prioritize climate risks and coping mechanisms across value chains. Experts identified and prioritized barriers that prevent the wider adoption of key coping mechanisms using a problem tree exercise. Barriers were grouped by themes for the intervention packages. Effective and feasible interventions were then prioritized among the interventions compiled based on interviews and literature review.

granaries that provide credit to farmers using crops as collateral and training farmers on storage techniques to reduce losses and maintain crop quality. Lastly, improved market access and product value for producer groups can be achieved by supporting farmers' organizations in improving product quality and uniformity. Assistance can also be given to exporters to identify opportunities for contract farming and to develop farmers' capacities and infrastructure to facilitate contract agreements.

Promoting index insurance to shield agrarian households from recurring shocks and improve their access to finance

Index insurance is an innovative tool to help farmers cope with weather related risks. Agricultural index insurance is a type of insurance that is designed to protect farmers and agricultural producers from the risks associated with weather events, such as drought, flood, or excessive rainfall, that can adversely affect crop yields and incomes. It is a financial tool that helps farmers manage risk and protect their livelihoods. In agricultural index insurance, a farmer pays a premium to an insurance company, which provides coverage against losses in crop yields due to specific weather events, such as drought or excessive rainfall, based on an index that measures the severity of those events. The index can be based on several variables, including rainfall, temperature, and other weather-related factors that can impact crop yields.

Index insurance can help enhance the resilience of agrarian communities to repeated natural shocks. If the index value falls below a certain threshold, indicating a significant reduction in crop yields due to a specific weather event, the farmer receives a payout from the insurance company to compensate for the loss. This payout can be used to cover the cost of inputs, such as seeds and fertilizer, or other expenses associated with farming. The advantage of agricultural index insurance is that it is often more affordable and accessible to farmers than traditional crop insurance. It also eliminates the need for time-consuming and costly claims processing, as payouts are automatically triggered by the index value.

To make index insurance viable in Madagascar, several issues need to be addressed:

First, the development of new and improved index insurance contracts that provide better risk protection is paramount. A pilot rainfall insurance program is underway in Madagascar. Based on lessons learned from other African countries, we recommend index insurance contracts that rely on remotely sensed satellite-based indices which offer a high degree of geographical resolution. A common example is Normalized Difference Vegetation Index (NDVI). NDVI is a measure of vegetation greenness and vigor, which can be used to estimate crop yields and monitor drought conditions. To be effective, index insurance contracts will have to be tailored to regional nuances in terms of crops grown, cultivation methods, timing and duration of growing seasons, and exposure to weather risk.

Second, the prevalence of poverty among Malagasy farmers makes it necessary to reduce the costs associated with the provision of index insurance. Evidence shows that the rate farmers are willing to pay for insurance is often lower than the actuarily fair premium rate. Mobile banking, which has revolutionized financial services for the poor in Madagascar and throughout the developing world over the past decade, offers a model for the low-cost provision of insurance products. However, the coverage of mobile networks and mobile money remains limited, and logistical issues around the collection of premiums and distribution of payouts need to be resolved. Thus, donors and international agencies are encouraged to experiment with mobile marketing of agricultural insurance products as part of their future index insurance initiatives.

Third, donors and international agencies need to reassess how index insurance can best be deployed to help poor farmers. It is becoming apparent that index insurance is universally of little value to farmers, primarily due to irreducible basis risk (i.e., the failure of index insurance to cover all losses that may be experienced by the insured). Mishra et al. (2021) show that index insurance is better suited to addressing the portfolio risk borne by agents in the agricultural marketing chain—including lenders, processors, and nucleus farmers—who enter into contractual agreements with large numbers of farmers simultaneously. By mitigating the risk associated with lending and contracting, index insurance has the potential to expand access to credit and contract marketing for smallholders, at reduced interest rates and on improved terms of trade in the face of growing climate risks.

No clear answer has yet emerged as to how lenders and processors can effectively adopt index insurance, while maximizing benefits for poor farmers. Contingent credit—whereby payouts from index insurance contracts go directly to the lender for the purpose of retiring the farmers' outstanding debt—is a promising approach but has not been fully explored (Mishra et al, 2021). Questions persist as to how lenders should adapt loan recovery,

debt restructuring, and portfolio risk management practices to contingent credit, and the use of index insurance to support production marketing contracts has received limited attention. Madagascar's ongoing pilot rainfall insurance program can help pave the way for more efficient uses of index insurance by working closely with multiple lenders and processors, and by assessing, through practical experimentation, the benefits of alternative lending and contracting practices for poor farmers.

2. Raising the productivity and quality of services of urban areas

Investing in more and better human capital

The recent decline in returns to education combined with the slow growth in good quality jobs suggest that human capital investment may not be economically attractive. In light of the still rapid population growth, building more and better human capital is the only option to ensure that future generations will be able to live better and more productive lives and exit poverty sustainably. The country needs to invest more, but especially to improve the efficiency of its human development sectors so that resources invested deliver good quality outcomes. To achieve this, improving governance in education and health sectors is key.

Madagascar has made progress in increasing the budget allocation to social sectors, but it remains below that of its peers in Sub-Saharan Africa and Low-Income Countries. In 2020, social sector spending accounted for 5.1 percent of the country's GDP, up from 4.4 percent in 2017. Despite this increase, Madagascar still lags SSA and LIC averages in terms of percentage of GDP allocated to social spending (World Bank, 2023). Social sectors are the second largest recipients of government spending in Madagascar, with administrative functions taking up the largest share at 49.8 percent. The education sector is the largest recipient of social spending, accounting for 73 percent of the total, followed by health at 21 percent, nutrition at 3 percent, water and sanitation at 2 percent, and social assistance at 1 percent.

Although the budget allocation to social sectors has increased in recent years, the execution rate of social spending has declined. The actual budget execution stagnated at 3.6 percent of GDP over the period between 2017 and 2020. The execution rates of spending in social sectors declined, from 82.3 percent in 2017 to 72.7 percent in 2020, indicating growing challenges in budget implementation. The exercise of "warrant" authority by the Prime Minister and President for all expenditure commitments above MGA 200 million and all transfers contributed to further delays in the budget execution.

The country receives a significant amount of Official Development Assistance (ODA), with social sectors being the largest destination of external financing. Although the share of ODA allocated to social sectors declined from 60 percent in 2014 to 44 percent in 2019, health still dominates the share of ODA allocation, while education stabilized and social assistance programs increased significantly since 2016 (Razafindravonona, 2023). However, compared to Sub-Saharan countries, Madagascar received less than half of ODA, when adjusted by population size.

The education sector faces several supply-side challenges, including workforce management, teacher effectiveness, expenditure management, and school management. Teachers' low academic qualifications and regional imbalances in teacher deployment create disparities in educational outcomes between rural and urban areas. Inadequate school management, teacher absenteeism, and low job satisfaction among public primary school personnel further worsen the situation. Corruption in the education sector, including recruitment, is on the rise despite interventions to curb such practices (AMD International, 2021; World Bank, 2021b, 2021a).

Most national education is provided by contract teachers, especially in preschool and primary. Despite the importance of the resources allocated to national education, an analysis of the 2018-2019 data shows that communities and parents of students are responsible for a large proportion of community teachers (FRAM). These teachers represent nearly 78.4 percent of teachers in preschool, 21 percent in primary school, 32 percent in middle school and 27 percent in high school.[64] In addition, the input allocation for public schools remains insufficient. For instance, pupils have less than one seat per pupil (0.24 in primary school, 0.4 in junior high, 0.46 in high school) and textbook allocations are also insufficient for students (UNICEF, 2018).

Finally, the school calendar is not aligned with the agricultural (rice) season. The school calendar follows a five bimester system, September-October; November-December; January-February; March-April; and May-June. This calendar is not designed to align with the agricultural and the cyclones' seasons, and the Ministry of National Education has failed to bring it in line with Madagascar's weather, instead maintaining the alignment to the French

[64] Civil servants represent only 8 percent in primary school, 23 percent in middle school and 36 percent in high school. Subsidized FRAMs account for 7.8 percent of preschool teachers, 35 percent of primary teachers, 6 percent of middle school teachers and 1 percent of high school teachers. (UNICEF, 2018)

school calendar. There is evidence that aligning the school calendar with the agricultural season can increase school attendance and educational attainment in rural areas where agriculture is a major economic activity, for instance in Malawi (Allen, 2022).

To improve the education system the government needs to implement deep governance reforms and invest in teacher quality and fair remuneration. First, the Ministry of National Education needs to significantly raise the skills of teachers, especially at public primary schools and in key subjects such as mathematics and languages. Using cost-efficient technologies can boost the efficacy of teacher training (Quota et al., 2022). Deploying more qualified teachers and paying them salary premia for working in rural areas and ensuring adequate teacher remuneration for FRAM teachers would reduce the disparity between rural and urban educational attainment. Governance failures in education also require urgent attention. For instance, establishing an independent regulatory body to ensure the quality, efficacy, and efficiency of educational institutions, expanding digital payments of teacher salaries, ensuring clear hiring procedures, job descriptions, and improving training for school directors.

Deficiencies in the quality of health services also contribute to lower levels of human capital. For instance, the Service Delivery Indicators (SDI) surveys show that the country performed worse than other African countries on most indicators, despite having a similar outpatient caseload (World Bank, 2017) and (World Bank forthcoming 2023). Moreover, health workers' absence rates more than doubled between 2016-2021, exceeding 40 percent in 2021.[65] Diagnostic accuracy also declined from 29.4 percent of the health conditions correctly diagnosed by health providers in 2016 to 23.2 percent in 2021.[66] Availability of drugs and functioning equipment also declined over the period (from 42.5 percent in 2016 to 23.5 percent in 2021 for hospitals) as well as essential drugs and vaccines for under-five children (from 52.6 percent in 2016 to 37.3 percent in 2021) and running water (from 53.4 percent in 2016 to 38.5 percent in 2021).

The Ministry of National Health needs to address health worker absenteeism, declining diagnostic and treatment accuracy of health providers, and lack of essential drugs and supplies. One strategy to reduce health worker absenteeism is to improve supervision, management, motivation, and accountability mechanisms. To improve the quality of the workforce, pre-service training needs to be improved and should include a uniform qualification examination, and for practitioners, monitoring their observance of the national guidelines for managing critical health conditions. To ensure access to necessary medical supplies, equipment, and drugs, the government needs to strengthen SALAMA (the medical procurement agency), include equipment in the material accounts in inventory measurement, and conduct frequent inventory checks. The sector also needs to improve the efficiency and transparency of health sector financing. Finally, promoting community-based health promotion and education programs, strengthening community health committees, and improving communication and feedback mechanisms between health providers and communities are essential to improve health service delivery.

Improving conditions for investment and job creation

As discussed in Chapter 3, urban poverty has been rising in part because the labor market is unable to provide decent employment conditions to most of the urban workers. While issues of low-quality labor supply are real, the main problem is the low creation of wage employment and the low salaries prevalent in the labor market. Inadequate infrastructure, limited access to finance, and weak institutions have all contributed to maintaining low private investment, low productivity and low levels of competition in the private sector, which favor rent extraction (from consumers and workers) by powerful firm owners. Major reforms to improve the business environment would increase private investment and allow more firms to enter the market and compete for jobs and customers, potentially raising wages and lowering prices.

Improving the investment climate is crucial to boost private investment, especially against slowing global growth. As a frontier market, Madagascar needs to make visible improvements in the investment climate to retain existing investors and attract a wider pool of investors (World Bank Group, 2021). Policy predictability, particularly of trade policy, investment rules, and access to land are crucial to increase private investment, which has been falling for the last decade. For instance, trade restrictions reduce investors' appetite for long-term projects, and trade policies protecting incumbent firms create disincentives for new entrants and increase costs and prices, hurting consumers. The multiplicity of laws and regulations governing investment, coupled with their uneven application, are often a source of concern in the private sector. Adopting an investment law that defines the different forms of investments, lists the activities reserved for local investment, and harmonizes the various laws and

[65] The absenteeism rate was highest at the hospital level, where nearly half of the health workers were absent on a typical day.
[66] Nurses and midwives showed a significant decline in diagnostic accuracy. Treatment accuracy of health professionals also showed significant deterioration, with lower treatment accuracy scores for all patient conditions except for malaria with anemia. Adherence to clinical guidelines (percentage of clinical cases treated as expected) dropped from 29.4 percent to 25.2 percent. The management of maternal and neonatal complications, the last indicator of health providers' competence, was relatively constant, dropping slightly by less than 1 percent during the period.

regulations would be a step in the right direction. Streamlining the processes for obtaining construction permits, connecting to utilities, paying taxes, and assessing credit risk would boost investment and encourage job creation.

Promoting inclusive and sustainable growth requires policies that reduce the concentration of market power and promote a level playing field for all firms. The concentration of market power in a few firms can limit competitiveness and productivity, resulting in economic growth that is neither inclusive nor sustainable. The proposed measures include building on what is already working, leveraging experiences from other countries, implementing well-designed performance-based measures, making tax expenditure statements transparent, applying open contracting principles, clarifying considerations in determining dominance, prohibiting the abuse of monopoly power, and introducing penalties for most anti-competitive practices. Specifically, adopting a freedom of information law, ratifying the OECD/Global Forum rules on fiscal transparency and information exchange, launching an open-data platform at the Ministry of Finance, and digitizing the Official Journal would build confidence among the public and the donor community about the government's ability to manage resources efficiently and effectively. Additionally, the Competition Council needs to increase monitoring and sanctioning of anti-competitive behavior, estimate the quantitative impacts of a lack of competition, and communicate results to the public and policymakers. Enhancing the deterrence effect of the law on anti-competitive behavior requires building a credible threat of enforcement action with sufficient penalties, developing a framework for settlements, and implementing safeguards for its independence. Finally, regulatory agencies need to improve appointment procedures to enhance independence, seek international expertise in some cases, and collaborate with the Competition Council on sector-specific issues.

3. Increasing resilience to shocks and strengthening basic safety nets

Malagasy households are vulnerable to both systemic and idiosyncratic shocks, but the former pose the greatest challenge. The repeated occurrence of systemic shocks—linked to both the country's history and the effects of climate change—hampers the coping ability of households, which thus seldom recover from such shocks. The pandemic-induced recession has exposed the vulnerability of some urban dwellers whose livelihoods depend on unreliable daily incomes and has created a new class of urban poor. Some of those affected have since recovered from the shock, but many remain in poverty. Repeated cyclones have underscored the long-standing neglect of infrastructure in the country, especially in areas where poor households tend to live. However, the ongoing inflationary pressure has had a limited impact on poor households, mainly because they have been able to lessen their dependence on the items most affected by inflation thus far.

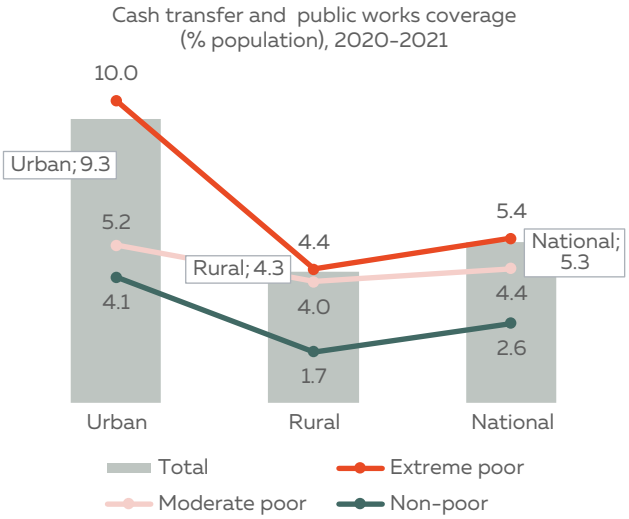
Madagascar's investment in social assistance is among the lowest in the world. The country only allocated an estimated only 0.3 percent of GDP to social safety net spending, compared to an average of 1.2 percent in sub-Saharan Africa (UNICEF, 2018, 2023; World Bank, 2023) and barely above the 0.26 percent in 2019. Administrative data and population figures from the latest census indicate that Madagascar's main social assistance programs cover approximately 5.3 percent of households and a similar share of the poor. Furthermore, per capita social assistance spending in Madagascar is among the lowest in the East and Southern African Region, comparable to countries such as Burundi, South Sudan, and Zimbabwe (UNICEF, 2023) The Fonds d'Intervention pour le Développement (FID), which is responsible for social assistance expenditure, is almost entirely funded by public development aid, with a limited contribution of 16 percent by the state.[67] This dependence on external financing causes significant variations in spending from one year to the next, and a low level of prioritization of social assistance.

Madagascar has two cash transfer programs. The first – *Transfert Monétaire pour le Développement Humain* (TMDH) – is a conditional cash transfer program introduced in 2016 to support primary school attendance. TMDH transfers are equal to about 6 percent of the income that corresponds to the national poverty line, and to about 8 percent of the extreme poverty line. The second program – *Argent Contre Travail Productif* (ACTP) – provides income support through paid work, over limited periods, to poor workers in select districts. ACTP transfers are equal to about 8.4 percent of the income that corresponds to the national poverty line, and to 12 percent of the extreme poverty line.

Social safety net coverage remains low. Figure 98 shows the percentage of individuals in Madagascar who are covered by social assistance programs, broken down by their poverty status (extreme poor, moderately poor, non-poor), and location (urban or rural). Overall, 5.3 percent of the population is cov-

[67] Despite the existence of coordination structures provided for by law, none have been established, leaving social protection technically coordinated by the Social Protection Working Group (SPWG). The SPWG is responsible for establishing a general policy framework for social protection for households in vulnerable situations, but its implementation remains incomplete.

Figure 98: Coverage of safety nets is still very low



Source: Author's calculations based on 2022 EPM data.

ered by social assistance programs. Looking at the poverty level, coverage is highest for the extreme poor at 5.4 percent, followed by 4.4 percent of moderate poor and 2.6 percent of the non-poor population. Finally, social assistance is skewed toward urban households as coverage is higher in urban areas (9.3 percent) than in rural areas (4.4 percent).[68]

As a result, it has limited poverty impact, though it makes a difference for beneficiary households. The simulation results from the 2021–22 EPM data suggest that social assistance has a very small impact on poverty and inequality reduction (0.2 percentage points lower and the Gini index 0.6 points lower) (Table 38). This can be attributed to the extremely low coverage of social assistance programs. To improve the impact of social assistance on poverty reduction in Madagascar, the government needs to prioritize scaling up the coverage of these programs. This can be achieved through increased budget allocation, better targeting of beneficiaries, and more efficient implementation of social assistance programs.

Table 38: The current social assistance system has marginal impact on poverty

	Poverty headcount	Gini
Post-transfer Indicators	75.2	36.8
Indicators without listed transfer		
All social assistance	75.4	37.4
Cash transfers, allowances, last resort programs	75.4	37.1
Food and in-kind transfers	75.3	37.2
Household, food transfers	75.2	37.1

Source: Author's simulations based on 2021/2 EPM data using ADEPT.

Well-targeted social assistance can reduce poverty rates by up to 7.2 percentage points, depending on its coverage of the poor. There may be a need to enhance the poverty reducing impact of the existing social assistance by changing its scope, improving targeting, and behaviorally enhancing its interventions.[69] A simulation of the impact of expanding the coverage of TMDH by targeting 30 percent of the poorest households via a proxy means-testing (PMT) formula and offering each household MGA 50,000 per month between 2023 and 2030 shows that the cost of the program would be equal to 2.16 percent of GDP in 2025, decreasing to 1.91 percent by 2030. The revised program would cover 1.8 million households on average, with the value of the transfer corresponding to 37 percent of GDP per capita.

Social assistance programs also need to change their scope, with a focus on graduating beneficiaries out of poverty. Graduation programs aim to lift people out of extreme poverty via financial support, skills training, and other forms of assistance over a fixed period. Unlike traditional social assistance programs, which typically provide ongoing support to vulnerable populations, graduation programs are designed to provide temporary support to individuals and households living in extreme poverty, with the goal of helping them become self-sufficient and self-reliant in the long term.

Cash transfer programs can improve social-cognitive development in children by conditioning them with behavior enhancing interventions. Datta et al. (2021) examined the effects of coupling interventions based on behavioral science with cash transfers on early childhood socio-cognitive development and household-level outcomes for children in Madagascar. The study employs a multi-arm cluster-randomized trial, where three behavioral interventions are layered onto a child-focused cash transfer program. These interventions include a Mother Leaders group and associated activities, which are augmented with a self-affirmation or a plan-making nudge. The findings suggest that incorporating behavioral interventions into social assistance programs can enhance their effectiveness in improving household-level outcomes and child development. In the case of Madagascar, policymakers and practitioners could consider incorporating behavioral interventions, such as the Mother Leaders group and associated activities, to complement existing cash transfer programs as such interventions may help promote positive parenting behaviors and improve children's socio-cognitive development, including nutrition.

[68] The period covered in the survey coincides with an expansion in urban coverage in response to COVID-19.
[69] A World Bank's credit is of US$250 million is expected to help Madagascar expand its social safety net coverage and the establishment of a registry of beneficiaries, benefiting at least 3 million people, or 13 percent of extremely poor households, in the 23 regions.

Graduation programs conditioned with behaviorally enhanced interventions have the potential to lift people out of extreme poverty and improve their long-term economic prospects. To enhance the cash transfer-based social assistance programs in Madagascar, the government can introduce behaviorally enhanced interventions such as Mother Leaders groups and associated activities, self-affirmation, or plan-making nudges to promote desirable parenting behaviors, increase interactions with children, and improve food security. To introduce poverty graduation elements, the government should carefully target the most vulnerable populations, collaborate with different government agencies, local communities, and other stakeholders. In addition, monitor and evaluate all programs to ensure effectiveness and identify any challenges. Programs should be scaled up with careful planning, adequate resources, and strong political commitment. By following these steps, the government of Madagascar can effectively enhance its social assistance programs and lift people out of extreme poverty while improving their long-term economic prospects.

4. Establishing a Real-Time Poverty Monitoring System Adapted to Monitor and Measure Impact of Climatic Disasters

Madagascar, particularly its South and East regions, is confronted with the recurring challenges of natural disasters and economic shocks, which disproportionately affect the poor and vulnerable populations. To address this issue effectively, it is imperative to develop a comprehensive poverty monitoring system tailored specifically to these areas. The system should encompass a Rapid and Frequent Monitoring System (RFMS)[70] in collaboration with key stakeholders from government agencies, international organizations, local communities, and academic institutions. By hiring and training local enumerators, costs associated with data collection can be minimized, while ensuring the collection of accurate and culturally sensitive information.

The integration of the Survey of Well-Being through Instant and Frequent Tracking (SWIFT) into the RFMS questionnaire is essential for estimating household expenditure/income, poverty levels, and related statistics. SWIFT utilizes machine learning and multiple imputation techniques, enabling rapid and accurate poverty assessments. Furthermore, by incorporating the SWIFT Plus approach, the system can effectively capture sudden changes in poverty resulting from economic shocks, such as the impact of drought. This integration empowers policymakers and stakeholders with real-time poverty data, facilitating timely and targeted policy interventions.

To strengthen the poverty monitoring system, significant emphasis should be placed on regular data collection and dissemination. Conducting monthly data collection enables the tracking of changes in living conditions, resilience, and coping strategies, thereby identifying vulnerabilities and evaluating intervention effectiveness. Developing a web-based platform or mobile application would provide stakeholders with real-time access to poverty and resilience indicators. Continuous training programs for enumerators and data analysts, along with public awareness campaigns, will enhance capacity building and community engagement, ensuring the sustainability of the system and maximizing its impact on policy formulation and evaluation. By implementing these measures, Madagascar can gain valuable insights into poverty dynamics and effectively design targeted interventions to improve the well-being of its most vulnerable populations.

[70] Catholic Relief Services is implementing a RFMS in Beloha and Tsihombe (in the Androy; both fully representative district-wide) and Ampanihy in Antsimo Adrefana (not the entire district, but representative across a portion of it) that can be scaled up to other key districts while integrating a SWIFT module to measure poverty.

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