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Executive Summary

Introduction

This report provides a dynamic poverty assessment of Mauritania between 2008 and 2014, the time period included between the last two household budget surveys (the “Enquête Permanente sur les Conditions de Vie des ménages” – EPCV). Its aim is not to provide a comprehensive poverty profile for either 2008 or 2014 but to respond to specific questions that arose in the course of the preparation of the Systematic Country Diagnostic (SCD) for Mauritania. This poverty assessment was designed to respond to these questions and various others questions raised by the CMU in FY16 in order to serve as a background report to the SCD.

The report is organized in two parts. Part I reviews the main findings related to poverty and shared prosperity and puts these findings under the microscope to find possible inconsistencies and validate results. It also provides a set of leads that could explain changes in poverty reviewing the main structure and drivers of the observed poverty changes. Part II turns to population groups at risk of marginalization to understand whether changes in welfare have included or marginalized further these groups. This part also explores social mobility and vulnerability using cross-section surveys and pseudo-panels constructed for this purpose.

Results point to positive progress overall. Poverty has significantly declined and this decline is explained by the pro-poor nature of welfare changes, which resulted in net gains for the bottom 40 percent of the population. Improvements in poverty and shared prosperity are in line with improvements in assets, education, health and subjective perceptions of wellbeing. These positive developments are explained by improvements in production, productivity and incomes in rural areas, which followed a period of restructuring of the agricultural and livestock sector, and by a combination of other factors such as internal migration and changes in relative prices.

However, progress has not been very inclusive in that some areas and some population groups have been left behind. Poverty in the capital Nouakchott has not declined likely because migration to urban areas tends to self-select the poorest among the poor. Labor force participation and the employment rate have not improved and groups that tend to be marginalized from progress such as youth, females and low income workers have been increasingly marginalized. Social mobility for these groups is not visible and this creates pools of chronic poverty and chronic exclusion that represent an important constraint to further poverty reduction in Mauritania.

Summary of Part I

A review of the stylized facts that characterize household welfare during the 2008-2014 period shows that annualized mean expenditure per capita increased by about 1.5 percent per year, which is in line with increases observed during previous periods in Mauritania. All quantiles have done well and changes in welfare have been pro-poor with the poor and the extreme poor performing better than the non-poor. As a consequence, inequality has decreased from 35.3 in 2008 to 31.9 percent in 2014 (Gini index).

The pro-poor nature of growth has resulted in a sharp decline of the poverty rate from 44.5 percent in 2008 to 33.0 percent in 2014, a fact that caught several observers by surprise. Mauritania experienced sustained GDP growth during the period and this was accompanied by sustained improvements in household welfare but the degree of pro-poorness of these improvements has been unexpected. When we benchmark the poverty performance of Mauritania between 2008 and 2014 with that of Mauritania in previous periods or with that of other countries in Sub Saharan Africa, the latest period outperforms these benchmarks. Put it differently, while the growth in household mean expenditure is not atypical, the decline in poverty that

corresponds to such growth has been larger than expected. Moreover, the decline in poverty is almost entirely explained by developments in rural areas with the capital Nouakchott showing an increase in poverty. This has resulted in an unprecedented urban-rural convergence in poverty.

These facts raise a number of questions: How robust is the poverty decline? What is the structure of poverty reduction? What explains poverty reduction? What explains the rural-urban convergence? What are the main correlates of poverty? Part I addressed these questions and provided a number of elements that helped to validate key findings and explain the main drivers of change.

How robust is the poverty decline? The poverty decline is robust to the various tests conducted. It is robust to the choice of poverty line. The poverty line adopted by the National Statistical Office (NSO) is situated in a part of the distribution where the poverty decline has been the largest. However, shifting the poverty line around this threshold would still result in poverty declines within a 9-12 percentage points range and we cannot attribute the poverty change simply to the poverty line. The poverty change is also robust to the choice of FGT poverty measure. Large declines in poverty are visible whether we use the poverty rate, poverty gap or severity of poverty indexes. It is robust to people's perceptions of wellbeing. The EPCV surveys contain two subjective questions on wellbeing and both questions point to significant improvements, even in Nouakchott where absolute poverty has increased.

Changes in poverty are consistent with changes in multidimensional poverty indicators and assets. By combining different non-monetary poverty indicators, we constructed two of the Alkire and Foster indexes of multidimensional poverty. These indexes show improvements comparable to poverty overall and in all components including education, health and housing. This is also the case if these indicators are estimated with different surveys available for Mauritania such as the Multiple Indicators Cluster Surveys (MICS). Poverty changes are also robust to improvements in ownership of assets. Ownership has increased in coverage for almost all assets considered including home ownership. They are also robust to the use of different questions used to collect information on expenditure (12 months or 15 days recall period). All these tests support the finding that the decline in poverty between 2008 and 2014 has been large, within a 9-12 percentage points range depending on the poverty line considered.

What is the structure of poverty reduction? Poverty reduction was decomposed into within areas and between areas effects, into growth and redistribution effects, into components of expenditure and into economic sectors of the employed. The report finds that changes in poverty are mostly due to within areas effects, particularly changes within rural areas and in the capital Nouakchott and in rural areas changes are mainly driven by changes in mean expenditure. The largest contributors to growth in mean expenditure are expenditures on services and utilities such as education, electricity, water and rent. It is also evident that among the employed population much of the action related to poverty reduction occurs in agriculture, livestock, construction and services.

What explains poverty reduction? Poverty reduction is explained by structural changes in rural areas, which led to increased production, productivity, prices and incomes for rural workers, particularly in the irrigated and mechanized sector and in livestock. The surface of cultivated land and agricultural output in tons have both increased very significantly between 2008 and 2014 and the drivers of these changes have been mechanized and irrigated agriculture. Livestock production and prices have also increased remarkably, a phenomenon that is partly explained by farmers' reconversion from agriculture to livestock production. Small producers increased output and benefitted from increased relative prices. Therefore, structural changes in rural areas have benefitted both large and small producers and point to an improved performance of the agricultural and livestock sectors also visible in an increase in exports.

What explains the urban-rural convergence in poverty? The asymmetric performance of urban and rural areas and internal migration are the main factors that explain such convergence. As a result of the structural changes in agriculture, rural producers have largely outperformed urban consumers in terms of growth in mean expenditure and poverty reduction between 2008 and 2014. According to the two latest censuses (2000 and 2013) the population of Mauritania became more urbanized and settled with an urban share increasing from 38.1 to 48.3 percent of the population between 2000 and 2013. Almost all prevalently rural regions lost in relative terms in favor of prevalently urban areas. Internal migrants tend to be poorer and we estimated that this internal migration may help to explain about 13.6 percent of the poverty reduction.

There is also some evidence that measurement issues artificially exaggerate the rural-urban convergence. In Nouakchott, the report finds evidence of an underestimation of food expenditure in 2014 due to two factors: Changes in questionnaire design (an increase in the number of items used for reporting expenditure) that led to questionnaire fatigue and the EMEL program (subsidized food) that artificially reduces expenditure on selected items. Both these factors result in an underestimation of food expenditure in the capital, which contributes to explain the growth in poverty in the capital and the urban rural convergence.

What are the main correlates of poverty? Poverty regressions indicate that the factors that correlate with poverty well are those largely expected such as household size, assets, housing, characteristics of the head of the household and the share of employed people. However, with the exception of household size, there is little consistency in how these factors predict poverty across time (between 2008 and 2014) and space (between urban and rural areas). When we decompose the poverty change into the role of observable covariates and the role of their coefficients, we find that the quasi-totality of poverty reduction is explained by changes in factors that are not easily captured by the covariates. These factors include, for instance, changes in people's behavior, structural changes, relative prices and economic shocks that affect income and expenditure but do not affect the classic predictors of expenditure. These findings are consistent with what we observed in relation to the structural changes in rural areas, internal migration, relative prices and exports.

Summary of Part II

Part II of the poverty assessment focuses on marginalized groups, inequality of opportunity and social mobility in an effort to detect whether some important groups of the population have been left behind and excluded from the very significant poverty reduction process documented in Part I. In particular, we focus on children, youth, females and house workers, three groups that are particularly at risk in a country like Mauritania, we measure whether and how opportunities have evolved using selected education, health, water and work indicators and we measure poverty transitions and vulnerability to poverty in the near future.

Overall, we find a clear wedge between progress on human development indicators such as education and health and progress in the labor market. While education and health have improved, the labor market benefits of these improved indicators have not materialized in terms of better inclusion into employment. This is expected to generate side effects for marginal groups and for the population at large. Young women find refuge in marriage as an alternative to work and the large group of young men out of work and education can contribute to increase social tensions.

The bottom 40 percent has performed relatively better than the top 60 percent according to the main human capital indicators but the gap with the top 60 percent is still large and access to work did not improve. Literacy and health have improved for both income groups between 2008 and 2014 whereas the share of people working has declined for both groups. However, the bottom 40 percent has performed better on all

three fronts with a larger growth in literacy and health and a marginally smaller decline in work. This implies that the gap in literacy, health and work between the two groups has declined between 2008 and 2014.

Child literacy and child work have improved overall with some important caveats. Literacy among children has marginally increased overall and girls have performed better than boys. However, girls continue to show lower literacy rates than boys and we observe a clear difference between younger (age 10-14) and older (age 15-20) children with the former showing a net decline in literacy and the latter a marginal increase. It is possible that this phenomenon relates to the 1999 education reform, something that requires a further analysis. Child labor has decreased for all school age children with the decrease being larger for younger children. Good predictors of child work are the child gender, age and school attendance and work status of the household head and his/her spouse. Similar regressors can help to predict child school attendance well. Unexpectedly, literacy of adults does not predict either child school attendance or child work well.

Youth and females have improved their literacy status whereas marriage in youth age is still pervasive and marginally increased for some groups. Labor market indicators have worsened for the most and particularly for youth and females, with rare exceptions. Clearly, the improvements in secondary and tertiary education have not resulted in more employment for women, probably leading some of these women into marriage as an alternative to work. That female exit the labor force around marriage age is a well known phenomenon in the Middle East and North Africa countries and it is also well documented that better educated women have a harder time in finding employment as compared to lower educated women because of both push and pull factors. Mauritania seems to fit this scenario, a question that would require further research.

One potential group of very unprivileged people are unpaid workers or workers in some form of bonded labor or even plain slavery. Mauritania has a long history of slavery. It was the last country in the world to abolish slavery in 1981 and it was only in 2007 that keeping slaves became a penal crime. Household budget surveys are not good instruments to measure this phenomenon because respondents tend to be head of households who would not disclose information on bonded labor. However, we can observe people working in the domestic services sector (about 1.9 percent in 2008 and 1.4 percent in 2014) and we find that workers in this sector have improved their condition in terms of literacy, age, gender balance and share of low paid workers. Yet, these findings rely on observed workers and the 2007 law may have also encouraged head of household to under report information on house workers, particularly on females, younger and unpaid workers. This would bias our samples and would suggest being very cautious about these results.

An overall positive picture is also portrayed by results on the Human Opportunity Index (HOI) with the exception of labor market indicators and, to a lesser extent, water. The HOI for literacy related to primary school children has improved thanks to an increase in coverage and a decrease in dissimilarities across groups. The HOI for health satisfaction shows very large improvements on the coverage and equity sides and the HOI for access to piped water has also improved although much less than the education and health indicators. Instead and contrary to other indicators, the situation on the labor market front has not improved, neither on the coverage nor on the equity side. The HOI decomposition also shows that literacy and health satisfaction, the scale component (coverage) is the main driver of the large HOI improvements whereas for piped water and work the small changes are driven by the equalization (equity) and scale components respectively. Findings confirm the wedge observed between progress on education and health and progress on the labor market indicators.

In the absence of panel data, the study constructed a pseudo-panel to attempt to derive some lessons on social mobility. We initially proposed two methods to construct pseudo-panels, a propensity score matching

method and a probabilistic method. Comparing results of the two methods shows that they are fairly similar in outcomes and that the propensity score method results are more accurate in predicting poverty correctly. We therefore use the propensity score method to analyze mobility in and out of poverty, which we do using selected household and geographic characteristics.

Results show that households headed by males have a higher degree of chronic poverty while households headed by females show a higher capacity to escape poverty, although overall mobility is almost identical for the two types of households. Rural households are much more mobile than urban households and the explanation relates to the share of people who exited poverty given that the share of people entering poverty is roughly similar in urban and rural areas. Households headed by inactive people are also those with the highest chronic poverty as we should expect but those headed by an unemployed are those with the lowest chronic poverty. This is explained by the fact that unemployment is mainly an urban phenomenon where poverty is lower and by the fact that those who actively seek employment are generally not on a subsistence level. In other words, they can afford seeking work. The largest share of households in chronic poverty are found among farmers and breeders given that these are rural professions where poverty is the highest. However, these two same groups are those that show the largest mobility and the largest shares of those who exited poverty confirming the major explanation behind the sharp poverty reduction observed in rural areas and its drivers.

Part II of the report also analyzed the vulnerability to poverty defined as the probability of poverty in the near future. For this purpose, we used two indexes of vulnerability, which we called m1 and m2, and also two approaches using our cross-section surveys and the constructed pseudo-panel. According to both indexes and according to both methods (cross-section and pseudo-panel) vulnerability has decreased between 2008 and 2014 and has decreased more visibly than poverty itself. The m1 and m2 indexes are fairly close and in one model m1 shows higher vulnerability than m2 whereas the reverse is true in the other model. In essence, while these models remain early developments of the vulnerability literature, they concord in showing a decrease in vulnerability between 2008 and 2014. By cross-tabulating poverty with vulnerability to poverty, we also find that the share of chronic poor has declined from 32.8 to 15.6 percent while the group of hard core non poor has increased from 43.8 to 60.4 percent. These are both positive developments which raise hope for a further reduction in poverty in the near future. However, as repeatedly mentioned in this study, the labor market fundamentals for inclusive growth and further poverty reduction are missing in Mauritania and this is what may compromise the medium and long-term potential of further poverty reduction.

The report concludes with a section on further areas of research. In the light of the findings and information gaps evidenced by the report, several areas were identified for further research including the questions of: a) education quality and the 1999 education reform; b) nutrition among marginalized areas and population; c) labor market constraints and jobless growth; d) water distribution and irrigation; and d) land ownership, distribution and reforms. These are some of the key areas for further research recommended by the report.

Part I – Poverty and its Drivers

Stylized facts

Welfare dynamics

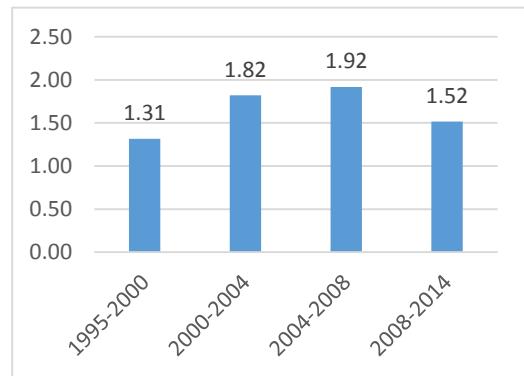
Mauritania has experienced a consistent growth in real household mean expenditure between 1995 and 2014.

The annualized real growth in mean household expenditure per capita¹ has always been positive during the period and estimated in between 1.31 and 1.92 percent per year (Figure 1). The latest period (2008-2014) is the period with the second slowest annualized growth overall with a 1.52 percent growth, down from 1.92 percent from the previous 2004-2008 period.

Distributional changes between 2008 and 2014 show progress across the distribution. As a first exercise, we look at the distribution of annual per capita expenditure between 2008 and 2014 (Figure 2, left panel). This shows three clear patterns. The first is that the distribution of expenditure has shifted to the right during the period indicating an absolute improvement in welfare for all parts of the distribution. The second is that the 2014 distribution is more “compressed” around the central moments of the distribution (mean, median) than the 2008 distribution indicating an overall reduction in inequality. The third is that the 2008 distribution is less “regular” than the 2014 distribution. That is because (in general and when working with income or expenditure data), the expected log distribution should be shaped as a normal (bell-shaped) function. The 2014 is nicer in this respect than the 2008 function.

The 2014 distribution “dominates” the 2008 distribution for all quantiles of expenditure. By plotting the Cumulative Distribution Functions (CDFs) for 2008 and 2014 we can see whether progress has occurred all along the expenditure distribution, which is the stochastic dominance test of first degree. As shown in Figure 2 (right panel), this is the case. All quantiles of expenditure in 2014 do better than the corresponding quantiles of expenditure in 2008, with the exception of observations on the very top of the distribution. It is also visible that lower quantiles experienced greater improvements than upper quantiles. Therefore, the shift in mean expenditure has not been exceptional by Mauritanian standards but all quantiles improved their living conditions, particularly lower quantiles.²

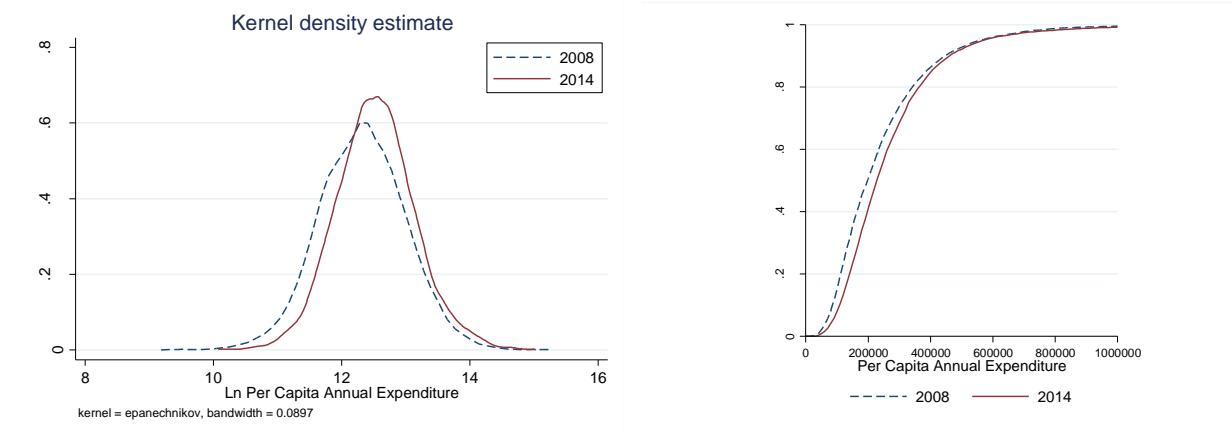
Figure 1 Expenditure per capita Growth (Annualized)



¹ Household expenditure is always per capita throughout the paper unless otherwise specified.

² It is important to note that these are “anonymous” comparisons given that we do not have panel data. Some groups of people may have worsened their welfare situation but we cannot observe this phenomenon if we cannot follow the same people over time. Quantiles do not represent the same households between the two years.

Figure 2 - Density Curves and Cumulative Distribution Functions (2008-2014)



Source: WB staff estimates, 2008 and 2014 EPCV.

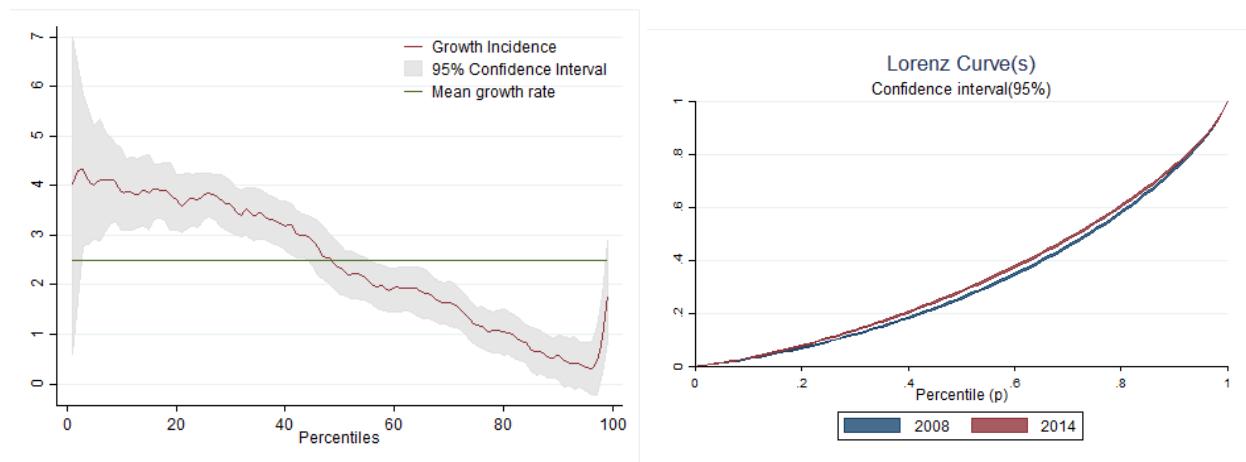
As a consequence of the distributional shifts, the mean and median of the distributions have increased on average between 2008 and 2014. Per capita mean expenditure has increased in real 2014 terms from 241,263 to 268,244 (Mauritanian Ouguiya – MRO) resulting in a growth rate of the mean of 11.2 percent over the period. The corresponding median value has increased from 198,281 to 227,810 MRO resulting in a growth rate of the median 14.9 percent. Therefore, the central moments of the distribution show real progress on average in line with the distributional changes.

Growth in household expenditure has been pro-poor between 2008 and 2014. Figure 3 (left panel) shows the Growth Incidence Curve (GIC) estimated between 2008 and 2014. Each point of the curve shows the mean growth in per capita household expenditure by percentile on an annualized basis. Expenditure growth has been positive for all percentiles with no exceptions. It is also evident that expenditure growth has been much higher for the lower percentiles as compared to the higher percentiles and that the slope of the curve is rather steep. This shows a robust pro-poor growth. The average growth of quantiles in annualized terms is close to 2.5 percent per year.³

Pro-poor growth has, in turn, reduced inequality. Overall inequality as measured by the Gini index declined from 35.3 to 31.9 percent between 2008 and 2014. Comparing the Lorenz curves and testing for differences at the 95 percent confidence level (two-sided test shown by the thickness of the curves) shows that the two curves are significantly apart all along the distribution. This is evidence that the decrease in inequality has been robust over the period (Figure 3, right panel).

³ Note that the annualized average growth of quantiles (2.5 percent) reported here is different from the annualized growth rate of mean expenditure (1.5 percent) reported in Figure 1. That is because household with larger expenditure weigh more than household with smaller expenditure on mean expenditure in the latter figure and household with larger expenditure had a lower or negative growth.

Figure 3 - Pro-poor growth and Lorenz Curves 2008-2014

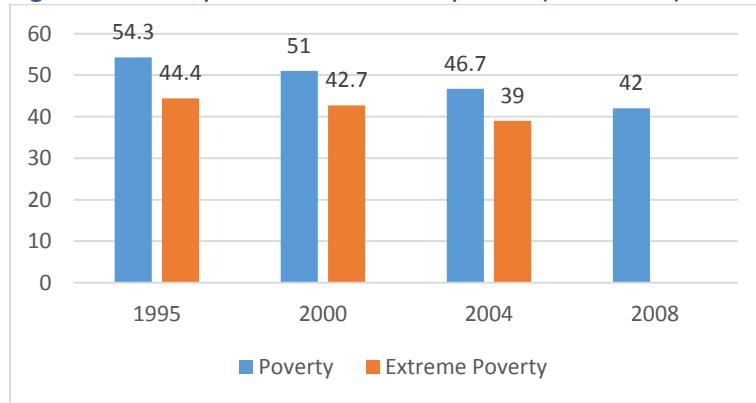


Source: WB staff estimates, 2008 and 2014 EPCV. The pro-poor growth curve is annualized with 95 percent confidence interval (grey area).

Changes in poverty and shared prosperity

Mauritania has been on a long-term poverty reduction trajectory between 1995 and 2008 but progress has been slow. According to official ONS estimates, the poverty rate declined from 54.3 percent in 1995 to 42 percent in 2008 accounting for an annual rate of poverty reduction of about one percentage point per year (Figure 4). Extreme poverty, defined in terms of the national food poverty line, has followed a more modest reduction, from 44.4 percent in 1996 to 39 percent in 2004.⁴ During this period, the National Statistical Office (NSO) has used a poverty line of 32,800 ouguiyas (MRO) or 370 USD at 1988 prices updating the line over the years using the official Consumer price Index (CPI).

Figure 4 - Poverty and Extreme Poverty Rates (1996-2008)



Source: ONS (2015) and IMF (2007)

More recently, poverty reduction accelerated. The NSO has recently revised poverty estimates based on a different consumption aggregate and a different poverty line as compared to the previous official series. At the time of writing this report, the NSO adopted a poverty line of 177,200 MRO at 2014 prices or 3.8

⁴ The 2008 figures for extreme poverty are not available from officially published NSO documents.

USD at PPP prices. These new data show that the poverty rate declined from 44.5 percent in 2008 to 33.0 percent in 2014 witnessing an acceleration of the poverty decline vis-à-vis previous periods (Table 1).

The extreme poor have done particularly well. While between 1996 and 2004 extreme poverty declined at a slow pace, even when compared to the slow progress of the poverty rate, between 2008 and 2014 extreme poverty halved. This is so whether we consider the international extreme poverty line of 1.9 USD/PPP or whether we consider the national food poverty line of 188,000 MRO per person per year (Table 1). In other words, while the period 1996-2008 saw Mauritania underperforming vis-à-vis the Millennium Development Goal (MDG) of halving poverty by 2015, the latest 2008-2014 period saw a very good performance in this respect.

Table 1 – Poverty Rates with Different Poverty Lines

Poverty Line (per capita, annual)	Local Currency	Poverty Rate	
		2008	2014
International Absolute Extreme (1.9USD/PPP)	88,470	10.8	5.6
National Food Poverty Line	118,000	22.1	12.9
International Absolute (3.1 USD/PPP)	144,346	33.2	21.4
National Absolute Poverty Line	177,200	44.5	33.0

Source: WB staff estimates, 2008 and 2014 EPCV.

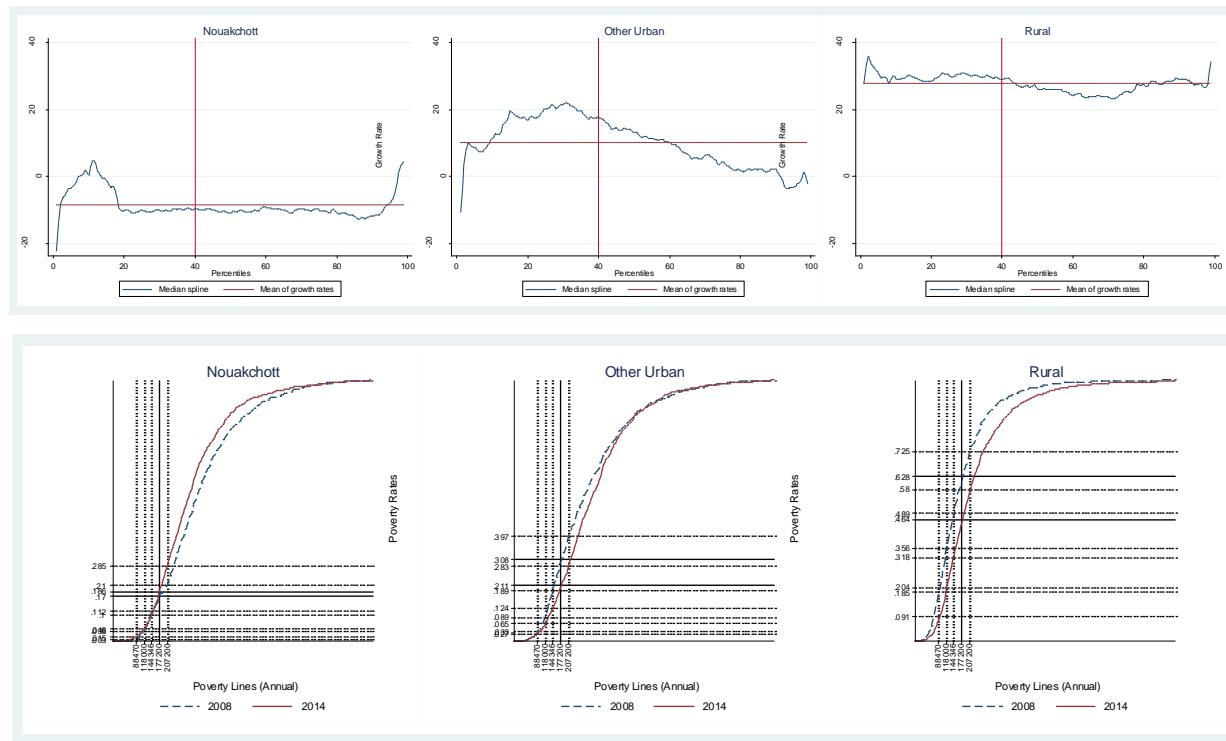
The shared prosperity indicator has also performed well. Mean expenditure for the bottom 40 percent of the population has increased by 24.4 percent between 2008 and 2014 and this compares to a growth rate of 8.3 percent for the top 60 percent of the population. On an annualized basis, these growth rates are 3.7 percent for the bottom 40 percent and 1.3 percent for the top 60 percent. Therefore, the bottom 40 percent has grown almost three times as fast as the top 60 percent during the latest 2008-2014 period.

A Geographic convergence in poverty

Changes in welfare and poverty are very different when we consider the capital Nouakchott, other urban areas and rural areas separately. Figure 5 (top panel) shows the Growth Incidence Curves (GICs) for the three areas. The curves are non-annualized to better show the contrast between regions. There are a number of elements that are immediately noticeable. By far, the highest growth in mean expenditure between 2008 and 2014 occurs in rural areas where all percentiles of the expenditure distribution have done very well, with the lower deciles performing slightly better than the upper deciles. Other urban areas come in second place in terms of performance. These areas show growth in mean expenditure across the distribution with exceptions only on the very tails. The deciles between the second and the fifth have done much better than the rest of the distribution but all decile with the exception of the top decile have a positive growth rate. We then have the capital Nouakchott where most of the percentiles show negative growth with only a small fraction of the poor showing positive developments. Also evident is the fact that the bottom 40 percent of the distribution has done better than the top 60 percent in all three areas considered. This is the only element that makes the three areas similar. If we look at the Cumulative Distribution Functions (CDFs) for the two years in Figure 5 (bottom panel), we clearly see a net improvement in welfare across the whole distribution in rural areas, lower but clear improvements in other urban areas and no improvements for the poor and a clear reduction in welfare for the non-poor in the capital Nouakchott.

These results are clear-cut in indicating a ranking in performance between the three areas with rural areas coming on top followed by other urban areas and the capital Nouakchott.

Figure 5 - Growth Incidence Curves and Cumulative Distribution Functions by Area



Source: WB staff estimates, 2008 and 2014 EPCV. Note: vertical lines represent poverty lines and horizontal lines represent poverty rates.

The asymmetric performance led to a convergence in household welfare across the three areas considered, particularly between urban and rural areas. Table 2 shows the Gini coefficient for the capital Nouakchott, other urban areas and rural areas between 2008 and 2014. In 2008, the capital Nouakchott showed a Gini of 28.2 percent as compared to a Gini of around 32-33 percent for other urban and rural areas. In 2014, inequality in Nouakchott and rural areas remained approximately unaltered while it decreased significantly in other urban areas and for the total population. What is most striking, however, is the information provided by the decomposition of total inequality into the components that derive from within and between areas inequality. It is clear that the within component has changed little while the between component has collapsed leading to cross-areas convergence in welfare. It is also evident that a good part of total inequality remains unexplained and that this component has increased between 2008 and 2014.

Table 2 - Inequality and Inequality Decomposition by Area (2008-2014)

	2008	2014	2014-2008
Inequality within areas			
Capital	28.2	28.3	0.2
Other urban areas	32.7	29.4	-3.2
Rural	32.2	32.4	0.2
Total	35.3	31.9	-3.4
Inequality Decomposition			

Within	32.1	34.3	2.2
Between	45.7	26.1	-19.7
Overlap	22.2	39.6	17.5
Total	100	100	0

Source: WB staff estimates, 2008 and 2014 EPCV.

Cross-regional changes in poverty show that predominantly rural regions have done better and that some regions had an exceptional performance. Rural areas remain poorer than urban areas, but predominantly rural regions have done much better than predominantly urban regions in terms of poverty reduction (Table 3). The regions of Hodh El Charghi, Gorgol, Brakna, Adrar and Tagant have experienced large falls in the poverty rate. The progress made by Tagant and Gorgol is particularly encouraging since these regions had the highest level of poverty in 2008. By contrast, the growth of urban poverty in the capital is worrisome. The increase in the poverty rate in Nouakchott, combined with the growth in population, has increased the share of the country's poor living in the capital. The region of Tiris Zemmour also shows a growth in poverty. The port and fish processing city of Nouadhibou has done better, achieving a visible decline in the poverty rate in spite of immigration, and now registering the lowest poverty rate among all the regions.⁵

Table 3 – FGT Poverty Measures by Region (2008-2014)

	Poverty Rate			Poverty Gap			Severity of Poverty		
	2008	2014	2014-2008	2008	2014	2014-2008	2008	2014	2014-2008
Hodh El Charghi	59.7	33.4	-26.3	23.7	9.1	-14.6	12.3	3.6	-8.7
Hodh El Gharbi	49.3	39.8	-9.5	15.6	11.5	-4.0	6.7	4.7	-2.0
Assaba	53.6	43.0	-10.6	18.6	14.0	-4.6	8.5	6.3	-2.2
Gorgol	69.1	41.1	-28.0	24.1	11.7	-12.3	11.4	4.8	-6.6
Brakna	66.3	41.0	-25.4	25.9	11.8	-14.1	13.0	4.7	-8.3
Trarza	40.9	33.3	-7.6	13.4	11.8	-1.6	6.2	5.8	-0.3
Adrar	57.0	34.6	-22.3	19.1	9.3	-9.8	8.8	3.5	-5.3
Dakhlet Nouadhibou	24.1	15.2	-8.9	5.2	4.8	-0.4	1.4	1.7	0.3
Tagant	71.4	48.2	-23.2	29.3	11.4	-17.9	15.4	3.9	-11.5
Guidimagha	68.2	51.0	-17.2	27.0	18.5	-8.5	13.8	9.4	-4.4
Tiris Zemmour	13.9	17.8	3.9	3.6	2.9	-0.7	1.2	0.8	-0.4
Inchiri	32.0	27.4	-4.6	11.0	4.7	-6.3	4.1	1.2	-3.0
Nouakchott	17.0	18.6	1.6	4.0	4.3	0.4	1.3	1.6	0.3

Source: WB staff estimates, 2008 and 2014 EPCV.

Benchmarks

Table 1 showed that the increase in household expenditure between 2008 and 2014 has been in line and even slightly lower than previous periods of time. Therefore, there is nothing particularly noticeable about the growth rate in household expenditure during the latest period. However, these periods resulted in different reductions in poverty so that one may want to compare the elasticities of poverty to changes in

⁵ EPCV household data are representative at the regional level. However, regional data for some regions such as Tiris Zemmour and Inchiri should be treated with caution, as the number of observations in the sample is small.

household expenditure or to changes in GDP. This can also be done comparing the 2008-2014 performance with previous periods in Mauritania or with other countries in Sub Saharan Africa or elsewhere.

The latest 2008-2014 period outperformed previous periods in Mauritania in terms of poverty elasticities. This can be seen from Table 4. There is substantial variability across years but it is visible that the poverty elasticity to changes in mean expenditure has been higher between 2008 and 2014 as compared to previous periods. This is true for all three FGT measures and whether we consider the 1.9 or 3.1 USD/PPP international poverty lines. Put it in other words, the latest period shows a “steeper” and negative Growth Incidence Curve (GIC) as compared to previous periods.

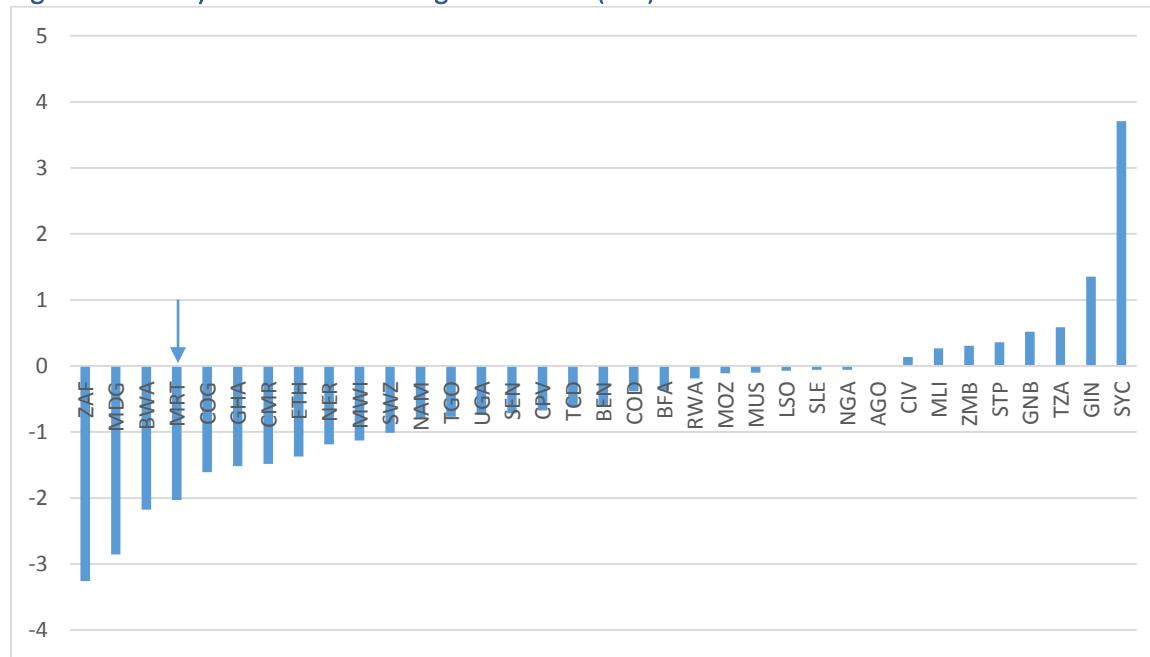
Table 4 - Poverty Elasticities to Changes in Mean Expenditure (Mauritania, annualized)

	Poverty Line=1.9 USD/PPP			Poverty Line=3.1 USD/PPP		
	Poverty Rate	Poverty Gap	Severity of Poverty	Poverty Rate	Poverty Gap	Severity of Poverty
1995-2000	0.06	-1.37	-3.64	-0.67	-0.68	-1.13
2000-2004	-4.11	-4.98	-5.51	-1.14	-2.56	-3.60
2004-2008	-3.61	-3.45	-2.79	-2.75	-3.22	-3.30
2008-2014	-6.26	-6.94	-7.88	-4.10	-5.34	-6.12

Source: WB staff estimates, 1995, 2000, 2004, 2008 and 2014 EPCV.

Mauritania performs well on average when compared with other countries in Sub-Saharan Africa (SSA). When we compare the average performance of Mauritania in terms of poverty elasticity to GDP growth, we find that this country ranks fourth after South-Africa, Madagascar and Botswana. Therefore, Mauritania is, on average, a good performer vis-à-vis other SSA countries and the last period, as we saw above, has been particularly good. These within country and cross-country benchmarking concord in showing that the 2008-2014 poverty performance has been above average. This finding, in turn, suggests to put the poverty decline under further scrutiny, which is what we do next.

Figure 6- Poverty-GDP Growth Average Elasticities (SSA)



Source: WB staff estimates, WB global database on elasticities.

Key questions

The section on stylized facts described positive developments in terms of household welfare and very positive trends in terms of poverty reduction between 2008 and 2014. During the same period, Mauritania experienced sustained GDP growth and very diverse developments when we compare the three areas of Nouakchott, other urban areas and rural areas. We also found the scale of the poverty reduction and the poverty elasticities during the last 2008-2014 period high as compared to previous periods in Mauritania and to other countries in SSA. This part of the report puts these changes under the microscope in an effort to validate or challenge changes in poverty. We ask a few questions that seem compelling in the context of Mauritania. We then carry out a number of tests that could help to answer these questions. The questions are as follows:

- How robust is the poverty decline?
- What is the structure of poverty reduction?
- What explains poverty reduction?
- What explains the urban-rural convergence?
- What are the main correlates of poverty?

How robust is the poverty decline?

Sensitivity to poverty lines and poverty measures

Poverty reduction estimates are robust whether we consider the poverty rate, the poverty gap or the severity of poverty and whether we consider different poverty lines. If we consider the extreme poverty lines (International extreme poverty line and national food poverty line -Table 5), all the three poverty measures considered (poverty rate, poverty gap and severity of poverty) show poverty halving between 2008 and 2014. If we consider the absolute poverty lines (International and national absolute poverty lines - Table 5), poverty declined by about a third for all three measures. Therefore, the poor have done well and the extreme poor have done particularly well during the period and these findings are robust to the use of different poverty lines.

Table 5 - FGT Poverty Measures (2008-2014)

Poverty Line	Poverty Rate		Poverty Gap		Severity of Poverty	
	2008	2014	2008	2014	2008	2014
International Absolute Extreme (1.9 USD/PPP)	10.8	5.6	2.8	1.3	1.1	0.5
National Food (188,000 MRO)	22.1	12.9	6.2	3.2	2.6	1.2
International Absolute (3.1 USD/PPP)	33.2	21.4	10.1	5.7	4.4	2.3

National Absolute (177,200 MRO)	44.5	33.0	15.4	9.7	7.3	4.1
Source: WB staff estimates, 2008 and 2014 EPCV.						

The national absolute poverty line makes the poverty decline particularly large. This can be seen in Figure 7 where we plotted the Cumulative Distributions Function (CDF) for 2008 and 2014. Vertical lines represent poverty lines and horizontal lines represent the corresponding poverty rates. The vertical distance between the two curves is therefore the poverty decline. It is evident that the particular absolute poverty line chosen for Mauritania is positioned in a part of the distributions where the distance between the two curves is the highest (poverty decline is the largest). If we move the poverty line to the right or to the left we are bound to find smaller declines in poverty. For example, if one uses a higher poverty line of 220,938 MRO

per person per year instead of the official poverty line of 177,200 MRO, the poverty decline would be -8.6 percentage points instead of -11.6. Vice-versa, if we chose the national food poverty line, the poverty decline would be of -9.2 percentage points. This evidently changes all the poverty elasticities discussed quite significantly. In essence, the particularly large poverty decline observed is also the result of the fact that the official absolute poverty line is located, by coincidence, where the distance between the two distributions is very large.

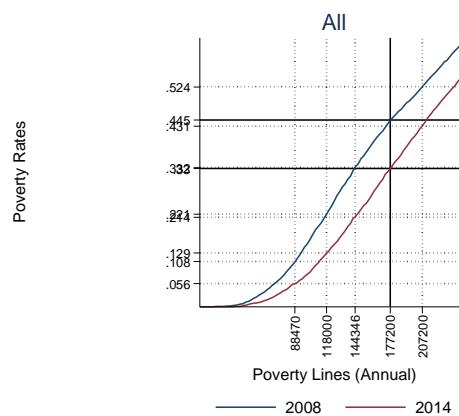
Subjective poverty

Poverty reduction is also robust to subjective perceptions of poverty. Using two different definitions of subjective poverty, the EPCV survey finds respondents consistently reporting that their poverty status and their difficulty in satisfying their food needs have improved (Table 6). For example, the share of respondents who consider themselves poor declined from 70 percent of the population to 61.2 percent and the share of respondents who declared to have difficulties in meeting food needs declined from 33.8 percent to 28.8 percent. These results are generally consistent with our overall findings on monetary poverty, except for those related to Nouakchott. These subjective improvements seem equally good in the capital Nouakchott as in other urban areas and in rural areas, in contrast with the findings on objective poverty that show a poverty increase in Nouakchott.

Table 6 - Subjective Poverty (Share of respondents)

	2008	2014
Share of respondents who consider themselves poor		
Nouakchott	76.1	57.9
Other urban	75.9	52.6
Rural	81.4	66.7
Total	79.0	61.2
Share of respondents with difficulties in meeting their food needs*		
Nouakchott	31.4	27.2

Figure 7 - Cumulative Distribution Function (censored at 250K)



Other urban	35.3	27.5
Rural	34.6	30.2
Total	33.8	28.8

Source: WB staff estimates, 2008 and 2014 EPCV. (*) Always or often.

Multidimensional poverty

Non-monetary multidimensional deprivation indexes are consistent in showing improvements in wellbeing between 2008 and 2014. Using the 2008 and 2014 EPCVs, we estimated two of the multidimensional welfare indexes proposed by Alkire and Foster: the multidimensional headcount index (H0) and the multidimensional poverty index (M0). The difference between the two indexes is that the first considers only the share of multidimensional poor while the second considers the share and the intensity of multidimensional poverty (it is the product between these two). With the available data, we were able to construct these indexes using education and living standards dimensions with the respective components. Table 7 shows the results. Both the H0 and M0 have improved by 7 percentage points. A decomposition of the indexes into the various components (Shapley decomposition) shows that most components have performed well with the exceptions of water and housing.

Table 7 - Multidimensional Headcount and Poverty Indexes

	H0			M0		
	2008	2014	2014-2008	2008	2014	2014-2008
Dim_1: Education						
1- Literacy (head of household)	0.147	0.122	-0.03	0.116	0.093	-0.02
2- Literacy (household average)	0.201	0.196	-0.01	0.142	0.13	-0.01
Dim_2: Living Standards						
1- Electricity	0.061	0.054	-0.01	0.043	0.038	-0.01
2- Improved drinking water sources	0.012	0.018	0.01	0.009	0.012	0.00
3- Sanitation	0.045	0.041	0.00	0.034	0.029	-0.01
4- Safe energy for cooking	0.062	0.054	-0.01	0.044	0.037	-0.01
5- Housing	0.052	0.048	0.00	0.038	0.034	0.00
6- Assets	0.039	0.021	-0.02	0.028	0.014	-0.01
MPI index (2 dimensions)	0.62	0.55	-0.07	0.45	0.39	-0.07

Source: WB staff estimates, 2008 and 2014 EPCV. (*)

The same multidimensional indexes estimated from different surveys also show remarkable improvements in wellbeing. The Foster-Alkire H0 and M0 indexes have been estimated for Mauritania using the 2007 and 2011 Multiple Indicators Cluster Surveys (MICS). Results show that the H0 declined from 61.7 to 52.2 percent and the M0 declined from 35.2 to 28.5 percent between 2007 and 2011.⁶ Progress is visible on all dimensions of the index with no exceptions including the schooling, child school attendance, child mortality, nutrition, electricity, improved sanitation, drinking water, flooring, cooking fuel and asset ownership indicators. All these indicators show very significant declines with the exception of the nutrition indicator, which improved only marginally.

⁶<https://www.google.com/webhp?sourceid=chrome-instant&ion=1&espv=2&ie=UTF-8#q=table+7+all+published+MPI+results>.

Assets

Ownership of assets has increased for all major assets including home ownership. Table 8 shows the share of respondents declaring to own one of the listed items. The share of households owning the property they live in is high. About 76 percent in 2008 and 82.4 percent in 2014. Only telephone ownership compares to home ownership in terms of population coverage. Other items that have large coverage are electricity, radios, televisions, satellite dishes and proper roofs and floors. This speaks to the relative importance that Mauritanian households attribute to homes. The increase in ownership between 2008 and 2014 has been positive for all assets with significant increases for important assets such as owning the property in which the household lives (+6.3%), a car (+2.2%), a fridge (+5%), a television (+11.7%), a satellite dish (+12.8%) or a telephone (+19.2%).⁷ The coverage of electricity and piped water has also increased, particularly electricity (+6.2%).

These gains have not been homogenous across areas. In the capital Nouakchott we find several negative signs related to housing and even for telephones and radios. One possibility for housing is that immigration into the capital tends to be among poorer people who live in poorer types of housing. On the contrary, piped water coverage has not improved in other urban and rural areas with all improvements occurring in Nouakchott. The growth in electricity coverage is also mainly explained by the growth in Nouakchott. For other items such as homes, computers, satellite dishes and televisions, the growth in coverage is visible in all areas but Nouakchott is the main driver of growth at the national level. What we observe here is that investments in public services such as water and electricity have mainly focused in the capital while the immigration of lower income households to the capital has probably contributed to lower the coverage of some household items like telephones and radios.

Table 8 - Assets Ownership (share of population)

	ALL			Nouakchott		Other Urban		Rural	
	2008	2014	14-08	2014	Diff.	2014	14-08	2014	14-08
Home ownership	76.0	82.4	6.3	63.4	14.9	79.6	5.0	94.0	3.5
Car	7.8	10.0	2.2	22.2	5.7	11.1	0.7	2.8	0.3
Piped water	20.9	22.9	2.0	30.7	15.1	38.9	-1.6	11.2	-6.4
Electricity	33.7	39.9	6.2	85.8	7.1	67.0	2.4	2.1	0.9
Good floor*	45.9	47.1	1.3	75.4	-4.7	58.3	0.3	26.5	1.9
Good roof**	53.2	54.4	1.1	91.2	-4.3	64.8	-1.2	29.3	1.7
Computer	1.9	5.8	3.9	15.8	10.4	5.7	4.0	0.4	0.2
Air conditioning	1.9	3.8	1.9	8.5	3.6	5.3	2.9	0.4	0.2
Telephone	64.7	83.9	19.2	88.7	-1.9	91.0	8.3	77.9	32.1
Modern kitchen	8.3	10.4	2.1	22.2	6.0	13.5	-2.8	2.4	0.6
Radio	41.9	39.4	-2.6	33.4	-8.7	46.5	3.9	39.3	-2.3
Satellite dish	25.3	38.0	12.8	80.1	19.3	57.0	14.1	6.2	4.5
Television	29.3	41.0	11.7	83.9	16.8	62.2	8.8	7.6	5.1
Fridge	12.6	17.6	5.0	37.5	9.5	28.7	3.3	1.6	0.8

Source: WB staff estimates, 2008 and 2014 EPCV. (*) Cement or tiles; (**) Metal, Zinc or Cement.

⁷ The large increase in telephones may be due to an effective increase in the number of fixed lines, to the fact that the 2014 survey included mobile phones, which were not yet included in the 2008 survey, or to both factors.

Welfare aggregate

An expenditure measure based on a different recall period also shows large declines in poverty. The EPCV questionnaire contains two sets of questions on expenditure, one based on a recall period of 12 months and the second based on a recall period of 15 days. Historically, the National Statistical Office (NSO) has used the measure based on a 12 months' recall period and the office has been very clear that this is the measure that benefitted of more efforts in terms of improvements over the years. However, recent research shows that shorter recall periods may improve respondents' accuracy (see for example Beegle et al., 2010) and one hypothesis is that changing the recall period may change the scale of the poverty decline, even if the NSO has been consistent in using the 12 months' recall period since 1995. We therefore reconstructed the expenditure aggregate using the 15 days recall period, re-estimated poverty and the poverty change and compared it with the results based on the 12 months' recall period. Results are shown in Table 9. Both welfare aggregates result in very large poverty declines and none of the two aggregates show consistently higher or lower poverty declines if we use different poverty lines. In correspondence of the absolute national poverty line, there is a gap of about two percentage points between the two approaches but the poverty decline shown by the 15 days approach still shows an overall decline of -9.5 percentage points. The 15 days approach also shows a larger decline in poverty if the international poverty line of 1.9 USD PPP is used. We conclude that the large poverty decline observed cannot be attributed to the choice of recall period.

Table 9 - Poverty Changes with Expenditure Aggregates based on Different Recall Periods

	LCU	Poverty Change	
		Recall 12 Months	Recall 15 Days
International absolute Extreme Poverty Line (1.9USD/PPP)	88,470	-5.3	-6.9
National Food Poverty Line	118,000	-9.2	-8.7
International Absolute Poverty Line (3.1 USD/PPP)	144,346	-11.8	-9.0
National Absolute Poverty Line	177,200	-11.6	-9.5
Upper Poverty Line (Orshansky method)	220,938	-8.6	-8.4

Source: WB staff estimates, 2008 and 2014 EPCV.

What is the structure of poverty reduction?

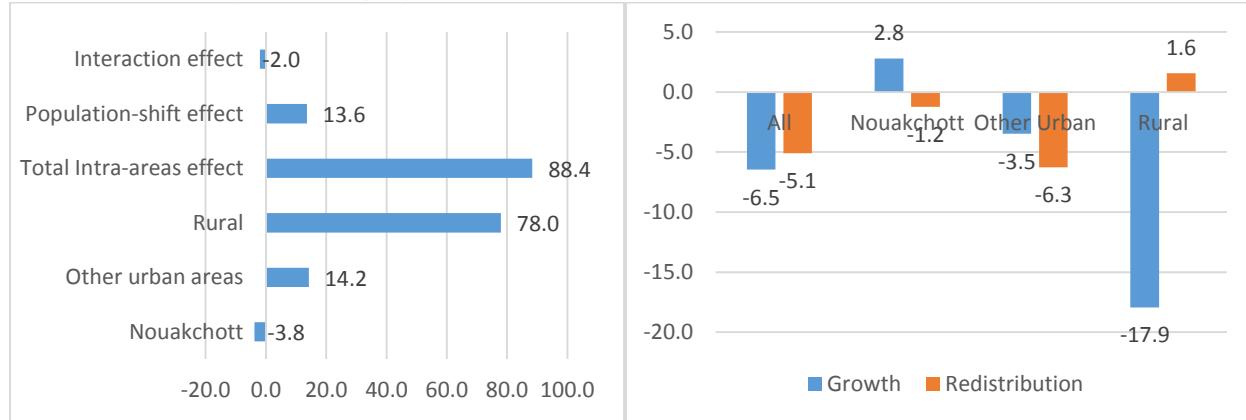
In this section, we provide four types of decompositions of the change in poverty between 2008 and 2014. The first is a decomposition originally used by Huppi and Ravallion (1991) whereby the change of poverty is decomposed into a component due to population-shifts and a component due to changes within areas and where this last "within" component effect is further decomposed into the contribution of each area. The second is the most common decomposition of the poverty change into growth and redistribution components. The literature offers several methods to do this decomposition and we opted to use the Shapley method, which has the convenient property of having no residual. The third is a decomposition of the poverty change into expenditure items to see which items lead the change. For this last decomposition we use a Stata module proposed by Araar and Duclos (2006). The fourth is the decomposition of the poverty change by economic sector.

By geographic area, growth and redistribution

Changes in poverty are mostly due to within areas effects and, within these areas, rural areas play the major role. Figure 8 (left panel), reports the results of the first decomposition on population, within and between areas effects. The poverty reduction is explained for 88.4 percent by the within areas effects and by 13.6 percent by population shifts. Therefore, population shifts had an important role in explaining poverty reduction but the predominant factor is to be found within areas. We can also observe that changes within areas are due mostly to changes within rural areas. These explain alone 78 percent of the total within area effect of 88.4 percent. Other urban areas follow with a small percentage while Nouakchott had a negative role given that poverty in this area has increased between 2008 and 2014.

At the national level, poverty reduction was equally due to growth in mean expenditure and redistribution but these two factors play a very different role in urban and rural areas. A growth-redistribution decomposition (Shapley method) shows that the overall poverty trend hides considerable variation depending on geographical areas (Figure 8, right panel). The growth in poverty in Nouakchott is largely explained by a fall in mean expenditure and the fall in poverty in rural areas is largely explained by a growth of mean expenditure in these areas. In other urban areas, redistribution has been more important than growth. Therefore, the very positive poverty performance experienced by Mauritania is largely explained by rural areas and, within rural areas, this poverty reduction is largely explained by growth in mean expenditure rather than by redistribution. What explains this growth in rural area is the main question we discuss in the section on the urban-rural convergence.

Figure 8 - Poverty Change Decomposition into Population and Areas Effects (left panel) and into Growth and Redistribution Components (right panel) – 2008-2014



Source: WB staff estimates, 2008 and 2014 EPCV. Shapley decomposition.

By expenditure item

Increases in expenditure on services and utilities are the larger contributors to the change in poverty but expenditure items play a very different role depending on the area considered. If we consider the nation as a whole, the expenditure items that contributed the most to poverty reduction are education, electricity, water and rent in this order while expenditure on food declined (Table 10). To a certain extent this is expected given that, during a period of growth, non-food expenditure tend to grow at a faster rate than food expenditure, which is consistent with what we observe in Table 10. What is atypical to see at the national level is the non-growth of the food component, which contributes to increase rather than decrease poverty.

The non-growth of the food component at the national level is explained by changes in Nouakchott. If we split the analysis by geographical areas, we find very significant differences. The atypical food effect is all explained by the capital Nouakchott. Most expenditure items would contribute on their own to decrease poverty but the fall in food expenditure in the capital reverses this effect and turns the poverty change positive (an increase in poverty overall). This is consistent with the hypothesis that questionnaire fatigue may have played a role in explaining an underestimation of expenditure in Nouakchott due to the increase in the number of items in the questionnaire, something we will return to further in the report. This is particularly true if we consider that the increase in the number of items mostly occurred for food items. It is also consistent with the results on subjective poverty where we found that respondents reported less deprivation in 2014 also in Nouakchott. In effect, almost all expenditure items in Table 10 show that expenditure on these items must have increased significantly and that these increases were offset only by food expenditure.

Results for other urban areas and rural areas are much more in line with what is expected. In other urban and rural areas increases in food expenditure help to explain poverty reduction and this effect is particularly important in rural areas. In other urban areas, what drives poverty reduction is expenditure on education and electricity probably because of extended coverage of these services in urban areas and because households could spend more money on these services as welfare increased. In Rural areas, food, self-consumption and education expenditure contributed the most to poverty reduction, which is expected given that households in rural areas started with a much lower expenditure per capita and a much higher poverty level.

Table 10 - Poverty Change Decomposition into Expenditure Items (2008-2014)

	All	Nouakchott	Other Urban	Rural
Food	1.14	19.86	-1.35	-5.87
Self-Consumption	-1.62	-1.22	-0.79	-2.37
Education	-2.46	-2.28	-2.86	-2.36
Health	-0.92	-0.02	-0.40	-1.54
Communication	-1.08	-2.46	0.05	-0.72
Water	-1.51	-2.52	-0.97	-1.06
Electricity	-2.41	-7.94	-2.26	0.60
Rent	-1.10	-1.79	0.42	-1.11
Occasional Non Food	-0.78	-2.08	0.46	-0.38
Frequent Non Food	-0.90	-0.99	-0.68	-0.68
Residual	0.09	3.00	-1.38	-0.90
Total Poverty Change	-11.55	1.55	-9.75	-16.38

Source: WB staff estimates, 2008 and 2014 EPCV.

By economic sector

Agriculture and livestock are among the leading sectors in terms of poverty reduction. Table 11 shows population shares and poverty rates for 2008 and 2014 and the decomposition of the change in poverty into population and sector components. Poverty reduction has occurred across sectors with agriculture, livestock, services and construction leading the way if we consider the change in poverty and the importance in terms of population share. We can also see a reallocation of employment from agriculture to livestock and a large increase in the population employed in commerce and sales. If we turn to the decomposition of the poverty change into the population and sector component, we find that population changes explain the

decline in poverty. This simply means that if workers had not reallocated to more productive sectors, the gains in poverty reduction would have been minimal.

Table 11 - Poverty Decomposition into Economic Sectors

	2008		2014		Change in FGT index	Popula- tion Compon- ent	Sector Compon- ent
	Pop. share	FGT index	Pop. share	FGT index			
Agriculture	7.70	75.10	3.80	57.50	-17.57	-1.02	-2.58
Livestock	8.80	60.90	14.20	44.00	-16.88	-1.94	2.82
Fishing	2.20	38.90	2.20	27.80	-11.13	-0.24	0.01
Mining	1.30	15.30	1.30	20.40	5.01	0.06	0.00
Industry	1.70	37.90	2.20	26.90	-11.00	-0.21	0.13
Construction	4.50	51.20	4.70	35.50	-15.64	-0.72	0.11
Transport et communication	3.00	37.00	3.30	22.10	-14.84	-0.47	0.09
Commerce and sales	16.80	35.70	25.00	31.90	-3.84	-0.80	2.77
Services	13.10	38.10	12.80	29.30	-8.77	-1.13	-0.11
Administration	9.50	22.00	4.80	18.40	-3.59	-0.26	-0.94
Others	31.40	48.30	25.70	31.30	-16.98	-4.84	-2.27
All	100.00	44.50	100.00	33.00	-11.55	-11.58	0.03

Source: WB staff estimates, 2008 and 2014 EPCV.

What explains poverty reduction?

We noted two key factors that led to an urban-rural convergence in terms of poverty. The first is that rural areas experienced an exceptional reduction in poverty and the second is that the capital Nouakchott has experienced a growth in poverty largely explained by a reduction in food consumption. This section provides possible explanations behind these two factors. We test and discuss several hypothesis including the role of internal migration, asymmetric performance of producers and consumers, the growth of livestock and agriculture, changes in questionnaire design and the role of prices and quantities.

Livestock and Agricultural performance

Between 2008 and 2014 the employment structure has changed. Using the 2008 and 2014 EPCVs, it is possible to restrict the sample to the employed population, which amounts to 19.5 percent of the population in 2008 and 17.4 percent in 2014, and observe changes in the employment structure by economic sector. As shown in Table 12, the employment shares decreased significantly in agriculture, fishing and the public administration in favor of livestock, transport and communication and others. This would suggest that some of the people moving from rural to urban areas may have changed occupation from agriculture and fishing towards transport and communication and others sectors whereas a share of those who stayed in rural areas may have moved from agriculture and fishing to livestock production.

The employed did well, particularly those employed in agriculture and livestock. The employed as a group did very well in terms of increases in mean expenditures but the largest increases can be seen among those working in agriculture and livestock with mean growth of 31.9 and 26.2 percentage respectively. Decreases in poverty for these two groups are large. Larger decreases in poverty can be seen for other employment groups such as industry, construction, transport and communication but the shares of these sectors on total employment are much smaller than agriculture or livestock. The only employment sectors

that experienced a large growth in mean expenditure and a large fall in poverty while having a large share of total employment are commerce and sales and services. Also noticeable is the fact that those employed in the mining sector show a sharp reduction in mean expenditure and a sharp increase in poverty, although they represent only about 1.5 percent of total employment.

Table 12 - Changes in Structure and Welfare of the Employed Population

	Employment structure (age 15+)			Mean Exp.	Poverty
	2008	2014	Change	Growth	Change
Agriculture	10.9	4.5	-58.9	31.9	-27.8
Livestock	10.3	13.8	34.0	26.2	-25.7
Fishing	3.0	2.5	-17.4	0.9	-17.3
Mining*	1.4	1.5	8.0	-15.9	50.3
Industry	3.0	3.0	-0.4	7.8	-36.5
Construction	5.7	5.8	1.6	8.3	-33.3
Transport et communication	3.4	4.0	17.8	6.6	-44.0
Commerce and sales	24.4	23.8	-2.6	11.8	-31.2
Services	17.0	17.1	0.9	11.8	-27.8
Administration	10.0	5.9	-41.3	-4.9	-21.1
Others	10.8	18.2	67.7	-5.7	-17.1
Total	100.0	100.0	0.0	8.4	-29.0

Source: WB staff estimates, 2008 and 2014 EPCV. Note: Expenditure refers to expenditure per capita in the households of the employed. (*) Data on mining should be treated with caution due to the small number of observations.

Improvements in agriculture have been driven by irrigated agriculture. Figure 9 shows changes in cultivated land and production of grains between 2008 and 2014 for irrigated and non-irrigated lands. The first visible fact is that progress has occurred almost entirely for irrigated lands where the land dedicated production expanded by 146 percent and the production in tons by about 150 percent. Instead, land coverage and production of grains in non-irrigated lands increased by much less and only for “Dieri” type of culture or for corn in “Walo” type of land. For all other cultures, land coverage and production declined. Considering that Mauritania was affected by a drought in 2011, this may partly explain this different performance between the two areas but it is also clear that mechanized and irrigated agriculture expanded significantly. The fact that land coverage expanded for irrigated agriculture and declined for non-irrigated agriculture also suggests that some of the land has been reconverted from rain-fed to irrigated land.

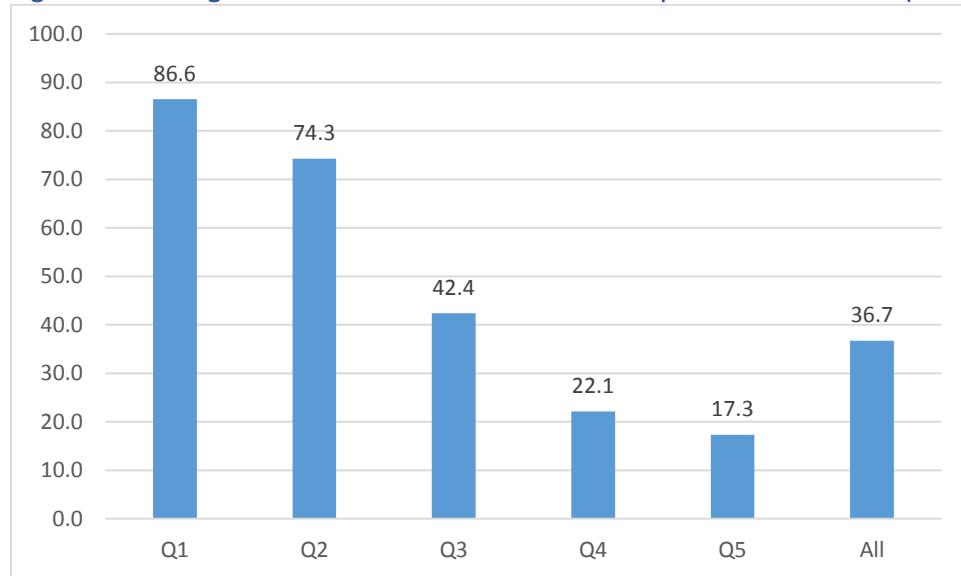
Figure 9 - Cultivated Land (Hectares) and Production (Tons) Changes (%)



Source: Ministry of Agriculture.

There are marked improvements in livestock ownership and these improvements have been pro-poor. The average number of animal heads owned by livestock owners has increased by 36.7 percent on average and it is clear that these improvements have been pro-poor. The average growth for the first quintile was 86.6 percent and increases across expenditure quintiles are decreasing with average improvements declining to 17.3 percent for the richest quintile. These improvements may be the result of improved investments in the livestock sector, improved savings of farmers or both. In Mauritania, it is rather common to purchase livestock as a form of savings. These are assets that can be mobilized for various purposes such as education or health expenditure if needed and they function in alternative to Banks. In either case, these improvements signal improvements in living conditions.

Figure 10 - Average Growth in Number of Animal Heads per Livestock Owner (2008-2014)



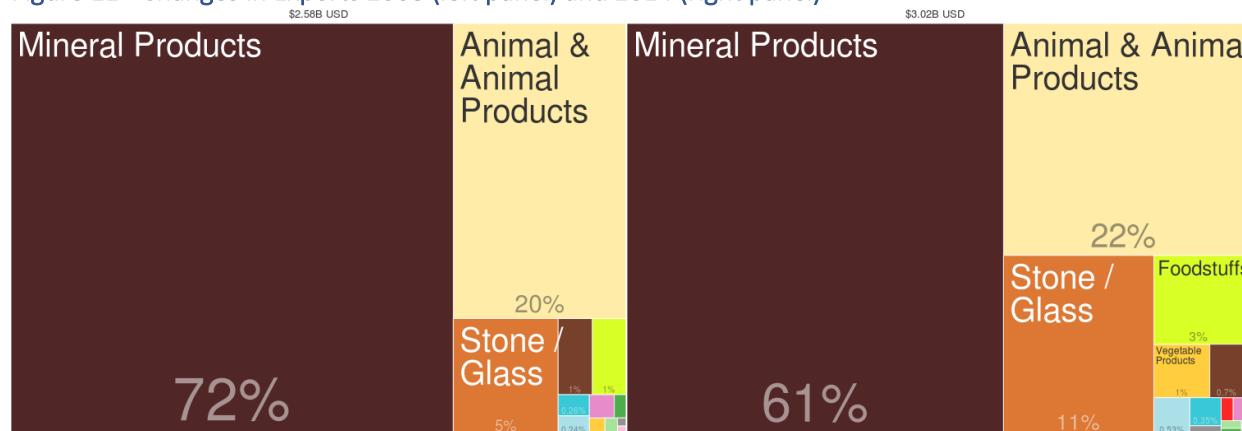
Source: WB staff estimates, 2008 and 2014 EPCV. Animals included include sheep, goats, camels, cattle, donkeys and horses.

This combination of factors could explain why the population employed in agriculture decreased while returns to agriculture increased (less rain fed agriculture and more mechanized agriculture that requires less employment and is more productive) and could also explain the increase in population working with livestock and the increase in returns to livestock production (reconversion of small farmers from agriculture to livestock because of better returns to the livestock sector). In essence, while the share of the population employed decreased marginally between 2008 and 2014, this population has markedly improved its wellbeing thanks to much better returns in agriculture and livestock in rural areas and in commerce and services in urban areas. This is quite consistent with what we found in previous sections.

Improvements in agriculture have also resulted in better exports of agriculture and livestock products. Figure 11 shows changes in exports between 2008 and 2014 using data from the Atlas of Economic Complexity. It is evident that the share of mineral products has declined from 72 to 61 percent and that animal and animal products, foodstuffs and vegetable products have all increased in weight of exports. Exports of stones and glass have also increased very significantly from 5 to 11 percent of total exports. This positive performance in relative terms holds in absolute terms as the volume of exports of agricultural and livestock products has increased over the period in constant terms. For example, exports of

animal and animal products increased from 507m to 596 m (+17.6 percent) and exports of foodstuffs from 22.9 m to 84.7 m (+270 percent).

Figure 11 - Changes in Exports 2008 (left panel) and 2014 (right panel)



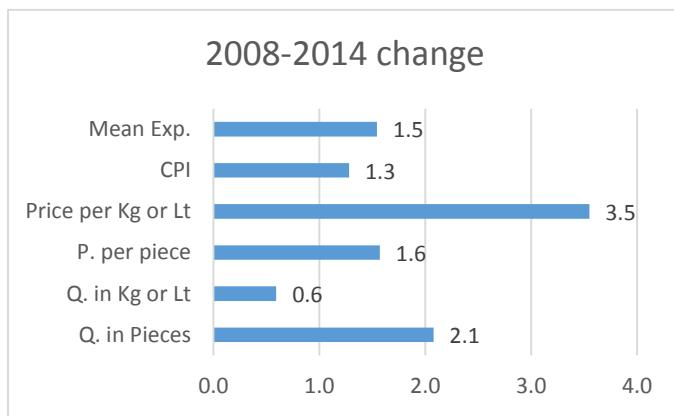
Source: The Atlas of Economic Complexity.⁸

Prices and quantities

An analysis of changes in prices and quantities of self-consumption shows that both increases in prices and increases in quantities have contributed to improve the wellbeing of rural households. The EPCV surveys contain self-reported information on quantities self-consumed as well as estimated prices. This concerns only a part of the households we observe, about 39 percent of the total population in both 2008 and 2014. Here we consider only rural areas where we could put together complete and consistent information on prices and quantities for 42 selected agricultural products. The questionnaires allow estimating prices and quantities by the form in which these products are usually bought (kg, lt, bag or box) or by weight or volume (kg. or lt. only) by transforming containers into their weight or volume. In Figure 12, we show percentage changes between 2008 and 2014 in mean expenditure, prices and quantities with monetary data expressed in nominal terms. We can see that expenditure and prices have all outperformed the inflation rate (CPI) and that the performance of prices per unit (the most accurate indicator of prices) has done better than the CPI by a factor of 2.7. It is also evident that growth in mean expenditure is not only explained by prices. Quantities have also increased whether we consider the total weight or volume or we consider the number of items exchanged. Therefore, those who report self-consumption, who are likely to be a good sample of the small and medium agricultural producers, have done much better than inflation in terms of prices and have also gained in terms of quantities. This confirms the good performance of producers vis-à-vis consumers given that consumers face, on average, CPI prices.

⁸ http://atlas.cid.harvard.edu/explore/tree_map/export/mrt/all/show/2008/

Figure 12 - Mean Expenditure, Prices and Quantities Consumed in Rural Areas (Self-consumption only)



Source: WB staff estimates, 2008 and 2014 EPCV.

Asymmetric changes in prices have also an important role in explaining poverty reduction across regions. If we compare the poverty rates in the regions deflated using the regional deflator with the non-deflated poverty rates, we find significant differences in the 2008 and 2014 poverty rates and in poverty changes over the period (Table 13). For example, using regional deflators increases poverty reduction in Adrar by 7.1 percentage points and by 6 percentage points in Tagant. Vice-versa, it reduces poverty reduction in Nouakchott by 2 percentage points turning poverty reduction into a poverty increase. In a previous section, it was remarked how the reduction in poverty has been very different across regions. Here we find some evidence that part of these differences are explained by asymmetric changes in prices captured by the regional deflators. Therefore, relative prices (regional and for producers and consumers) had a very important role in explaining changes in poverty between 2008 and 2014.

Table 13- Differences in Poverty Rates with and without Regional Price Deflators

	2008	2014	2014-2008
Hodh El Charghi	2.2	0.9	-1.3
Hodh El Gharbi	1.5	3.3	1.8
Assaba	0.6	1.5	0.8
Gorgol	2.5	2.8	0.4
Brakna	0.9	5.0	4.1
Trarza	0.5	0.0	-0.5
Adrar	-3.6	3.5	7.1
Dakhlet Nouadhibou	-2.2	0.0	2.2
Tagant	-4.2	1.8	6.0
Guidimagha	0.0	3.0	3.0
Tiris Zemmour	0.0	1.1	1.0
Inchiri	0.0	0.6	0.6
Nouakchott	-0.8	-2.8	-2.0

Source: WB staff estimates, 2008 and 2014 EPCV.

What explains the urban-rural convergence?

Producers and consumers

Overall, rural producers have done better than urban consumers. Using the 2008 and 2014 EPCVs it was possible to categorize households into households that produced food and households that did not using responses on self-production. A simple analysis comparing the changes in mean expenditure and poverty across these two groups and across urban and rural areas provides some insights on the very good performance of rural areas (Table 14). Producers of agricultural products largely outperformed consumers with a growth rate in household expenditure per capita of over 33 percent as compared to a growth for non-producers of only 1.4 percent. These changes in mean expenditure together with the fact that changes have been pro-poor, determined a fall in the poverty rate of producers of -20.6 percentage points as compared to a fall for non-producers of -5.8 percentage points. In rural areas, both types of households have done well but producers have done better than non-producers. In urban areas, both types of households have done poorly, but producers have done better than consumers. This is explained by better relative prices that producers faced as compared to consumers and increases in agricultural production.

Table 14- Welfare Changes of Producers and Non-Producers (2008-2014)

	Rural	Urban	Total
<i>Mean Expenditure</i>			
Non Producers	22.3	-4.6	1.4
Producers	32.2	3.8	33.6
Total	28.4	-3.4	11.2
<i>Poverty</i>			
Non Producers	-11.9	-2.3	-5.8
Producers	-19.1	-4.1	-20.6
Total	-16.4	-2.5	-11.6

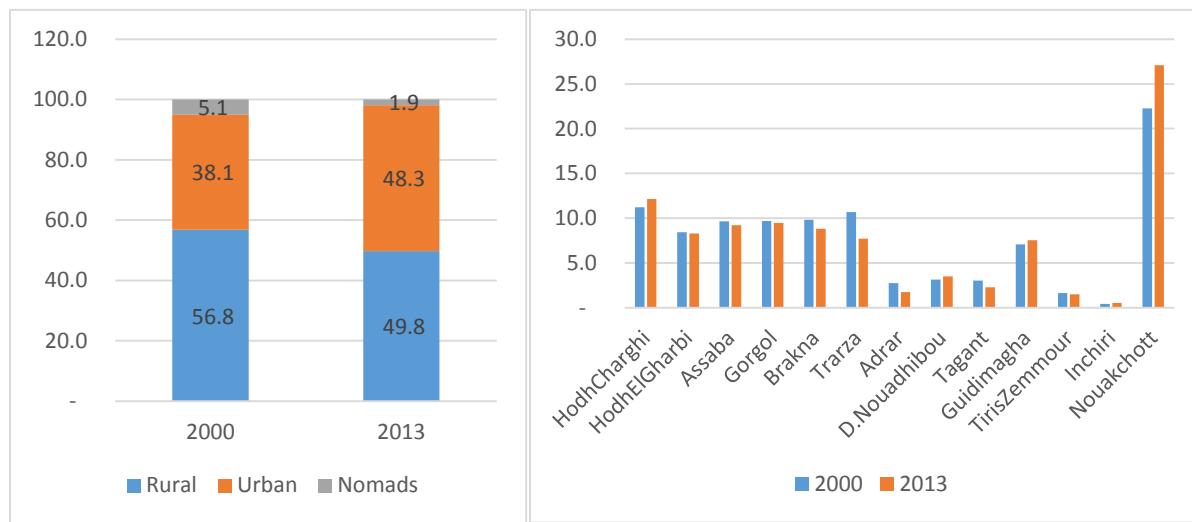
Source: WB staff estimates, 2008 and 2014 EPCV.

Internal migration

The population of Mauritania has undergone structural changes and a process of urbanization between 2000 and 2013 (Figure 13). According to the last two population censuses, the population of Mauritania has become more urbanized and sedentary. The share of the total population living in urban areas increased from 38.1 percent in 2000 to 48.3 percent in 2013 and the share of nomadic people decreased from 5.1 percent to 1.9 percent (Figure 13, left panel). The capital Nouakchott has increased its share of population from 22.3 to 27.1 percent explaining about half of the urbanization process while the other half is explained by changes within regions. This internal migration has also resulted in different population changes across regions (Figure 13, right panel). Prevalently urban region such as Nouadhibou and Guidimatha have increased their population share while all prevalently rural region with the exception of Hodh El Charghi have reduced their population share.

Unfortunately, at the time of writing, the new population estimates (based on the latest 2013 census) for years others than the two censuses were not available, which means that we are not able to report population changes between 2008 and 2014, the period we are considering for the changes in poverty. However, assuming linear changes between 2000 and 2013, we could approximate the population changes for the period 2008-2014 to about half of those observed between 2000 and 2013.

Figure 13 - Population Changes 2000-2013 (population=100)



Source: Population censuses 2000 and 2013 (ONS, 2015a).

The better performance of rural areas may be partly explained by the rural-urban migration. We have already found that population shifts account for about 13.6 percent of the poverty decline between 2008 and 2014 (Figure 8), which translates into about 1.6 percentage points of the 11.6 percentage points of the poverty decline. The discussion on assets has also shown that the share of households with proper roof and floor declined in Nouakchott (Table 8), which would hardly be possible if it wasn't for immigration of poorer households to the capital. It is likely that the population that moved was predominantly poor and this would have resulted in a shift of poverty from rural to urban areas. This is not the lead explanation of poverty reduction but an important factor that contributed in the direction of reducing poverty in rural areas and increasing it in the capital Nouakchott. We do not have sufficient elements to determine whether the poorest in rural areas are those who moved to urban areas. This may be likely given that incomes and productivity have been increasing in rural areas but not employment, which is consistent with the fact that poorer manual agricultural labor has been migrating rather than owner of assets like land and livestock even if small.

Changes in questionnaire design

Have changes in questionnaire design resulted in better or worse reporting? Between 2008 and 2014, the National statistical Office (NSO) has made an effort to improve on the quality of the EPCV survey. One of the major changes was to increase the number of items listed for the collection of income and expenditure information from 233 to 460 items. See annex for a comparison of the number of items across groups of products and years. These changes evidently imply that the 2008 and 2014 expenditure aggregate are less comparable than in the past when the number of items was identical. The effect of these changes may also work in opposite directions. For example, more items may imply a more accurate recording of expenditures on the part of respondents because it is normally easier to remember expenditures if one is asked more rather than less details. If a person is asked how much she spent on green apples and yellow apples, this person may be more accurate in responding than if she was asked how much she spent on apples alone. If this is true, then the 2008 expenditure aggregate would be underestimated vis-à-vis the 2014 aggregate and the poverty decline would be overestimated. However, having more items may also result in the opposite effect if respondents fatigue increases with the number of items. It is known that long questionnaires result in respondents' fatigue, which reduces the quality of answers. Having more items may have increased

respondents' fatigue and this may have resulted in an underestimation of the 2014 expenditure aggregate as compared to the 2008 aggregate, which implies an underestimation of the poverty decline.

Initial evidence suggests that reporting quality has worsened between 2008 and 2014 but only for upper income households in Nouakchott. To test how changes in the number of items have affected the expenditure aggregate and the overall poverty decline, we run a regression of the changes in mean expenditure by item on the changes in the number of sub-items. This is to see whether we can detect a correlation between changes in mean expenditure and the changes in the number of items. A positive and significant correlation would speak in favor of the first possible effect (better reporting in 2014) and a negative and significant effect would speak in favor of the second possible effect (worse reporting in 2014). Results are shown in Table 15, first for the three main geographical areas and then by quintiles. For the geographical areas (top panel), the only significant coefficient is for Nouakchott where the sign is negative and the coefficient large. Annual expenditure per capita is lower by 266 MRO for each additional item included in the questionnaire. For quintiles (bottom panel), we find significant coefficients for quintiles one to four with a consistent negative sign and with increasing coefficients (from -60.9 for the first quintile to 172.2 for the fourth quintile). Therefore, results speak in favor of the second hypothesis (questionnaire fatigue and worse reporting in 2014) but this is true only in Nouakchott and mostly for upper income households.

Given these results, the increase in poverty observed for Nouakchott should be treated with caution. Given that Nouakchott has by far the highest mean expenditure, these results are consistent in indicating that questionnaire fatigue has been an issue for upper income people. While this result does not invalidate the large poverty decline observed, it may help to explain why we observe a poverty increase in Nouakchott where most of the upper income households are located. Recall that the poverty increase in Nouakchott was entirely explained by the reduction in food consumption, which was largely unexpected. The increase in questionnaire items is a phenomenon that affected particularly food items and this list of items was already long in 2008. Hence, results for Nouakchott indicate a certain underestimating of food consumption in 2014 and should be treated with caution.

Table 15 - Mean Expenditure Vs. No. of Items Regressions (2008-2014)

Vars	All	Nouakchott	Other Urban	Rural
diffitems	-57.194 (1.50)	-266.314 (2.46)*	-65.866 (1.37)	14.332 (0.45)
_cons	484.394 (2.01)*	773.032 (0.94)	431.721 (1.31)	507.880 (2.48)*
<i>R</i> ²	0.03	0.10	0.03	0.00
<i>N</i>	77	54	66	74

Vars	All	Quint_1	Quint_2	Quint_3	Quint_4	Quint_5
diffitems	-57.194 (1.50)	-60.885 (2.15)*	-98.361 (2.73)**	-151.176 (3.22)**	-172.168 (3.01)**	-171.978 (1.97)
_cons	484.394 (2.01)*	194.885 (1.02)	283.060 (1.19)	406.526 (1.32)	568.483 (1.48)	624.496 (1.08)
<i>R</i> ²	0.03	0.07	0.10	0.13	0.12	0.05
<i>N</i>	77	67	71	72	68	70

Source: Source: WB staff estimates, 2008 and 2014 EPCV. The dependent variable is the mean difference in expenditure between 2008 and 2014. The independent variable "dffitems" is the difference in number of sub-items between 2008 and 2014. Observations refer to (aggregated) items.

The EMEL program

The EMEL program has a small effect on poverty but could help to explain poverty increase in urban areas. The EMEL program, which was introduced in 2012, subsidizes key food products including wheat, rice, sugar, oil and pasta based on a quota system. In essence, households that cue up for these products at selected retailers can buy these products at discounted prices up to fixed monthly quotas. From the perspective of data collection and the EPCV survey, this program leads to reduced expenditures and lower estimates of monetary welfare. As this program appears to have had an urban bias,⁹ urban welfare would be underestimated relative to rural welfare if this program is not taken into account. To address this issue, we have added to household expenditure the difference between the EMEL subsidized prize and the free market price to those households who declared to consume EMEL products. This probably overestimates the impact of the EMEL product because some of the EMEL products are bought at non-subsidized prices. Results show that the EMEL program further reduces national poverty from 33 percent to 32.2 percent in 2014. This is a small effect and we should also consider this figure to be an upper bound of the effect. Therefore, the poor performance of urban areas cannot be explained in terms of omission of the effects of the EMEL program from official estimates but this may be one additional factor explaining the negative growth of food consumption in Nouakchott.

What are the main correlates of poverty?

Correlates of poverty

The main predictors of poverty are largely as expected but behave differently across years and geographical areas. Table 23 reports the results of the poverty regressions run on households and including all the main indicators found in the individual and household EPCV files. Results are largely as expected and the model helps to predict poverty fairly well (although not everywhere, see next section). However, the model performs rather differently across geographical areas and across years. For example, the model performs better in 2008 as compared to 2014 and better in urban areas as compared to rural areas.¹⁰

Most variables perform as expected although their significance level is not always consistent across years and geographical areas. Household size is the main predictor of poverty for both years and all areas. Various assets follow in terms of prediction capacity of poverty. When significant, these assets always carry a negative sign as we would expect. Among the most frequently significant items across years and areas are having a telephone, a satellite dish, electricity and a roof made of durable materials. Older age of the head of the household reduces poverty and this effect is reduced as the head becomes older but this variable is significant only in Nouakchott in 2008 and in rural areas in 2014. Having a car is significant only in Nouakchott in 2008 and in rural areas in 2014 and owning the home in which the household live is significant only in rural areas and only in 2008. For cars, this is probably explained by the low share of households with cars (see Table 8) while for home ownership this is probably explained by the very high share of home ownership in the country. In other words, for none of the two variables we have much variance across the samples.

Being married reduces poverty significantly only in rural areas and secondary education reduces poverty significantly only in 2008. Similarly, the share of small children below the age of six increases poverty but this variable is significant only in rural areas in 2014. On the contrary, the share of older aged people in the household reduces poverty although this is clearly visible only in 2008 and rural areas. Surprisingly, the

⁹ The EPCV household survey found many more urban residents benefiting from EMEL compared to rural residents and a recent evaluation also concluded that there was an urban bias. World Bank, Note d’Evaluation des Filets de Sécurité Alimentaire du Programme Emel, 2013.

¹⁰ Note that for the purpose of comparability across time and areas, the set of independent variables is the same for all models.

employment sector (public, private or self-employed) is not very relevant for predicting poverty and where this is important, such as in rural areas in 2014, being employed in the private sector or being self-employed increases rather than decreases poverty. Instead, the share of employed persons in the household reduces poverty as we should expect.

The role of correlates in explaining changes in poverty

One alternative way to explore the EPCV data is to decompose poverty changes into observables Xs and their Betas coefficients. In essence, we can estimate a welfare model using 2008 data and use the resulting coefficients of the independent variables to estimate welfare using 2014 data. Vice-versa, we can estimate a welfare model using 2014 data and use the resulting coefficients of the independent variables to estimate welfare using 2008 data. Comparing results allows us to estimate how changes in coefficients (Betas) contributed to changes in poverty as compared to changes in household observable characteristics (Xs). This can be done by decomposing the estimated changes in poverty into these two components.

It is important to note here that changes in coefficients may be due to behavioral changes on the part of households or changes in prices associated to observed characteristics that are not captured by the time deflator used. For example, if prices have increased disproportionately for agricultural workers between 2008 and 2014, being a farmer in 2014 may be associated with much larger “Betas” than being a farmer in 2008, even if the share of farmers has not changed across years. Given what we learned about the performance of rural areas so far, this cannot be excluded and we cannot assume fixed relative prices over the period.

Results are shown in Table 24 (in annex) at the national level and by geographic area. Looking at the national estimations, we can see that both the 2008 and 2014 models are rather good in predicting poverty within surveys. In 2008, (within survey) predicted poverty using the 2008 model is 44.9 percent as opposed to the actual estimation of 44.5. Using the 2014 model, the (within survey) predicted poverty is 32.7 percent as compared to an actual value of 33 percent. These small differences result in an estimated poverty decline of -12.2 percent as opposed to the actual value of -11.5 percent.

Instead, the models are not very good in predicting changes in poverty. One of the basic assumptions of cross-survey imputation to estimate out of sample statistics is that the “Betas” are stable over time. This is not the case for our samples. The estimated decline can be decomposed into the “Betas” effect and the “Xs” effects. Results show that the “Betas” effect account for the lion’s share of the change (-10.4 percent of the total -12.2 percent) and cannot be considered as stable.

The models used are also good for estimating poverty in rural areas within samples. The 2008 model predicts poverty almost perfectly and the 2014 model predicts a poverty rate of 45.3 percent as opposed to a rate of 46.4 percent of the actual data. The predicted change in poverty of -17.4 percent is totally accounted for by the “Betas” given that the “Xs” effects have a positive sign. Therefore, poverty reduction in rural areas is due to factors that are not captured by the observable “Xs” but by factors that affect the Betas such as household behavior, relative prices or other economic shocks not captured by the “Xs”.

For urban areas (Nouakchott and other urban areas), the capacity of the models to predict poverty correctly is less evident, particularly in 2008. For example, we can see that predicted poverty in Nouakchott in 2008 is 15.7 percent as compared to an actual value of 17 percent. Also in urban areas the “Betas” effects are much stronger than the “Xs” effects and this is the case for Nouakchott and other urban areas. In conclusion, cross-survey imputations suggest that there is much more happening in Mauritania than what we can observe with the “Xs” from the EPCV surveys. This may be due to behavioral changes on the part of

households or to other factors such as changes in relative prices associated with “Xs” but captured in the “Betas”. This is likely to be the case given the other findings of this report on relative prices.

Part II – Social Exclusion and Social Mobility

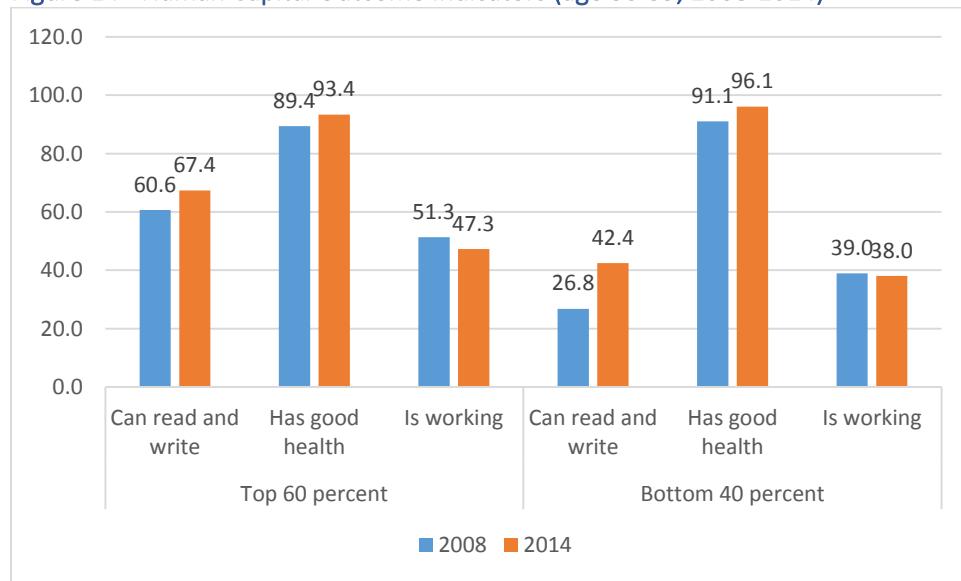
Social exclusion

In this part of the study, we analyze some key indicators for selected population groups at greater risk of social exclusion and vulnerability. We start with the main human capital indicators for adults. We then look at youth and gender in urban and rural areas and at children to better understand literacy and child labor for boys and girls. We finish by focusing on house workers as one group that may deserve particular attention in a country like Mauritania.

The bottom 40 percent

The bottom 40 percent has performed relatively better than the top 60 percent according to the main human capital indicators but the gap with the top 60 percent is still large and access to work did not improve. Figure 14 focuses on human capital outcome indicators and reports the share of people who can read and write, is in good health and works for the bottom 40 percent and the top 60 percent of the expenditure distribution with the sample restricted to adults in age 30-59. Literacy and health have improved for both income groups between 2008 and 2014 whereas the share of people working has declined for both groups. However, the bottom 40 percent has performed better on all three fronts with a larger growth in literacy and health and a marginally smaller decline in work. This implies that the gap in literacy, health and work has declined between 2008 and 2014 and, in the case of health, the rates are even better for the bottom 40 percent. However, the gap between income groups on literacy and work remains very large in 2014. The literacy rate of adults in age 30-59 is 67.4 percent for the top 60 percent and only 42.4 percent for the bottom 40 percent and the rate of working people is 47.3 and 38 percent respectively.

Figure 14 - Human Capital Outcome Indicators (age 30-59, 2008-2014)



Source: WB staff estimates from the 2008 and 2014 EPCV.

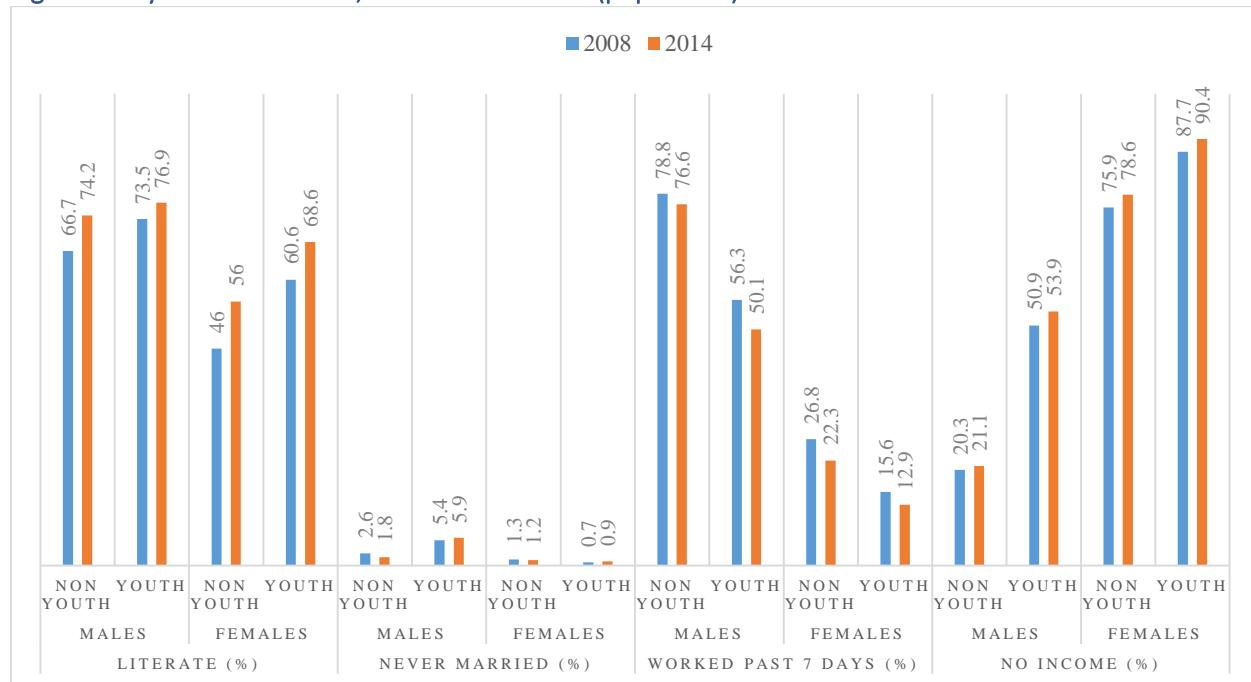
Youth and Gender

Youth are defined as people in age 20-29 not in education and non-youth are defined as people in age 30-59 not in education. Table 25 in annex reports statistics on education, marital status, employment and income for youth and non youth, males and females, in rural and in urban areas. Figure 15 depicts the same results for the total population.

Youth and females have improved their literacy status whereas marriage in youth age is still pervasive and marginally increased for some groups. The share of literates is higher for youth and in urban areas as compared to non-youth and rural areas as we should expect. However, improvements in literacy have occurred for both genders and areas with the greatest improvements visible for females non youth in urban areas. The share of people who never married is higher for youth as compared with non youth and much lower for female youth as compared to male youth. However, it is very low overall with a peak of 8.8 percent of the population for males youth in urban areas in 2014. Also interesting is the fact that the share of never married people declined for males and females for non youth but increased for youth and that the overall decline is due to rural areas only.

Labor market indicators have worsened for all and particularly for youth and females, with rare exceptions. The share of people who declared to work during the 7 days prior to the interview is higher for non youth as compared to youth and much higher for males as compared to females. It also declined for males and females and for youth and non youth between 2008 and 2014 in both urban and rural areas with the sole exception of non youth in urban areas who saw significant increases in work for males. The share of people with no income is lower for males than for females and has increased between 2008 and 2014 particularly for females and youth. For women, this is explained by the poor performance of rural areas whereas for youth it is explained by the poor performance of urban areas. In essence, while progress is visible for youth and females on the education front, there are no corresponding improvements on the labor market side for these two groups.

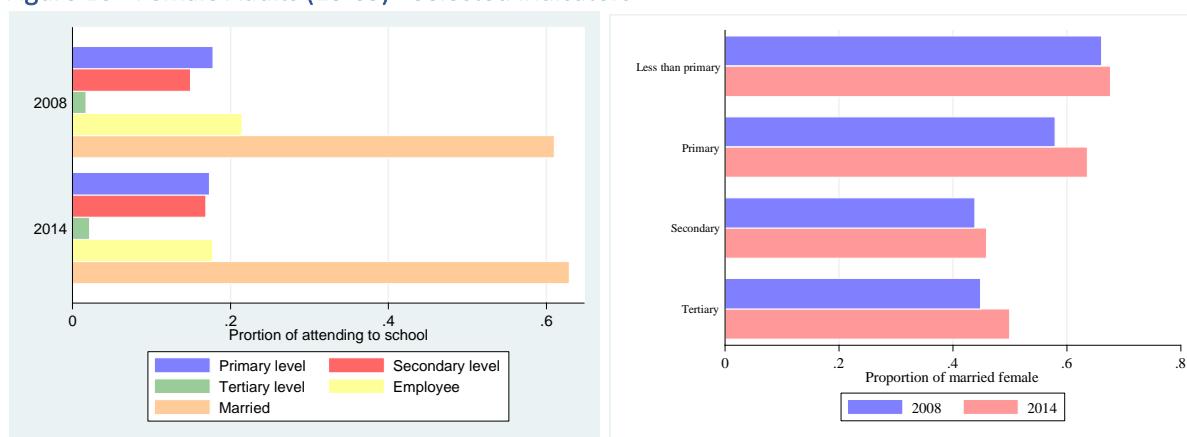
Figure 15 – youth and Gender, Selected Indicators (population)



Source: WB staff estimates from the 2008 and 2014 EPCV. Youth is age 20-29 non in education and non youth is age 30-59 non in education.

There is no progress for female employment and marriage remains the most viable alternative to work. Progress among female children will require time to improve female status among adults and better female education does not necessarily translate into better employment prospects. Figure 16 provides some additional indicators for adult females. The share of females with primary education has not improved while there is a small improvement in the proportion of females with secondary and tertiary education implying that more women are encouraged to continue education beyond primary level than in the past. However, the share of women employed has declined and this has occurred together with an increase in the proportion of married women for all educational levels (Figure 16, right panel). Clearly, the improvements in secondary and tertiary education have not resulted in more employment, probably leading some of these women into marriage as an alternative to work. That female exit the labor force around marriage age is a well known phenomenon in the Middle East and North Africa countries (Verme, 2015). It is also known that better educated women have a harder time in finding employment as compared to lower educated women, which is explained by the fact that economic sectors that tend to employ females such services and manufacturing grow little while education improves marriage prospects (Verme et al., 2015). In other words, the pull factors that would lead women into employment are weak (labor demand is weak) while the push factors that discourage women from seeking employment have become stronger (marriage prospects). The combination of these two factors results in a reduction of female labor participation and an increase in the marriage rate.

Figure 16 - Female Adults (18-65) - Selected Indicators

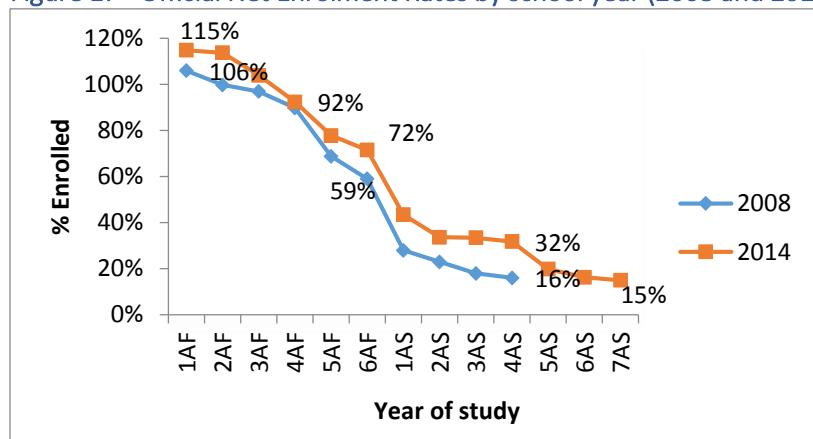


Source: WB staff estimates from the 2008 and 2014 EPCV.

Children education and work

Official statistics on primary and secondary education show improvements between 2008 and 2014 although attrition between educational levels remains large. According to the 2015 report on the state of education, the Gross Enrolment Rate (GER) for primary education has improved from 97.6 to 100.4 percent and the retention rate has increased from 54 to 60 percent between 2008 and 2014. The primary and secondary Net Enrolment Rates (NER) have also improved for all age groups between 2008 and 2014 with no exceptions (Figure 17). Large drops in both enrolment and retention rates are visible particularly between the primary and secondary cycle but, overall, the situation has improved during the period considered.

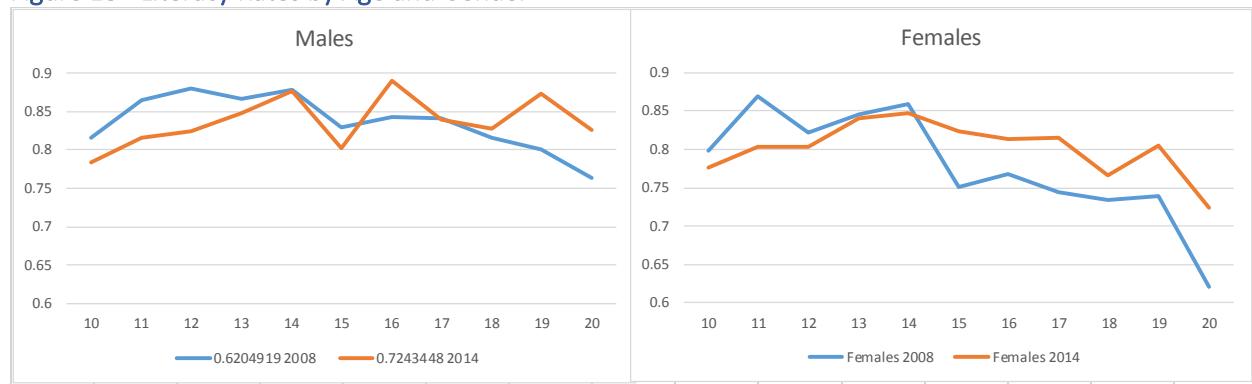
Figure 17 - Official Net Enrolment Rates by school year (2008 and 2014)



Source : RIM (2015) with DSPC/MEN data.

Data on educational outcomes are not positive for younger children. Data on literacy are only available from survey sources including the EPCV survey. This survey shows that literacy in age 10-20 y.o. has declined overall from 83.9 to 83.2 percent for males and increased from 77.6 to 79.9 percent for females. However, for children below the age of 15, the decline is large for both males and females whereas children above the age of 15 show improvements overall (Figure 18). The under 15 decline is larger for males but literacy rates for females remain generally lower than for males across age groups and for both 2008 and 2014 although the gender gap has narrowed in virtue of the better female performance.

Figure 18 - Literacy Rates by Age and Gender



Source: WB staff estimates from the 2008 and 2014 EPCV.

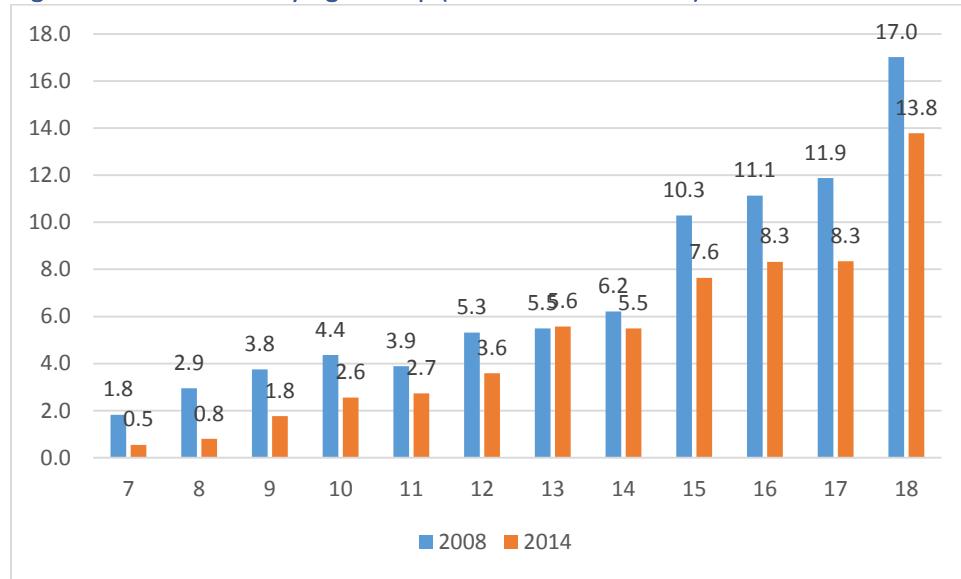
The contrast between literacy rates of adult and children may be due to the 1999 reform of the educational system. Mauritania passed a major reform of the education system in 1999 encouraging bilingual training and introducing structural changes to the secondary cycle. Although it is not possible to conduct a proper assessment of the 1999 reform, education specialists and the official 2015 education report lament a worsening of the quality of education over the past decade. This is line with what we find on literacy and would explain why literacy rates are worse for children as compared to adults and worse for younger children as compared to older children. This is one question that will require some more in depth analysis.

The 2008 and 2014 EPCV also contain a question on school attendance. The specific question asks whether the child has attended school during the school year (2007/2008 or 2013/2014). This question has been used by the NSO to estimate Gross Enrolment Rates but results are not comparable to the official GERs for two

reasons. The first is that the EPCV question measures attendance during the school year rather than enrollment at the beginning of the year and the second is that the 2014 replies to the EPCV question contain a very large number of missing observations that cannot be attributed to either “yes” or “no” answers whereas there are no missing answers in 2008. Therefore, we are not in a position to use school attendance to produce reliable statistics on changes of school attendance over time. However, given the importance of this variable, we will use it in the regression analysis that follows assuming that the factors that explain school attendance can be traced even if the population statistics of this variable may be unreliable.

The phenomenon of child work has decreased for all school year children. The EPCV asks respondents of age 7 and above whether they have worked during the week prior to the interview. Using this variable, we estimated the share of children in work by age (Figure 19). It is evident that child work is a phenomenon in decline for all school age children and that the decline has been larger for younger children. The share of children in school has declined from 3.2 to 1.6 percent for primary school children (age 7-11) and from 9.4 to 7.5 percent for secondary school children (age 12-18). Therefore, the absolute decline has been of about 2 percentage points for all children and the relative decline has been larger for primary school children.

Figure 19 - Child Work by Age Group (% of children at work)



Source: WB staff estimates from the 2008 and 2014 EPCV.

Good predictors of child work are the child gender, age and school attendance and work status of the household head and the spouse. Predictors of child work are as follows. Being female decreases the probability of work while age increases it. These factors have a similar force in both years. School attendance decreases the probability of work as we should expect with the effect increasing in strength over the two years. The higher the share of children out of school in the family the higher the probability of work, a factor that is rather constant over time. The literacy of the head of the household is irrelevant in either 2008 and marginally significant and negative in 2014 whereas the literacy of the spouse is an important factor in 2008 that becomes insignificant in 2014. Instead, a working head of household increases the probability of child work and so does a working spouse. In fact, the working spouse variable is dropped from the model as it predicts child work perfectly. This may signal that mothers tend to work when they don't have to take care of children who are working or, in the case of smaller children, that mothers and children work together. The probability of child work increases in other urban areas and rural areas as compared to Nouakchott but this effect is significant only in 2008.

Similar regressors can help to predict child school attendance well. Keeping in mind the caveats described about the school attendance variable, we find that being female reduces the probability of school attendance and this phenomenon is stronger in 2014 as compared to 2008. Therefore overall improvements between 2008 and 2014 have occurred with a gender bias that simple statistics are less able to depict. Age reduces the probability of school attendance as we should expect whereas child work does not seem to play a role. The share of children in the family out of work is a good indicator of increased school attendance in both years. A literate head of household increases school attendance in 2008 but not in 2014 and a literate spouse is irrelevant in both years. Therefore the role of literacy among adults is not very important contrary to what we should expect. A working head of household increases the probability of school attendance only in 2014 whereas a working spouse increases it in both years. As for child work, adults work status is more important than literary and this is particularly the case for spouses. As for the child at work equation, being in other urban and rural areas increases the probability of attending school, except for other urban areas in 2014.

Table 16 - Predictors of Child Work and Child School Attendance

Dep.Var. Child at work	2008	2014	Dep. Var.: Child at school	2008	2014
female	-0.582 (10.78)**	-0.51 (5.65)**	female	-0.138 (5.14)**	-0.225 (4.31)**
age	0.126 (14.77)**	0.1 (6.51)**	age	-0.089 (22.83)**	-0.217 (23.55)**
child at school	-0.35 (6.26)**	-0.623 (5.81)**	child at work	-0.002 -0.04	-0.022 -0.2
share of children out of school	5.131 (36.82)**	5.103 (19.64)**	share of children out of work	3.812 (74.41)**	4.682 (42.14)**
hh literate	0.063 -1.08	-0.212 (2.20)*	hh literate	0.091 (2.95)**	-0.032 -0.54
hh works	0.305 (5.38)**	0.748 (7.42)**	hh works	0.039 -1.34	0.109 (1.98)*
hh spouse literate	-0.533 (6.36)**	-0.238 -1.95	hh spouse literate	0.061 -1.69	-0.062 -1.01
hh spouse works	dropped perf.pred.	0	hh spouse works	0.844 (11.67)**	0.552 (3.38)**
other urban	1.476 (13.52)**	-0.226 -1.14	other urban	0.921 (14.10)**	-0.059 -0.53
rural	1.533 (15.12)**	-0.011 -0.06	rural	0.883 (14.30)**	-0.219 (2.19)*
regional dummies	yes	yes	regional dummies	yes	yes
constant	-4.095 (23.45)**	-3.708 (12.08)**	constant	-0.74 (10.41)**	0.797 (5.29)**

Observations	19305	9687	Observations	19922	10316
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Source: WB staff estimations from the 2008 and 2014 EPCV.

House workers

One potential group of very unprivileged people are unpaid workers or workers in some form of bonded labor or even plain slavery. Mauritania has a long history with slavery. It was the last country in the world to abolish slavery in 1981 and it was only in 2007 that keeping slaves became a penal crime. Household budget surveys are not good instruments to measure this phenomenon because respondents tend to be head of households who would not disclose information on bonded labor. However, we can identify in the data a group of workers labelled “Services domestiques” (domestic services) and we can provide some basic comparative statistics on this group using information on gender, age, literacy and income. Table 17 presents the results.

Some improvements are visible for house workers but results may be affected by selection bias. House workers are a small share of the total number of workers, about 1.9 percent in 2008 and 1.4 percent in 2014. They tend to have a larger share of females and they are much younger and much less educated on average than non house workers. However, the share of females has decreased and has decreased more than for other workers while mean age and the share of literate has increased and has increased more than for other workers. The share of low paid house workers has also declined more than the share of low paid non house workers.

These findings are overall positive and signal improvements of the observed house workers and this may be related to the law punishing slavery introduced in 2007. However, the same results could also point to an opposite scenario. Improvements in gender, age, literacy and low incomes could be equally explained if head of households tried to avoid reporting on unpaid, female and younger labor, precisely the kind of labor more likely to be subject to bonded labor. This would simply bias the 2014 sample resulting in apparent improvements. While we do not have elements to sustain this alternative hypotheses, it is important to interpret these results with caution.

Table 17 - House workers

	2008 Non house workers	2014 House workers	2008-2014 Non house workers	2008-2014 House workers
Share of working population (%)	98.1	1.9	98.6	1.4
Females (%)	26.5	71.9	23.5	57.9
Mean Age	40.0	27.5	41.0	29.0
Literate (%)	62.5	34.0	70.4	53.5
Low Income (%)	23.7	59.3	19.0	48.7
Zero Income (%)	4.1	1.1	2.1	1.0

Source: WB staff estimates from the 2008 and 2014 EPCV.

Inequality of Opportunity

In this section, we report results for the Human Opportunity Index (HOI) proposed by Barros et al (2008). The index measures the degree of opportunities available in a certain country (proxied by the coverage rate of an indicator) and how equitably these opportunities are distributed across population groups (proxied by a dissimilarity index). The HOI is computed as the difference between the coverage of an indicator (C) and

a penalty factor (P), the latter computed as the product between coverage and a dissimilarity index (D). Therefore, an increase in coverage will increase the index while an increase in dissimilarity will decrease the index, coverage being equal. In essence, the index takes the coverage of opportunities available in a certain domain for a given population and discounts them by how inequitably these opportunities are distributed across population groups. The index and its components are estimated across four selected indicators representative of education (literacy), health (satisfaction with health provision), services (access to piped water) and the labor market (work during the past 7 days).

The HOI for literacy has improved marginally thanks to an increase in coverage and a decrease in dissimilarities across groups. We define literacy as those children in age 10-20 who declared to be able to read and write with easy or with some difficulty. Results are shown in Table 18. We can see an improvement of the index from 75.5 to 76.7 percent between 2008 and 2014. This improvement is explained by both an increase in coverage of literacy and a decrease in the dissimilarities across population groups where groups are defined across child, household and spatial characteristics (see Table 26 in annex for the full list of variables and the econometric results). Improvements in education were already observed when we looked at the components of the Multidimensional Poverty Index (MPI) in Part I of the study and these results are consistent with the MPI results. What is new here is that the dissimilarities across population groups relatively to the overall coverage have diminished. This is consistent with what we observed in relation to household expenditure in Part I of the study. Household expenditure on education has been one of the major factors explaining poverty reduction in rural areas where most of the poor are located. Better incomes in rural areas explain increased expenditure on non-food items such as education. This increased expenditure has been larger for poorer households and literacy for poorer groups improved relatively to better off groups, which reduced inequality of access across groups.¹¹

The HOI for health status shows improvements on the coverage and equity sides. The estimated share of people reporting not to be ill or injured during the two weeks prior to the interview (coverage) has increased from 90.4 to 94.1 percent and the dissimilarity across population groups has decreased from 1.9 to 1.1 percent. This statistics is supported by the one on the share of the population attending health services during the two weeks prior to the interview which declined from 5.2 to 4 percent between 2008 and 2014. As we saw from Part 1 of the study, this occurred during a period when the decline in poverty was also explained by an increase in expenditure on health. We also saw that health indicators included in the MPI improved overall. We may conclude therefore that spending and the general health situation of households has improved over the period. Of course, an increase in health expenditure is also compatible with an increase in unit costs for health and a reduction of people attending health services because of the increased costs, which would be a rather negative outcome particularly for the poor. However, the decline in attendance in health services has occurred together with the decline in the share of ill or injured people. Therefore, improvements in health may well be related to the increase in health spending.

The HOI for access to piped water has also improved but much less than the education and health indicators. The coverage of access to piped water increased minimally from 21 to 22.9 percent while the dissimilarity index across population groups improved by decreasing from 36.9 to 30.4 percent. This has resulted in an HOI increasing from 13.2 to 16 percent. Evidently, the coverage of piped water is still low and progress has been slow, even if progress has been rather equitable. Given the importance of access to water in a country such as Mauritania, this is one area that will require attention in the years to come.

Contrary to other indicators, the situation on the labor market front has not improved, neither on the coverage nor on the equity side. The coverage of people declaring to having worked during the 7 days prior to the interview declined from 26 to 23.1 percent and the dissimilarity index increased from 33.3 to

¹¹ Recall, however, that literacy for the younger children has declined.

36.8 percent. Although these changes are small relatively to the positive changes observed for other indicators, they point to a labor market that has not been able to meet the existing demand and that, in doing so, has further discriminated across population groups. This evidence is consistent with our findings on youth and female performance. For the future of Mauritania and its further prospects of poverty reduction, this is the most worrying factor. Poverty reduction has been largely explained by increases in productivity, wages and relative prices for producers and rural areas but, for the long-term poverty reduction prospects, growth will have to be more inclusive and expand its population base. Between 2008 and 2014, we do not see any sign of that.

Table 18 - HOI for selected indicators

	2008	2014	Change in %
Literacy (age 10-20)			
Coverage (C)	80.7	81.5	1.0
Dissimilarity (D)	6.3	5.9	-6.7
Opportunity Index (HOI)	75.5	76.7	1.5
Good health			
Coverage (C)	92.2	95.1	3.2
Dissimilarity (D)	1.9	1.1	-43.0
Opportunity Index (HOI)	90.4	94.1	4.1
Piped water access			
Coverage (C)	21.0	22.9	9.4
Dissimilarity (D)	36.9	30.4	-17.6
Opportunity Index (HOI)	13.2	16.0	20.6
Work (past 7 days)			
Coverage (C)	26.0	23.1	-11.0
Dissimilarity (D)	33.3	36.8	10.5
Opportunity Index (HOI)	17.3	14.6	-15.7

Source: WB staff estimations using the 2008 and 2014 EPCV.

HOI results are consistent with MPI results. As a consistency test with the MPI exercise carried out in Part 1 of the study, we also provide results on the HOI and its decomposition using five of the living standards indicators used for the MPI (electricity, water, sanitation, energy for cooking and housing). Results for coverage (which is what can be used to compare with MPI results) are all in line with the MPI results whereas here we learn something new about the equity side of these indicators. In particular, gains in coverage of electricity, sanitation, energy for cooking and housing have all occurred in an equitable manner as shown by the decline in the dissimilarity components of the HOI. For some indicators, such as electricity, sanitation and housing, the composition component dominate change between 2008 and 2014 whereas scale largely dominates only for water.

Table 19 - HOI and its decomposition for MPI indicators

	Electricity (light)		Water (distance)		Sanitation (toilet)		Energy (cook)		Housing (Floor)	
	2008	2014	2008	2014	2008	2014	2008	2014	2008	2014
HOI	13.3	20.9	84.2	74.2	34.5	41.6	22.4	29.5	29.8	35.5
Coverage (C)	30.7	39.8	87.3	79.7	48.4	55.0	37.1	46.0	44.1	47.7
Dissimilarity (D)	56.7	47.5	3.5	6.9	28.7	24.3	39.7	35.8	32.4	25.4

Decomposition (%)					
Composition (%)	72.6	-15.1	97.7	47.0	99.7
Scale (%)	25.5	85.5	4.3	57.5	-13.8
Equalization (%)	1.9	29.5	-2.0	-4.5	14.1
Total	100	100	100	100	100

Source: WB staff estimations using the 2008 and 2014 EPCV.

Social mobility

The study of social mobility would normally require panel data able to follow the same individuals or households over time. Panel data, however, are not available for most countries in the world and are rarely available in African countries. Mauritania is no exception, as the country has not yet introduced a panel survey. One alternative to gain some insights on longitudinal movements of people is to use a pseudo-panel constructed on cross-section data. The idea is to identify comparable households or population groups between any two cross-section surveys and treat these households *as if* they were the same households. The literature proposes several approaches to the construction of pseudo-panels mostly based on some form of parametric or non-parametric matching technique between households belonging to different cross-section surveys where the matching relies on observable individual and household characteristics. For the case of Mauritania, we tested two alternative approaches (see appendix). The first approach is a one to one propensity score matching technique and the second approach is a probabilistic model based on comparable population groups. The appendix compares results from both models and shows that these results are similar. However, the propensity score matching methods provides more precise poverty estimates and it is the model used to illustrate results in the sections that follow.

Poverty transitions

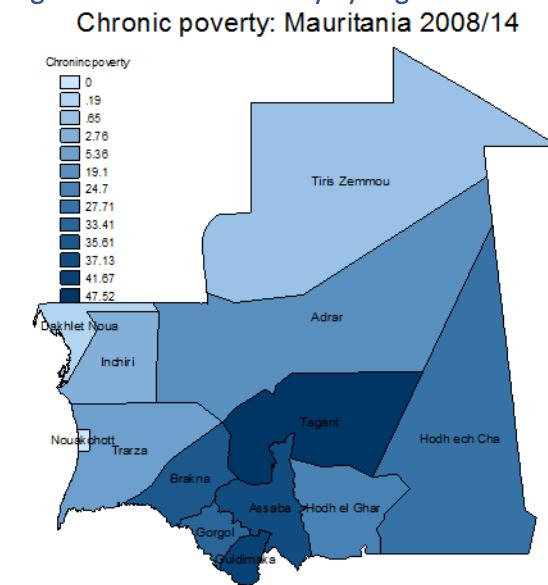
Based on the propensity score pseudo-panel, we provide estimations of shares of population, chronic poor, those who entry and exit poverty and the sum of the last two groups which we label “mobility”. This last is the same as the Shorrocks mobility index (1978), which is simply one (or 100) minus the diagonal elements of the transition matrix of poverty. We do this across several population groups defined along gender, education, area, region, age, employment status, occupation status and profession criteria. Results are shown in Table 20.

Households headed by males show a higher degree of chronic poverty while households headed by females show a higher capacity to escape poverty. Chronic poverty is also concentrated among households where the head is less educated but it is also clear that households with less educated heads are more mobile showing a higher share of people entering and exiting poverty. Interestingly and in terms of age, households headed by people in age 40-59 are those with the greatest ability to escape poverty while households headed by younger people are those with the lowest capacity. This is another indicator of distress for the youth population.

Rural households are much more mobile than urban households and the explanation relates to the share of people who exited poverty given that the share of people entering poverty is roughly similar in urban and rural areas. Across regions, the most successful regions in terms of shares of people who managed to escape poverty, we find Hodh El Chargi, Gorgol and Guidimatha, three regions that we saw did very well in terms of poverty reduction measured with cross-section data. Hodh El Chargi and Gorgol are also the largest regions in terms of population shares helping to explain a good part of the poverty

reduction in the country. Yet, Gorgol and Guidimatha are also regions that belong to the central group of regions where chronic poverty is the highest (see Figure 20). These are regions split across a hard core of poor people and a group that greatly benefitted from the structural changes observed in rural areas.

Figure 20 - Chronic Poverty by Region



Source: WB staff estimates from the 2008 and 2014 EPCV.

Households headed by inactive people are also those with the highest chronic poverty as we should expect but those headed by an unemployed are those with the lowest chronic poverty. This is explained by the fact that unemployment is mainly an urban phenomenon where poverty is lower and by the fact that those who actively seek employment are generally not on a subsistence level. In other words, they can afford seeking work. It is also interesting to observe that the employed and the inactive are the two groups most likely to escape poverty while the unemployed are the last group. Therefore, those who can afford to seek work are also not very successful whereas, when opportunities arise, these may be taken up by inactive individuals.

The largest share of households in chronic poverty are found among farmers and breeders given that these are rural professions where poverty is the highest. However, these two same groups are those that show the largest mobility and the largest shares of those who exited poverty confirming the major explanation behind the sharp poverty reduction observed in rural areas. Traders is the only other group that is both large in terms of population and did rather well in terms of mobility out of poverty.

Table 20 - Poverty Transition Estimates (2008-2014)

	Population share in 2014	Chronic poverty	Exiting poverty	Entering poverty	Mobility
Population	100	20.89	23.22	12.07	35.29
<i>Sex of household head</i>					
Female	28.04	17.83	24.61	10.66	35.27
Male	71.96	22.08	22.68	12.62	35.3

<i>Education level of household head</i>					
Less than primary	75.51	24.6	23.81	13.26	37.07
Primary	10.22	13.68	22.12	12.27	34.39
Secondary	10.04	7.82	21.3	5.35	26.65
Tertiary	4.23	3.06	19.78	6.42	26.19
<i>Age Cohort of Household Head</i>					
20-24 years old	1.06	8.86	22.63	13.67	36.29
25-29 years old	3.09	12.89	20.17	9.4	29.57
30-34 years old	7.3	17.73	21.06	8.92	29.98
35-39 years old	10	19.36	21.41	10.01	31.42
40-44 years old	12.72	21.7	25.12	10.01	35.14
45-49 years old	13.38	22.85	24.9	9.91	34.81
50-54 years old	15.55	20.14	23.8	15.81	39.61
55-59 years old	9.75	20.89	24.07	11.7	35.76
60-64 years old	9.87	22.03	23.07	11.61	34.69
65 and above years old	17.15	23.18	22.24	15.38	37.62
<i>Area</i>					
Rural	49.6	33.96	30.21	12.46	42.67
Urban	50.4	8.03	16.34	11.69	28.03
<i>Region</i>					
Hodh El Charghi	12.2	23.67	36.67	9.71	46.38
Hodh El Gharbi	8.3	23.39	23.22	16.41	39.62
Assaba	9.2	30.82	21.39	12.18	33.57
Gorgol	9.5	33.67	34.2	7.45	41.65
Brakna	8.8	31.92	29.92	9.06	38.98
Trarza	7.7	18.18	19.98	15.12	35.1
Adrar	1.8	22.55	25.38	12.09	37.47
Dakhlet Nouadhibou	3.5	7.09	16.79	8.11	24.9
Tagant	2.3	38.01	32.4	10.23	42.63
Guidimatha	7.5	33.5	30.49	17.54	48.03
Tiris Zemmour	1.5	4.79	6.05	13.01	19.06
Inchiri	0.6	19.89	9.18	7.47	16.65
Nouakchott	27.1	5.85	11.83	12.72	24.55
<i>Employment Status of head of</i>					
Employed	66.1	20.32	22.58	11.96	34.54
Unemployed	0.56	15.5	17.22	15.01	32.23
Out of Labor Force	33.35	22.1	24.58	12.26	36.84
<i>Profession of head of household</i>					
Farming	6.41	36.31	33.25	12.8	46.05
Breeding	9.78	32.42	29.26	12.74	41.99
Fishing	1.48	14.52	18.41	10.11	28.53
Contractor	0.2	0	10.87	0	10.87
Administrative manager	2.69	6.16	23.2	6.28	29.48
Administrative agent	2.84	5.94	20.75	5.99	26.74
Trader	8.69	12.86	23.77	8.6	32.37
Seller	5.97	17.06	21.69	11.4	33.09
Artisan	0.63	17.27	29.8	5.01	34.8
Domestic services	0.33	7.02	25.4	22.25	47.65
Armed Forces and Security	1.45	9.88	14.76	6.08	20.83

Worker	7.6	25.01	16.73	14.27	31
Other occupations	11.76	13.72	20.94	11.67	32.61
No profession	1.5	18.72	21	13.15	34.15
No occupation	38.69	22.33	22.82	13.56	36.38

Source: WB staff estimations based on the 2008 and 2014 EPCVs.

Vulnerability to poverty

The study of vulnerability is a relatively recent development in economics. There is no unanimous view of what constitutes economic vulnerability and how it should be measured but a popular definition is that vulnerability is the risk of being economically deprived in the future. Future risks are generally measured in probabilistic terms and, if we are referring to vulnerability to poverty, our measure of interest is the probability of being poor in the future. The probability of being poor in the future is then measured by predicting poverty using individual or household endowments. The basic idea is the following. If an individual is observed to be poor but his/her endowments are associated with higher welfare, the risk of being poor in the near future is expected to be lower than the current condition.

Ideally, one would want to measure vulnerability using panel data, which in the case of Mauritania are not available. However, the literature proposes alternatives using either one or two cross section survey data (Chaudhuri, 2003; Chaudhuri et al., 2002) and we can also use the pseudo-panel already constructed. In essence, one runs an econometric equation on consumption using a set of regressors and uses this equation to predict consumption. Under certain assumptions related to the error term, these predictions can be used to estimate the probability of being poor. This probability can be estimated by running first a consumption equation and then estimate the probability of being poor (we call this index m1) or by running directly a poverty model to estimate this probability (we call this index m2). One can also use the pseudo-panel already constructed to estimate vulnerability. Remember that with the matching pseudo panel it is assumed that household characteristics are the same across time (it is *as if* we had the same households over time). Therefore, we can use the pooled 2008 and 2014 data as they were one data set and estimate the probability of being poor in 2014 (see technical appendix for more details).

According to both m1 and m2 indexes and according to both methods (cross-section and pseudo-panel) vulnerability has decreased between 2008 and 2014 and has decreased more visibly than poverty itself. The m1 and m2 indexes are fairly close and in one model m1 shows higher vulnerability than m2 whereas the reverse is true in the other model. In essence, while these models remain early developments of the vulnerability literature, they concord in showing a decrease in vulnerability between 2008 and 2014 indicating that endowments associated with consumption and poverty have improved over time, something that was already reported in Part I of the study.

Table 21 - Vulnerability Indexes

	2008	2014 (cross-section)	2014 (pooled pseudo-panel)
Headcount index	44.52%	32.97%	32.97%
Vulnerability index (m1)	44.49%	22.22%	24.23%
Vulnerability index (m2)	44.08%	23.35%	21.67%

Source: WB staff estimations based on the 2008 and 2014 EPCV.

The share of hard core poor has declined substantially while the share of hard core non poor has increased. The poor and the vulnerable are not necessarily the same households and it is instructive to

cross-tabulate the poor with the vulnerable to see the degree of overlap between these two groups. This is shown in Table 22 using the 2008 and 2014 cross-section surveys and the vulnerability index m1. In 2008, the majority of households (76.6 percent) overlapped in poverty and vulnerability status and this is also the case for 2014 with similar proportions (76 percent). However, the group of hard core poor who are both poor and vulnerable to poverty in the near future has declined substantially over the period from 32.8 to 15.6 percent while the group of hard core non poor has increased from 43.8 to 60.4 percent. These are both positive developments which raise hope for a further reduction in poverty in the near future. However, as repeatedly mentioned in this study, the labor market fundamentals for inclusive growth and further poverty reduction are missing in Mauritania and this is what may compromise the medium and long-term potential of further poverty reduction.

Table 22 - Poverty and Vulnerability

		2008			2014				
		Vulnerable			Vulnerable				
Poor	No	No	Yes	Total	Poor	No	No	Yes	Total
		43.8	11.7	55.5			60.4	6.7	67.0
		11.7	32.8	44.5			17.4	15.6	33.0
Total		55.5	44.5	100.0	Total		77.8	22.2	100.0

Source: WB staff estimations based on the 2008 and 2014 EPCV. The probability threshold used to identify the vulnerable is 50 percent.

Further research

The report has assessed poverty changes in Mauritania between 2008 and 2014, the two latest household budget surveys available for the country. It made the most of available data but also showed that some information from the surveys proved unreliable or incomplete whereas other important information necessary to explain poverty reduction is not available in surveys. This highlighted the need for further research in selected areas. In particular and given the characteristics of Mauritania, it would be important to expand research in the domains of education, nutrition, labor, water and land rights.

On education, we observed discrepancies between official enrolment rates and survey based enrolment rates, an issue that is being discussed by the NSO and the ministries responsible for education and that deserves a careful re-assessment. It is particularly important to distinguish between enrolment and attendance rates and clarify what is sporadic non-attendance and what is permanent attrition. This report also speculated that education quality in the aftermath of the 1999 reform has declined resulting in declining literacy rates for the younger children. Educational outcomes such as literacy are a cornerstone of development processes. The quality of education and the 1999 education reform are two questions that would require a proper evaluation.

On nutrition, the EPCV questionnaires contain questions which have not been used in this report and that could be used in conjunction with administrative health data and the DHS by nutrition specialist to assess progress in the country. This is another health outcome indicator that could complement the ill/injuries indicator used by this report. Particularly important would be a spatial and population group analysis of nutrition to identify whether there are neglected areas or population groups that escaped government's supervision.

On employment, this report provided only summary information on work and argued that the labor market is one of the major constraints preventing Mauritania from further poverty reduction. These findings should be reassessed in the context of a full labor market report that makes use of the EPCV surveys and the 2012 LFS. Different WB teams have been working in this direction and, when finished, this work should be brought together with this report to better identify the labor demand and supply constraints to further poverty reduction. The underlying essential question to answer is what explains jobless growth and poverty reduction, whether population pressure alone, the lack of growth in key economic sectors, increased productivity or other factors.

On water, this report indicated two important aspects that would require further research. One is the reach of the water domestic pipeline system. We observed very little progress on this front and progress very concentrated in urban areas. It would be important to better understand the causes of these shortcomings and the future prospects for expanding the domestic water network. The second question related to water is the expansion of the irrigation system. This report argued that progress in agriculture was largely the product of increased production and productivity in the irrigated and mechanized sector whereas rain-fed agriculture has lagged behind. This type of development has delivered in terms of overall welfare and poverty reduction but has not improved employment and inclusion resulting in outmigration of manual labor from rural to urban areas. It would be important therefore to determine the potential for expanding the irrigation system to smaller farmers and more marginal lands in an effort to provide a sustained livelihood to the small farming sector and contain internal migration.

On land, this report provided only some statistics on the expansion of irrigated land. The information contained in the EPCV on land ownership was deemed largely unreliable whereas we could not find complementary information from administrative sources on land ownership or land reforms. Nevertheless, the statistics from the Ministry of agriculture shows that the private sector benefitted from increased land allocation and we also gathered anecdotal evidence of land distribution programs in urban areas. It would be essential to collect comprehensive statistics on land ownership and carry out a proper assessment of land reforms, not just large reforms, but land distribution practices at the local level. For example, it is unclear what land rights have rural-urban internal migrants when they settle in urban areas and whether they owned land before leaving. It is also unclear how large private investors acquire land and under what conditions. These are important questions to clarify for future development prospects.

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Statistical Appendix

Table 23 - Poverty Regressions (Probit)

	Nouakchott		Other Urban		Rural	
	2008	2014	2008	2014	2008	2014
hage	-0.06 (2.16)*	0.017 -0.64	-0.001 -0.05	0.027 -1.23	-0.001 -0.06	-0.036 (3.05)**
hage2	0.001 (2.25)*	0 -0.74	0 -0.23	0 -1.31	0 -0.44	0 (3.50)**
hfem	0.559 (2.78)**	0.063 -0.41	0.055 -0.43	0.007 -0.05	0.092 -1.28	0.063 -0.73
hmarried	-0.339 -1.61	0.087 -0.54	0.029 -0.21	0.063 -0.46	-0.281 (3.64)**	-0.22 (2.59)**
hedusec	-0.591 (3.10)**	-0.193 -1.39	-0.372 (2.41)*	-0.22 -1.46	-0.325 (2.61)**	-0.294 -1.82
heduter	-0.153 -0.44	0.045 -0.22	-0.508 -1.86	-0.788 (3.15)**	-0.093 -0.45	-0.226 -0.51
hemplpub	0.088 -0.5	-0.201 -1.07	0.033 -0.23	-0.121 -0.62	-0.102 -0.97	-0.274 -0.61
hemplpriv	0.099 -0.66	0.004 -0.02	0.04 -0.3	-0.026 -0.14	0.07 -0.94	0.228 (2.17)*
hemplself	0.112 -0.78	-0.171 -1.24	-0.238 (2.32)*	-0.125 -1.03	-0.004 -0.08	0.172 (2.50)*
hhszie	0.23 (10.78)**	0.253 (8.96)**	0.313 (13.51)**	0.215 (10.01)**	0.293 (18.69)**	0.249 (14.23)**
femshare	-0.124 -0.38	-0.128 -0.51	-0.384 -1.77	-0.178 -0.74	-0.088 -0.73	-0.253 -1.91
emplshare	-0.675 (1.97)*	-0.042 -0.13	-0.461 -1.93	-0.478 -1.72	-0.399 (3.46)**	-0.735 (4.15)**
age05	0.47 -0.68	0.844 -1.28	0.204 -0.5	0.315 -0.55	0.015 -0.07	0.87 (3.29)**
age615	0.411 -0.6	0.829 -1.28	-0.048 -0.12	0.268 -0.48	0.171 -0.84	0.478 -1.85
age1625	-0.104 -0.14	0.316 -0.46	-0.584 -1.46	0.059 -0.1	-0.445 (2.13)*	0.34 -1.23
age2635	-0.438 -0.56	-0.213 -0.31	-0.755 -1.79	0.784 -1.27	-0.403 -1.8	0.047 -0.15
age3650	0.015 -0.02	-0.306 -0.5	-0.586 -1.56	0.071 -0.13	-0.423 (2.18)*	0.497 -1.96
homeown	0.186 -1.63	-0.013 -0.12	0.023 -0.23	-0.109 -1.01	-0.235 (3.08)**	-0.137 -1.28
iron	0.163	-0.299	-1.138	-0.322	-0.354	-0.193

	-0.68	-1.48	(2.41)*	-1.12	-0.87	-0.51
fridge	-0.409 (2.17)*	-0.228 -1.79	-0.171 -1.13	0.222 -1.65	-0.096 -0.47	-0.938 (2.58)**
television	-0.279	-0.117	-0.038	0.059	0.053	0.072
	-1.52	-0.44	-0.27	-0.35	-0.3	-0.44
satellite	-0.087	-0.187	-0.322	-0.454	-0.049	-0.614
	-0.49	-0.78	(2.28)*	(2.92)**	-0.24	(2.94)**
radio	-0.123	-0.224	-0.117	-0.041	-0.217	-0.266
	-1.03	(2.14)*	-1.35	-0.44	(4.56)**	(4.86)**
kitchen	-0.388	-0.269	-0.182	-0.262	-0.136	-0.731
	-1.89	-1.8	-0.94	-1.62	-0.82	(2.97)**
car	-0.782 (3.32)**	-0.051 -0.36	-0.224 -1.25	-0.158 -0.88	-0.062 -0.38	-0.365 (2.19)*
telephone	-0.256	0.189	-0.588	-0.343	-0.473	-0.505
	-1.78	-1.18	(6.10)**	(2.64)**	(9.57)**	(8.58)**
aircond	0.077	0.015	0.19	-0.001	-0.611	0.03
	-0.21	-0.06	-0.67	0	-1.5	-0.07
computer	-0.489	-0.292	-0.426	-0.412	-0.068	-0.491
	-1.31	-1.54	-1.16	-1.21	-0.19	-0.75
roofgood	-0.375	-0.384	-0.318	-0.197	-0.194	0.053
	-1.61	(2.63)**	(3.44)**	-1.84	(3.35)**	-0.82
floorgood	-0.104	-0.075	-0.102	-0.028	-0.449	-0.222
	-0.83	-0.64	-1.08	-0.28	(7.62)**	(3.54)**
electricity	-0.309 (2.22)*	-0.298 (2.02)*	-0.271 (2.41)*	-0.015 -0.12	-0.026 -0.15	-0.164 -0.78
waterpipe	-0.235	0.122	-0.159	-0.133	-0.374	0.021
	-1.15	-1.06	-1.74	-1.35	(6.03)**	-0.23
_cons	-0.268	-2.564	-0.789	-2.342	-0.157	-0.504
	-0.26	(2.76)**	-1.17	(2.76)**	-0.44	-1.2
Obs.	2,388	2,250	3,733	2,892	7,565	4,199
Ps.R2	0.338	0.305	0.335	0.296	0.262	0.249

Source: Source: WB staff estimates, 2008 and 2014 EPCV.

Table 24 - Poverty Estimations from Cross-Survey Imputations

	2008	2014	2014-2008
National			
Actual	44.5	33.0	-11.5
Predicted within sample	44.9	32.7	-12.2
Predicted cross-sample	33.2	41.8	
	(Betas2014-Xs2008)	(Betas2008-Xs2014)	Decomposition
Beta effect	-11.7	-9.1	-10.4
Xs effects	-3.1	-0.5	-1.8
Total effect	-14.8	-9.6	-12.2
Nouakchott			
Actual	17.0	18.6	1.6
Predicted within sample	15.7	19.3	3.6
Predicted cross-sample	22.0	12.9	
	(Betas2014-Xs2008)	(Betas2008-Xs2014)	Decomposition
Beta effect	6.3	6.4	6.4
Xs effects	-2.8	-2.7	-2.8
Total effect	3.5	3.7	3.6
Other urban			
Actual	30.8	21.1	-9.8
Predicted within sample	28.5	20.2	-8.4
Predicted cross-sample	18.4	25.7	
	(Betas2014-Xs2008)	(Betas2008-Xs2014)	Decomposition
Beta effect	-10.1	-5.5	-7.8
Xs effects	-2.9	1.7	-0.6
Total effect	-12.9	-3.8	-8.4
Rural			
Actual	62.8	46.4	-16.4
Predicted within sample	62.7	45.3	-17.4
Predicted cross-sample	44.5	63.6	
	(Betas2014-Xs2008)	(Betas2008-Xs2014)	Decomposition
Beta effect	-18.2	-18.3	-18.3
Xs effects	0.9	0.8	0.9
Total effect	-17.3	-17.5	-17.4

Source: Source: WB staff estimates, 2008 and 2014 EPCV.

Table 25 - Youth, Gender by Areas, Selected Indicators

		2008		2014		2008-2014	
		Males	Females	Males	Females	Males	Females
POPULATION							
Non Youth	Literate (%)	66.7	46.0	74.2	56.0	7.5	10.0
	Never married (%)	2.6	1.3	1.8	1.2	-0.8	-0.1
	Worked past 7 days (%)	78.8	26.8	76.6	22.3	-2.2	-4.4
	No income (%)	20.3	75.9	21.1	78.6	0.9	2.7
Youth	Literate (%)	73.5	60.6	76.9	68.6	3.5	8.1
	Never married (%)	5.4	0.7	5.9	0.9	0.5	0.2
	Worked past 7 days (%)	56.3	15.6	50.1	12.9	-6.1	-2.7
	No income (%)	50.9	87.7	53.9	90.4	3.0	2.7
RURAL							
Non Youth	Literate (%)	52.6	36.6	62.3	41.8	9.7	5.2
	Never married (%)	1.3	1.2	1.0	0.9	-0.3	-0.3
	Worked past 7 days (%)	76.0	20.3	73.7	16.6	-2.2	-3.7
	No income (%)	23.0	83.0	22.7	85.4	-0.3	2.5
Youth	Literate (%)	56.3	50.5	66.0	59.3	9.7	8.8
	Never married (%)	3.7	0.5	0.9	0.7	-2.8	0.2
	Worked past 7 days (%)	55.5	14.1	49.9	10.8	-5.5	-3.4
	No income (%)	55.5	90.9	54.5	94.2	-1.1	3.3
URBAN							
Non Youth	Literate (%)	75.1	55.1	82.4	68.5	7.3	13.4
	Never married (%)	1.8	1.1	2.4	1.4	0.5	0.2
	Worked past 7 days (%)	42.9	18.7	78.5	27.3	35.6	8.6
	No income (%)	57.6	82.8	20.0	72.6	-37.6	-10.2
Youth	Literate (%)	83.7	70.2	83.2	76.7	-0.5	6.5
	Never married (%)	6.6	0.9	8.8	1.0	2.2	0.1
	Worked past 7 days (%)	58.3	18.2	50.2	14.8	-8.1	-3.4
	No income (%)	45.6	83.2	53.5	87.1	8.0	3.9

Source: WB staff estimates from the 2008 and 2014 EPCV. Youth is age 20-29 non in education and non youth is age 30-59 non in education.

Table 26 - HOI Logit model: List of Repressors for literacy

Child characteristics:

- Age of child
- Female child

Household characteristics:

- Household size
- Male household head
- Number of spouses
- Age of household head
- Log of per capita expenditures

Region:

- Hodh El Gharbi
- Assaba
- Gorgol
- Brakna
- Trarza
- Adrar
- Dakhlet Nouadhibou
- Tagant
- Guidimagha
- Tiris Zemmour
- Inchiri

Area:

- Other urban areas
- Rural area

Constant

Observations

Pseudo R²

Table 27 - Variables used for the propensity score matching

<i>HH Demographic characteristics</i>	
i.comp_age	The age of household head in 2014: we add six year for those of 2008
compa_age	The number of children that have the age between 0 and 8 in 2008 and those that have the age between 6 and 14 in 2014
av_hh_age_m	The average age of male member of the household in 2014. For the year of 2008, six years were added.
av_hh_age_f	The average age of female member of the household in 2014. For the year of 2008, six years were added.
i.hhsiz	Household size
depend0014	Population between 0 and 14 years old
active1564	Population between 15-64 years old
<i>HH Living area</i>	
i.capital	Living area (Urban, semi-urban, rural)
i.region	We assume that the household continues with a high probability to live in its initial region.

Table 28 - Logit Model for the Estimation of the Propensity Score

	Logit model treatment
<i>Household characteristics</i>	
Number of child (0-8: 2008 & 6-14: 2014)	-0.174***
Average age of male household members	-0.0357***
Average age of female household members	-0.0544***
Population between 0 and 14 years old	-2.081***
Population between 15-64 years old	-1.935***
Dummies of Household size	<i>Yes</i>
Dummies of age of the household head	<i>Yes</i>
<i>Living area:</i>	
- Capital	1.265***
- Other Urban Areas	0.280***
<i>Region:</i>	
- Hodh El Charghi	1.018***
- Hodh El Gharbi	1.052***
- Assaba	0.954***
- Gorgol	0.517***
- Brakna	0.520***
- Trarza	0.704***
- Adrar	0.730***
- Dakhlet Nouadhibou	1.554***
- Tagant	0.742***
- Guidimatha	0.748***
- Tiris Zemmour	0.476**
Observations	22911
Pseudo R²	0.247

Source: Produced by the authors using the --- Data

* p<0.10, ** p<0.05, *** p<0.010

Technical Appendix

Notes on survey methodology

Survey methodology. The Enquête Permanente sur les Conditions de vie des ménages (EPCV) surveys are undertaken by the National Statistical Office of Mauritania every four to six years. These surveys are based on the QUIBB methodology developed by the World Bank in the early 2000s and popular in Africa. A full description of the survey methodology including sampling and questionnaire design for 2008 and 2014 can be found in the following websites:

- EPCV 2008 : <http://catalog.ihsn.org/index.php/catalog/6155/study-description>
- EPCV 2014 : <http://catalog.ihsn.org/index.php/catalog/5963/study-description>

Changes in questionnaire design. The most recent 2014 EPCV questionnaire contained several changes vis-à-vis the 2008 questionnaire. The most important change was an increase in the number of expenditure items listed. Table 29 shows the comparison between the number of items in 2008 and 2014. It shows that there are significant increases in the number of items for retrospective expenditures including health, education and health and for other occasional or current expenditure. The only group of items that did not change significantly is food self-consumption. The other important change that occurred regards the labor market questions which in 2014 were aligned to the ILO methodology. Both these changes are positive in that they improved the questionnaire. However, they make results over time less comparable and created some challenges for reconstructing comparable welfare aggregates.

Definition of welfare. The measure of welfare was based on consumption rather than income because consumption is a more satisfactory measure of well-being for both theoretical and practical reasons in that consumption is smoother and less variable than income. Nominal household consumption aggregate was constructed broadly following the best-practice guidelines provided in Deaton and Zaidi (2002) and consists of two main components: food and nonfood consumption.

Consumption aggregate. The consumption aggregate was reconstructed for both 2008 and 2014 to harmonize the two aggregates inasmuch as possible. This required some strategic choices related to the items to be preserved in the final aggregate to allow comparability. The group of items which were finally retained were food (purchases and self-consumption) and nonfood (education, health, communication, water, electricity, rent, occasional and frequent non-food expenditures). However, there was some slight deviation from the NSO in two aspects – cost of housing and durable goods. Housing rental costs are important for households residing in urban areas. However, one cannot include rent costs for some households and not for others who own their housing structures. The NSO uses the self-imputed rent and actual rent to cost housing while the Bank methodology used regression imputation using the households that actually paid rent. Several methodologies¹² were tested before settling for a Generalised Linear Model (GLM) that takes into account the variance of each input as a function of the predicted value. The welfare aggregate further excluded all durable goods. Ownership of durable goods is an important component of welfare but data on durable goods were deemed not comparable over the period and finally excluded.

¹² Simple (Hedonic) regression rent model, Duan Smearing estimate (predlog); Generalised Linear Model

The estimate of food self-consumption was straightforward whereas food purchase and some non-food expenditures were not. Both the 2008 and 2014 surveys contained questions on expenditure using two different approaches, one based on a 12 months recollection period and one based on a 15 days recollection period. The NSO has historically used the 12 months recollection period and used the 15 days recollection period question only to check on a few items. Our team made an effort to harmonize both the 15 days and 12 months recollection questions and compared results. Both approaches result in a sharp poverty reduction between 2008 and 2014 but the two aggregates do not provide the same results on all items. Following prolonged discussions with the NSO, we finally opted to use the 12 months' aggregate.

Food basket. The budget shares for all items can be derived from food and non-food items. In the case of food, this is practical and easy but for non-food, it is difficult to calculate prices because of extreme heterogeneity. Several iterations were undertaken to derive a food basket that is consumed prevalently by the poor based on a second to ninth decile of consumption. To test the robustness of the basket, a first iteration was carried out for all food items, a second iteration dropped all food items for which calories content could not be derived and a third iteration included all items without prices. The weighted food shares of these iteration was retained for the food basket.

Adjusting for Spatial Price Variation. Nominal consumption of the household must be adjusted to account for the cost-of-living differences spatially and longitudinally. The Fisher index (the weighted square root of the Laspeyres and the Paasche index) was used to adjust consumption spatially. The Consumer Price Index was used to adjust consumption longitudinally.

Poverty line. The poverty line was calculated based on the Cost-of-Basic Needs (CBN).¹³ The CBN method assumes that households have to meet a minimum caloric (nutritional need) requirement for each member to undertake normal functions. The consumption bundle deemed to be adequate for basic minimum consumption needs, is valued in some reference prices. Determining the poverty line involves a series of key steps starting with determining the basic minimum calorie requirement and then adding a minimum allowance for nonfood consumption to derive the overall poverty line. The calorie requirement for food was based on the FAO food tables as Mauritania does not have country-specific food calories table. For the overall poverty line, several poverty lines were constructed and robustness checks compared before selecting the final poverty line. Methods used included the Ravallion, Engel and Orshansky methods. The final choice was based on the Ravallion approach, agreed upon with the NSO and established at 177,200 MRO per capita per year. See Table 1 in the text for a comparison of this poverty line with other lines.

Poverty measures. A common class of poverty measures is the Foster, Greer and Thorbecke (commonly known as the FGT) indices.

$$P_\alpha = \frac{1}{N} \sum_{i=1}^q \left(\frac{z - y_i}{z} \right)^\alpha \quad (\alpha \geq 0)$$

¹³ Ravallion 1998

The FGT measure, $P_{(o)}$, is defined as: where N is the population size for which the measure is computed, y_i is the level of individual welfare (real per capita consumption) of the i th individual, z is the poverty line. The $(y_i < Z)$ is an indicator function that maps a value of 1 when the constraint is satisfied and 0 otherwise, and is the poverty sensitivity indicator. The FGT measure produces three different poverty indices: (a) head count which is the ratio of the population who is below the poverty line and measures the incidence of poverty; (b) poverty gap is the mean proportionate gap from the poverty line of the poor; and (c) severity of poverty is the poverty gap squared.

Table 29 - Items Comparison 2008-2014

Section			Number of items		Percent change		
2008	2014		2008	2014			
Expenditure							
<i>Total number of items</i>							
J	J	Depenses retrospectives du menage	34	53	55.9%		
J1	J1	Dépenses scolaires durant l'année scolaire 2013/2014(UM)	4	9	125.0%		
		<i>Frais de scolarité</i>	1	4	300.0%		
		<i>Livres et fournitures scolaires</i>	1	2	100.0%		
		<i>Cotisation des Parents d'Elèves (APE)</i>	1	1	0.0%		
		<i>Autres contributions scolaires non spécifiées</i>	1	2	100.0%		
J2	J2	Dépenses de santé au cours des 30 derniers jours (UM)	5	23	360.0%		
		<i>Frais de consultation</i>	1	2	100.0%		
		<i>Frais d'analyse médicale</i>	1	2	100.0%		
		<i>Transport santé</i>	1	3	200.0%		
		<i>Médicaments</i>	1	14	1300.0%		
		<i>Autres services médicaux</i>	1	2	100.0%		
J3	J3	Ménage paye- t 'il ou aurait 'il dû payer	5	14	180.0%		
		<i>Loyer - effectivement payé</i>	1	1	0.0%		
		<i>Loyer - aurait dû payer</i>	1	1	0.0%		
		<i>Frais de communication</i>	1	7	600.0%		
		<i>Eau</i>	1	3	200.0%		
		<i>Electricité</i>	1	2	100.0%		
J4	J4	Dépenses d'inputs Agricoles au cours des 12 derniers mois	6	7	16.7%		
		<i>Semence</i>	1	1	0.0%		
		<i>Engrais</i>	1	1	0.0%		
		<i>Produit phytosanitaire</i>	1	1	0.0%		
		<i>Main d'oeuvre agricole</i>	1	1	0.0%		
		<i>Réparation de matériel agricole</i>	1	1	0.0%		
		<i>Location et achat de matériel agricole</i>	1	1	0.0%		
		<i>Autres inputs agricoles</i>	0	1	..		
K	K	Autoconsommation (food)	47	50	6.4%		
		<i>Graines et farines</i>	10	11	10.0%		
		<i>Riz local (paddy, entier)</i>	1	1	0.0%		
		<i>Blé</i>	1	1	0.0%		
		<i>Other</i>	8	9	12.5%		
		<i>Racines et tubercules</i>	3	3	0.0%		
		<i>Légumineuses</i>	3	3	0.0%		
		<i>Fruits</i>	9	9	0.0%		
		<i>Légumes</i>	8	9	12.5%		
		<i>Volaille, Viande, Poisson</i>	9	10	11.1%		
		<i>Beef</i>	1	1	0.0%		
		<i>Mouton</i>	1	1	0.0%		
		<i>Birds</i>	2	2	0.0%		
		<i>Fish</i>	2	3	50.0%		
		<i>Other</i>	3	3	0.0%		
		<i>Autres Produits animaliers</i>	4	4	0.0%		
		<i>Autres produits autoconsommés</i>	1	1	0.0%		

L	L	Depense occasionnelle	35	91	160.0%
		Articles personnels	1	4	300.0%
		Articles de ménage	15	46	206.7%
		Matériaux de construction et main d'oeuvre	12	13	8.3%
		Chaussures, vêtements, Tissus	6	11	83.3%
		Autres dépenses occasionnelles	1	17	1600.0%
M	M	Depense courantes	117	266	127.4%
		Non-food	25	69	176.0%
		Articles personnels (dépenses hors scolarisation)	10	32	220.0%
		Entretien ménager combustible, chauffage, éclairage	11	18	63.6%
		Transport, carburant et entretien	3	12	300.0%
		Soins personnel	1	7	600.0%
		Food	92	197	114.1%
		Céréales, farines et produits à base de farine	16	33	106.3%
		Racines et tubercules	4	4	0.0%
		Légumineuses et noix	5	13	160.0%
		Fruits	11	20	81.8%
		Légumes	11	16	45.5%
		Aliments préparés hors du ménage	4	13	225.0%
		Viandes, volailles et poissons	10	27	170.0%
		Produits animaliers	9	21	133.3%
		Huiles et matières grasses végétales	3	6	100.0%
		Sucre, produits sucrés, excitants et boissons	11	20	81.8%
		Conсерves et condiments	8	20	150.0%
		Autres produits de dépenses courantes	0	4	..
Revenue					
Total number of items			31	42	35.5%
O	N	Revenu du ménage	28	38	35.7%
		Revenu de l'agriculture, l'élevage et la pêche	17	22	29.4%
		Salaires et revenus non agricoles	8	8	0.0%
		Transferts de revenus et diverses recettes	3	8	166.7%
O	O	Transfert et autres dépenses effectuées par le ménage	3	4	33.3%
Prices					
Total number of items			32	33	3.1%
Prix	Prix	Questionnaire sur les Prix	32	33	3.1%

Steps to Build the Human Opportunity Index

1. Estimate a logistic model on whether child i had access to a given basic good or service as a function of his or her circumstances.
2. Predict the probability of being at school

$$\hat{p}_i = \frac{1}{1 + \exp(\hat{\beta}_0 + \sum_{k=1}^m \hat{\beta}_k)}$$

3. Compute the overall coverage rate C ,

$$C = \sum_{i=1}^n w_i \hat{p}_i$$

where $w_i = \frac{1}{n}$ or some sampling weights.

4. Compute the Dissimilarity Index \widehat{D}

$$\widehat{D} = \frac{1}{2C} \sum_{i=1}^n w_i |\hat{p}_i - C|$$

5. Compute the penalty, $P = C * \widehat{D}$

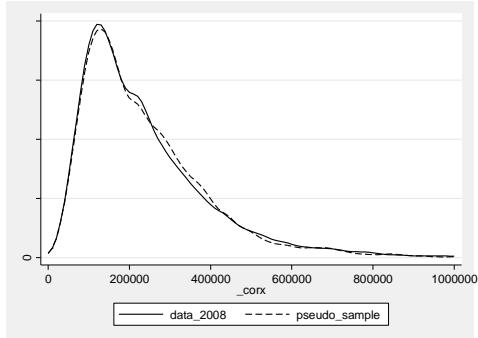
6. Compute the $HOI = C - P$

Source : http://fmwww.bc.edu/repec/bocode/h/hoi_equations.pdf

Constructing a pseudo-panel

The first approach we follow to the construction of the pseudo-panel is based on propensity score matching. The key to this approach is to use the 2008 and 2014 EPCV surveys and exploit the fact that the 2008 survey contains 43 percent more observations than the 2014 survey. This permits to identify one matching household from the 2008 survey for each household in the 2014 sample. As suggested by Deaton (1985), for the matching exercise it is important to use a set of characteristics that can have a high probability of remaining constant between the two survey waves. Moreover, it is also important to avoid the use of outcome variables that will be used for the analyses with the pseudo-panel data such as poverty, expenditure or social classes or the use of variables that are highly correlated with such outcomes such as education. Based on these principles and the data available, we selected a final set of matching variables based on household and household head characteristics and geographical location. The full set of variables is described in Table 27 of the statistical annex and the econometric regression used to estimate the propensity score is provided in Table 28 in annex. Based on propensity score matching, we derived a 2008 sample of the same size of the 2014 sample with each household in 2008 representing one household in 2014. To test whether our 2008 reduced and matched sample maintains the same properties of the 2008 full sample, we compare the two expenditure distributions. **Error! Reference source not found.** shows that the 2008 pseudo-panel and full distributions are very close, although a small difference exist along selected sections of the distributions.

Figure 21 - A Comparison of the 2008 Pseudo-sample and the full sample distributions.



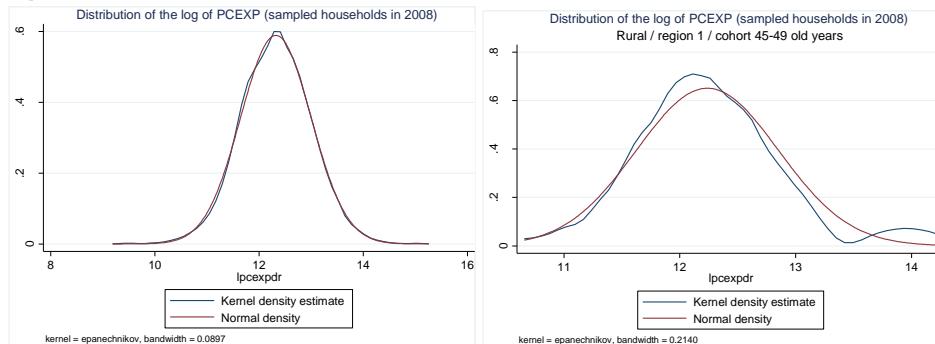
Source: WB staff estimates based on the 2008 EPCV.

The second approach we follow to construct a pseudo-panel is what we label the “probabilistic approach”. Instead of matching households, we construct comparable population groups based on a set of key household characteristics. The variables we use to construct population groups are household head cohorts (10 age groups), living areas (rural/urban) and regions (13 regions). The combination of these variables originates 260 population groups. This approach is based on the outcome of interest, which in our case can be real per capita expenditure or poverty. The rationale is that the log of the per capita expenditures follows closely a normal distribution. As shown in Figure 22 this is the case for an entire distribution but also, in general, for sub-sets of the population. Formally, if $g_{i,j,k}$ denotes the population group living in 2008 in area i and region j of the cohort k , the distribution of the outcome of a randomly selected household within this group will belong to a normal distribution $N(\mu_{i,j,k}, \sigma_{i,j,k})$. Using the 2008 data, the two parameters of the normal distribution are first estimated for each group $(\mu_{i,j,k}, \sigma_{i,j,k})$. Then, based on this probabilistic approach, for each sampled household in 2014 the corresponding 2008 group is identified and the expected expenditure or the expected poverty is assigned to the household. This allows mapping each household in 2014 to one of the 260 groups constructed on 2008 data and estimate expenditure or poverty.

The advantage of having a pseudo-panel is to be able to observe changes in welfare status over time for households that can be considered as proxies. **Error! Reference source not found.** shows results for poverty using a Markov type transition matrix using the two pseudo-panel approaches described.

The propensity score matching matrix (left panel) includes the poverty rates for 2008 and 2014 using the original 2014 sample and the 2008 pseudo-sample. Therefore, the 2014 poverty figure is the same as we have already reported in other sections of the study (32.97 percent) whereas the 2008 figure is an estimate based on the pseudo-sample of the true 2008 figure based on the full 2008 sample. This estimate is 44.11 percent, which is rather close to the 44.5 percent of the regular 2008 sample. This is a further test that our pseudo-sample provides similar welfare statistics to the full sample. **Error! Reference source not found.** also reports transitions in and out of poverty. We can see that 12.07 percent of the total sample moved into poverty between 2008 and 2014 while 23.22 percent moved out of poverty. The “chronic” poor (those who remained poor between the two years) are estimated at 20.89 percent whereas the chronic non-poor are estimated at 43.82 percent.

Figure 22 - Actual Vs. Normal Distributions (2008)



Source: WB staff estimates based on the 2008 EPCV.

Since our main objective is to assess poverty dynamics, the probabilistic model is best applied to the probability of being poor. Once we estimate the probability of being poor in each year and for each household, we can then estimate the transition probabilities as follows:

$$PP_h = P_{h,1} * P_{h,2};$$

$$NP_h = (1 - P_{h,1}) * P_{h,2};$$

$$PN_h = P_{h,1} * (1 - P_{h,2});$$

$$PP_h = (1 - P_{h,1}) * (1 - P_{h,2});$$

where the first letter corresponds to the poverty status in 2008 and the second letter corresponds to the poverty status in 2014. For example, PP represents the group of households who remained poor between the two years whereas PN represents the group of households who moved from poor to non-poor status. Once the probabilities of these four statuses are estimated at the household level, the expected values will regenerate the transition matrix. The resulting transition matrix is reported in **Error! Reference source not found.**. We can see that the estimated poverty level in 2014 is 33.09 percent instead of the actual 32.97 and the estimated poverty level for 2008 is 42.28 instead of the actual 44.5 percent.

The probabilistic approach provides results that are close to the propensity score method but somehow less accurate if we regard the 2008 poverty rate. That is because one of the assumptions of this model is that the

chosen characteristics to identify the 260 groups (age, area and region) are assumed to be stable over the period. For age, this is a valid assumption given that we can scale back the age of the household head in 2014 to 2008 by subtracting six years. Instead, we know that a significant portion of the population has moved from rural to urban areas and possibly across regions and this is something we cannot correct for. In conclusion, while the probabilistic model is useful to validate the broad results on poverty transitions and the pseudo-panel approach, in the next sections we will rely on the propensity score matching model to illustrate the full set of results based on the pseudo-panel.

Table 30 - Poverty Transition Matrix

Propensity Score Matching				Probabilistic Approach			
		2014				2014	
2008	Non-poor	Poor	Total	2008	Non-poor	Poor	Total
Non-poor	43.82	12.07	55.89	Non-poor	44.81	12.91	57.72
Poor	23.22	20.89	44.11	Poor	22.11	20.17	42.28
Total	67.03	32.97	100	Total	66.91	33.09	100

Source: WB staff estimations based on the 2008 and 2014 EPCV.

Vulnerability models

Formally, the vulnerability level of household (or individual) i at time t is defined by:

$$VEP_i^t = Pr(c_i^{t+1} < z).$$

To predict the consumption of household i at time $t+1$ and the variance of consumption δ_i^2 , the following heteroscedasticity regression can be specified:

$$\begin{aligned}\ln(c_i) &= X_i\beta + \varepsilon_i \\ \ln(\delta_i^2) &= X_i\theta + \zeta_i\end{aligned}$$

where consumption is simply linked to the observed endowments. With the assumption of normality in the distribution of the error terms ε_i , the vulnerability -or probability of being poor- can be estimated by:

$$VEP_i^t = \phi\left(\frac{\ln(z) - \ln(\hat{c}_i^{t+1})}{\hat{\delta}_i^{t+1}}\right)$$

Where ϕ denotes the cumulative density function. Usually, we assume that the household is vulnerable to poverty if its VEP exceeds 50 percent. In practice, and with the absence of panel data, the vulnerability status to poverty of individual i at time t (denoted by $V0_i^t$) is defined as follow:

$$V0_i^t = I[VEP_i^t > 0.5] \text{ and } VEP_i^t \approx \phi\left(\frac{\ln(z) - \ln(\hat{c}_i^{t+1})}{\hat{\delta}_i^{t+1}}\right).$$

Finally, like the headcount index, the index of vulnerability is simply $V0^t = E[V0_i^t]$.

When the model predicts perfectly the observed consumption, and when the distribution of consumption is close to the log normal, the $V0$ index converges to the headcount index. One alternative to the consumption

OLS model is to use a poverty probit model to estimate poverty and then use the indicator $V0_i^t = I[\Pr(\text{poor}_t^i) > 0.5]$ as probability of being poor in the future. We denote the index of vulnerability based on the Chaudhuri, 2003 econometrical approach by $V0_{m1}^t$, and that based on the Probit model by $V0_{m2}^t$. For both models, the set of regressors is the following:

- Age of Household head
- Squared age of household head
- Number of people in household
- Squared household size
- Children between 0 and 4 years old
- Children between 5 and 9 years old
- Children between 10 and 17 years old
- Sum total of adult equivalent scales (FAO scales)
- Population between 15-64 years old
- Population between 0 and 14 years old
- Highest education level attained of Household head
- Region
- Marital status of Household head
- Adult females
- Adult males

One can also use the pseudo-panel already constructed to estimate vulnerability. The steps of this application are:

- 1- Estimating: $\Pr((\hat{c}_i^{t+1}|X_i^t) < z)$ and t=2008, t+1=2014.
- 2- Based on the estimated coefficients of the model in step1, estimating the probability of being poor in the future after 2014: $\Pr((\hat{c}_i^{t+2}|X_i^{t+1}) < z)$.