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Face of poverty in Madagascar

Poverty, Gender and Inequality Assessment

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MADAGASCAR

Abbreviations and Acronyms

ADePT	ADePT: Software Platform for Automated Economic Analysis
CSB2	Second-Tier Basic Health Centers
CEPE	Certificate of Primary Elementary Education
CHD1	*Centres Hospitaliers de District de premier échelon* (Primary District Hospital Centers)
CHRR	Regional Reference Hospitals
CHU	University Hospitals
CPI	Consumer Price Index
EPM	*Enquête Périodique auprès des Ménages (Household Surveys)*
FDI	Foreign Direct Investment
FHH	Female-Headed Households
FS	*Formation Sanitaire* (Health Center)
GDP	Gross Domestic Product
GIC	Growth Incidence Curves
HIV	Human Immunodeficiency Virus
INSTAT	Madagascar Central Bureau of Statistics
IMF	International Monetary Fund
MDG	Millennium Development Goals
MDRI	Multilateral Debt Relief Initiative
MHH	Male-Headed Households
PREM	Poverty Reduction and Economic Management
PPP	Purchasing Power Parity
TFP	Total Factor Productivity
SSA	Sub-Saharan Africa
WDI	World Development Indicators

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CONTENTS

FIGURES

BOXES

TABLES

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Executive Summary

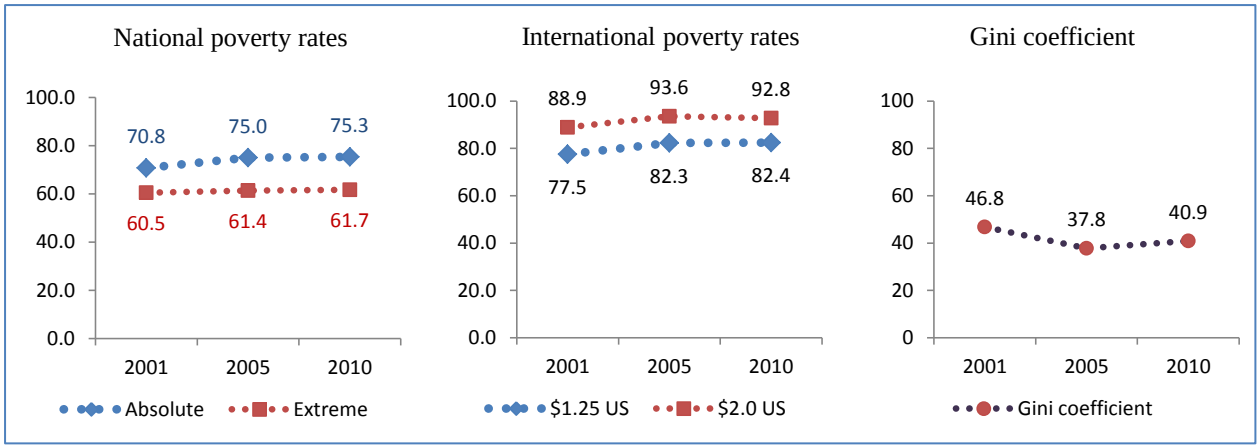
1. Madagascar has been entirely unsuccessful in reducing the number of its people that are poor, or extremely so, in the ten years since 2001, when poverty was already at a very high level. This well-known conclusion draws on the analysis of three successive rounds of the national Household Expenditure Surveys (*Enquête Périodiques auprès des Ménages*, EPM) conducted by the Madagascar National Institute of Statistics (INSTAT) in 2001, 2005 and 2010.

2. The objective of the analysis in this report is to document the levels and changes in poverty in Madagascar, and provide a detailed review of correlates of poverty and inequality in various dimensions, including gender, age, the structure of households, and place of residence. The report is an assessment of past poverty trends, and, while policy implications are highlighted in many cases, the report is focused mainly on the descriptive, rather than prescriptive.

A high and increasing number of poor …

3. Several economic measures of poverty paint a picture of the development tragedy in which Madagascar remains mired. Based on our revised estimates of the national poverty line and data from the national household surveys, about 75 percent of the population of Madagascar was found living in poverty in 2010. In other words, close to 16 million Malagasy people were estimated to be poor that year. A stunning proportion of close to 60 percent of the population was estimated as extremely poor, based on the minimum food intake poverty estimation methodology—meaning that close to 13 million Malagasy people earn or live on resources whose value falls below the cost of about 2100 calories a day.

Figure 1: Madagascar Poverty and Inequality trends



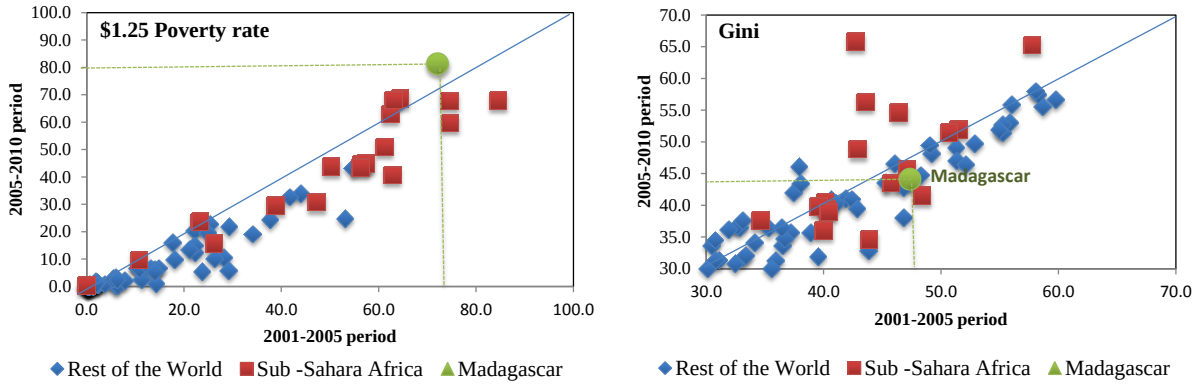
4. This report's main findings are broadly in line with poverty estimates published officially by the INSTAT for 2010, but the methodology of poverty estimation used in this report differs from the one officially used, and generates a different profile of poverty level especially for 2005, and thus of changes over the decade. We find that the poverty headcount did not decrease between 2001 and 2005, rising instead from 71 to 75 percent of the population, rather than the 68 percent estimated official headcount for 2005. Then we

estimate that poverty incidence increased again from 2005, but marginally, to 75.3 percent by 2010, close to the official estimate. The methodology is described at length in the report and its annexes.

5. Absolute poverty in rural areas has consistently deteriorated over the three different years when measurements were made, while the situation in urban areas deteriorated in the first half of the decade, then slightly improved in the second half. The incidence of poverty rose in both urban and rural areas during the 2001-2005 period, no doubt due to the severe political and economic crisis of 2002. In the 2005-2010 period, the incidence of poverty in rural areas was stagnant, or slightly increased, but fell in urban areas. A similar trend is observed in case of extreme poverty. Close to 80 percent of Madagascar's population live in rural areas, and poverty in rural areas is nearly twice as high there than in the urban areas. As a result, 86 percent of the poor live in rural areas.

6. Based on a cross-country comparison as of 2010, Madagascar has become one of the poorest countries in the world, with close to 82.4 percent of the population living below $1.25 per day in 2010, or 92.8 percent below $2.0 per day. The position of Madagascar in terms of level of the international poverty has been deteriorated since beginning of the decade. It is now clearly an outlier and high poverty incidence distinguishes the country, requiring a special attention from policy makers and the international community. Interestingly, the country is not among the most unequal: despite very low incomes and high poverty incidence, inequality, as measured by the gini coefficient, was in the mid-40s range, putting Madagascar in the middle of the range of values for sub-Saharan countries, and worldwide.

Figure 2: International 1.25 dollar-a-day poverty and inequality, cross-country comparison



Source: WDI of May, 2013. For Madagascar - author's estimations based on EPM and international conversion factors with the use of national official CPI.

…but a poverty less deep and less unequal

7. Not all the changes in poverty have been negative over the decade. The reduction in two alternative measures of poverty that focus more on the poor and captures how poor they are—the poverty gap and poverty severity (squared poverty gap)—suggests some improvement of welfare, albeit modest, among those below the poverty line. The poverty gap—a measure of the shortfall of resources of all households against the poverty line (with households above the poverty line treated as having a zero shortfall)—is estimated to have decreased from 36 to 34 percent, while poverty severity (the squared gap) fell from about 22 to 19 percent. This relative improvement occurred mostly in rural areas however, helping to reduce differences between the rural and urban poor. Both measures of poverty gap and

squared poverty gap improved in rural areas over the decade, while they remained almost unchanged or, in fact, increased in the urban areas. While the rural-urban gap in poverty rate narrowed slightly between 2001 and 2010, it still remains considerable. The rural poverty gap in 2010 was 37.5 percent, compared to the urban poverty gap of 20.1 percent. Similarly, the squared poverty gap in rural areas was 21 in 2010, and it was 10.3 in urban areas.

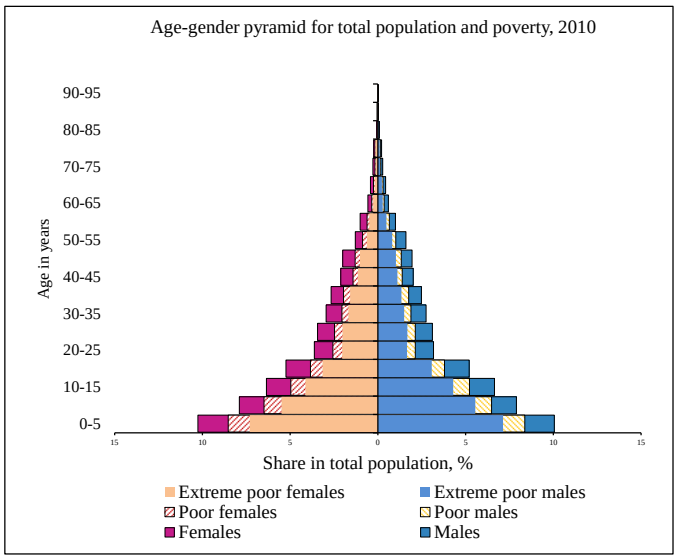
8. Associated with this decline in poverty depth or severity despite an increasing headcount, an overall fall in inequality took place between 2001 and 2010, driven by several factors. Decompositions of overall changes by various components indicate that both within-group and between-group inequality played an important role in reduction of inequality. It is evident that sector reallocation of labor (or activity), a premium on education, and regional composition had a strong impact leading to reduction of inequality. As we will see, one way of interpreting this finding is that, at least for the early part of the decade, a sector shift towards agriculture had a significant positive impact (meaning, it helped to reduce) on inequality in Madagascar, even as poverty remained broad, and the economy failed to grow.

Who the poor are

9. Population and poverty in Madagascar have a predominantly young face. When the population is classified by age, young children come out as the poorest segment of Madagascar's population. Absolute poverty has increased among most age groups, while the distribution of changes in extreme poverty across age groups between 2001 and 2010 was ambiguous. Family size and dependency ratios in Madagascar are likely to have grown faster than potential gains achieved from returns to employment.

10. The basic demographic structure of the population remained unchanged during the 2000s, with prevailing large families with children. Larger households are, on average, poorer. In addition to size, household structure plays an important role in the poverty determination. Extreme poverty incidence, though not absolute poverty, is higher among female-headed households. That there are no large apparent differences between males and females in terms of absolute poverty rates does not, however, imply there are no gender-related discrepancies. Labor market outcomes suggest that women's earnings are not as high as those of men when controlling for various other factors.

Figure 3: **Age-Gender Pyramid, for total population and absolute and extreme poverty, 2010**



Source: World Bank staff calculations from EPM data.

Poor in more ways than just food consumption

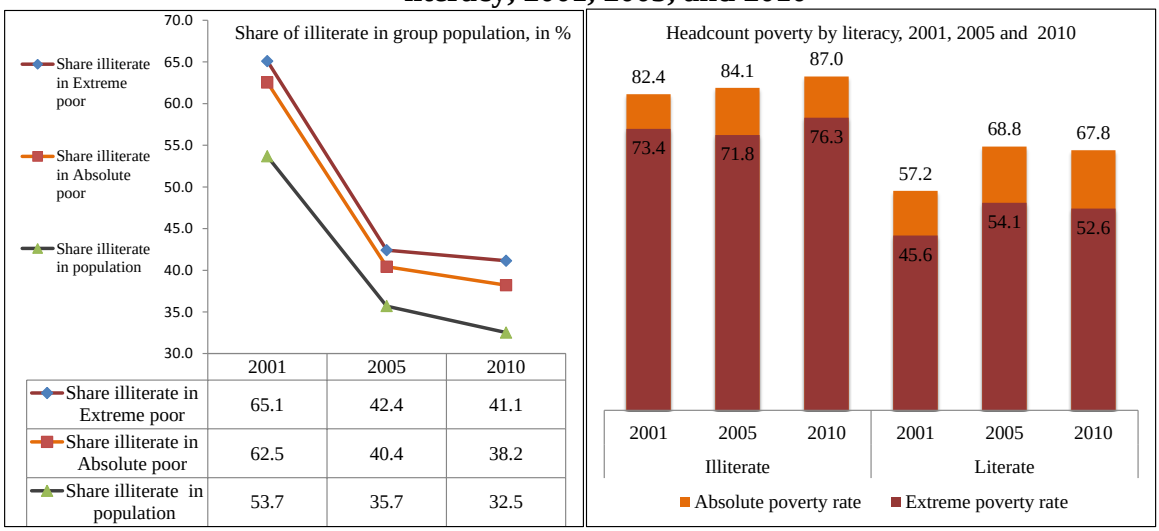
11. Food consumption patterns in Madagascar are broadly in line with those found in very poor countries, but, worryingly, indications from the EPMs are that food consumption has shifted to lower quality food items over the decade. The share of food consumption remained at around 75 percent for the poorest three deciles of the consumption distribution, while it increased for the total population. The composition of the food basket changed during the 2000s with a significant shift from higher quality and more expensive food items such as eggs, milk, and meat towards cheaper and lower in nutritional quality items such as fruits, tubers, and vegetables. A similar trend is observed among both poor and the poorest households.

12. Assets ownership in Madagascar has only slightly improved in 2010 in comparison to 2001. The core items of the durable goods module in the Madagascar surveys remained essentially unchanged over 2001-10. A composite total asset ownership index that we compiled increased slightly over the 2000s, primarily due to the introduction of cell phones. Asset ownership indices are much higher in urban then in rural areas. Rural areas grew faster in terms of traditional asset ownership, while urban are faster in the new technology. There is a strong negative correlation between asset index and level of absolute or extreme poverty.

13. One of the key non-income dimensions of welfare is access to tap water at home, which has sharply declined over the decade. Regarding cooking gas, a deterioration has also been observed during the 2000s, raising environmental issues if household turn to wood and charcoal for cooking and heating needs. A small improvement took place on the toilet-at-home indicator, though levels of access for the poor, or for rural populations, remain very low. Access to electricity is another common indicator used to assess non-income dimensions of poverty and it is very low in Madagascar, especially in rural areas where it is less than 6 percent, and altogether absent from the lives of most of the poor. While people have neither cars nor electricity because they are poor, any policy that, in Madagascar, directly favors consumers of cars or electricity is a policy that favors the very rich.

14. Illiteracy rates have fallen in Madagascar over the decade, based on EPM survey measures. Illiteracy and poverty are closely associated, but the gaps between literate and illiterate have declined. A majority of Malagasy adult population could not read or write in the beginning of the 2000s. An analysis of literacy suggests a significant improvement during the 2000s, though 32 percent of the population still remains illiterate.

Figure 4: **Distribution of illiterate population (left) and poverty headcount rates by literacy, 2001, 2005, and 2010**



	2001	2005	2010
Share illiterate in Extreme poor	65.1	42.4	41.1
Share illiterate in Absolute poor	62.5	40.4	38.2
Share illiterate in population	53.7	35.7	32.5

Source: World Bank staff calculations from EPM data. The figures are for the individuals.

15. Despite an increase in literacy rates, the contribution of education to poverty has not been strong. Overall, extreme poverty fell among educated people, but absolute poverty remained stagnant during 2001-2010. The proportion of households whose heads had completed primary education also increased, albeit marginally. In line with increases in literacy rates, net enrollment went up in relative and absolute terms during the 2000s. The improvement in the net enrollment rates in primary and secondary education occurred among the poorest, while enrollment in primary and secondary among the better-off segment of population remained unchanged during the 2000s. Net enrollment rates in the rural areas are much lower than in urban areas. With accessibility to public or private schools having reached near universal levels according to EPM respondents, and in particular, public schools being available to most of the poor, quality and demand-side issues are increasingly driving the dynamics of primary education policy.

16. Despite some improvements in enrollment, access to secondary and tertiary education remains limited for the vast majority of the population. The gaps in poverty incidence are growing still further with the attainment of higher education. It is sobering to note that the enrollment in the tertiary education is almost non-existent in Madagascar, and available only for the richest population.

17. As regards, health care, despite a modest increase in the volume of supply, there is evidence that the quality of services has deteriorated from 2005 to 2010, as reported by EPM respondents. It is not entirely clear if these trends pre-dated the early 2009 crisis, but they have clearly been made worse since its onset. Ignoring quality or use, availability of basic healthcare is not universal, being least available in rural areas, or to the poorest. Moreover, access has worsened for the poorest between 2005 and 2010. Overall, 77 percent of

household indicated that they had access to a primary health care center in 2010, but that proportion was 68 percent for the poorest quintile (with surprisingly little difference between the rural and urban poor), a proportion markedly lower than in 2005. In other words, 32 percent of the poorest quintile of Malagasy do not have access to a primary health care center.

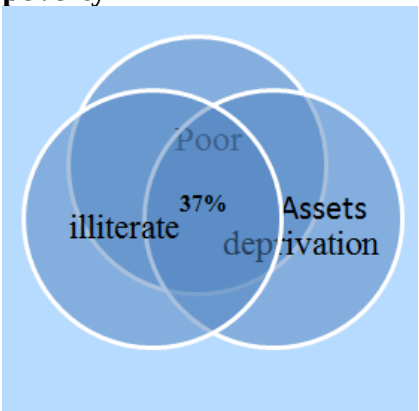
18. Only about a third of people reporting a disease actually seek formal care for it, and that number is even smaller for the poor—about one fifth of household in the first quintile seek formal care when self-assessed as ill. The rate of formal consultation significantly depends on the level of education of the individual him- or herself and the education level of the head of household—another mechanism that may work against the poor. There are also variations, but less so, by place of residence, age and gender, with, however, an unusually low relative consultation rate for baby girls compared with boys.

19. By far, basic level health centers, ¾ of which are public, remain the most used care centers in case of illness. The utilization rate of the CSBs has however ostensibly declined from 2005, including for the poor, while recourse to hospitals and private health care centers has increased. Private health centers are often deemed to offer services of superior quality but such services remain largely inaccessible for the poor. Nonetheless, their use has increased, even for the poorest, compared to 2005. In addition to cost of treatment, distance has a significant effect on use, which probably accounts for lower rural use in general, even after controlling for income and cost.

20. About a third of the population in Madagascar is deprived on multiple dimensions—the "have nothings", whether in consumption, literacy and education, basic household assets, or electricity.

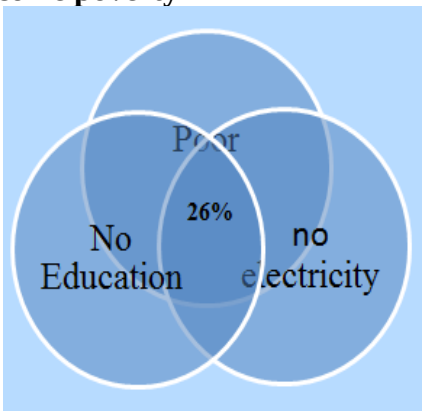
Figure 5: Venn Diagram of Non-income and Income Poverty

A. Assets, literacy and income poverty



A: Assets deprivation index less 7
B: Illiterate
C: Poor households

B. electricity, education and income poverty



A No Education
B No Electricity
C Poor households

21. Non-income measures of well-being, especially human development indicators, place Madagascar in the middle range of African countries. Plotting Madagascar's human development indicators next to other countries in the World put Madagascar squarely among the other African countries, but not an outlier. The mortality rate of children less than five

years old in Madagascar is among the lowest in African countries and the situation has improved during the 2000s. Adolescence fertility rate is around 150, which is slightly lower than sub-Saharan Africa average. Youth literacy rate is around African average, and improved during the 2000s. Prevalence of HIV aids (as proportion of population ages 15-49) is one of the lowest in Africa.

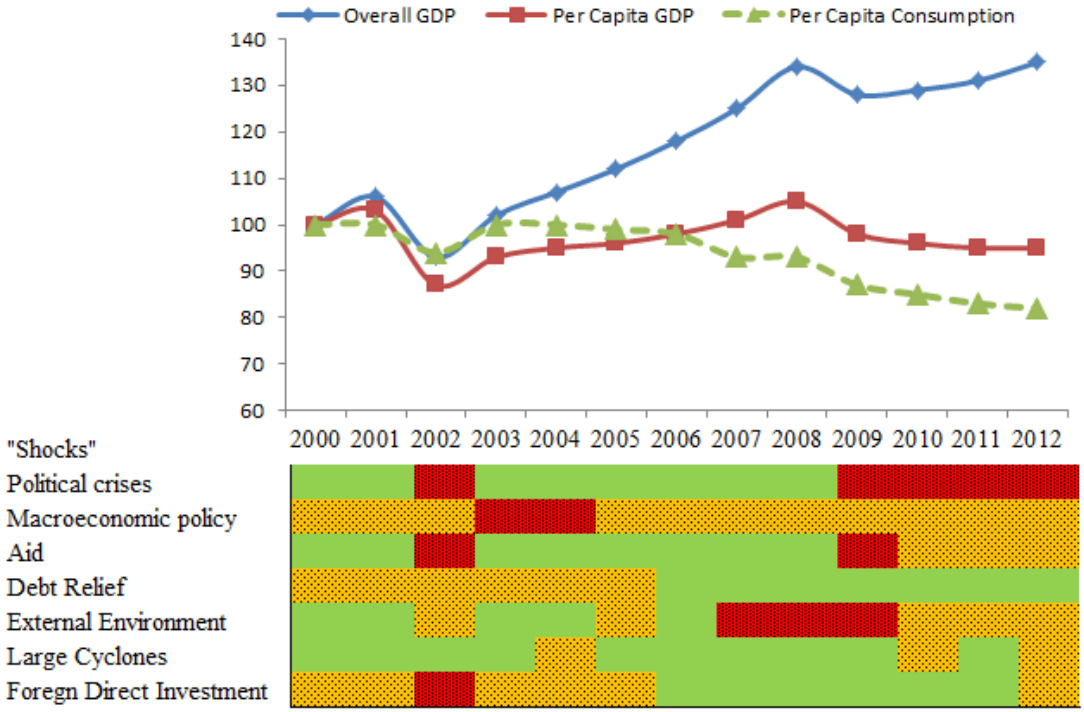
22. Much progress remains to be done in all these important areas, and the deterioration that has taken place in recent years is a major source of concern, but Madagascar's relative position suggests again that it is on the economic front that lay the most severe challenges. Nonetheless, on neither inequality measures, nor on various non-income human development measures, such as children mortality rates, adolescence fertility rates, literacy and HIV prevalence, as well as primary school enrollment, is Madagascar the outlier that it has become in terms of economic growth and poverty incidence. The country has thus positive achievements to its credit. Their sustainability is, however, in question if the basic economic situation of its citizens does not improve, whether or not the country is in crisis.

Explaining poverty trends in the decade: the political and economic context

23. Twice over the decade, an incipient growth process that had emerged already by the mid-1990s was stopped by political crises, in 2002 and 2009. The underlying trend of that "off-crisis" growth process was close to 5 percent for overall real GDP, or under 2 percent per capita. Over ten years at that rate, GDP would have grown by 65 percent. In the event, cumulative growth over 2000-10 fell short, reaching only 30 percent, less than half of what it could have been.[1] As a result, given high population growth, per capita GDP and income have in fact declined. With population growth at close to 3 percent, per capita GDP has fallen by four percent cumulatively for the decade as a whole, and it continues to fall since 2010.

[1] Madagascar's GDP per capita stood at the equivalent of US$420 in 2010, and PPP$965.

Figure 6: Madagascar—GDP, per capita GDP, and per capita Consumption, 2000-12 and Economic "Shocks"



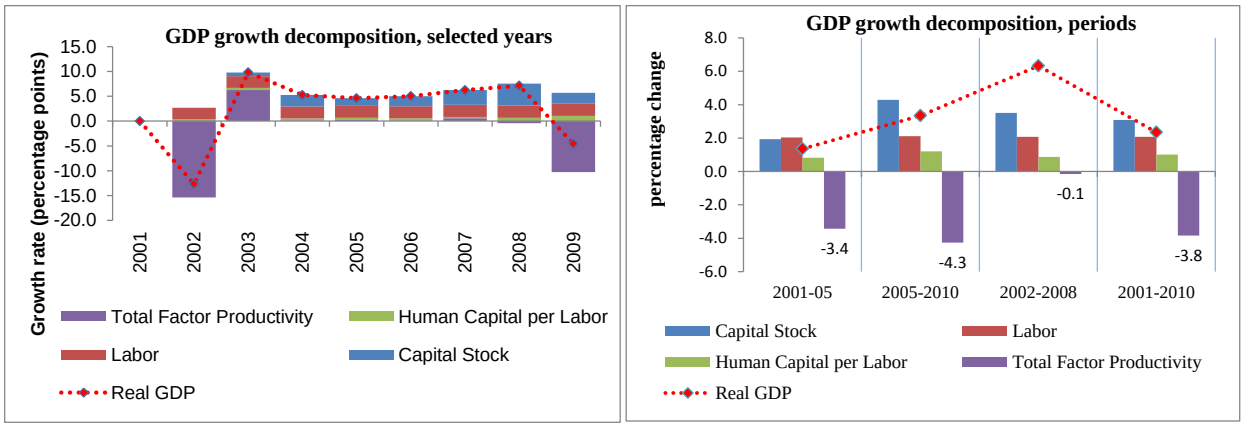
24. Most of the loss in per capita GDP took place during the two crises sub-periods, while in the 6-year period between 2003 and 2008, per capita GDP grew by a cumulative 14 percent. Without economic growth, neither can people find jobs, improve their livelihoods, or grow their businesses, nor can the State generate resources to pay for the public goods, services and capital that the country clearly needs to grow faster and share the benefits of growth.

25. To understand the factors affecting poverty over time, and in drawing on the three EPM surveys, the analysis in this report therefore confronts an issue of chronology that it is worth emphasizing: between the first survey, in 2001, and the second, in 2005, a political crisis hit Madagascar in full force in 2002. That crisis was short, lasting one year, but highly costly. It was, however, followed by a 3-year recovery, albeit one that was itself not foreign to shocks, including a brief macroeconomic policy slippage that ended up with the exchange rate depreciating by 70 percent and inflation surging. The timeline between the first and second survey thus includes a crisis early on followed by a few years of recovery.

26. Almost inversely, between the second survey, in 2005, and the third in 2010, four years of growth were interrupted, late in that five years span, by another political crisis, which took place in early 2009, just as the global economy was itself enduring a major financial and economic crisis. This timeline thus includes about 4 years of growth ending with a severe local political crisis. Since we do not have "before and after" surveys for each of the two political crises, an analysis of their impact, or a reasonably accurate attribution of the crises themselves to the subsequent poverty outcomes, is fraught with difficulties: we are summing different sequences of good and bad years over sub-periods.

27. The poor derive most of their income from either self-employment or being employed, and it is mainly their income and employment status that determines their welfare and economic situation. Developments in the labor markets are thus central to the evolution of poverty. Employment and labor participation have increased in Madagascar for the young and adults, while child labor has decreased. There are few differences in labor participation between genders. Earnings on the other hand have not improved. In 2000s, poverty in Madagascar was less an outcome of joblessness or inactivity than an outcome of low earnings and limited opportunities.

Figure 7: GDP growth accounting



Source: World Bank staff estimates from EPM and WDI indicators.

28. Between 2001 and 2010, some structural changes have characterized the labor market in Madagascar. After the 2001 crisis, overall average labor productivity plummeted (-4.7 percent) due mainly to a shift in the sectoral composition of the labor market towards agriculture, where productivity is much lower than in most other sectors (and has not been growing). That process only reversed very slowly, and the reversal was not completed by the time of the second crisis, in 2009, a crisis which has probably led to its resumption. Low productivity in agriculture is exacerbated by the presence of a large (even if slightly declining over time) share of workers engaged in family-aid unpaid activities. Family aid workers have also increased markedly in the secondary and tertiary sectors.

29. As a consequence of the increase in the number and share of laborers employed in the primary sector, agriculture has become the main source of labor income. The composition of the labor share of income by job type has changed significantly. Income derived from self-employment has decreased in relevance, from 42 percent of total income in 2001 to 26 percent in 2010. The shift towards the agricultural sector has also been accompanied by a corresponding "ruralization" of the Malagasy population. In urban areas, the role of different sectors in supplying labor income has changed markedly, with trade becoming the main source.

30. Agriculture has been the sector least affected by temporary political shocks. This is in part because much agriculture remains disconnected from urban developments, especially in Antananarivo, the locus of political unrest in Madagascar. The shift to agriculture, with low productivity levels compared to other sectors, has then had a depressing effect on the economy as a whole. Moreover, productivity trends in agriculture have remained flat in the decade. The shift to agriculture has thus been a shift to a sector that did not gain in productivity, and did not contribute to growth.

31. An analysis of the determinants of earnings highlights the role of experience and education on the upside, and gender on the downside. Average earnings increase with experience, even if this effect decreases with higher experience, as it usually happens. The returns to experience have increased between 2001 and 2010 for wage jobs, but they have decreased in rural areas. The disadvantage of women's earnings with respect to those of men is substantial but it has decreased markedly. In 2010, women's earnings were on average 34 percent lower than those of men with the same characteristics.

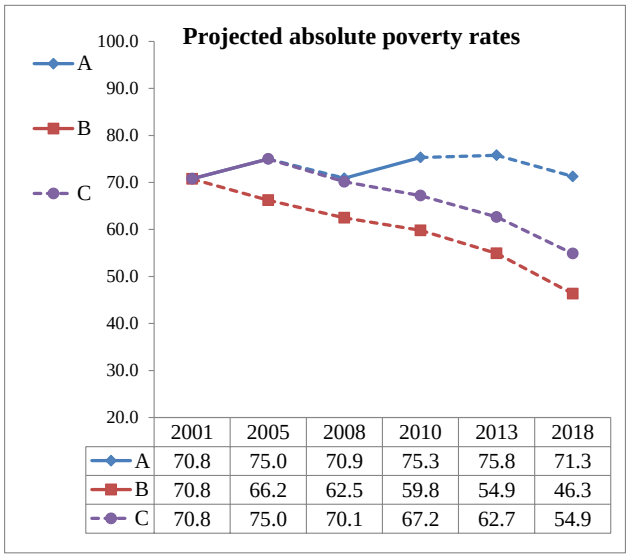
32. Returns to education in 2010 remain positive, even as they appear to have decreased compared with 2001, probably on account of factors affecting the demand for skills (by firms) rather than, for example, rapid growth on the supply side. Still, in 2010 one additional year of education allowed an increase in earnings by 5 percent. This means that the five years of primary education increased earnings by 28 percent. Returns to education in 2010 were higher for wage workers (6 percent) and broadly similar in rural and urban areas. Furthermore, they were higher for women than for men (respectively, just above 6 percent and around 4 percent). At the same time, they were lower than in 2001.

The poverty costs of the political crises

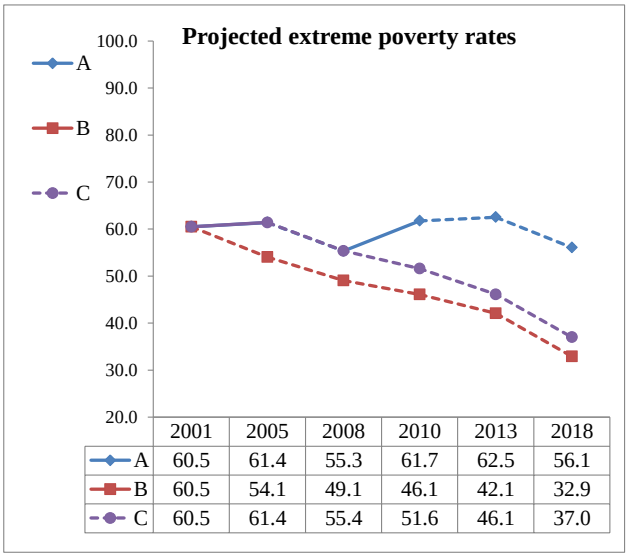
33. Two political crises in the 2000s have cost Madagascar dearly in terms of poverty reduction. The last chapter focuses on the current one, but also provides a longer view of the poverty impacts of having failed to sustain economic growth on account of the two crises in one decade. Based on our earlier findings about the connection between growth and poverty, growth of per capita GDP at about 2.8 percent a year—well within reach for Madagascar—would have translated into a reduction of poverty from 71 percent in 2001, to 55 percent in 2013. Instead, as noted above, we estimate poverty incidence, at the national poverty line, at about 76 percent in 2013. Thus, a full 21 percentage points more people—4.5 million people—are among the poor than under a counterfactual of sustained growth.

34. As to the effects of the second crisis, starting in 2009, without it poverty would have probably declined to 63 percent, vs. our estimate of 76 percent in 2013—in just five years, the loss in the fight against poverty can be counted as having affected 13 percent of the population.

Figure 8: The Hypothetical Loss in the Opportunity to Exit Poverty, 2001–2010 and projections throughout 2018



	2001	2005	2008	2010	2013	2018
A	70.8	75.0	70.9	75.3	75.8	71.3
B	70.8	66.2	62.5	59.8	54.9	46.3
C	70.8	75.0	70.1	67.2	62.7	54.9



	2001	2005	2008	2010	2013	2018
A	60.5	61.4	55.3	61.7	62.5	56.1
B	60.5	54.1	49.1	46.1	42.1	32.9
C	60.5	61.4	55.4	51.6	46.1	37.0

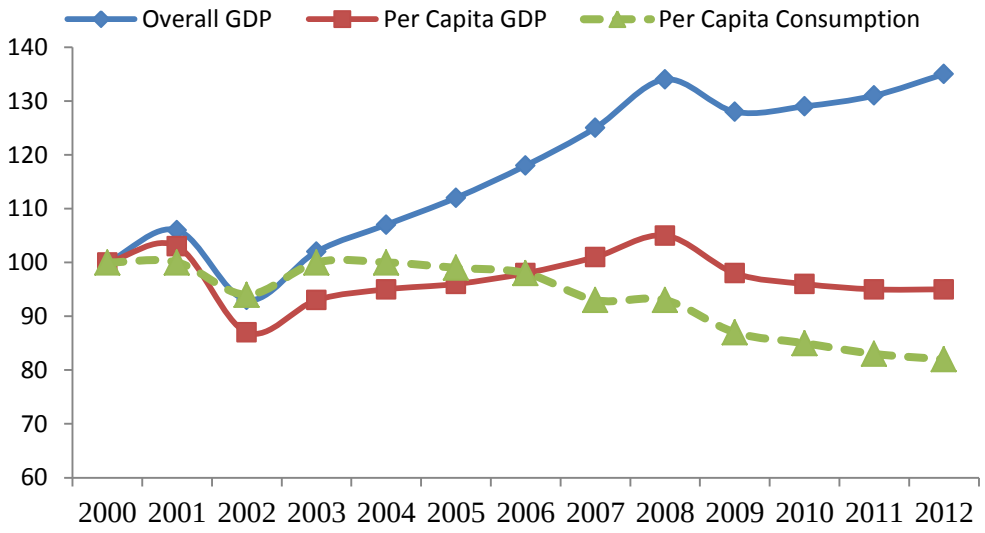
Source: Author's compilation. Estimation based on micro simulation methodology.
Note: The solid lines show the actual poverty rate in Madagascar. The dotted lines are the poverty rates estimated based on micro simulation method for three main scenario discussed in the main text. For the years beyond 2013 the results of micro simulations are based on the GDP per capita projections from World Economic Outlook Database (WEO), International Monetary Fund, Washington.

Chapter 1: The Lost Decade—A Brief Overview

Much of what this report develops in detail can be traced back to a simple chart, showing three measures of economic growth in Madagascar—or rather, the lack thereof—over the first decade of this century. This chart shows that per capita GDP or consumption have not grown, or even declined over the decade.

35. **Twice over the decade, an incipient growth process that had emerged already by the mid-1990s was stopped by political crises, one short-lived in 2002, and one as yet ongoing, started in 2009.** The underlying trend of that "off-crisis" growth process was close to 5 percent for overall real GDP. Over ten years at that rate, GDP would have grown by 65 percent. In the event, as the blue line in Figure 9 shows, cumulative growth over 2000-10 fell short, reaching only 30 percent, less than half of what it could have been.[2]

Figure 9 : Madagascar—GDP, per capita GDP, and per capita Consumption, 2000-12



36. **As a result, given high population growth, per capita GDP and income have in fact declined.** Given that population growth is close to 3 percent, the "off-crisis" trend growth in per capita GDP was close to 2 percent per year. At that rate, it would take 35 years to double per capita GDP, but at least it would grow. In the event, as the red line in Figure 9 shows, per capita GDP has fallen by four percent cumulatively for the decade as a whole, and it continues to fall since 2010. Most of the loss in per capita GDP took place during the two crises sub-periods, while in the 6-year period between 2003 and 2008, per capita GDP grew by a cumulative 14 percent. Without economic growth, neither can people find jobs or grow their businesses, nor can the State generate resources to pay for the public goods, services and capital that the country clearly needs to grow faster, improve the welfare of its people, and share the benefits of growth.

[2] Madagascar's GDP per capita stood at the equivalent of US$420 in 2010, and PPP$965.

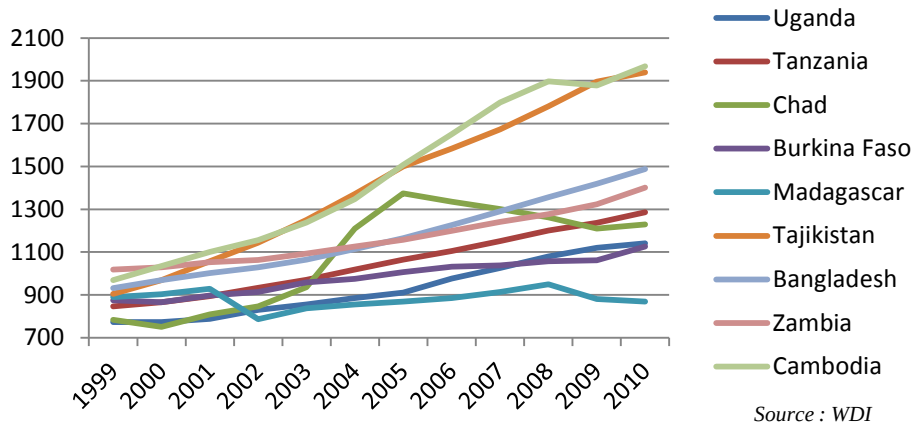
37. **Closer to an average measure of Malagasy people's welfare and livelihoods, real average per capita consumption is estimated to have fallen even more than per capita GDP.** The green line, drawn from the National Accounts estimates of per capita private consumption, shows a deeper cumulative fall over the decade, compared with per capita GDP. These results are not borne out by the other measures of consumption-related poverty used in this report—the household measures of real consumption, drawn from three household surveys, show a decline in the first five years of the decade, and a zero rate of change over the next five years. Among the reasons for this difference, besides methodological differences in the definition of consumption, is the fact that the National Accounts estimates themselves are very weak, using a dated methodology and a limited number of quality source data—but it is not the sole reason.

38. **The lack of buoyancy of per capita consumption when the economy did grow reflects in part the nature of growth at that time, driven by investment.** Nonetheless, they suggest that the growth process that did take place, especially between 2003 and 2008, did not translate into significant improvement in the livelihoods of Malagasy households, being driven in part by public investment, especially donor-funded projects, and private investment, especially in mining. Investment, both public and private, is sorely needed in Madagascar, and the core implication is that, for economic growth to translate into meaningful welfare improvement for a majority of the people, even faster economic growth is needed.

39. **Madagascar's weak growth performance has become atypical of recent developments in low-income countries.** The economic decline of Madagascar long predates this first decade of the century. Cumulatively, the real GDP per capita of Madagascar fell more than 30 percent between 1980 and 2010. Such a poor growth experience is no longer a frequent phenomenon among countries of the world. Madagascar is in fact one of a handful of countries in the world that have experienced a cumulative decline for 30 years, measured by GDP per capita in real terms). Of 155 countries for which a measurement is available, only 19 have experienced a cumulative economic regression between 1980 and 2010[3]. Among these 19 countries with a declining economy, 11 had a GDP per head below PPP$ 2000 in 2010, coupling decline and poverty. The performance of Madagascar places it among these 11 countries, and in fact, just behind Liberia and the Democratic Republic of Congo, two countries which, unlike Madagascar, had earlier fallen into a prolonged period of violent conflict. Even these two countries have rediscovered growth recently (over 30 percent for the first, more than 15 for the second, in the past 5 years), while for Madagascar, the last 5 years have been 5 years of decline. As the next figure also illustrates, Madagascar is now an outlier.

[3] 136 other countries had at least positive growth; 80 of them experienced a growth rate of 50 percent of the GDP per capita in 30 years, and 35 have at least doubled their per capita GDP.

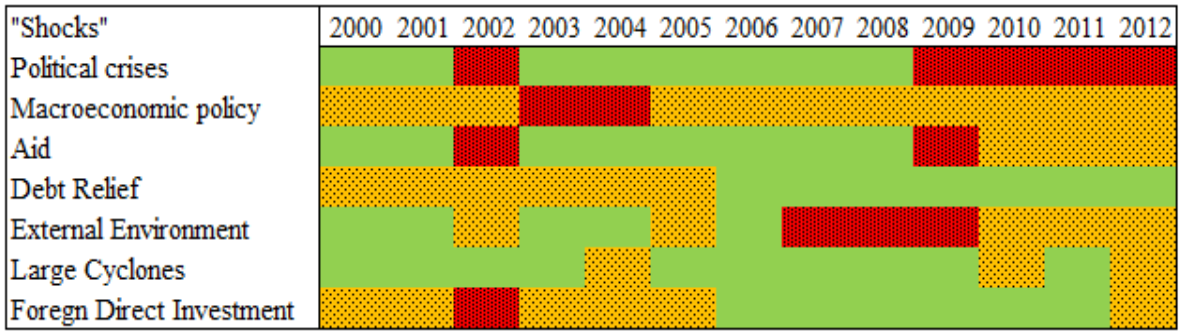
Figure 10 : GDP per capita, PPP, various countries



Source : WDI

40. **Political shocks have dominated the economy.** Political crises are not the only shocks that affect the economy of Madagascar. As the next color-coded table shows, exogenous or domestic shocks have numerous sources.

Table 1: A qualitative overview of large shocks in Madagascar, 2000-2012



- Macroeconomic policy has not been consistently supportive: in 2003 and early 2004, loose spending, tax and monetary policies put pressure on the external position, ending up with a sharp corrective depreciation of the nominal exchange rate by more than 70 percent, and a temporary surge in inflation to close to 30 percent.
- Donor aid has been pro-cyclical to the political cycles, dropping sharply during both crises, and accelerating in high-growth years—but the magnitude of the negative shocks never exceeded 2-3 percent of GDP, not enough of a shock to explain much of the country's checkered economic momentum.
- Debt relief expanded in 2005, with Madagascar benefitting from the Multilateral Debt Relief Initiative that erased more than US$2 billion of debt, bringing its level below 30 percent of GDP (where it still stands currently), from more than 70 percent prior to MDRI relief.
- The external economic environment of the global economy, which had been mildly or strongly supportive for much of the decade, worsened sharply in 2008 with the onset of the global crisis, and a deep recession in Europe, to which Madagascar is highly exposed. Given the nature of the channels through which these shocks could affect Madagascar (mainly export demand for goods and services), and based on the average experience of other, non-oil-producing, low income countries, or that of

Sub-Saharan Africa, the growth effects of the global crisis over 2009-10 cannot account for much more than 20 percent of the total fall in GDP in that period.

- Cyclones have been frequent—"large cyclones", in the table above, are those that affect more than 10 percent of the population (there have been five such occurrences in the years to 2012)—yet, for all their local impacts, the macroeconomic costs of cyclone damages have rarely been estimated to exceed 1/3 of a percent of GDP.
- Foreign direct investment, both a result of supportive policies, the country's endowment, and a favorable global investment climate in the mining sector, can also be construed as positive "shocks" to the country's economy.
- Political shocks, with their direct effects on the investment climate, for both domestic firms and FDI, and on tourism, as well as their indirect effects through donor aid, remain the dominant shocks that can explain macroeconomic performance in Madagascar.

41. As several indicators of this report show, the shocks have affected the economy through different channels. One of these channels is central to both growth and poverty developments in Madagascar in the past decade, and should become the focus of much policy attention once the crisis is over. As Table 2 clearly shows at the aggregate level (see indices of sector GDP in the bottom panel), agriculture has been the sector least affected by temporary political shocks. This is in part because much agriculture remains disconnected from urban developments, especially in Antananarivo, the locus of political unrest in Madagascar. But it is also because, in response to crises, people seem to have flocked to agriculture, either as an alternative occupation or as a safety net. This is very clear for the 2002 crisis, and, though evidence is more limited, probably the case for the current crisis as well. The shift to agriculture, with low productivity levels compared to other sectors, has then had a depressing effect on the economy as a whole. Moreover, productivity trends in agriculture have remained flat in the decade. The shift to agriculture has thus been a shift to a sector that did not gain in productivity, and did not contribute to growth. Finding a way to boost agriculture productivity across the country, for a large fraction of people engaged in agriculture, would go a long way to boosting economic growth, to making growth more pro-poor, and to reducing poverty.

Table 2: Growth, Consumption and Sector Growth in Madagascar, 2000-12

Key indicators	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Per capita GDP growth	1.2	2.8	-15.0	6.5	2.1	1.5	1.9	3.1	4.0	-6.9	-2.3	-1.0	-0.3
Per capita GDP	100	103	87	93	95	96	98	101	105	98	96	95	95
Per capita growth at 2.2 percent	100	102	104	107	109	111	114	116	119	122	124	127	130
Gap	0	-1	16	13	13	14	14	13	11	19	23	25	27
Per capita consumption growth	1.3	-0.3	-5.8	6.1	0.6	-1.2	-1.4	-5.2	0.1	-6.3	-2.3	-1.8	-1.3
Per capita consumption	100	100	94	100	100	99	98	93	93	87	85	83	82
Per capita growth at 2.2 percent	100	102	104	107	109	111	114	116	119	122	124	127	130
Gap	0	2	10	7	8	11	14	21	22	29	32	34	37
Sector GDP													
Agriculture (per capita)	100	101	97	96	96	96	95	94	95	100	94	89	88
Industry (per capita)	100	105	80	89	93	93	94	100	101	90	88	89	89
Services (per capita)	100	103	85	92	94	98	102	107	113	101	100	100	102

Source: National Accounts, Instat for 2000-2011, and staff estimates for 2012.

Chapter 2: Poverty, Growth, and Inequality

Several economic measures of poverty paint a picture of the development tragedy in which Madagascar remains mired. Based on our revised estimates of the national poverty line and data from the national household survey ("EPM"), about 75 percent of the population of Madagascar was found living in poverty in 2010. Close to 60 percent of the population was estimated as extremely poor based on the minimum food intake poverty estimation methodology - meaning that they earn or live on resources whose value falls below the market cost of about 2100 calories a day.

On international comparable measures of poverty, Madagascar is now one of the poorest countries in the world, among those for which it is measured: close to 80 percent of the people in Madagascar live below PPP$1.25 a-day, and 92 percent live below PPP$2 a day. Over the ten years of this assessment, covering the period from 2001 to 2010 for which household data are available, overall changes have been marginal: the situation among the poorest deciles of income distribution in Madagascar has improved somewhat, but, for them, from being farther below the poverty line to being still below the poverty line; still, population-wide poverty rates have increased since 2001; the economic situation of people in the upper quintile of income distribution has deteriorated, though possibly not for the very top of the income distribution; associated with this trend in the decade is a reduction in inequality.

The trends in the poverty headcount are very sensitive to the location of the poverty line. This is demonstrated in the GICs and the welfare dominance analysis. An increasing and extraordinarily large proportion of the Malagasy population of 22 million is now broadly equal in the face of deep and pervasive poverty.

42. Despite the fact that there was some improvement of the consumption level of the poorest population, Madagascar has been unsuccessful in reducing absolute poverty since 2001, when poverty was already at a very high level. This conclusion draws on the analysis of three successive rounds of the national Household Expenditure Surveys conducted by the Madagascar National Institute of Statistics (INSTAT) in 2001, 2005 and 2010. This report's main results are broadly in line with poverty estimates published officially by the INSTAT, but the methodology of poverty estimation used in this report differs from the one officially used, and generates a different profile of poverty changes over the decade. This chapter focuses on poverty incidence and changes between 2001, 2005 and 2010. The objective of this analysis is to bring out the relationship between changes in poverty, household consumption growth, and distributional changes at the national, urban, and rural levels, as well as across the main geographical regions of the country.

43. The time frame of the analysis is limited to the most recent survey available for our use that was conducted in 2010. INSTAT is in the process of completing the preparation of new data from its most recent round of the survey conducted in 2012. While it will be essential to update the analysis contained in this report when the survey data becomes available, the recent context suggests that the situation has only deteriorated.

44. For the beginning to the end of the decade as a whole, income per person has remained unchanged. Interim periods of economic growth were interrupted by political shocks, a short but deeply costly one in 2002 and a longer one that started in 2009 and is as

yet ongoing. The political turmoil generated limited physical damage but stalled the growth momentum, and led to changes in government, suspensions in foreign aid, strains in the public finances and interruption in policy and programs, hampering public service provision. While the overall economic stasis that resulted hurt the country's broad poverty trends, the shocks also affected the income distribution, hitting differentially certain geographic areas and population groups.

45. This chapter includes six sections and is organized as follows: Section A discusses survey data quality, comparability, Section B provides motivation for the choice of the poverty estimation methodology; Section C presents poverty and inequality trends at the national, rural and urban levels; Section D discusses inclusiveness of growth and distributional changes; Section E links growth, inequality and poverty reduction; and Section F focuses on international comparisons, (Section G presents poverty projections and trends under different GDP growth scenarios – not there yet). Drawing on some on this material, the report will include possible scenarios analyzing the way Madagascar's economy adjusts to or rebounds from the recent political and economic hardship helping to understand how future potential economic growth translates into welfare gains among different groups, sectors, and regions.

A. A NOTE ON DATA QUALITY AND APPROACH

46. **This report draws on the Madagascar Households Income and Expenditures survey (*Enquête Périodique auprès des Ménages* (EPM)) data for much of its content.** EPM is a core survey of the *Institut National de la Statistique* (INSTAT). The survey has been administered for almost two decades and provides a source to monitoring poverty and inequality. EPMs were conducted in 2001, 2004, 2005 and 2010. However, using some of the EPM to analyze poverty and inequality presents practical problems. Therefore, it is useful to begin the analysis with a discussion of the challenges and how the analysis contained in this report has approached them.

47. **The first major uncertainty is related to surveys conducted around a major economic and political crisis.** The 2004 survey because it was not fully comparable to the other three surveys. It was decided to use 2001, 2005, and 2010 surveys for this analysis. (Patrick to Complete the reason).We made three decisions to handle the comparability issue. The first decision is to compare only 2001, 2005, and 2010 data where the data are comparable.

48. **The second uncertainty concerns issues of representativeness of the samples**. Madagascar has not had a reliable census since 1993. Therefore, household surveys still used the 1993 population frame as the starting point for selecting areas. In 2007-2008, the World Bank and other donors provided financial and technical assistance to INSTAT to initiate the preparation of a new census that included census mapping. Although the census has yet to be conducted, the complete listing of households from the census mapping made it possible for INSTAT to update the sampling frame to more accurately reflect the current structural composition of the population. It was from this sampling frame that the 2010 EPM sample was drawn, and from which sampling weights were derived. New adjusted weights have been constructed.

49. **The third challenge concerns comparability of the surveys**. INSTAT has made an effort to maintain consistency over the years in the components of the EPM questionnaires

related to poverty measurement. This is reflected in the nearly identical questionnaires for food and non-food expenditures, education and health expenditures, housing values and characteristics, ownership of durable goods, gifts and transfers, and in-kind payments. There are still several challenges related to changes in the way auto-consumption is recorded, changes of number of enumeration areas, sample sizes, and other changes as noted in Box 1.

Box 1: EPM Survey Instrument and Methods Comparability

The Madagascar Household Income and Expenditure Survey (EPM) has become a core survey in Madagascar's efforts to build a long-term monitoring and evaluation system. The survey data, however, raise several practical problems for a reliable estimation of welfare in Madagascar.

Changes in survey instruments, particularly in the measurement of production and self-consumption of agricultural goods by smallholder farms, raise issues of comparability. There are several instances where there are differences that are worth noting. The sequence of modules has been changed and the way auto-consumption questions were asked changed as well. Respondents' fatigue could impact some data comparability. Another difference is in section of the agriculture module where self-consumption data is collected, with differences in the methodology used in the 2005 survey compared to that of the 2001 and 2010 surveys. In the earlier and later surveys, information was collected on production and its uses in one section (with the intent of assuring consistency of quantities, and forcing the enumerators to check for consistency). In the 2005 questionnaire, however, separate sections were devoted each to production, self-consumption, and sales. There was also no accounting of quantities used for share-cropping payments, in-kind payments for labor or credit, livestock feed, gifts/social obligations, losses, thefts or carry-over for seed, as was done in 2001 and 2010. Further, respondents in 2005 were asked to estimate quantities in local units and to provide their own conversion rate to metric units, whereas respondents in 2001 and in 2010 were asked to use metric units in their estimates. These two differences raise some concerns about comparability.

Number and structure of administrative areas more than tripled and sample size has increased. Between the 2001 and 2005 surveys, the largest administrative units in the country were changed from 6 provinces (faritany) to 22 regions. Consequently, INSTAT has been compelled to conduct surveys with samples large enough to be representative at the urban-rural level within each region. As such, while 5,080 households were interviewed in the 2001 EPM, the sample sizes more than doubled to 11,781 households in 2005 and to 12,460 households in 2010. In addition to the changes listed above, the definition of urban areas changed. But with comparability in mind, the INSTAT technicians used the old definition of urban areas when the sampling for the 2010 survey was done. As such, the new definition is not an issue for comparability of the surveys. The redrawing of some enumeration boundaries in the process of completing the cartography meant, however, that some areas that were previously defined as urban became defined as rural even under the old definition of urban.

50. **The fourth challenge relates to absence of a reliable nationally representative Consumer Price Index (CPI)**. The Madagascar national CPI is constructed based on the prices obtained from five main cities. Thus, the CPI is not representative for the entire country, especially the rural areas. This issue, crucial to several of our results, is discussed in the next section. A detailed technical discussion on the choice of the CPI is found in Annex D.

B. DECISION ON USE OF POVERTY LINES FOR THE ANALYSIS

51. **Poverty estimates presented in this report are based on recalculated poverty lines for 2005 and 2010 using the poverty estimation methodology used in 2001.** There were four main reasons to examine the scope for re-estimating the poverty line, already alluded to above. First, as described above, the lack of a reliable nationally representative CPI does not provide a good choice for over time poverty line deflation. Second, consumption patterns of the population have significantly changed during the 2000s. Third, despite broadly similar survey instruments, the changes in the 2005 survey were important, especially as the

survey's sample size was significantly increased to cover district level estimations for a new and larger number of districts. In addition, regional deflators for the consumption aggregates are calculated in 2005 and in 2010 based on 22 regions instead of 6 in 2001. Fourth, the sampling frame of the 2010 survey changed, reflecting new census mapping data.

52. **The lack of a reliable nationally representative consumer price index (CPI) is a crucial factor in the accuracy of poverty calculations.** Reliable over time poverty estimation should be based on comparable welfare aggregates constructed on the basis of harmonized household surveys that allow the conversion of nominal monetary and welfare-related variables in real terms, that is, after correction for inflation, from the base year. The method used by INSTAT to evaluate the poverty line (the value of a reference basket) relies on the official CPI, itself based on price data collected only in the five largest cities in Madagascar. Madagascar is a large country with close to 80 percent of the population living in rural areas, differences in local agro-climatic conditions and severe connectivity issues reflecting in part a dilapidated road network. There can be significant divergences in prices across space and time that should be taken into consideration. Thus, the use of the officially published five main cities CPI could turn out to be an inappropriate choice to measure changes in prices faced by the poor in rural areas.

53. **In the event, the conclusion of a detailed comparability analysis of the official versus survey-based CPI indicators is that the official CPI differs from the survey-based estimation, though mainly for 2005.** Details are presented in Appendix A. The use of the official CPI leads to a different trend in, and regional distribution of, poverty in comparison to the survey-based CPI estimation. This said, at the aggregate level, differences in CPI affect mostly the 2005 poverty rate estimates (with the official CPI leading to under-estimating overall poverty that year) and do not have any effect on the 2001 and 2010 poverty levels.

54. **These results are broadly robust to alternative methods.** To test the robustness of this analysis, several methods for comparing data and addressing the CPI issues, methods that are available in the literature, were applied to the Madagascar data. In all, six different methods are used. A detailed discussion of these methods and the results obtained from applying them to the Madagascar EPM data is the subject of Appendix F of this report. With that as a background, the rest of this report looks at the poverty outcomes using the poverty estimation methodology after re-estimating poverty lines for each of the surveys.

C. THERE WAS AN INCREASE IN POVERTY BETWEEN 2001 AND 2010

55. **Poverty headcount rates based on both absolute (upper) and extreme (lower) estimates of the national poverty lines increased between 2001 and 2010.** The absolute poverty rate was around 71 percent in 2001 and rose to around 75 percent in both 2005 and 2010 (Table 3). Extreme poverty incidence, which was estimated at 60.5 percent of the population in 2001, edged up to close to 62 percent in 2010.

Table 3: National and International Poverty for 2001, 2005, and 2010

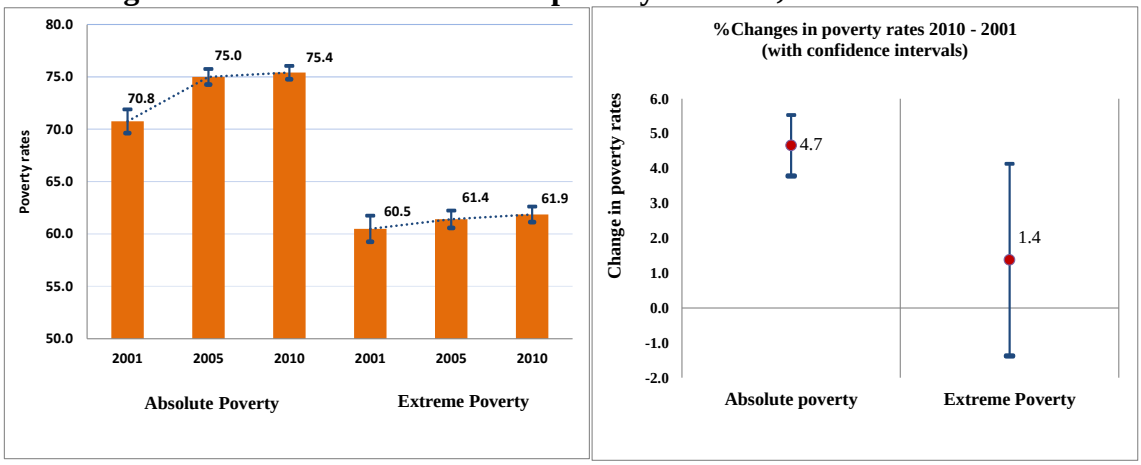
	Poverty Headcount Rate			Number of Poor (million people)			Poverty Gap			Squared Poverty Gap		
	2001	2005	2010	2001	2005	2010	2001	2005	2010	2001	2005	2010
Poverty Estimate used in this report												
Absolute	70.8	75.0	75.3	11.2	13.4	15.6	35.9	32.1	33.9	21.7	16.9	18.8
Extreme	60.5	61.4	61.7	9.6	11.0	12.8	26.5	22.0	23.5	14.6	10.4	11.8
International Poverty Lines												
$1.25 US	77.5	82.3	82.4	12.3	14.7	17.1	42.2	39.7	41.3	26.9	22.6	24.5
$2.0 US	88.9	93.6	92.8	14.1	16.7	19.2	57.8	58.2	59.0	41.8	39.7	41.1

Source: World Bank staff estimates from EPM data. Option A-Poverty based on the methodology adopted in this report based on method initially introduced in 2001. Option B-poverty published by INSTAT. Option C-International poverty estimates converting consumption per capita using ICP conversion factor and comparing to $1.25 and $2.0 poverty lines. See Annex D for the discussion on the choice and methodology for poverty lines estimation. Poverty lines used in this report are: Absolute poverty lines (2001 – 192 733 Ar, 2005 -289 169 Ar, 2010 – 381 791 Ar), Extreme poverty lines (2001 – 146 864 Ar, 2005 – 227 085 Ar, 2010 – 294 690 Ar).

56. **The increase in poverty headcount rates was large and, given that it was accompanied by an increase in Madagascar's population of about 2.9 percent a year, it resulted in an even more significant increase in the number of people in absolute poverty or extreme poverty.** The population estimate used in this report has a total population of 20.7 million in 2010. An estimated 15.6 million Malagasy were below the absolute poverty line in 2010, while 12.8 million people were below the extreme poverty line. The size of the population living below the absolute poverty line increased by nearly 4.4 million between 2001 and 2010. The number of extreme poor increased by 3.2 million over the same period. In 2010, 17.1 million people in Madagascar lived below 1.25 US dollar a day (see Figure 11).

57. **Overall, the data shows an increase in poverty in the early 2000s and stagnation in the poverty rates in the second part of 2000s.** The results from several methodologies, attempting to correct for a number of weaknesses in the data, support a deterioration of poverty rate in the 2000s. The deterioration is evident based on any measurement choice we undertake. The deterioration in the poverty rate between 2001 and 2010 is likely capturing a real deterioration in the welfare of the population.

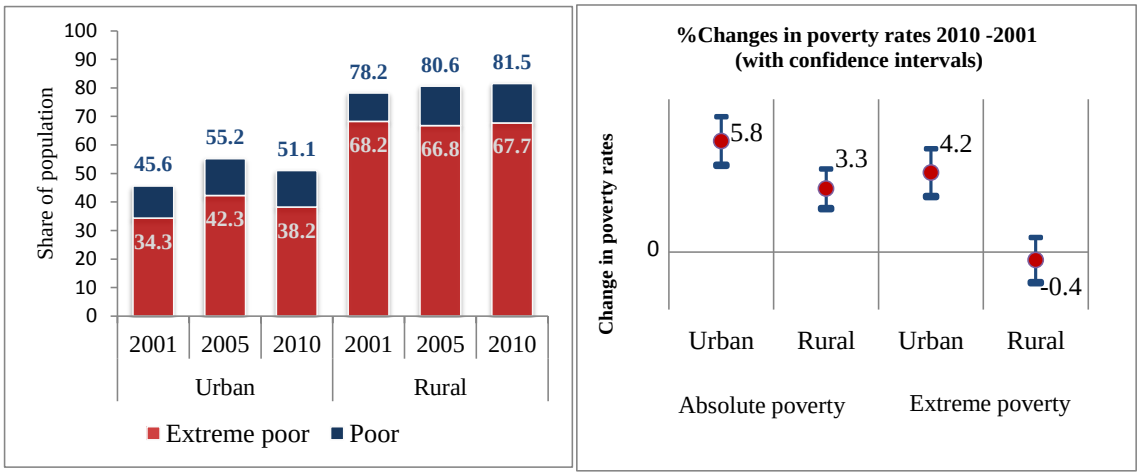
Figure 11: Absolute and extreme poverty for 2001, 2005 and 2010



Source: World Bank staff estimates from EPM data. *(Confidence intervals based on 5 percent significance, no change in poverty is crossing 0 line)*

58. There has been almost no change over the years in the proportion of the extremely poor—an incredible 62 percent of the people in Madagascar are extremely poor, living on less than the cost of 2100 calories a day and hardly able to survive above starvation. The extreme poor, defined as people who have difficulty meeting basic caloric needs, comprised 60.5 percent of the population in 2001, and 61.7 percent in 2010. Two thirds of people living in rural areas are extreme poor, a proportion that, as Figure 12 shows, has not changed in the last 10 years.

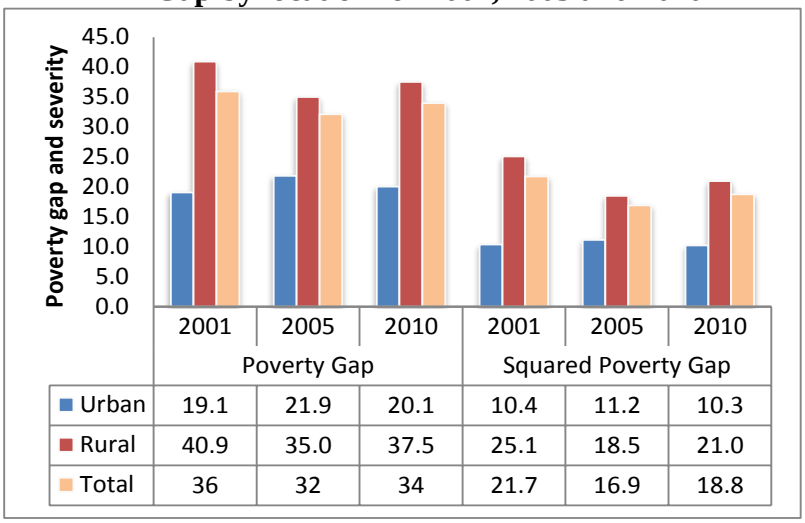
Figure 12: Evolution of absolute and extreme poverty by location for 2001, 2005 and 2010



Source: World Bank staff estimates from EPM data.

59. **Absolute poverty in rural areas has consistently deteriorated over the three different years when measurements were made, while the situation in urban areas deteriorated in the first half of the decade, then slightly improved in the second half.** The incidence of poverty rose in both urban and rural areas during the 2001-2005 period. In the 2005-2010 period, the incidence of poverty in rural areas was stagnant, or slightly increased, but fell in urban areas (Figure **12**). A similar trend is observed in case of extreme poverty. Close to 80 percent of Madagascar's population live in rural areas, and poverty in rural areas is nearly twice as high there than in the urban areas. As a result, 86 percent of the poor live in rural areas.

Figure 13: Evolution of Poverty Gap and Squared Poverty Gap by location for 2001, 2005 and 2010



	Poverty Gap			Squared Poverty Gap		
	2001	2005	2010	2001	2005	2010
Urban	19.1	21.9	20.1	10.4	11.2	10.3
Rural	40.9	35.0	37.5	25.1	18.5	21.0
Total	36	32	34	21.7	16.9	18.8

Source: World Bank staff estimates from EPM data.

60. **Poverty in Madagascar is deep and a high fraction of the population is vulnerable to falling below the poverty line. The poverty gap eased from 36 percent in 2001, to 34 percent in 2010**. Poverty in Madagascar is not only widespread, it is also deep. The poverty headcount (aka FGT0) or poverty incidence measures the number of people below the poverty line, but does not measure the distance from the poverty line for those that fall below. One way to gauge the depth of poverty is to look at other measures of poverty that are sensitive to the distance of the poor to the poverty line based on the welfare measure. The households close to the poverty line could be moved out of poverty with relatively less effort than those which are far below the line. What is commonly called the poverty gap (a.k.a. FGT1) is the average shortfall of all households from the poverty line, treating the non-poor as having zero shortfall. The poverty gap measures capture both the proportion of the poor (the headcount) and the average distance of the poor from the poverty line. The decline in the poverty gap indicates that the consumption of the poor has improved. The improvement took place in rural areas, while the poverty gap in urban areas actually increased.

Table 4: Some international comparisons of poverty headcounts and gaps

Country	Date	Headcount	Gap	H/G
		At PPP$1.25 a day		
Congo (DR)	2006	87.7	52.8	1.7
Madagascar	2010	82.4	41.3	2.0
Rwanda	2006	72.1	34.8	2.1
Rwanda	2011	63.2	26.2	2.4
Mozambique	2008	59.6	25.1	2.4
Mali	2010	50.4	16.4	3.1
Bangladesh	2010	43.3	11.2	3.9
Lao	2008	33.9	9.0	3.8
India	2010	32.7	7.5	4.4
Indonesia	2010	18.1	3.3	5.5
		National Poverty Line		
Madagascar	2010	75.0	34.0	2.2

Source: World Development Indicators

61. **Similarly to poverty gap, consumption (or income) gap measure has reduced in Madagascar.** The average distance of the poor from the poverty line is sometimes called the "consumption gap" or the "income gap", it is equal to the ratio FGT1/FGT0. The "consumption gap" in 2001 was 50.8%, and in 2010 it dropped to 45.2%. The fall in the poverty gap also implies that the reduction in the consumption gap more than outweighed the increase in the poverty headcount.

62. **The severity of poverty (measured by the squared poverty gap), which is sensitive to both distance to the poverty line and inequality among the poor, is also high, and is estimated at about 21.7 (2001) and 18.8 (2010) percent.** Poverty severity measures income inequality among the poor and the lower the measure the better. Poverty severity in Madagascar has slightly declined from 21.7 in 2001 to 18.8 in 2010, suggesting some improvement in this measure: a decline in squared poverty gap implies a more equitable distribution of consumption among the poor.

63. **The reduction in poverty gap and poverty severity statistics suggests some improvement among those below the poverty line, but this relative improvement occurred mostly in rural areas, helping to reduce gaps between rural and urban poor.** Both measures of poverty gap and squared poverty gap improved in rural areas, while they remained almost unchanged or increased in the urban areas. While the rural-urban gap in poverty rate narrowed slightly between 2001 and 2010, it still remains considerable. The rural poverty gap in 2010 was 37.5 percent, compared to the urban poverty gap of 20.1 percent. Similarly, the squared poverty gap in rural areas was 21 in 2010, and it was 10.3 in urban areas.

Figure 14: Sensitivity of Headcount Poverty Rate with Respect to the Choice of Poverty Line

	2001		2005		2010	
	Poverty Headcount Rate	**Change from actual (percent)**	**Poverty Headcount Rate**	**Change from actual (percent)**	**Poverty Headcount Rate**	**Change from actual (percent)**
Poverty line = Total poverty line						
Actual	70.8	0.0	75.0	0.0	75.3	0.0
+5 percent	73.0	3.1	77.2	2.9	77.2	2.5
+10 percent	74.8	5.7	79.2	5.6	79.2	5.2
+20 percent	77.7	9.8	82.5	10.0	82.6	9.6
-5 percent	68.9	-2.7	72.6	-3.3	73.0	-3.0
-10 percent	67.1	-5.2	69.7	-7.1	70.5	-6.4
-20 percent	62.4	-11.8	62.5	-16.7	63.9	-15.2
Poverty line = Food poverty line						
Actual	60.5	0.0	61.4	0.0	61.7	0.0
+5 percent	62.4	3.2	64.5	5.1	64.7	4.8
+10 percent	64.4	6.5	67.2	9.4	66.9	8.4
+20 percent	67.4	11.4	72.0	17.3	72.0	16.6
-5 percent	58.3	-3.6	58.1	-5.4	58.6	-5.0
-10 percent	55.1	-8.9	54.7	-11.0	54.9	-11.1
-20 percent	49.0	-19.0	46.1	-25.0	46.8	-24.2

Source: World Bank staff calculations from EPM data.

64. **Small shocks to the poverty line would affect a large fraction of the population.** Another, probably more intuitive, way to describe the depth of poverty and vulnerability is to estimate the fraction of the population that is just around the poverty line. Figure 14 shows that, based on the 2010 data (third column) a series of hypothetical shocks reducing the consumption of those that are now considered non-poor by 5, 10, and 20 percent would send an additional 2.5, 5 and 10 percent of the population into poverty. In other words, if the poverty line was 20 percent higher in 2010, the poverty rate would be about 82.6 percent, and not 75.3 percent. This measure of the depth of vulnerability did not change over time: overall, a 20 percent increase in the poverty line (or, nearly equivalently, a uniform 20 percent drop in per capita consumption across the entire income distribution at unchanged poverty line) would result in increase in poverty by approximately 10 percentage points.

65. **An opposite scenario, with increased consumption of those who are now considered non-poor by 5, 10, and 20 percent would take 3, 6.4 and 15.2 percent of the population out of poverty.** Overall, around one quarter of the population in Madagascar is found at a 20-percent distance of the poverty line and 40 percent are within 20 percent of the extreme poverty line. This is an important finding suggesting that a 20 percent per capita consumption growth rate—needing less than 5 percent total consumption growth per year for 10 years—, assuming unchanged inequality, would reduce extreme poverty in Madagascar from 67 to 47 percent. Extreme poverty is more responsive to growth on the upside, and it is thus relatively easier to gain reduction of extreme poverty than absolute poverty.[4]

66. **The trends in the poverty headcount are very sensitive to the location of the poverty line.** The average consumption of the poorest population has improved as described

[4] Based on the same logic, to eradicate extreme poverty in Madagascar, the required growth is 700 percent, assuming people will be getting the income proportionally. In other words, based on a purely hypothetical scenario, GDP should grow 8 fold to eradicate poverty at its current measure in Madagascar.

by the poverty gap, consumption gap and squared poverty gap measures. This is demonstrated in the GICs and the welfare dominance analysis demonstrated below. If the poverty line were somewhere slightly below the extreme poverty line then the poverty headcount would have declined over the decade from 2001 to 2010.

D. INCLUSIVENESS OF GROWTH IN MADAGASCAR

67. **The increase in poverty during 2001-2005 (respectively, stagnation during 2005-2010) was driven by a sizeable decline (respectively stagnation) in average per capita consumption.** Error! Reference source not found. provides a summary of the changes in the economy, rural/urban areas, and across the distribution. It is important to re-emphasize that the consumption changes figures presented at this table are deflated based on the survey-based deflators instead of the official CPI changes. On this basis, real per capita consumption expenditure from HIES decreased on average by 1.6 percent per annum between 2001 and 2005, remained around 0 during 2005 to 2010. Overall, during the 2001-2010 period, consumption per capita fell by 0.8 percent. The decrease in percentage terms was higher for urban areas than rural areas. Despite of the recovery in urban consumption in 2005-2010, the percentage reduction of urban consumption over the entire period of 2001-2010 was higher than that in rural areas: between 2001 and 2010, mean of per capita consumption declined by about 1 percent per annum in urban areas, but it fell by 0.4 percent per annual in rural areas.

Table 5: Growth in consumption per capita (percent): 2001, 2005 and 2010

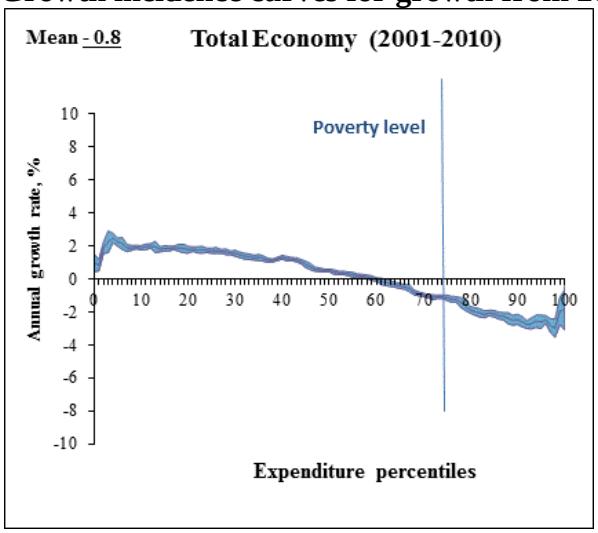
	2001-2005	2005-2010	2001-2010
Total	-1.6	0.0	-0.8
Urban	-3.6	1.7	-1.0
Rural	-0.5	-0.4	-0.4
Quintiles of Consumption per capita			
1 quintile	5.9	-2.4	1.7
2	3.9	-1.3	1.3
3	1.5	-0.6	0.4
4	-1.5	-0.3	-0.9
5 Highest	-4.5	1.0	-1.8

Source: World Bank staff calculations from EPM data. Survey based CPI is used to deflate over time.

68. **Average changes in household consumption per capita do not reflect changes in the income distribution which occurred in Madagascar during the 2000s.** The poorest people gained during the 2000s, while people at the top of the distribution experienced losses. It is therefore important to look into changes in consumption across levels of consumption (quintiles, or groups of 20 percent, of consumption per capita) to analyze distributional changes. As shown in Table 5, the per capita consumption of the three lowest quintiles of the consumption distribution increased significantly during the 2001-2005 period, with average per capita consumption in the bottom quintile growing at 5.9 percent growth per annum, while consumption of the upper two quintiles declined (in the top quintile, a significant reduction by 4.5 percent per annum). A reverse pattern holds for 2005-10, with drops in per capita consumption of the poorest, and an increase only in the top quintile. For the 2001-2010 period as a whole, there has been an overall improvement for the poorest and an overall decline for the top earners.

69. **Growth Incidence Curves (GIC) confirm that during 2001-2010 changes in the consumption distribution were progressive; the poorest enjoyed higher growth than those in the middle of the distribution and the top, while average growth was negative.** Figure **15** shows the GIC for Madagascar. Growth incidence curves analysis, proposed by Ravallion and Chen (2003), plot per capita expenditure growth rates in between 2001 and 2010 against percentiles ranked by per capita expenditure, from poorest to highest. The GIC provides an intuitive picture of how much growth has favored different population groups. According to the GIC, the poorest 60 percent of the population experienced a larger-than-average statistically significant growth – not enough to affect their position above the poverty line, but enough to reduce the poverty gap. However, the top 40 percent of the population experienced a negative growth rate. The slope of the GIC curve is negative. This indicates that, even as overall average growth has been negative, its structure across the distribution of household has been pro-poor. The overall poverty rate, however, is found around 75th percent of percentile where a deterioration of the consumption has been observed. Poverty overall has thus deteriorated, while the poverty gap and squared poverty gap have been reduced. In other words, the distributional changes in the income distribution suggest an overall stagnation in poverty, applying to around a quarter of the income distribution located close to the poverty line, with an improvement in the position of the poorest people living below the median of income distribution.

Figure 15: Growth incidence curves for growth from 2001 to 2010

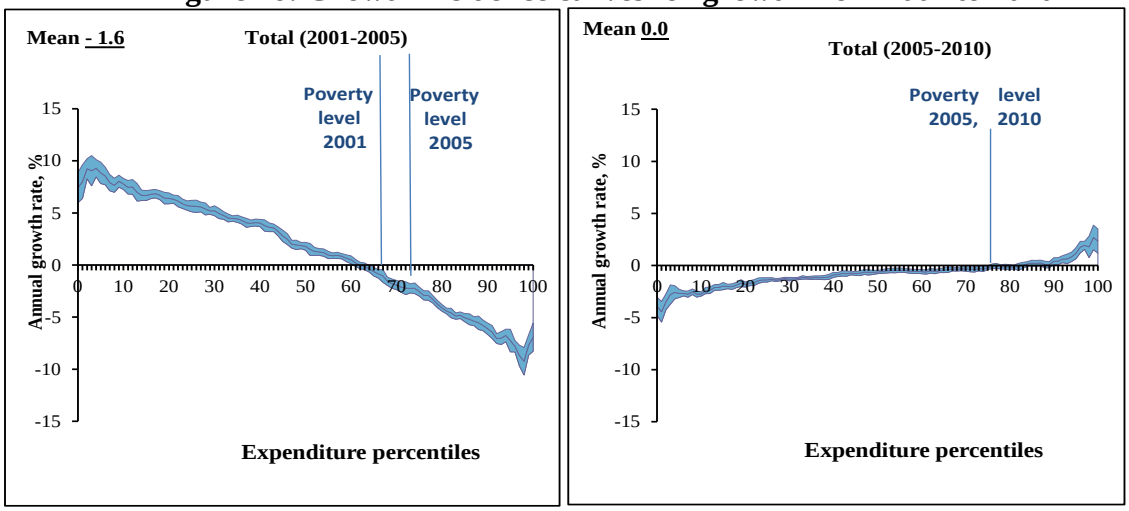


Source: World Bank staff calculations from EPM data.

70. **The shape of GIC curves varies significantly between the two periods of 2001-2005 and 2005-2010.** Essentially the trends were reversed from one period to the next. According to the GIC estimates for 2001 to 2005 the poorest 65 percent of the population experienced positive growth, while top 35 percent experienced negative growth. This indicates that the structure of economic growth during that period favored the poorest or had been strongly pro-poor, even as it was negative on average. People around the poverty line lost their consumption levels and the overall situation deteriorated. The situation was opposite during the 2005-2010 period, when the GIC indicates that annual average growth of per capita consumption was negative for the bottom 75 percent and positive for the top 25 percent of the population. The magnitude of this pattern of growth among the poorest during the first half of 2000s was higher than during the later period, and as a result, the overall change during the 2001-2010 was overall pro-poor. In other words, based on the EPM 2001,

2005 and 2010, the two halves of the 2000s had very different dynamics in terms of the evolution of households' consumption per capita across the distribution.

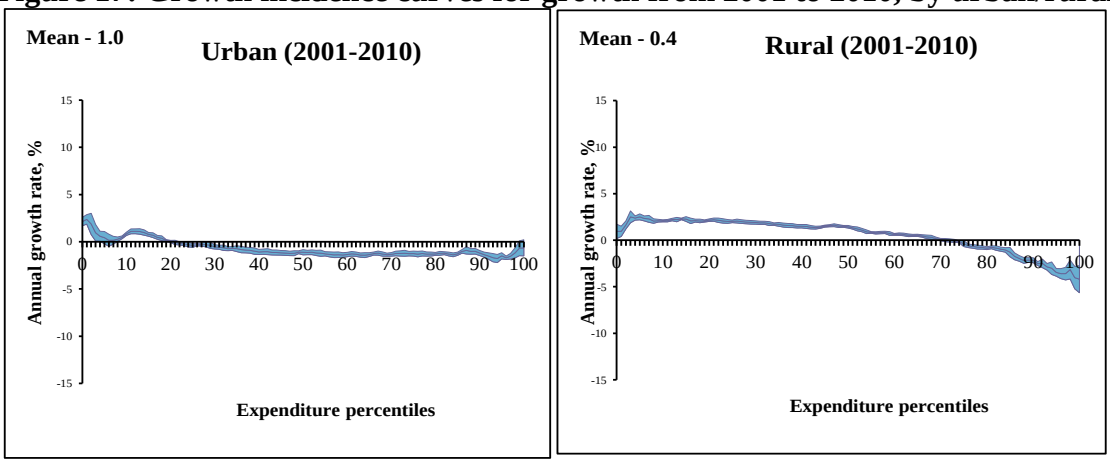
Figure 16: Growth incidence curves for growth from 2001 to 2010



Source: World Bank staff calculations from EPM data.

71. **This pattern only applied to rural areas, however.** The graphs in the Figure 17 give a hint as to why we observe increase in poverty in both rural and urban areas, at the same time that there was an improvement in the poverty gap in rural areas. The poverty headcount rate measures changes in poverty mainly around the poverty line and, in Madagascar, starting from a high poverty rate, the situation around the 7th and 8th deciles of the consumption distribution tells much of the poverty story. During 2001-2010 consumption growth on average was negative for all people above the lower 20th percentile in the urban areas. Clearly poverty has increased in urban areas across the board. In rural areas, however, consumption grew for people below the 70th percentile and was negative above it. Thus, poverty incidence could remain unchanged in rural areas, even as the situation of the poorest improved (unlike that of the poor in urban areas), which is confirmed by poverty gap and squared poverty gap indices. Since at least 80 percent of the Madagascar's population is still rural, it is not surprising that there was both an overall stagnation in poverty, along with an improvement in terms of the poverty gap.

Figure 17: Growth incidence curves for growth from 2001 to 2010, by urban/rural



Source: World Bank staff calculations from EPM data.

72. **Consistent with the GIC analysis, there was a significant reduction in inequality between 2001 and 2010, with a majority of the fall in inequality occurring in the rural areas**. As discussed above in the GIC analysis, people ranked at the bottom of the consumption distribution had substantial positive gains, while the top quintile had a negative growth. Most of the reduction in inequality occurred during the 2001-05 period, when the Gini coefficient fell from 46.8 to 37.8. By 2010, when consumption in the top deciles had substantially recovered, the Gini coefficient was up to 40.9. The net result should be a decrease in inequality, which is what we observe in Table 6 . The results show that the Gini coefficient fell by about 6 percentage points between 2001 and 2010.

Table 6: Inequality indices for 2001, 2005 and 2010

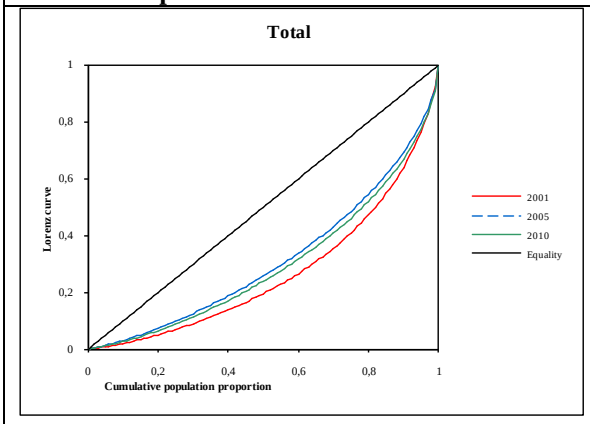
	Total			Urban			Rural		
Percentile ratio	**2001**	**2005**	**2010**	**2001**	**2005**	**2010**	**2001**	**2005**	**2010**
p90/p10	8.1	4.7	5.5	8.1	5.9	6.8	6.7	4.0	4.6
p75/p25	2.9	2.2	2.3	2.9	2.7	2.8	2.7	2.0	2.1
Theil Inequality	40.2	29.7	35.4	34.1	33.2	34.4	36.9	24.8	30.9
Gini coefficient	46.8	37.8	40.9	43.9	41.8	42.6	44.5	34.1	37.2

Source: World Bank staff calculations from EPM data.

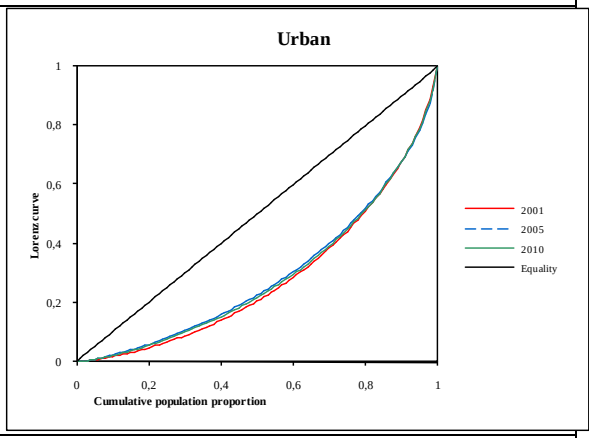
73. **The reduction in the inequality between 2001 and 2010 is clearly illustrated in the Lorenz curves presented in the Figure** 18**.** The Lorenz curve plots the proportion of the welfare gained by the various portions of the population ordered by their consumption levels. The 45 degree line represents total equality, and the farther the curve from the diagonal, the higher the inequality. In 2001, the distribution of the households' consumption per capita was much further away from the diagonal line. The inward shift of the Lorenz curve for all households, and especially for rural ones, indicates that the bottom percentiles of the population accessed more of the total consumption in 2010 than they did in 2001. Similarly opposite, but smaller, outwards shift occurred between 2005 and 2010, suggesting increase in the inequality between 2005 and 2010, but in much smaller extent than the reduction in the first half of the 2000s.

Figure 18: Lorenz Curves for 2003/04 and 2005/06

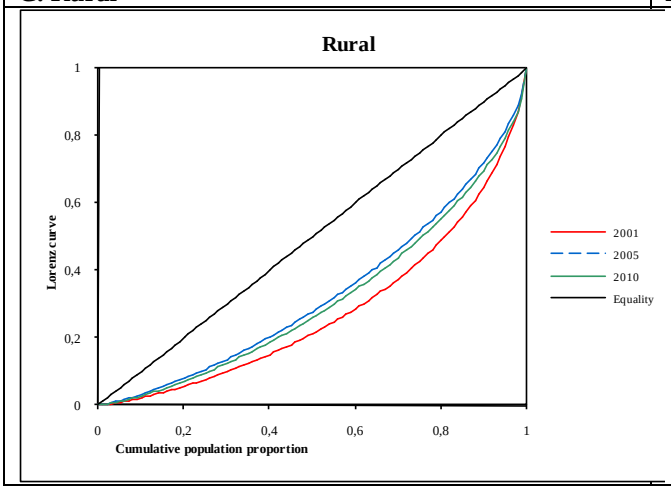
A. Entire Population



B. Urban



C. Rural



D. Antananarivo Area

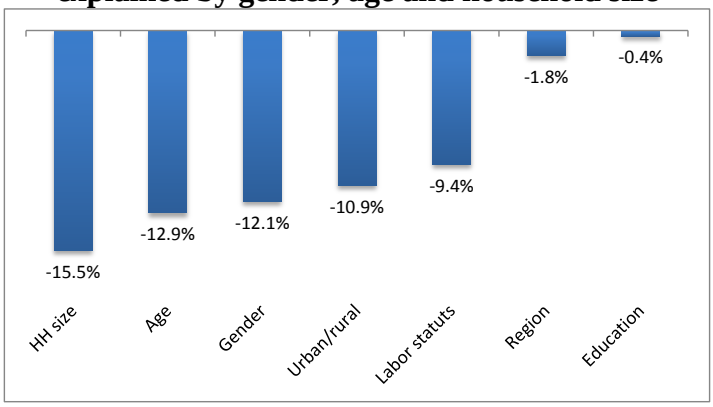
Source: World Bank staff calculations from EPM data.

74. **The decline in inequality is also confirmed by other indicators measuring inequality.** Inequality in households' consumption measured by percentiles ratios of consumption of top to low deciles and inequality measured by Theil index, show a decline in rural areas and complete inequality during the 2000s.**Error! Reference source not found.** Thus, in rural areas, per capita consumption level of the 90th percentile was 6.7 times that of the 10th percentile in 2001. The ratio was reduced to 4.6 in 2010. In the urban areas, there was a decline in the ratio from 8.1 in 2001 to 6.8 in 2010.

75. **Inequality measures could be decomposed into within- and between-group inequality by various groups of the population.** Within-group inequality measures the contribution to the total inequality of the within-group consumption distribution, without taking into the consideration the differences in the level of variables. Between-group inequality measures the contribution to the overall inequality of the average consumption by sub-groups of the variable of interest, assuming a homogenous distribution of consumption within each sub-group.

76. **Within-group inequality component has decreased by households' size, demographic, and gender, but remained almost unchanged by education and region, while increased by sector of employment.** Within-group inequality between 2001 and 2010 disaggregated by head of household's age, gender, education, family size, occupation, employment status, and region, and rural-urban location (see Figure 19). The decrease in the within-group inequality occurred by households size (15.5 percent), age group (12.9 percent), gender (12.1 percent), labor status, and rural/urban location. The increase in within-group inequality was observed only by sector of employment. Lower changes in within-group inequality are observed for educational groups and within regions. Clearly, inequality has decreased within demographic groups more than within regions, education, and labor status.

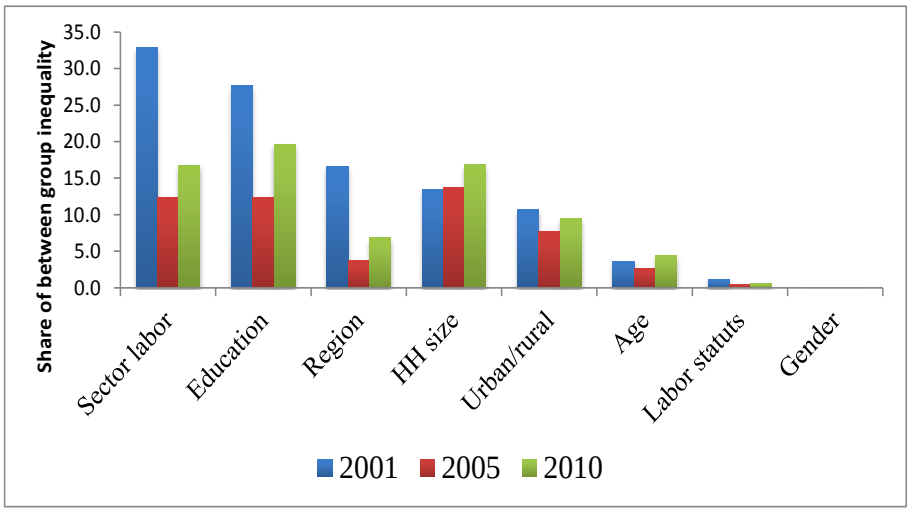
Figure 19: Lower within-group inequality is mostly explained by gender, age and household size



Source: World Bank staff calculations from EPM data. Figure presents the percentage change of the within-group inequality expressed by first decomposing the Theil entropy index of inequality on within and between group components and then changes in the within group component.

77. **The share of between-group inequality also declined significantly by sector of occupation, level of education, geographical region, and place of residence (rural/urban).** Education levels grew from 5 percent in 2001 to 10 percent in 2010 (Figure 20). Between-group inequality also increased by sector of occupation, while labor force participation had a much lower impact.

Figure 20: Share of between-group inequality in total inequality



Source: World Bank staff calculations from EPM data.

78. **To sum up, the overall fall in inequality between 2001 and 2010 was driven by several factors.** Decomposition of overall changes by various components indicate that both within-group and between-group inequality played an important role in reduction of inequality. It is evident that changes in sector reallocation, premium on education, and regional composition had a strong impact leading to reduction of inequality. One way of

interpreting this finding is that, at least for the early part of the decade, a sector shift towards agriculture had a significant impact on inequality in Madagascar.

E. LINKING GROWTH, INEQUALITY AND POVERTY CHANGES

79. **The broad links between economic growth and poverty changes can be attributed to changes in the growth or to the inequality.** The method of decomposing changes in poverty into growth and redistribution components have been developed by Datt Ravallion (1992), which we apply here.

80. **A decomposition method measuring the relative impact of growth versus redistribution confirms prior results.** Changes in poverty over the 2001 to 2010 period were dominated by (negative) growth, while redistribution effects did not impact the poverty headcount but significantly reduced poverty gap. Error! Reference source not found. shows the proportion of the observed trends that is accounted for by growth, changes in the distribution and a residual component. The decompositions are performed for headcount poverty rate (P0), poverty gap measure (P1) and severity of poverty indicator (poverty gap squared, P2).

81. **Between 2001 and 2005, the estimated headcount increased by about 4.3 percentage points, while poverty gap fell by 3.8 percentage points.** From the previous analysis we concluded that the inequality has dropped significantly during first half of 2000s and GIC had a strongly progressive shape. As Table 7 suggests, the growth component played the main role in the headcount (H0) increase, while redistribution component did not have significant impact on the poverty headcount. Nevertheless, the redistribution component associated with the changes in the inequality had a very strong positive impact on the poverty gap and squared poverty gap measures, offsetting the negative impact of the growth component and leading to the poverty gap reduction. Thus, the conclusion from this analysis is not substantially different from our previous analysis: redistribution component had a very significant positive impact on the consumption distribution in Madagascar during the 2001-2005 period, but it mostly affected the extremely poor by reducing the poverty gap. If the shape of the distribution stayed the same—and inequality wouldn't have changed between 2001 and 2005—then the headcount poverty rate would have remained unchanged (increase by 0.2 percentage points), while the poverty gap would have been higher by 7.3 percentage point.

82. **A large number of people found in extreme poverty in 2001 could have improved their well-being, but not enough to get out of the poverty.** Growth component, as opposite to the redistribution component, led to an increase of all three measures of poverty. In other words, the table suggests that in addition to poor growth, the dramatic reduction in inequality in 2001-2005 did not actually impact the headcount poverty rate, but had a significant impact on the poverty gap in Madagascar. A similar pattern is observed in both rural and urban areas, while negative growth effect was more evident in the urban areas. The improvement in terms of poverty gap reduction was stronger in the rural areas.

Table 7: **Decomposition of poverty: 2001-2005 compared to 2005-2010**

	2001-2005				2005-2010			
	% Change	Growth	Redistribution	Interaction	% Change	Growth	Redistribution	Interaction
Total								
Poverty headcount (P0)	4.3	3.7	0.2	0.4	0.3	-0.3	0.5	0.1
Poverty gap (P1)	-3.8	2.9	-7.3	0.6	1.9	-0.3	2.1	0.0
Poverty severity (P2)	-4.8	2.4	-7.2	0.0	1.9	-0.2	2.1	0.0
Urban								
Poverty headcount (P0)	9.5	8.7	-0.6	1.4	-4.1	-5.1	0.4	0.6
Poverty gap (P1)	2.8	5.2	-2.9	0.5	-1.8	-2.9	1.1	0.1
Poverty severity (P2)	0.8	3.5	-2.7	0.0	-0.9	-1.8	1	0.0
Rural								
Poverty headcount (P0)	2.4	1.1	1.3	0.0	0.9	0.9	0.1	-0.2
Poverty gap (P1)	-5.9	0.9	-7	0.2	2.5	0.8	1.8	0.0
Poverty severity (P2)	-6.6	0.8	-7.3	0.0	2.4	0.5	1.9	0.0

Source: World Bank Staff calculations from EPM data.

83. **A decomposition of the changes in poverty during 2005 and 2010 period suggests very small changes in poverty in the total economy due to both low growth and redistribution effects**. Overall poverty did not change during this period and both growth and redistribution effects were small. In urban areas, however, growth played a dominant role in poverty reduction with a -5.1 percentage points in poverty reduction attributed to growth. Redistribution accounts for 0.4 percentage points. Growth in urban areas during the 2005-2010 could be seen as a recovery to the loss in the 2001-2005. In the rural areas, growth and redistribution were weaker.

84. **These differential contributions between urban and rural areas suggest that the growth costs of the 2009 crisis are not the sole culprit for the lack of a net change in poverty between 2005 and 2010.** It is useful to recall that the 2010 survey was conducted in mid-2010, a mere 15 months into the crisis, whereas the prior period from the 2005 survey had lasted 45 months and was generally one of overall growth. The crisis itself predominantly affected, at least at first, the economy of Antananarivo and a few other urban areas. Yet, as Table 7 shows, there was still a net positive growth contribution to poverty reduction in urban areas (of which Antananarivo is by far the largest part) from 2005 to when the 2010 survey was conducted. Tentatively, this suggests that growth was not strongly pro-poor over 2005-08, being weak in rural areas, and with a small negative redistributive bias in urban areas.

Table 8 : Decomposition of poverty: 2001 compared to 2010

	Change	Growth	Redistribution	Interaction
Total				
Poverty headcount (P0)	4.5	3.5	1.3	-0.2
Poverty gap (P1)	-1.9	2.7	-5.1	0.5
Poverty severity (P2)	-2.9	2.2	-5.2	0.0
Urban				
Poverty headcount (P0)	5.4	4.9	0.8	-0.3
Poverty gap (P1)	1.0	2.5	-1.8	0.2
Poverty severity (P2)	-0.1	1.7	-1.8	0.0
Rural				
Poverty headcount (P0)	3.3	1.8	1.7	-0.2
Poverty gap (P1)	-3.4	1.5	-5.2	0.3
Poverty severity (P2)	-4.1	1.3	-5.4	0.0

Source: World Bank Staff calculations from EPM data.

85. **Putting these decompositions together for changes between 2001 and 2010 leads to similar conclusions as those observed in the 2001-2005 analysis.** The lack of growth was a dominant factor in the poverty increase, while mild redistribution helped in poverty gap reduction. Similar results were observed in both rural and urban areas, while redistribution had much stronger impact in rural areas. Negative growth in urban areas significantly increased poverty.

Box 2: Could "growth" in Madagascar be called pro-poor

According to Martin Ravallion, one finds two quite different definitions of "pro-poor growth" in the recent literature and policy-oriented discussions. By one definition ("first"), "pro-poor growth" means that poverty falls more than it would have had if all incomes had grown at the same rate (Baulch and McCullock, 2000; Kakwani and Pernia, 2000). By second definition ("second"), "pro-poor growth" is growth that reduces poverty (Ravallion and Chen, 2003).

The first definition focuses on the distributional shifts during the growth process; roughly speaking, for growth to be deemed "pro-poor" by first definition, the incomes of the poor should grow at a higher rate than those of the non-poor. A concern with this definition is that rising inequality during a period of overall economic expansion may come with large absolute gains to the poor, yet will not be deemed to be a "pro-poor growth." (Similarly, a recession will be deemed "pro-poor" if poor people lose proportionately less than others, even though they are in fact worse off.).

The second definition avoids this problem by focusing instead on what happens to poverty. The extent to which growth is "pro-poor" depends on how much a chosen measure of poverty changes. Naturally, this will depend in part on what happens to distribution, but only partially, as it will also depend on what happens to average living standards.

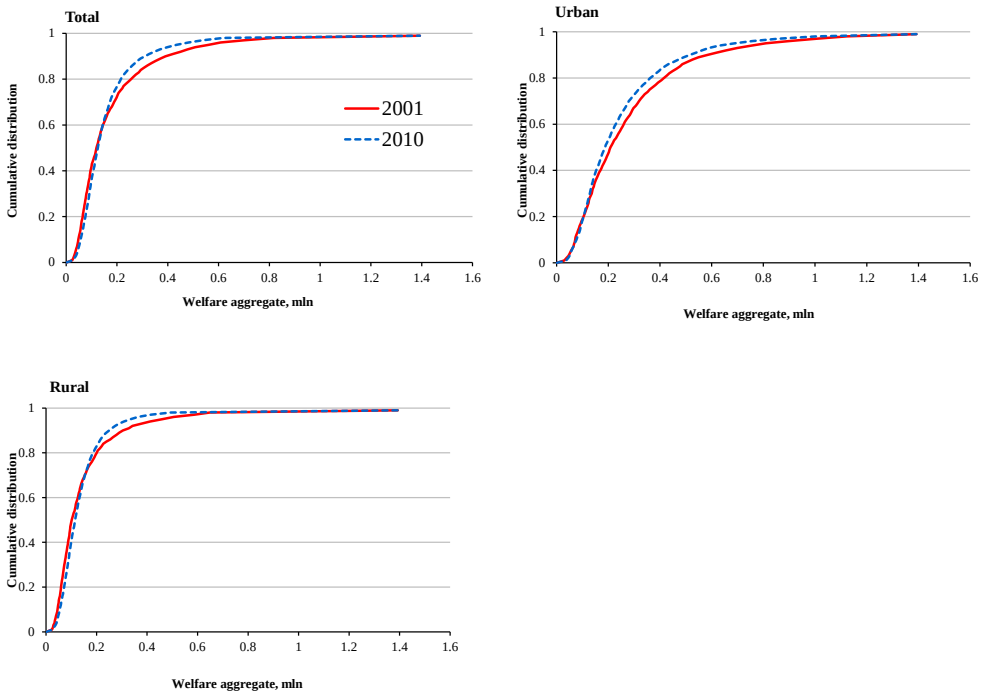
Madagascar did not enjoy cumulative overall growth during 2001-2005 and 2001-2010, but the structure of growth clearly benefited the poor (which remained poor), on average, more than the non-poor, even as poverty itself actually increased. In a way, the consumption of the non-poor fell more than that of the poor. Thus, based on the first definition, growth could be called pro-poor in Madagascar, but definitely not based on the second definition.

86. **Stochastic Dominance Analysis used to test sensitivity of the results to the choice of poverty line and poverty measures raising a possibility that the results obtained are**

not robust. Potentially different results could be obtained due to a choice of a different poverty line and conclusions can be drawn differently if poverty trends differ substantially. Poverty dominance analysis provides a method of ranking the expenditure distributions and examines whether one distribution has unambiguously more or less poverty than another over a range of poverty lines. If poverty incidence curves do not cross, the situation should be improved for any level of consumption, and in this case, poverty comparison is robust with respect to the choice of the poverty line. Alternatively, once the lines cross, the results depend on where in the length of the consumption distribution the poverty lines are drawn.

87. **Stochastic Dominance Analysis for Madagascar implies that it does matter where the poverty line is drawn.** Stochastic dominance analysis has been applied to establish robustness of the poverty estimation in Madagascar. The results based on the poverty incidence curves for 2001 and 2010 are presented in Figure 21. Clearly, poverty incidence curves for total economy cross around 60 percentile of the consumption distribution. This matters where the poverty line is drawn and in case poverty line would be set lower we could get an opposite trend in poverty. Similar results as in total economy are obtained in the rural areas where the poverty incidence curves cross several times. In urban areas, however, the results are more robust crossing only in the very low part of the distribution. Thus the situation in the urban areas deteriorated regardless of the choice of the poverty line.

Figure 21: Stochastic Dominance Analysis



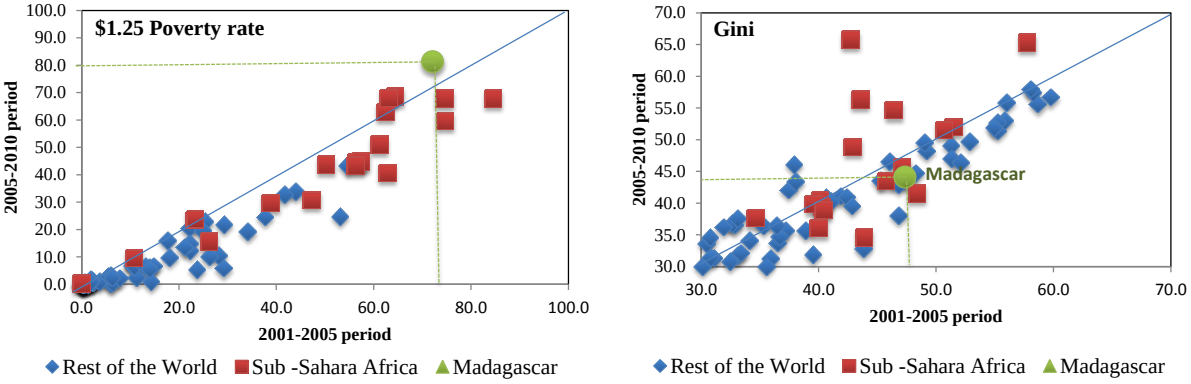
*The horizontal axis represents consumption aggregate figures, the vertical axis represents the percentage of the population to the consumption per capita.

F. MADAGASCAR IN INTERNATIONAL COMPARISONS

88. In this section we compare Madagascar with other developed and developing countries worldwide, and sub-Sahara Africa in particular, in terms of countries' economic development, poverty, inequality and basic indicators of non-income dimensions of poverty.

International comparisons of poverty rates cannot be made using national absolute poverty since countries set different subsistence minimum standards, and use different methodologies for poverty estimations. In addition, households' surveys used for poverty estimations are not generally comparable across countries. A common practice for cross-country comparison is to use a fixed poverty line expressed in the internationally comparable denomination, such as the PPP one-dollar-a-day or two dollars-a-day estimates. The dollar-a-day method of poverty estimation uses conversion factors[5] and comparable-over-time consumer price indices to convert national consumption aggregates to US dollars.[6]

Figure 22: International 1.25 dollar-a-day poverty and inequality, cross-country comparison



Source: WDI of May, 2013. For Madagascar - author's estimations based on EPM and international conversion factors with the use of national official CPI.

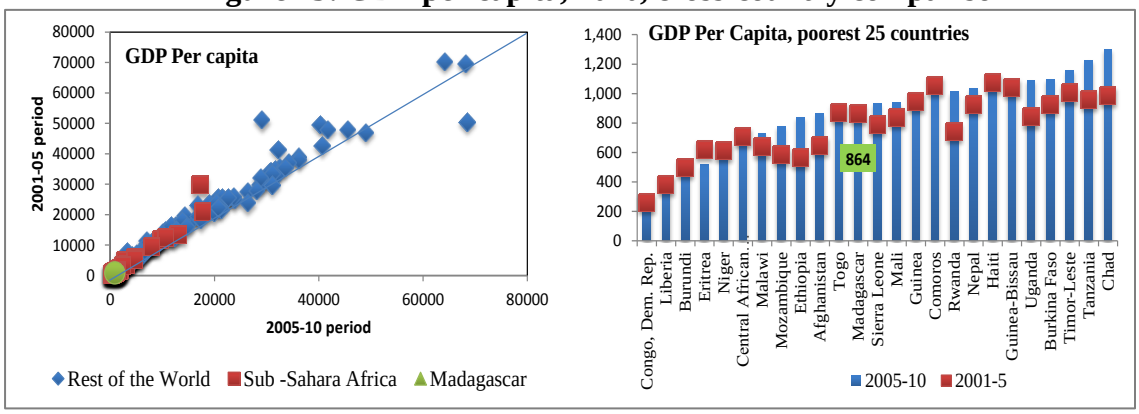
89. **Based on the cross-country comparison as of 2010, Madagascar has become one of the poorest countries in the World, but inequality is in the mid-range of countries' inequality distribution[7].** As shown in the Figure 22, Madagascar, with close to 80 percent of the population living below $1.25 per day in 2010, was the poorest country worldwide. The position of Madagascar in terms of level of the international poverty has been deteriorated since beginning of the decade. Madagascar is clearly an outlier and high poverty incidence distinguishes the country and requires a special attention from policy makers and international community. Despite very low incomes and high poverty incidence, inequality expressed in form of Gini coefficient, was in the mid-40s range, putting Madagascar in the middle of the range of values for sub-Saharan countries, and worldwide.

[5] Conversion factors or PPP is an exchange rate that takes into account the cost of common items in different countries. This conversion is defined as the number of units of a country's currency required to purchase a standard basket of goods and services collected in all countries. This report uses the 2005 ICP conversion factor that was converted to the survey year using Madagascar national CPI inflation rates.

6 It is important to emphasize that international 1 dollar a-day or 2 dollar a-day estimates should be used mainly for international comparisons. Policy dialogue and within-country discussions should be informed by the national absolute and extreme poverty estimation methodology.

[7] According to WDI Madagascar is the poorest country in the World; however, WDI do not include Congo Dem. Rep and Liberia estimations. According to POVCALNET estimations, 1.25 dollar-a-day poverty rates for Congo Dem. Rep and Liberia are above Madagascar in 2010.

Figure 23: GDP per capita, 2010, cross-country comparison

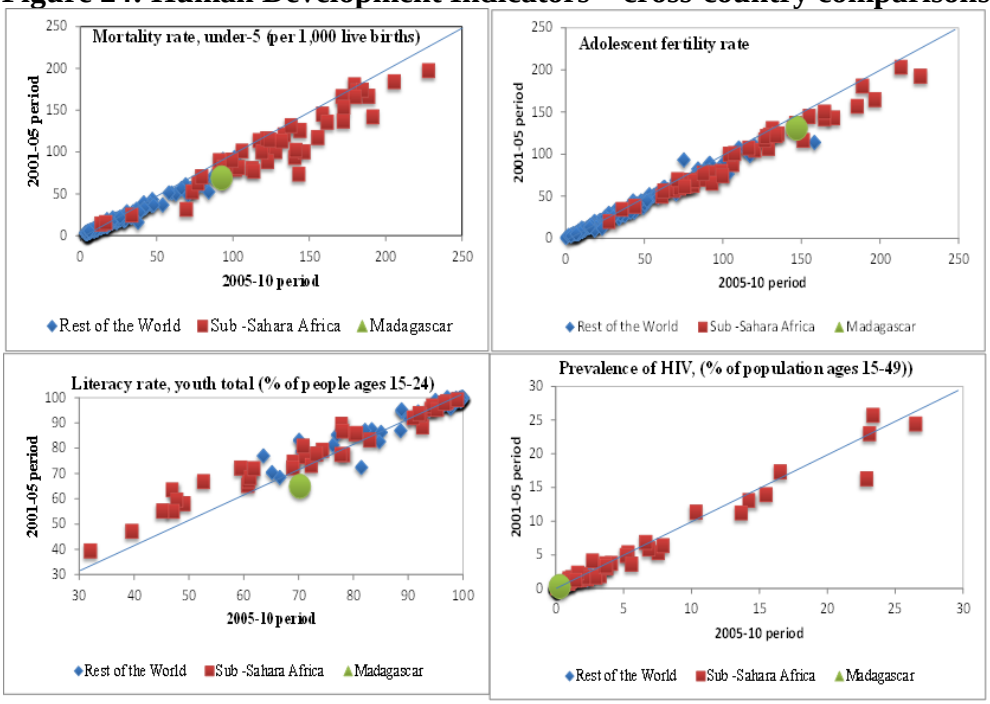


Source: World Development Indicators (WDI), the World Bank, May 2013.

90. **Madagascar's country ranking in terms of GDP per capita also places Madagascar in the low end of the distribution, but, clearly, Madagascar's GDP per capita is not the lowest.** As illustrated in the Figure 23, ten sub-Saharan African countries have GDP per capita significantly lower than in Madagascar. Madagascar has a moderately high level of inequality. Several reasons could possibly challenge the international poverty findings. They could be related to the national accounting measures of the GDP, conversion factors could be inaccurate for Madagascar, and lack of good nationally representative CPI could also have an impact on the international dollar a day calculation.

91. **Other non-income measures of well-being, especially human development indicators, place Madagascar in the middle range of African countries.** Plotting Madagascar's human development indicators next to other countries in the World put Madagascar among the other African countries (Figure 23). Mortality rate of children less than five years old in Madagascar is among the lowest in African countries and the situation has improved during the 2000s. Adolescence fertility rate is around 150, which is slightly lower than sub-Saharan Africa average. Youth literacy rate is around African average, and improved during the 2000s. Prevalence of HIV aids (as proportion of population ages 15-49) is one of the lowest in Africa.

Figure 24: Human Development Indicators – cross-country comparisons



Source: World Development Indicators (WDI), the World Bank, May 2013.

92. **Much progress remains to be done in all these important areas, and the deterioration that has taken place in recent years is a major source of concern, but Madagascar's relative position suggests again that it is on the economic front that lay the most severe challenges.** The noticeable deterioration in the second period of the decade, compared to the first, is a cause of concern, especially as the ongoing political crisis is likely to translate into further slippage on most measures. Nonetheless, on neither inequality measures, nor on various non-income human development measures, such as children mortality rates, adolescence fertility rates, literacy and HIV prevalence, as well as primary school enrollment, is Madagascar the outlier that it has become in terms of economic growth and level. The country has positive achievements to its credit, but their sustainability is in question if the basic economic situation of its citizens does not improve.

Chapter 3: Poverty profile and risk of poverty

The basic demographic structure of the population remained merely unchanged during the 2000s, with prevailing large families with children. Larger households are, on average, poorer In addition to size, household structure plays an important role in the poverty determination. Extreme poverty incidence, though not absolute poverty, is higher among female-headed households. That there are no large apparent differences between males and females in terms of absolute poverty rates, but this does not imply there are no gender-related discrepancies.

Children are the poorest segment of Madagascar's population. Absolute poverty has increased among most age groups, while the distribution of changes in extreme poverty across age groups between 2001 and 2010 was ambiguous. Family size and dependency ratios in Madagascar are likely to have grown faster than potential gains achieved from returns to employment. Population and poverty in Madagascar have a predominantly young face.

Illiteracy rates have fallen in Madagascar. Illiteracy and poverty are closely associated, but the gaps between literate and illiterate have declined. A majority of Malagasy adult population could not read or write in the beginning of the 2000s. Analysis of literacy suggests a significant improvement during the 2000s, though 32 percent of the population still remains illiterate.

Despite an increase in literacy rates, the contribution of education to poverty has not been strong. Overall, extreme poverty fell among educated people, but absolute poverty remained stagnant during 2001-2010. In line with increases in literacy rates, net enrollment went up in relative and absolute terms during the 2000s. The improvement in the net enrollment rates in primary and secondary education occurred among the poorest, while enrollment in primary and secondary among the better-off segment of population remained unchanged during the 2000s.

Net enrollment rates in the rural areas are much lower than in urban. The proportion of households whose heads had completed primary education also increased, albeit marginally. Despite some improvements in enrollment, access to secondary and tertiary education remains limited for the vast majority of the population. The gaps in poverty incidence are growing still further with the attainment of higher education. It is sobering to note that the enrollment in the tertiary education is almost non-existent in Madagascar, and available only for the richest population.

93. **This chapter presents a profile of extreme and absolute poverty in Madagascar, and the changes in welfare which took place during the 2000s.** The profiles of poverty described in this section cover four main dimensions of demographic composition of poverty, attainment of education and its relation to the extreme and absolute poverty and labor characteristics of the poor. We will discuss geospatial dimensions of poverty. This chapter thus focuses on the poor and their human capital endowments, demographic composition, labor market outcomes, and regional dimension of poverty. As poverty in Madagascar dominates in rural areas, this chapter pays special attention to the rural poor. The discussion

will focus on the incidence of poverty and look at factors determining the risk of falling into poverty. The standard poverty tables were obtained mostly from ADePT poverty analysis presented in the annex of the report. Standard ADePT tables include poverty headcount ratios, share of the poor in each given group as well as share of total population by discussed characteristics. The analysis is presented for absolute and extreme poverty level for 2001, 2005, and 2010.

94. **Several of the figures and tables show indicators calculated for consumption deciles to depict characteristics of the ultra-poor found in the tails of welfare distribution.** We define ultra-poor people as people whose consumption places them in the lower tail of the distribution. Poverty is widespread in Madagascar and presenting results for the absolutely poor or even for the extremely poor would cover more than a majority of the population. In many cases it seems important to go beyond standard definitions of poverty or even extreme poverty to address welfare changes and characteristics of people ranked at the lowest part of the distribution. To address this issue, we conducted an additional analysis showing characteristics of people by deciles of consumption distribution. The deciles are determined by ranking the entire population from lowest consumption per capita level to highest consumption level and then creating groups, each consisting of 10 percent of the population. Thus, the first quintile decile is the poorest 10 percent of the population, the second decile is the next 10 percent etc., and on up to the tenth decile comprising the wealthiest 10 percent of the population.

95. Multivariate regressions of household consumption on a range of individual, household, and location-specific attributes help in identifying the key determinants of household welfare and the processes underlying the changes in poverty incidence over time. The chapter also includes an in-depth analysis of the poorest group (extreme poor) of households, to examine the changes in their welfare over time and the factors likely contributing to those changes. This chapter consists of three sections and is organized as follows: Section A is presenting demographic characteristics of the poor, Section B describing education characteristics of poor, Section C analyzing labor dimension of poverty and discussing sources of income and income-based poverty.

A. DEMOGRAPHIC CHARACTERISTICS OF POOR HOUSEHOLDS

96. It is well known that households' demographic characteristics such as family size, structure, and ethnicity play an important role in the determination of the socio-economic status of the family and level of poverty. Generally larger households have higher rates of poverty, and higher dependency ratios are associated with higher poverty levels. In general, similar characteristics are true for Madagascar, with some interesting exceptions.

Household size

97. **The basic demographic structure of the population remained merely unchanged during the 2000s, with prevailing large families with children.** The basic demographic structure of the population presented in the Table 9 suggests that an average Malagasy family has a large number of members. Average households size was 6.0 persons per household and this figure remained constant over the decade. Among the non-poor, family size is much smaller, and also remained constant over this time frame. Average age of the population, head of households' age, and share of female heads of households all remained the same during the decade. On average, a Malagasy family has 3 children under the age of 15 year

and 1.4 children less than 7 years of age. All demographic statistics indicate a lack of any significant changes during the 2000s. The number of children is negatively associated with poverty: a higher number of dependent children within a household would be associated with higher likelihood of poverty. As shown in the Table 9, poor households had a larger average household size than non-poor households in all three years.

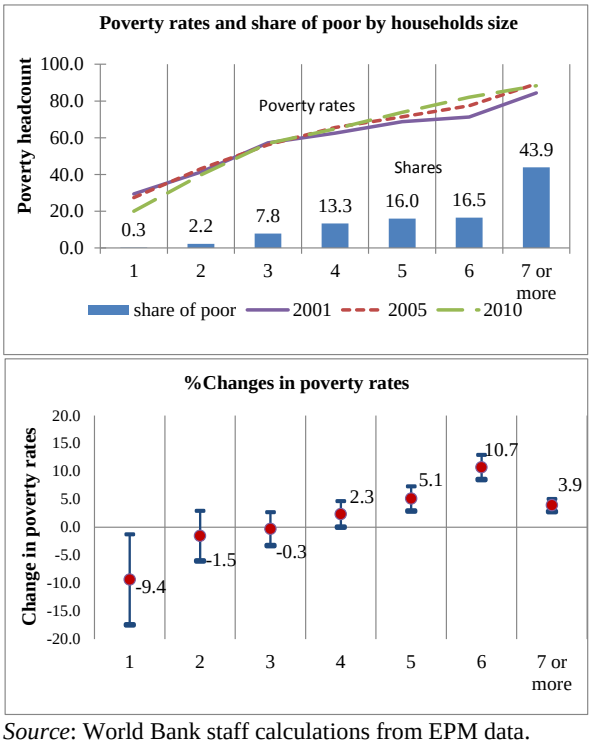
Table 9: Demographic characteristics of households in Madagascar

	Poor			Non-poor			Total Population		
	2001	2005	2010	2001	2005	2010	2001	2005	2010
Household size	6.4	6.4	6.4	4.9	4.7	4.7	5.9	6.0	6.0
Nr. of Children under 7	1.6	1.6	1.7	0.9	0.8	0.8	1.4	1.4	1.5
Nr. of Children under 15	3.2	3.3	3.4	1.8	1.8	1.8	2.8	2.9	3.0
Number of Adults 15-64	3.1	3.0	2.9	2.9	2.7	2.8	3.0	2.9	2.9
Number of Elderly 65+	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Average Age	20.2	20.4	19.8	25.1	25.5	25.7	21.6	21.7	21.2
Average Age of Head	41.8	42.3	41.8	42.4	43.0	42.7	42.1	42.5	42.1
Share of Female Head	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2

Source: World Bank staff calculations from EPM data.

98. **Larger households are, on average, poorer.** Households with more than seven family members have a poverty incidence of nearly 88 percent, compared to 20 percent incidence for one-member household (Figure 25). The large households with seven or more members represent 43.9 percent of the poor and 37.5 percent of the population. During the 2000s, the welfare situation of the larger households significantly deteriorated, while the welfare of the smaller households improved. As shown in the Figure 25 at the bottom chart, the changes between 2001 and 2010 were positive and statistically significant among bigger families suggesting an increase in poverty.

Figure 25: Poverty Rates by Household Size



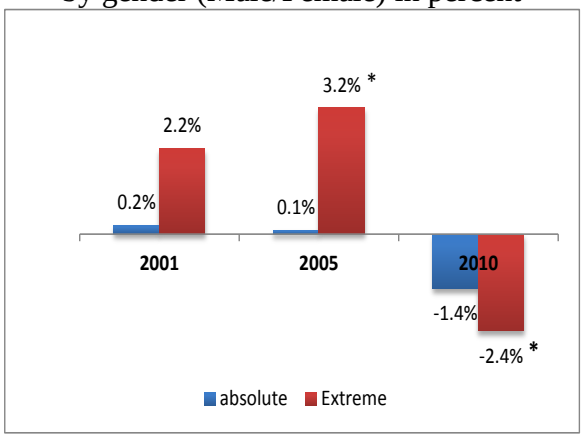
Source: World Bank staff calculations from EPM data.

99. **Households with no dependents have a poverty incidence of 33 percent as opposite to 78 percent otherwise.** Over time, the incidence of poverty for households with more dependents has worsened. For instance, in 2001, the ratio of the poverty rate between households with no dependents to households with dependent increased by almost 40 percent. Similarly, the difference in the poverty incidence between households with higher and lower dependency ratios has widened over time.

Gender of the household head

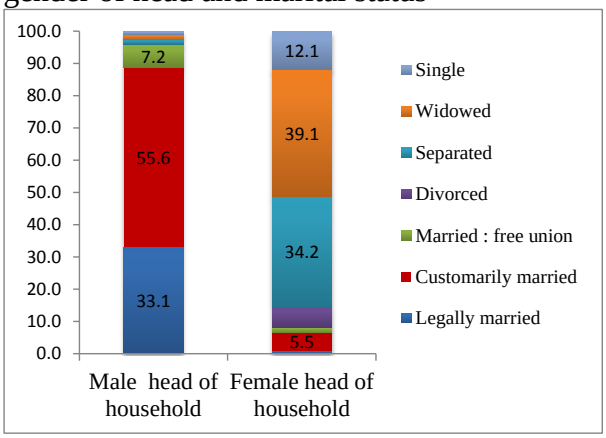
100. **Extreme poverty incidence, though not absolute poverty, is higher among female-headed households.** The incidence of poverty for both female headed households and male-headed households was 76.3 percent in 2010, hence statistically there was no difference. However, in case of the extreme poverty, in 2010 female heads of households were more deprived in comparison to male heads, or difference between extreme poverty among males and females was positive and statistically greater than 0. The deterioration (increase) in terms of poverty among female headed households occurred between 2005 and 2010. Over this period of time, the incidence of poverty raised more among female-headed households, while falling among male-headed households, so that the gap has increased (Figure 26). It is not clear what accounts for this development, but it suggests the ineffectiveness or, rather in Madagascar, the absence, of policies that pay attention to specific, highly vulnerable groups such as poor female-headed households, or address underlying gender biases.

Figure 26: Ratios of extreme poverty rates by gender (Male/Female) in percent



Source: World Bank staff calculations from EPM data

Figure 27 : Distribution of the population by gender of head and marital status



Source: World Bank staff calculations from EPM data

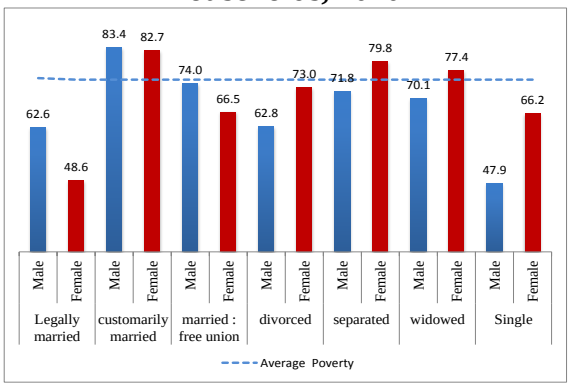
101. **That there are no large apparent differences between males and females in terms of absolute poverty rates, but this does not imply there are no gender-related discrepancies.** Poverty is measured at a household's level and large families in Madagascar include, obviously, males and females, making it difficult to distinguish between genders. Even an analysis comparing households' heads by gender does not fully reveal the reality of gender biases, as the characteristics of female-headed households (FHH) differ significantly from those of male-headed households (MHH), and MHH with similar characteristics as FHH differ significantly in terms of poverty rates. A more detailed analysis in chapter 3 expands on this theme.

102. **The characteristics of female headed households differ significantly from male headed**. As shown in the Figure 27, male heads of households are married (95.6 percent of the cases), while only 6.6 percent of the female heads of households are reputedly married. Majority of the female heads of households are widowed (39.1 percent) or separated (34.2 percent). Female headed households are more likely to live in smaller families and in urban areas. Early marriage and high fertility rates among women leave fewer opportunities for education and for employment possibilities outside the marriage. In addition, our analysis does not take into consideration within-family dynamics that might have its own implication

on gender differences. A more conclusive analysis will be presented in the next section where we discuss the poverty profile and changes based on a multivariate regression model.

103. **Relatively more female-headed households whose female heads reported being single, divorced or in separated status are poor.** Figure 28 illustrates absolute poverty rates among female and male heads of households disaggregated by marital status. Divorced and separated female headed households have higher poverty rates than male headed households by 10 and 8 percentage points respectively, suggesting that a woman's prior marriage ended without equal transfer of household assets to the female. Single females have much higher level of poverty than males. The same figure suggests that customarily married women share the same level of welfare as the related male-headed household.

Figure 28: Absolute poverty rate by marital status and gender of heads of households, 2010

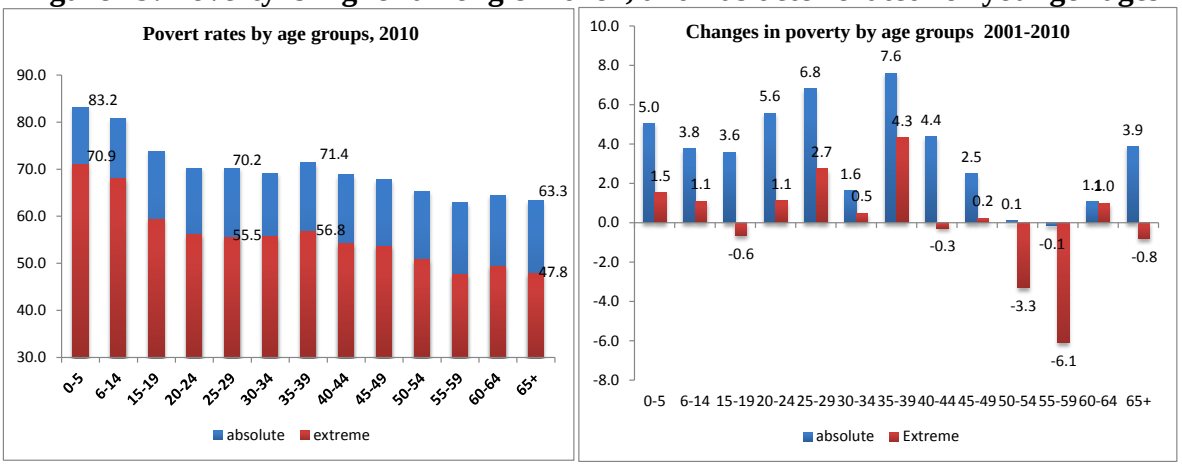


Source: World Bank staff calculations from EPM data.

Children and poverty

104. **Children are the poorest segment of Madagascar's population.** A U-shape positive relationship between age and poverty is a common phenomenon in many countries in the world: low-age children are disproportionately among the poor, and that proportion declines with age until adulthood, to increase again for older people. In Madagascar, in contrast, the relationship between children and poverty is clearly L-shaped. When the population is ranked by age segments, children from age 0 to 5 are the poorest segment both in terms of absolute and extreme poverty; the elderly are not necessarily poorer than average. As shown in Figure 29, high poverty rates characterize the young age group: fully 83.2 percent of children between 0-5 year olds are poor (for reminder, compared with a population average of 75 percent), and close to 71 percent of children are extremely poor (compared with a population average of 61.7. In comparison, the elderly are a very small population group in Madagascar, and not necessarily poorer than average. During the 2000s the welfare of children, taken as a group, has deteriorated, and their extreme and absolute poverty increased.

Figure 29: Poverty is higher among children, and has deteriorated for younger ages

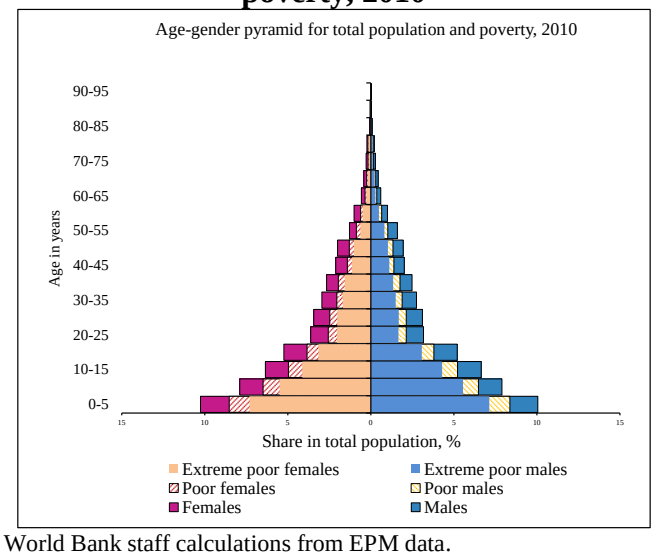


Source: World Bank staff calculations from EPM data.

105. **Absolute poverty has increased among most age groups, while the distribution of changes in extreme poverty across age groups between 2001 and 2010 was ambiguous.** Percentage points changes in absolute and extreme poverty rates are presented in the right chart in Figure 30. Absolute poverty rates have increased drastically for all age sub-groups under 50 years old. People between 50 and 64 remained at the same level of poverty, while poverty of the 65+ has deteriorated. Extreme poverty rates did not change as much in absolute poverty rates. Most of the changes among almost all segments were up and down within 3 percentage point range and were statistically not significant. The situation has improved among the 50-64 age group with a fall in extreme poverty—and it is not clear what accounts for this development.

106. **Family size and dependency ratios in Madagascar are likely to have grown faster than potential gains achieved from returns to employment.** Family size is an important factor having a strong impact on poverty levels. This is especially evident in case of rural areas where demand for large family size is directly associated with farm production and the need of low skilled labor.

Figure 30: **Age-Gender Pyramid, for total population and absolute and extreme poverty, 2010**



Source: World Bank staff calculations from EPM data.

107. **Population and poverty in Madagascar have a predominantly young face.** The wide base of the population pyramid indicates that the country has a very young population. The population pyramid is presented in Figure 30 and suggests that both absolute and extreme poverty are widespread and evenly cover all age groups. Children and youth have the highest shares of population and poverty. EPM data indicates that 46 percent of the population in Madagascar is less than 15 years old, and they account for more than half (51 percent) of the absolute poor as well as more than half (52 percent) of the extremely poor. The pyramid also reflects an even gender ratio—the population of men is not substantially different than the population of women. A very small portion of the population lives over age 65. Only 2.4 percent of the population in 2010 was 65 and older, and elderly poor represented only 2 percent of the poor population.

Regressions against multiple characteristics

108. **Regression analyses provide a better picture of the correlates of poverty and demographic characteristics as it controls a range of other factors.** The preceding discussion looked at poverty profiles between 2001 and 2010 based on the descriptive statistics; however, the presentation of a descriptive statistics is essentially a pair-wise correlation between an observable characteristic and poverty status, which does not tell much about the combined effect of various variables on poverty. As an example, a high correlation between poverty and marital status does not tell us how much of it is due to the fact that divorced females are more likely to be unemployed. Therefore, there is a need to understand the link between an observable characteristic and poverty status controlling other variables. The use of regression models allows an analysis of the relationships between characteristics controlling for other effects.

Table 10: **Consumption and poverty regression results**

	A. Consumption regression				B. Probability to fall in poverty			
	2001		2010		2001		2010	
	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural
Household characteristics								
Log of household size	-0.25*	-0.27*	-0.48*	-0.38*	0.25	0.78*	0.65*	0.75*
Log of household size squared	-0.08**	-0.08**	-0.01	-0.04**	0.2**	0.01	0.14**	0.09
Share of children 0-6								
Share of children 7-16	0.34*	0.22**	0.32*	0.29*	-0.69*	-0.37	-0.91*	-0.75*
Share of male adults	0.87*	0.72*	0.63*	0.71*	-1.84*	-1.37*	-1.4*	-1.59*
Share of female adults	0.9*	0.67*	0.7*	0.59*	-1.96*	-1.14*	-1.7*	-1.39*
Share of Elderly (>=60)	0.63*	0.47*	0.37*	0.37*	-1.53*	-0.89**	-0.83*	-1.2*
Individual characteristics								
Log of household head's age	0.14*	0.11**	0.18*	0.13*	0.01	-0.17	-0.32*	-0.15
Female	0.05	-0.02	-0.03	-0.08**	-0.07	0.07	0.17**	0.04
Marital								
Legally married								
Customarily married	-0.17*	-0.15*	-0.23*	-0.1*	0.39*	0.3**	0.46*	0.24*
Married : free union	-0.19*	-0.12**	-0.15*	-0.11*	0.36*	0.26	0.45*	0.34*
Divorced	-0.22**	-0.23**	-0.11	-0.04	0.61**	0.28	0.4**	0.33
Separated	-0.2*	-0.1	-0.3*	-0.15*	0.48*	0.3	0.62*	0.38*
Widowed	-0.09	-0.17**	-0.26*	-0.15*	0.15	0.25	0.56*	0.45*
Single	-0.16**	-0.05	-0.22*	-0.09**	0.56*	0.09	0.47*	0.23

Source: World Bank staff calculations from EPM data.
Consumption regression: OLS with log consumption per capita dependent variable.
Logistic regression with a dependent variable is probability to fall in poverty.
The table presents partial of the regression results related to the demographic characteristics of the population. The entire regression with labor, location and education variables is presented in the annex. * Stands for 5 percent significance interval, while ** for 1 percent significance interval.

109. Two types of regression models have been used to determine correlates of poverty and vulnerability, and better describe the poverty profile in Madagascar. First one is the consumption per capita regression model, where (the log of) households' consumption per capita was regressed against households' characteristics such as household size, and the number of children at different age levels. The second one is a logistic regression model estimating the probability of falling into poverty based on the same households and individual characteristics as used in the first model.

110. Table 10 presents results from two sets of the models specified separately for rural and urban areas for 2001 and 2010. The independent variables in both models were observed: individual and households characteristics such as demographics (age, gender, household's composition), set of variables related to the level of education, labor related characteristics, and household location variables. The entire set of the regression results is presented in Annex B. The results obtained from the regression analysis are generally in line with descriptive statistics presented above, but there are some differences that could be summarized as following:

- The gender variable on its own has not been found to be statistically significant in most of the specifications. However, male-headed households have on average 8 percent higher consumption than female-headed households in rural areas in 2010, but there is no significant difference in urban areas.

- In 2010, households headed by widowers experienced poverty incidence higher by 22 percent in rural than in urban areas. Regression results show that poverty rates among urban widow-headed households are especially high. Probably the loss of income in these households makes them extremely vulnerable to poverty.

- Legally married people have the lowest poverty rates; people customarily married have a 30 percent higher poverty rate than those legally married. On average, married people are much better off than single, widowers, and divorced.

- Households' size variable strongly correlates with poverty and low consumption. Probability of larger households to fall into poverty is significantly higher than in case of smaller ones. Adding a child increased probability of falling in poverty by 50 percent.

- Households with lower dependency ratio have lower poverty and higher per capita consumption. Children and younger people have a much higher probability to be poor and have lower consumption per capita.

B. LITERACY, EDUCATION AND POVERTY INCIDENCE

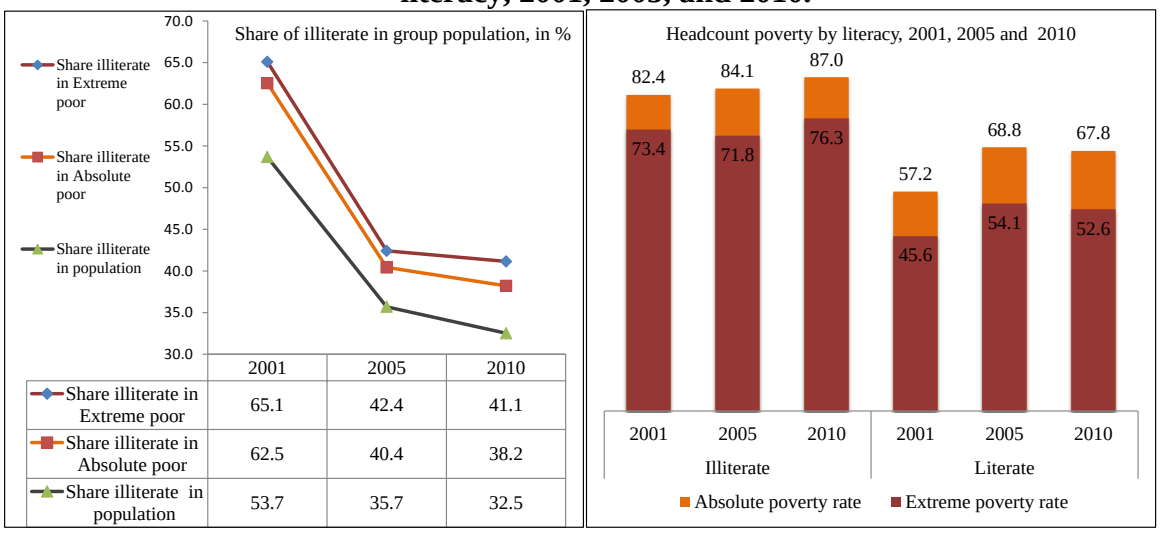
Literacy and poverty

111. Illiteracy rates have fallen in Madagascar. As illustrated in Figure 31, at the beginning of the century, illiteracy rates, the most acute form of education deprivation, were very high in Madagascar. According to the 2001 EPM data, 54 percent of the population was illiterate. Among the poor this figure was 63 percent and among the extremely poor, 65 percent. Over the decade, illiteracy has significantly declined. In 2010, 33 percent of the

population was still illiterate, 28 percent among absolute poor, and 41 percent among extremely poor. To date, illiteracy still appears to be a major issue in Madagascar. It is probably an area where the 2009-13 political crisis has contributed to block prior progress.

112. **Illiteracy and poverty are closely associated, but the gaps between literate and illiterate have declined.** Data on poverty headcount by literacy in the Figure 31 show that the poverty rate among illiterate was as high as 87 percent in 2010, with 76.3 percent among the extremely poor. Poverty among the illiterate has increased by almost 5 percentage points between 2001 and 2010. However, it is interesting to observe that the poverty gap between literate and illiterate has declined during the first decade of the 2000s. The reduction in gaps, unfortunately, was not associated with the improvement of the position of illiterate segment of the population, but rather deterioration among the literate. In 2001, the ratio of poverty between literate and illiterate was 0.7, while in 2010 it increased to 0.77. The poverty rates among the literate population increased by 10 percentage points during the decade, twice as much than among the illiterate. A similar trend of reducing gaps is observed among the extreme poor.

Figure 31: **Distribution of illiterate population (left) and poverty headcount rates by literacy, 2001, 2005, and 2010.**



	2001	2005	2010
Share illiterate in Extreme poor	65.1	42.4	41.1
Share illiterate in Absolute poor	62.5	40.4	38.2
Share illiterate in population	53.7	35.7	32.5

Source: World Bank staff calculations from EPM data. The figures are for the individuals.

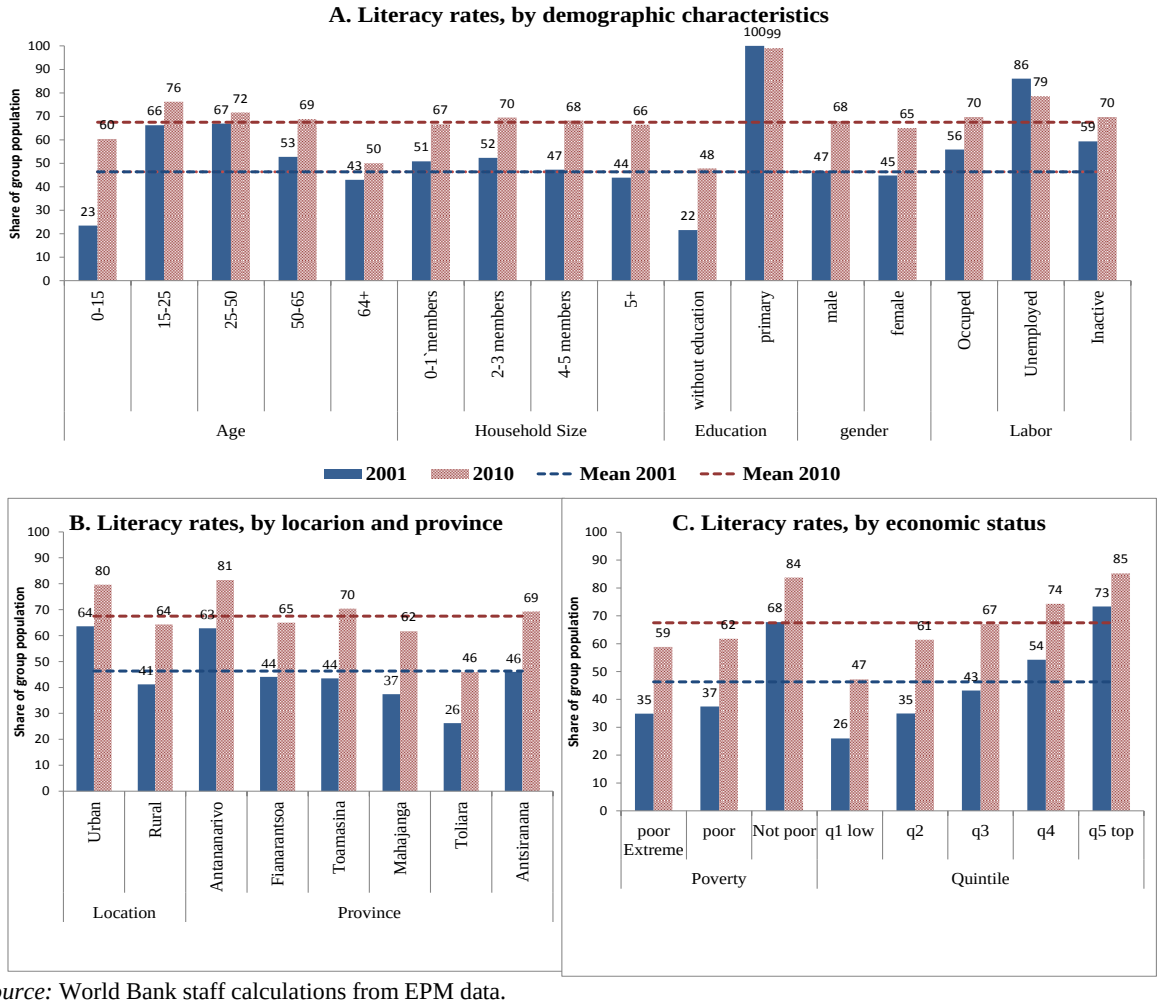
113. **A majority of Malagasy adult population could not read or write in the beginning of the 2000s.** The problem was evident across youth and elderly alike. At that time Madagascar was one of a very few countries, where less than 40 percent of the population between 15 and 24 years were literate[8]. As described in the previous chapters, the literacy rates have improved during the 2000s. In this section we describe trends in the literacy and education attendance of the population in the country to shed light on the non-income dimension of poverty. Even though the illiteracy fell, access to education and quality of the education remains as a major problem. The issue of the relatively high prevalence of illiteracy and low level of basic education require consistent attention from the policy makers and international community.

[8] Mali (24.2 percent), Burkina Faso (33 percent), Afghanistan (34.3 percent), Madagascar (36.5 percent), and Chad (37.6 percent).

114. **Analysis of literacy suggests a significant improvement during the 2000s, though 32 percent of the population still remains illiterate.** Figure 32 showcases literacy rates for 2001 and 2010 by major segments of the population in Madagascar. The charts describe literacy by (A) demographic characteristics, (B) location and provinces, and (C) by socio economic situation of the households and poverty. The results could be summarized as following:

- **Literacy improvement in Madagascar was significant and widespread.** All segments of the population enjoyed improvement in the literacy. On average, the prevalence of literacy increased from 46.3 percent in 2001 to 67.5 percent in 2010.
- The most significant improvement in the literacy rates is observed among children under 15 years old, where literacy rates increased from 23 percent in 2001 to 60 percent in 2010.

Figure 32: Literacy rates by demographic, location, and socio economic status 2001-2010

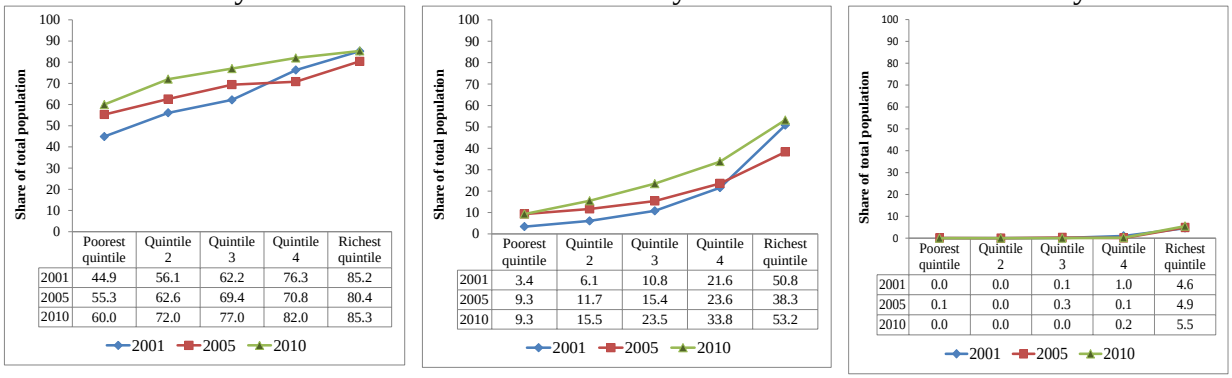


Source: World Bank staff calculations from EPM data.

- Still, more than 30 percent of the population in Madagascar is illiterate. The highest prevalence in the illiteracy in 2010 was among elderly population of 64+ years old (50 percent), generally uneducated people (52 percent), poor and extremely poor (ca. 40 percent), and inhabitants of Toliara region (54 percent).

- In general, rural areas have significantly lower literacy rates than urban areas, even though the situation there has improved as well.
- Literacy, similarly to poverty, has a strong regional dimension. Antananarivo has the highest literacy rates, while Toliara the lowest.
- General labor status does not have significant impact on the literacy. Unemployed are actually the educated people in Madagascar.
- Gender dimension is not very prominent in terms of literacy gaps in Madagascar. Males are slightly more literate than female, but the differences are not statistically significant.

Figure 33: Enrollment rates by quintile of consumption per capita, 2001, 2005 and 2010



Primary	Poorest quintile	Quintile 2	Quintile 3	Quintile 4	Richest quintile
2001	44.9	56.1	62.2	76.3	85.2
2005	55.3	62.6	69.4	70.8	80.4
2010	60.0	72.0	77.0	82.0	85.3

Secondary	Poorest quintile	Quintile 2	Quintile 3	Quintile 4	Richest quintile
2001	3.4	6.1	10.8	21.6	50.8
2005	9.3	11.7	15.4	23.6	38.3
2010	9.3	15.5	23.5	33.8	53.2

Tertiary	Poorest quintile	Quintile 2	Quintile 3	Quintile 4	Richest quintile
2001	0.0	0.0	0.1	1.0	4.6
2005	0.1	0.0	0.3	0.1	4.9
2010	0.0	0.0	0.0	0.2	5.5

Source: World Bank staff calculations from EPM data.

Education and poverty

115. **Despite an increase in literacy rates, the contribution of education to poverty has not been strong.** While education does appear to make a difference in Madagascar, trends in the number of its beneficiaries, and in its benefits, have not added up to a significant contribution to poverty over the decade. For the purpose of the EPMs, people who fail to complete the primary education cycle are classified as having no education. The proportion of households whose heads had no education increased between 2001 and 2010, and poverty incidence increased in this group. The incidence of poverty in this group—the highest in the distribution by education achievement—was about 86 percent in 2010, marginally higher than it had been in 2001(85.0 percent). Extreme poverty among the head of households "without education" was the highest level as well—76.3 percent in 2001 and a marginally lower 74.3 percent in 2010.

116. **In line with increases in literacy rates, net enrollment went up in relative and absolute terms during the 2000s.** The composition of the population by net enrollment in education, suggest that during 2001-2010 net enrollment in primary education has grown from 62.3 percent in 2001 to 73.8 percent in 2010. Net enrollment in secondary education doubled from 11.0 to 22.4 percent and enrollment in tertiary education went up from 0.3 percent 0.7 percent (still less than one percent of the population is enrolled in the tertiary education in Madagascar).

117. **The improvement in the net enrollment rates in primary and secondary education occurred among the poorest, while enrollment in primary and secondary among the better-off segment of population remained unchanged during the 2000s**. Decomposition of the primary enrollment rates by quintile of the consumption per capita

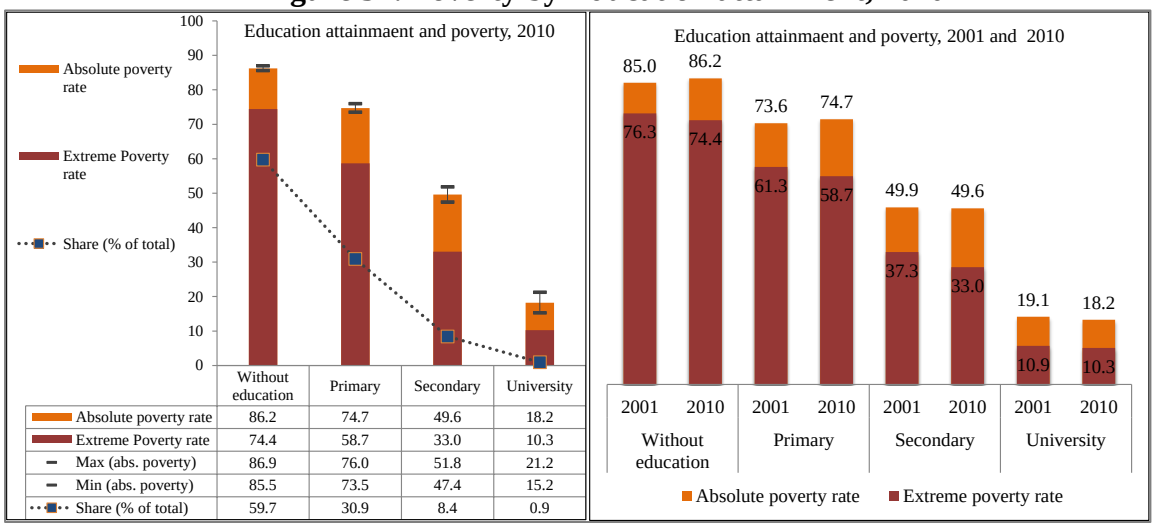
suggests that poorest quintiles of the consumption distribution have experienced increase in the net enrollment from 44.9 to 60 percent during the 2000s (Figure 33). However, top quintile did not show any improvement in the primary net enrollment rate. Still, 40 percent of the low quintile of the income distribution does not have access to the primary education. A similar situation is observed for the secondary education when poorest quintiles tripled their enrollment from 3.4 percent to 9.9 percent. The net enrollment in secondary education among the richest remained almost unchanged during the decade.

118. **Despite some improvements in enrollment, access to secondary and tertiary education remains limited for the vast majority of the population.** Despite the improvement of the net enrollment rates, the gaps between primary and secondary education are tremendous, and enrollment rates in the secondary and tertiary are minimal. Even among the richest quintiles of the income distribution secondary school enrollment is only 53 percent. Among the poorest these shares are minimal. Thus less than 10 percent of the children were enrolled in secondary education in 2010. The situation with high or tertiary education is grim. Less than 2 percent on average are enrolled and literally zero among first 3 quintiles of the income distribution. Only people found in the top quintile, who are not poor, had 5.5 percent net enrollment rate in the tertiary education.

119. **Net enrollment rates in the rural areas are much lower than in urban.** On average, net enrollment rates in the secondary education in the rural areas are significantly lower than in urban. The gaps in tertiary education are even higher. Measuring inequality of opportunity in education goes beyond the scope of this report, but relatively low enrollment rates and significant differences in location and in socio-economic situation of the parents suggest high level of inequality of opportunity in the access to the education.

120. **The proportion of households whose heads had completed primary education also increased, albeit marginally.** The incidence of poverty also increased in this group—from 73.6 percent in 2001 to 74.7 percent in 2010. The upshot of an increase in the number of uneducated or primary-school educated was a fall in the proportion of households whose heads had achieved secondary or tertiary education. The high proportion of uneducated people in Madagascar is a core social and economic problem, most likely associated with low labor productivity, low earnings, and high poverty.

Figure 34: Poverty by Education attainment, 2010



	Without education	Primary	Secondary	University
Absolute poverty rate	86.2	74.7	49.6	18.2
Extreme Poverty rate	74.4	58.7	33.0	10.3
Max (abs. poverty)	86.9	76.0	51.8	21.2
Min (abs. poverty)	85.5	73.5	47.4	15.2
Share (% of total)	59.7	30.9	8.4	0.9

Source: World Bank staff calculations from EPM data. The figures are for the heads of households.

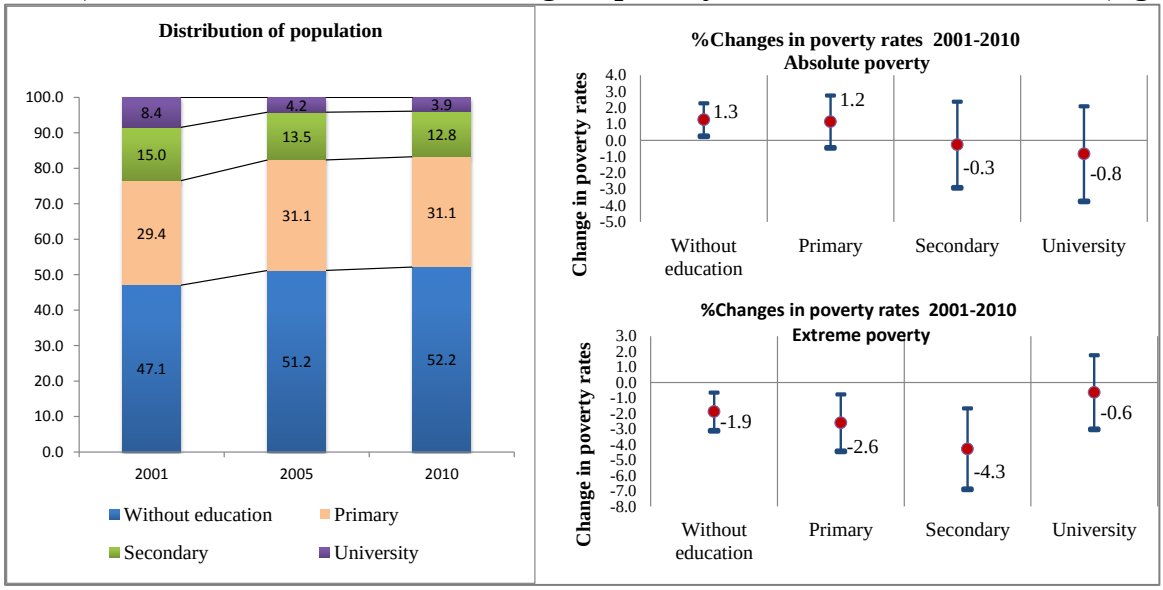
121. **Having secondary or high education significantly reduces the probability to be poor in Madagascar**. As presented in the Figure 35, poverty incidence of households with heads who obtained primary education is around 75 percent, while poverty incidence of households with heads having secondary education is about 50 percent-the difference is a whopping 25 percentage points. The gap between primary and secondary education is even more significant in terms of extreme poverty, where extreme poverty incidence falls from 59 percent among those with primary education to 37 percent among those with the secondary.

122. **The gaps in poverty incidence are growing still further with the attainment of higher education.** Thus, the gap in poverty rates between university degree and secondary degree holding heads of households is almost 30 percentage points—households with heads with university degree have poverty rates of 18.2 percent while households with heads with secondary education have 50 percent poverty rate. Clearly, and unexpectedly, having higher education in Madagascar pays off significantly. However, as described below, the proportion of people with university degree is low in Madagascar: only about 4 percent of the heads of households had completed university degree in 2010. The situation is getting worse: the numbers of highly educated individuals are falling since 2001.

123. **It is sobering to note that the enrollment in the tertiary education is almost non-existent in Madagascar, and available only for the richest population.** The disadvantages conferred by unequal opportunities in education earlier in life are consequential in the later life blocking opportunities to grow, especially in the fast developing world. The opportunities to thrive and succeed in getting a better job for the majority of population are very limited, and lack of access to secondary and tertiary education impede the economic development and has long term impact of poverty eradication.

124. **Overall, extreme poverty fell among educated people, but absolute poverty remained stagnant during 2001-2010.** In recent years, the largest reduction in extreme poverty headcount has occurred among those who completed primary and secondary education—most (from half to two thirds) are poor, but less are extremely so. Heads of households without education have experienced reduction of the extreme poverty as well, but by lower extent than those with secondary education. Thus, extreme poverty rate fell among heads with secondary education by 4.3 percentage points between 2001 and 2010. However, absolute poverty rates disaggregated by education groups did not show statistically significant changes between 2001 and 2010 (see chart in the Figure 35).

Figure 35: Distribution of households by heads' education level: 2001, 2005, 2010 (left chart); and confidence interval of change in poverty headcount rates 2001-2010 (right).



Source: World Bank staff calculations from EPM data.

125. **A multivariate regression analysis of poverty in Madagascar confirms that educational attainment and literacy have very strong negative correlation with poverty.** Table 11 presents results for educational attainment of the households and literacy variable. Regression analysis confirms that households headed by an individual with low educational attainment faces a much higher risk of poverty. As expected, education is positively related with household welfare, by increasing returns associated with higher education level. Regression results confirm the most significant increase in the returns on education between primary and secondary, and between secondary and university degree. All the explanatory variables have their expected signs, and variations over time confirm general story of deterioration in return on education between 2001 and 2010. Literacy rate variable has a very strong correlation with poverty and with stronger welfare in the rural areas. Being literate in rural areas reduces the probability of falling into poverty by almost approximately 50 percent.

Table 11: Poverty and education regression results

	A. Consumption regression				B. Probability to fall in poverty			
	2001		2010		2001		2010	
	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural
Education of the household head								
Without education (base)								
Primary	0.15*	0.1**	0.08*	0.08*	-0.28**	-0.20	-0.21*	-0.18*
Secondary	0.35*	0.37*	0.34*	0.29*	-0.61*	-0.67*	-0.74*	-0.62*
University	0.73*	0.79*	0.66*	0.68*	-1.28*	-1.34*	-1.43*	-1.2*
Literate	0.11**	0.12*	0.26*	0.12*	-0.26**	-0.24**	-0.51*	-0.23*

Source: World Bank staff calculations from EPM data.
Consumption regression: OLS with log consumption per capita dependent variable. Logistic regression with a dependent variable is probability to fall in poverty. The table presents partial of the regression results related to the education characteristics of the population. The entire regression with labor, location and education variables is presented in the annex.
* Stands for 5 percent significance interval, while ** for 1 percent significance interval.

126. **The more educated have lower incidence of poverty because they have better employment prospects and receive a better pay.** Over 50 percent of people with tertiary

education are managers or qualified salaried employees (see Table 12). By comparison, less than 2 percent of individuals with no or only primary education has such jobs. A higher proportion of secondary-educated individuals report working as qualified workers. The self-employed category is also occupied more by those with secondary and university degrees. There are also differences in remuneration. Between 2001 and 2010, real wages of salaried employees have remained steady, but, as discussed in a subsequent chapter on labor, on a cross-section basis across the population, university and secondary education brings significant gains.

Table 12: Occupation and education

Employment status	No education	Primary	Secondary	University
Manager	0.5	0.4	4.2	24.4
Qualified worker	0.8	1.8	11.1	27.8
Non-qualified worker	3.1	5.8	7.7	6.0
Self-employment	2.8	4.7	9.6	8.4
Agriculture	30.7	27.6	20.3	9.0
Trainee	0.0	0.0	0.9	1.0
Familial aid	59.3	55.7	39.2	15.6
Unemployed	2.9	4.0	7.1	7.8
Total	100.0	100.0	100.0	100.0

Source: World Bank staff calculations from EPM data. The figures are for the workers ages 15+.

C. LABOR MARKET CHARACTERISTICS AND THE POOR[9]

127. **Madagascar's labor markets are fairly typical of low-income countries, and the dynamics of poverty and inequality indicators clearly reflect the structure and changes, or lack thereof, of employment and earnings.** As is common in low income countries, a large fraction of the population is active—close to 90 percent of working age population (from 15 to 64) was active; inactivity and unemployment are essentially unaffordable for the vast majority of working-age people and, indeed, poverty incidence is lower among the inactive or unemployed; of the active population, a large fraction is active in agriculture, which is also the employment category where poverty is, by far, the highest; to the group of working-age that works must be added the fraction of children in the 5-14 age group that also work: close to 20 percent of them were working in 2010. In all, almost half of the population works in Madagascar, a high rate in a country where almost half the population falls below the age of 15. Employment indicators do not differ sharply between men and women.

128. The following table provides a quick overview of the main features of population and employment in Madagascar. Over the decade, population has grown by at least 4.5 million people, helping to enlarge the working age group by close to 2 million people. The number of inactive has fallen somewhat, with a corresponding increase in the number of active people by more than 2 million, to about 9.3 million people in 2010, most of which (97 percent) were working.

[9] We return to this theme in more detail in Chapter 7 below.

129. **Both labor force participation and employment rates are high.** The labor force participation rate was already high in 2001 at 83.5 percent, and has increased further subsequently, reaching 90.3 percent in 2010. This level has been reached thanks to very high rates for both men and women (those for women being only few percentage points lower than those for men).

130. **Despite the lack of economic growth, between 2001 and 2010 approximately two million jobs have been created in Madagascar**. The annual growth rate of job creation, larger than that of the working age population, has produced an increase in the employment rate from 82.7 to 87.1 percent.

Table 13: Basic population and employment indicators, 2001-2010

	2001	2005	2010	Change	Percentage change
		(in millions)			
Total population	15.7	18.8	20.2	4.5	29
Population 5 years and above	13.1	16.2	16.8	3.7	28
Child population (5-14 years of age)	4.2	6.0	6.0	1.8	
Child laborers	0.9	0.9	1.0	0.1	
Working age population (15-64 years of age)	8.4	9.7	10.3	1.8	22
Inactive	1.4	1.2	1.0	-0.4	-28
Active	7.1	8.5	9.3	2.2	32
Employed	7.0	8.3	9.0	2.0	28
Unemployed	0.1	0.2	0.3	0.3	372

Source: EPMs.

131. **Agriculture is by far the main sector for the active, and it is also the one in which poverty is highest.** Agriculture is cited as the primary activity for close to 80 percent of the population. The remaining 20 percent are employed in industry (about 5 percent) and services (about 15 percent). Interestingly, the large apparent shift in employment towards agriculture between 2001 and 2005, possibly on account of the 2002 political crisis, has been partly reversed until 2010, but partly only: there were still 4½ percentage points more people in agriculture in 2010 than in 2001, down 2 percentage points from 2005. Poverty is also sharply higher in agriculture than in other sectors of employment: poverty incidence in agriculture was 80 percent in 2010, somewhat lower than 2001; in other sectors, poverty incidence is never above 50 percent, and it is as low as 27 percent for employees of the public sector (a small group in total employment). For the decade as a whole, this "ruralization" of activity is probably associated with lower average productivity in the economy at large, and the limited change in GDP: people did not flock to employment in agriculture because of rapid gains in livelihoods driven by productivity gains.

Table 14: Employment and Poverty by sector

	Share of total employment by sector			
Sector	**2001**	**2005**	**2010**	**Change**
Agriculture/Primary	73.8	80.1	78.2	4.4
Industry	7.5	3.9	5.2	-2.3
Trade	6.3	5.4	7.4	1.1
Public Service	2.9	2.4	2.8	-0.1
Private Service	9.5	8.2	6.4	-3.1
	Poverty rate by sector			
	2001	**2005**	**2010**	**Change**
Agriculture/Primary	82.4	79.3	80.0	-2.5
Industry	37.8	46.9	50.7	12.9
Trade	33.6	44.2	33.4	-0.2
Public Service	27.9	34.7	27.0	-0.8
Private Service	30.9	46.5	46.0	15.1

Source: EPMs. Changes shown between years 2001 and 2010

132. **Unemployment is low, but inaccurately depicts employment status of individuals**. The level of unemployment based on EPM data is very low in Madagascar (less than 5 percent). However, Stifel et al. (2007) analyzed the labor market in Madagascar between 2001 and 2005, and used the term "disguised unemployment", to describe a situation in which individuals "take up any employment opportunity that appears in order to support their families" (p. 15); this "employment [however] is unproductive compared to alternative work [they] would undertake if it was available to [them]" (p. 15). Their overall conclusion is that the unemployment rate in Madagascar does not provide "an accurate depiction of the employment status of many rural household members involved in agriculture activities" (p. 15)[10]. We see no reasons not to endorse this interpretation.

133. **The incidence of child labor is relatively high but it has decreased.** In 2010, 16.9 percent of children aged 5-14 years were working (they were 20.7 percent of the children of this age in 2001). However, children of primary school age were much less likely to work than those of lower intermediate age: the figures being respectively 11.2 and 32.6 percent. Furthermore, in 2010 the incidence was smaller for girls than for boys (respectively, 15.3 and 18.5), higher in rural areas than in urban ones (respectively, 18.2 and 11.4 percent) and for poor than for non-poor people (respectively, 17.9 and 12.7 percent).

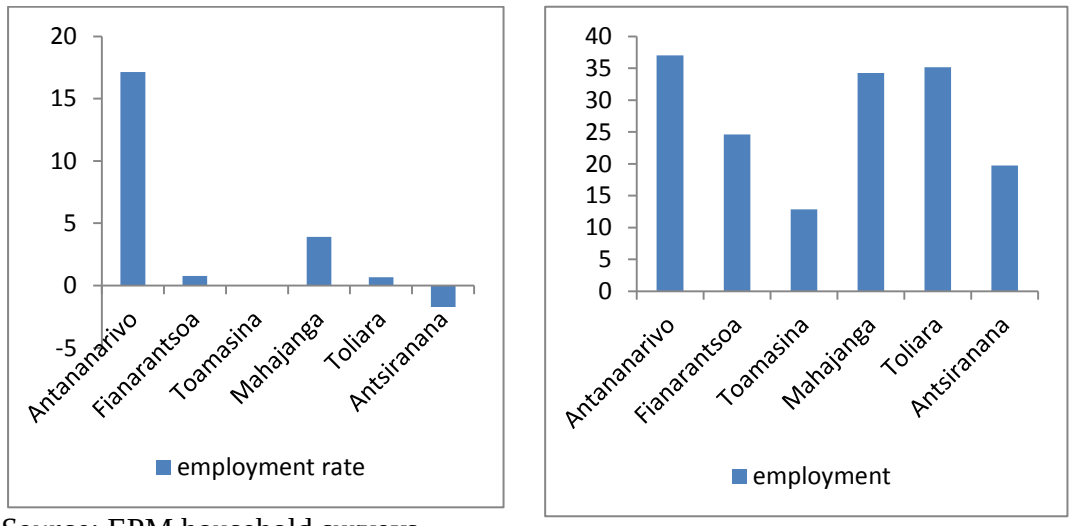
134. **Between 2001 and 2010, the number of employed workers in agriculture has increased dramatically**. In 2001 the workers employed in agriculture were 5.1 million, corresponding to 73.8 percent of employment. By 2010 they had increased to 7 million (73.8 percent of employment). In 2010 there were 466 thousands workers employed in industry, that is 11.2 percent less than in 2001. Also in terms of shares on total employment the figure for industry in 2010, at 5.2 percent, was lower than that for 2001 by 2.3 percentage points. Also the share of workers employed in services was in 2010 lower than that in 2001,

[10] A similar view is shared by Hoftijer and Paci (2008): "[The unemployment rate] sends mixed information for low-income countries such as Madagascar, where unemployment can be viewed as a luxury afforded to those with the means to forgo income-earning employment while searching for good jobs" (p. 35).

by 2.1 percentage points. Between 2005 and 2010, both industry and services absorbed workers, but, similarly to what had happened in the previous 5 years, these inflows were not enough to bring the shares in employment of these sectors back to their 2001 figures.

135. **Antananarivo is the province where the increase in the number of workers employed in agriculture has been the largest.** More than 800 thousands of the 1.9 million additional agricultural workers between 2001 and 2010 are in Antananarivo; around 360 thousands in Fianarantsoa and 265 thousands and 236 thousands respectively in Toliara and Mahajanga. The employment rate in Antananarivo has grown markedly between 2001 and 2010, and much less in the other 5 big regions. In 2001 Antananarivo had by far the smallest employment rate among the 6 big regions, at 74.9 percentage points, 7.8 percentage points lower than the national average. In 2010, the figure had increased by 17.1 percent to 87.7 percent, and it had become 0.6 percentage points higher than the national average (Figure 36, right panel).

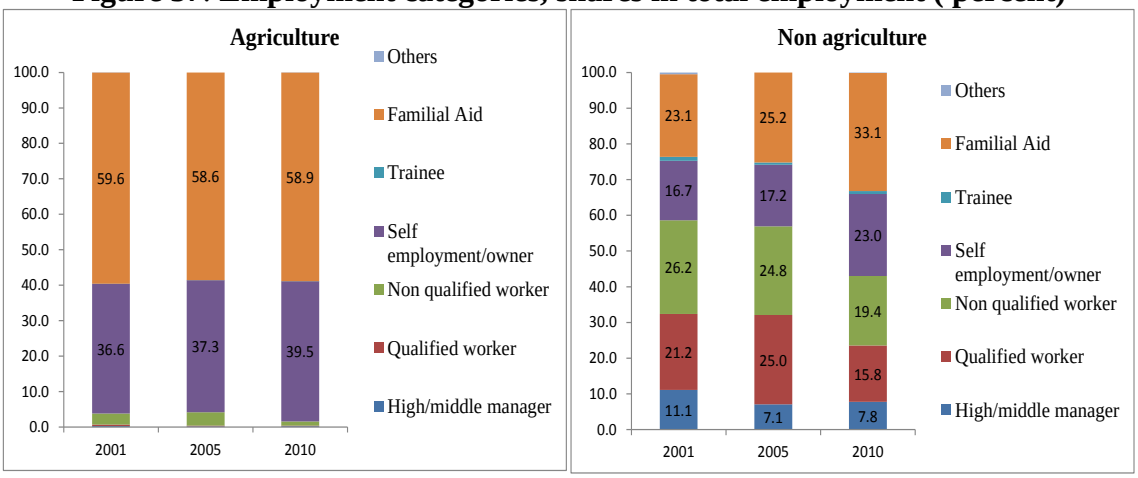
Figure 36: Employment and employment rates in 6 big regions (2001 – 2010 percent change)



Source: EPM household surveys.

136. **Large shares of employed people work as self-employed or familial aid**. In contrast, relative small shares are employed in qualified or non-qualified wage jobs or in managerial positions. Figure 37 (left panel) shows that in agriculture, around 60 percent of employed people work as familial aid (a share almost unchanged between 2001 and 2010), while more than one third are self-employed (a share increasing from 36.6 percent in 2001 to 39.5 in 2010). Familial aid represents the most important job type also outside agriculture, concerning one third of employed workers in 2010 (they were 23.1 percent of all non-agricultural workers in 2001). Self-employed are the second largest portion of workers employed outside agriculture in 2010, at 23.0 percent (they were 16.7 percent in 2001), but non-qualified and qualified wage workers are also relevant (in 2010 they represent, respectively, 19.4 and 15.8 percent of workers employed outside agriculture).

Figure 37: Employment categories, shares in total employment (percent)

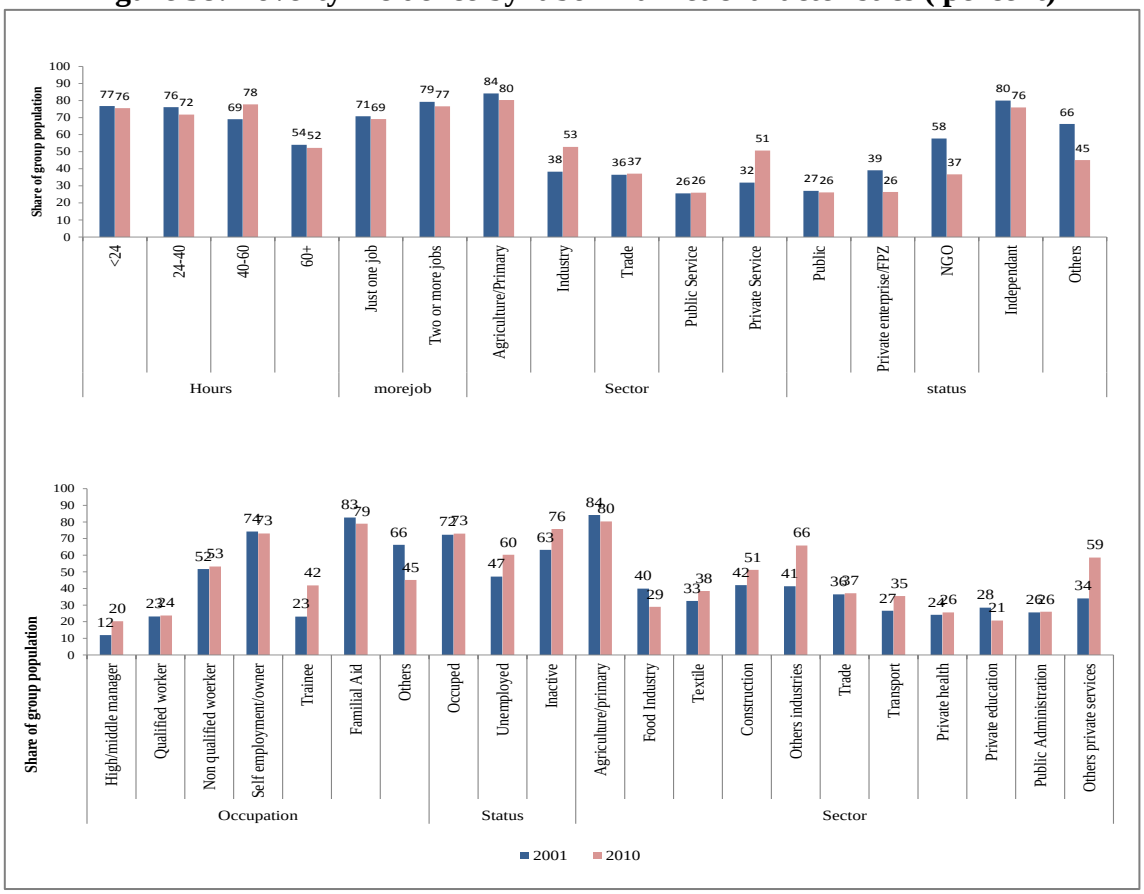


Source: EPM household surveys.

137. **Poverty incidence is strongly associated with the type of employment.** Figure 38 shows that the highest headcount rates are found among those who are familial aid and self-employed, in 2010 respectively 77.8 and 73.7 percent. Wage work in general, and even more so qualified one, allows greater protection against poverty: in 2010, the poor were 52.1 percent of non-qualified wage workers, and 23.4 percent of qualified ones. The increase in the share of poor employed workers is consistent with the decline in the number and share of higher earnings, more formal jobs and the increase in those of less productive, less formal ones, described above Figure 36.

138. **Poverty rates are higher in rural areas than in urban ones across all job types.** In 2010, 77.9 percent of rural self-employed were poor, while the incidence was 52.9 among urban self-employed; for workers employed as familial aid the figures were 81.4 percent for rural areas and 59.4 for urban ones; for non-qualified wage workers, 63.5 percent in rural areas and 34.5 in urban ones; and for qualified wage workers, 35.3 percent in rural areas and 14.0 percent in urban ones. The main changes from 2001 have happened to the situation of qualified wage workers, whose poverty rates have decreased in urban areas (from 20.4 percent in 2001), but have increased markedly in rural ones (by 9.1 percentage points).

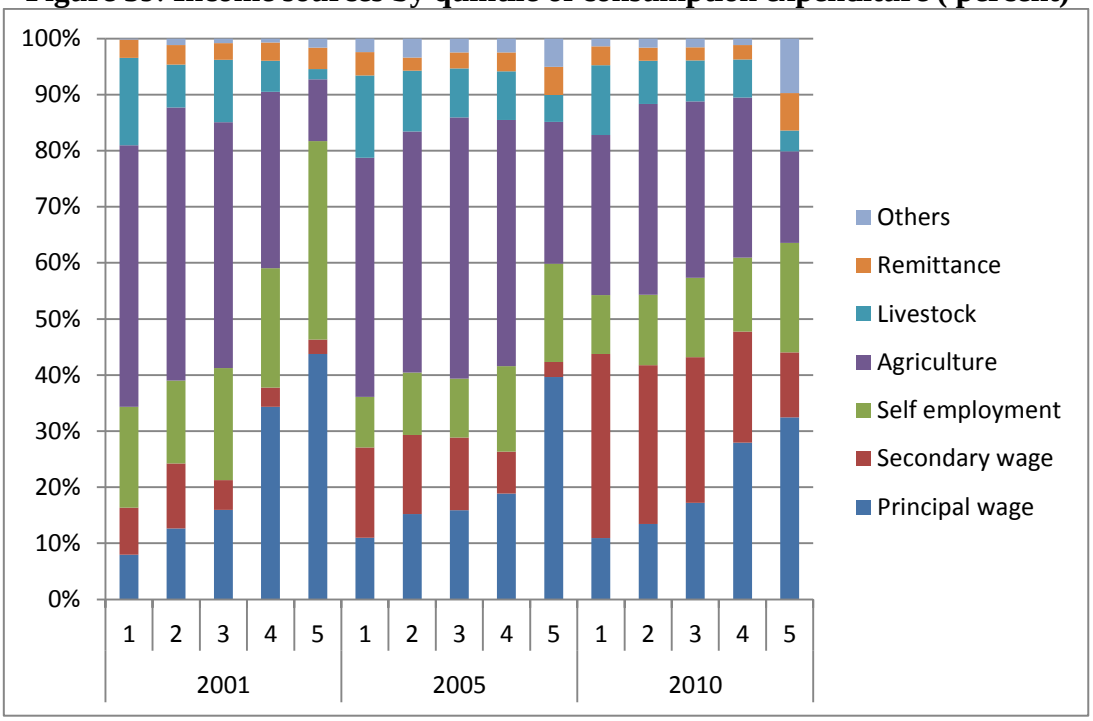
Figure 38: Poverty incidence by labor market characteristics (percent)



Source: EPM household surveys.

139. **The relative importance of the various income sources of poor and non-poor people has changed remarkably between 2001 and 2010, becoming more similar across different consumption quintiles.** In 2010 the poorest people (first consumption quintile) have derived 54.3 percent of their income from labor, while in 2001 their main source of income were agricultural revenues while labor income supplied only 34.4 percent of the total (Figure 39). On the other side of the consumption distribution, the richest people (fifth consumption quintile,) in 2010 derived 63.6 percent of their income from labor (half of it coming from the first job), while in 2001 labor income supplied 81.7 percent of the total. There is a sort of convergence among consumption quintiles over the structure of income sources.

Figure 39: **Income sources by quintile of consumption expenditure (percent)**



Source: EPM household surveys.

140. **Earnings inequality in 2010 is lower than in 2001 (but higher than in 2005).** The Gini coefficient decreased from 48.6 to 45.5 percent (the Theil index, from 42.5 to 38.9 percent) between 2001 and 2005. This development was due to the fact that "earnings increased in the lower and middle parts of the earnings distribution (largely primary sector workers) and fell in the upper end of the distribution (the highest-paid secondary and tertiary workers)", a phenomenon already observed for the earlier period of the decade by Hoftijzer and Paci (2008, p. 7). The reduction in inequality was associated with a reduction in the depth of poverty: the poverty gap decreased from 35.9 percent in 2001 to 32.1 percent in 2005. However, the subsequent five years have seen a partial reversal of these improvements (the figures for 2010 are 47.7 percent for the Gini coefficient and 41.7 percent for the Theil index). This has resulted in a depth of poverty that in 2010 was higher than in 2005 but lower than in 2001 (the poverty gap was at 33.9 percent).

141. **Between 2005 and 2010 inequality has increased within each sector of activity.** However, the changes have been more marked in trade and industry (respectively, +11.7 and +8.7 percentage points in their Gini coefficients), while in agriculture and public services the increases have been very small (respectively, +0.7 and +0.4 percentage points in their Gini coefficients). Furthermore, because between 2001 and 2010 inequality has risen within each sector while decreasing on the whole, differences in earnings across sectors have decreased.

142. **In non-agricultural activities, inequality has increased between 2005 and 2010 within each education level.** These changes have been relevant for all education levels up to the secondary one (ranging from +5.5 percentage points for the Gini coefficient for workers without education to +8.3 percentage points for those with primary education) and very small for workers with a university degree. These increases in inequality are consistent with the evidence that in urban areas an additional year of education has had a smaller effect on earnings in 2010 than in 2005. In agricultural activities the pattern of inequality by education levels has been more varied, with a small decrease among those without education (-0.6

percentage points in the Gini coefficient), a limited increase among those with primary education (+0.8 percentage points) and more relevant increases in the much smaller sets of workers with secondary or university education (respectively, +3.2 and +16.2 percentage points). These patterns translate into a larger effect of an additional year of education on earnings in rural areas in 2010 than in 2005.

Chapter 4: Education, Health and Poverty

143. This chapter contains two sections, covering access to education and to health care. The objective is to drill a bit deeper in the data sets of the 3 EPM, and highlight key features of the relationship between access to basic social services on the one hand, and poverty and some of its correlates on the other. We exploit the opportunity afforded by available data in the EPM for education and health along with a range of household characteristics, such as total consumption (as a measure of welfare), age, gender, education of household heads, and place of residence.

A. ACCESS TO EDUCATION AND POVERTY

144. This brief section deals reviews the current situation of access to education in Madagascar. We analyze access to education in relation to different characteristics of individuals and households, with a particular focus on poverty and gender. The section tries to describe first the Malagasy educational system on the supply side of availability. Access to education is subsequently analyzed using conventional indicators such as gross net enrolment rates. After that, the impact of the benefits of public education is discussed followed by analysis of the expenditure in education. The document ends with a very simple econometric analysis of demand and access to primary education in Madagascar.

THE EDUCATION SYSTEM IN MADAGASCAR AND AVAILABILITY OF EDUCATION SERVICES

145. The current Malagasy educational system is structured around four levels. A primary level consists of five years of study, compulsory for children from 6 to 10 years. At the end of primary school, children can receive their first degree (CEPE or certificate of primary elementary education). The second level is divided into two cycles. The first cycle of secondary education consists of four years of schooling ("collège") for children from 11 to 14 years old and the second cycle consists of three years of schooling ("lycée") for children from 15 to 17 years. The compulsory nature of education is limited to the level of the first two cycles, and in all, education is supposed to be compulsory for children from 6 to 14 years. After "collège", children receive their second degree (the BEPC). And, after high school, students receive the CCSO allowing them access to the third level of education, at universities, which typically lasts four years. This structure of the Malagasy educational system has not changed for almost four decades. The system is predominantly public but the private sector is very present in mostly denominational schools.

146. Currently, the public elementary system has about 22,000 establishments equipped with approximately 70,000 classrooms with about 80,000 teachers. It should be noted however that more than 67% of these teachers are community "FRAM" teachers, recruited locally by parents; some of them benefit from a State subsidy and are ostensibly regulated. The private primary sector is much less important in terms of size—it has only 5,800 establishments throughout the country. At more advanced levels, the size of the public system decreases (there are 1,800 public colleges with 19,000 teachers), while that of the private sector increases (2,000 establishments). Finally, at the high school level, there was only about 250 public and 690 private *lycées*. The private education system tends to be concentrated in urban areas.

Table 15: Availability of education services by school type and level, %

	2005			2010		
	Urban	**Rural**	**Total**	**Urban**	**Rural**	**Total**
Public primary	100.0	99.7	99.8	99.9	99.8	99.8
Private primary	95.5	81.8	86.7	90.9	73.8	78.2
Secondary Level 1 (Collège)	98.9	94.2	95.9	97.5	92.3	93.6
Secondary Level 2 (Lycée)	86.1	51.1	63.6	90.5	50.9	61.0

Source: Author's calculation on EPM 2005 and 2010 data.

147. Relative to demand, as can be seen from the results of community surveys in the 2005 and 2010 EPM (no such data exist for 2001), the availability of public primary education is almost universal. "Availability" refers here to the known existence of a school in the community under survey. By that definition, public primary education is available for 99 percent of the population either urban or rural. *Collèges* are also widely available especially in urban areas where the availability rate is about 98 percent, though in rural areas, the percentage is somewhat lower, at about 94 percent. Over the period 2005-2010, availability has practically not changed for primary school and the college.

Table 16: Some characteristics of primary education services

	2005			2010		
	Urban	**Rural**	**Total**	**Urban**	**Rural**	**Total**
Public schools						
Distance (km)	1.0	1.1	1.1	1.1	1.8	1.6
Annual costs (Ar)	1,717	878	1,012	5,027	2,852	3,222
Pupil/Teacher Ratio	49.4	60.2	57.8	46.1	47.1	47.0
Class size	54.2	48.6	49.8	50.3	45.3	46.2
More than one class in a room	33.0	59.1	53.3	35.7	52.0	49.0
Quality of infrastructure	65.3	48.5	52.2	63.3	47.4	50.3
Quality of education	85.4	66.4	70.6	76.2	67.0	68.7
Canteen program	4.1	4.2	4.2	16.4	8.9	10.2
Received Financial Aid	17.3	12.8	13.8	4.1	5.1	4.9
Private schools						
Distance (km)	0.9	1.3	1.1	0.9	1.6	1.3
Annual costs (Ar)	44,461	8,982	21,694	43,514	19,109	26,642
Pupil/Teacher Ratio	40.2	49.1	45.4	30.0	39.7	36.8
Class size	37.8	37.6	37.7	38.3	35.0	36.0
More than one class in a room	20.8	57.2	42.1	18.1	41.4	34.4
Quality of infrastructure	72.7	42.1	54.8	76.9	64.4	68.1
Quality of education	94.9	70.7	80.7	92.3	86.0	87.9
Canteen program	8.3	10.8	9.6	11.5	9.1	9.9
Received Financial Aid	24.1	18.6	20.9	2.6	4.2	3.7

Source: Author's calculation on EPM 2005 and 2010 data.

148. With regard to high school, however, availability remains low: in 2010, approximately 40 percent of the population does not access to this level of education. It is available only in urban areas, and has improved between 2005 and 2010, with a current rate of 90%. In rural areas, in contrast, where close to 80 percent of the population lives, high school is available for only half the population.

149. In primary schools, given that accessibility is no longer a major constraint, the main supply-side determinants of enrollment are the quality of infrastructure and the hard-to-measure quality of teaching. From 2005 to 2010, class sizes have decreased, but so have the quality of physical school infrastructure and the fraction of households that consider the quality of education to be satisfactory. The private primary sector fares better on most indicators, and they have generally improved between 2005 and 2010. However, the costs of education are a little more than eight times higher in the private than in the public schools on average.

ACCESS TO EDUCATION : ENROLLMENT RATES

150. To measure effective access of the population to various services of education, we draw on EPM reported data about gross and net enrolment rates. The gross enrolment rate for a cycle is the ratio between the number of students in this cycle regardless of their age and the total number of children in the age range for this cycle. The net rate is rather the relationship between pupils belonging to the age of the cycle interval and the total number in the interval of legal age relative to the cycle in question. Thus, the gross enrolment rate can exceed 100 percent (and it does), while the net rate must be less than or equal to 100 percent.

Table 17: Enrollment rate and out-of-school by year and level, %

Level	Indicator	2001	2005	2010
Primary	Gross attendance	107.0	120.4	117.5
	Net attendance	62.3	66.2	73.3
	Proportion of out-of-school	36.9	33.5	25.6
Collège	Gross attendance	32.1	33.9	43.8
	Net attendance	11.9	12.9	22.9
	Proportion of out-of-school	35.2	17.1	27.4
Lycée	Gross attendance	14.8	11.8	15.8
	Net attendance	4.1	2.8	6.3
	Proportion of out-of-school	62.5	57.6	60.5
University	Gross attendance	2.4	2.3	2.3
	Net attendance	1.3	1.3	1.2

Source: Author's calculation on EPM 2001, 2005 and 2010 data.

151. In 2010, according to the EPM, gross primary school enrolment was 117.5 percent while the net rate was 73.3 percent. This difference most likely reflects late entry into primary school. The decrease in the gross rate, and increase in the net rate, between 2005 and 2010 may indicate that more children at the statutory age are joining primary school—more in total, or earlier than before (this is borne out in the pseudo-panel analysis presented in Chapter 9). We note that the enrolment rates, both gross and net, reported in the EPMs are much smaller than official enrolment statistics from the Ministry of Education.

152. The increasing gross and net rates of enrolment at the level of the college confirms the first fact, as well as higher transition rates from primary to secondary. Consistent with this, the proportion of out of school children at primary level has decreased from 2001 to 2005 to 2010. It stood at 26 percent in 2010 (there are indications that the situation has worsened sharply over the subsequent crisis years). Gross and net enrolment rates at higher levels are still low. More than 60 percent of the *lycée* age group was out of school. At the tertiary level, only 1.3 percent of the relevant age group attended university.

Table 18: Enrollment rate in primary education by individual and household characteristics, %

	2001		2005		2010	
	Gross Attendance	**Net Attendance**	**Gross Attendance**	**Net Attendance**	**Gross Attendance**	**Net Attendance**
Total	107.0	62.3	120.4	66.2	117.5	73.3
Gender						
Boys	110.7	62.7	122.6	65.9	117.7	72.2
Girls	103.4	62.0	118.3	66.4	117.3	74.4
Area of residence						
Urban	126.7	74.7	125.9	72.5	120.9	80.1
Rural	102.0	59.2	119.2	64.7	116.7	71.8
Residence and gender						
Urban - Boys	127.5	73.3	127.9	71.5	121.8	78.9
Urban - Girls	126.0	76.1	123.8	73.6	119.9	81.4
Rural - Boys	106.6	60.1	121.3	64.6	116.7	70.6
Rural - Girls	97.7	58.4	117.0	64.8	116.7	72.9
Quintile of consumption						
Quintile 1	81.3	44.9	107.8	55.3	99.0	59.4
Quintile 2	103.7	56.1	116.6	62.6	115.0	71.5
Quintile 3	115.4	62.2	124.1	69.4	123.0	76.5
Quintile 4	122.0	76.3	125.2	70.8	127.8	81.5
Quintile 5	127.6	85.2	137.4	80.4	132.3	85.3
Quintile and gender						
Quintile 1 - Boys	91.0	50.2	114.4	56.8	98.3	57.9
Quintile 2 - Boys	107.1	55.6	115.0	59.9	113.0	69.8
Quintile 3 - Boys	121.6	56.4	128.8	68.8	122.5	75.2
Quintile 4 - Boys	119.2	74.8	124.7	71.2	129.7	80.5
Quintile 5 - Boys	125.1	85.0	136.5	79.2	136.7	85.9
Quintile 1 - Girls	72.1	39.8	101.8	53.9	99.8	60.8
Quintile 2 - Girls	100.6	56.6	118.4	65.6	117.0	73.2
Quintile 3 - Girls	110.1	67.4	119.8	69.9	123.6	77.9
Quintile 4 - Girls	124.7	77.8	125.6	70.3	126.0	82.5
Quintile 5 - Girls	130.8	85.5	138.3	81.7	127.8	84.6
Education level of Household head						
Without education	84.4	47.2	114.4	57.5	104.0	63.9
Primary	126.5	71.5	121.2	66.5	126.2	76.8
Secondary	136.9	81.2	123.4	71.0	121.9	79.1
University	124.7	89.6	126.4	76.0	117.5	78.2
Gender of Household head						
Male	107.9	62.3	119.8	66.7	120.2	74.4
Female	102.1	62.4	121.9	65.0	111.4	70.7

Source: Author's calculation on EPM 2001, 2005 and 2010 data.

153. Variation in enrolment to primary school among households reflects mainly demand-side factors. These decisions depend more on the socio-economic characteristics and

immediate environment of the household. To illustrate this, we analyze here the distribution of gross and net enrolment rates by selected characteristics of individuals and their households.

- Firstly, enrolment in schools in Madagascar varies significantly with the affluence of households, to the disadvantage of the poorest. In 2010, primary gross enrolment was 99 percent for the poorest quintile of the poorest compared to 132 percent for the richest, a difference of 33 percentage points. The net rate ranged from 59 percent for the poorest, to 84 percent for the richest quintile. This feature has not markedly changed over the decade, despite an expansion of the system, and could signal the increasing role of demand-side factors, and a poverty trap through education.

- The gender difference for primary enrolment of the poorest that existed in 2001 (and was only true for the poorest quintile) had apparently been eliminated by 2010. Overall, there are now more girls than boys enrolled in primary school, whether in urban or in rural areas. The only significant remaining gender gap is the one related to the gender of household heads (known to be poorer)—in 2010, the net enrolment rate for their children was about 4 percentage point lower than that of male-headed household.

- On the other hand, access to education also significantly differs across levels of parental education. For a head of household without the level of education, the gross primary school enrolment rate is 104 percent, against 120 percent in the case of heads of households with a high school degree or more. A similar pattern is also observed for net enrolment rates. That pattern has flattened somewhat over 2001-10.

- In Madagascar, the most disadvantaged children are always those living in rural areas. Despite near universal availability of schools, gross enrolment rate were slightly lower in rural areas (117 percent), compared with urban areas (121 percent), but the differential is a larger 9 percentage points for net enrolment. Most likely, higher poverty in rural areas accounts for this difference, but indicators for the quality of teaching conditions, the quality of infrastructure and the quality of teaching are also worse in rural areas.

- Enrollment in post-primary schools shows a similar, but much more pronounced pattern. The net enrolment rates for college was 8 percent for the poorest, and almost 50 percent for the richest quintile; that for *lycée* was less than 1 percent for the poorest, and 21 percent for the richest.

- Drop-out rates, as well as the profile of children having never attended school, show a symmetric pattern—higher rates for poorer people, lower rates for more educated HH heads, and higher rates at higher school levels.

Table 19: Enrollment rate in *collège*, *lycée* and post-secondary education by individual and household characteristics in 2010, %

	Collège		Lycée		University	
	Gross Attendance	**Net Attendance**	**Gross Attendance**	**Net Attendance**	**Gross Attendance**	**Net Attendance**
Total	43.8	22.9	15.8	6.3	2.3	1.2
Gender						
Boys	45.0	21.3	16.6	6.1	2.3	1.2
Girls	42.6	24.5	15.0	6.6	2.3	1.3
Area of residence						
Urban	70.5	38.2	44.2	17.4	6.1	3.6
Rural	37.6	19.3	8.1	3.3	1.3	0.6
Residence and gender						
Urban - Boys	67.8	34.3	48.4	17.1	5.9	3.4
Urban - Girls	73.4	42.2	40.3	17.6	6.2	3.7
Rural - Boys	39.5	18.2	8.6	3.3	1.3	0.6
Rural - Girls	35.5	20.4	7.5	3.4	1.2	0.6
Quintile of consumption						
Quintile 1	15.9	7.7	2.0	0.6	0.0	0.0
Quintile 2	26.8	12.5	2.9	1.2	0.0	0.0
Quintile 3	41.1	21.1	8.1	1.5	0.3	0.0
Quintile 4	57.6	31.4	14.1	5.9	0.8	0.2
Quintile 5	88.5	47.7	49.2	21.3	8.8	5.1
Quintile and gender						
Quintile 1 - Boys	16.7	7.1	1.5	0.4	0.0	0.0
Quintile 2 - Boys	29.9	13.3	3.7	1.0	0.0	0.0
Quintile 3 - Boys	42.1	20.3	9.7	1.8	0.6	0.0
Quintile 4 - Boys	58.4	29.0	12.3	4.4	0.2	0.2
Quintile 5 - Boys	88.8	41.8	51.6	21.2	8.6	4.7
Quintile 1 - Girls	15.2	8.3	2.4	0.8	0.0	0.0
Quintile 2 - Girls	23.8	11.6	2.0	1.5	0.0	0.0
Quintile 3 - Girls	40.0	22.1	6.2	1.2	0.1	0.0
Quintile 4 - Girls	56.7	33.9	15.9	7.4	1.2	0.1
Quintile 5 - Girls	88.3	53.3	46.6	21.3	9.0	5.5
Education level of Household head						
Without education	24.5	11.2	5.4	1.6	0.2	0.0
Primary	39.3	21.5	9.1	3.4	0.9	0.5
Secondary	63.8	31.7	27.8	10.2	2.1	1.4
University	80.6	47.5	42.4	21.5	16.1	8.4
Gender of Household head						
Male	43.3	22.6	14.1	5.8	2.2	1.2
Female	45.1	23.5	19.5	7.5	2.5	1.3

Source: Author's calculation on EPM 2010 data.

Table 20: Drop-out rate by individual and household characteristics in 2010, %

	Primary	College	Lycée
Total	6.3	9.7	12.4
Gender			
Boys	6.3	9.5	9.6
Girls	6.2	9.9	15.4
Area of residence			
Urban	4.2	8.3	10.5
Rural	6.8	10.4	15.0
Residence and gender			
Urban - Boys	4.5	8.9	8.6
Urban - Girls	3.8	7.8	12.6
Rural - Boys	6.8	9.9	11.1
Rural - Girls	6.7	11.0	19.4
Quintile of consumption			
Quintile 1	9.2	12.6	0.0
Quintile 2	6.5	13.6	29.4
Quintile 3	6.3	11.0	15.4
Quintile 4	5.6	8.5	16.6
Quintile 5	2.9	8.3	10.2
Quintile and gender			
Quintile 1 - Boys	9.5	10.4	0.0
Quintile 2 - Boys	6.0	9.0	38.6
Quintile 3 - Boys	6.2	13.0	9.9
Quintile 4 - Boys	6.3	8.1	12.4
Quintile 5 - Boys	3.2	8.7	7.6
Quintile 1 - Girls	9.0	14.6	0.0
Quintile 2 - Girls	7.0	19.5	16.3
Quintile 3 - Girls	6.5	8.1	25.6
Quintile 4 - Girls	4.8	8.9	20.0
Quintile 5 - Girls	2.7	7.8	13.0
Education level of Household head			
Without education	8.2	14.6	12.3
Primary	6.1	11.8	13.3
Secondary	4.9	7.1	14.5
University	4.1	6.2	8.5
Gender of Household head			
Male	6.2	9.1	13.0
Female	6.3	11.0	11.4

Source: Author's calculation on EPM 2010 data.

Table 21: Proportion of those who never attend school among children of 6 to 14 ages by individual and household characteristics, %

	2001	2005	2010
Total	23.4	20.7	18.2
Gender			
Boys	24.5	20.9	19.3
Girls	22.2	20.4	17.0
Area of residence			
Urban	11.8	15.9	11.4
Rural	26.4	21.9	19.7
Residence and gender			
Urban - Boys	14.2	16.2	12.1
Urban - Girls	9.5	15.6	10.6
Rural - Boys	27.1	22.1	21.0
Rural - Girls	25.7	21.6	18.4
Quintile of consumption			
Quintile 1	40.3	29.4	31.5
Quintile 2	27.6	23.1	20.2
Quintile 3	22.1	18.7	16.5
Quintile 4	12.2	17.2	11.0
Quintile 5	3.7	10.5	5.8
Quintile and gender			
Quintile 1 - Boys	39.9	27.3	32.9
Quintile 2 - Boys	30.9	25.1	22.0
Quintile 3 - Boys	22.7	19.5	17.6
Quintile 4 - Boys	13.5	17.4	11.7
Quintile 5 - Boys	5.3	11.5	6.1
Quintile 1 - Girls	40.7	31.4	30.0
Quintile 2 - Girls	24.3	21.0	18.4
Quintile 3 - Girls	21.6	17.9	15.3
Quintile 4 - Girls	10.9	17.0	10.3
Quintile 5 - Girls	1.8	9.4	5.5
Education level of Household head			
Without education	38.0	27.0	27.2
Primary	12.9	20.8	14.8
Secondary	6.2	16.7	13.4
University	1.9	13.5	12.6
Gender of Household head			
Male	23.3	20.9	16.7
Female	23.5	20.2	21.4

Source: Author's calculation on EPM 2001. 2005 and 2010 data.

INCIDENCE ANALYSIS OF PUBLIC EDUCATION

154. In this section, we carry out a very simple analysis of the impact of the benefits of public education through the expansion of public institutions. The core question is: "have public policies (through public schools) benefitted the poor?" Because it is a very simple analysis, the benefit is quantified through only schooling participation: the individual enjoys the benefits of the policy with a value of 1 if it is registered in the public system, and 0 otherwise. A more comprehensive approach would also consider the level of public expenditure by beneficiary—and, more relevantly, measures related to the quality of instruction, and of inputs that are clear correlates of learning outcomes—, which we do not do. As a result, this analysis does not, for example, take into account the geographic distributions of public expenditure per se.

155. We present a simple table on enrolment in the public school system by (consumption) quintile. In addition we consider two indicators, an enrolment rate per child and a rate of entry per capita. The latter thus takes into account household size. In this analysis, the distribution across quintile captures the progressiveness of the system—a flat distribution is an egalitarian one. Benefit concentration curves are also shown to capture the evolution of the impact of the benefits of the public education system.

Table 22: Incidence of public education by quintile in 2010

	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5	Total
Primary						
Enrollment rate per child	0.5444	0.6437	0.6713	0.6441	0.4418	0.5983
Enrollment rate per capita	0.1726	0.1891	0.1803	0.1478	0.0798	0.1540
Collège						
Enrollment rate per child	0.0695	0.1070	0.1705	0.2196	0.2599	0.1601
Enrollment rate per capita	0.0159	0.0256	0.0377	0.0452	0.0432	0.0335
Lycée						
Enrollment rate per child	0.0037	0.0055	0.0105	0.0344	0.0852	0.0290
Enrollment rate per capita	0.0007	0.0011	0.0043	0.0066	0.0162	0.0058
University						
Enrollment rate per child	0.0000	0.0000	0.0004	0.0013	0.0289	0.0072
Enrollment rate per capita	0.0000	0.0000	0.0003	0.0003	0.0050	0.0011

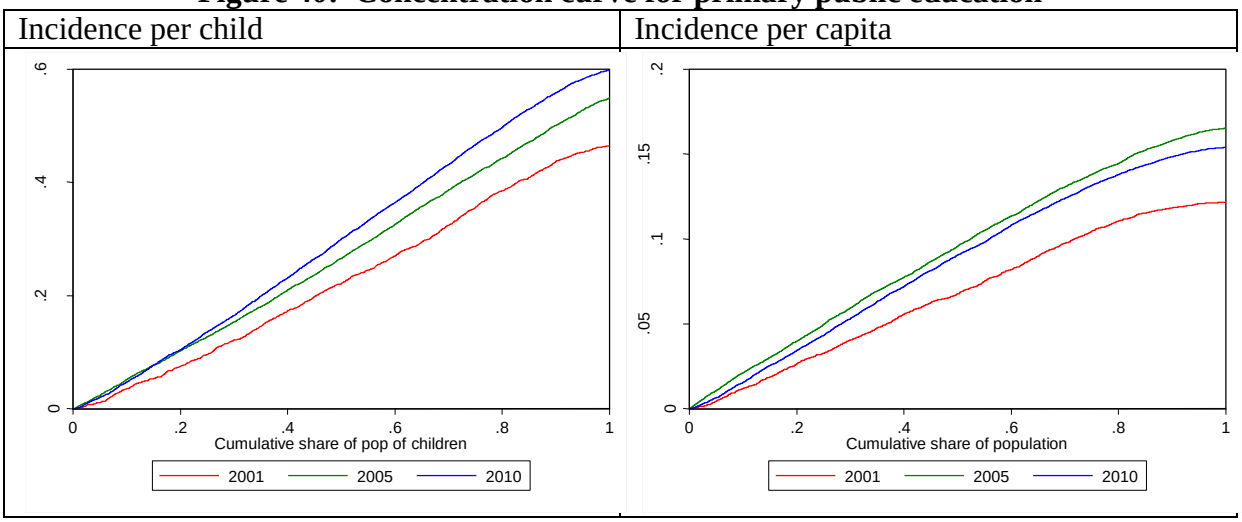
Source: Author's calculation on EPM 2010 data.

156. **The public system is broadly egalitarian at the primary level.** There is relatively more concentration of benefits at the level of the poor than the richest, though benefits are higher in the second and third quintile. The poorest quintile shows a lower incidence rate over the second and third quintile, but much higher than the fifth quintile for example. This is equally true for both measures, per child and per capita. Comparing benefit curves between the three surveys, the situation has significantly improved over time: for benefit per child, the 2010 curve dominates both that for 2005 and 2001; for incidence per capita, 2010 curve dominates only that of 2001. From this simple analysis of profits, the primary public education in Madagascar happens to target the poor reasonably well. The main challenges are likely to be related to the quality of education (and, to some extent, the quality of facilities).

157. **The situation is radically different at secondary and post-secondary level, where a regressive bias in public schooling is very clear.** This is true for both measures, per child

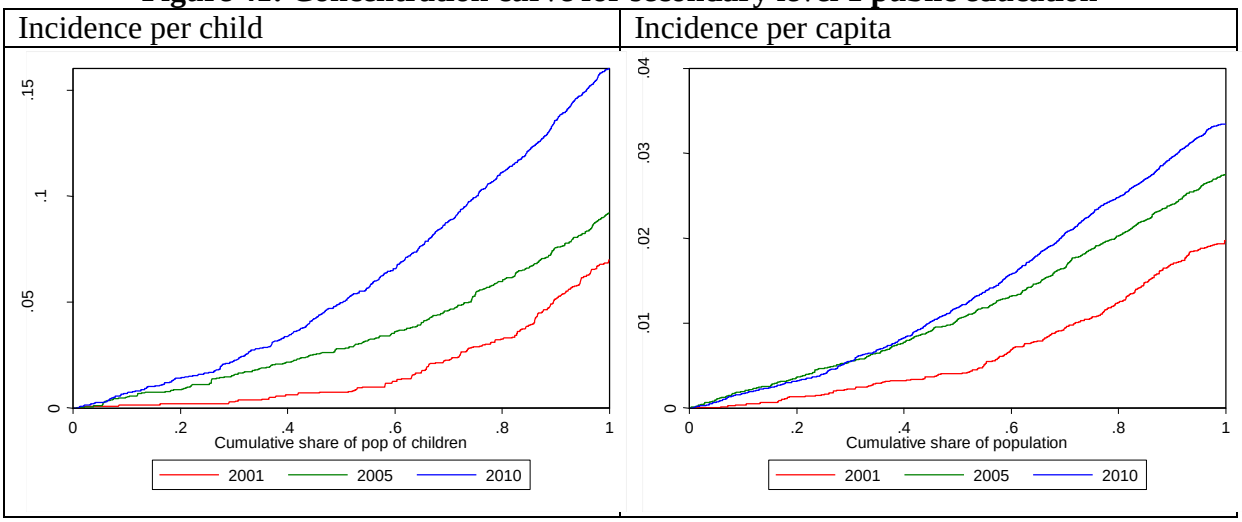
or per capita, though the concentration curves at *collège* level confirm an improvement since 2001. This does not necessarily indicate a policy bias, as demand-side factors probably account for at least part of this feature, but it is important to note for the distributional effects of policies that allocate resources to secondary and tertiary education.

Figure 40: Concentration curve for primary public education



Source: Author's calculation on EPM 2001, 2005 and 2010 data.

Figure 41: Concentration curve for secondary level 1 public education



Source: Author's calculation on EPM 2001, 2005 and 2010 data.

HOUSEHOLD EXPENDITURES ON EDUCATION

158. **Families spend on average about 10 percent of their non-food spending on education, a proportion that is broadly stable across quintiles.** Household spending on education clearly reflects a mix of ability and willingness to pay. In 2010, average spending on education per household was 61,000 Ar. (about 2 percent of their total budget, and 11 percent of their non-food budget). The poorest spent only 23,000 Ar., a slightly higher share of their non-food budget than the average household, and a larger one than the richest. That share was marginally higher still for poor household in the second and third poorest quintiles (more than 13 percent). Comparing 2001 and 2010 shows little differences in these

shares or their distribution across quintiles, but for the year 2005, these shares were much lower, for still unclear reasons.[11]

Table 23: Household expenditure on education from 2001 to 2010

Year	Expenditure and %	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5	Total
2001	Education expenditures	8,683	15442	26,514	51,048	114,623	36,750
	Non-food expenditures	87,858	129,556	218,528	402,346	121,000	343,574
	%	9.9%	11.9%	12.1%	12.7%	9.5%	10.7%
2005	Education expenditures	10,371	13,137	17,015	23,713	72,657	23,704
	Non-food expenditures	167,515	208,092	265,134	368,272	1,057,049	360,475
	%	6.2%	6.3%	6.4%	6.4%	6.9%	6.6%
2010	Education expenditures	22,753	37,665	47,845	73,521	173,752	61,121
	Non-food expenditures	186,772	276,662	363,662	601,849	1,861,364	548,986
	%	12.2%	13.6%	13.2%	12.2%	9.3%	11.1%

Source: Author's calculation on EPM 2001, 2005 and 2010 data.

159. **The average expenditure per child attending school was of the order of 39,000 Ar in 2010.** About 70 percent of that spending, on average, was for stationery, transport and food: stationery (*cahiers*) represented 17 percent, transportation costs in urban areas 33 percent and, finally, food for children enrolled in school was 22 percent.

DETERMINANTS OF ACCESS TO EDUCATION

160. In this sub section, we perform a simple econometric analysis of access to primary education. However, we limit ourselves to the case of the primary for which data are the most complete including at community level of survey data. For the modeling of access to education, however, we use a nested logit model to account for the fact that household not only decide on enrolling their children but also which type of schools, public or private, they go to. In the regression specification, we introduce cost and quality parameters, and these are treated as school-specific features, which households cannot control. They make their choice on the type of school following the overall characteristics of the schools by confronting them with their own situations.

161. Thus, the usual socio-economic characteristics of individuals and households are introduced in the model. Characteristics concern the gender and age of the child and of the household head, as well as the latter's marital status and level of education. Household variables include its size of the household, the number of children and adults, and the level of per capita consumption. In addition to this, we include working in agriculture is also introduced as well as the surface of the land owned by households and the size of their livestock husbandry. For localization, the middle of residence is taken into account to capture the structural differences across the middle. Indicator variables of the six provinces are also incorporated into the model to capture the possible differential's behavior by region.

162. The following table reports regression results:

[11] In that year, the share on food was higher, possibly reflecting impoverishment compared to 2001 and higher food costs.

Table 24: Results of nested logistic model of access to primary education

Choice of school (against no enrollment)	Public	Private
School level equation		
Cost of school	-2.482e-06***	
Distance	-.00018***	
Quality of infrastructure	-.0004	
Quality of education	.277***	
Ratio pupil/teacher	.00273***	
Dimension of class	.0035***	
% of more classes in room	-.0391	
Canteen	.0543	
Individual level equation		
Girl	.14***	.181**
Age	.15***	.044**
Age of head	-.003*	-.008**
Female head	.168	.412**
Head with primary education	.61***	.517***
Head with secondary education	.761***	1.290***
Head with tertiary education	.162	1.137***
Head as customarily married	-.710***	-1.063***
Head as in free union	-.922***	-1.683***
Head as divorced	-1.272***	-1.574***
Head as separated	-.819***	-1.528***
Head as widowed	-.884***	-1.313***
Head as single	-.952***	-1.753***
Head in agriculture	-.221***	-.619***
Household size	.033	.079
Number on child in household	-.037	-.162**
Number of adults in household	-.032	-.05912496
Per capita consumption	1.667e-06***	3.320e-06***
Land in possession	-7.513e-07	-.0001
Number of large animal	-.001	.004
Number of small animal	.002	.004
In rural	-.377***	-.144*
Fianarantsoa	.151*	-.172
Toamasina	.508***	.409***
Mahajanga	-.379***	-.358***
Toliara	-.696***	-.579***
Antsiranana	.562***	.682***
Constant	**3.056*** **	**3.816*** **
Dissimilarity parameters	**.747*** **	**.4684*** **
LR test for IIA (tau = 1): chi2(2) = 101.16 Prob > chi2 = 0.0000		

Source: Author's calculation on EPM 2001, 2005 and 2010 data.
Note : * p<0.1 ; ** p<0.05 ; *** p<0.01.

163. We will begin the interpretations by the coefficients of the variables specific to schools. These coefficients are identical (i.e. independent) of the type of school.

- The coefficient on schooling costs is negative, as is intuitive. So is the next coefficient: distance of the school negatively affects children's access to primary education.

- As regards quality indicators, the quality of infrastructure enters with the wrong sign, but the coefficient is not significant. On the other hand, households respond to the quality of education—an important issue for policy in the sector now that access is almost universal.

- Households send their children to schools where there are more students (possibly a signal effect for parents, or peer effects for children). On the other hand, the variable "school cafeteria" normally does not affect the decisions of households to send their children to school, despite the reported fact that this phenomenon has become more important between 2005 and 2010 especially at public schools.

164. In continuing the analysis at the level of the characteristics of individuals and households, some highlights include the following:

- There is some gender gap (despite the results at the level of the descriptive analysis) but it affects boys. More young girls are sent to school in this estimate, and more often in private schools. Interestingly, for children sent to private school, the gender of the head of household matters: female heads do so more than male heads (despite being on average poorer). That factor does not appear for children sent to public schools, however.

- Compared to the age of children, access to education increases with the age of the child, confirming the unusual importance of late entry to primary school in Madagascar. In addition, parents tend to send the older children to the public sector. Young parents send their children to school more than older parents, and older parents prefer public education.

- The results of the model reveal a form of poverty trap, or vicious cycle, through education in Madagascar: access to primary education is significantly dependent on the wellbeing of parents (even controlling for education and place of residence of the household head). The income elasticity of private education is much higher than that for public, but it is not small for public schools. In addition, other things equal, less educated parents send their children to school less often compared to the parents with more education level. Moreover, more educated parents prefer the private to the public school sector.

- Finally, in relation to the location of the household, being in rural areas significantly reduces children's access to primary education. This type of gap of access to services in relation to place of residence remains a challenge for Madagascar, being present as well for health care. Several factors are at play, including on the demand side—controlling for costs, income and parents education, and for various supply side characteristics, the place of residence and being engaged in agriculture both show negative coefficients, possibly reflecting differential opportunity costs or parents' perceptions of the benefits of education.

B. ACCESS TO HEALTH CARE AND POVERTY

165. The objective of this section is to provide a rapid assessment of access to health care in Madagascar in relation to poverty and gender. This assessment examines the evolution of the situation since the year 2001, using data from the EPM 2001, 2005 and 2010. The health module of the EPMs provides information on the status of various indicators on rates of disease as reported by individuals themselves, the behavior of individuals confronted with ill

health (the type of care they seek), and access to, and spending on, health care. These indicators are used in this section against characteristics of individuals and households such as poverty and other characteristics that may have links with health issues, such as age and gender. The 'community survey' module of the EPM also provides information on other crucial variables on the availability of health services at the community level, as seen by members of the community themselves. However, the community data are available only for 2005 and 2010.

166. This section includes six sections. A brief overview of the availability of health care in Madagascar is provided using data from the health statistical yearbooks as well as data from the EPM. Then, incidence of diseases and the health status of the population are analyzed to understand demand for care. Third, behaviors in front of disease are explored, followed directly by the analysis of the choice of providers and access to care. The structure of household health expenditure is then discussed. A final section ends with the estimation of a simple model of access to care in Madagascar.

A BRIEF OVERVIEW OF THE HEALTH SECTOR IN MADAGASCAR AND AVAILABILITY OF CARE SERVICES

167. Madagascar's health system offers people a range of health care providers that is organized hierarchically in four levels.

- At the first level, we find the entry-level basic health centers, or CSB1. A CSB1, with medical staff composed of a nurse, or a midwife and nurse, provides the first interface between the health system and the population. The CSB1 service mandate is to provide basic health care and immunization.

- At the second level, one finds the second-tier basic health centers, CSB2, and primary District Hospital Centers (*Centres Hospitaliers de District de premier échelon*, CHD1). In terms of care and medical staffing, these two types of structures are broadly similar. They deal with essential obstetric care in addition to the package of activities provided by the CSB1. They are endowed with doctor and paramedics. The main difference between these two structures is that the CSB2 lies at the municipal level, while the CHD1 is located at the district, with a generally larger capacity. In terms of medical reference, CSB1, CSB2, and CHD1 ensure especially the first contact with users of health care.

- At the third level are first-reference hospitals, either CHD2 or CHRR or regional reference hospitals. These hospitals provide more advanced health care such as emergency surgery and comprehensive obstetric care. They are staffed with more specialized medical staff (surgeon, ER specialists, anesthetists, etc.).

- At the fourth level are University hospitals or CHU, which are hospitals of second (higher) reference. They provide comprehensive health care with a staff of all specialties.

168. In 2009, the Malagasy health system, public or private, comprised a total of 3240 CSB, 131 CHD, 20 CHRR and 2 CHU with 17 institutions attached to the CHU. The public sector had 986 CSB1 and 1510 CSB2, while the private sector is also very present in

the field of health through 124 CSB1 private and 610 private CSB2 spread throughout the country. The private sector also accounts for 3 CHD1 and 41 CHD2. In terms of health personnel, the public sector had in 2009, approximately 3750 doctors and 5660 nurses or midwives.

169. **The number of facilities of basic health care grew over 2004-08 but has since stagnated.** In the public sector, the average annual rate of net creation of public CSB over 2004-08 was on the order of 35 to 40 CSB per year, or about 1½ percent per year. The number of public CSBs went from 2383 centers in 2004 to 2500 centers in 2008. The 2009 crisis has effectively stalled this progress: the net creation of public CSBs declined from 12 in 2008 to 6 in 2009, then a recovery to 40 new public CSBs in 2010, followed by a decline (of 1) in 2011. In parallel, the workforce in public CSBs, which had grown by about 1 percent per year (i.e. much less than population growth), went from 2500 in 2008 to merely 2545 in 2011. In the private health sector, on the other hand, the number of centers was 715 in 2011, having increased from 565 in 2004 (a 25 percent increase), despite the closure of 61 centers in 2010 on account of the political and economic crisis.

Table 25: Evolution of available medical facilities by type

Year	2004	2007	2008	2009	2010	2011
CSB	2,948	3,195	3,223	3,240	3,219	3,260
Public	2,383	2,488	2,500	2,506	2,546	2,545
Private	565	707	723	734	673	715
CHD1	85	70	68	66	63	63
CHD2	55	52	53	66	75	78
Total CHD	140	122	121	132	138	141
CHRR	4	20	20	20	19	18
CHU/ES	14	18	18	18	18	18

Source : Health statistical yearbook 2007-2011.

170. **Despite a modest increase in the volume of supply, there is evidence that the quality of services has deteriorated from 2005 to 2010.** A few indicators available on the characteristics of health services from the 2005 and 2010 EPM community surveys seem to confirm this trend. Availability of drugs in health centers in general decreased from 81 percent in 2005 to 74 percent in 2010, and this decline was especially more pronounced in rural areas. Furthermore, the average waiting time for a consultation slightly deteriorated, increasing from 40 minutes to 55 minutes between 2005 and 2010.

171. **It is not entirely clear if these trends pre-dated the early 2009 crisis, but they have clearly been made worse since its onset.** On the one hand, facilities and staffing numbers had not risen in line with population (a good lower-bound benchmark for the rise in demand) over 2005-2010 as a whole, before or after the crisis. On the other, the budget cuts enacted after 2009, as well as a reduction in donor funding for public health, are an important likely factor in the deterioration. The overall health budget declined from 255 billion Ariary in 2008 to Ariary 180 billion in 2009, a reduction of 30 percent (it remained broadly at this level over 2011-12, once wage inflation is accounted for). The withdrawal of non-humanitarian external financing by 35 percent also hurt the performance of the system, let alone its needed growth in volume.

172. **Ignoring quality or use, availability of basic healthcare is not universal, being least available in rural areas, or to the poorest.** In 2010, availability of formal health care (public or private) was inexistent for 16 percent of the population, but that number varies regressively across quintiles, being 10 percent for the richest, though only 4 percent of the urban richest, and 23 percent for the poorest, reaching as high as 25 percent for the poorest in rural areas: one fourth of the rural poorest does not have easily accessible health care centers.

173. **Moreover, access has worsened for the poorest between 2005 and 2010**. Comparing 2005 and 2010 on these measures shows that the situation had slightly improved for the richest, but deteriorated for the poorest. It is the change in access to public, rather than private, basic health centers that accounts for this change. In 2005, 21 percent of the rural poorest did not have access to public CSBs, but that number has increased to 34 percent in 2010. For the richest quintile, access has in fact increased from 76.5 percent of the population in 2005 to 85 percent in 2010, but here again the gains have taken place largely in urban areas.[12]

Table 26: Share of the population having access to formal care services by area and by quintile of consumption, %

	2005			2010		
Quintile	**Urban**	**Rural**	**Total**	**Urban**	**Rural**	**Total**
Quintile 1	83.5	81.2	81.5	91.2	74.9	76.5
Quintile 2	86.7	82.2	82.9	86.4	80.9	81.5
Quintile 3	89.5	78.6	80.4	89.3	85.4	86.0
Quintile 4	90.4	82.4	84.2	94.2	85.7	87.4
Quintile 5	94.6	85.2	89.1	95.8	86.3	90.5
Total	90.5	81.7	83.6	92.9	82.2	84.3

Source: Author's calculation based on households surveys 2005. 2010.

Table 27: Share of population having access to primary health care center by area and quintile of consumption, %

	2005			2010		
Quintile	**Urban**	**Rural**	**Total**	**Urban**	**Rural**	**Total**
Quintile 1	76.2	79.4	78.9	87.9	66.0	68.1
Quintile 2	80.5	79.9	80.0	81.1	73.4	74.3
Quintile 3	80.1	75.5	76.3	84.1	79.0	79.8
Quintile 4	80.6	78.4	78.9	89.7	77.9	80.4
Quintile 5	78.6	75.0	76.5	92.5	78.9	84.9
Total	79.2	77.8	78.1	88.9	74.6	77.5

Source: Author's calculation based on households surveys 2005. 2010.

DEMAND FOR CARE, INCIDENCE OF DISEASE AND HEALTH STATUS

174. The health module of the EPM survey data can be used to calculate the proportion of the population that reports to have been sick during a reference period. The reference period is a short 14 days for the EPM surveys. This indicator is useful both for judging the health

[12] There are no significant differences on a gender basis on these measures.

status of the population as a whole and to understand the demand for care. This said, it is important to note that EPM data on health are declarative answers of respondents, not professional assessments of health, and therefore subjective or affected by respondents' knowledge or awareness. In this section, we focus on data for 2001, 2005 and 2010.

175. **Between 10-12 percent of respondents indicated that they had been ill over the reference period in the 2010 survey.** This is broadly unchanged from 2001, but markedly higher than in 2005, when it averaged 7.1 percent.[13] Spurious factors, for example related to the timing of the survey or sampling, could account for the change. As indicated before, poverty incidence, as measured by consumption, did not change between the two dates, but two variables could add some explanatory power (even as they too could be affected by similar sampling or timing issues). The 2005 and 2010 survey show large differences in access to tap water (18.6 percent in 2005, declining to 11.5 percent in 2010) and latrines (41 percent of the population did not have latrines in 2005, rising to 53 percent in 2010), two variables often associated with the incidence of diseases, especially, as we will see below, the types of diseases more prevalent in Madagascar.

176. **The surveys also confirm that there were no large average differences between rural and urban areas in response rates—good or bad health does not occur at differential rates with location.** Likewise, for urban areas, in 2010, there were no large differences across quintiles of the income distribution. For rural areas, however, there is a noticeable U-shape in reported disease rates across the income distribution, with the rate high for the poorest, then decreasing in the middle quintiles and rising again for richer quintiles. This is in line with facts observed in other developing countries, showing that the rich tend to be more aware of their health status, and therefore tend to report a disease more readily. If it is the case, reported disease rates could in fact under-estimate the vulnerability of the poorest segments of the population.

Table 28: Disease prevalence by area and quintile of consumption, %

	2001			2005			2010		
Quintile	**Urban**	**Rural**	**Total**	**Urban**	**Rural**	**Total**	**Urban**	**Rural**	**Total**
Quintile 1	8.6	9.9	9.8	6.4	6.3	6.3	11.7	13.1	12.9
Quintile 2	10.9	10.1	10.2	6.0	6.4	6.3	11.4	12.1	12.0
Quintile 3	9.8	11.4	11.1	7.0	6.8	6.8	11.3	11.2	11.2
Quintile 4	10.5	11.7	11.3	8.0	7.1	7.3	11.1	12.1	11.9
Quintile 5	11.4	16.3	14.0	7.9	9.3	8.7	11.9	15.6	14.0
Total	10.7	11.5	11.3	7.3	7.0	7.1	11.6	12.6	12.4

Source: Author's calculation based on households surveys 2001. 2005 and 2010.

[13] The response rates for 2005 are atypical of similar question in other surveys. The rates were 11.3% in 2001, 11.8% in 2002, 10.8% in 2004 and 12.4% in 2010.

Table 29: Disease prevalence by age and gender, %

	2001		2005		2010	
Age group	**Male**	**Female**	**Male**	**Female**	**Male**	**Female**
Below one year old	17.7	17.6	15.9	14.9	22.3	20.0
1 to 4	13.7	10.8	9.9	9.6	14.5	14.1
5 to 14	6.7	6.5	4.2	3.9	7.9	7.8
15 to 24	6.1	9.3	3.4	5.3	6.9	11.2
25 to 65	14.4	15.9	7.3	9.6	13.6	16.6
Above 65 years old	18.8	28.2	19.6	21.6	34.2	34.0
Total	10.8	11.8	6.6	7.6	11.6	13.2

Source: Author's calculation based on households surveys 2001. 2005 and 2010.

177. **The reported incidence of disease varies greatly with age.** Children under 5 years old and seniors (over age 65) are by and large the most vulnerable. For children at one year, the rate of disease reached 21 percent in 2010, while for children one to four years, the rate was 14 percent. At the other end of the age spectrum, for individuals over age 65, the percentage is even higher, at 34 percent. Here, poverty and disease show a closer covariance: for children less than one year, the incidence among those of the poorest quintile was 22.5 percent—more than one in five. For the elderly in the first quintile, the disease rate was 42.3 percent. Being poor and old, or being poor and very young are associated with higher vulnerability to ill health, and should be a natural focus of health policy.

178. **Women appear to be slightly more vulnerable than men to disease.** In 2010, the number of women reporting ill health exceeded that of men on average by 14 percent (1.6 percentage point). The gap between men and women is higher in urban areas (20 percent). It is by age that the difference is more striking: for all individuals above the age of 15, the number of women reporting ill health exceeds that of men by 60 percent.

179. **As to the nature of reported diseases, the most cited ones are fever or the suspicion of malaria, acute respiratory infections (ARI), diarrhea and cough lasting more than three weeks.** 40 percent of all reported diseases were fever or the suspicion of malaria, followed by diarrhea (12.4 percent), long cough (8.8 percent) and ARI (7 percent). Taken together, these four reported conditions account for 70 percent of all reported diseases. They are also the leading causes of death for young children.

180. **All told, a 12 percent rate of disease implies that 2,400,000 individuals are potentially in need of curative care over a given period**. However, their decisions to seek effective remedies to some types of treatment or care will depend on other factors.

Table 30: Incidence by type of disease 2001- 2010, %

Type of disease	2001	2005	2010
Acute respiratory infections	6.9	7.5	7.0
Fever or suspicion of malaria	50.0	44.0	39.7
Diarrheal diseases	12.2	12.4	12.4
Skin infections	3.2	2.5	1.7
Bucco-dental infections	5.2	4.5	6.5
Sexually Transmitted Infections	0.9	0.2	0.4
Wounds. burns	4.5	5.1	4.8
Eye and appendix	1.2	2.0	1.6
High blood pressure	2.8	2.7	4.0
Cough exceeding 3 weeks	7.0	5.5	8.8
Gynecological infections	1.2	1.2	1.1
Measles	0.0	1.3	0.4
Others	4.9	11.1	11.7
Total	100.0	100.0	100.0

Source: Author's calculation based on households surveys 2001. 2005 and 2010.

BEHAVIORS TOWARDS ILL HEALTH

181. **In Madagascar, only about a third of people reporting a disease actually seek formal care for it.** When confronted by disease, an individual should normally approach a health center to obtain appropriate and necessary care according to the illness contracted and its characteristics. In practice, this is only rarely the case. In Madagascar, the sick may indeed resort to formal, public or private, health care centers. Over the 2001-10 period, however, a declining proportion of people have chosen to do so: the rate of recourse to formal care was close to 50 percent in 2001 but it has declined to 31 percent by 2010, according to EPM survey data. An increasing proportion self-medicate instead, and the rates have been the reverse of that for formal care, growing from 31 percent in 2001 to 50 percent in 2010. The remainder—either seeking no care at all, or seeking informal care, including from traditional healers and other tradi-practitioners such as "renin-jaza"—have remained a broadly stable proportion of the population, at about 20 percent.

Table 31: Attitudes towards illnesses from 2001 to 2010, %

Typical attitude to illness	2001	2005	2010
Self-medication	30.8	44.1	50.3
No treatment / informal care	21.8	17.9	18.7
Formal care	47.4	38.0	31.0
Total	100.0	100.0	100.0

Source: Author's calculation based on households surveys 2001, 2005 and 2010.

182. **The recourse by the poor to formal health care is very limited.** For 2010, among the poor, the consultation rate is barely half that of the rich—a ratio that has remained almost unchanged over the decade. The use of formal care varies significantly depending on the level of affluence of households in which the individual stands. The consultation rate ranged from 22 percent for the first quintile to 43 percent for the richest quintile. Such a difference can reflect both economic factors (cost of care and need to work) or, as we show next, other

factors that are correlated to poverty (such education levels[14]), but it warrants a special attention for policy.

183. **The rate of formal consultation also significantly depend on the level of education of the individual him- or herself and the education level of the head of household.** In 2010, the consultation rate for individuals without education was 37 percent lower compared to individuals with a high level of education, a phenomenon that seems to have magnified over the years. When considering the level of education of the household head, the disparity in the use of care is larger still: the consultation rate of individuals in households whose head had no education was more than 42 percent lower than that of people with better educated household heads.

184. **There are also variations, but less so, by place of residence, age and gender, with, however, a lower relative consultation rate for baby girls than boys.** More urban people, naturally, seek treatment in formal health centers than rural residents—the differential in terms of consultation rate is 7 percent. There are no large differences in terms of the gender of individuals needing care, and the small differences that existed have reversed over the decade: in 2001, women had a consultation rate 2 percentage points below that of men; by 2010, women had a slightly higher use of formal care compared to men. Hearteningly, consultation rates are particularly high for children under one year relative to the rest of the age groups. This said, a gender difference re-appears here: in 2010, the consultation rate for baby girls (less than one year old) was 41.5 percent, compared with a 52.5 percent rate for baby boys—a difference that has increased since 2001, and has no clear explanation.

Table 32: Formal care consultation rate by gender and by quintile of consumption, %

	2001			2005			2010		
Quintile	**Men**	**Women**	**Total**	**Men**	**Women**	**Total**	**Men**	**Women**	**Total**
Quintile 1	35.9	32.4	34.0	31.3	26.4	28.9	20.0	22.7	21.5
Quintile 2	42.6	45.8	44.4	36.2	36.8	36.5	26.9	27.8	27.4
Quintile 3	45.1	45.1	45.1	36.8	34.8	35.7	33.4	28.8	31.0
Quintile 4	56.0	44.2	49.7	37.4	42.2	40.3	32.1	31.3	31.7
Quintile 5	59.0	59.0	59.0	46.4	45.0	45.7	41.9	43.3	42.7
Total	48.8	46.2	47.4	38.0	38.0	38.0	30.9	31.1	31.0

2. Source: Author's calculation based on households surveys 2001. 2005 and 2010.

185. **Female-headed households seem to be relatively disadvantaged in terms of access to formal care compared to households headed by men, though mainly for poor households and households with a head of household without level of education.** The differential is small—one percentage point in favor of households headed by a man in terms of rate of consultation in 2010, and it has narrowed from 2001, when this differential was more than 6 percent. It is important to note, however, that the differences are more pronounced for FHH in the first quintile and with no education—three markers of being relatively more disadvantaged.

[14] An unexplored hypothesis could also be that health care providers offer a better service to the richest, whether they pay or not, leading the poorest to eschew care more often.

ACCESS TO CARE AND CHOICE OF CARE PROVIDERS

186. In this section, to facilitate the analysis, we regroup the different places or centers of consultation that patients can use. All the hospitals (CHD of level 1 or 2, CHR and CHRR) are grouped into a category 'hospital '. All public (level 1 or level 2) basic care centers, CSB (level 1 or 2), are designated by the generic term CSB. All private health care centers, private clinics, private basic health care centers, NGO-administered centers, and pharmacies are grouped in a 'private' group. And finally, informal centers constitute a separate group.

187. **In Madagascar, by far, the CSB remain the most used care centers in case of illness.** In 2010, more than half of the consultations made by patients (54 percent) were in CSBs, quite naturally as these are the ones most readily available to the entire population. The use of the CSB is in fact larger in rural areas—more than 61 percent of sick individuals have chosen to consult a CSB, versus 28 percent in urban areas, reflecting both accessibility and quality factors. The CSB remain the main place of access to health care for the poor, regardless of place of residence (see next Table): in 2010, for example, the use of the CSB rate was 65 percent for individuals in the first quintile of consumption compared with 43 percent only for individuals in the highest quintile.

Table 33: Distribution of the use of health facilities in case of illness by quintile of consumption, %

Year	Facility type	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5	Total
2001	Hospital	5.6	14.5	16.0	15.9	15.8	14.4
	CSB	74.5	64.2	49.3	48.8	22.4	46.6
	Private formal care	14.8	15.1	29.9	25.6	55.9	32.6
	Informal cares	5.1	6.3	4.8	9.7	5.9	6.5
2005	Hospital	7.1	6.7	6.6	3.6	12.6	7.8
	CSB	82.3	68.3	76.0	67.1	49.7	65.8
	Private formal care	5.4	18.6	14.3	24.0	31.7	21.1
	Informal cares	5.2	6.4	3.1	5.3	6.0	5.3
2010	Hospital	11.5	8.1	13.1	17.2	15.9	13.7
	CSB	65.0	63.3	55.2	51.7	42.7	53.6
	Private formal care	14.5	23.1	26.7	26.6	37.8	27.6
	Informal cares	9.1	5.4	5.0	4.5	3.5	5.2

Source: Author's calculation based on households surveys 2001. 2005 and 2010.

188. **The utilization rate of the CSBs has however declined from 2005, while recourse to hospitals and private health care centers has increased**. In 2005, CSB consultation rates accounted for 66 percent of the total, decreasing to 54 percent by 2010. In parallel, the use of hospitals has almost doubled from 8 percent in 2005 to 14 percent in 2010, while the use of private centers increased from 21 percent in 2005 to nearly 28 percent in 2010. In urban areas, the shift towards hospitals seems to have benefitted the poor. The first (poorest) urban quintile displays a consultation rate in hospitals of 45 percent (compared with 20 percent for individuals in the fifth, richest, quintile). Hospitals have been more pro-poor in urban areas. In rural areas, in contrast, access to the services of hospitals remains the privilege of the richest households.

189. **Private health centers are often deemed to offer services of superior quality but such services remain largely inaccessible for the poor.** In rural areas, the rate of use of private care services in 2010 was only 14 percent among individuals in the first quintile compared to 30 percent for those in the fifth quintile, indicating a large role for quality, while in urban areas, 21 percent of individuals in the poorest quintile seek private formal care, and more than half of the richest do. However, it is useful to note that the gap between the rich and the poor with regard to access to private services has decreased between 2005 and 2010, and that both rich and poor have increased their use of private care. Interestingly, there is a gender difference in recourse to private care to the benefit of women, whereas men visit CSBs and hospitals, a phenomenon that has increased since 2005.

Table 34: Distribution of the use of health facilities by type and by area, %

		Urban			Rural		
Year	**Facility type**	**Quintile 1**	**Quintile 5**	**Ensemble**	**Quintile 1**	**Quintile 5**	**Total**
2001	Hospital	33.0	22.3	26.0	2.7	11.2	10.1
	CSB	35.8	23.1	32.3	78.5	21.9	51.8
	Private formal care	29.2	50.7	37.7	13.3	59.6	30.7
	Informal cares	2.1	3.9	3.9	5.4	7.3	7.4
2005	Hospital	20.8	22.6	19.0	4.6	6.2	4.0
	CSB	60.6	31.1	39.9	86.1	61.5	74.4
	Private formal care	7.2	41.6	35.1	5.1	25.5	16.5
	Informal cares	11.4	4.6	5.9	4.1	6.8	5.1
2010	Hospital	44.9	20.4	25.5	7.6	13.1	10.2
	CSB	28.4	24.5	27.9	69.2	54.4	61.1
	Private formal care	21.2	50.7	41.3	13.7	29.5	23.6
	Informal cares	5.5	4.4	5.3	9.5	3.0	5.1

Source: Author's calculation based on households surveys 2001. 2005 and 2010.

HEALTH CARE COSTS AND HOUSEHOLD HEALTH SPENDING

190. EPM data at the same time provide information on the costs incurred by patients depending on the type of health center they consult and also the total amount of expenditure incurred by households on health in a year. The cost of treatment of an illness or injury includes the cost of consultation, the cost of transport and the cost of drugs and other benefits.

191. **The structure of expenditure per treatment, across types of care centers, ignoring the type of disease, shows, unexpectedly, a relatively higher cost of treatment in hospitals.** This could reflect both the higher costs of hospitalization, and the fact that the cases treated in hospitals are typically more severe. In 2010, the treatment of diseases in hospitals required approximately 45,000 Ar from households. Private centers are also relatively more expensive with an average cost of 25,000 Ar by treatment. The most accessible formal centers remain the CSB, at an average cost of 11,000 Ar.

192. **However, average costs per type of center exhibit disparities, particularly if one takes into account the affluence of households.** For the same health center and even for the same type of disease, the average cost of treatment incurred by the poorest is significantly lower than that of the richest. For example, in hospitals, the average expenditure per treatment of the individuals in the first quintile is 16,000 Ar against 76,000 Ar for those in the

fifth quintile. A more likely interpretation would be that the poor seek less onerous care because of cost, even though they do so less often, and probably for more severe cases.

Table 35: Average cost of illness treatment by type of health facility in 2010

Facility type	Quintile of consumption					Total
	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5	
Hospital	16,436	35,148	18,513	36,965	75,986	44,691
CSB	7,037	14,291	8,333	15,675	13,102	11,827
Private formal care	8,474	8,432	14,473	21,708	38,242	25,021
Informal cares	4,528	9,849	6,970	5,962	15,231	8,556

Source: Author's calculation based on household survey 2010.

193. **Spending on health by household also shows significant disparities across the income distribution.** The lower ability to pay of poorer households shows up in their average spending levels on health care: in 2010, expenditure in health of the poorest was approximately 8,000 Ar, an amount which is a fifth of the amount spent by the richest (45,000 Ar). Ignoring food expenditures, which are generally incompressible for poor households, spending on health care weighs relatively heavier in all of their non-food expenditure, being twice as high as a share as for the richest: for households in the first quintile, the percentage of spending on health in the total non-food spending is about 4.3 percent, compared to 2.3 percent for the highest quintile.

Table 36: Average health expenditures by households (in current Ariary)

Year	Type of expenditure	Quintile of consumption					Total
		Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5	
2001	Average health expenditures	3,814	4,930	9,902	13,411	31,757	11,073
	Average non-food expenditures	87,859	129,557	218,528	402,346	1,210,008	343,574
	% health expenditures	4,3%	3,8%	4,5%	3,3%	2,6%	3,2%
2005	Average health expenditures	5,428	7,199	12,726	14,391	24,661	11,645
	Average non-food expenditures	167,515	208,092	265,134	368,272	1,057,049	360,475
	% health expenditures	3,2%	3,5%	4,8%	3,9%	2,3%	3,2%
2010	Average health expenditures	8,013	13,616	15,625	22,789	45,171	18,582
	Average non-food expenditures	186,772	276,662	363,662	601,849	1,861,364	548,986
	% health expenditures	4,3%	4,9%	4,3%	3,8%	2,4%	3,4%

Source: Author's calculation based on households surveys 2001, 2005 and 2010.

194. Affordability, related to 'income' and 'cost of treatment' are among the factors which play heavily on the poor's access to health care. In addition to this, it should be noted that the cost of treatment alone may be inadequate to grasp the situation. Indeed, there are also opportunity costs related to other factors such as the duration of travel to more distant centers, the problem of inactivity and thus loss of income due to illness, etc. It is worth noting that, according to households themselves; health problems are the second source of shock, after the shocks related to the environment and natural hazards, which affects the well-being of households.

ESTIMATION OF THE DETERMINANTS OF ACCESS TO CARE

195. In this sub-section, we use a simple econometric model to try to identify the current determinants of access to care in Madagascar in the light of all the facts noted above in descriptive terms. As access to care may be influenced by specific factors on both the supply and on the demand side, it is necessary to specify these different factors jointly in order to isolate and evaluate their effective contribution to access to care.

196. On the demand side, the characteristics of the individual such as gender, age, etc., are taken into account in the model as these features may contain information on determinants of choice of care, including specific beliefs, knowledge or behaviors affecting access to care. The regression also includes characteristics of households themselves, and of its head, including, as one proxy for income, the consumption quintile to which the household belongs, and another proxy for well-being, namely an index of the volume and quality of the assets owned by the household, and the type of housing (that we also digitize into a quintile index). With respect to supply, the availability and volume of supply are considered through the number of health centers (FS, *formations sanitaires*) available in the community where households live. An indicator of opportunity cost is the distance of the health center, as reported by households. Finally, the variable "cost" is also introduced in the model to capture price effects on access to care. Finally, the characteristics of the disease must also be taken into account, drawing on available data, the types of disease and duration of disease are introduced in the model.

197. The model is estimated for the formal general health care access and the access to basic, especially health care. Given the significant difference that exists between rural and urban areas in Madagascar, the model is also estimated for the whole of the country and for both places of residence.

198. The type of model used is the multi-level logistic model, given that certain factors are common for certain individuals, such as household and community characteristics. Within this framework, the model takes into account fixed effects at the community level. The variance of coefficients of the model also takes into account a cluster at the level of the community. The results of the estimation of the model are as follows:

Table 37: Result of an estimation of a multi-level logistic modelisation of determinants of access to health care

	Access to formal care			Access to primary care		
Variables	**Total**	**Urban**	**Rural**	**Total**	**Urban**	**Rural**
Individual						
Female	0.987	0.968	1.012	1.006	1.014	1.005
Primary education	1.043	0.965	1.183	1.074	0.958	1.214
Secondary education and above	1.01	0.992	1.087	0.725*	0.611**	0.905
Children below 1 year old	2.450***	2.443***	2.574***	2.530***	2.492***	2.524***
Children aged 1-4 years old	1.066	0.963	1.172	1.178	1.139	1.193
Individuals aged 15 to 24 years old	1.107	0.989	1.212	1.285*	1.485	1.14
Adults aged 25 to 65 years old	1.008	0.914	1.074	1.169	1.245	1.102
Adults above 65 years old	0.957	0.877	1.039	0.931	0.604	1.127
Head of household						
Female	0.973	0.92	0.951	1.064	0.83	1.16

	Access to formal care			Access to primary care		
Variables	**Total**	**Urban**	**Rural**	**Total**	**Urban**	**Rural**
Divorced	0.838	0.867	0.831	0.815	0.994	0.791
Widower	1.07	1.106	1.056	1.044	1.929**	0.723
Single/ others	0.951	1.064	0.74	0.769	0.737	0.803
Family in polygamy	1.31	1.396	1.353	0.859	0.407	1.099
Primary education	1.028	0.849	1.217	1.183	1.038	1.243
Secondary education and above	1.042	0.893	1.177	1.360**	1.493*	1.062
Farmer	0.857	0.891	0.813	1.053	1.145	1.067
Quintile of consumption						
Quintile 2	1.199	0.917	1.404**	1.317*	1.29	1.321
Quintile 3	1.572***	1.188	1.908***	1.660***	1.356	1.848***
Quintile 4	1.691***	1.475**	1.760***	1.731***	1.643	1.773***
Quintile 5 (most wealthy)	2.013***	1.601**	2.293***	1.969***	1.786*	1.989***
Quintile of well-being						
Quintile 1 (most wealthy)	1.650***	1.810***	1.496*	1.085	1.105	1.182
Quintile 2	1.2	1.303	1.144	0.899	0.945	0.942
Quintile 3	1.234*	1.321	1.165	1.121	1.194	1.143
Quintile 4	1.072	0.974	1.136	1.031	0.855	1.106
Household size						
3 to 4 people	1.453***	1.580***	1.197	1.465**	1.770**	1.300
5 to 6 people	1.446***	1.513**	1.187	1.336	1.194	1.414
7 to 8 people	1.466***	1.774***	1.085	1.476**	1.696*	1.37
9 people and more	1.847***	2.086***	1.419	1.945***	1.811*	1.942**
Rural area	0.934			2.505***		
Type of illness						
Acute respiratory infection	1.254*	1.428**	1.088	1.314*	1.764**	1.146
Diarrheal diseases	1.393***	1.267*	1.484***	1.167	1.22	1.161
Skin infections	1.868***	2.054**	1.54	1.042	0.948	1.065
Bucco-dental Infections	0.626***	0.687**	0.524***	0.467***	0.491**	0.455***
Sexually transmitted infections	1.813	2.141	1.304	2.375*	6.194***	0.835
Wounds, burn	0.798	0.896	0.677*	0.783	1.099	0.609**
Eye and appendix	0.677	1.11	0.365**	0.388**	0.763	0.260***
High blood pressure	1.249	1.379*	1.201	0.697	0.571	0.911
Cough exceeding 3 weeks	0.906	0.948	0.853	0.843	1.159	0.719*
Gynecological Infections	3.355***	4.706***	2.233**	0.812	0.285	1.093
Measles	1.285	1.621	0.631	0.986	1.77	0.514
Other diseases	1.116	1.244	1.009	0.831	1.143	0.679**
Illness duration						
2 to 4 weeks	1.867***	1.967***	1.765***	1.611***	1.444*	1.800***
1 month to 1 year	2.851***	2.951***	2.776***	1.778***	1.377	2.149***
More than one year	1.754***	1.263	2.564***	1.501***	0.605*	2.429***
At community level						
1 to 3 health centers available	1.145	1.617**	1.066	0.979	1.302	0.974
4 to 6 FS health centers available	1.612***	2.126***	1.562	1.332	1.761	1.222
More than 6 health centers available	0.946	1.377	0.847	0.776	1.299	0.58

	Access to formal care			Access to primary care		
Variables	**Total**	**Urban**	**Rural**	**Total**	**Urban**	**Rural**
Health center located at less than 500m	0.883	0.88	0.85	0.862	0.981	0.694*
Health center located at less than 1Km	0.844	0.527**	1.188	0.93	0.484	1.079
Health center located at more than 1Km	0.645**	0.546**	0.711	0.743	0.867	0.580*
Consultation cost below 800 Ar	0.963	0.947	0.875	0.932	0.901	0.833
Consultation cost between 800 and 1500 Ar	0.869	0.824	0.86	0.691*	0.731	0.589**
Consultation cost above 1500 Ar	0.863	0.722*	1.011	0.587***	0.499**	0.576**
Hospital available	1.134	0.912	1.43	1.12	0.746	1.965**
Private center available	0.871	0.968	0.77	0.495	0.547	0.333
CSB available	1.892***	3.132***	1.615**	2.678***		2.192***
Private clinics available	0.922	0.896	0.976	0.834	0.663	1.732
Private physicians available	1.191	1.129	1.347	2.01	2.34	2.592
Intercept	0.088***	0.064***	0.096***	0.013***	0.027***	0.047***
LnSigma2	0.691	0.475	0.902	1.116	1.379	0.892
N	6363	3168	3195	6363	3168	3195
Sigma	0.831	0.689	0.95	1.056	1.174	0.944
Rho	0.174	0.126	0.215	0.253	0.295	0.213

Source: Author's calculation based on household survey 2010.
Note : * p<0.1 ; ** p<0,05 ; *** p<0,01.

199. The coefficients of the model are presented in the form of "odds ratios": they measure the relative probability that an individual of given characteristics has access (seeks and obtains) care relative to a reference (coefficients higher than one indicate a higher such probability, and those lower than one indicate a lower probability). The stars indicate the statistical significance of the coefficients. Based on this regression:

- Few individual characteristics actually show a statistically significant influence on access, nor do characteristics of the head of the household. This is true regardless of place of residence or type of care. Some results of the descriptive analysis are therefore not confirmed: the coefficients of the gender variables (whether an individual is a woman, or whether the head of the household is female) are all non-significant.

- The level of education of the individual displays a rather unexpected impact on access to care: in urban areas, compared to individuals without education level, individuals with a high level of education (secondary or above) have an access to care that is 40 percent lower. It is possible that better educated people, being more knowledgeable about diseases, seek less care than less educated people.

- Younger children (less than one year) have a much higher rate of access, up to two times that of the baseline which is the group of 5-14 years (this reference group has both the lowest rate of disease and lowest rate of consultation). The regression results thus show that younger children received significant attention for health care. This is not the case for children in the 1-5 age group, or for the elderly, however, two

vulnerable groups in terms of incidence of disease (while the 15-24 age group shows a higher coefficient, despite being close to the reference group on incidence of disease).

- Among the characteristics of the head of household, the level of education is significant and positive (higher than one) for heads of HH having higher education, consistent with intuition. On the other hand, the other characteristics of the head of household show no significant effect.

- With regard to 'income', the results clearly show a positive and significant association between access to care and the level of affluence of the household of an individual, regardless of place of residence or type of access (formal or basic). This result is partly corroborated by the index of well-being, though only for the case of access to formal care. This effect is not significant for access to basic urban health care, possibly reflecting broad, near universal access.

- With regard to the size of the household, this variable displays a positive and significant association with access to care especially in urban areas. It is possible that this effect reflects awareness of a higher risk of transmission of diseases in larger families, and the attendant higher attention to being treated when sick to prevent it.

- Diseases of the mouth and teeth, and of the eyes, are under-treated, while gynecological cases, respiratory issues and diarrheas prompt significantly more access, though mainly in urban areas.

- With regard to the variables relating to supply, availability (number of health centers in the community, or presence of a CSB) and distance have significant effects in the intuitive direction. The presence of a CSB has a large effect on access to care, much more so in urban areas. Distance has a negative effect, but mainly in urban areas. Treatment costs have a negative and significant effect on access to care, especially for access to basic health care in both urban or rural areas.

Chapter 5: Non-Income Dimensions of Poverty

The share of food consumption remained around 75 percent for the poorest 3 deciles of the consumption distribution, while significantly increased for the total population. The composition of the food basket changed during the 2000s with a significant shift from higher quality and more expensive food items such as eggs, milk, and meat towards cheaper and lower in nutritional quality items such as fruits, tubers, and vegetables. A similar trend is observed among both poor and the poorest households.

The core items of the durable goods module in the Madagascar surveys remained essentially unchanged over 2001-10. Total asset ownership index slightly increased during the 2000s, primarily due to the introduction of cell phones. Asset ownership indices are higher in urban then in rural areas; rural areas grew faster in terms of traditional asset ownership, while urban are faster in the new technology. There is a strong negative correlation between asset index and level of absolute or extreme poverty. Assets ownership in Madagascar has slightly improved in 2010 in comparison to 2001.

One of the non-income dimensions of welfare is access to tap water at home, which has sharply declined over the decade. Regarding cooking gas, a deterioration has also been observed during the 2000s. A small improvement took place on the toilet at home indicator, though levels of access for the poor, or for rural populations, remain very low. Access to electricity is another common indicator used to assess non-income dimensions of poverty and it is very low in Madagascar, especially in rural areas, and absent from the lives of most of the poor.

About a third of the population in Madagascar is deprived on multiple dimensions—the "have nothings", whether in consumption, literacy and education, basic household assets, or electricity.

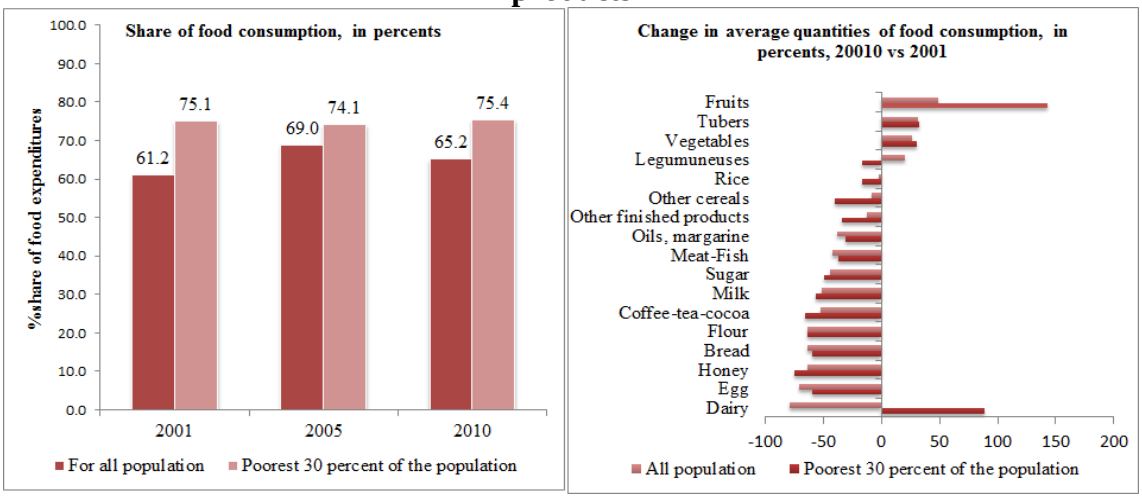
200. This chapter explores the multidimensional characteristics of population directly associated with households' material deprivation and poverty. Income or consumption poverty often strongly correlates with material deprivation variables and lack of basic services. Households' welfare is influenced by a range of characteristics other than consumption and improvements in these indicators would show a positive trend in the wellbeing of the population. Households with a higher consumption level are likely to live in a better house, own durable goods, get better services, and have better education outcomes. Richer household normally has access to electricity, water, sanitation, and a modern set of goods such as cell phones and possibly access to internet and a computer.

201. A majority of the population in Madagascar is in fact lacking in these assets and services, but changes in these indicators over time would serve as a consistency check for the consumption poverty trends, and can be easily targeted for poverty reduction and labor related policies. A number of non-consumption indicators available in the EPM surveys will be analyzed in this chapter during the 2000s, for both the general population and the poor. The analysis will be carried out in five key areas, namely: the composition of the food basket, asset ownership, electricity access, literacy levels, and access to basic services. Earlier work on poverty in Madagascar, similarly as in many other countries, shows that poverty and these characteristics are closely associated.

202. This chapter consists of four sections and is organized as follows: Section A looks at composition of the food consumption of the population, Section B describes and analyses assets ownership index as a measure of material deprivation, Section C discusses access to basic education, and Section D describes access to services indicators and looks at multidimensional deprivation.

A. SHIFT IN THE CONSUMPTION BASKET COMPOSITION

Figure 42: Share of food consumption increased and people started to consume cheaper products



Source: Author's calculations.

203. **The share of food consumption remained around 75 percent for the poorest 3 deciles of the consumption distribution, while significantly increased for the total population.** Shares of food expenditures in total expenditures over time are an alternative measure of poverty and wellbeing of the population. The higher the share of food, the lower the possibility of spending on other than basic food items by the households and higher level of poverty. In this dimension, however, Madagascar also shows little improvement, especially for the poor. As shown in the Figure 42, the share of the food consumption by the population increased from 61.2 percent in 2001 to 69 percent in 2005, and then decreased to 65.2 percent. The increase of the food share in Madagascar is clearly a bad sign, supporting our finding of deterioration in the overall welfare and increase in poverty. The proportion of food consumption is especially high as the consumption takes in the consideration the imputed value of housing and durable goods.

204. **The composition of the food basket changed during the 2000s with a significant shift from higher quality and more expensive food items such as eggs, milk, and meat towards cheaper and lower in nutritional quality items such as fruits, tubers, and vegetables.** The deterioration of the economic situation of the population is clearly visible based on the changes in the average quantities of the food items. The consumption of the initially more expensive items such as meat, eggs, honey, bread, and flour has fallen and is being substituted by relatively cheap items such as fruits, tubers and vegetables. Not only the quantities of quality and expensive food items have been reduced but the share of expenditures on these components has fallen. For example, the share of meat expenditures in total food expenditures was 17.1 percent in 2001, and fell to 10.7 percent in 2010.

205. **A similar trend is observed among both poor and the poorest households.** Among the households placed in the first three deciles of income distribution meat expenditure share in total food expenditure fell from 9.1 percent to 5.8 percent during the 2000s. The fact that both shares of consumption and shares of expenditures on meat has fallen indicates that the changes are associated with loss of welfare rather than changes in the consumption patterns due to price volatility. The shift to the consumption of cheaper foods confirms the deterioration of the socio-economic situation in the country.

B. ASSET OWNERSHIP INDEX AS AN INDEX MEASURING THE LEVEL OF MATERIAL DEPRIVATION AND WELFARE DEVELOPMENT

206. Another non-income measure associated with households' material deprivation is shown through an asset ownership index. The idea behind creating an asset ownership index is not new and has been used in various studies worldwide. The index is usually built based on set of comparable durable items and goods available in consecutive surveys. The resulting index could be constructed on the national level or could be assigned to each household. The household level asset ownership index has its own benefits as it allows linking the index with the welfare aggregate and poverty. A problem associated with the use of this index, as opposed to the income-related measures, is in allowing for households' preferences in its determination. For example, households could decide whether to use a land line or a cell phone, or whether to buy a car or use a public transportation. At the same time, if well measured, asset ownership index is a good tool to measure wellbeing of the population. It is calculated on physical quantities, avoiding measurement issues related to price comparability and measurement errors are minimal. To overcome households' preference problem, a larger number of very basic assets could be used and the index will measure number of items the households own.

Table 38: Asset ownership in Madagascar

	Total			Urban			Rural		
	2001	2005	2010	2001	2005	2010	2001	2005	2010
TV	13.5	10.7	12.2	34.8	35.8	35.9	7.4	3.6	6.2
Moped / Moped	0.8	1.2	1.3	1.3	2.5	2.3	0.7	0.9	1.0
Bicycle	12.4	19.2	22.1	17.9	18.8	26.8	10.8	19.4	20.9
Landline	0.5	0.5	0.8	1.6	1.9	1.9	0.2	0.1	0.5
Radio	24.9	35.6	40.4	32.6	32.4	44.2	22.6	36.5	39.4
Bed	74.8	77.0	76.3	90.1	87.3	85.8	70.4	74.1	73.8
Other Furniture	21.2	22.3	28.0	38.8	37.9	42.4	16.1	17.9	24.4
Private Car (Excluding Car Function)	1.7	0.9	0.9	3.5	2.7	2.4	1.1	0.4	0.5
Chair	56.4	50.1	50.7	78.7	72.1	69.4	49.9	43.9	45.9
Camera	0.1	0.2	0.9	7.0	6.0	4.0	0.2	0.2	0.7
Gas Stove	1.7	1.2	0.9	4.8	4.2	2.6	0.8	0.4	0.4
Chain Hifi	2.8	6.4	2.6	6.4	19.9	7.5	1.8	2.5	1.4
Refrigerator	2.4	1.9	1.7	5.8	6.7	5.7	1.4	0.6	0.7
Video Recorder	1.4	0.9	0.5	4.0	3.3	1.1	0.7	0.2	0.3
Freezer	0.7	1.9	0.7	2.4	3.0	2.2	0.2	1.6	0.3
Table	62.6	56.7	57.6	82.1	74.9	74.3	57.0	51.5	53.3
Sewing Machine	18.8	11.8	10.1	31.6	18.4	17.7	15.0	10.0	8.1
Musical Instruments	1.4	0.8	1.4	2.3	1.7	3.0	1.2	0.5	1.0
House	82.3	83.0	87.7	63.3	64.1	73.1	87.8	88.3	91.4
Computer	0.2	0.5	1.1	0.8	1.7	3.4	0.0	0.1	0.6
Mobile Phone	1.8	3.3	24.2	4.5	12.2	51.6	1.0	0.8	17.2

Source: Author's calculations.

207. **The core items of the durable goods module in the Madagascar surveys remained essentially unchanged over 2001-10.** Table 38 presents summary statistics for the selected assets included in the asset ownership index. The figures in the table indicate the proportion of the particular asset's ownership. For instance, 13.5 percent of the population in Madagascar owned a television set at home in 2001. The figure has reduced to 10.7 in 2005 and to 12.2 in 2010. In urban areas, the proportion of TV ownership has been significantly higher than in the rural areas. Exploring asset ownership in Madagascar has interesting outcomes:

- Most durable goods are owned by the urban population. Urban asset ownership prevails in almost all explored items. Only house ownership is higher in the rural areas, but this is related to the differences in housing market, urban rentals, and rural-urban house ownership differentials. It is also possible that the list of chosen items is not necessarily representing the assets used by rural population (farm implements, livestock and stocks of grains are alternative forms of asset ownership, more prevalent in rural areas).
- Very few of the items are owned by 50 percent of more of the total population. Basic assets such as refrigerators or gas stoves have a very small share in the asset's ownership.
- Cars and other expensive items are very rare elements, and very urban (as residents of Antananarivo may not be fully aware of).
- Radios and mobile phones are two items where ownership has grown significantly in the decade. Mobile phone ownership is growing very fast and at the time of the 2010 survey, 25 percent of the population owned a cell phone as opposed to only 1.8 percent in 2001.

208. **Three asset ownership indices have been constructed: for total, traditional, and new technology asset ownership.** Each one is comprised based on the number of relevant items the household owns. Each household received a score in accordance with the number of items from the predefined list it owns. For a "total index", the maximum number of items in each year used was 21, and the index includes all traditional basic items such as a house, radio, chairs, refrigerator, etc., plus the newly available on the market items such as cell phones, computer, and internet connection. If a household owns 6 items out of 21, the asset index score for this household will be 6. Thus, the total index ranges from 0 to 21, where 0 means that the household does not own any of the items in the list and 21 if it owns all 21 items. A second index, called traditional index, excludes newly available items; and the third index is an index for just the three new technology related items. Three different indices capture traditional assets as well as changes happening due to technological revolution, following up on the way it penetrates different population segments[15].

Table 39: Indices of asset ownership in Madagascar

	Total index			Traditional index			New Technology index		
	2001	2005	2010	2001	2005	2010	2001	2005	2010
Total	4.16	4.12	4.41	4.14	4.08	4.14	0.02	0.04	0.27
Quintile 1	2.49	2.91	2.81	2.49	2.91	2.75	0.00	0.00	0.05
Quintile 2	3.17	3.34	3.38	3.17	3.34	3.27	0.00	0.00	0.11
Quintile 3	3.65	3.78	4.05	3.65	3.78	3.88	0.00	0.00	0.17
Quintile 4	4.63	4.42	4.96	4.63	4.41	4.65	0.00	0.01	0.32
Quintile 5	6.87	6.17	6.84	6.77	5.98	6.15	0.10	0.19	0.69
Urban	5.54	5.44	5.84	5.49	5.29	5.26	0.06	0.14	0.57
Rural	3.75	3.75	4.04	3.74	3.74	3.85	0.01	0.01	0.19
Antananarivo	5.52	4.99	5.72	5.47	4.91	5.27	0.06	0.08	0.45
Extreme poor	3.12	3.36	3.44	3.12	3.35	3.33	0.00	0.00	0.11
Poor	3.30	3.55	3.69	3.30	3.55	3.54	0.00	0.00	0.15
Non-Poor	6.25	5.84	6.59	6.18	5.69	5.96	0.07	0.15	0.64

Source: Author's calculations.

209. **Total asset ownership index slightly increased during the 2000s, primarily due to the introduction of cell phones**. The increase in the recent period was due to the fast increase in their use. Table 39 presents summary statistics of the three asset ownership indices for total economy, and disaggregated by consumption quintiles, urban, rural and capital location, and level of poverty. Total asset ownership index fell slightly during the 2001 to 2005 period, and then recovered reaching its maximum in 2010. The development in the asset ownership depends highly on the inclusion of the cell phones. New technology index soared during the second part of 2000s, while traditional index remained stagnant. Traditional index fell from 4.14 to 4.08 during the first half of the 2000s and came back to the 2001 level in 2010. In other words, if not for introduction of cell phones during the 2000s, the situation in terms of the asset ownership in Madagascar would remain unchanged throughout the decade.

210. **New technology penetration, especially attributed to wide use of cell phones, became widespread in Madagascar; however, despite a high usage of cell phones as of**

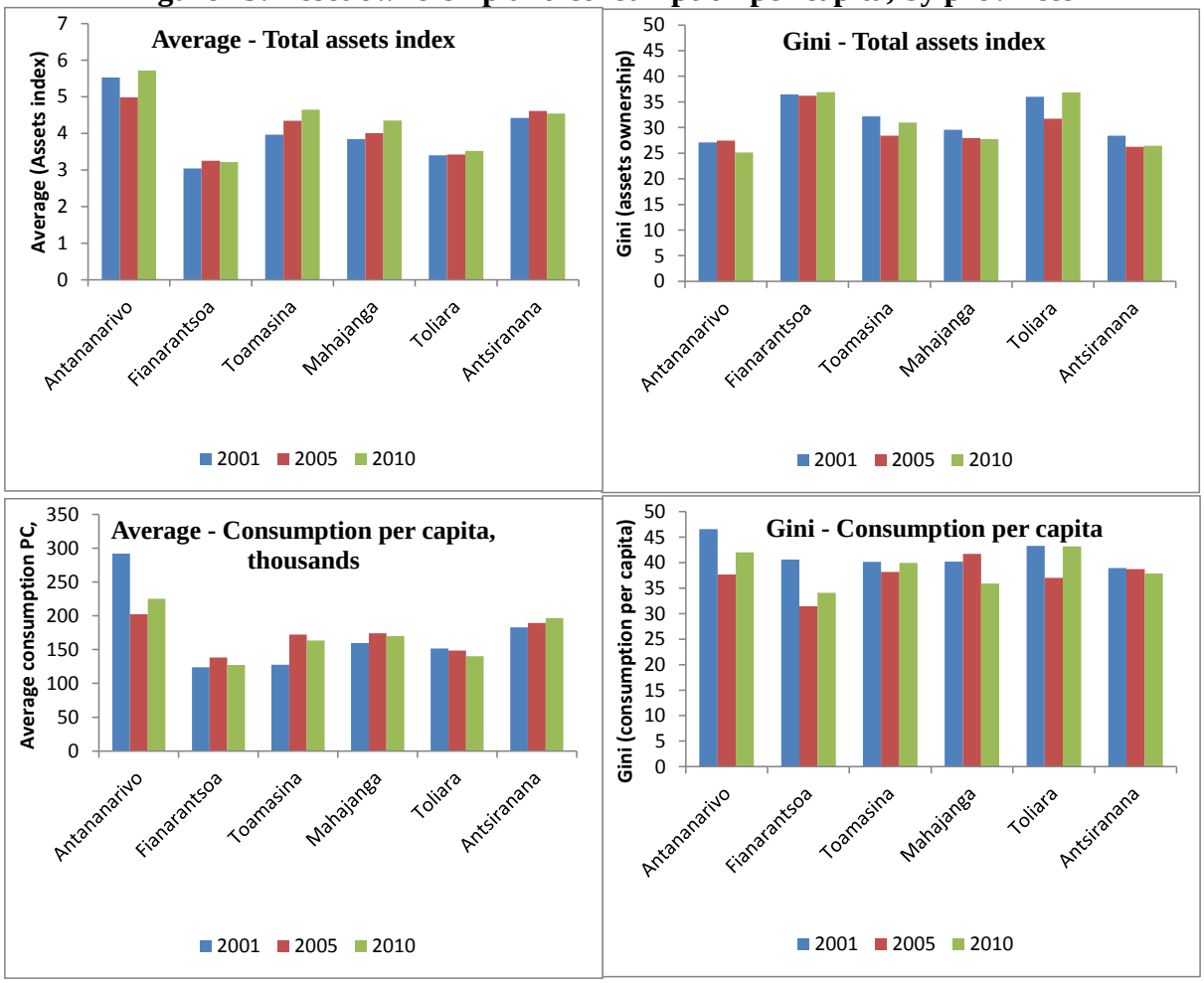
[15] Clearly, as the items are selected separately in each index, the total index is the sum of the Traditional and New technology indices.

2010, less than 1 percent of the population has access to the computers. In 2001, only 1.8 percent of the population had access the cell phones, while in 2010 this figure reached 24 percent. New Technology asset ownership index has increased accordingly reaching 27 percent in 2010. Despite the increase in the use of cell phones, the number of computers used by the population is still minimal. Approximately 1.1 percent of the population in Madagascar owns a computer.

211. **Asset ownership indices are higher in urban then in rural areas; rural areas grew faster in terms of traditional asset ownership, while urban are faster in the new technology.** Population living in urban areas has higher Total asset ownership index than in the rural areas, while the index is not different in the capital than in other urban areas. The differences between urban and rural exist, but they are not as striking as the differences in poverty rates. Over time, rural areas have experienced improvement in all three indices, while urban areas did not improve in the traditional index. The cell phones' penetration was very fast in the urban areas-much faster than in rural, which made total index in the urban areas to rise as fast as in the rural. Overall conclusion is that rural areas develop faster than urban in terms of traditional asset ownership, while urban growth is associated with the cell phones penetration.

212. **There is a strong negative correlation between asset index and level of absolute or extreme poverty**. The total asset index among non-poor is almost as twice as high as that of the extreme and absolute poor. However, over time, the changes in indices are not consistently positive for the non-poor, in line with other trends: the non-poor population experienced a reduction in traditional asset ownership, from 6.18 in 2001 to 5.69 in 2005, then a small increase to only 5.96. This is confirmed in the analysis by the quintiles of the consumption: the asset indices increased between 2001 and 2010 for the lowest quintiles and middle of the distribution, but decreased for the top quintile.

Figure 43: Asset ownership and consumption per capita, by provinces

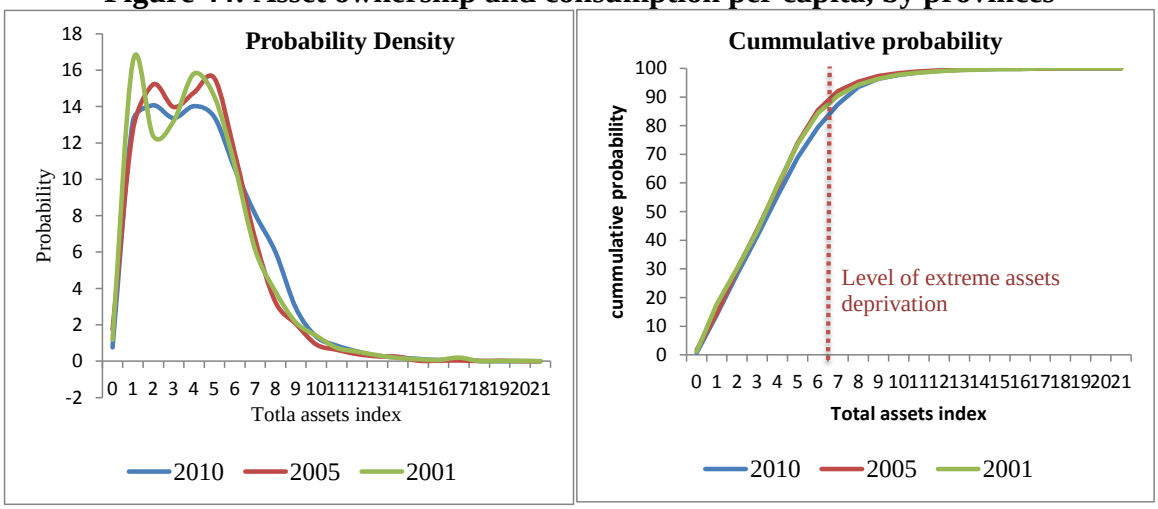


Source: Author's calculations.

213. On a provincial level, the level and changes of the total asset index highly correlates across provinces with the consumption index, but it shows both lower variance and differences in terms of inequality (see Figure 43).

- The gaps between provinces are significant both in terms of asset ownership and in consumption per capita and the ranking of the provinces are broadly similar for both indicators.
- Both asset ownership and average consumption are the highest in Antananarivo. The capital remains the richest region both in terms of the incomes/consumption and in terms of asset ownership. In terms of consumption, the differences with other regions are more pronounced.
- Antananarivo is a very diverse region in terms of income inequality, but much more equal than other regions in terms of asset ownership.
- Changes over time in asset ownership and in consumption are not necessarily correlated within provinces.

Figure 44: Asset ownership and consumption per capita, by provinces



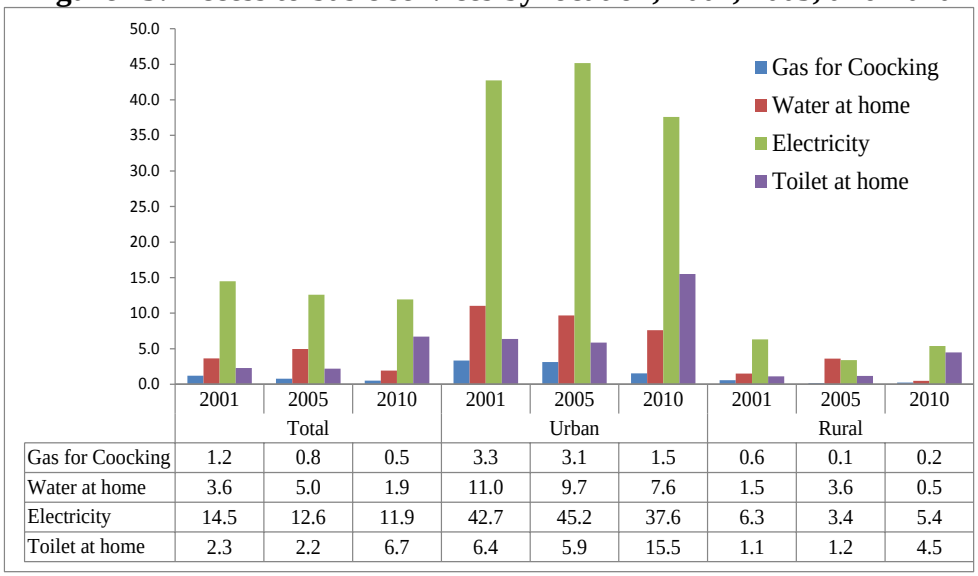
214. **Assets ownership in Madagascar has slightly improved in 2010 in comparison to 2001.** Total asset ownership indicator could potentially range from 0 to 21, but in reality a vast majority of the Malagasy own less than 10 items. Figure 44 shows the density and cumulative distribution of the index. The charts clearly shows that most of the distribution falls below 10 items and the country average and medians are between 4 and 5. According to the analysis, asset ownership in Madagascar has slightly improved in 2010 in comparison to 2001. Based on the total asset index we defined a level of deprivation which we called "extreme asset deprivation". It is arbitrarily set at 7: if the household owns less than 7 of the basic items it is considered materially deprived. Based on this definition, close to 80 percent of the Malagasy owns 6 or less of these items.

215. **An analysis of asset ownership analysis in Madagascar confirms general story of the stagnation in the economy during the 2000s.** The situation has marginally improved due to the introduction of the cell phones which drives an improvement in the modern asset ownership index. Ownership of the traditional items has hardly improved at all. Asset ownership index is higher in the urban areas but in rural it is developing faster, albeit at a low level. A vast majority of the Malagasy population owns a small portion of the list of basic items. Close to 80 percent of the population could be called deprived in terms of basic asset ownership. There is a high correlation in the asset ownership and level of poverty in Madagascar—close to 90 percent of the poor are heavily deprived of asset ownership.

C. DETERIORATION IN MAJOR NON-INCOME WELFARE INDICATORS

216. A number of non-consumption indicators of welfare show significant deterioration between 2001 and 2010. Some indicators deteriorated for the general population and the poor alike (Figure 45). The losses in the key areas like access to electricity or tap water coincide with the deterioration in the income poverty.

Figure 45: Access to basic services by location, 2001, 2005, and 2010

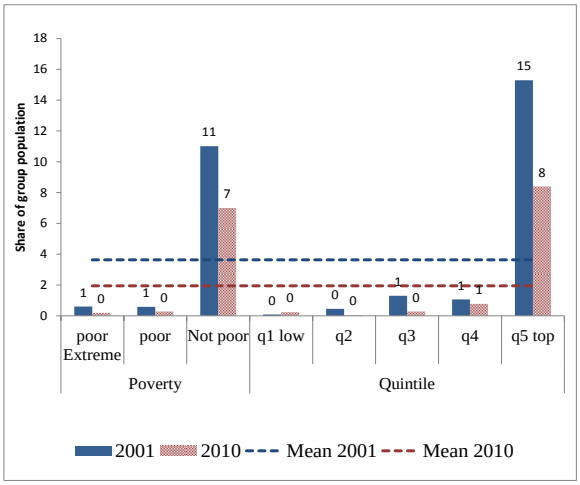


	2001	2005	2010	2001	2005	2010	2001	2005	2010
	Total			Urban			Rural		
Gas for Coocking	1.2	0.8	0.5	3.3	3.1	1.5	0.6	0.1	0.2
Water at home	3.6	5.0	1.9	11.0	9.7	7.6	1.5	3.6	0.5
Electricity	14.5	12.6	11.9	42.7	45.2	37.6	6.3	3.4	5.4
Toilet at home	2.3	2.2	6.7	6.4	5.9	15.5	1.1	1.2	4.5

Source: World Bank staff calculations from EPM data.

217. **One of the non-income dimensions of welfare is access to tap water at home, which has sharply declined over the decade.** Access to tap water at home is the basic indicator used in various studies to assess inequality of opportunity. In Madagascar, access to indoor tap water appears to have deteriorated in rural and in urban areas during the 2000s, and remains at very low level everywhere, but especially in the rural areas. In addition, the inequality of access between the richest and the poorest quintiles is large. Less than 1 percent of the poorest quintile has indoor water tap compared to 8 percent of the richest quintile. Moreover, these rates are still lower than those in urban areas.

Figure 46:Access to tap water at home



218. **Regarding cooking gas, a deterioration has also been observed during the 2000s**—less than 1.5 percent of the urban and less than 1 percent of rural population reports living in a dwelling with gas for cooking. By association, cutting wood for cooking or heating remains the natural alternative, one that is highly costly in environmental terms, and directly associated with being poor.

219. **A small improvement took place on the toilet at home indicator, though levels of access for the poor, or for rural populations, remain very low.** Access to hygienic sanitation facilities is closely associated with better health outcomes. Between 2001 and 2010, the percentage of households with access to a safe toilet at home has increased from 2.6 to percent to 6.7 percent (Figure 45). At the same time, the differences between poor and non-poor, and urban and rural inhabitants remain significant. In 2010, poor and rural households almost did not to have access to a toilet.

220. **Access to electricity is another common indicator used to assess non-income dimensions of poverty and it is very low in Madagascar, especially in rural areas, and absent from the lives of most of the poor.** According to the EPM, access to electricity indicator has deteriorated as well in Madagascar during the 2000s. In 2010, 37.6 percent of the population had access to electricity in the urban areas and only 5.3 percent in the rural. Overall, 12 percent of the population has access to electricity, a minority that is in general not poor. All these numbers are lower than in 2001. As a consequence, a policy that favors access to electricity could be pro-poor, but if it is conducted in a manner that does not discriminate between the poor and non-poor consumers of electricity, such as through implicit subsidies on prices, it is invariably and massively to the benefit of the non-poor.

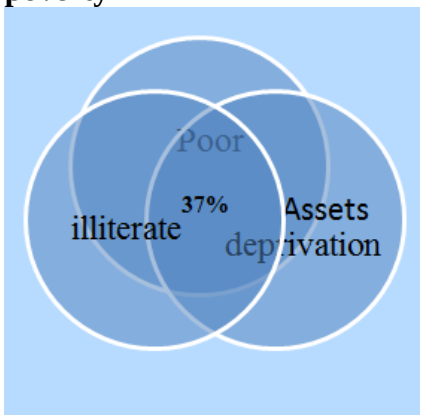
Deprivation on multiple dimensions: putting it all together

221. **Madagascar shows very low outcomes for access to basic services, goods or assets**. Although the trends in income poverty have been disappointing, there has been a stagnation in major indicators related to the population's access to services over the past decade. Significant disparities and differences between poor and non-poor, and between rural and urban populations, remain and are significant. A very low proportion of the population reports living in dwellings with electricity with indoor water taps, water, and sanitation.

222. **About a third of the population in Madagascar is deprived on multiple dimensions—the "have nothings", whether in consumption, literacy and education, basic household assets, or electricity.** As shown in the Figure 47, about 37 percent of the population is poor, illiterate and deprived in terms of the assets ownership. On the other hand, the evidence from the EPM suggests that about 26 percent are poor and reports having no education and no access to electricity. Similarly, in this case-wide range of households are deprived on multiple dimensions.

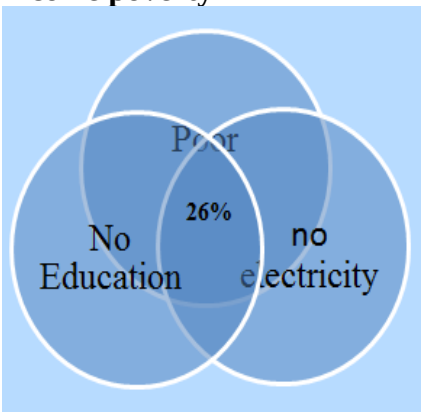
Figure 47: Venn Diagram of Non-income and Income Poverty

A. Assets, literacy and income poverty



A: Assets deprivation index less 7
B: Illiterate
C: Poor households

B. electricity, education and income poverty



A No Education
B No Electricity
C Poor households

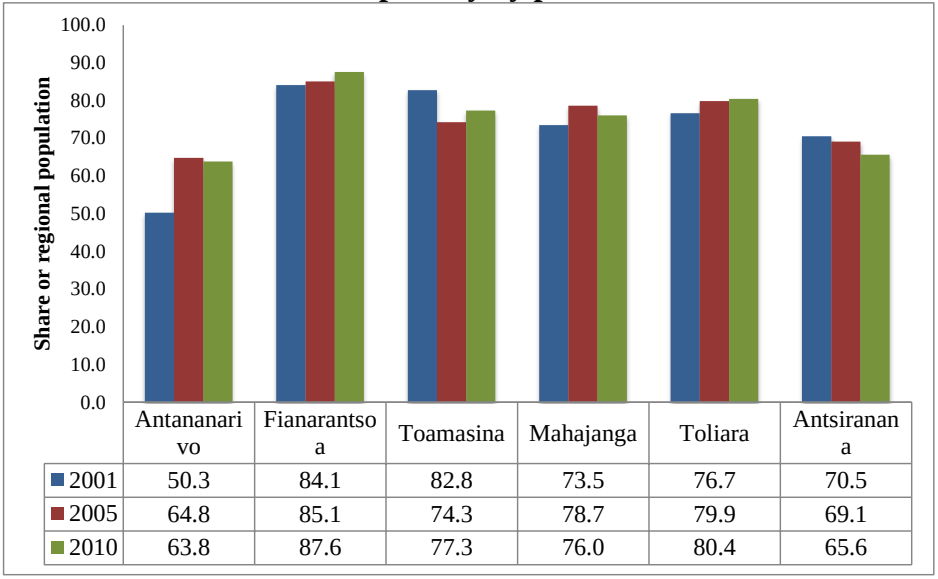
Chapter 6: Incidence of Poverty across Space

Poverty and inequality vary substantially across Madagascar's regions, with poverty rates in the poorest region twice as high as in the richest. Despite poverty stagnation on a national level, there is variation in the regional poverty changes, with some regions having gained and some having lost. Most of the regions have moderate inequality. The increase in inequality between regions is the main reason for overall rising inequality, but the contribution of changes in within-region inequality to total inequality is rising rapidly. The large variation in regional poverty rates suggests the need for a balance of universal and regional policies for growth and development.

A. Incidence of Poverty – Provincial Analysis – 6 Provinces

223. EPM survey data in 2001 was stratified into six main provinces and urban and rural areas within them. In 2005 and 2010 the sample frame of the survey was increased to get representative information for 22 main regions, plus rural and urban differentiation. In order to get comparable estimates for all three surveys we start our regional analysis based on the provinces, and later on look back at a more disaggregated regional level, then finally analyze poverty trends at the sub-regional level combining regional and urban/rural story. The analysis of the provincial level will be carried out for the entire decade; however, the lack of the regional representative survey data for 2001 restricts the more disaggregated regional analysis to the second part of the 2000s.

Figure 48: Evolution of absolute poverty by provinces for 2001, 2005, and 2010



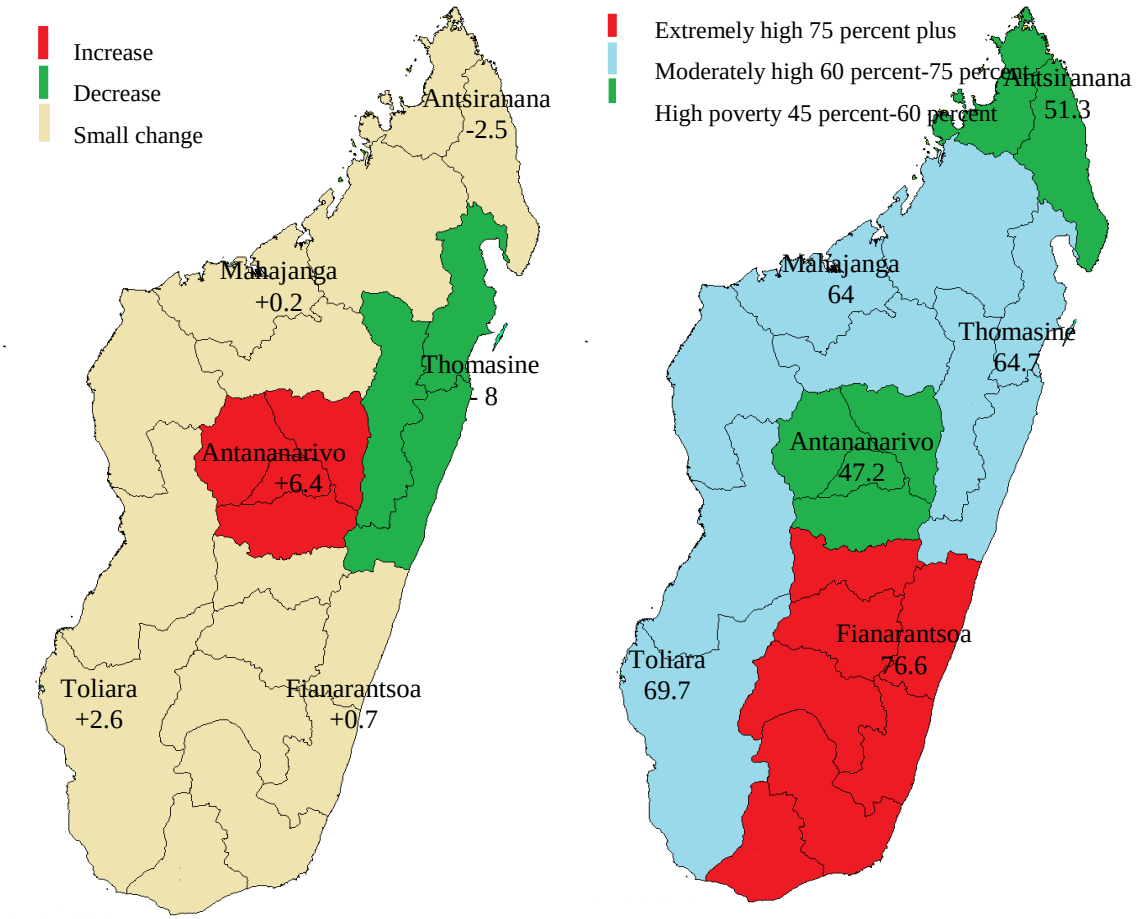
	Antananarivo	Fianarantsoa	Toamasina	Mahajanga	Toliara	Antsiranana
2001	50.3	84.1	82.8	73.5	76.7	70.5
2005	64.8	85.1	74.3	78.7	79.9	69.1
2010	63.8	87.6	77.3	76.0	80.4	65.6

Source: World Bank staff estimates from EPM data.

224. A spatial analysis of poverty reveals broad provincial variations, with the highest level of poverty concentrated in the Fianarantsoa province, and the lowest in the province of Antananarivo, but it is the deterioration in the welfare in that latter province that accounts for most of the overall changes in poverty in Madagascar in the 2000s. Poverty rates vary across the vast land mass of Madagascar (Figure 48). Relatively better off provinces and regions are located in the northern and central part of the country. Antananarivo, as the province home to the capital city, shows the lowest incidence of

poverty. However, in 2001, poverty incidence in Antananarivo was 50 percent, while the closest province by poverty incidence at that time had an estimated 70.5 percent of poverty, and poverty reached 84 percent in the poorest province. Developments in the decade, especially the political crises and associated economic hardship, hit the wellbeing of the people in Antananarivo the most in relative terms: poverty soared, reaching 65 percent in 2005, then only mildly improving in the second half of the decade, to 64 percent. Overall, the cross-provincial disparity has gone down significantly. In four of the six provinces poverty incidence rose over the decade, including in the poorest in 2001, still the poorest in 2010, Fianarantsoa, while poverty incidence declined in two provinces, Toamasina in the east, and Antsiranana in the north.

Figure 49: Provincial Extreme poverty rates (left hand chart) and change in extreme poverty incidence 2001-2010

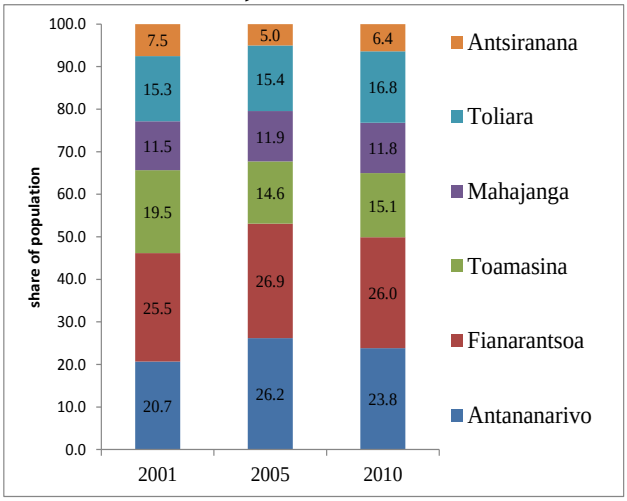


Source: World Bank staff estimates from EPM data.

225. **Extreme poverty also varies across Madagascar, but changes were especially large in only two provinces, one registering a large increase (Antananarivo), and one a significant decrease (Toamasina) between 2001 and 2010.** Provincial disaggregated (Figure 49) data shows an increase in extreme poverty in Antananarivo by 6.4 percentage points, and a reduction in Toamasina by 8 percentage points. Extreme and absolute poverty are widespread in Madagascar, but are generally higher in the southern part of the island—more than 70 percent of the population of the two southern provinces were extreme poor. Fianarantsoa province has the highest extreme and absolute poverty rates with 87.6 percent of the population living below absolute poverty line, and 76.6 being extremely poor in 2010.

226. **There was a shift in the provincial poverty composition, but 86 percent of the poor still resides in rural areas.** The proportion of the poor by province out of the total poor in Madagascar significantly increased in Antananarivo from 21 percent in 2001 to 24 percent in 2010, while the share of the poor in Toamasina fell from 20 to 15 percent during the same period (see Figure 50). Approximately half of the poor in 2010 were found in Antananarivo and Fianarantsoa provinces. As poverty is so widespread in Madagascar, the provincial shares of the poor are distributed broadly proportionally to the size of provincial populations, while poverty is more dominant in the rural areas—approximately 80 percent of the population lives in rural areas, and 86 percent of the poor are concentrated in the rural areas.

Figure 50: Regional decomposition of poverty 2001, 2005 and 2010



Source: World Bank staff estimates from EPM data.

227. **Over 2001 to 2005, the Antananarivo province recorded a dramatic drop in average real per capita consumption that was only partly offset in the second half of the decade, while most provinces that gained on average over 2001-05 subsequently lost over 2005-10, with a sharp improvement for the decade as a whole only for Toamasina.** Table 40 provides a summary of the changes in the consumption across the provinces. Between 2001 and 2005, average per capita consumption in real terms fell by about 7.9 percent for the country as a while, with urban areas experienced a steeper (16.7 percent) contraction, while the fall in consumption in rural areas was only 2.3 percent. Provincial differences are striking: in Antananarivo consumption per capita fell by 30.7 percent, while in Toamasina, consumption grew by 35 percent. As mentioned above, the overall impact was negative with strong difference across regions. In contrast, in the period of 2005-2010, average real per capita consumption did not change at the national level, but increased by 9.5 percent growth in urban areas and fell by 2 percent in rural areas. Over that period, in Antananarivo, consumption per capita grew by 11 percent, but not enough to compensate for the prior loss, resulting in reduction of the average consumption during the entire 2001-2010 decade. Overall, both rural and urban areas experienced consumption decline during the 2000s, while the situation is more nuanced at the provincial level.

Table 40: Percent change in real consumption per capita

	2005/2001	2010/2005	2010/2001
Total	-7.9	0.7	-7.3
Urban	-16.7	9.5	-8.8
Rural	-2.3	-1.6	-3.9
Antananarivo	-30.7	11.3	-22.9
Fianarantsoa	12.0	-8.1	3.0
Toamasina	34.9	-5.1	28.0
Mahajanga	9.1	-2.3	6.5
Toliara	-2.0	-5.7	-7.5
Antsiranana	3.5	3.8	7.5

Source: World Bank staff estimates from EPM data.

228. **Provincial changes drove much of the co-evolution of growth and inequality over the decade.** In order to illustrate the dramatic impact of the collapse in the consumption in

the capital during the 2000s, we decomposed the changes in regional/provincial growth and redistribution effects (plus as residual)[16]. A shift of welfare from Antananarivo to other much poorer provinces led to a drastic reduction in inequality during the first half of the 2000s leading to increase in poverty and reduction in the inequality. As presented in Figure 51, the (negative) growth component in Antananarivo contributed to increased poverty during 2001-2005, while distributional changes worked the other way, towards a reduction of poverty (albeit not enough to offset the first effect). The overall impact of the 2001 economic crisis had a prolonged effect on the welfare and dramatic changes in the welfare distribution in the entire country. In a majority of provinces other than Antananarivo, the situation during 2001-2005 was opposite: as shown in Figure 51, most of the provinces showed a positive sign of the redistributive effect (contributing to increase poverty by a rise in inequality), while the negative sign of the (positive) growth effect is associated with reductions in poverty. The net effect of the changes in most of the regions, except Antananarivo, was positive.

229. **The situation in Antananarivo during the second part of the 2000s has improved, but the recovery was offset by the 2009 economic crisis.** The economy, on average, stagnated during 2005-2010 as a whole, with some improvement in the relative position in Antananarivo and a worsening of the income distribution. The impact of the growth and redistribution effects in the second half of the 2000s is presented in the right hand chart in the Figure 51. The trends are also opposite for a majority of the regions. The overall net effect of the 2000s has been negative as the changes of the first half of the decade had much stronger impact on the welfare distribution and wealth losses, while the post-2002 recovery has been hampered by the 2009 economic and political crisis.

[16] Datt and Ravallion, 2001. Growth component is associated with change in average consumption between the years, and positive sign of this effect suggests the direction of the change in this component led to increase in poverty. Redistribution component is associated with the change in poverty due to change in the inequality, and positive sign suggests that inequality worked on increase in poverty. Residual component is part that could not be well attributed to changes in inequality and growth. Clearly, each of the growth and redistribution components for each region could potentially work in positive (increase in poverty) or negative direction (decrease in poverty).

Figure 51: Collapse of consumption in Antananarivo led to changes in income distribution in Madagascar in 2000s.

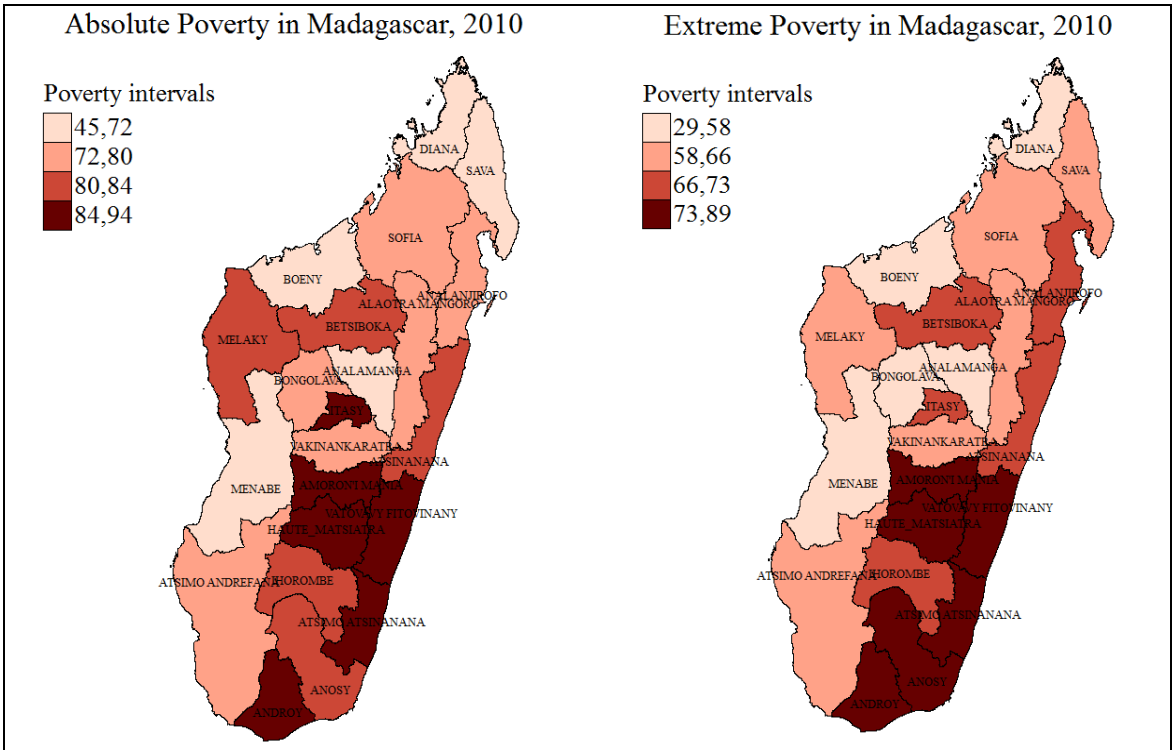
Source: World Bank staff estimates from EPM data

B. REGIONAL DIMENSION OF POVERTY – 22 REGIONS

230. Beside the original provincial divisions, Madagascar was further divided into 22 regions called faritra. These formerly second-tier administrative divisions became the first-level administrative divisions when the former six provinces were dissolved [in 2009]. The following part of the analysis looks at the newly available regional disaggregation of the economy, which is available only for 2005 and 2010. As the regionally disaggregated data on faritra level is not available for 2001, we mostly concentrate on the regional poverty profiles and look at the decomposition of the welfare changes between 2005 and 2010.

231. **Similarly to the provincial analysis, regionally disaggregated detailed spatial analysis of poverty in Madagascar reveals broad variations, with pockets of poverty concentrated in the South and South-Eastern parts of the country.** As shown in Figure 52, poverty is spread across the country, but it has clear regional dimensions. Relatively better off regions are concentrated in the Central, Northern, and North-Western parts of the country, while Southern and Eastern territories are poorer. The pattern is broadly similar on the absolute and extreme poverty disaggregation, with even more pronounced spatial dimension in case of extreme poverty. Regional proximity has its own importance in the poverty determination and majority of neighboring regions are similar in terms of their levels of poverty.

Figure 52: Poverty rates vary across Madagascar's Regions, 2010



Source: World Bank staff estimates from EPM data.

Source: World Bank staff estimates from EPM data. *The charts are constructed using ADePT MAP (amap) software.*

232. **Most of Madagascar's poor live in regions with high levels of poverty.** More than 75 percent of the poor live in regions with high or very high poverty; fewer than 25 percent reside in the seven relatively low-poverty regions where poverty rates fall below the national average (Table 41). Most of the increase in poverty between 2005 and 2010 has also occurred in these poorest regions. The eight poorest regions, with 35 percent of the country's population, have a much greater burden of the poor and experienced a 5 percentage points increase in poverty between 2005 and 2010.

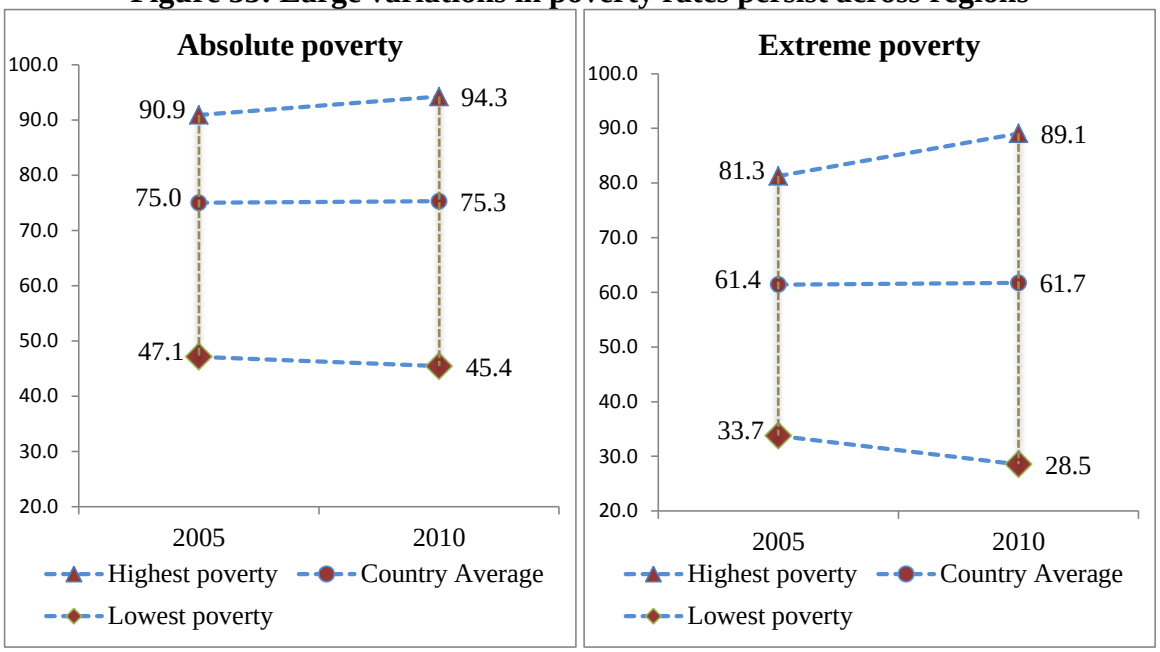
Table 41: Poverty by affluence of regions, 2010s

	Number of region	Population share (percent)	Average poverty rate (percent)	Poor population (millions of people)	Share of poor (percent)	Average regional poverty percentage change (2005 to 2010)
All Madagascar Average	22	100,0	75,3	15,2	100,0	0,4
Low poverty (average poverty <65 percent)	4	20,8	50,9	2,1	14,0	-0,3
Medium Poverty (average poverty 65-75 percent)	3	11,7	72,8	1,7	11,3	0,6
High Poverty (average poverty 75-80 percent)	7	33,2	79,1	5,3	34,9	-3,8
Very High poverty (average poverty 80+ percent)	8	34,3	87,2	6,0	39,8	4,7

Source: World Bank staff estimates from EPM data.

233. **The variation in poverty rates across regions is large and has increased during the second part of 2000s**. Poverty rates vary from 45.4 percent in Analamanga region to 94.3 percent in Atsimo Atsinanana (Figure 53) in 2010. The same regions are marginal in terms of absolute and extreme poverty. As shown in the chart, the variations between regions increased during 2005 and 2010 period. This is more evident in case of the cross-regional variations in case of extreme poverty.

Figure 53: Large variations in poverty rates persist across regions



Source: World Bank staff estimates from EPM data. Poverty rates refer to average (all-Madagascar) poverty rates.

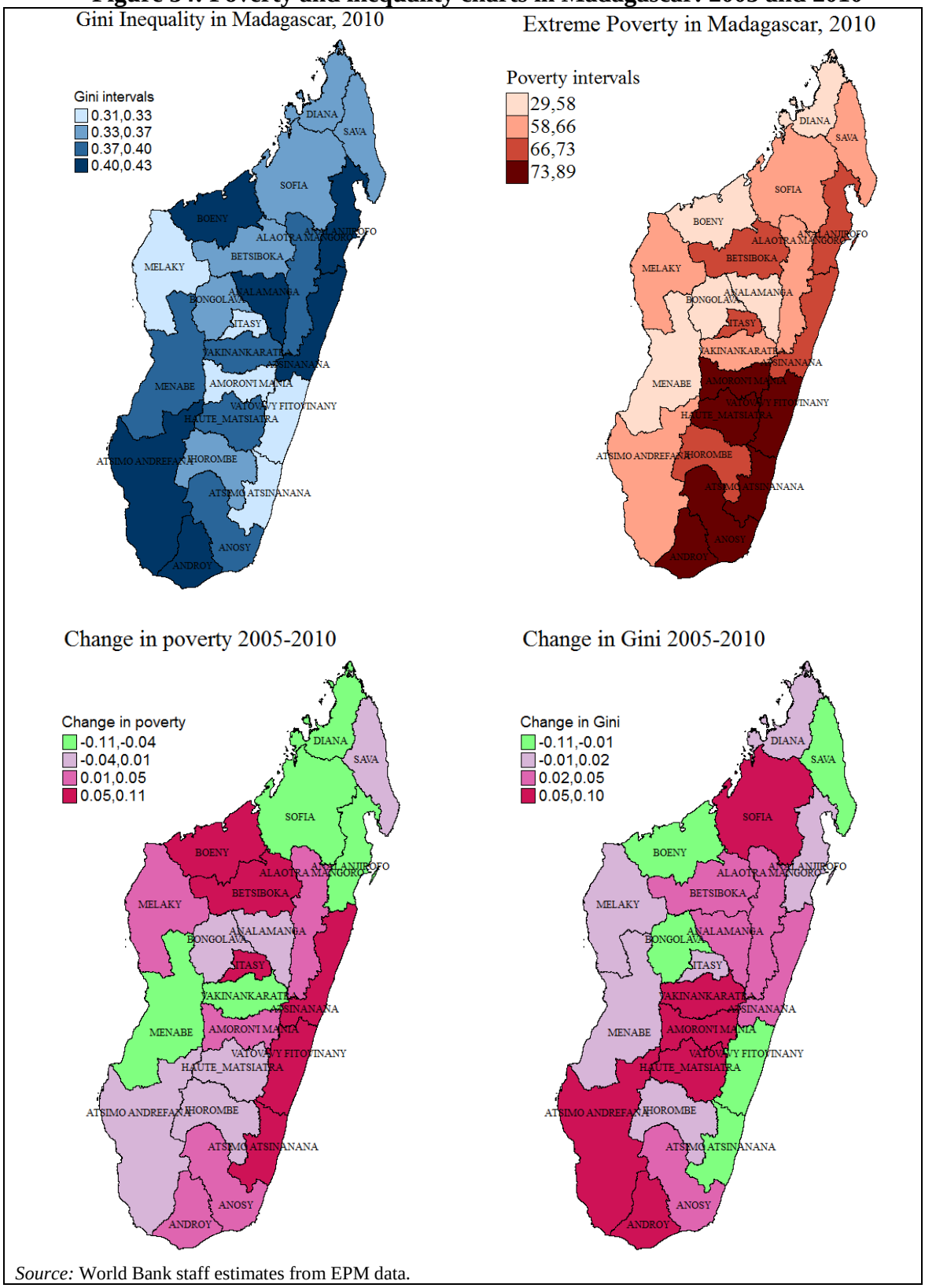
234. As described in previous sections, the inequality significantly fell in Madagascar during 2001-2005 and then increased during 2005-2010. Regional reallocation from urban to rural areas and deterioration of capital's positioning played an important role for this trend during the first five years of the 2000s. The situation in terms of inequality reversed during

the second part of the 2000s, but this did not lead to an increase in poverty. The analysis below relates to the regional changes in the second part of the 2000s when the increase in the national inequality has occurred. The analysis looks at regional gaps in terms of inequality levels and dynamics.

235. **Regions differ in terms of level of inequality, and poorer regions in Madagascar are more equal regions**. Similarly as in the case of the levels of poverty, inequality indicators, expressed in terms of regional Gini coefficients, range widely from 31 in Itasy region to 43 in Atsimo Andrefana region. Gini coefficients are plotted on the top left map chart on the Figure 54. Regions with higher level of inequality in Madagascar are in the North-Eastern area and in the Central part of the country. Regions with high level of inequality are not the same regions characterized by high level of poverty. The maps shown in Figure 54 show a clear miss-match between levels of inequality and levels of extreme poverty. In other words, the poorest regions are relatively equal in terms of their consumption per capita.

236. **National inequality increased between 2005 and 2010 while poverty remained stagnant, but the direction of the change on the regional inequality is ambiguous.** As shown in the maps in the Figure 54 six regions have experienced reduction in the inequality and in five regions the inequality has decreased. The direction of the changes in the inequality does not have clear geographical dimension. Another finding is that the magnitude of change in the regional inequality is not directly associated with the changes in poverty.

Figure 54: Poverty and inequality charts in Madagascar: 2005 and 2010

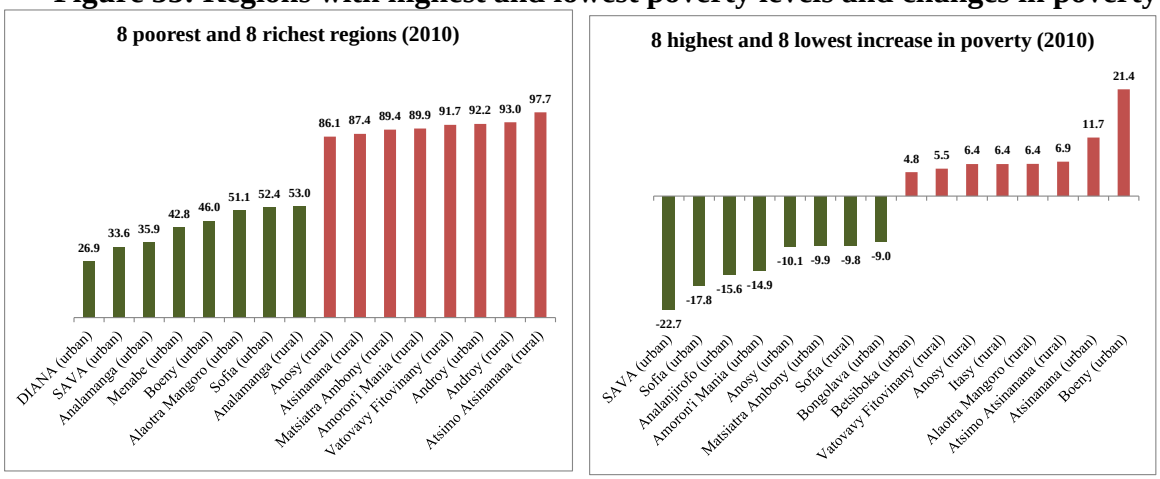


Source: World Bank staff estimates from EPM data.

237. **A further disaggregation by regions and rural/urban status show even more pronounced differences in levels and changes of poverty and inequality.** The stagnation in poverty during the 2005-2010 period and high level of poverty observed at the national level masks considerable regional variation. As described above, regions show a very

significant range in poverty levels, and the directions of changes in poverty over time vary significantly. The spatial differences are even more significant if we disaggregate regional data further on urban and rural areas. Dividing 22 regions into rural and urban creates 44 sub-regions in Madagascar. This division is legitimate as EPM surveys for 2005 and 2010 were designed to be representative at the national, regional, and rural/urban levels. As presented in Figure 55 the sub-regional variation is even more pronounced. The lowest poverty is observed in urban Diana sub-region, where poverty level is as low as 26.9 percent—a very low level of poverty in Madagascar's reality. Urban Sava and urban Analamanga are among sub-regions with relatively low poverty rates. The poorest region in Madagascar is the rural area of the Atsioma Atsinanana where poverty rate in 2010 reached an unbelievable 97.7 percent: almost the entire population of this sub-region lives below the poverty line, and it is probably the poorest area so defined in the entire world.

Figure 55: Regions with highest and lowest poverty levels and changes in poverty



Source: World Bank staff estimates from EPM data.

238. **Unexpectedly, a majority of the poorest sub-regions are found among the rural areas, while the better-off sub-regions are among urban, but changes in poverty went in both directions for rural and urban sub-regions.** Out of seven sub-regions with the lowest poverty in Madagascar six are all located in the urban areas (Figure 55). Seven out of eight poorest sub-regions are all located in the rural areas. Similar as with level of poverty, significant diversity is observed among sub-regions in terms of changes in poverty between 2005 and 2010. Sub-regions however differed in significant poverty reduction: urban Sava had a 22 percent reduction in poverty while poverty in the urban Boeny area increased by 21.4 percent.

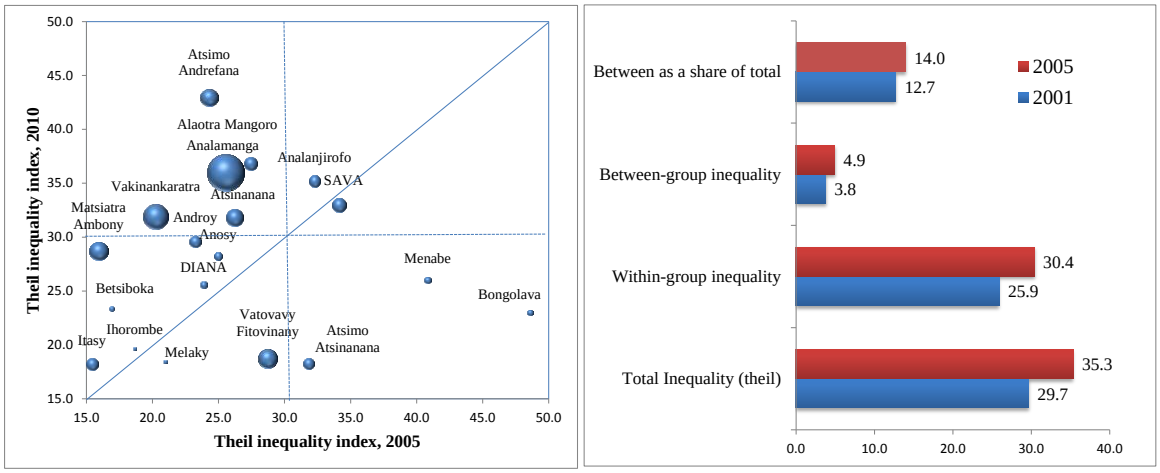
C. REGIONAL TRENDS IN INEQUALITY

239. **An increase in inequality (as measured by the Theil coefficient) occurred in 17 out 22 regions.** Based on the level of the regional inequality, two groups emerge: relatively low inequality regions with Theil coefficients less than 0.3; and medium-high level inequality regions with the inequality level above 0.3 (Figure 56). [17] The majority of regions (17 out 22) experienced increase in inequality and seven big regions moved to the upper left quadrant of

[17] The charts show the regional Theil coefficients in 2005 and 2010 (with weighting for the size of regional population, measured by the size of the bubbles). The closer the bubbles (population size weighted regional Theil coefficients) to the 45 degree line, the smaller the change in the regional inequality coefficient. The observations above the line indicate an increase in the Theil coefficient and below the line, a decrease in the Gini coefficient.

the distribution (low inequality in 2005 and medium-high inequality in 2010). At the same time, some other regions are found in other quadrants of the distribution. Atsimo Andefana, for example, experienced a significant increase in inequality. Atsimo Atsinanana, Menabe, and Bongolava saw reduced inequality, while Sava and Analanjirofo remained on top of the inequality quadrant in both years. In sum, regions differ in terms of the inequality but significant increase in inequality occurred in majority of the regions during the 2005-2010.

Figure 56: The largest regions (shown by larger bubbles) drove up overall inequality in Madagascar



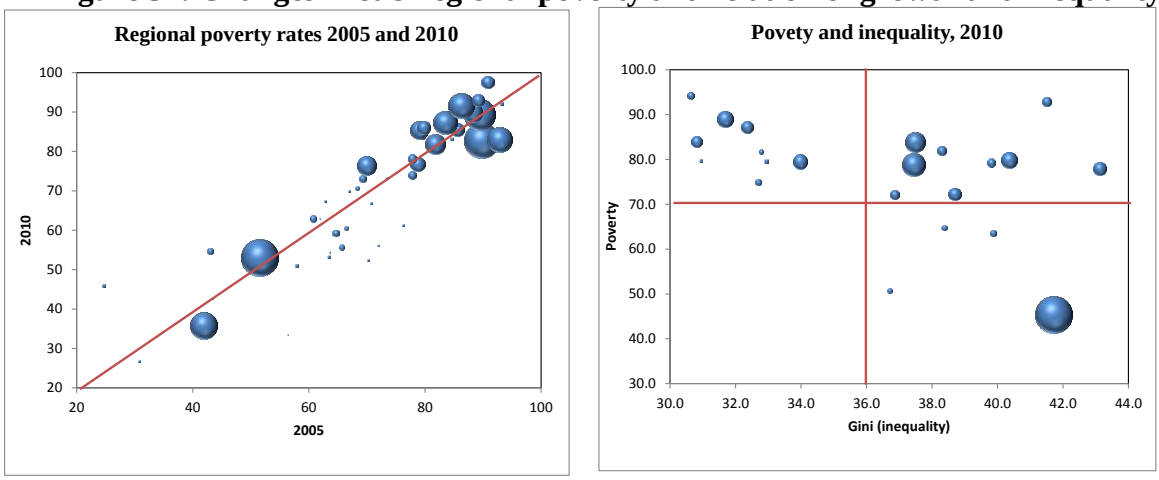
Source: World Bank staff estimates from EPM data.

240. **Decomposing the Theil index of inequality into "within" and "between" region contributions also shows that within-region inequality is dominant (six times more in 2010) though the share of between-regional inequality is growing.** When adjusted for population size, the increase in inequality is due to an increase in inequality within and in between regions (Figure 56, on the right).[18] Between-region inequality contributed less to the overall inequality, though its share is rapidly growing.

241. **Between 2005 and 2010, while regional poverty rates moved up and down with zero net effect, and changes differed across regions, the rankings of regions did not change.** As shown in Figure 57, the ranking of the regions almost did not change despite a slight movement of poverty, up and down, between 2005 and 2010. In the following section we look closely at the connection between regional growth, inequality, and poverty.

[18] See Appendix for methodological details.

Figure 57: Changes in sub-regional poverty and relation of growth and inequality



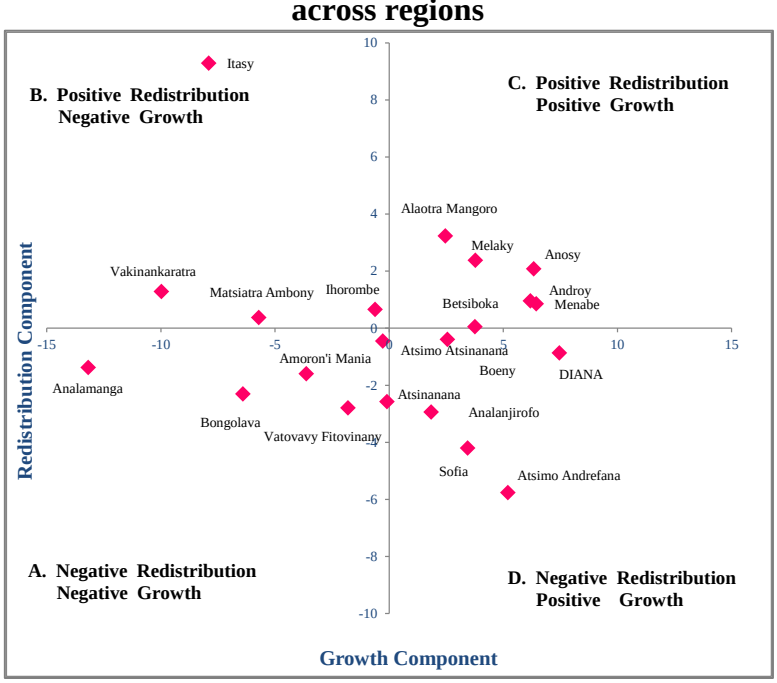
Source: World Bank staff estimates from EPM data. *Bubble size is weighted by the share of the region in total population.*

D. DECOMPOSING REGIONAL POVERTY AND INEQUALITY

242. **There is a strong relation between poverty and inequality in Madagascar: poorer regions have low inequality and richer regions have higher inequality, while there are no regions in Madagascar which fall in the low poverty-low inequality category.** The 22 regions have been divided into four main categories according to the level of their poverty and inequality (Figure 57). High poverty regions with poverty above 70 percent, and low poverty regions with the poverty below this threshold. High inequality regions with regional Gini above 35, and low inequality regions below this threshold. Subsequently, we plotted regional poverty and inequality one against another, and divided the regions on four main sub-groups based on the poverty and inequality levels. Regions with high poverty and high inequality (top right quadrant), low poverty and low inequality (down left quadrant); high poverty and low inequality (down-right quadrant) and low poverty and high inequality (top left quadrant). Interestingly, based on this definition, there is no region in Madagascar in the "low poverty"-"low inequality" category.

243. **Both growth and redistribution components were important for regional changes in poverty between 2005 and 2010.** The magnitude of the effects was comparable and the overall change in poverty was negligible. Even though the overall effect of growth on poverty had a negative sign (worked on reduction of the poverty), while redistribution effect had negative sign, the story on the regional level is much more complex and ambiguous. Figure 58 illustrates ambiguity of the growth and redistribution effects and shows that regions are merely equally spread between all 4 quadrants.

Figure 58: Both growth and redistribution were important factors in poverty changes across regions



Source: EPM 2005-10.

244. Based on the sign of each effect four main groups of regions could be identified depending upon the contribution of growth and redistributive effects on poverty (Figure 58). In this classification, "negative effect" means that the sign of either redistribution or growth on poverty is negative: for example, a negative growth effect is an increase in average consumption (hence a positive degree of consumption growth) that is associated with a negative change in poverty. Regions were broadly divided into the four categories.

- **Negative redistribution effect and negative growth effect.** In this case, both effects work to decrease poverty. There were six such regions—Analamanga, Bongolava, Amoron'i Mania, Vatovavy Fitovinany, and Atsinanana.
- **Positive redistribution effect and negative growth effect**. In this case, negative growth effect decreases poverty but the positive redistribution effect reduces poverty. There were four such regions—Vakinankaratra, Itasy, Matsiatra Ambony and Ihorombe.
- **Positive redistribution effect and positive growth effect**. This is the case where both redistribution and growth had contributed to an increase in poverty. Of the twenty two Madagascar regions, five are in this category—Betsiboka, Melaky, Androy, Anosy, and Menabe.
- **Negative redistribution effect and positive growth effect**. In this case, redistribution effects work to reduce poverty while the growth effect increases it. Of the twenty two regions, seven are in this category—Atsimo Atsinanana, Atsimo Andrefana, Sofia, Boeny, Atsinanana, Analanjirofo and DIANA.

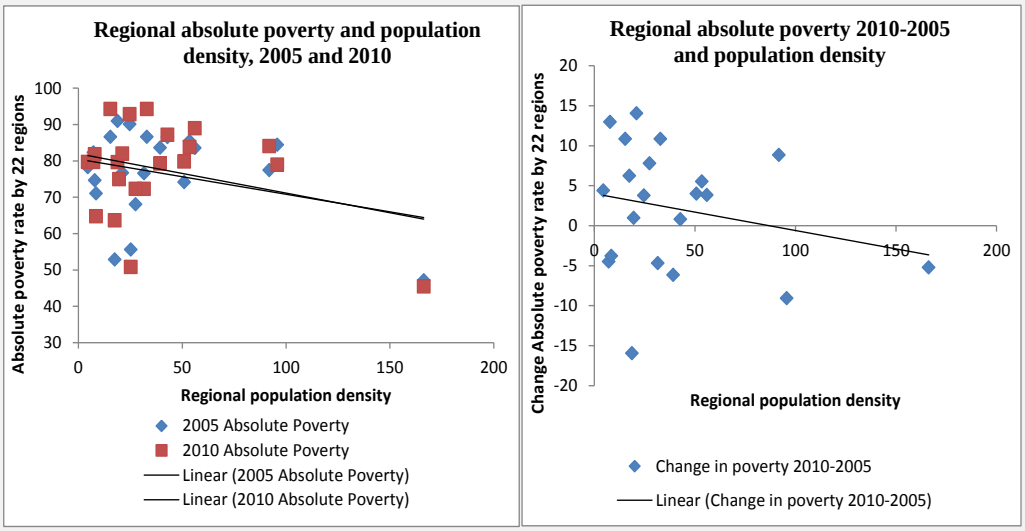
245. **The profile of the poor across Madagascar's regions is common. A regression analysis reveals correlates of the regional poverty to various regional characteristics and in general shares the national characteristics discussed in Chapter 2:**

- The risk of poverty is higher in rural areas in both better off and poorer regions.
- Poorer regions have less population density. Poverty has clear spatial dimension as well, with poorer regions located in the Southern and Eastern areas of the island.
- Regional demographic characteristics play important role in poverty determination- regions with higher fertility rates and larger families have higher poverty.
- The regions with a higher proportion of non-working have a higher risk of poverty; but they make up a small share of the total population. Poorer regions also have a greater share of agriculture-employed.
- The poverty risk is higher for the less educated, the less skilled, and illiterate.
- In 2010, there is much higher variation across regions in poverty rates among households with heads that attained only low and basic education.

Box 3: Regional poverty and population density

Regions with higher population densities have lower poverty rates and higher rates of poverty reduction during 2005-2010. As population density rises, the regional poverty rate falls (Figure 59). Most of Madagascar's regions have fairly low population densities ranging from 4.5 person per square kilometer in Melaky to 163.3 in Analamanga (Antananarivo region), and poverty rates in the low density regions are significantly higher in higher density regions. Denser regions also show faster rates of poverty reduction.

Figure 59: Poverty rates fall with higher population density



Source: World Bank staff estimates from EPM data. Results of correlation un-weighted.

246. **The policy implications from this analysis are twofold.** Similarities in the poverty profile across regions mean that common policies targeted to certain common characteristics—especially labor market and demographic risk factors, such as child allowances—would reach the poor across the spectrum of regions. But the spatial analysis revealed significant number of pockets of poverty in some regions. Thus, regional policies

are needed to reach certain groups of the poor population. A proper balance between universal and regional policies is required.

Chapter 7: Madagascar – Labor Market and Income Sources

The poor in Madagascar derive most of their income from either self-employment or being employed, and it is mainly their income and employment status that determines their welfare and economic situation. Developments in the labor markets are thus central to the evolution of poverty. Employment and labor participation have increased in Madagascar for the young and adults, while child labor has decreased. There are few differences in labor participation between genders. In 2000s, poverty was less an outcome of joblessness and more an outcome of low earnings.

Between 2001 and 2010 related structural changes have characterized the labor market in Madagascar. After the 2001 crisis, labor productivity plummeted (-4.7 percent) due to a shift in the sectoral composition of the labor market towards agriculture, where productivity is low and not growing. That process only reversed very slowly, and the reversal was not completed by the time of the second crisis, which has probably led to its resumption. Low productivity in agriculture is exacerbated by the presence of a large (even if slightly declining over time) share of workers engaged in family-aid unpaid activities. Family aid workers have also increased markedly in the secondary and tertiary sectors.

As a consequence of the increase in the number and share of workers employed in the primary sector, agriculture has become the main source of labor income. The composition of the labor share of income by job type has changed significantly. Income derived from self-employment has decreased its relevance, from 42 percent of total income in 2001 to 26 percent in 2010. The shift towards the agricultural sector has also been accompanied by a corresponding "ruralization" of the Malagasy population. Also, in urban areas, the role of the different sectors in supplying labor income has changed markedly, with trade becoming the main source. Moreover, in urban areas the role of the different sectors in supplying labor income has changed markedly, with trade becoming the main source.

Average earnings increase with experience (proxied by the age of workers), even if this effect decreases with higher experience, as it usually happens. The returns to experience have increased between 2001 and 2010 for wage jobs and decreased in rural areas. The disadvantage of women's earnings with respect to those of men is substantial but it has decreased markedly. In 2010, women's earnings were on average 34 percent lower than those of men with the same characteristics. Returns to education in 2010 appear to have decreased with respect to 2001. In 2010 one additional year of education allowed an increase in earnings by 5 percent. This means that the five years of primary education increased earnings by 28 percent. Returns to education in 2010 were higher for wage workers (6 percent) and similar in rural and urban areas. Furthermore, they were higher for women than for men (respectively, just above 6 percent and around 4 percent). At the same time, they were lower than in 2001.

247. This chapter is mainly concerned with the impact of employment, income from labor, and labor markets in enhancing shared growth in Madagascar. There is no doubt that the degree of poverty changes over time depends on the magnitude of economic growth as well as the distribution of economic growth among people. In the previous section we showed that during the 2000s economic growth, in form of change in real GDP per capita, was positive, albeit cumulatively small. We have also found that at the same time poverty in fact increased, yet the inequality gap narrowed, and the poorest rural Malagasy became less poor. Other

reports found that more than two thirds of the poor in Madagascar work and, as will be shown later, 86 percent of the population age 15 years or older either works or is looking for a job.

248. The poor in Madagascar derive most of their income from either self-employment or being employed, and it is mainly their income and employment status that determines their welfare and economic situation. Opportunities to improve the welfare of the population may depend crucially on labor market, characteristics of employment, returns to labor, and imperfections in the labor markets. The stagnation of poverty in Madagascar during the 2000s could also depend on changes in its overall labor market, and whether people in Madagascar have, or can easily acquire, the skills required by the fast changing world. The main questions we would like to clarify in this section are related to the interrelation between growth, labor market, and poverty reduction. The answers to these questions should serve as inputs in determining whether employment or productivity should be at the top of the policy priority, or whether or not policy interventions should concentrate more narrowly on the sectors where the poor are.

249. This chapter consists of four sections and is organized as follows: Section A looks at evolution of the labor market in Madagascar, Section B discusses Total Factor Productivity and labor productivity in Madagascar, and Section C, look at labor market profile and characteristics.

A. THE EVOLUTION OF THE LABOR MARKET IN MADAGASCAR DURING THE LAST DECADE

250. The Malagasy labor market has been thoroughly investigated in a recent work by Hoftijzer and Paci (2008). In this chapter we take advantage of the findings of that report and update (parts of) the analysis using the household budget data for 2010. We check whether the new data confirms the main conclusions reached at the time the book was published (2008), and provide new insights on the causes underlying the recent developments in the living standards in Madagascar.

251. The evolution of the labor market in Madagascar during the last decade has not changed its traits, typical of a low-income country. Both labor force participation and employment rates have further increased since 2005. These trends, however, hide the effects of a massive inflow of workers into agriculture, the lowest productivity sector in the Malagasy economy. Similarly to what happened during the first half of the 2000s, between 2005 and 2010 agriculture seems to have helped to absorb the impact of the 2009 economic crisis on living standards (Amendola and Vecchi, 2008). On the negative side, the shift of a large share of the active population to agriculture has produced a negative effect on average labor productivity. Through this channel, both the growth perspectives of the country and the living standards of the population have been severely compromised. The contraction of the industry and service sectors and the ruralization of the Malagasy population, strong especially in the first half of the decade, have added to this tendency.

252. The process of ruralization is clearly a key driver of some of what has been observed in poverty trends. The intersectoral shift towards agriculture is likely to explain—at least partly—the decreasing trend of the poverty gap index between 2001 and 2005. The reduction of the within-component of inequality is the major driver of the inequality trend at the national level and is therefore likely to be responsible for the narrowing of the poverty gap in the first five years of the decade. On the other hand, the decrease in inequality might also

suggest that the Malagasy economy is accelerating down the path towards a rural, low-TFP economy, where living standards are not that different across the population, but also not too distant from subsistence levels. This trend has been partially reversed in the 2005-2010 period, when both the poverty gap and inequality have increased, even if remaining lower than in 2001. Again, the within-component part of inequality played a relevant role in producing this result.

253. The analysis of the determinants of earnings suggests that, between 2005 and 2010, gender and education have played a major role in promoting workers' earnings. In fact, from this angle, one can see some positive signals. The returns to an additional year of education range between 4 and 7 percent, and are on the rise in rural areas. Regression estimates also show that while women are at disadvantage in the Malagasy labor market, the gender wage gap is narrowing. These are positive news and reverse most of the trends observed between 2001 and 2005.

254. Other encouraging signals come from the poverty and child labor indicators. Even if the incidence of poverty is still very high, the depth of poverty fell between 2001 and 2010. This was the result of a fall between 2001 and 2005 (when earnings in worse paying jobs increased) and a smaller increase between 2005 and 2010 (when earnings have fallen across most of their distribution). Finally, the incidence of child labor is relatively high but it has decreased notably between 2001 and 2010.

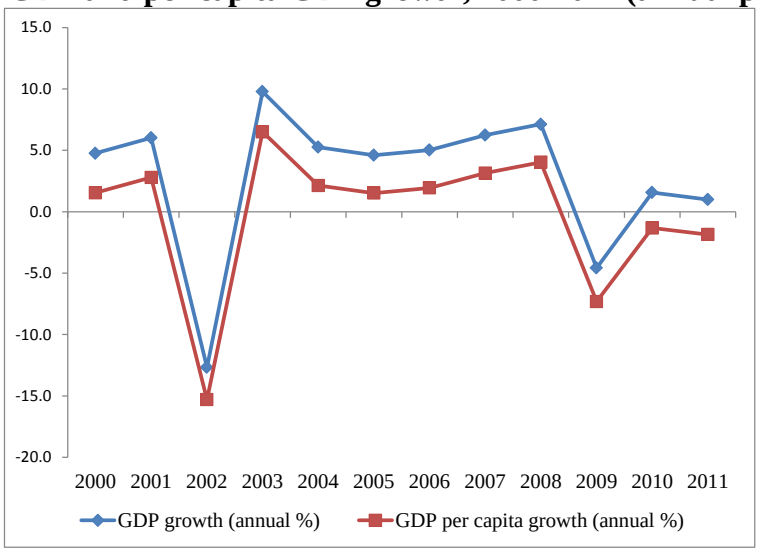
255. The roadmap of the chapter is as follows. We start providing a brief overview of the main macroeconomic stylized facts during the last decade in Madagascar. In Section 2 we outline the evolution of the main features of the labor market during the past decade. Section 3 investigates the evolution of the structure of the labor market in parallel with the dynamics of labor productivity and earnings. As emphasized by previous studies, low productivity is likely to be the single most important determinant for living conditions in Madagascar. Section 4 investigates the determinants of earnings, with a twofold aim. Firstly, there is a need to identify the population categories that are more negatively affected by the macroeconomic dynamics of the Malagasy economy. Secondly, there is also a need to understand the factors responsible for the limited capacity of generating income: this is explored by estimating earning functions for the whole population and separately by population sub-groups. Section 5 examines the association between poverty and occupational status and job types and the changes in the income sources of poor and non-poor people and in earnings inequality.

256. **The first decade of the century has seen a reduction in per capita GDP in Madagascar**. Figure 60 shows that this is due to stable population growth rates (around 3 percent a year between 2000 and 2011), and an average increase in GDP of 2.8 percent annually, during the same years. In per capita terms, GDP has *decreased* by an average 0.2 percent per year.

257. **A distinctive feature of GDP dynamics in Madagascar is a relatively high volatility.** This is an important feature to consider when analyzing poverty, in that a stable economic environment tends to be beneficial to the poor, who are usually more vulnerable to both idiosyncratic and systemic shocks. The volatility of GDP is illustrated in Figure 60 between 2001 and 2008 the GDP annual growth rates have ranged between 4.6 and 9.8 percent, with an exceptional fall in 2002, when it decreased by 12.7 percent. A further fall in GDP, by 4.6 percent, has happened in 2009. A similar pattern is observed in GDP per capita

growth rates (year on year variations have been positive between 2001 and 2008, with the exception of 2002, when it has fallen by 15.3 percent) and for the years since the onset of the 2009 political crisis. In sum, a slowly contracting and highly volatile GDP provides a description of the salient features of Madagascar macroeconomic record during the last decade.

Figure 60: GDP and per capita GDP growth, 2000-2011 (annual percent)



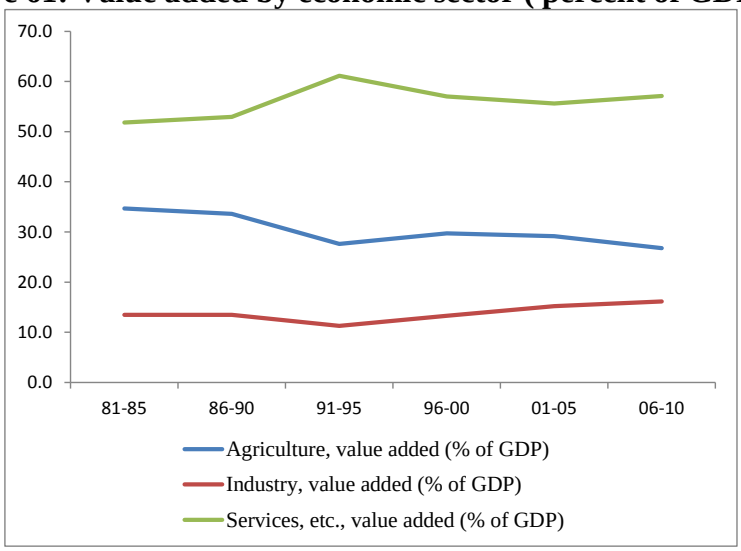
Source: The World Bank World DataBank (http://databank.worldbank.org).

258. **During the last decade, economic growth, on the supply side, was driven by the secondary and the tertiary sectors.** Agriculture, industry and services have all contributed to the performance of the Madagascar economy. Figure 61 shows the results of a simple decomposition exercise covering the years 1981-2010. According to our calculations, services accounted for more than half of GDP dynamics, a share that has slowly risen in the past three decades, as that of industry. The contribution of the agricultural sector, on the other hand, has gradually decreased from around 35 percent of GDP in the first half of the 1980s to around 27 percent of GDP in the second half of the first decade of the century.

259. **Public expenditure, reflecting mainly aid, and, later in the decade, private investment, reflecting the emergence of the mining sector, were the main drivers of growth on the demand side.** A GDP decomposition exercise on the components of aggregate demand indicates that, in the period 2000-2010, the most important demand-side drivers of GDP growth have been gross fixed capital formation (dominated, starting in the mid-decade, by large mining projects) and public expenditure (with donor aid driving public investment), while the contributions of household expenditure and net foreign demand seem to have been smaller.

260. **Donor funding has tended to be pro-cyclical in Madagascar**, though the short-term relation is dominated by the political shocks: aid was buoyant between 2003 and 2008, when the economy returned on a growth trajectory, and aid dropped sharply with political crises in both 2002 and 2009 and beyond, conflating the domestic impact of the political shock on the economy with a distinct fiscal impact.

Figure 61: Value added by economic sector (percent of GDP)



Source: The World Bank World DataBank (http://databank.worldbank.org).

B. HAS OUTPUT GROWTH BEEN ACCOMPANIED BY EMPLOYMENT GENERATION? WHAT HAPPEN TO THE TOTAL FACTOR PRODUCTIVITY (TFP)

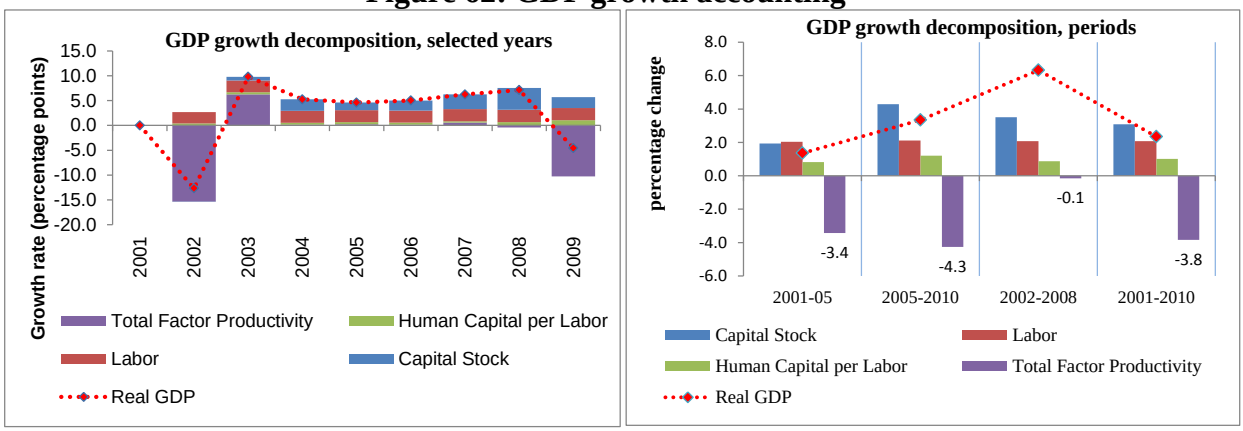
261. The aim of this section is to understand which sectors are growing, in terms of output, employment, and productivity (output per worker). Has growth in Madagascar been accompanied by increases in employment or productivity, and have the poor been able to benefit from expansions in the growing sectors? We decompose real GDP and employment growth so we can further understand the role played by Capital, Total Factor Productivity (TFP), and sector shifts. We first decomposed aggregate growth into employment and productivity changes and then decomposed employment changes by sectors. Unfortunately, lack of data prevents us from further decomposing value added by sector.

262. **The apparent fall in TFP during 2000s had a strong negative impact on economic growth in Madagascar, especially during the crisis years.** Growth accounting analysis presented in Figure 62 decomposes economic growth in Madagascar on four main factors (see annex for the methodological discussion): (1) changes in capital stock, (2) changes in raw labor (the number of work-hours), (3) growth in human capital per labor, proxied by average years of schooling, and (4) a residual component, total factor productivity (TFP). This latter residual can reflect several factors conceptually distinct from the usual definition of TFP (technological change and the organization of production), such as sector shifts and temporary changes in rate of capacity utilization, but for the purpose of this discussion, the use of a residual captures largely the main stylized drivers of growth in the last decade.

263. **The first three factors—capital, labor and human capital—but not TFP growth had a positive impact on economic growth in any year or sub period of the decade.** TFP changes were strongly negative during crisis years, positive only in the year after the 2002 crisis had ended and, importantly, almost zero otherwise. Similar results were obtained from the GDP decompositions on various sub-periods during the 2000s as presented in the right hand chart in Figure 62. Similarly to the yearly analysis, TFP changes had strong negative impact on growth during the entire decade and for the sub-periods that include at least one of the crisis year, either 2001 or 2009. TFP for non-crisis period (the 2003-2008 compared with 2002) was almost zero. A year following the recovery, the impact of TFP on the economic

growth was positive. The growth accounting decomposition suggests that during crisis years of 2001 and 2009 TFP had significant negative implications on the economic growth.

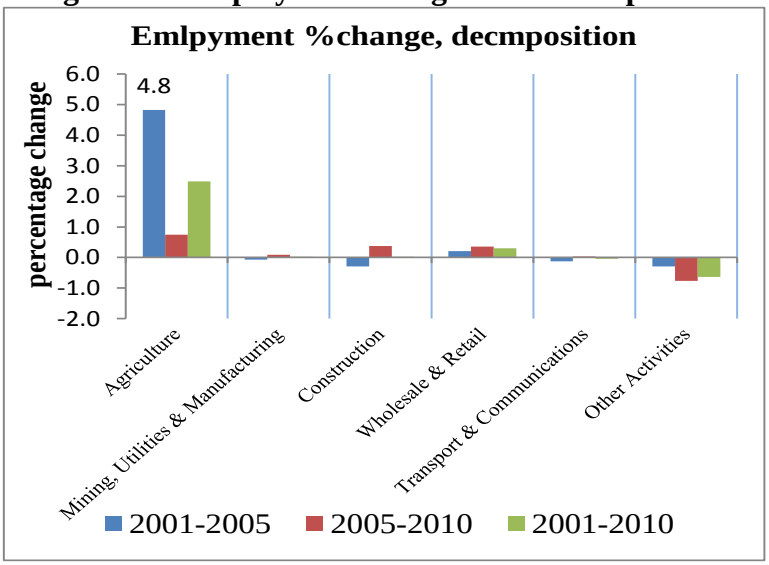
Figure 62: GDP growth accounting



Source: World Bank staff estimates from EPM and WDI indicators.

264. **While other components of the accounting decomposition had positive impact on GDP growth, the magnitude of their contribution varies.** Increase in capital had strong and positive impact on growth in Madagascar in all years and sub-period during the 2000s. Both labor and human capital components positively impacted growth rates as well, but the contribution of human capital was the smallest of the three. Overall, if not for economic and political crises in 2001 and 2009, growth would probably have been stable and positive, and it would have produced gains in labor market, which in turn would have had a positive impact on poverty.

Figure 63: Employment rate growth decomposition



Source: World Bank staff estimates from EPM and WDI indicators.

265. **In 2000s, poverty was less an outcome of joblessness and more an outcome of low earnings.** Employment rate grew by 2.6 percent points during the 2001-2010 period and close to 86 percent of the 15+ population is formally or informally employed. Employment rates and their positive growth that characterized Madagascar's economy during the 2000s can be decomposed or extended to multiple sectors. Figure 63 shows the results of a decomposition of employment growth rates by sector. Agriculture was the main driver in

increase of the employment rate in Madagascar during the 2000s, contributing more than 85 percent to the employment growth. Wholesale and retail trade positively contributed to change in employment rates during this period. But manufacturing, construction, and other activities all saw a negative impact of employment change, given their small share in total employment. In other words, the agriculture sector was the main driver of employment growth in Madagascar. But, because productivity is structurally lower in that sector and does not appear to have grown fast, the temporary shifts into agriculture following the 2002 crisis translated into a fall of TFP and of labor market productivity.

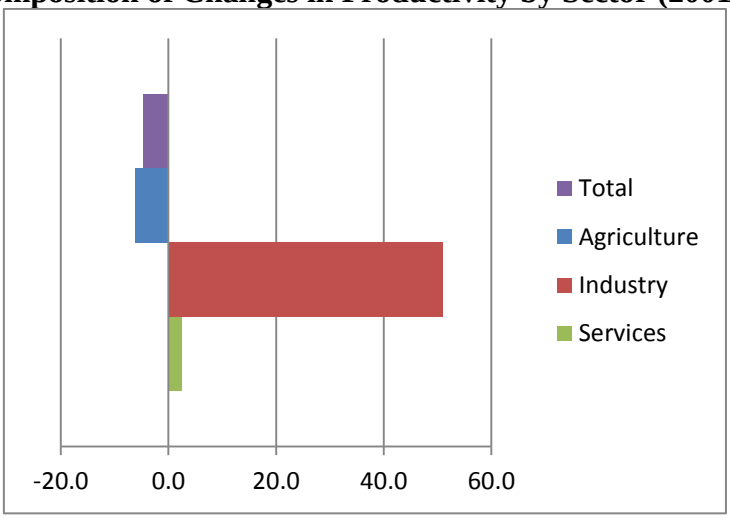
266. **Thus political crises have damaged medium-term growth in Madagascar through at least two main channels**, aside from the ostensible small physical damage to capital reported for the 2002 crisis: one, related to uncertainty and its consequence on private investment, leading to both slower capital accumulation and slower expansion of higher-productivity sectors such as the export-oriented industrial sectors; and the other, through its prompting a shift of labor to a low-productivity sector. In the short-term, crises also operate through another mechanism, namely the negative fiscal shock of lower aid.

B. LABOR PRODUCTIVITY AND THE CHANGES IN THE STRUCTURE OF THE LABOR MARKET

267. **Between 2001 and 2010 related structural changes have characterized the labor market in Madagascar.** In particular, the relevance of agriculture has increased while those of industry and private services have declined; larger shares of employed people have worked as self-employed or familial aid, while smaller shares have been in qualified or non-qualified wage jobs or in managerial positions; employment rates have increased in urban and rural areas and for both men and women. These changes are closely related with the pattern of labor productivity between 2001 and 2010.

268. **After the 2001 crisis, labor productivity plummeted (-4.7 percent) due to a shift in the sectoral composition of the labor market.** In the last ten years, agriculture has absorbed a massive inflow of workers. This fact is consistent with both low unemployment rates and low labor productivity. Productivity (defined as average output per worker) has decreased mainly because workers moved from higher to lower productivity sectors. In particular, they have moved out of industry and into mostly agriculture and to a much lesser extent services. These movements and the decrease in productivity in agriculture have more than compensated the increase in productivity in industry and services (see Figure 64). Hoftijzer and Paci (2008. p. 46) had already estimated a 130 percent increase in productivity in industry between 2001 and 2005 (p. 46). This change was partially reversed between 2005 and 2010, so that in 2010 productivity in industry was 51 percent higher than in 2001. The changes in productivity over the 2001–2010 period mean that while in 2001 an agricultural worker produced on average less than 20 percent of an average industrial worker output, in 2010 it produced only 12 percent of a secondary sector worker output. Furthermore, while in 2001 an industrial worker produced around two thirds of a worker in the tertiary sector, in 2010 his/her output was larger than 90 percent of a that of a tertiary sector worker. The relation between productivities in agriculture and services has remained almost unchanged: in 2001 the agricultural sector worker output was 12 percent of that of the tertiary sector one while in 2010 that share was at 11 percent.

Figure 64: Decomposition of Changes in Productivity by Sector (2001-2010, percent)

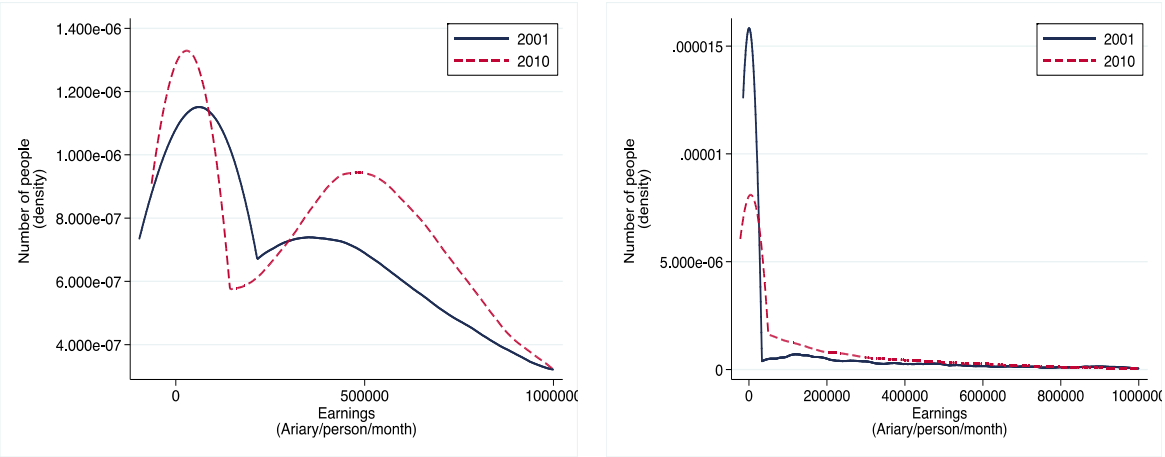


Source: EPM household surveys.

269. **Low productivity in agriculture is exacerbated by the presence of a large (even if slightly declining over time) share of workers engaged in family-aid unpaid activities.** Even if the agricultural sector largely contributes to maintaining a very low unemployment rate in Madagascar, agricultural workers are most often underemployed and receive a near-zero wage. This means not only that their productivity is low, but also that there is a significant transfer of their product/earnings to the firm owner or the household head. This phenomenon is clearly captured in Figure 65.

Figure 65: Earnings in agriculture (2001 and 2010)

Men aged 15-64 **Women aged 15-64**



Source: EPM household surveys.

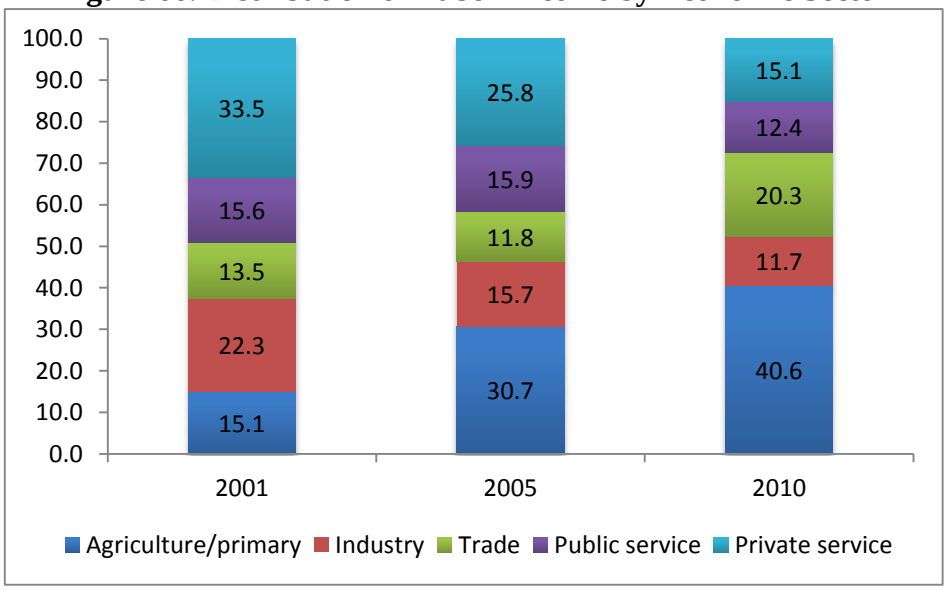
270. **Family aid workers have increased markedly in the secondary and tertiary sectors.** Between 2001 and 2010 the shares of these workers over all nonagricultural ones has risen from 23.1 percent to 33.1 percent, due to an increase in their numbers from 1.6 to 3.0 million. This trend can be interpreted as the result of the expulsion of workers from more formal wage jobs and their going back to the family firm.

271. **Despite the improvements in productivity, there are also further signals of an increase in the relevance of low productivity jobs in the secondary and tertiary sectors.**

Wage workers, both qualified and non-qualified, who had increased between 2001 and 2005, were in 2010 less than in 2001 (their number had declined, respectively, by 4.8 and 5.0 percent). Furthermore, they represented smaller shares of all non-agricultural workers (-5.5 percentage points for qualified workers and -6.8 percentage points for non-qualified workers). On the other hand, the number of self-employed has increased remarkably (from 1.2 to 2.1 millions), as their relevance among non-agricultural workers (from 16.7 to 23.0 percent).

272. **As a consequence of the increase in the number and share of workers employed in the primary sector, agriculture has become the main source of labor income.** The share of income coming from labor (that is derived from wages and self-employment) has oscillated around a flat trend during the years 2000s. Labor income represented about two thirds of total income in 2001. It went down to slightly less than 50 percent in 2005, and then up again to 60 percent in 2010. Agriculture's share over total labor income has risen from 15.1 percent in 2001 to 40.6 percent in 2010 (Figure 66). The second most important source of labor income has become trade, with a share of 20.3 percent in 2010, 6.7 percentage points higher than in 2001. Private services, that provided a third of total labor income in 2001, have seen their relevance plummet to 15.1 percent. Also industry's role has sharply decreased, from 22.3 percent to 11.7 percent of total labor income.

Figure 66: **Distribution of Labor Income by Economic Sector**



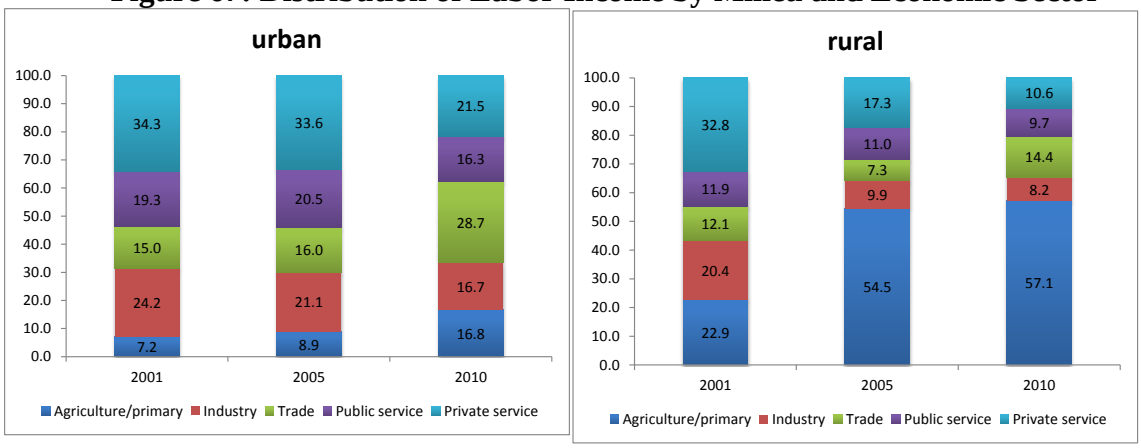
Source: EPM household surveys.

273. **The composition of the labor share of income by job type has changed significantly**. Income derived from self-employment has decreased its relevance, from 42 percent of total income in 2001 to 26 percent in 2010. The data show that the increase in the share of wages is mainly due to the contribution originating from second jobs. In fact, their share has increased from 7 percent in 2001 to 31 percent in 2010. This is consistent with the hypothesis that low productivity (low wages) prompt individuals to search for a second job.

274. **The shift towards the agricultural sector has been accompanied by a corresponding "ruralization" of the Malagasy population.** Urban population has

decreased from 22.9 to 20.3 percent of the total between 2001 and 2010[19]. Correspondingly, the share of total labor income produced in urban areas has decreased from 49.5 in 2001 to 41.0 in 2010.

Figure 67: Distribution of Labor Income by Milieu and Economic Sector



Source: EPM household surveys.

275. **In rural areas, agriculture has become the main source of labor income.** In 2010 labor income from agriculture accounted for 57.1 percent of total labor income in rural areas (Figure 67, left panel). This is a very substantial increase from the 2001 share of 22.9 percent. In contrast, private services, that in 2001 were the main source of labor income in rural areas, generating 32.8 of the total, in 2010 have produced only 10.6 percent of the total. Similarly, the share of labor income related to jobs in industry has decreased markedly, from 20.4 percent in 2001 to 8.2 percent in 2010.

276. **Also, in urban areas, the role of the different sectors in supplying labor income has changed markedly, with trade becoming the main source.** In urban areas, in 2010 trade has been the source of 28.7 percent of labor income (its share was 15.0 percent in 2001, Figure 67, right panel). On the other hand, in 2010 only 21.5 percent of urban workers labor income came from private services, which had been their main source in 2001 (with a share of 34.3 percent). These changes could indicate that informal activities, such as trade, have become more relevant also in the urban areas thereby contributing to lower labor productivity.

277. **Moreover, in urban areas the role of the different sectors in supplying labor income has changed markedly, with trade becoming the main source.** In urban areas, in 2010 trade has been the source of 28.7 percent of labor income (its share was 15.0 percent in 2001 (Figure 67). On the other hand, in 2010 only 21.5 percent of urban workers labor income came from private services, which had been their main source in 2001 (with a share of 34.3 percent). These changes could indicate that informal activities, such as trade, have become more relevant also in the urban areas thereby contributing to lower labor productivity.

[19] It is worth mentioning that also demographic factors not considered here, such as different fertility rates between urban and rural areas, could have played a role in producing this outcome, adding to labor market dynamics.

C. THE DETERMINANTS OF EARNINGS

278. To ascertain the underlying causes of differences in living standards across Malagasy population subgroups it is important to figure out why average earnings vary across workers and the territory. In this section we focus on standard regression-based techniques to investigate *(a)* the returns to an additional year of education in Madagascar, and *(b)* the extent that average wage differences between population subgroups can be ascribed to different characteristics of the groups and/or to different returns to such characteristics. Although a much more sophisticated analysis than ours is needed to address these issues appropriately, the main findings are robust enough to provide us with useful hints for interpreting the recent trends in earnings.

279. **Average earnings increase with experience (here proxied by the age of workers), even if this effect decreases with higher experience, as it usually happens** (see the regression estimates in Table 42 below). The returns to experience have increased between 2001 and 2010 for wage jobs and decreased in rural areas.

280. **The disadvantage of women's earnings with respect to those of men is substantial but it has decreased markedly.** Women's earnings are lower than those of men with the same characteristics (as measured by the explanatory variables in the regressions, Figure 68). The women's disadvantage is large. In 2010, women's earnings were on average 34 percent lower than those of men with the same characteristics. The distance was larger among salaried workers (41 percent) and lower in urban than in rural areas (respectively, 29 and 36 percent). These figures, however, represent a relevant improvement with respect to 2001 and, even more, 2005. This could be evidence that the work carried out in the country to promote "gender equality and empowerment of women", one of the challenges included in the Madagascar Action Plan, is effective.

281. **Returns to education in 2010 appear to have decreased with respect to 2001.** In 2010 one additional year of education allowed an increase in earnings by 5 percent. This means that the normal five years of primary education increased earnings by 28 percent. Returns to education in 2010 were higher for wage workers (6 percent) and similar in rural and urban areas. Furthermore, they were higher for women than for men (respectively, just above 6 percent and around 4 percent). Returns to education in 2010 were lower than in 2001 both overall and for all subgroups or areas considered in Figure 68 (the differences ranged from less than one percent for women to around 2 percent for men). However in rural areas they were higher in 2010 than in 2005 by just less than one percent.

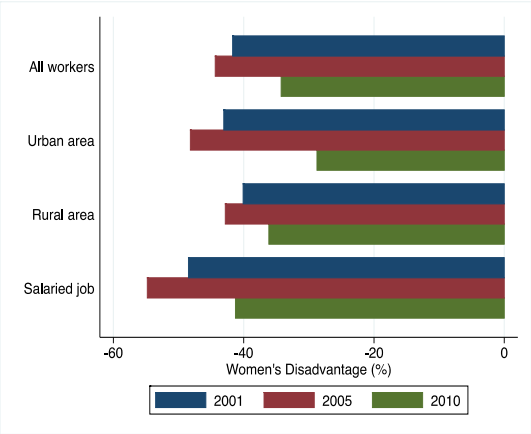
Table 42: Determinants of earnings, 2001, 2005 and 2010

	All workers 2001	All workers 2005	All workers 2010	Urban 2001	Urban 2005	Urban 2010	Rural 2001	Rural 2005	Rural 2010
Salaried job	0.204	0.0963	0.336	0.158	-0.248	0.542***	0.253	0.445	-0.216
	-1.21	-0.4	-1.69	-1	(-1.08)	-3.69	-0.77	-1.04	(-0.41)
Non-agr. self-empl.	0.544**	0.421	0.735***	0.437**	0.162	0.888***	0.64	0.693	0.231
	-3.15	-1.73	-3.68	-2.69	-0.7	-6	-1.91	-1.62	-0.43
Agr. self-employed	0.0231	0.238	0.623**	-0.125	-0.181	0.585***	0.103	0.618	0.175
	-0.14	-0.98	-3.13	(-0.77)	(-0.78)	-3.96	-0.31	-1.45	-0.33
Non-agr. familial aid	-1.212***	-0.674*	-0.0885	-1.082***	-1.347***	0.0584	-1.340***	-0.216	-0.586
	(-6.13)	(-2.52)	(-0.44)	(-5.82)	(-4.80)	-0.39	(-3.48)	(-0.47)	(-1.10)
Agr. familial aid	-0.936***	-0.951***	-0.896***	-0.649***	-1.461***	-0.828***	-0.929**	-0.584	-1.357*
	(-5.38)	(-3.92)	(-4.51)	(-3.40)	(-6.23)	(-5.61)	(-2.78)	(-1.37)	(-2.56)
Public sector	0.339	0.408	0.660**	0.381*	0.0613	0.830***	0.3	0.765	0.15
	-1.93	-1.67	-3.29	-2.31	-0.26	-5.57	-0.88	-1.78	-0.28
Experience	0.0655***	0.0571***	0.0565***	0.0660***	0.0667***	0.0696***	0.0656***	0.0531***	0.0531***
	-9.95	-14.12	-16.19	-7.45	-11.33	-14.17	-6.24	-9.45	-10.64
Experience squared	-0.000653***	-0.000626***	-0.000607***	-0.000675***	-0.000758***	-0.000759***	-0.000650***	-0.000577***	-0.000567***
	(-7.90)	(-12.39)	(-13.76)	(-6.05)	(-10.23)	(-12.25)	(-4.93)	(-8.23)	(-8.99)
Years of education	0.0657***	0.0493***	0.0497***	0.0628***	0.0642***	0.0495***	0.0668***	0.0391***	0.0474***
	-19.74	-23.17	-25.38	-16.33	-26.5	-21.45	-11.73	-11.82	-15.87
Woman	-0.417***	-0.444***	-0.342***	-0.431***	-0.482***	-0.288***	-0.401***	-0.428***	-0.361***
	(-13.19)	(-23.22)	(-19.19)	(-11.76)	(-19.91)	(-13.22)	(-7.45)	(-15.27)	(-13.49)
Married	0.225***	0.235***	0.232***	0.293***	0.195***	0.275***	0.190**	0.257***	0.215***
	-5.79	-9.34	-10.81	-6.03	-6.05	-10.05	-2.95	-6.99	-6.79
Divorced, Widowed	0.148**	0.202***	0.159***	0.353***	0.134**	0.128***	0.0472	0.228***	0.167***
	-2.89	-6.16	-5.24	-5.58	-3.14	-3.38	-0.55	-4.76	-3.69
Urban	0.125***	0.146***	0.209***						
	-4.3	-8.09	-12.93						
Antananarivo	-0.221***	-0.166***	-0.156***	-0.348***	-0.374***	-0.178***	-0.166*	-0.105*	-0.125**
	(-4.61)	(-5.10)	(-5.81)	(-5.36)	(-7.27)	(-4.64)	(-2.14)	(-2.37)	(-3.23)
Fianarantsoa	-0.773***	-0.308***	-0.288***	-1.026***	-0.507***	-0.349***	-0.687***	-0.260***	-0.263***
	(-15.62)	(-9.28)	(-10.40)	(-14.37)	(-9.23)	(-8.13)	(-8.81)	(-5.81)	(-6.77)
Toamasina	-0.592***	-0.165***	-0.281***	-0.592***	-0.286***	-0.254***	-0.589***	-0.141**	-0.274***
	(-11.60)	(-4.74)	(-9.75)	(-8.17)	(-5.02)	(-6.01)	(-7.31)	(-3.00)	(-6.72)
Mahajanga	-0.470***	-0.231***	-0.0487	-0.484***	-0.190**	-0.0524	-0.459***	-0.258***	-0.035
	(-8.41)	(-6.28)	(-1.57)	(-6.29)	(-3.26)	(-1.15)	(-5.16)	(-5.14)	(-0.80)
Toliara	-0.283***	-0.227***	-0.217***	-0.458***	-0.367***	-0.207***	-0.215*	-0.196***	-0.206***
	(-5.27)	(-6.31)	(-7.31)	(-6.20)	(-6.31)	(-4.71)	(-2.52)	(-4.02)	(-4.91)
Constant	11.51***	11.63***	11.20***	11.77***	12.10***	11.02***	11.43***	11.31***	11.74***
	-56.69	-46.13	-54.01	-52.87	-47.67	-65.03	-30.56	-25.84	-21.85
Observations	5868	13249	17412	3671	6515	8951	2197	6734	8461
Adjusted R^2	0.413	0.451	0.525	0.37	0.416	0.492	0.4	0.449	0.525

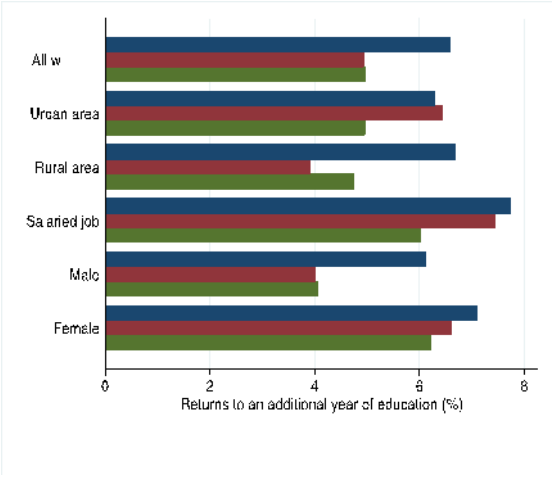
Source: EPMs and authors' calculations

Figure 68: Women's earnings disadvantages

Woman's disadvantage (2001, 2005, 2010, percent)



Returns to an additional year of education (2001, 2005, 2010, percent)



Source: EPM household surveys.

282. After the seminal papers of Oaxaca (1973) and Blinder (1973), the so-called Oaxaca-Blinder decomposition has become a standard tool to investigate average wage gaps among population subgroups. The aim of our analysis is to decompose differences in mean wages across two or more groups, for instance men and women. Such decomposition allows us to identify two components. The first component, usually referred to as the "explained" difference is the fraction of the wage gap that can be attributed to differences in certain characteristics of men and women, such as differences in human capital. To the extent that men are better educated than women than the gap in the level of education is likely to be mirrored in a wage gap. The second component, often called the "unexplained" difference, is due to different treatment of the two groups in the market. In this sense, the unexplained difference is often interpreted as that part of the wage gap due to "discrimination" (although this might be due to other factors such as differences in the quality of human or physical capital, difference in the effort levels or other factors).[20]

283. **Between 2005 and 2010 gender discrimination has decreased.** Oaxaca-Blinder decompositions applied to the Malagasy data allow us to investigate the trend of gender discrimination in earnings. We find that in 2005 about 44 percent of the overall wage gap was "explained" by different characteristics of male and female. The remaining 56 percent was due to what in this type of analysis is often called "gender discrimination". By 2010, gender discrimination has clearly decreased: the unexplained component accounted for about 40 percent of the total average wage gap.

[20] See Fortin, Lemieux and Firpo (2010) for a comprehensive overview of decomposition methods.

Chapter 8: Gender and Poverty in Madagascar: the special case of Female-Headed Households

About a fifth of all households are headed by women, who are mostly widowed, divorced, or separated). While on first inspection, they do not appear, as a group, to be significantly worse off than male-headed households, the situation is different when one controls for obvious covariates including location and age, as well as, importantly, the marital status of the head. Conditional on location only, female-headed households in both rural and urban areas enjoy lower consumption than male headed households.

284. **In common with many other African countries, a substantial share of Madagascar's households is headed by women.** A fifth (20.4 percent) of all household heads in the 2010 EPM household budget survey sample are female, with a slightly higher proportion in urban (22.5 percent) than rural areas (18.4 percent). Households with a female head (FHH) account for 15 percent of Malagasy population, reflecting the typically lower size of households headed by women. Their household members account for 18.3 percent of the country's urban, and 14 percent of its rural, population (Table 43).

Table 43: The distribution of population and households by gender of head in 2010

	Rural		Urban		Total	
	Male	Female	Male	Female	Male	Female
percent Households	81.6	18.4	77.6	22.4	80.7	19.3
percent Population	86.0	14.0	81.7	18.3	85.1	14.9
EPM sample obs	5,012	1,128	4,901	1,419	9,913	2,547

Source: EPM 2010

285. **On balance, a majority of studies find that FHH are poorer in many parts of the world**[21]. Of course, as these studies emphasize, FHHs are heterogeneous. Whether and how disadvantaged they are is inextricably linked to why they are female-headed (also see Kabeer, 1997). In Africa, studies for Uganda (Appleton, 1996), Zimbabwe (Horrell & Krishnan, 2007) and Mali (van de Walle, 2013) find that among them, households headed by widows are especially impoverished relative to all other households.

286. **So, what are the circumstances that result in households being female headed in Madagascar?** As shown in Table 44, the vast majority (74.3 and 77.5 percent in urban and rural areas respectively) reflect broken unions—divorce, separation and widowhood. Another 16 percent are single women. It is striking to compare these same figures for male heads of households for whom the picture is very different. In urban Madagascar, 91 percent of male heads are in a union while this is the case for 93 percent of rural male heads. Clearly, and in contrast to women, men who undergo divorce, separation or widowhood, typically remarry.

[21] see Buvinic and Rao Gupta (1997) for a review of the literature; also see Chant (1997) and Quisumbing et al., (2001)

Table 44: The distribution of household heads by their marital status, %

	Rural		Urban		Total	
	Male	Female	Male	Female	Male	Female
Legally married	29.2	0.6	42.9	1.9	32.1	0.9
Customarily Married	55.8	4.8	40.2	4.2	52.5	4.6
Free union	8.2	1.7	7.5	1.6	8.1	1.7
Divorced	0.2	6.7	0.5	6.6	0.3	6.7
Separated	2.2	34.3	2.6	30.0	2.3	33.2
Widowed	2.0	36.9	2.6	38.7	2.1	37.3
Single	2.4	15.2	3.8	17.1	2.7	15.7
Total	100	100	100	100	100	100

Source: EPM 2010. Population weighted to represent the population of heads.

287. **FHH differ mainly from MHH by the marital status of the household head, their age, and the size of the household.** Table 45 presents population weighted means and standard deviations for some other key household and individual characteristics for male and female headed households across urban and rural areas. It turns out that, in comparing the situation of male- and female-headed households in Madagascar, the marital status of their heads is the most discordant across a large array of attributes. Other differences across the two types of households are generally less pronounced. Female heads are typically older (by almost 5 years on average) and head smaller households (of 1 to 1.5 fewer members on average). They typically consist of relatively more adult women and fewer men.

288. **Differences in other dimensions are also important.** In terms of assets, in both rural and urban Madagascar, female heads have about 1 year less schooling on average; they cultivate just over half the acres of land that male heads cultivate; possess 3 to 4 times fewer large farm animals and close to two times fewer small farm animals. As one might expect, they are also less likely to be retired from a formal job and to be pension beneficiaries. In contrast, FHH are more likely on average to be the recipients of remittances. Female heads are more likely to engage in petty trade activities, while male heads are somewhat more likely to be engaged in agricultural self-employment. Differences are small with respect to the access to electricity (38 versus 41 percent in urban and 5 versus 6 percent in rural areas for FHH and MHH respectively); reliance on nature to go to the toilet (28 percent for FHH versus 26 percent for MHH in urban and 64 versus 55 percent in rural areas); and reliance on lakes, rivers and rain water as drinking water sources (23 versus 28 percent in urban, and 56 versus 60 in rural areas).

Table 45: Summary statistics for households with male and female heads by urban and rural residence, 2010

	MHH urban		MHH rural		FHH urban		FHH rural	
	mean	sd	Mean	sd	mean	sd	mean	sd
PC consumption/1000	323.61	536.33	178.19	272.85	348.93	481,9	168.02	264.12
Age of head	41.61	13.37	41.05	13.67	46.30	16.22	45.80	15.88
Single head	0.04	0.19	0.02	0.15	0.17	0.38	0.15	0.36
Married legally	0.43	0.49	0.29	0.45	0.02	0.13	0.01	0.08
Free union	0.08	0.26	0.08	0.28	0.02	0.12	0.02	0.13
Customarily Mar.	0.40	0.49	0.56	0.50	0.04	0.20	0.05	0.21
Divorced head	0.01	0.07	0.00	0.04	0.07	0.25	0.07	0.25
Separated head	0.03	0.16	0.02	0.15	0.30	0.46	0.34	0.47
Widowed head	0.03	0.16	0.02	0.14	0.39	0.49	0.37	0.48
Chronically ill head	0.02	0.14	0.02	0.14	0.03	0.18	0.05	0.21
Has Ill members	0.07	0.16	0.07	0.16	0.10	0.24	0.10	0.22
HH size	4.73	2.21	5.21	2.38	3.65	2.15	3.76	2.08
Sh. women>56	0.02	0.08	0.02	0.08	0.14	0.26	0.13	0.26
Sh. Men>56	0.05	0.13	0.04	0.12	0.00	0.03	0.00	0.03
Sh. Women 15-55	0.26	0.15	0.24	0.13	0.41	0.30	0.34	0.26
Sh. Men 15-55	0.31	0.20	0.28	0.18	0.14	0.20	0.10	0.17
Sh. Girls 0-6	0.09	0.14	0.12	0.15	0.07	0.14	0.10	0.16
Sh. Boys 0-6	0.10	0.14	0.11	0.14	0.06	0.13	0.10	0.16
Years education	5.74	4.46	3.42	3.39	4.87	4.20	2.46	3.19
Land acres	72.3	149.0	130.6	216.3	38.9	102.5	78.7	119.8
Large livestock	1.62	18.42	3.40	33.00	0.46	2.16	1.00	3.69
Small livestock	5.98	13.55	9.33	13.86	3.92	9.48	6.21	11.58
Gets soc. security	0.11	0.32	0.03	0.17	0.09	0.29	0.02	0.15
Retired	0.13	0.34	0.04	0.20	0.10	0.30	0.03	0.16
Gets remittances	0.38	0.48	0.32	0.47	0.56	0.50	0.47	0.50
In trade	0.13	0.34	0.04	0.18	0.22	0.41	0.07	0.26
In agriculture	0.46	0.50	0.83	0.38	0.33	0.47	0.75	0.43
Lost job	0.44	0.50	0.43	0.50	0.43	0.49	0.30	0.46
Unemployed	0.02	0.15	0.01	0.08	0.08	0.27	0.02	0.15
Inactive	0.03	0.17	0.01	0.11	0.10	0.31	0.04	0.19
Has electricity	0.41	0.49	0.06	0.25	0.38	0.49	0.05	0.21
WC in nature	0.26	0.44	0.55	0.50	0.28	0.45	0.64	0.48
Drink. water lakes	0.28	0.45	0.60	0.49	0.23	0.42	0.56	0.50
Brick house	0.41	0.49	0.24	0.42	0.39	0.49	0.17	0.37

Note: Population weighted. Per capita consumption is expressed in 2010 Ariary divided by 1000.

289. **Female headship is associated with lower living standards more clearly in rural areas.** Table 46 and Table 47 present regressions of (log) household per capita consumption on the entire sample of EPM 2010 households. Here we are asking how female headed households fare with respect to living standards in comparison with male headed households. The omitted, comparison group, is all male headed households. A series of 6 regressions that progressively add sets of controls—namely for location, marital status, demographics,

education and productive assets—are each given for urban households and then for rural households. (Note that the first two regressions in each set are given in Table 46, while the rest follow in Table 47. The idea here is to see whether a specific group of controls can account for the effect of female headship on living standards.

290. The first regression in each set asks whether FHH in Madagascar are unconditionally poorer on average than MHH Table 46). No significant difference is found for urban Madagascar until the regression also controls for community fixed effects in column 2. In other words, FHH tend to be poorer within any given urban area but not when making comparisons between urban areas. Conditioning on no other characteristics besides location, FHH are found to have per capita expenditures that are 5 percent lower. In rural areas, the estimated difference in consumption is negative and significant whether or not location is held constant and of the order of 6 to 7 percent lower.

Table 46: Estimated effects of female headship and head's marital status on log household consumption per capita (no controls, and community fixed effects only)

	Urban		Rural	
	Reg1	**Reg2**	**Reg7**	**Reg8**
Female head	0.02	-0.05**	-0.07**	-0.06***
	(0.87)	(-2.28)	(-2.49)	(-2.63)
Constant	12.25***	12.27***	11.81***	11.81***
	(419.2)	(2,675.9)	(528.13)	(2,934.14)
Observations	6,320	6,320	6,140	6,140
Adjusted R squared	0.000	0.412	0.001	0.326

Note: *** p<0.01, ** p<0.05, * p<0.1. Regressions 2 and 8 add location fixed effects. Standard errors are clustered at community level. The left out comparison group is all male heads.

Table 47: Estimated effects of female headship and head's marital status on log household consumption per capita

	Urban				Rural			
	reg3	reg4	reg5	reg6	reg9	reg10	reg11	reg12
Married FH	0.24*	0.17	0.08	0.06	0.17	0.19	0.15	0.10
	-1.81	-1.27	-0.56	-0.44	-0.92	-1.21	-1.04	-0.74
Custom. Mar FH	-0.21**	-0.14*	-0.07	-0.07	-0.08	-0.09	-0.09	-0.05
	(-2.10)	(-1.76)	(-0.87)	(-0.90)	(-1.20)	(-1.57)	(-1.59)	(-0.95)
Free union FH	0.04	0.01	0.09	0.09	-0.25**	-0.28***	-0.27**	-0.25***
	-0.36	-0.11	-1.17	-0.98	(-2.12)	(-2.70)	(-2.57)	(-2.62)
Separated FH	-0.12***	-0.28***	-0.20***	-0.19***	-0.10***	-0.19***	-0.18***	-0.16***
	(-3.42)	(-9.18)	(-7.19)	(-6.75)	(-2.80)	(-6.44)	(-6.18)	(-6.13)
Divorced FH	0.13	-0.01	0.01	0.04	-0.06	-0.18***	-0.15**	-0.13**
	-1.45	(-0.13)	-0.20	-0.56	(-0.86)	(-2.69)	(-2.48)	(-2.21)
Widowed FH	-0.09***	-0.26***	-0.18***	-0.17***	-0.07**	-0.23***	-0.19***	-0.16***
	(-2.82)	(-8.40)	(-6.29)	(-5.76)	(-2.06)	(-7.36)	(-6.41)	(-5.71)
Single FH	0.13***	-0.21***	-0.16***	-0.15***	0.10*	-0.13***	-0.11**	-0.11**
	-2.59	(-4.44)	(-3.66)	(-3.48)	-1.73	(-2.62)	(-2.26)	(-2.04)
Polygamous		0.03	0.06	0.06		0.04	0.04	0.03
		-0.42	-0.88	-0.90		-0.64	-0.76	-0.47
Age		0.02***	0.02***	0.02***		0.02***	0.02***	0.02***
		-7.90	-6.24	-5.78		-7.34	-6.37	-5.83
Age squared		-0.00***	-0.00***	-0.00***		-0.00***	-0.00***	-0.00***
		(-7.29)	(-5.59)	(-5.19)		(-6.67)	(-5.66)	(-5.19)
Log HH size		-0.51***	-0.50***	-0.52***		-0.45***	-0.45***	-0.50***
		(-25.93)	(-27.40)	(-28.19)		(-20.80)	(-20.99)	(-23.64)
Sh. women 56+		0.29***	0.29***	0.27***		0.22***	0.24***	0.17**
		-3.19	-3.30	-3.13		-2.76	-2.99	-2.07
Share of men 56+		0.20*	0.25**	0.23**		0.31***	0.32***	0.24**
		-1.83	-2.44	-2.33		-3.03	-3.22	-2.54
Sh women 15-55		0.39***	0.33***	0.31***		0.32***	0.29***	0.24***
		-7.02	-6.41	-6.22		-5.35	-5.03	-4.20
Sh. men 15-55		0.28***	0.26***	0.25***		0.41***	0.39***	0.33***
		-5.34	-5.28	-5.18		-7.50	-7.29	-6.37
Sh. women 0-6		-0.33***	-0.28***	-0.24***		-0.23***	-0.19***	-0.13***
		(-6.46)	(-5.86)	(-4.86)		(-4.64)	(-4.03)	(-2.87)
Sh. men 0-6		-0.34***	-0.30***	-0.26***		-0.25***	-0.24***	-0.20***
		(-5.84)	(-5.43)	(-4.77)		(-5.09)	(-5.07)	(-4.31)
Head ill		0.01	0.01	0.01		0.02	0.01	0.01
		-0.21	-0.22	-0.24		-0.38	-0.22	-0.25

Table 48: Estimated effects of female headship and head's marital status on log household consumption per capita (continued)

	Urban				Rural			
	reg3	reg4	reg5	reg6	reg9	reg10	reg11	reg12
Sh other >15 ill		-0.06	-0.02	-0.03		0.03	0.02	0.04
		(-1.30)	(-0.60)	(-0.84)		-0.58	-0.51	-1.01
yrs of education			0.01*	0.01			0.00	0.00
			-1.67	-1.58			-0.34	(-0.19)
Edu yrs squared			0.00***	0.00***			0.00***	0.00***
			-7.10	-7.54			-6.41	-6.65
Land acres				0.00***				0.00***
				-5.03				-4.73
N. large livestock				0.00				0.00
				-1.53				-1.48
N. small livestock				0.00***				0.00***
				-8.33				-6.27
constant	12.27***	12.35***	12.27***	12.29***	11.81***	11.88***	11.85***	11.89***
	-2703.57	-155.14	-153.93	-155.20	-3044.98	-151.17	-152.78	-154.35
Observations	6320	6320	6320	6320	6140	6140	6140	6140
Adjusted R2	0.42	0.59	0.64	0.64	0.33	0.53	0.56	0.59

Note: *** p<0.01, ** p<0.05, * p<0.1. All regressions control for location fixed effects. Standard errors are clustered at community level. The left out comparison group is all male heads.

291. **In urban areas, when controlling for marital status, significant and large effects appear.** In the following columns, the regressions progressively add sets of controls. The next regression adds dummy variables for the marital status of the female head. Focusing first on urban areas, we see that some significant and large effects appear. In particular, FHH headed by customarily married women appear to be 21 percent poorer, those with separated heads are 12 percent poorer and those with a widowed head 9 percent worse off. These are clearly large effects. FHH with legally married or single heads appear to have higher consumption than MHH as a whole. However, as has been shown elsewhere (Lanjouw and Ravallion 1995; van de Walle, 2013) these results could well be spurious since FHH tend also to be smaller (Table 48). Per capita welfare measures will then exaggerate the cost for larger (and male headed) households of achieving a given level of welfare given economies of scale in consumption (Lanjouw & Ravallion, 1995). Indeed, once household size and composition attributes are entered, estimated negative coefficients become more pronounced while that of a customarily married female head is much reduced in size and the positive effect of having a legally married head vanishes. Controlling for human and physical assets (land and livestock) further attenuates the negative effects. The final regression suggests that FHH with separated heads are poorest (19 percent poorer), followed by those with widowed (17 percent) and single (15 percent) heads.

292. **The picture in rural areas is similar in some respects.** Here too, allowing for a full set of controls, separated, widowed and single women head households that are significantly poorer (by 16, 16 and 11 percent respectively) than male heads do. However, in rural Madagascar, among FHH, it is those who are headed by women in free unions that are the worst off relative to male headed households at 25 percent poorer on average. Finally, rural

households headed by divorced women are also found to be worse off than MHH with consumption per person 13 percent lower.

293. **Overall, the main reason FHH are poorer is highly correlated with the marital status of their heads.** Single, widowed and separated women are all badly off, as are divorced and women in free unions in rural areas. These are very robust effects. These groups also account for the vast majority of FHH. Although far fewer men are in these marital situations as heads, it may well be that their households are equally badly off. After all, there is likely to be heterogeneity among MHH as well and it may likewise be correlated with marital status. We examine this issue in Table 49 which presents a similar set of regressions to those given in Table 47 and Table 48. Here however, controls are also entered for the marital status of male heads. The omitted category is legally married male heads. All the estimated effects are thus relative to the welfare of households with legally married male heads.

294. **Interestingly, the results suggest that MHH with divorced heads are bottom of the living standards ladder in urban areas.** They are found to be 39 percent poorer than legally married male heads. However they account for only 0.05 percent of urban MHH. They are followed by households headed by separated women (31 percent), by single women (27 percent), widowed women (26 percent), customarily married women, separated and single men (all at 20 percent) and finally customarily married, free union and widowed men (17, 17 and 18 percent).

295. **In rural areas, FHH remain at the bottom of the heap.** As before, those with heads in a free union are the most disadvantaged (31 percent poorer) followed by those with separated or widowed female heads (20 percent) and divorced heads (17 percent). Among rural MHH, those with widowed heads are the worst off, at 16 percent poorer on average than households headed by legally married men.

Table 49: Estimated effects on log household consumption per capita of female or male headship and marital status versus legally married male headship

	Urban				Rural			
	reg3	reg4	reg5	reg6	reg9	reg10	reg11	reg12
Married FH	0.15	0.04	0	-0.02	0.13	0.1	0.1	0.06
	-1.1	-0.29	(-0.01)	(-0.17)	-0.71	-0.63	-0.7	-0.42
Custom. Mar FH	-0.35***	-0.33***	-0.20***	-0.20***	-0.15**	-0.20***	-0.15**	-0.10*
	(-3.34)	(-4.06)	(-2.61)	(-2.72)	(-2.02)	(-3.27)	(-2.51)	(-1.82)
Free union FH	-0.1	-0.17**	-0.03	-0.04	-0.32***	-0.40***	-0.34***	-0.31***
	(-1.02)	(-2.09)	(-0.39)	(-0.43)	(-2.68)	(-3.75)	(-3.16)	(-3.19)
Separated FH	-0.25***	-0.45***	-0.33***	-0.31***	-0.16***	-0.29***	-0.23***	-0.20***
	(-6.68)	(-13.40)	(-10.21)	(-9.89)	(-3.84)	(-7.81)	(-6.40)	(-6.22)
Divorced FH	0.02	-0.15*	-0.08	-0.06	-0.11	-0.25***	-0.20***	-0.17***
	-0.25	(-1.95)	(-1.17)	(-0.83)	(-1.48)	(-3.83)	(-3.12)	(-2.79)
Widowed FH	-0.21***	-0.40***	-0.28***	-0.26***	-0.12***	-0.31***	-0.23***	-0.20***
	(-5.85)	(-12.13)	(-9.06)	(-8.66)	(-3.22)	(-8.58)	(-6.82)	(-6.15)
Single FH	0.01	-0.38***	-0.28***	-0.27***	0.04	-0.23***	-0.16***	-0.15***
	-0.27	(-7.59)	(-5.92)	(-5.78)	-0.59	(-4.17)	(-3.05)	(-2.73)
Custo. Mar. MH	-0.26***	-0.25***	-0.17***	-0.17***	-0.11***	-0.11***	-0.06***	-0.05**
	(-10.62)	(-11.82)	(-8.58)	(-8.75)	(-4.11)	(-4.90)	(-2.73)	(-2.45)
Free union MH	-0.20***	-0.26***	-0.17***	-0.17***	-0.12***	-0.17***	-0.10***	-0.09**
	(-5.98)	(-8.95)	(-6.20)	(-6.34)	(-3.03)	(-4.63)	(-2.86)	(-2.54)
Separated MH	0.08	-0.28***	-0.21***	-0.20***	0.25***	-0.23***	-0.16***	-0.14***
	-1.35	(-5.64)	(-4.41)	(-4.39)	-3.5	(-4.20)	(-2.93)	(-2.89)
Divorced MH	-0.05	-0.49***	-0.42***	-0.39***	-0.17	-0.28	-0.24	-0.23
	(-0.46)	(-5.94)	(-4.34)	(-4.07)	(-0.60)	(-1.08)	(-0.83)	(-0.85)
Widowed MH	0.05	-0.25***	-0.18***	-0.18***	0.09	-0.24***	-0.19***	-0.16***
	-0.71	(-3.79)	(-2.99)	(-2.99)	-1.54	(-4.59)	(-3.68)	(-3.24)
Single MH	0.27***	-0.24***	-0.21***	-0.20***	0.46***	-0.19***	-0.16***	-0.13**
	-4.41	(-4.41)	(-3.75)	(-3.64)	-6.66	(-3.24)	(-2.77)	(-2.35)
Polygamous		0.1	0.11	0.11		0.05	0.05	0.03
		-1.33	-1.52	-1.57		-0.97	-0.87	-0.57
Age		0.02***	0.02***	0.01***		0.02***	0.02***	0.02***
		-7.13	-5.83	-5.35		-7.13	-6.24	-5.72
Age squared		-0.00***	-0.00***	-0.00***		-0.00***	-0.00***	-0.00***
		(-6.68)	(-5.26)	(-4.85)		(-6.41)	(-5.50)	(-5.06)
Log HH size		-0.53***	-0.52***	-0.55***		-0.48***	-0.47***	-0.52***
		(-26.42)	(-27.47)	(-28.27)		(-20.89)	(-20.98)	(-23.14)
Sh. women 56+		0.20**	0.21**	0.19**		0.15*	0.16**	0.1
		-2.2	-2.35	-2.24		-1.73	-2.01	-1.24
Share of men 56+		0.21**	0.26**	0.24**		0.36***	0.36***	0.28***
		-2	-2.57	-2.45		-3.53	-3.66	-2.95
Sh women 15-55		0.33***	0.27***	0.27***		0.25***	0.23***	0.18***
		-5.89	-5.15	-5.06		-4.03	-3.8	-3.08
Sh. men 15-55		0.28***	0.27***	0.26***		0.45***	0.42***	0.36***
		-5.4	-5.51	-5.39		-8.06	-7.87	-6.88

Table 49: Estimated effects on log household consumption per capita of female or male headship and marital statuses versus legally married male headship (continued)

	Urban				Rural			
	reg3	reg4	reg5	reg6	reg9	reg10	reg11	reg12
Sh. women 0-6		-0.33***	-0.29***	-0.24***		-0.22***	-0.19***	-0.13***
		(-6.69)	(-6.16)	(-5.09)		(-4.68)	(-4.18)	(-2.99)
Sh. men 0-6		-0.34***	-0.31***	-0.27***		-0.24***	-0.24***	-0.20***
		(-6.09)	(-5.74)	(-5.03)		(-5.03)	(-5.15)	(-4.38)
		-0.19	-0.19	-0.22		-0.34	-0.21	-0.25
Sh other >15 ill		-0.05	-0.02	-0.03		0.03	0.03	0.05
		(-1.07)	(-0.45)	(-0.69)		-0.74	-0.6	-1.1
yrs of education			0.01*	0.01*			0	0
			-1.9	-1.82			-0.15	(-0.35)
yrs edu. squared			0.00***	0.00***			0.00***	0.00***
			-6.27	-6.67			-6.31	-6.55
Land acres				0.00***				0.00***
				-4.96				-4.74
N. large livestock				0				0
				-1.39				-1.49
N. small livestock				0.00***				0.00***
				-8.11				-6.14
constant	12.39***	12.64***	12.49***	12.50***	11.87***	12.02***	11.95***	11.97***
	-766.62	-155.9	-157.37	-158.02	-607.96	-147.5	-147.57	-147.99
Observations	6,320	6,320	6,320	6,320	6,140	6,140	6,140	6,140
Adjusted R2	0.44	0.604	0.642	0.651	0.347	0.529	0.558	0.59

Note: *** p<0.01, ** p<0.05, * p<0.1. Estimated using 2010 EPM. Regressions include location fixed effects. Standard errors are clustered at community level. The left out comparison group is legally married heads.

Implications for future work and policy

296. This short, explorative foray into some of the more prominent gender differences that emerge from the two recent EPMs suggests the need for a deeper understanding of how poverty is linked up to household formation and marital status in Madagascar. Why is it that, controlling for obvious covariates including location, we see these large differences in consumption depending on the marital status and gender of the head? Are these causal effects? Or are there important endogeneity concerns here?

297. **A key issue that needs to be better understood is why people, social norms and institutions do not adjust to attenuate those differences.** What are the social and economic barriers to adjustment and welfare improvements? Without intervention, can we expect marital circumstances to adjust to better protect the rights of women and children? The sorting of people into marital arrangements may well be working to create these differences. Indeed, the gender separation across FHH and MHH that is apparent in the data may make it harder to reform and change policies in favor of women. Policies and practices outside the "family realm" may do more to disadvantage women. Factors could include access to credit and financial services, property and inheritance rights, legal status, the registration of women's names on land records, etc. Why are women so disadvantaged by separation and free unions and widowhood? What are the consequences for their children and implications for the intergenerational transmission of poverty? These are some of the

key questions going forward. At this point, existing data sets, including the DHS and the EPM surveys can be further exploited to examine these questions together with more qualitative work on social and customary norms and practices.

298. **In general, these results suggest the need for more policy focus and attention to women's legal rights, inheritance protection and family law.** Of course, exactly what form policy interventions should take will require deeper and more nuanced understanding. The constitution of Madagascar is silent on customary law and yet, a large majority of men and women are joined under customary unions. Thus, existing laws apply only to legally sanctioned marriage which affects a minority elite. The first step in paving the way for upholding equal rights for women and protecting children when unions break down is to put laws and regulations in place that cover all unions, including customary marriage as well as free unions and have provisions for the offspring of those unions. This may take the form of some kind of enforceable non-bureaucratic, non-religious, system of partnership registrations with legal clout. Having the laws is necessary but not sufficient. Compliance requires widespread education campaigns, as well as political will and economic resources to enforce the law.

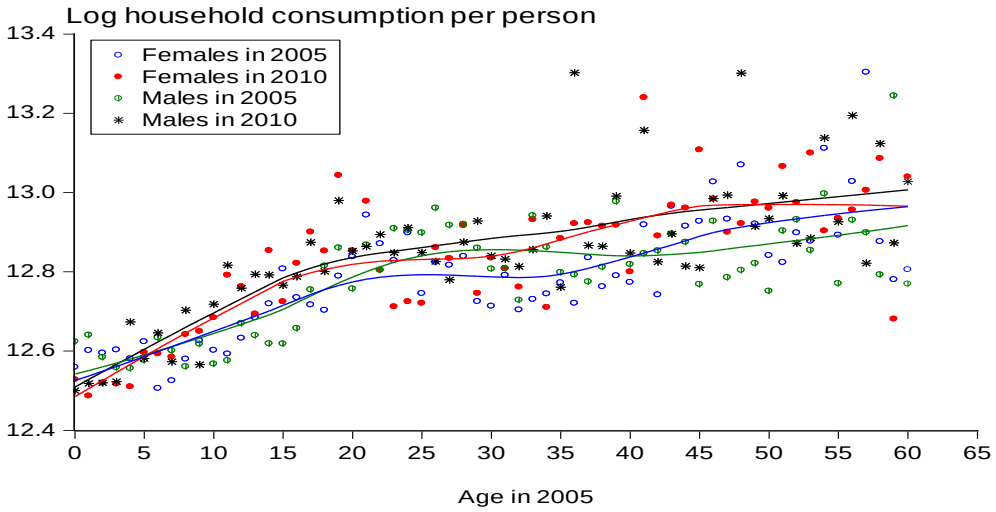
Chapter 9: A pseudo-panel analysis over 2005-10

This chapter is another look at some of the trends of poverty by gender and by age, though only for the second half of the decade, drawing on a pseudo-panel analysis. Absolute poverty has marginally edged down between 2005 and 2010 for most age cohorts, except those of younger men. Activity rates, higher for men across ages, have increased, especially for younger cohorts. There has been little improvement in wages over time. There has been a considerable increase in the share of women looking for work over time at any age. The period saw a clear increase in the share of both men and women who are self-employed in agriculture. There have been rising rates of self-employment in the non-farm sector over time for both men and women except among the elderly. A huge increase in school attendance for younger children is revealed. Moreover, there was a large increase in the average years of schooling of younger children followed by a flattening out for cohorts in their mid-teens.

299. In this chapter, we turn to an analysis of separate male and female synthetic panels by age created using the EPM 2005 and 2010 household surveys. The surveys contain information on various characteristics of individuals and of the households in which they live. For both dates, means of each of those attributes are created for all female individuals of a given age and similarly for all male individuals by age. The age range goes from 1 to age 80 or so, when the number of observations at each age become sparse. The two surveys are comparable and nationally representative. Age gender cohorts are thus also representative. We can then compare the attributes of gender cohorts of a given age in 2005 with the same cohort 5 years older in 2010 and observe time trends by gender and compare levels and trends across male and female individuals. One limitation of this approach is that, due to likely migration and population movements across geographic areas between the surveys, it is not possible to make consistent comparisons of more disaggregated cohorts such as by urban and rural sector. The analysis is thus limited to national gender/age cohorts.

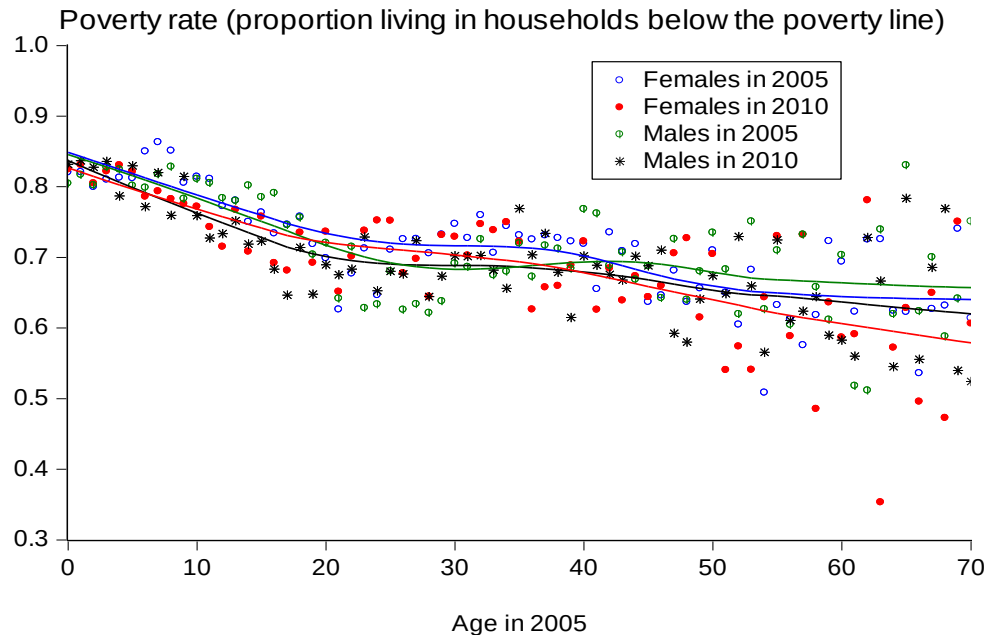
300. Figure 69 to Figure 78 plot the means by gender and age of welfare and other indicators of interest over 2005 to 2010, a period that has been quite politically tumultuous, but overall economically stagnant, in Madagascar. Figure 69 starts by plotting log per capita consumption of the households of the age gender cohorts. At most ages, 2010 consumption is higher for men than for women although a temporary reversal sets in between ages 42 to 49 when women's household per capita consumption fleetingly surpasses that of men's. The cross-gender pattern is more mixed in the earlier year. In 2005, male children under 5 appear to be in higher per capita consumption households. After a brief equalization, male consumption again overtakes that of women quite significantly from age 20 to around age 40 after which women do better. Consumption is everywhere higher in 2010 than in 2005 for both men and for women except for the very youngest.

Figure 69: Trends in log per capita consumption by age and gender over time



301. **Absolute poverty has marginally edged down between 2005 and 2010 for most age cohorts, except those of younger men.** Figure 70 presents the age specific poverty rate trends. On the whole, poverty rates have gone down over time for both men and women across the age distribution. The one exception is for men between the ages of 25 and 35 when the 2010 poverty rates are slightly above those measured for 2005. When comparing poverty for men and women, there is a cross-over effect common to both years whereby men are less poor up to their forties or so and then exhibit a higher poverty rate thereafter. This is similar to the consumption patterns and most likely reflects life cycle effects.

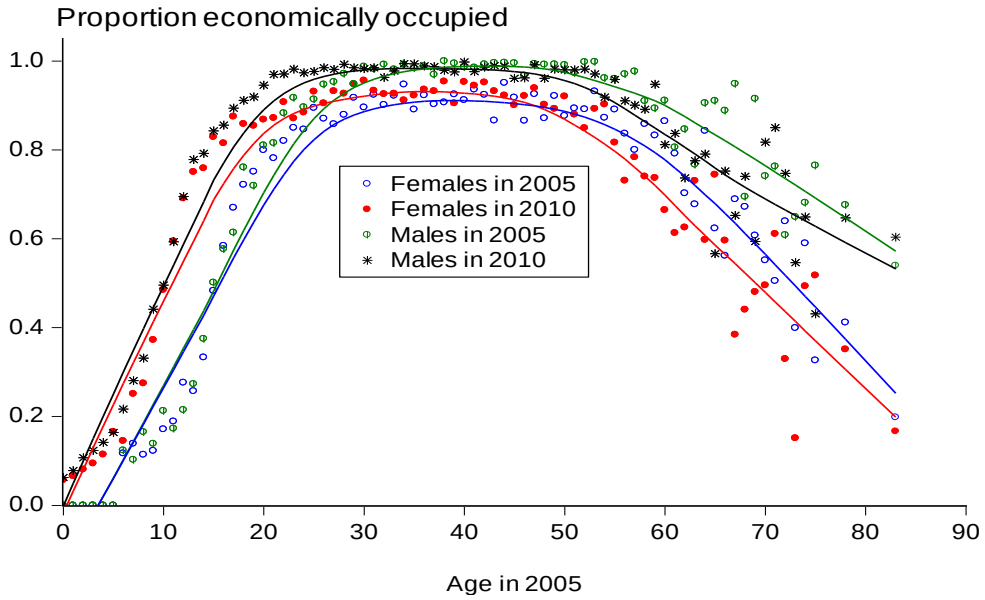
Figure 70: Trends in poverty incidence by age and gender over time



302. **Activity rates, higher for men across ages, have increased, especially for younger cohorts.** Figure 71 turns to employment and specifically the share of economically occupied individuals. For both men and women, occupation rates rise with age, stabilize around age 40 and progressively fall after that. For younger cohorts of both genders (up to age 40 for men

and 50 for women) there are pretty substantial increases in occupational rates over the 5 years between the surveys. The increase is about 15 or more percentage points among teens and young adults. However, for the older cohorts, occupational rates actually fell over time. Economic activity rates are higher for men across all ages. There is some convergence at younger ages, but for older women, rates are noticeably lower.

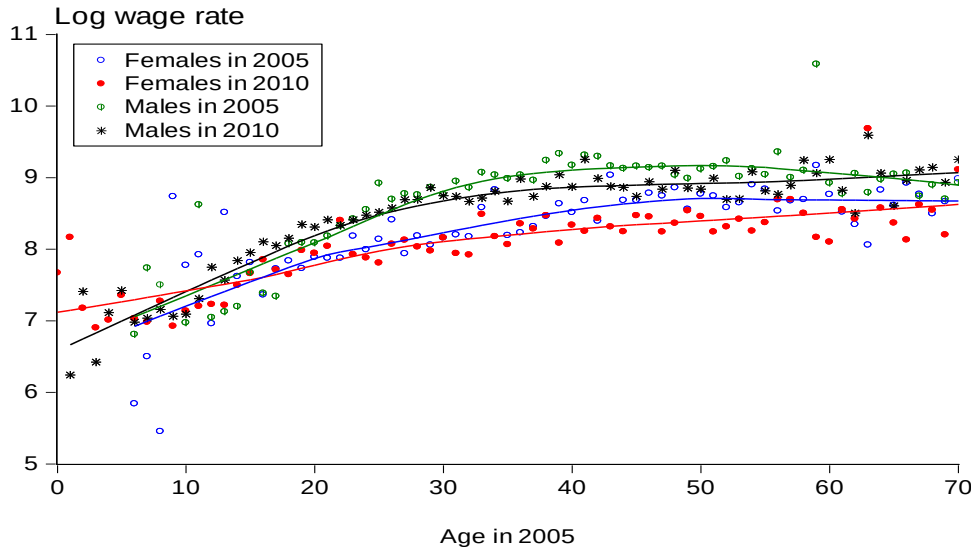
Figure 71: Trends in the share of males and females who are economically occupied by age



303. **There has been little improvement in wages over time (**Figure 72**).** Indeed, for both men and women, real wages have fallen across the board for all ages except the young. For men, this decline over time kicks in during their mid-twenties and persists to their late 60s. The wage reduction over time afflicts women earlier, from around their mid-teens and lasts throughout the age distribution. Except for the very young in 2010, there is also a pronounced gender gap in wages favoring men at both dates. This is in line with findings in the literature.[22]

[22] Nordman et al 2010; Nordman and Vaillant 2013; Hoftijzer and Paci, 2008

Figure 72: Trends in log wage rates by age and gender 2005 to 2010



304. **There has been a considerable increase in the share of women looking for work over time at any age (**Figure 73**).** The share of women searching for employment also dominates that of men at both dates, no doubt reflecting the fact that men are more likely to already have jobs. Yet, there has also been a rise in the proportion of men looking for work, although the increase is concentrated among the under 20, and those in their late 30s. The latter are no doubt looking to supplement their families' incomes. This picture is reinforced by Figure 74 which presents the share of individuals with second jobs. For both men and women we see a huge increase in working a second job. Indeed, the percentage of adults with second jobs is very high at about 50 percent on average. At both dates, men at any age are more likely to have more than one job than women at the same age.

Figure 73: Trends in the share of men and women looking for work by age, 2005-2010.

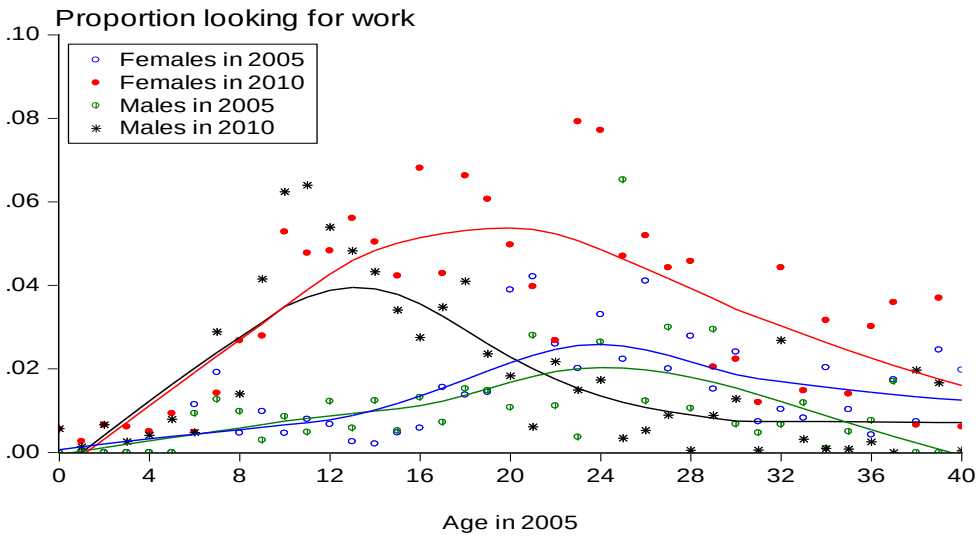
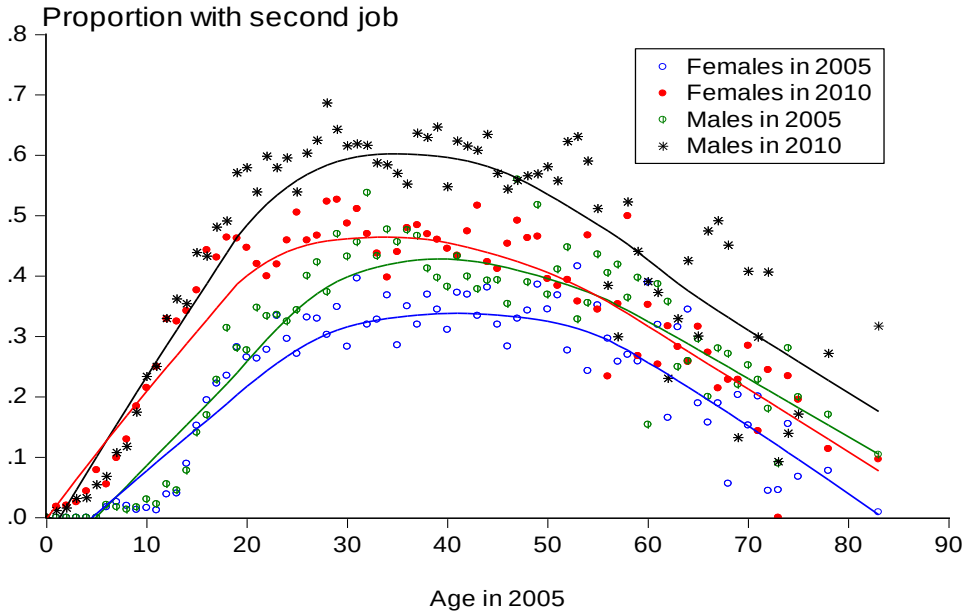


Figure 74: Trends in the share of men and women with second work activity by age, 2005-2010.



305. **The period saw a clear increase in the share of both young men and women who are self-employed in agriculture (**Figure 75**)**. Overall, there are far more men than women who report working on their own account as farmers. But the share doing so rose quite steeply for young men under 30. This may reflect desperation more than anything else. Given the stagnation of the economy – the fall in real wages and the lack of alternative employment – agriculture has had to absorb many young men. More women too appear to be relying on farming but for women, the shares increase more so for older women.

306. **There have been rising rates of self-employment in the non-farm sector over time for both men and women except among the elderly (**Figure 75**)**. In contrast to younger cohorts, older men and women have dropped out of the non-farm sector. Again, there is higher participation in the sector by men than by women.

Figure 75: Trends in the share of men and women self-employed in agriculture by age, 2005-2010.

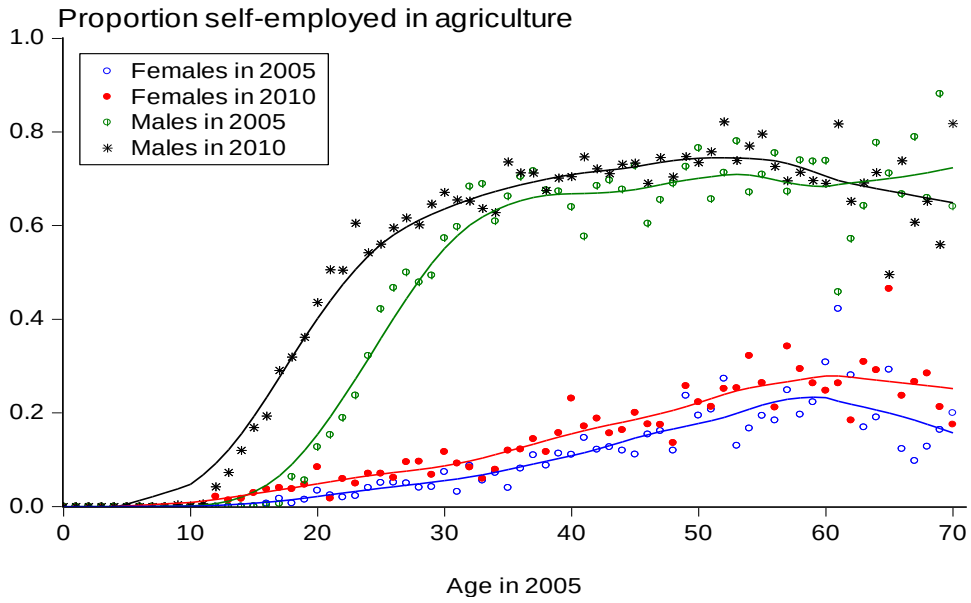
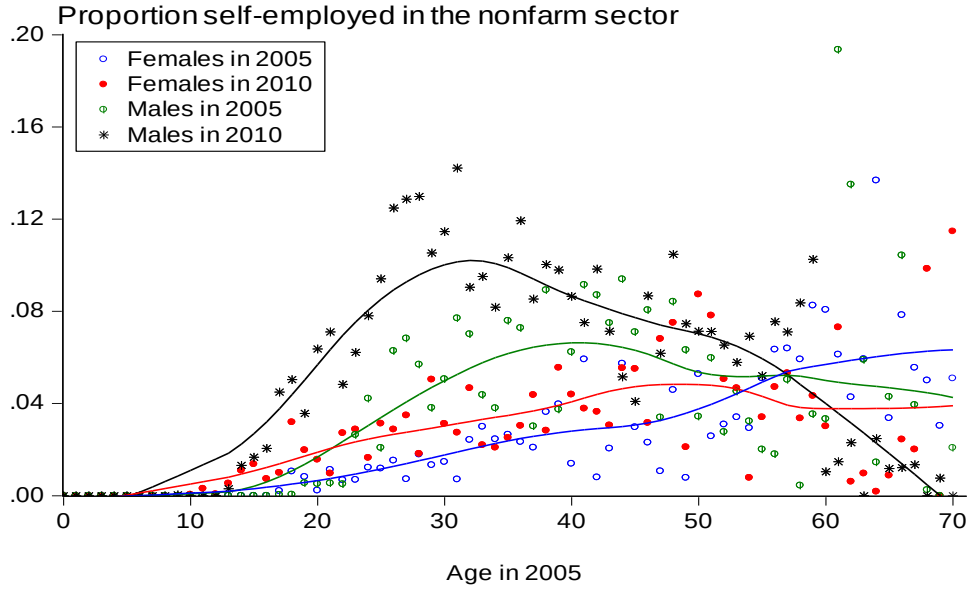
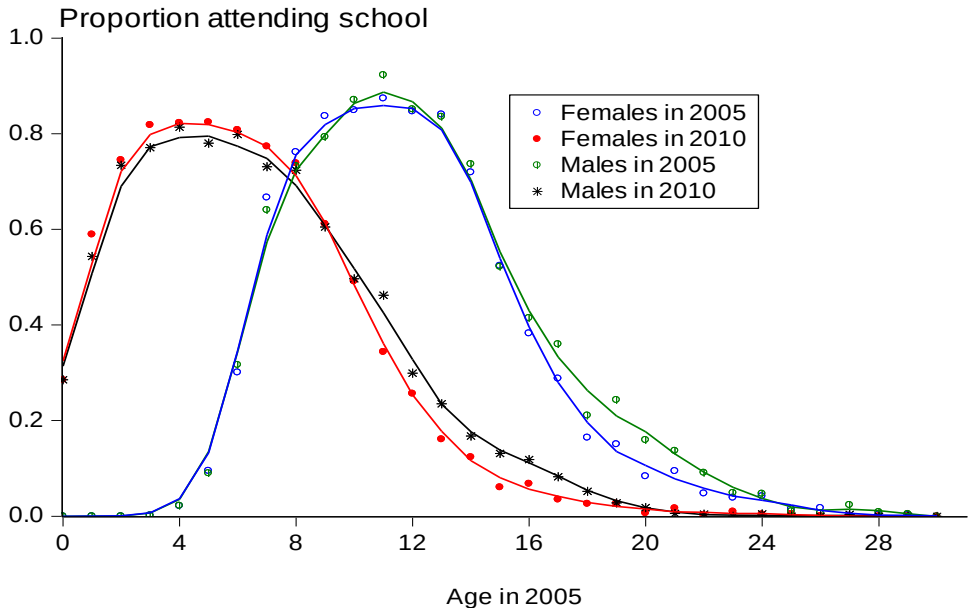


Figure 76: Trends in the share of men and women self-employed in the non-farm sector, by age, 2005-2010.



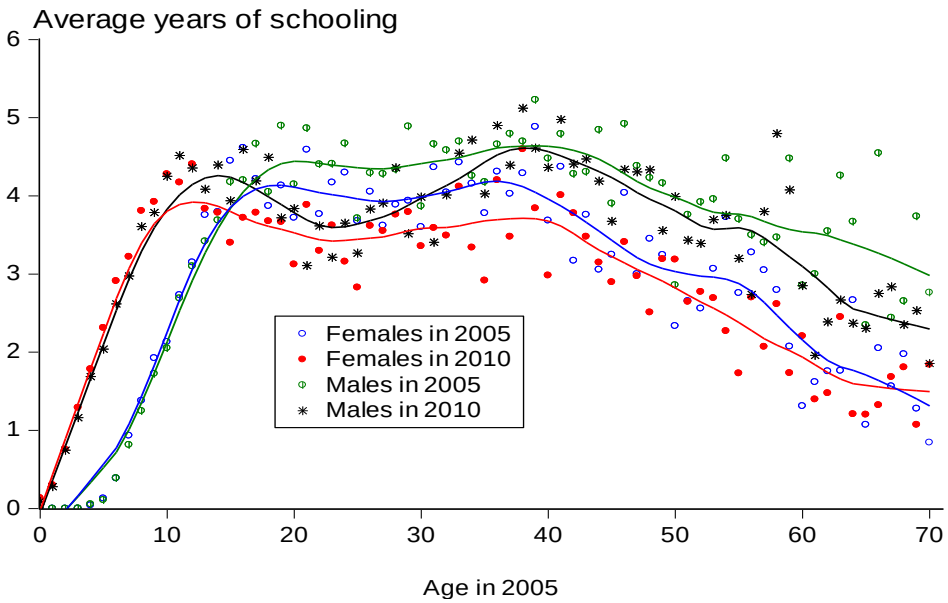
307. **A huge increase in school attendance for younger children is revealed.** Focusing specifically on the younger age cohorts, Figure 77, looks at the proportions of boys and girls attending school. This increase occurred for those under 8 and was somewhat higher for girls. Children are going to school earlier, but they are also dropping out earlier. Above 8 years of age, there is a steady decline in school attendance, which is more rapid for girls from about age 9-10, as was also the case in 2005. On balance it is hard to tell whether there has been a change in overall attendance and not simply in its age profile.

Figure 77: Share of boys and girls who attend school by age, 2005 and 2010



308. **Moreover, there was a large increase in the average years of schooling of younger children followed by a flattening out for cohorts in their mid-teens.** When we examine what has happened to the average years of schooling, what we see is consistent with the big increase in the school attendance of younger children (Figure 78). This is consistent with parents thinking that the opportunity cost of staying in school has not risen (due to low wages and employment prospects) but also with a belief that things will eventually get better, with payoffs for investments in education.

Figure 78: Average years of schooling by age and gender, 2005 and 2010



Chapter 10: The Crisis and Poverty

Two political crises in the 2000s have cost Madagascar dearly in terms of poverty reduction. This chapter focuses on the current one, but also provides a longer view of the poverty impacts of having failed to sustain economic growth on account of the two crises. Based on our earlier findings about the connection between growth and poverty, growth of per capita GDP at about 2.8 percent a year would have translated into a reduction of poverty from 71 percent in 2001, to 55 percent in 2013. Instead, we estimate poverty incidence, at the national poverty line, at about 76 percent. A full 21 percentage points more people are among the poor than under a counterfactual of sustained growth. For the effects of the second crisis, starting in 2009, without it poverty would have probably declined to 63 percent, vs. our estimate of 76 percent in 2013—in just five years, the loss in the fight against poverty can be counted as about 13 percent of the population.

309. **Two major economic crises hit Madagascar's economy during the 2000s.** The first political and economic crisis occurred in 2001 and was associated with 14.9 percent loss in GDP per capita. The recovery, however, was fast and a rebound of 6.1 percent was recorded the following year. The positive economic growth continued for six consecutive years, but the 2009 crisis abruptly hit the economy and is erasing the gains achieved during the pre-crisis years.

The 2009-13 crisis

310. Probably the largest and most diffuse cost of the political crisis, affecting most of the millions of Malagasy households, has been the sharp stalling on the economic front. Madagascar's growth momentum has been severely interrupted, while population growth has not taken a pause as the crisis has been going on—there are now about 2.5 million more Malagasy people than the year before the crisis. Foregone economic growth, and the foregone higher national income that it would have implied, have been significant. To measure these costs, we compare the economy's recent developments against a counterfactual: the trajectory on which the country could have evolved without the crisis.

311. Madagascar is a country with economic potential. In the last 15 years, it experienced 5 years of political crisis on two distinct occasions—4 of these 5 years over 2009-12. In the other 10 years, and in two growth episodes, Madagascar had been able to grow at 5 percent a year on average, ignoring 2003, a year of rapid post-crisis rebound at 10 percent. Madagascar could and should grow faster, but even against this benchmark of 5 percent annual growth, several measures provide a sense of the huge costs of the current crisis:

- With the economic downturn in 2009, and subpar growth over 2010-12, overall GDP came out in 2012 slightly under its 2008 level. That, however, will be close to 18 percent below what it would have been if it had just remained on an average growth trend of 5 percent a year. By this measure, this is an annual loss in incomes for the country as a whole that has now reached about US$1.6 billion just for the year 2012.

- Every past year that the economy has failed to be on this trajectory has been a year of loss. Cumulatively since 2008, the total sum of these annual losses over 4 years is estimated at close to US$6 billion. These costs are gone, and will not be recouped.

- Overall GDP growth must exceed population growth just to avoid falling backward. But at Madagascar's population growth (2.9 percent a year), and the no-growth record over 2008-12, income per capita is estimated to have returned to its 2003 level, as if the subsequent 5-year growth period had never occurred. The 2012 level of per capita income is about $100 below what it could have been under a normal growth trend—very large in a country where per capita GDP is only about $450, even if income is not well distributed across the population.

- When the crisis ends, the economy will not spring back up to its trend in a short time. The costs of foregone growth will remain a legacy of the crisis for years to come. But if the crisis continues, these annual costs of foregone growth will only grow in time – just one additional year of crisis at current trends (2 percent), below the reference growth trajectory at 5 percent, will see an increase in total annual costs from US$1.6 to nearly US$2 billion.

312. 2008-10 were years of global crisis, and even though few Sub-Saharan African countries were much affected, it is reasonable to assume that this crisis, in politically normal times in Madagascar, would also have had an negative impact on the economy. To account for this, another counterfactual is to take as reference a lower average growth rate of 4 percent a year over 4 years—thus assuming that the global crisis' impact on Madagascar would have erased a total of 4½ percent of GDP growth, a number in line with the experience of other SSA countries. Even against this less optimistic growth trajectory, the foregone growth and annual income loss due to the domestic political crisis remains enormous: about US$1.3 billion in 2012, or €1 billion.

313. It is tempting to believe that the shallow growth momentum of the crisis will end by itself and growth will pick up. Some emerging dynamism is already observable in several segments of the economy. There are signs that some of the ground lost in the past 4 years is slowly being regained in various sectors: tourism, activities in *zone franche* enterprises, some commercial real estate in urban centers, local agri-business companies now searching for export markets, the continuation of large mining projects investment and their coming on stream at exploitation, or the temporary benefits of high cloves prices. This is good news. There have also been some activities related to natural resources exploitation, in forestry and mining, where growth reflects poor governance and may damage the country's natural endowment—the kind of economic growth that the Malagasy people do not want. To sum up, for good or less good reasons, some segments of the economy are showing signs of recovery.

314. There are several reasons not to be sanguine about these signs. First, even these "green shoots" of economic recovery do not add up to a resumption of rapid broad-based growth. All the sectors mentioned above have seen signs of growth resumption in the last two years, even as the *overall* economic growth rate still remains around 2 percent. Second, several of these sectors are not major contributors to the tax base, in part because of the fiscal regime applicable to them or because of its weak enforcement—longstanding problems in Madagascar that predate the current crisis. Without this impact, one major mechanism for diffusing the benefits of this growth to the population at large, from a growing economy to tax revenues to public spending on development priorities, is weak. Third, major binding constraints not only to faster growth, but even to the modest growth the economy now enjoys, continue to build up, especially in power, road infrastructure and, a longstanding issue in Madagascar, governance in the relations between the public and the private sector. Because of this, a nascent resumption of growth cannot be taken for granted. Fourth, it is not all clear

that the modest growth that is appearing is contributing to even modest poverty reduction. Not only is it too little, but it is also located in sectors that have limited traction on poverty. We return to the last two points below.

Mining and future growth

315. Some large mining projects are contributing to boost headline GDP growth. Those mining projects show up in broad GDP, being large and capital intensive. GDP growth may then temporarily accelerate to beyond 5 percent a year and more. It might then be tempting again to herald a new era of resumed economic growth.

316. However, for all their local impacts in the narrow region where they take place, some of these impacts good (some direct and indirect job creation—an estimated 15,000 for the largest project—, and some fiscal distribution to local governments), some of these impacts risky (environmental impacts), they will remain a fairly small employment generation contributor to the larger Malagasy economy of 21 million people, 13½ million of which are in the labor force. Moreover, given the fiscal regime of these investments, which is broadly appropriate for some large projects in Madagascar, fiscal payoffs—often, in the international experience, one of the main contributions of mining to the domestic economy at the overall level—will take several years to materialize, until the bulk of large investment is paid off.

317. In future years, production and earnings will not be a sure thing, remaining dependent on volatile global commodity prices. Finally, the large projects coming on stream should be thought as adding a one-time increase to economic activity, not permanent growth, year after year. Overall, in coming years, it will thus be important to monitor, not only the fiscal transfers from mining, but also non-mining GDP as a closer proxy to a measure of aggregate activity that will relate to the livelihoods of Malagasy people—a change in momentum in the non-mining economy is unlikely to take place in the current crisis context.

The economy in a difficult global environment

318. Madagascar is an open economy, at a time of signs of slowdown and high uncertainties in the global economic environment. Those exogenous shocks to the economy ignore the local political dynamics and economic context. Developments in the euro zone in particular, to which Madagascar is exposed—through 80 percent of its tourism earnings, 50 percent of its exports of goods, 15 percent of its FDI, and through other channels—are a current cause of concern. We estimate that a serious shock to the European economy could translate into another loss of GDP growth in Madagascar to a level close to 1½ percent a year for 2 years.

319. More and different shocks ought to be expected in years to come, as will positive opportunities in the world economy. But, just as it is the case for the impact of cyclones and other weather shocks, the political crisis has amplified costs in this area: the ability to mount even partial public responses is now sharply curtailed, despite the potential for economic and social costs that are hard to measure but significant. In particular, developing well targeted public programs for alleviating the impact of shocks on vulnerable populations is a tall order in a low-income, low-capacity economy such as Madagascar, but four years of crisis are four years lost to the investment in basic public systems that may address the problems, in learning about what can work, and in scaling up workable solutions.

Fiscal adjustment and the crisis

320. One mistake macroeconomic policy makers have not made during the crisis years is to question the need for adjusting the public finances to the double whammy of a tighter fiscal base and lower donor contributions. The costs of not having adjusted, for all the temporary palliatives, would have been severe—indebtedness, some crowding out of the private sector, high inflation, and the subsequent costs of taming them. Dealing with such problems would have taken a long time to address by the next administration, at a time when it should have to focus on getting the country back to work on the developmental agenda. For all its negative impact on public goods and services, tightening the belt was essential to avoid yet more costs of the crisis. So, the impacts of tightening the belt must be attributed not to the policy responses themselves, imperfect as they may be, but to the crisis itself.

321. Here again, we can provide one metric of costs by estimating developments in revenues and aid relative to the possible trajectory that the economy and public finances could have followed without the crisis. On a trend growth trajectory, stable (albeit still weak) revenue performance, and continued aid in line with trends in the previous decade, the country's public finances would have been much stronger, providing public resources to critical developmental objectives. By this measure, the cumulative loss in public revenues over the 4 years from 2009 to 2012 is in the order of US$1.5 billion, while the cumulative loss in aid is in the order of US2.3 billion. The sum of the two comes close to the equivalent of half an annual GDP. As long as the political crisis endures, it remains unlikely that public revenues and aid will return to the levels seen in non-crisis years over the last 15 years.

Mortgaging future growth—infrastructure

322. The crisis is itself adding costs and putting limits on future growth—public infrastructure in particular has suffered a considerable cut over the crisis. The public stock of infrastructure needed to support future growth has suffered since the crisis for two main reasons: a contraction of investment to expand it, and limited attention and resources to maintain it and run it efficiently. The public investment budget plans have been cut by almost half since the crisis, in large part with the sharp reduction in donor programs, but also within the domestically-financed budget, as investment spending has been the main adjustment variable to lower revenues. There are also indications that the actual execution of the investment budget continues to fall short of budget plans—another longstanding problem in the country. Recurrent costs of maintenance of this public stock has also fallen: in road maintenance, for example, funding has been cut by more than 60 percent from its previous peak in 2008, when it was already below the level needed to ensure adequate road maintenance.

323. Roads, water, and power will remain essential ingredients of more rapid long-term growth, and here the cuts have been nothing short of dramatic. The future costs of having failed to expand and maintain public infrastructure may reach 1½-2 percent of economic growth per year, over the long-term. With each additional year of crisis, the costs of rebuilding depleted or un-maintained capital will increase even faster as time wears on.

Mortgaging future growth—education

324. The situation in education is particularly worrisome. Population growth alone has added at least 500,000 children to the age cohorts that should be in primary school. But the

actual numbers of children in primary school has somewhat declined since 2008, even as gross enrollment ratios remain in excess of 110 percent, reflecting a range of factors, on the demand side (factors affecting households' resources and choices) and the supply side (factors affecting the performance of the public and private school system). As a result, the number of out-of-school children has swelled in just a few years.

325. Much recent evolution on social indicators, in education but also health, nutrition and access to water and sanitation, is clearly reflecting the deteriorating economic context—households' lower incomes and financing constraints, uncertainty about the future, and shocks that cut further into their assets make them face more difficult choices in their lives and in how they allocate their more limited resources. Early evidence suggest that several mechanisms have been at play since the onset of the crisis, as they had before, especially for the poor: parents taking their kids out of school to cut on family spending in the face of higher prices for school fees or community teacher payments, to have them work to complement family resources, or because the future benefits of putting them to school appear increasingly elusive, and similarly in the health sector, cuts on unaffordable medical expenses in favor of other priorities.

326. There is also a contribution from public programs, the supply side. Public programs have suffered in turn from the double shock of fiscal adjustment and policy interruption. In the specific example of education, the current budget allocations have not fallen sharply, though resources have been reallocated towards teacher salaries, with large cuts in non-salary spending, raising issues of quality. Meanwhile, sharp cuts in investment basically imply that education infrastructure cannot expand in line with growing cohorts of children at all levels, primary, secondary and tertiary.

327. It is not just finance that is under pressure, but also policy continuity and effectiveness. Social problems that have been longstanding and acute in Madagascar, such as strikingly poor child nutrition indicators relative to the country's level of economic and social development, require sustained, high-quality efforts that have been negatively affected by the same developments. Thus, it is not just finance but capacity, the development of tools and policies, and the ability to develop performance and a results-based conception of the public role.

The social and poverty crisis

328. The economic shock in Madagascar is a major source of impact on social outcomes. Hard data is sparse, however: in fact, one casualty of the crisis is also a general slowdown in the production and dissemination of data on the economy, social indicators and programmatic outcomes. The budget of the Statistical Institute has been cut even more than road maintenance, by some 80 percent. Some efforts have been made—a poverty survey was conducted in early 2010, and a group of donors will help fund a survey of the status of progress on Millennium Development Goals (MDG) in 2012—but overall there is a dearth of data for policy guidance and evaluation.

329. Most likely, this planned report on MDGs will show that most of them are now out of reach. Poverty incidence (MDG1), primary net enrollment ratios and completion rates (MDG2), child mortality (MDG4) and maternal mortality (MDG5), which in 2007 were still deemed potentially achievable, can no longer be reached on time, with some (poverty and maternal mortality) by a wide margin.

Poverty and the crisis

330. Madagascar is among the poorest countries, and poverty incidence, measured on monetary poverty, is strikingly high. Again, measurement is an issue, even as there is no doubt that poverty incidence has increased since the onset of the crisis. Very preliminary estimates suggest that, from end-2008 to 2012, poverty incidence may have increased by 10 percent from where it may have been in 2008, with the larger effects over 2011-12, as the crisis deepened. This would imply that the ranks of the poor have sharply increased in numbers.

331. Much poverty in Madagascar is rural, with rural poverty that constitutes more than 80 percent of total monetary poverty in Madagascar—millions of rural poor, engaged in subsistence agriculture, or local rural off-farm activities. Opportunities and jobs are scarce and low paying, and the productivity of the farm economy is low. Even in rapid growth years of the last 15 years, a combination of price shocks, weak infrastructure, rural development programs of limited effectiveness (because of inadequate size, design, governance, and resources), poor governance issues in the functioning of markets and other issues, all combined, had translated into limited traction on overall rural poverty. The crisis years are no different.

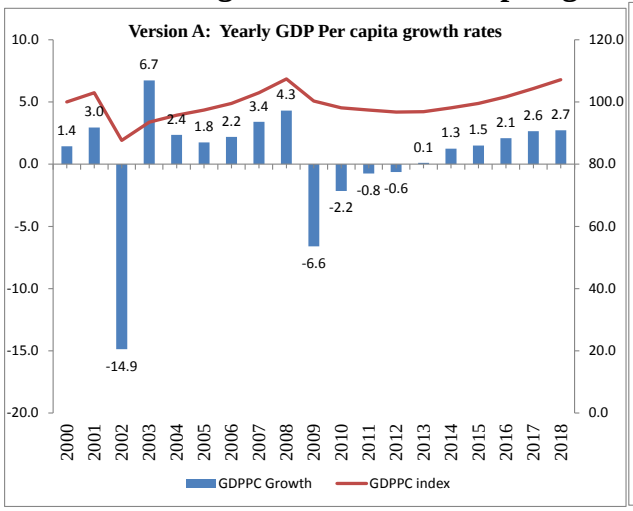
332. Urban poverty—about 20 percent of the total—has probably suffered more from the crisis, driven by unfavorable crisis-related developments in sectors such as the *zone franche* enterprises, the public sector, construction and others, where job losses have been significant. The last two years appear to have been particularly hard: weather, market and governance conditions have taken a toll on rural production first, but ensuing rising prices have transferred the shock to urban households in 2011 and 2012, households already hit by a slowing urban economy and rising oil prices.

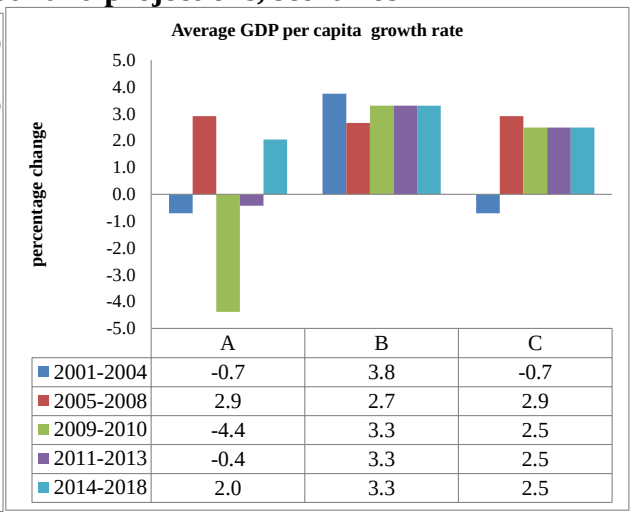
333. We use a micro simulation methodology to assess the impact of the economic crises on poverty, or on the ability of the people to get out of poverty. A similar methodology has been used to project poverty throughout 2018.

334. The fact that poverty rates in Madagascar remained stagnant during the 2005-2010 should not lead to the conclusion that the recent crisis had no effect on poverty already at its onset. One should not fail to take into consideration the opportunity costs associated with the inability to exit poverty. The effect of the crisis on a population can be measured in two ways: one is to estimate the poverty loss based on the simple change in the poverty rate before and after the crisis; the second is to represent the poverty loss as the difference between the hypothetical poverty rates for the crisis year estimated based on non-crisis macroeconomic projections and the actual poverty rates.

335. To estimate the impact of the crisis on poverty, and to project poverty for the future, we have constructed two hypothetical scenarios based on different economic growth assumptions and compared them with the baseline scenario reflecting real changes in poverty. Figure 79 illustrates development of GDP per capita growth rates and present average growth rates for three scenarios with or without economic crises.

Figure 79: GDP Per capita growth and projections, scenarios





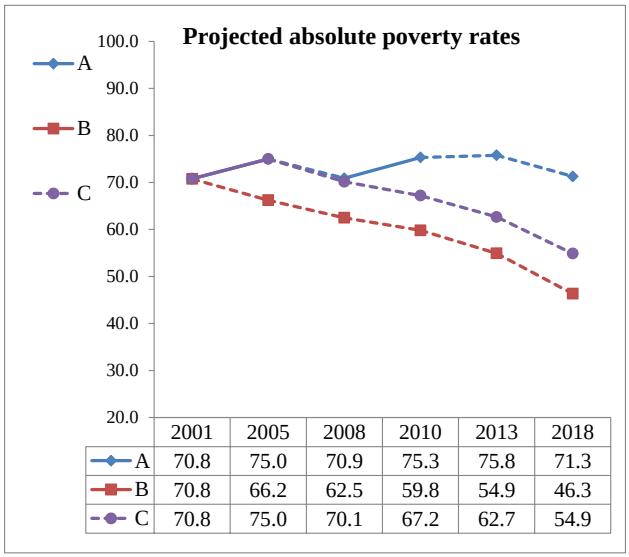
	A	B	C
2001-2004	-0.7	3.8	-0.7
2005-2008	2.9	2.7	2.9
2009-2010	-4.4	3.3	2.5
2011-2013	-0.4	3.3	2.5
2014-2018	2.0	3.3	2.5

Source: Author's compilation.

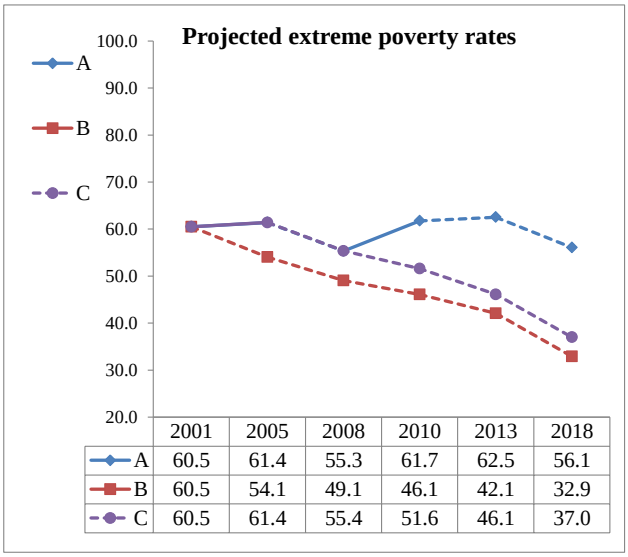
The scenarios could be summarized as follows:

- **Scenario A** (baseline scenario) is a factual scenario based on the EPM data for 2001, 2005, and 2010, and projected for 2011-2018. For the later period, the projections were based on the IMF's GDP per capita growth projections for 2011-2018, published in April 2013. This scenario has been used as a baseline scenario for comparison with other hypothetical scenarios. Survey data for 2010 was used as a base year for 2011-2018 projections. The GDP per capita growth rates and real GDP per capita associated with this scenario is presented in the left hand chart of the Figure 79.
- **Scenario B** is the most optimistic scenario assuming that neither 2001 nor 2009 crises would have happened and, thus, the economic growth in the crisis years as well as years impacted by slowdown would have had positive growth rate. The right hand chart in the Figure 79 shows average growth rates used in the simulations.
- **Scenario C** eliminates the impact of the 2009 crisis, as if it did not happen, with positive growth rates of the second period. In other words, Scenario C uses real survey data from prior to 2006, and later on uses projections.

Figure 80: The Hypothetical Loss in the Opportunity to Exit Poverty, 2001–2010 and projections throughout 2018



	2001	2005	2008	2010	2013	2018
A	70.8	75.0	70.9	75.3	75.8	71.3
B	70.8	66.2	62.5	59.8	54.9	46.3
C	70.8	75.0	70.1	67.2	62.7	54.9



	2001	2005	2008	2010	2013	2018
A	60.5	61.4	55.3	61.7	62.5	56.1
B	60.5	54.1	49.1	46.1	42.1	32.9
C	60.5	61.4	55.4	51.6	46.1	37.0

Source: Author's compilation. Estimation based on micro simulation methodology.
Note: The solid lines show the actual poverty rate in Madagascar. The dotted lines are the poverty rates estimated based on micro simulation method for three main scenario discussed in the main text. For the years beyond 2013 the results of micro simulations are based on the GDP per capita projections from World Economic Outlook Database (WEO), International Monetary Fund, Washington.

336. **The recent economic crisis led to a significant loss in terms of poverty.** Micro simulation methodology allows constructing poverty for all years. Comparison of the 2008 estimated poverty rates (before the 2009 crisis) with the 2010 actual poverty rates and following years estimated poverty rates indicates that the 2009 crisis had a very strong adverse impact on the economy. As presented in the scenario C, specifically designed to estimate poverty with the absence of the crisis, the poverty rates would probably have gone down from the estimated 70.1 percent in 2008 to 67.7 percent in 2010 and to 62.7 percent in 2013. In other words, if not for the recent crisis, the poverty during the 2000s would have significantly gone down. Similar trends would have occurred for the extremely poor, as shown on the Figure 80 right hand chart.

337. **Had Madagascar avoided two political crises, close to 11 percent less of the country's population would have been poor in 2010 in comparison to 2001.** Version B illustrates reduction in the estimated poverty assuming neither 2001 nor 2009 crises had occurred. In this scenario, growth would have been stable and poverty would have fallen even steeper. According to our estimation, poverty would have probably fallen by more than 11 percentage points from 70.8 percent in 2001, 59.8 percent in 2010, and to 54.9 percent in 2013.

338. **The crises had even more tremendous toll on the economy in terms of potential in poverty reduction.** An alternative way to look at poverty loss is to measure loss in terms of the potential of poverty reduction. For example, poverty rate in 2010 was close to 75 percent, while without the crises the poverty in Madagascar would have been as low as 59.8 percent in the same year. Thus, close to 15.5 percent of the population or 3.2 million people who would have otherwise escaped poverty were unable to do so because of the crises (see Figure 80). As of 2010, approximately 7.4 percentage points loss was associated with the 2001 crisis and another 8.1 percentage points of poverty loss with the 2009 crisis. Despite the

severity of the first crisis in terms of the GDP contractions being more than twice as strong than during the second crisis, the second crisis has had a stronger impact on poverty, because it spanned over a longer period of time.

Annex A. Main Tables

Table A1a: Absolute and Extreme poverty, selected population groups

	Absolute Poor			Extreme Poor			Share of Poor			Share of Population		
	2001	2005	2010	2001	2005	2010	2001	2005	2010	2001	2005	2010
Labor Status												
Inactive	63.3	74.0	75.8	52.4	59.9	62.9	32.2	35.6	37.3	35.1	35.4	36.3
Occuped	72.3	73.9	73.0	61.8	59.8	58.7	67.3	63.1	60.7	64.2	62.8	61.3
Unemployed	47.1	52.3	60.3	40.2	40.9	43.6	0.5	1.3	2.0	0.7	1.8	2.4
Sector of Employment												
Agriculture/primary	84.2	80.3	80.3	74.2	66.1	65.5	88.8	89.1	88.1	76.4	82.0	80.1
Construction	42.0	55.6	51.2	27.8	45.7	34.1	0.8	0.9	0.8	1.3	1.2	1.2
Food Industry	39.9	47.7	29.0	27.8	30.8	13.2	0.5	0.1	0.1	0.9	0.2	0.3
Others industries	41.3	45.8	65.8	24.3	29.1	51.0	1.3	0.8	1.8	2.3	1.3	2.0
Others private services	34.0	53.9	58.6	24.8	38.5	47.5	2.8	4.5	3.4	6.0	6.2	4.2
Private education	28.5	45.9	20.7	16.6	28.6	16.5	0.3	0.3	0.1	0.8	0.5	0.5
Private health	24.1	12.9	25.6	18.6	4.7	11.8	0.1	0.0	0.1	0.2	0.1	0.2
Public Administration	25.6	31.5	26.0	14.1	20.9	17.2	0.9	0.9	0.9	2.6	2.1	2.4
Textile	32.5	14.3	38.5	21.4	4.2	22.7	1.0	0.1	0.6	2.3	0.8	1.2
Trade	36.5	44.0	37.1	22.5	30.8	25.0	2.9	2.9	3.5	5.7	4.9	6.9
Transport	26.6	29.8	35.4	14.4	20.6	25.8	0.6	0.3	0.5	1.6	0.8	1.0
Employer type												
Independant	80.0	77.6	75.9	69.9	63.3	61.4	81.8	94.2	97.5	74.0	89.7	93.7
NGO	57.7	51.9	36.7	48.3	33.4	27.1	0.6	0.1	0.2	0.7	0.2	0.4
Others	66.3	61.6	45.1	53.0	47.0	33.6	11.1	1.7	0.5	12.2	2.1	0.8
Private enterprise/FPZ	39.1	38.3	26.4	29.2	27.3	13.8	5.2	2.9	1.0	9.7	5.6	2.8
Public	27.1	31.1	26.1	15.2	21.1	17.3	1.3	1.0	0.8	3.5	2.4	2.3
Number of jobs												
Just one job	70.8	71.9	69.1	60.0	58.3	56.2	79.2	62.5	45.9	81.0	64.2	48.5
Two or more jobs	79.2	77.4	76.6	70.1	62.6	61.0	20.8	37.5	54.1	19.0	35.8	51.5
Hours worked												
24-40	76.1	70.5	71.8	66.0	57.2	57.6	28.1	17.9	18.0	25.8	19.0	18.9
40-60	69.1	76.2	77.7	59.1	63.0	64.9	61.2	65.9	66.9	62.0	64.9	64.8
60+	54.1	53.5	52.3	38.6	39.9	39.4	6.1	3.0	2.9	7.9	4.1	4.1
<24	76.8	83.3	75.5	68.3	69.2	61.6	4.6	13.2	12.3	4.2	11.9	12.2
Sector												
Agriculture/Primary	84.2	80.3	80.3	74.2	66.1	65.5	88.8	89.1	88.1	76.4	82.0	80.1
Industry	38.3	42.6	52.8	24.5	29.8	37.1	3.6	2.0	3.4	6.8	3.5	4.7
Private Service	31.9	50.3	50.7	21.9	35.5	40.3	3.8	5.1	4.1	8.6	7.5	5.9
Public Service	25.6	31.5	26.0	14.1	20.9	17.2	0.9	0.9	0.9	2.6	2.1	2.4
Trade	36.5	44.0	37.1	22.5	30.8	25.0	2.9	2.9	3.5	5.7	4.9	6.9

Source: Authors' calculations based on EPM data

Table A1b: Absolute and Extreme poverty, selected population groups - continued

	Absolute Poor			Extreme Poor			Share of Poor			Share of Population		
	2001	2005	2010	2001	2005	2010	2001	2005	2010	2001	2005	2010
Labor Status												
Inactive	63.3	74.0	75.8	52.4	59.9	62.9	32.2	35.6	37.3	35.1	35.4	36.3
Occuped	72.3	73.9	73.0	61.8	59.8	58.7	67.3	63.1	60.7	64.2	62.8	61.3
Unemployed	47.1	52.3	60.3	40.2	40.9	43.6	0.5	1.3	2.0	0.7	1.8	2.4
Sector of Employment												
Agriculture/primary	84.2	80.3	80.3	74.2	66.1	65.5	88.8	89.1	88.1	76.4	82.0	80.1
Construction	42.0	55.6	51.2	27.8	45.7	34.1	0.8	0.9	0.8	1.3	1.2	1.2
Food Industry	39.9	47.7	29.0	27.8	30.8	13.2	0.5	0.1	0.1	0.9	0.2	0.3
Others industries	41.3	45.8	65.8	24.3	29.1	51.0	1.3	0.8	1.8	2.3	1.3	2.0
Others private services	34.0	53.9	58.6	24.8	38.5	47.5	2.8	4.5	3.4	6.0	6.2	4.2
Private education	28.5	45.9	20.7	16.6	28.6	16.5	0.3	0.3	0.1	0.8	0.5	0.5
Private health	24.1	12.9	25.6	18.6	4.7	11.8	0.1	0.0	0.1	0.2	0.1	0.2
Public Administration	25.6	31.5	26.0	14.1	20.9	17.2	0.9	0.9	0.9	2.6	2.1	2.4
Textile	32.5	14.3	38.5	21.4	4.2	22.7	1.0	0.1	0.6	2.3	0.8	1.2
Trade	36.5	44.0	37.1	22.5	30.8	25.0	2.9	2.9	3.5	5.7	4.9	6.9
Transport	26.6	29.8	35.4	14.4	20.6	25.8	0.6	0.3	0.5	1.6	0.8	1.0
Employer type												
Independant	80.0	77.6	75.9	69.9	63.3	61.4	81.8	94.2	97.5	74.0	89.7	93.7
NGO	57.7	51.9	36.7	48.3	33.4	27.1	0.6	0.1	0.2	0.7	0.2	0.4
Others	66.3	61.6	45.1	53.0	47.0	33.6	11.1	1.7	0.5	12.2	2.1	0.8
Private enterprise/FPZ	39.1	38.3	26.4	29.2	27.3	13.8	5.2	2.9	1.0	9.7	5.6	2.8
Public	27.1	31.1	26.1	15.2	21.1	17.3	1.3	1.0	0.8	3.5	2.4	2.3
Number of jobs												
Just one job	70.8	71.9	69.1	60.0	58.3	56.2	79.2	62.5	45.9	81.0	64.2	48.5
Two or more jobs	79.2	77.4	76.6	70.1	62.6	61.0	20.8	37.5	54.1	19.0	35.8	51.5
Hours worked												
24-40	76.1	70.5	71.8	66.0	57.2	57.6	28.1	17.9	18.0	25.8	19.0	18.9
40-60	69.1	76.2	77.7	59.1	63.0	64.9	61.2	65.9	66.9	62.0	64.9	64.8
60+	54.1	53.5	52.3	38.6	39.9	39.4	6.1	3.0	2.9	7.9	4.1	4.1
<24	76.8	83.3	75.5	68.3	69.2	61.6	4.6	13.2	12.3	4.2	11.9	12.2
Sector												
Agriculture/Primary	84.2	80.3	80.3	74.2	66.1	65.5	88.8	89.1	88.1	76.4	82.0	80.1
Industry	38.3	42.6	52.8	24.5	29.8	37.1	3.6	2.0	3.4	6.8	3.5	4.7
Private Service	31.9	50.3	50.7	21.9	35.5	40.3	3.8	5.1	4.1	8.6	7.5	5.9
Public Service	25.6	31.5	26.0	14.1	20.9	17.2	0.9	0.9	0.9	2.6	2.1	2.4
Trade	36.5	44.0	37.1	22.5	30.8	25.0	2.9	2.9	3.5	5.7	4.9	6.9

Source: Authors' calculations based on EPM data

Table A2: Consumption and poverty regressions, selected years

	Consumption regression				Probability to fall in poverty			
	2001		2010		2001		2010	
	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural
Household characteristics								
Log of household size	-0.25*	-0.27*	-0.48*	-0.38*	0.25	0.78*	0.65*	0.75*
Log of household size squared	-0.08**	-0.08**	-0.01	-0.04**	0.2**	0.01	0.14**	0.09
Share of children 0-6								
Share of children 7-16	0.34*	0.22**	0.32*	0.29*	-0.69*	-0.37	-0.91*	-0.75*
Share of male adults	0.87*	0.72*	0.63*	0.71*	-1.84*	-1.37*	-1.4*	-1.59*
Share of female adults	0.9*	0.67*	0.7*	0.59*	-1.96*	-1.14*	-1.7*	-1.39*
Share of Elderly (>=60)	0.63*	0.47*	0.37*	0.37*	-1.53*	-0.89**	-0.83*	-1.2*
Individual characteristics								
Log of household head's age	0.14*	0.11**	0.18*	0.13*	0.01	-0.17	-0.32*	-0.15
Female	0.05	-0.02	-0.03	-0.08**	-0.07	0.07	0.17**	0.04
Marital								
Legally married								
Customarily married	-0.17*	-0.15*	-0.23*	-0.1*	0.39*	0.3**	0.46*	0.24*
Married : free union	-0.19*	-0.12**	-0.15*	-0.11*	0.36*	0.26	0.45*	0.34*
Divorced	-0.22**	-0.23**	-0.11	-0.04	0.61**	0.28	0.4**	0.33
Separated	-0.2*	-0.1	-0.3*	-0.15*	0.48*	0.3	0.62*	0.38*
Widowed	-0.09	-0.17**	-0.26*	-0.15*	0.15	0.25	0.56*	0.45*
Single	-0.16**	-0.05	-0.22*	-0.09**	0.56*	0.09	0.47*	0.23
Provinces								
Antananarivo								
Fianarantsoa	-0.34*	-0.36*	-0.14*	-0.21*	0.74*	0.63*	0.2*	0.46*
Toamasina	-0.34*	-0.38*	-0.09*	-0.23*	0.55*	0.63*	0.16**	0.4*
Mahajanga	-0.13*	-0.17*	0.05**	-0.08*	0.31*	0.23	-0.14**	0.13
Toliara	-0.15*	-0.21*	-0.14*	-0.31*	0.15	0.25	0.06	0.27*
Antsiranana	0.09**	-0.13**	0.1*	0.01	-0.34**	0.28**	-0.48*	-0.17
Quartiles of land holdings								
No land								
Lowest quartile	-0.47*	-0.43*	-0.37*	-0.2*	0.81*	0.7*	0.85*	0.51*
Second quartile	-0.48*	-0.39*	-0.33*	-0.11*	0.85*	0.84*	0.78*	0.3*
Third quartile	-0.37*	-0.18*	-0.3*	-0.07**	0.67*	0.3**	0.7*	0.18**
Highest quartile	-0.27*	-0.02	-0.2*	0.14*	0.59*	-0.04	0.52*	-0.19**
Education of the household head								
Without education (base)								
Primary	0.15*	0.1**	0.08*	0.08*	-0.28**	-0.20	-0.21*	-0.18*
Secondary	0.35*	0.37*	0.34*	0.29*	-0.61*	-0.67*	-0.74*	-0.62*
University	0.73*	0.79*	0.66*	0.68*	-1.28*	-1.34*	-1.43*	-1.2*
Literacy								
Literate	0.11**	0.12*	0.26*	0.12*	-0.26**	-0.24**	-0.51*	-0.23*
Employment status of the household head								
Occuped								
Unemployed	-0.05	0	-0.19*	-0.21*	0.43	0	0.6*	0.21
Inactive	-0.07	-0.08	0	-0.11**	0.11	0.09	-0.07	0.35**
Intercept	11.77*	11.82*	11.88*	11.71*	0.05	0.47	0.86**	0.73**
Number of observations	3034	2033	6257	6069	3034	2033	6257	6069
Adjusted R2	0.54	0.49	0.54	0.41	0.34	0.3	0.36	0.26

Source: Authors' calculations based on EPM data

Table A3: Regional Poverty and inequality indicators, 2005 and 2010

	Absolute Poor		Extreme Poor		Share of Poor		Share of Pop.	
	2005	2010	2005	2010	2005	2010	2005	2010
Total	**75.0**	**75.3**	**61.4**	**61.7**	**100.0**	**100.0**	**100.0**	**100.0**
Analamanga	47.1	45.4	33.7	28.5	9.1	7.9	14.5	13.1
Vakinankaratra	84.4	78.9	70.0	60.9	10.1	9.2	9.0	8.8
Itasy	77.4	84.0	62.5	71.3	4.6	4.6	4.5	4.2
Bongolava	75.0	74.9	56.7	57.7	2.3	2.1	2.3	2.1
Matsiatra Ambony	85.4	83.8	67.1	72.7	9.0	7.2	7.9	6.5
Amoron'i Mania	86.5	87.2	73.3	74.1	5.6	4.5	4.8	3.9
Vatovavy Fitovinany	83.5	89.0	72.5	76.3	7.2	8.1	6.5	6.9
Ihorombe	82.3	79.7	70.8	66.3	1.6	1.2	1.5	1.2
Atsimo Atsinanana	86.6	94.3	78.2	89.1	3.6	4.9	3.1	3.9
Atsinanana	74.2	79.8	63.8	67.8	6.4	6.4	6.5	6.0
Analanjirofo	83.6	79.3	73.8	67.7	3.7	4.3	3.4	4.1
Alaotra Mangoro	68.1	72.3	50.1	57.9	4.5	4.4	4.9	4.6
Boeny	52.9	63.6	39.9	46.1	1.7	2.4	2.5	2.9
Sofia	90.9	79.6	79.9	64.0	7.1	5.9	5.8	5.6
Betsiboka	74.7	81.8	56.2	69.2	1.9	2.0	1.9	1.9
Melaky	78.3	79.7	59.1	63.5	1.2	1.4	1.1	1.4
Atsimo Andrefana	78.8	78.0	68.3	66.2	5.6	6.3	5.3	6.1
Androy	90.1	92.8	81.3	85.1	4.2	5.0	3.5	4.0
Anosy	76.7	82.0	60.1	74.2	3.6	3.3	3.5	3.1
Menabe	71.0	64.7	52.4	48.6	2.1	2.2	2.2	2.5
DIANA	55.6	50.8	37.4	33.3	1.4	1.5	1.9	2.3
SAVA	76.6	72.3	64.1	59.4	3.6	4.9	3.5	5.1

	Gini Coeff.		GE(0)		GE(1) Theil		GE(2)	
	2005	2010	2005	2010	2005	2010	2005	2010
Analamanga	37.0	41.7	22.7	29.0	25.5	36.0	40.2	79.8
Vakinankaratra	32.3	37.4	17.4	23.5	20.2	31.9	36.2	70.2
Itasy	28.8	30.8	13.3	15.4	15.4	18.2	22.5	29.1
Bongolava	37.4	32.7	25.8	17.8	48.6	23.0	230.1	41.6
Matsiatra Ambony	27.5	37.5	12.8	23.3	15.9	28.7	27.1	52.5
Amoron'i Mania	24.9	32.3	10.4	17.0	12.0	20.8	18.9	33.6
Vatovavy Fitovinany	37.3	31.7	23.3	16.7	28.7	18.7	62.7	27.3
Ihorombe	31.2	32.9	16.0	17.6	18.7	19.7	27.7	28.8
Atsimo Atsinanana	37.2	30.6	23.8	15.5	31.8	18.3	71.8	30.4
Atsinanana	38.2	40.4	24.0	27.1	26.2	31.8	37.5	60.1
Analanjirofo	38.4	39.8	24.8	26.5	32.3	35.2	67.5	114.3
Alaotra Mangoro	36.0	38.7	21.5	25.6	27.4	36.8	53.9	130.0
Boeny	51.1	39.9	44.1	27.1	54.6	34.9	125.8	89.0
Sofia	28.1	34.0	13.4	19.2	13.8	23.1	17.5	40.2
Betsiboka	28.9	32.8	13.9	18.2	16.9	23.3	28.9	49.6
Melaky	32.1	30.9	17.0	15.6	21.0	18.5	36.2	28.5
Atsimo Andrefana	36.9	43.1	23.4	33.3	24.3	43.0	34.1	285.6
Androy	34.0	41.5	19.7	30.5	23.2	29.6	40.3	38.9
Anosy	34.8	38.3	20.5	23.9	24.9	28.2	56.7	47.3
Menabe	39.2	38.4	27.3	24.4	40.8	26.0	133.7	36.3
DIANA	36.0	36.7	21.7	22.6	23.9	25.6	35.8	43.0
SAVA	38.7	36.9	25.4	23.0	34.1	33.0	85.0	119.8

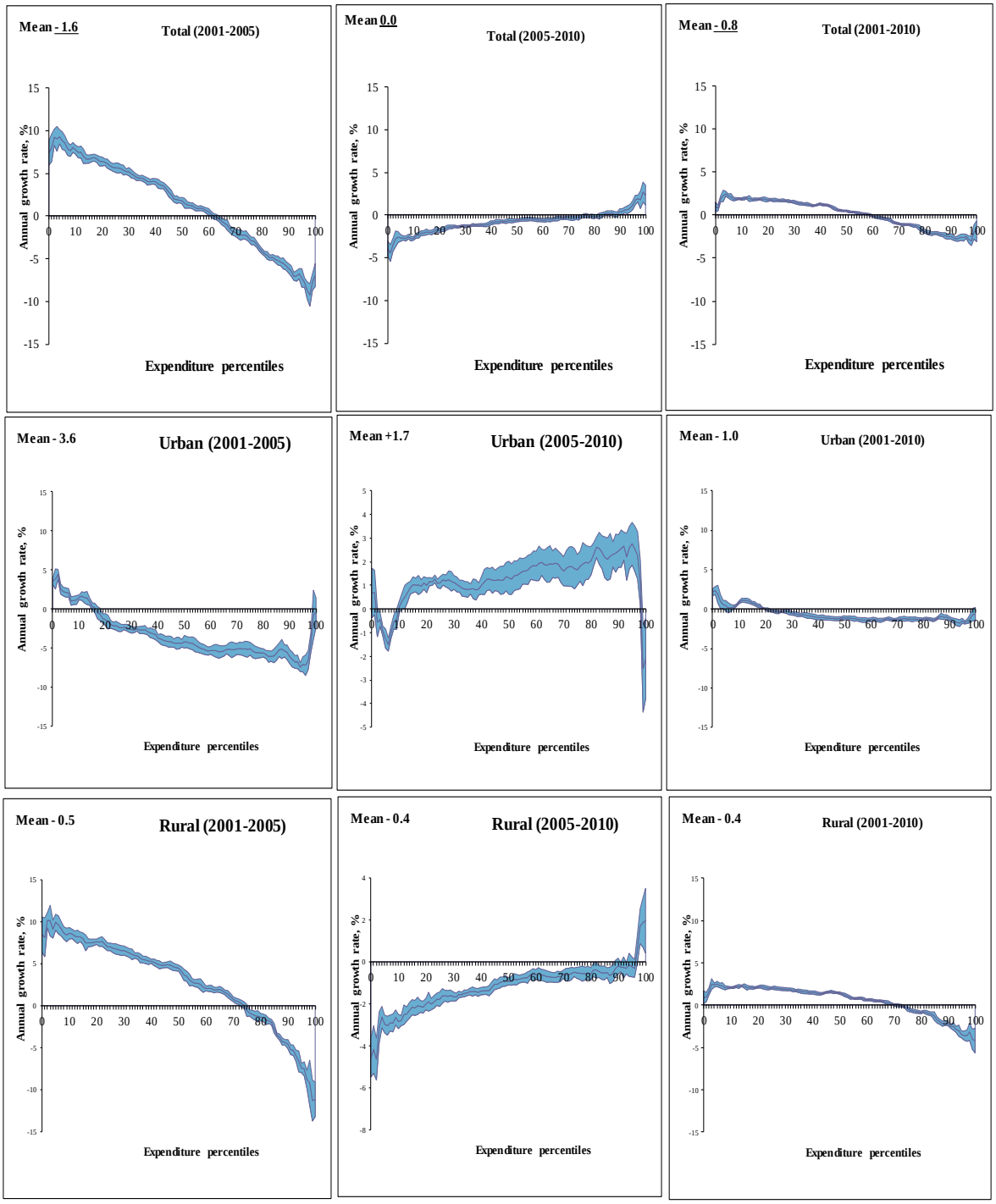
Source: Authors' calculations based on EPM data

Table A4: Median, Mean and Basic Inequality Measures by households' head characteristics

	Mean income	Median income	Gini coefficient	GE(0)	GE(1)	GE(2)
2001						
Total	185,858	119,330	46.9	37.1	40.2	64.1
Gender of the household head						
Male	186,323	119,902	46.8	37.0	40.2	64.2
Female	183,239	115,394	47.1	37.7	40.3	64.0
Education of the household head						
Without education	120,794	87,824	39.8	26.1	28.2	40.2
Primary	162,930	118,406	39.0	25.3	26.6	38.2
Secondary	269,970	193,631	41.9	29.8	30.6	42.2
University	478,607	360,829	40.0	27.7	26.9	33.9
2005						
Total	171,107	128,117	37.8	23.9	29.7	64.5
Gender of the household head						
Male	170,720	127,875	37.9	24.0	30.1	67.6
Female	173,411	129,058	37.4	23.3	27.3	46.5
Education of the household head						
Without education	140,332	113,091	33.8	19.5	24.8	60.6
Primary	165,234	129,464	35.0	20.7	26.7	68.8
Secondary	226,958	179,946	34.1	19.3	20.4	27.7
University	413,066	305,512	40.1	26.9	30.5	46.6
2010						
Total	172,308	124,649	40.9	28.4	35.3	93.0
Gender of the household head						
Male	172,637	125,354	40.6	27.8	34.8	91.7
Female	170,426	118,360	43.1	31.8	38.3	100.3
Education of the household head						
Without education	128,373	104,738	34.4	20.4	24.1	79.8
Primary	167,709	132,562	35.1	20.8	26.8	75.6
Secondary	259,853	194,941	39.6	27.0	33.1	82.3
University	510,288	381,384	40.8	28.3	28.7	37.4

Source: Authors' calculations based on EPM data

Table A5: Growth incidence curves: 2001 -2010



Source: Author's calculations based on EPS data

Annex B. Detailed Tables

Table B.1: Summary Statistics of Main Aggregates by Survey Wave

	2001		2005		2010	
	Mean	**sd**	**Mean**	**sd**	**Mean**	**sd**
Household size	4.7	2.4	4.9	2.3	4.8	2.4
Total Consumption of HH	878,193	965,416	1,245,092	1,400,195	1,649,329	1,831,565
Total Expenditures of HH	706,083	918,398	801,834	971,571	1,186,370	1,667,566
Consumption of own produced or fetched food	137,558	182,033	396,101	788,438	454,117	739,966
Gift and in kind transfers	34,552	148,292	47,156	621,352	8,842	125,475
Total Expenditures of HH	706,083	918,398	801,834	971,571	1,186,370	1,667,566
Food expenditures (incl. alcohol and tobacco)	383,938	408,112	452,701	419,572	649,964	761,004
Non-Food expenditures	322,145	586,361	349,134	674,387	536,405	1,250,959

Table B.2: Average annual Food expenditures. in current Ariary

	2001		2005		2010	
	Mean	**sd**	**Mean**	**sd**	**Mean**	**sd**
Food expenditures (incl. alcohol and tobacco)	383,938	408,112	452,701	419,572	649,964	761,004
Rice	104,814	116,184	239,650	222,579	224,210	283,619
Other cereals	4,851	18,775	22,712	36,834	8,266	36,826
Tubers	11,110	17,464	28,254	37,404	29,930	89,291
Vegetables	36,193	41,568	44,395	43,829	76,068	492,402
Fruits	8,396	18,311	13,237	19,880	13,138	28,723
Meat and fish	63,766	100,283	67,589	88,739	103,007	143,348
Milks. cheese and eggs	18,204	49,884	33,843	69,946	15,599	69,303
Oil and fats	13,710	16,100	22,508	18,070	32,695	36,098
Sweets	13,320	16,193	22,569	18,574	22,728	30,665
Coffee. tea and cocoa	5,359	9,821	20,638	36,373	15,216	28,374
Other food products	17,643	27,926	19,293	115,535	29,887	51,213
Restaurants and prepared meals	38,709	131,854	13,318	81,421	24,395	111,851
Non-alcoholic beverages	10,822	51,461	3,535	24,527	6,740	40,571
Alcoholic beverages	11,614	60,020	6,483	43,109	13,597	61,676
Tobacco	25,428	55,737	24,656	54,541	34,524	74,776

Table B.3: HH Average annual NON-FOOD Expenditures in current Ariary

	2001		2005		2010	
	Mean	**sd**	**Mean**	**sd**	**Mean**	**sd**
Non-Food expenditures	322,145	586,361	349,134	674,387	536,405	1,250,959
Housing and related	147,304	267,454	154,638	221,100	255,831	882,078
Clothing and footwear	40,409	64,535	42,465	63,726	57,072	83,067
Furniture and household equipment	11,187	16,882	18,849	21,044	26,175	25,805
Health	10,117	30,369	10,602	36,834	18,509	62,273
Transports et communications	5,446	30,140	6,554	37,538	29,211	99,906
Recreation and culture	2,098	9,850	1,050	8,051	3,715	16,425
Education	29,012	86,892	19,775	69,977	88,402	171,430
Other services and goods	41,051	124,681	28,900	109,822	34,747	135,402
Users fee on durables goods	44,675	160,155	66,301	416,611	60,897	364,955

Source: World Bank staff calculations from EPM data.

Table B.4: Shares of the Food and Non-food Expenditures over Total Expenditure

	2001	2005	2010
Food expenditures (incl. alcohol and tobacco)	53.7	56.5	53.1
Housing and related	20.6	19.3	20.9
Clothing and footwear	5.6	5.3	4.7
Furniture and household equipment	1.6	2.4	2.1
Health	1.4	1.3	1.5
Transports et communications	0.8	0.8	2.4
Recreation and culture	0.3	0.1	0.3
Education	4.1	2.5	7.2
Other services and goods	5.7	3.6	2.8
Users fee on durables goods	6.2	8.3	5.0

Table B.5: Shares of the Expenditures on Food categories over Total Food Expenditure

	2001	2005	2010
Rice	27.3	41.1	34.5
Other cereals	1.3	3.9	1.3
Tubers	2.9	4.8	4.6
Vegetables	9.4	7.6	11.7
Fruits	2.2	2.3	2.0
Meat and fish	16.6	11.6	15.8
Milks. cheese and eggs	4.7	5.8	2.4
Oil and fats	3.6	3.9	5.0
Sweets	3.5	3.9	3.5
Coffee. tea and cocoa	1.4	3.5	2.3
Other food products	4.6	3.3	4.6
Restaurants and prepared meals	10.1	2.3	3.8
Non-alcoholic beverages	2.8	0.6	1.0
Alcoholic beverages	3.0	1.1	2.1
Tobacco	6.6	4.2	5.3

Source: World Bank staff calculations from EPM data.

Table B.6: Poverty Headcount by Location

Survey Wave	**2001**	**2005**	**2010**
Total	70.8	75.0	75.3
Urban	45.6	55.2	51.1
Rural	78.2	80.6	81.5

Source: World Bank staff calculations from EPM data.

Table B.7: Madagascar: GDP at Current Prices, 2000–10.

Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
GDP by sector											
Primary	1,389	1,536	1,793	1,815	2,135	2,592	2,969	3,219	3,589	4,490	4,701
Secondary	677	803	816	955	1,183	1,445	1,744	2,037	2,341	2,468	2,688
Tertiary	2,736	3,214	3,084	3,500	4,161	5,193	6,200	7,410	8,708	8,634	9,639
Public sector	290	344	328	479	505	592	778	922	968	990	1,145
Non imputed charges	-54	-47	-39	-45	-63	-67	-108	-135	-187	-182	-267
GDP at factors costs	4,748	5,506	5,653	6,225	7,415	9,163	10,805	12,531	14,451	15,410	16,761
Net Indirect tax	501	462	355	554	742	931	1,012	1,229	1,630	1,319	1,491
GDP at market costs	5,248	5,969	6,008	6,779	8,157	10,094	11,817	13,760	16,081	16,729	18,251
Net imports	398	428	542	950	1,462	1,750	1,895	2,992	4,883	4,894	3,238
Imports	2,029	2,153	1,500	2,406	4,317	4,598	5,408	7,164	9,151	8,635	7,632
Exports	1,631	1,725	959	1,456	2,855	2,848	3,513	4,173	4,268	3,742	4,393
Total ressources	5,647	6,396	6,550	7,729	9,619	11,844	13,712	16,752	20,964	21,623	21,490
Consumption	4,797	5,328	5,746	6,631	7,712	9,604	10,724	12,678	14,481	16,314	18,054
Public	413	528	502	719	767	928	1,058	1,691	1,492	1,581	1,941
Private	4,384	4,800	5,244	5,912	6,945	8,675	9,666	10,986	12,989	14,733	16,113
Gross Investment	850	1,068	804	1,098	1,907	2,240	2,989	4,074	6,484	5,309	3,436
Public	324	400	236	487	818	879	1,246	963	1,142	665	431
Private	526	668	568	610	1,089	1,361	1,742	3,493	5,342	4,644	3,005
Variation of stocks	0	0	0	0	0	0	0	-382	0	0	0
Interior savings	452	641	262	148	445	490	1,093	1,082	1,600	415	198

Source: INSTAT.

Table B.8: Poverty Incidence. Gap and Severity. corrected for Survey design

		Estimate	Standard Error	95% Confidence Interval	
Poverty incidence (p0)				Low	Up
	2001	70.8	1.9	67.0	74.5
	2005	75.0	1.0	73.1	76.9
	2010	75.3	0.8	73.7	76.9
Poverty gap (p1)					
	2001	35.9	1.5	33.0	38.8
	2005	32.1	0.7	30.7	33.4
	2010	33.9	0.7	32.7	35.2
Poverty severity (p2)					
	2001	21.7	1.2	19.4	24.0
	2005	16.9	0.5	15.9	17.9
	2010	18.8	0.5	17.8	19.8

Source: World Bank staff estimates from EPM data.

Table B.9: Poverty Headcount by Location. Region and Ethnic areas

	2001	2005	2010
Total	70.8	75.0	75.3
Urban	45.6	55.2	51.1
Rural	78.2	80.6	81.5
Antananarivo	50.3	64.8	63.8
Fianarantsoa	84.1	85.1	87.6
Toamasina	82.8	74.3	77.3
Mahajanga	73.5	78.7	76.0
Toliara	76.7	79.9	80.4
Antsiranana	70.5	69.1	65.6

Source: World Bank staff calculations from EPM data.

Table B.10: Poverty Contribution by Location

	2001	2005	2010
Rural	85.3	83.8	86.2
Urban	14.7	16.2	13.8
Total	100	100	100

Source: World Bank staff calculations from EPM data.

Table B.11: Poverty Contribution by Region

	2001	2005	2010
Antananarivo	20.7	26.2	23.8
Fianarantsoa	25.5	26.9	26.0
Toamasina	19.5	14.6	15.1
Mahajanga	11.5	11.9	11.8
Toliara	15.3	15.4	16.8
Antsiranana	7.5	5.0	6.4
Total	100	100	100

Source: World Bank Staff calculations from EPM data.

Table B.12: Poverty Headcount by Household Size Category

	2001	2005	2010
1 to 2	38.9	40.2	35.7
3 to 4	60.5	61.9	61.3
5 to 6	70.0	74.4	77.8
7 to 8	81.6	86.2	86.2
9 to 10	86.0	93.5	91.5
11 +	91.2	94.1	90.7

Table B.13: Poverty Headcount by Household Head Gender

	2001	2005	2010
Male	70.8	75.0	75.1
Female	70.6	74.9	76.4

Source: World Bank staff calculations from EPM data

Table B.14: Fraction of Elderly in the Household and Poverty

	2001	2005	2010
No elderly	71.0	75.3	75.6
1-25%	72.8	79.8	76.1
26-50%	47.4	47.1	48.6
51%	28.8	31.2	41.2

Source: World Bank staff calculations from EPM data.

Table B.15: Dependency Ratio and Poverty Headcount

	2001	2005	2010
Only dependents	76.7	80.2	81.1
Dependency ratio>1	83.9	85.6	86.7
Dependency ratio<=1	62.1	66.4	65.8

Source: World Bank staff calculations from EPM data.

Table B.16: Education of the Household Head and Poverty Headcount

	2001	2005	2010
None. can't read/write	87.7	86.5	89.8
None but can read/write	77.8	82.0	82.1
Primary	73.6	75.4	74.5
Secondary	49.9	54.8	49.6
University or higher	19.1	22.1	18.2

Source: World Bank staff calculations from EPM data.

Table B.17: Main Activity of the Household Head and Poverty Headcount

	2001	2005	2010
Manager	14.7	29.8	24.6
Qualified worker	32.7	40.4	33.7
Unqualified worker	61.4	74.9	63.3
Self-employment	40.3	56.3	53.6
Farmers (small size)	89.9	85.4	87
Farmers (medium size)	84.4	82.1	83.1
Farmers (large size)	80.6	73.5	72.2
Others occupied	64.1	38.9	74.3
Unemployed	37.2	56.4	64.5
Out of Labor Force	50.4	60.4	58.3

Source: World Bank staff calculations from EPM data.

Table B.18: Employment Sector of the Household Head and Poverty Headcount

	2001	2005	2010
Wage earner. agriculture	65.7	83.1	76.9
Wage earner. manufacturing	37.1	51.6	46.8
Wage earner. trade	30.4	39.7	37.0
Wage earner. public	33.3	41.0	32.1
Wage earner. service	39.2	51.3	44.6
Self-employment. agriculture	86.5	82.6	84.0
Self-employment. manufacturing	51.3	62.4	65.7
Self-employment. trade	38.1	54.2	40.5
Self-employment. service	29.9	57.0	64.9
Others	64.1	38.9	74.3
Unemployed	37.2	56.4	64.5
Out of Labor Force	50.4	60.4	58.3

Source: World Bank staff calculations from EPM data

Table B.19: Land Tenure and Poverty Rural areas

	2005	2010
Landless	43.1	64
Owns land	33.5	47.8

Table B.20: Ownership of Livestock and Poverty in Rural areas

	2005	2010
No livestock	38.2	55.6
At least 1	27.9	49.4
More than 1	37.3	43.9

Table B.21: Ownership of Major Equipment (tractor. or trailer) and Poverty in Rural areas

	2005	2010
No equipment	35.5	55.8
At least 1 major equipment	32.6	37

Note: Weighted by individual level weights. Only half of Wave III has observations on land ownership and is thus excluded.
Source: World Bank staff calculations from EPM data.

Table B.22: Employment and Education. 2001. Are Well-educated People more likely to be employed?

	Cannot read/write	No education	Primary	Secondary	University
Manager	0.2	0.7	0.5	6.1	32.7
Qualified worker	0.6	1.5	4.4	16.2	30.3
Unqualified worker	6.4	8.9	9.3	15.4	5.8
Self employment	1.6	3.2	4.7	8.5	11.0
Farmers	25.7	32.8	27.7	16.6	4.9
Unpaid family worker	65.1	52.2	51.7	33.4	10.5
Others occupied	0.2	0.2	0.4	1.2	1.1
Unemployed	0.4	0.6	1.4	2.6	3.8
Total	100.0	100.0	100.0	100.0	100.0

Source: World Bank staff calculations from EPM data.

Table B.23: Employment and Education. 2005. Are Well-educated People more likely to be Employed?

	Cannot read/write	No education	Primary	Secondary	University
Manager	0.05	0.26	0.3	3.24	23.29
Qualified worker	0.56	1.74	2.97	14.75	37.32
Unqualified worker	5.85	6.72	8.05	10.44	5.22
Self employment	1.81	2.19	3.69	6.16	5.24
Farmers	27.27	30.27	32.27	16.84	7.14
Unpaid family worker	62.27	56.37	50.53	43.23	11.92
Others occupied	0.01	0.07	0.01	0.45	1.16
Unemployed	2.18	2.38	2.19	4.9	8.72
Total	100.0	100.0	100.0	100.0	100.0

Source: EPM 2005.

Table B.24: Unemployment and Education. 2001. Are Well-educated People more Likely to be Employed?

	Employed	Unemployed	Non active
Cannot read/write	38.8	9.5	18.1
No education but can read/write	12.6	5.2	8.0
Primary	30.0	28.1	26.7
Secondary	12.8	34.5	33.5
Tertiary	5.9	22.8	13.7

Table B.25: Unemployment and education. 2005. Are the Unemployed more Likely to be with Lower Educational Attainment?

	Employed	Unemployed	Non active
Cannot read/write	28.2	20.8	11.5
No education but can read/write	27.2	18.5	11.8
Primary	27.1	21.6	29.1
Secondary	14.4	27.7	40.2
Tertiary	3.2	11.4	7.5

Source: World Bank staff calculations from EPM data.

Table B.26: Employment Education. 2010. Are Well-educated People More Likely to be Employed?

	Cannot read/write	No education	Primary	Secondary	University
Manager	0.1	0.9	0.4	4.2	24.4
Qualified worker	0.3	1.4	1.8	11.1	27.8
Unqualified worker	2.8	3.6	5.8	7.7	6.0
Self employment	2.3	3.4	4.8	9.6	8.4
Farmers	31.8	29.5	27.6	20.3	9.0
Unpaid family worker	60.0	58.4	55.6	39.1	15.6
Others occupied	0.1	0.1	0.1	1.0	1.0
Unemployed	2.8	3.0	4.1	7.1	7.8
Total	100.0	100.0	100.0	100.0	100.0

Source: World Bank staff calculations from EPM data.Weighted figures for 15-65 year-olds.

Table B.27: Unemployment and Education. 2010. Are the Unemployed More Likely to be with Lower Educational Attainment

	Employed	Unemployed	Non active
Cannot read/write	28.9	18.5	14.6
No education but can read/write	23.6	16.8	11.7
Primary	32.4	32.7	35.1
Secondary	11.7	24.7	33.7
Tertiary	3.4	7.4	4.9

Table B.28: Poverty and Unemployment

	2001	2005	2010
% of poor unemployed	0.5	1.2	1.9
% of non-poor unemployed	1.2	3.3	3.7

World Bank staff calculations from EPM data.

Table B.29: Gross Enrollment Rates for Primary school

	2001	2005	2010
Total	107.0	120.4	117.8
Poor	100.9	117.2	115.0
Male	110.7	122.6	118.3
Females	103.4	118.3	117.3
Poorest quintile	81.3	107.8	99.5
Quintile 2	103.7	116.6	115.6
Quintile 3	115.4	124.1	123.3
Quintile 4	122.0	125.2	127.7
Richest quintile	127.6	137.4	132.1

Table B.30: Net Enrollment for Primary school

	2001	2005	2010
Total	62.3	66.2	73.8
Poor	56.5	63.5	71.3
Male	62.7	65.9	72.7
Females	62.0	66.4	74.8
Poorest quintile	44.9	55.3	60.0
Quintile 2	56.1	62.6	72.0
Quintile 3	62.2	69.4	77.0
Quintile 4	76.3	70.8	82.0
Richest quintile	85.2	80.4	85.3

Source: World Bank staff calculations from EPM data.

Table B.31: Net Enrollment Rates for Secondary schools

	2001	2005	2010
Total	17.1	19.1	26.6
Poor	8.6	14.3	19.6
Male	17.0	18.2	26.6
Females	17.3	19.9	26.6
Poorest quintile	3.4	9.3	9.3
Quintile 2	6.1	11.7	15.5
Quintile 3	10.8	15.4	23.5
Quintile 4	21.6	23.6	33.8
Richest quintile	50.8	38.3	53.2

Table B.32: Net Enrollment Rates for Tertiary Education

	2001	2005	2010
Total	1.3	1.3	1.3
Poor	0.0	0.2	0.0
Male	0.9	0.9	1.3
Females	1.6	1.6	1.4
Poorest quintile	0.0	0.1	0.0
Quintile 2	0.0	0.0	0.0
Quintile 3	0.1	0.3	0.0
Quintile 4	1.0	0.1	0.2
Richest quintile	4.6	4.9	5.5

Source: World Bank staff calculations from EPM data.

Table B.33: Access to Electricity: Percent of People Living in Dwellings with Electricity

	2001	2005	2010
Total	13.3	12.1	11.1
Poor	3.4	4.3	2.9
Urban	40.7	44.7	36.9
Rural	5.2	2.9	4.5
Poorest quintile	0.3	0.6	0.7
Quintile 2	0.6	2.3	0.8
Quintile 3	4.2	5.3	3.5
Quintile 4	16.1	13	9.4
Richest quintile	45.5	39.4	41.3

Table B.34: Access to Safe Dwelling: Percent of People Living in Dwellings with Walls of brick. block or cement?

	2001	2005	2010
Total	25.3	27.0	26.1
Poor	14.9	20.5	18.8
Urban	42.6	44.3	39.7
Rural	20.2	22.2	22.6
Poorest quintile	7.3	11.4	10.8
Quintile 2	11.1	17.6	16.9
Quintile 3	17.6	24.8	20.8
Quintile 4	30.7	31.1	30.9
Richest quintile	59.8	50.3	51.0

Table B.35: Access to Water: Percent of People Living in Dwellings with Indoor Water tap?

	2001	2005	2010
Total	7.1	6.3	2.0
Poor	1.8	4.1	0.3
Urban	15.9	13.9	7.7
Rural	4.5	4.2	0.5
Poorest quintile	0.3	2.9	0.2
Quintile 2	0.7	4.1	0.0
Quintile 3	3.4	4.3	0.3
Quintile 4	4.6	5.4	0.8
Richest quintile	26.6	15.0	8.4

Source: World Bank staff calculations from EPM data.

Table B.36: Rural Poverty Headcount Rate and Poverty Contribution

	Poverty Headcount Rate			Poverty Contribution		
	2001	2005	2010	2001	2005	2010
Antananarivo	58.8	72.2	72.0	20.0	24.2	22.2
Fianarantsoa	88.7	88.3	91.3	26.3	27.9	27.3
Toamasina	88.4	79.3	83.3	19.3	15.2	15.0
Mahajanga	79.3	86.1	81.2	11.5	12.1	11.9
Toliara	83.4	82.4	84.6	14.9	15.1	16.7
Antsiranana	80.1	74.3	72.1	8.0	5.5	6.9

Table B.37: Rural Area. Educational Attainment

	2001	2005	2010
No education and Cannot read/write	58.8	38.8	35.7
No education but can read/write	10.6	30.2	30.4
Primary	21.6	22.2	26.1
Secondary	7.0	7.8	6.7
Tertiary	2.1	1.0	1.2

Source: World Bank staff calculations from EPM data.

Table B.38: Rural Access to Electricity: Percent of People Living in dwellings with Electricity?

Rural	2001	2005	2010
Total	5.2	2.9	4.5
Poor	0.9	0.9	1.7
Poorest national quintile	0.1	0.2	0.5
Quintile 2	0.1	0.3	0.5
Quintile 3	1.4	0.8	2.3
Quintile 4	5.3	3.5	4.9
Richest national quintile	28.3	13.0	20.2

Table B.39: Rural Access to Safe Dwelling: Percent of People Living in dwellings with Walls of brick. block or cement?

Rural	2001	2005	2010
Total	20.2	22.2	22.6
Poor	13.1	18.6	18.0
Poorest national quintile	6.7	11.3	10.5
Quintile 2	10.2	15.5	16.5
Quintile 3	16.3	22.8	19.9
Quintile 4	26.9	26.8	30.0
Richest national quintile	57.2	41.1	45.3

Table B.40: Rural Access to Water: Percent of People Living in Dwellings with Indoor Water tap?

Rural	2001	2005	2010
Total	4.5	4.2	0.5
Poor	1.3	4.0	0.2
Poorest national quintile	0.2	2.9	0.2
Quintile 2	0.5	4.1	0.0
Quintile 3	2.6	3.9	0.2
Quintile 4	3.6	4.8	0.4
Richest national quintile	22.8	5.9	2.1

Source: World Bank staff calculations from EPM data.

Table B.41: Rural Unemployment: % of Individuals Reporting being Unemployed

	2001	2005	2010
Total Rural	0.3	0.9	1.6
Rural Poor	0.3	0.8	1.5
Poorest quintile	0.2	0.8	1.5
Quintile 2	0.4	0.8	1.2
Quintile 3	0.3	0.7	1.2
Quintile 4	0.1	0.8	1.9
Richest quintile	0.8	1.6	2.3

Table B.42: Rural Gross Enrollment Rates for Primary school

	2001	2005	2010
Total	102.0	119.2	117.0
Poor	97.5	116.2	114.4
Male	106.6	121.3	117.4
Females	97.7	117.0	116.7
Poorest quintile	80.1	108.7	99.2
Quintile 2	101.3	115.3	114.9
Quintile 3	112.9	122.0	123.9
Quintile 4	117.9	124.4	127.1
Richest quintile	122.3	138.8	138.9

Source: EPM 2001- 05

Table B.43: Rural Net Enrollment Rates for Primary School

	2001	2005	2010
Total	59.2	64.7	72.3
Poor	55.0	62.8	70.4
Male	60.1	64.6	71.2
Females	58.4	64.8	73.3
Poorest quintile	45.0	55.6	59.4
Quintile 2	55.6	61.9	71.4
Quintile 3	60.8	68.0	76.5
Quintile 4	73.8	69.7	81.1
Richest quintile	83.6	78.2	84.7

Table B.44: Rural Net Enrollment Rates for Secondary schools

	2001	2005	2010
Total	11.0	14.8	22.4
Poor	6.3	12.7	18.2
Male	12.3	14.2	22.8
Females	9.5	15.4	22.0
Poorest quintile	3.4	8.4	8.9
Quintile 2	5.4	9.8	15.0
Quintile 3	8.1	13.9	22.0
Quintile 4	13.1	20.6	31.7
Richest quintile	44.3	27.0	45.0

Source: World Bank staff calculations from EPM data.

Table B.45: Inequality Indices for 2001-2010

	2001	2005	2010
Percentile ratio p90/p10	8.13	4.68	5.50
p75/p25	2.96	2.16	2.29
Generalized Entropy. GE(-1)	0.48	0.27	0.34
GE(0)	0.37	0.24	0.28
GE(1)	0.40	0.30	0.35
GE(2)	0.64	0.64	0.93
Gini coefficient	0.47	0.38	0.41
Atkinson A(0.5)	0.18	0.12	0.14
A(1)	0.31	0.21	0.25
A(2)	0.49	0.35	0.41

Table B.46: Correlates of Consumption by Year

Log of per capita consumption	2001	2005	2010
HH composition			
HH size	-0.1130***	-0.1114***	-0.1155***
	[0.0048]	[0.0033]	[0.0031]
HH with child under 5	-0.1959***	-0.1381***	-0.1753***
	[0.0177]	[0.0121]	[0.0110]
Characteristics of the Head			
Age of Head	0.0126***	0.0120***	0.0159***
	[0.0032]	[0.0022]	[0.0020]
Age squared of Head	-0.0001***	-0.0001***	-0.0002***
	[0.0000]	[0.0000]	[0.0000]
Female headed	-0.0487**	-0.0757***	-0.1344***
	[0.0198]	[0.0134]	[0.0127]
Human capital			
HH with Child not in school	-0.1317***	-0.0742***	-0.1314***
	[0.0210]	[0.0121]	[0.0120]
Head at primary level	0.1417***	0.1019***	0.1239***
	[0.0199]	[0.0118]	[0.0106]
Head at secondary level	0.2779***	0.1888***	0.2540***
	[0.0249]	[0.0153]	[0.0146]
Head at tertiary level	0.5287***	0.4057***	0.4528***
	[0.0309]	[0.0257]	[0.0230]
Economics characteristics of the HH			
Head in agriculture	-0.2487***	-0.0630***	-0.1410***
	[0.0236]	[0.0162]	[0.0141]
Number of informal employment	-0.0120*	0.0093*	0.0116**
	[0.0065]	[0.0048]	[0.0047]
Number of public employment	0.0027	0.0357*	0.0190
	[0.0221]	[0.0200]	[0.0203]
Number of formal employment	0.0731***	0.1002***	0.0758***
	[0.0125]	[0.0136]	[0.0159]
HH with non agricultural enterprise	0.0937***	0.1190***	0.1096***
	[0.0186]	[0.0116]	[0.0099]
Amount of transfers received (Log)	0.0036**	0.0064***	0.0011
	[0.0016]	[0.0011]	[0.0010]
Access to piped water	0.0038***	0.0018***	0.0038***
	[0.0003]	[0.0002]	[0.0003]
Access to safe dwelling	0.0018***	0.0017***	0.0018***
	[0.0002]	[0.0001]	[0.0001]
Access to electricity	0.0031***	0.0041***	0.0045***
	[0.0002]	[0.0002]	[0.0002]
Agricultural capital			
Number of animals	0.0004	-0.0000	0.0008**
	[0.0003]	[0.0000]	[0.0003]

Log of per capita consumption	2001	2005	2010
Land cultivated in acres	0.0004***	0.0007***	0.0005***
	[0.0000]	[0.0001]	[0.0001]
Geographic location			
Rural area	-0.1133***	-0.0417***	-0.0964***
	[0.0193]	[0.0112]	[0.0100]
Living in Fianarantsoa	-0.3068***	-0.0364**	-0.1131***
	[0.0243]	[0.0145]	[0.0134]
Living in Toamasina	-0.2549***	-0.0133	-0.0981***
	[0.0268]	[0.0172]	[0.0161]
Living in Mahajanga	-0.0601**	0.0458***	0.0468***
	[0.0266]	[0.0163]	[0.0137]
Living in Toliara	-0.1018***	-0.0186	-0.1642***
	[0.0292]	[0.0165]	[0.0161]
Living in Antsiranana	0.0713**	0.1118***	0.1853***
	[0.0277]	[0.0204]	[0.0185]
Constant	12.3503***	12.0387***	12.1470***
	[0.0734]	[0.0508]	[0.0445]
Estimation characteristics			
Number of observation	5080	11781	12460
R squared	0.6332	0.4139	0.5692

Source: World Bank staff calculations from EPM data. * p<0.1, ** p<0.05, *** p<0.01

Table B.47 : Overall Poverty

	Poverty Headcount Rate			Poverty Gap			Squared Poverty Gap		
	2001	2005	2010	2001	2005	2010	2001	2005	2010
Poverty line = Total poverty line									
Urban	45.6	55.2	51.1	19.1	21.9	20.1	10.4	11.2	10.3
Rural	78.2	80.6	81.5	40.9	35.0	37.5	25.1	18.5	21.0
Total	70.8	75.0	75.3	35.9	32.1	33.9	21.7	16.9	18.8
Poverty line = Food poverty line									
Urban	34.3	42.3	38.2	12.5	14.5	12.8	6.3	6.7	6.0
Rural	68.2	66.8	67.7	30.6	24.2	26.3	17.0	11.4	13.3
Total	60.5	61.4	61.7	26.5	22.0	23.5	14.6	10.4	11.8

Source: World Bank staff calculation from EPM data.

Table B.48 : Poverty by location and region, %

	Poverty Headcount Rate			Distribution of the Poor			Distribution of Population		
	2001	2005	2010	2001	2005	2010	2001	2005	2010
Urban	45.6	55.2	51.1	14.7	16.2	13.8	22.9	22.0	20.3
Rural	78.2	80.6	81.5	85.3	83.8	86.2	77.1	78.0	79.7
6 big regions									
Antananarivo	50.3	64.8	63.8	20.7	26.2	23.8	29.2	30.3	28.1
Fianarantsoa	84.1	85.1	87.6	25.5	26.9	26.0	21.4	23.8	22.4
Toamasina	82.8	74.3	77.3	19.5	14.6	15.1	16.6	14.7	14.7
Mahajanga	73.5	78.7	76.0	11.5	11.9	11.8	11.0	11.3	11.7
Toliara	76.7	79.9	80.4	15.3	15.4	16.8	14.2	14.5	15.7
Antsiranana	70.5	69.1	65.6	7.5	5.0	6.4	7.6	5.5	7.4
Total	70.8	75.0	75.3	100.0	100.0	100.0	100.0	100.0	100.0

Source: World Bank staff calculation from EPM data.

Table B.49 : Mean real per capita consumption by groups

	2001	2005	2010
Location			
Urban	291,659.5	242,904.4	266,034.4
Rural	154,494.6	150,870.5	148,417.9
Regions			
Antananarivo	291,941.9	202,356.8	225,153.3
Fianarantsoa	123,676.6	138,510.4	127,332.9
Toamasina	127,678.3	172,239.0	163,375.5
Mahajanga	159,635.0	174,089.0	170,073.4
Toliara	151,811.0	148,779.3	140,368.9
Antsiranana	183,161.2	189,608.0	196,831.2
Quintiles of WA			
Lowest quintile	46,356.8	61,743.1	55,050.4
2	80,147.7	97,055.6	91,318.6
3	119,444.7	128,467.1	125,046.6
4	190,743.2	177,077.8	175,018.9
Highest quintile	492,257.8	390,907.8	414,911.5
Total	185,858.2	171,106.6	172,308.3

Source: World Bank staff calculation from EPM data.

Table B.50 : Poverty by age groups

	Poverty Headcount Rate			Distribution of the Poor			Distribution of Population		
	2001	2005	2010	2001	2005	2010	2001	2005	2010
Age									
0-5	78.2	81.2	83.2	21.5	20.8	22.4	19.4	19.2	20.3
6-14	77.1	80.8	80.8	26.3	28.9	28.3	24.2	26.8	26.4
15-19	70.2	75.3	73.8	10.6	10.2	10.5	10.6	10.2	10.7
20-24	64.6	67.3	70.1	8.0	6.8	7.0	8.7	7.6	7.5
25-29	63.4	68.4	70.2	6.4	6.4	6.0	7.1	7.1	6.5
30-34	67.5	71.7	69.1	6.1	5.8	5.4	6.4	6.1	5.8
35-39	63.8	71.6	71.4	5.0	5.0	5.0	5.5	5.3	5.3
40-44	64.5	71.6	68.8	4.5	4.4	4.0	5.0	4.6	4.3
45-49	65.3	66.3	67.8	3.8	3.6	3.6	4.1	4.0	4.0
50-54	65.2	66.9	65.3	3.0	2.9	2.8	3.3	3.3	3.3
55-59	63.0	64.7	62.8	1.5	1.7	1.8	1.7	1.9	2.1
60-64	63.4	66.4	64.5	1.4	1.1	1.1	1.5	1.3	1.3
65+	59.4	65.3	63.3	2.1	2.4	2.0	2.5	2.7	2.4
Total	70.8	75.0	75.3	100.0	100.0	100.0	100.0	100.0	100.0

Source: World Bank staff calculation from EPM data.

Table B.51 : Poverty by demographic composition

	Poverty Headcount Rate			Distribution of the Poor			Distribution of Population		
	2001	2005	2010	2001	2005	2010	2001	2005	2010
Number of children 0-6 years old									
no children	55.4	59.2	58.2	23.5	23.0	21.1	30.1	29.2	27.3
1	66.8	74.3	71.4	24.9	27.3	26.3	26.4	27.6	27.7
2	79.7	81.3	83.0	26.6	26.0	27.0	23.6	24.0	24.5
3 or more children	88.6	92.0	94.2	24.9	23.6	25.6	19.9	19.2	20.5
Household size									
1	29.4	27.4	20.2	0.5	0.3	0.3	1.2	1.0	1.0
2	41.3	43.2	39.4	2.8	2.4	2.2	4.8	4.2	4.1
3	57.2	56.1	56.7	8.3	7.3	7.7	10.2	9.8	10.3
4	62.5	65.6	64.4	14.4	13.3	13.3	16.3	15.2	15.5
5	68.7	71.4	73.7	15.0	16.1	16.0	15.4	16.9	16.4
6	71.3	77.5	82.1	16.2	16.6	16.6	16.1	16.1	15.2
7 or more	84.4	89.3	88.2	42.8	43.9	43.9	35.9	36.9	37.5
Total	70.8	75.0	75.3	100.0	100.0	100.0	100.0	100.0	100.0

Source: World Bank staff calculation from EPM data.

Table B.52 : Poverty by quartile of land holdings

	Poverty Headcount Rate			Distribution of the Poor			Distribution of Population		
	2001	2005	2010	2001	2005	2010	2001	2005	2010
Quartiles of land holdings									
No land	35.7	45.6	44.2	13.7	11.0	9.7	27.1	18.1	16.5
Lowest quartile	81.6	86.8	84.1	21.0	23.7	23.3	18.2	20.5	20.9
Second quartile	90.0	82.0	83.8	23.2	22.4	23.2	18.2	20.5	20.9
Third quartile	83.7	81.9	83.3	21.6	22.4	23.1	18.2	20.5	20.9
Highest quartile	79.8	75.4	74.6	20.6	20.6	20.7	18.2	20.5	20.9
Total	70.8	75.0	75.3	100.0	100.0	100.0	100.0	100.0	100.0

Source: World Bank staff calculation from EPM data.

Table B.53 : Other measures of Poverty

	Sen Index			Sen-Shorrocks-Thon Index			Watts Index		
	2001	2005	2010	2001	2005	2010	2001	2005	2010
Poverty line = Total poverty line									
Urban	0.307	0.358	0.333	0.322	0.354	0.331	0.291	0.320	0.295
Rural	0.575	0.505	0.539	0.574	0.493	0.526	0.669	0.519	0.578
Total	0.522	0.483	0.509	0.528	0.467	0.493	0.583	0.475	0.521
Poverty line = Food poverty line									
Urban	0.221	0.261	0.236	0.223	0.249	0.224	0.183	0.203	0.179
Rural	0.474	0.387	0.417	0.462	0.373	0.404	0.469	0.340	0.384
Total	0.424	0.369	0.392	0.416	0.349	0.372	0.404	0.310	0.342

Source: World Bank staff calculation from EPM data.

Annex C. Poverty Decompositions

Table C.1: Decomposition of Poverty: 2001 compared to 2005

	Change	Growth	Redistribution	Interaction
Poverty headcount (P0)	4.3	3.7	0.2	0.4
Poverty gap (P1)	-3.8	2.9	-7.3	0.6
Poverty severity (P2)	-4.8	2.4	-7.2	0

Source: World Bank staff calculations from EPM data.

Table C.2: Decomposition of Poverty: 2005 compared to 2010

	Change	Growth	Redistribution	Interaction
Poverty headcount (P0)	0.3	-0.3	0.5	0.1
Poverty gap (P1)	1.9	-0.3	2.1	0
Poverty severity (P2)	1.9	-0.2	2.1	0

Source: World Bank staff calculations from EPM data.

Table C.3: Decomposition of Poverty: 2001 compared to 2010

	Change	Growth	Redistribution	Interaction
Poverty headcount (P0)	4.5	3.5	1.3	-0.2
Poverty gap (P1)	-1.9	2.7	-5.1	0.5
Poverty severity (P2)	-2.9	2.2	-5.2	0.0

Source: World Bank staff calculations from EPM data.

Table C.4: Urban Poverty Decomposition: 2001 compared to 2005

	Change	Growth	Redistribution	Interaction
Poverty headcount (P0)	9.5	8.7	-0.6	1.4
Poverty gap (P1)	2.8	5.2	-2.9	0.5
Poverty severity (P2)	0.8	3.5	-2.7	0

Source: World Bank staff calculations from EPM data.

Table C.5: Urban Poverty Decomposition: 2005 compared to 2010

	Change	Growth	Redistribution	Interaction
Poverty headcount (P0)	-4.1	-5.1	0.4	0.6
Poverty gap (P1)	-1.8	-2.9	1.1	0.1
Poverty severity (P2)	-0.9	-1.8	1	0

Source: World Bank staff calculations from EPM data.

Table C.6: Urban Decomposition: 2001 compared to 2010

	Change	Growth	Redistribution	Interaction
Poverty headcount (P0)	5.4	4.9	0.8	-0.3
Poverty gap (P1)	1.0	2.5	-1.8	0.2
Poverty severity (P2)	-0.1	1.7	-1.8	0.0

Source: World Bank staff calculations from EPM data.

Table C.7: Rural Poverty Decomposition: 2001 compared to 2005

	Change	Growth	Redistribution	Interaction
Poverty headcount (P0)	2.4	1.1	1.3	0
Poverty gap (P1)	-5.9	0.9	-7	0.2
Poverty severity (P2)	-6.6	0.8	-7.3	0

Source: World Bank staff calculations from EPM data.

Table C.8: Rural Poverty Decomposition: 2005 compared to 2010

	Change	Growth	Redistribution	Interaction
Poverty headcount (P0)	0.9	0.9	0.1	-0.2
Poverty gap (P1)	2.5	0.8	1.8	0
Poverty severity (P2)	2.4	0.5	1.9	0

Source: World Bank staff calculations from EPM data.

Table C.9: Rural Poverty Decomposition: 2001 compared to 2010

	Change	Growth	Redistribution	Interaction
Poverty headcount (P0)	3.3	1.8	1.7	-0.2
Poverty gap (P1)	-3.4	1.5	-5.2	0.3
Poverty severity (P2)	-4.1	1.3	-5.4	0.0

Source: World Bank staff calculations from EPM data.

Annex D. Methodology for estimating poverty

Background

The Poverty, Gender and Inequality Assessment or PGIA is a research project that is mainly to evaluate the current state of poverty in Madagascar. By "state of poverty" is associated not only the current profile of poverty, but also the trends that are observed in recent years. The study intends to cover the period 2001-2010 for which data on the living conditions of households are available through the various surveys conducted at nationwide by the national institute in charge of the production of statistics in this Madagascar as the INSTAT (Intititut National de la Statistique). For the PGIA, the information contained in the national household surveys called EPM (Enquête Périodique auprès des Ménages) of 2001, 2005 and 2010 were chosen specifically for the assessment of poverty in Madagascar and its evolution through the years.

Reasons for the choice of EPMs in the analysis of this report

The PGIA analysis period extends from 2001 to 2010. And during this period, five sets of EPM are available as those of 2001, 2002, 2004, 2005 and 2010. As part of the PGIA, EPM only the years 2001, 2005 and 2010 will be considered. Data for the years 2002 and 2004 will not be used in the analysis. The 2002 EPM is not considered because its data are just collected from a rapid assessment of the 2002 crisis and covering only very small variables and have no interest in more depth analytical work. The purpose of the EPM 2002 was to make a quick review of the impact of the 2002 crisis on poverty. Moreover, this survey was conducted at a time when the crisis itself has not yet been finally passed. For the EPM 2004, it is also generally less used for analytical work in favor of the EPM 2005. The EPM 2004 has had some problems at the time of data collection. Data collection took place over two distinct periods for certain areas of enumeration, raising consistency issues for inter-temporal comparisons. Moreover, the 2004 EPM data collection was almost superimposed with the beginning of that of the EPM 2005.

The original method of poverty estimation

On the basic principle, the methodology for determining poverty EPM in 2001 was perfectly valid. It is based on principles, which are the most used, distributed by Deaton and Zaidi (1999) for the evaluation of aggregate consumption and those of Bidani and Ravallion (1994) for the estimation of the poverty line in 2001.

However, in terms of evolution through time, for 2005 and 2010, the poverty lines used are the 2001 updated from official consumer prices indexes inflation, published by the National Institute of Statistics. Official CPI index covers only 20 percent of the country population. In particular, it covers only the seven major cities in Madagascar. But more than 80% of the population lives in rural areas and the urban areas is not limited to only the seven cities considered.

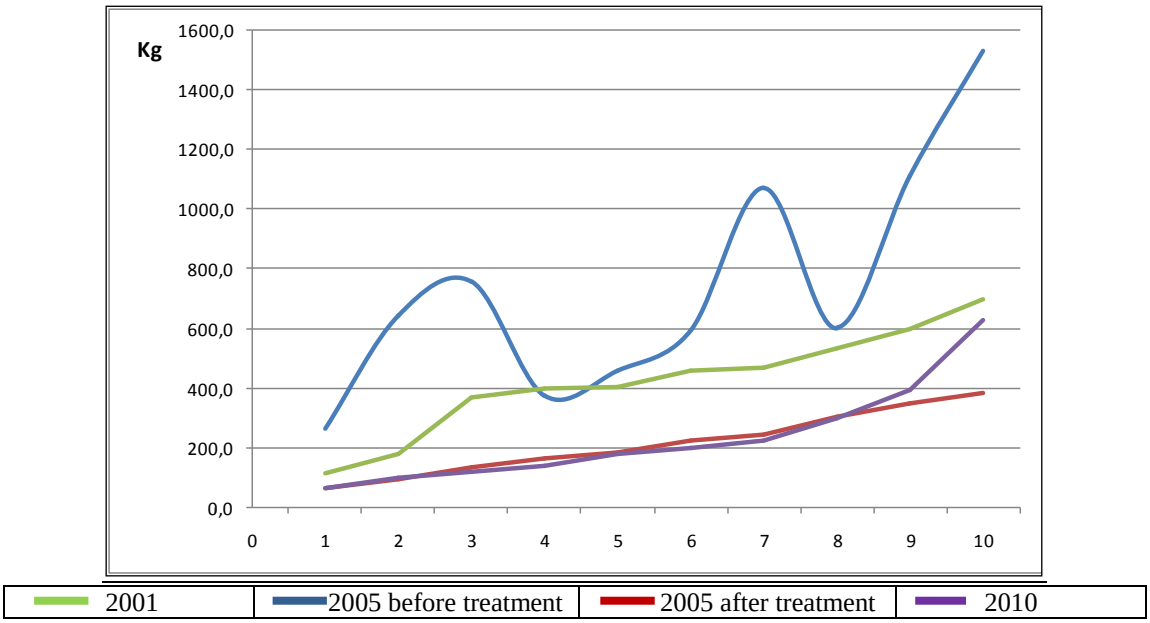
Three other issues support the idea of recalculating poverty lines: (1) changes in survey size, (2) questionable quality of the 2005 survey, and (3) new sampling frame changes in 2008.

(1) **Changes of survey size and coverage**. In 2005, Madagascar has passed in the "Region" system allowing the "province" or "Faritany" system in its territorial

organization. The number of the largest administrative subdivision rises from 6 provinces in 22 regions at 2005. This had the effect of doubling the sample between EPM 2001 and EPM 2005. The new survey is not only of much larger sample, but should be representative of the 22 main regions.

(2) **Quality of the 2005 survey**. The quality of the 2005 data has been under discussion and significant "cleaning of the survey has been undertaken. The following chart shows the results of the restatement of the 2005 survey, which show significant data challenges. Thus, a "reorganization" of the agricultural section in 2005 rendered the survey somewhat different from that in 2001 and 2010 and resulted obviously an overestimation of agricultural self-consumption for 2005.

Figure D1: Average production of paddy in Kg per capita consumption deciles in 2001, 2005 and 2010.



Source: Our calculations on data EPM 2001, EPM 2005 and EPM 2010.

3. **New sampling frame.** A new census mapping operation was performed in 2008 and sampling of the EPM 2010 is based on the new cutting EA (enumeration area) of the country from this census mapping while the EPM2001 and 2005 are based on EAs 1993 census which remains very old.

In spite of these inconsistencies, the questionnaires of the EPM surveys in 2001, 2005 and 2010 were broadly similar and consumption aggregates were commonly comparable.

Testing consistencies of alternative on consumer prices indexes

To verify and overcome the problems of coverage of the official consumer price index, an alternative survey base CPI has been calculated based on unit values and based on the community survey section of the EPM 2001, 2005 and 2010. The comparison of the official CPI and unit value survey CPI is illustrated in the table (**D2)**:

Table D2: Consumer Prices indexes in Madagascar

	2001	2005	2010
Official Total	1	1.5445	2.4513
Official Food	1	1.6620	2.5181
Official Non Food	1	1.4349	2.3930
Total Based Survey	1	1.6589	2.4506
Survey Based Food	1	1.8057	2.5251
Survey Based NO Food	1	1.5589	2.3996

Source: Our calculations on data EPM 2001, EPM 2005 and EPM 2010.

Overall inflation during 2001-2010 is comparable, but within sub-periods 2001-2005 and 2005-2010 rates of inflation differ significantly. From 2001 to 2010, the official indexes and the surveys based indexes had comparable growth rates. Notwithstanding, from 2001 to 2005, we find that the price changes reported by official indexes are significantly underestimated compared to the surveys based indexes. The opposite is observed in 2005-2010. Clearly use of the official CPI versus survey base CPI lead to very different poverty estimation.

Choice of methodologies of estimating the poverty line

To address data challenges and lack of good nationally representative CPI we estimated poverty using various methods to assess sensitivity of the estimates to choice of the CPI, methods of regional price deflation and recalculating poverty estimates in each period versus using deflated data. Table D3 below summarizes main approaches:

1. Options A: recalculated poverty line separately for each one on the regional basis. A separate poverty line is derived for each region. This method is based on the method of poverty consistent with the notion of utility from Arndt and Simler (2010). This option uses regional poverty line as regional price deflators.
2. Option B is similar as A, but all monetary variables are deflated by survey based regional Paasche indices.
3. Option C which is a re-estimate of poverty line each year (2001, 2005 and 2010) on a national level. The method is the Cost of Basic Needs from Bidani and Ravallion (1994). The method adopts original official estimates of poverty in 2001 and uses the same exactly method in 2005 and 2010. Three different options have been used assuming alternative methods of deflation (C0, C1, and C3).
4. Option D and E. D - Official poverty estimates. E - recalculates official poverty estimated. The method uses 2001 poverty lines and over time update using official CPI. (Method D is omitted from the summary table as produces similar results as Method E).
5. Option F (0,1,2) is similar to the official methodology, but instead CPI uses different survey based deflators. It is presented in three versions depending on the type of index based on survey data to consider.

Details of the assumptions and characteristics of each option under options and the results are shown in the table below:

Table D3: Poverty line methods summary for Madagascar

	Regional Poverty Line		National Poverty Line			Official Poverty Line	PL update based on Survey Based CPI Methods		
Options	**A**	**B**	**C0**	**C1**	**C2**	**E**	**F0**	**F1**	**F2**
	Regional PL (PL as regional deflators)	Regional PL + Regional Deflators	National PL	National PL	National PL	Official CPI update	Survey base CPI with Engle for non food	Survey base CPI - just food	Survey base CPI: Food + Non Food Estimated
Assumptions									
Reference Group	Iteration ending at 70%	Iteration ending at 70%	30%	30%	30%	30%	30%	30%	30%
Economy of Scale	Per Capita	Per Capita	Per Capita	Per Capita	Per Capita	Per Capita	Per Capita	Per Capita	Per Capita
Regional Deflators	Regional PL as deflator	Paasche Survey base	Paasche Survey base	Paasche Survey base	Paasche Survey base	Paasche Survey base	Paasche Survey base	Paasche Survey base	Paasche Survey base
Over time update in PL	PL recalculated every 5 years	PL recalculated every 5 years	PL recalculated every 5 years	PL recalculated every 5 years	PL recalculated every 5 years	Official CPI based on Urban cities for 2001-2005, Official CPI of Capital for 2005-2010	Survey base CPI with Engle for non food	Survey base CPI - just food	Survey base CPI: Food + Non Food Estimated
# of regions used for Regional deflator	in 2001 6 regions, in 2005 and 2010 22 regions	in 2001 6 regions, in 2005 and 2010 22 regions	in 2001 6 regions, in 2005 and 2010 22 regions	in 2001 6 regions, in 2005 and 2010 22 regions	6 regions for each year	in 2001 6 regions, in 2005 and 2010 22 regions	in 2001 6 regions, in 2005 and 2010 22 regions	in 2001 6 regions, in 2005 and 2010 22 regions	in 2001 6 regions, in 2005 and 2010 22 regions
Type of consumption used for PL estimation	Nominal	Nominal	Nominal	Real	Real	NA	NA	NA	NA
Non Food Component	Engle regression method	Engle regression method	Engle regression method	Engle regression method	Engle regression method	NA	Engle regression method	NA	NA
Poverty Headcount (H0)									
2001	65,99	65,99	69,73	70,75	69,88	69,60	69,73	69,73	69,73
2005	71,63	71,63	73,32	75,01	74,21	68,70	75,09	78,06	74,02
2010	70,58	70,58	67,66	75,42	66,98	76,50	77,22	79,11	78,11
Gini Coefficient									
2001	0,441	0,468	0,468	0,468	0,468	0,469	0,468	0,468	0,468
2005	0,350	0,356	0,372	0,378	0,376	0,372	0,372	0,372	0,372
2010	0,384	0,397	0,403	0,408	0,403	0,402	0,403	0,403	0,403

Source: Author's calculations.

Method chosen for this note: Cost of Basic Needs (CBN) approach

This study adopted version C1 as a preferable method to calculate poverty in Madagascar. According to this approach, the poverty has been recalculated each year based on the commonly applied Cost of Basic Needs approach. The decision to recalculate poverty in every round of the EPM is made based on significant discrepancies in survey base versus official CPI indicators. The choice was reinforced by the changes in the survey methodology and changes in the regional survey coverage in 2005. It is important to emphasize that the choice of the poverty estimation method has an impact on the level of poverty in Madagascar, but does not change general trend observed across different methods of poverty calculations,

and the main "story" remain unchanged. All the reviewed poverty estimation methods indicate stagnation or increase in poverty over the 2001-2010 period.

The following basic steps in calculation poverty have been followed in each one of the reviewed methods:

1. **Consumption aggregates were calculated based on commonly adopted method described in Deaton and Zaidi (1999).** Similar consumption aggregates have been used in case of nominal Official consumption aggregates. The regional prices adjustment has been made using Paache type deflators (6 main regions used for all survey years).
2. **Identifying a reference group from which food consumption patterns can be drawn.** A fixed nominal expenditure level is used to define the reference group. The choice of the reference population is a normative judgment in the construction of a poverty line. Ideally, the reference group will be chosen to be consistent with the resulting poverty estimates based on behavioral parameters of the reference group. In this analysis, the reference population to set the food consumption pattern is the population of people in the 3th and 4th deciles of the per capita consumption distribution among all individuals. The food basket of this group is meant to capture the food consumption patterns for a relevant, relatively low income population. Similar approach has been used in the 2001 poverty line estimation.
3. **Setting the calorie requirements**. Recommended calorie needs are derived using the World Health Organization (WHO) caloric requirements. We calculate the food poverty line as the cost of buying a diet of 2133 calories per capita per day, given the food consumption patterns of households in a reference population. For each food item, a caloric content value is assigned based on calorie tables produced by the United Sates Department of Agriculture (USDA).
4. **Deriving the food poverty line by calculating the caloric value unit, which is the cost of each calorie the reference group consumes.** The food poverty line is computed as the total cost of this reference population minimal food basket. The prices for each food are drawn from the national unit value prices calculated from the food diary. Using this methodology, the food poverty line is estimated as 807 Ariary per capita per day needed to obtain 2133 calories per day for 2010. The monthly value of the food poverty line is equal to 12 239 Ariary per capita in 2001, 18 924 Ariary in 2005 and 24 557 Ariary in 2010.
5. **Estimating the allowance for non-food goods.** The need for non-food consumption requires adding an allowance for non-food goods and services to the food poverty line. The upper-bound method used here to determine the value of the general or complete poverty line (CPL) was developed by M. Ravallion (see Ravallion 1994). The share of total consumption that goes to non-food consumption is calculated for this reference group. The monthly value of the complete poverty line is equal to 16 061 Ariary per capita in 2001, 24 097 Ariary in 2005 and 31 816 Ariary in 2010.

Table D1: official poverty lines and Poverty lines used in this report 2001, 2005 and 2010

Year	2001	2005	2010
Currency *	FMG	MGA	MGA
Official Poverty line			
Food Poverty line	751,800	232,171	356,508
Poverty line	988,600	305,300	468,800
Temporal deflator **	1.0	1.544	1.536
Poverty line used in this report			
Food Poverty line	734,320	227,085	294,690
Complete Poverty line (CPL)	963,665	289,169	381,791
Temporal deflator **	1.0	1.501	1.320

Source: Main Report EPM 2001, EPM 2005 main report and the main report EPM 2010.
* 1 Ariary = 5 FMG. FMG or Malagasy Franc is the former national currency replaced by the MGA from 2005.
** Current survey compared to the previous survey year for the three years 2001, 2005 and 2010.

Table D4: Comparison of newly estimated with the original rates for 2001, 2005 and 2010 poverty rates. (In%)

Year	2001	2005	2010
Poverty rates from the original poverty lines and deflators (A)	69.7	68.7	76.5
Poverty rate from new poverty lines and deflators (B)	70.8	75.0	75.4
Difference (A-B)	-1.1	-6.3	1.1

Source: Own calculations on data EPM 2001, EPM 2005 and EPM 2010.

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