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Mali

Geography of Poverty in Mali

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US$1.00 = CFAF 610

ABBREVIATIONS AND ACRONYMS

ACLED	Armed Conflict Location and Event Dataset
AFD	African Development Bank
AFISMA	Afican-led International Support Mission to Mali
AICD	Africa Infrastruture Country Diagnostic
AQIM	Al-Qaeda in the Islamic Maghreb
CID	Center for International Development
CPI	Consumer Price Inflation
CSLP	*Cadre Stratégique de Lutte Contre la Pauvreté* (Poverty Reduction Strategy)
DNSI	Discrimination and National Security Initiative
ELIM	Enquête Intégrée auprès des Ménages
EMEP	Enquête Malienne sur l'Evaluation de la Pauvreté
EMOP	Enquête Modulaire et Permanente auprès des Ménages
F CFA	Franc de la Communauté Financière Africaine
FEWSNET	Famine Early Warning Systems Network
GDP	Gross Domestic Product
GIS	Geographic Information System
IDP	Internal Development Program
IED	Improvised Explosive Devises
IMF	International Monetary Fund
INSTAT	Institut National de la Statistique
MICS	Multiple Indicator Cluster Survey
MICS	Multiple Indicators Cluster Survey
MINUSMA	United Nations Multidimensional Integrated Stabilization Mission in Mali
NOREF	Norwegian Peacebuilding Resource Centre
PAPC	Post-conflict Assistance Project
PIB	Gross Domestic Product
RGPH	*Recensement Général de la Population et de l'Habitat*
UEMOA	West African States Monetary Union
UN	United Nations
USD	US dollar
WAEMU	West African Economic and Monetary Union
WDI	World Development Indicators

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Aknowledgements

This study was prepared under the leadership of M. Sékouba Diarra Coordinator of the Cellule-Technique of the CSLP, in collaboration with INSTAT and the World Bank. The INSTAT team led by the Directeur Général, M. Seydou Moussa Traore, comprised Assa Doumbia-Gakou (Chef de Département des Statistiques Démographiques et Sociales, M. Vinima Traore (Chef de Division de la Cartographie), Abdoul Kdiawara (Chargé de Cartographie) and Siaka CISSE (Chef de Division des Statistiques Démographiques et Sociales). The World Bank team led by M. Johannes Hoogeveen (Senior Economist) comprised Yele Batana (Senior Economist), Brian Blankespoor (GIS Specialist), Sebastien Dessus (Lead Economist), Cheikh Diop (Senior Economist), Judite Fernandes (Team Assistant), Julia Lendorfer (Consultant), Yishen Liu (consultant), Kristin Panier (Consultant), Mathieu Pellerin (Consultant), Harris Selod (Senior Economist), Gael Raballand (Senior Economist) and Souleymane Traore (Team Assistant).

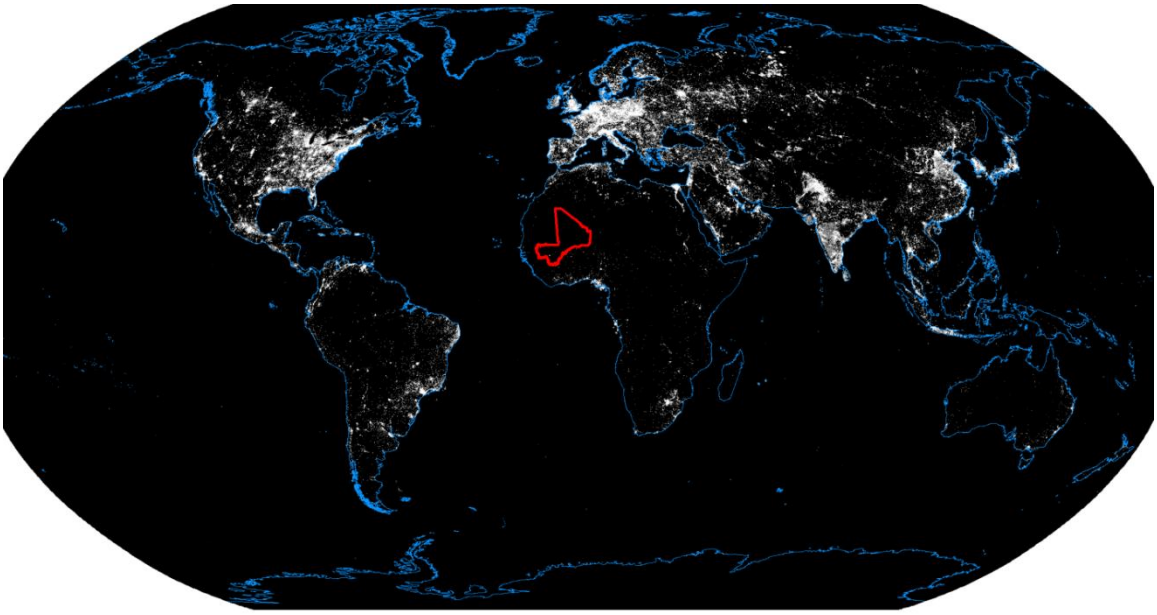
Executive Summary

Introduction

1. **This study discusses the impact of economic geography and (low) population density on development outcomes in Mali and explores how policies to reduce poverty could be made more effective by taking these two factors into account.**

2. **Economic geography and development are intricately related, globally and locally**. This can be illustrated with the map of night-time light intensity (Figure 1). The map not only demonstrates the footprint humans leave on the earth, night-time light intensity is a good proxy for the amount of income earned in a given location. The brightest spots on the map are found in the northern hemisphere (Europe, the east coast of North America, the Indian subcontinent) and in coastal areas (particularly in south-east Asia). Africa is the continent with the lowest light intensity. Within Africa the Sahel is particularly dark, a reflection of the combined effects of low population density and low per capita incomes. Mali, which borders are depicted on the map, only has one bright spot (Bamako), if it can be discerned at all. The map serves as reminder of the inequalities that exist between countries, and illustrates how markets favor certain locations over others: bright areas come in clusters suggesting that it is easier to develop in locations close to areas of great wealth. For those who do not live in such locations, the ability to trade goods is important: one finds greater night-time light intensity in coastal areas.

Figure 1: Night-time light intensity in 2012



Source: Staff calculations, using DMSP stable lights 2012.

3. **Many of Mali's development challenges have a spatial dimension.** Mali is the 5th largest country in Africa, it covers 4.1 percent of Africa's land mass and hosts1.5 percent of its population. Per capita incomes are amongst the lowest in the world and being land-locked and

located in a neighborhood of limited wealth, its opportunities for growth and development are constrained. Mali cannot benefit from wealthy neighbors, population density is low and large distances to West Africa's coast limit opportunities for trade. Poverty is widespread and significant spatial economic inequalities exist within the country. 40 percent of GDP is earned in Bamako for instance. This economic dominance of the capital city spills over into welfare outcomes: a person born in Bamako can expect to enjoy a level of per capita consumption that is two and a half times higher than that of a person born in Ségou or Sikasso. The same person from Bamako can also expect to live more than 6 years longer.

4. **The crisis in north Mali which started in 2012 and continues to date has brought questions of economic geography to the center of attention**. The crisis raised questions about whether it was fuelled by high levels of poverty and low levels of service delivery, whether too many, or too few resources were spent in the north, whether it is reasonable to expect a comparable level of service delivery in low density areas (the north) where unit costs are higher and whether improved service delivery in the north could help secure peace.

5. **To help answer such questions, and to analyze how to reduce poverty in Mali as a whole, this study uses different sources of information to analyze the diversity of livelihood patterns, in access to services and in living standards**. The study uses quantitative information from household surveys, population and firm censuses, administrative and geographic data and qualitative information about livelihoods. By combining data from different sources we are able to shed new light on various development issues: how different sources of income are associated to poverty reduction, why poverty in Sikasso remains stubbornly high (though it may be lower than previously thought) as well as the relationship between improved access to markets, poverty and vulnerability. We discuss how differences in service delivery are associated with population density and show the primacy of Bamako in the formal economy of the country. In the final section we explore what it would take to reduce poverty by half by 2030.

6. **The 2009 World Development Report (WDR) on Economic Geography offers useful guidance to policy makers grappling with issues of economic geography**. The WDR argues that to reduce poverty, economies need to integrate economically. To this end, policy makers have three instruments at their disposal: spatially-blind institutions (i.e. services that are offered to all, irrespective of where one lives); connectivity (such as roads and railways), and spatially targeted interventions (such as special incentives for enterprises, public works, agriculture extension schemes, training programs). This study argues that the authorities will need to employ all three policy instruments, while emphasizing that if the objective is poverty reduction, most attention should be focused on spatially blind approaches.

7. **A number of new analyses have been prepared to inform this study**. A reclassification of Mali's rural and urban areas based on population density allows us to re-estimate the degree of urbanization; a re-estimation of the poverty line addresses problems with food-shares in the existing poverty lines, while a comparison between asset based and consumption based poverty measures raises questions about the accuracy of the (consumption based) poverty estimates for Sikasso. Integration of census and household surveys with information on livelihoods permits us to link information about changes in poverty to sources of income and growth –something that was not possible before. The study is informed by new

estimates of market access (using population density and infrastructure) and of the size of informal cross-border trade between Mali and Algeria. Finally, poverty- growth projections shed light on the question whether significant reduction in poverty can be achieved by 2030.

Location, Population and Livelihood

8. **Using a measure of population density to define rural and urban areas, we find that Mali's economy is predominantly rural:** 73 percent of the population resides in rural areas. We identify 75 towns and cities hosting 3.9 million people—out of a population of 14.5 million. Bamako is the dominant city. It hosts more than 2.1 million people (15 percent of the population), five times more than the next three largest cities combined: in Ségou, Sikasso and Kayes live 166,000, 143,000 and 127,000 people respectively (3 percent of the population).

9. **Agriculture remains important, in rural areas but also in cities**. In rural areas 86 percent of all jobs are in agriculture as opposed to 3 percent in Bamako. Agricultural jobs represent a significant portion of employment; in small cities with less than 30,000 people, 43 percent of people work in agriculture; in cities with over 30,000 inhabitants this is 24 percent (it is 3 percent in Bamako). Inversely, the shares of administrative jobs, of service jobs and, above all, of trade activities increase with city size. In the four largest cities, trade jobs account for 28 to 32 percent of employment.

10. **The location of formal activities is skewed towards Bamako**. Irrespective of whether one considers the number of formal enterprises, or their turnover, Bamako is the dominant location. The primacy of Bamako in generating income is such that with 15 percent of the population about 40 percent of GDP is generated. With 18 percent of GDP, the region of Kayes is another important contributor to GDP followed by Sikasso (12 percent) and Koulikoro (11 percent).

11. **In the face of rapid population growth, Mali is urbanizing**. The population of Bamako grew at 3.7 percent on average per year between 1987 and 1998; between 1998 and 2009 growth accelerated to an annual average of 6.1 percent. At this rate of growth, the population of Bamako will exceed 4 million by 2020.[1] By contrast, between 1998 and 2009, secondary cities and rural locations grew at 3.6 percent and 2.3 percent respectively. Because cities grow at a faster pace than rural areas the country is urbanizing. In this context it is worthwhile to note the rapid, and increasing, rate of general population growth: the population growth rate accelerated from about 1.6-1.7 percent between 1976 and 1987, to 3.1-3.6 percent between 1998 and 2009. Such a rapid rate of population growth has consequences for jobs, unemployment and the demand for social services. It increases pressure on cultivable (irrigated) land and access to water and has the potential to become a driver of social change and possibly even conflict in the future.

12. **While Bamako's population increased rapidly, agglomeration effects are not leading to a process of economic growth and transformatio**n. Between 2001 and 2010 per capita

[1] The crisis in Côte d'Ivoire may have contributed to the acceleration of Bamako's growth, as migrants who used to travel south, opted to go to Bamako instead. If this is the case, the growth of Bamako can be expected to slow down as the economy of Côte d'Ivoire picks up.

income growth hovered around 1 percent per annum for most households, except for the top 10 percent who became less well off. Decomposing the overall change into two periods, 2001-2006 and 2006-2010, we find that the city transformed from a place with high levels of per capita growth in the early 2000s to a place in which per capita consumption growth is negative. This lack of dynamism is corroborated by other evidence: a comparison of the 2009 and 1998 population censuses shows that the sectoral composition of jobs has changed little; macro-economic statistics show that the secondary sector (which is largely located in Bamako) did not grow – at least not in per capita terms.

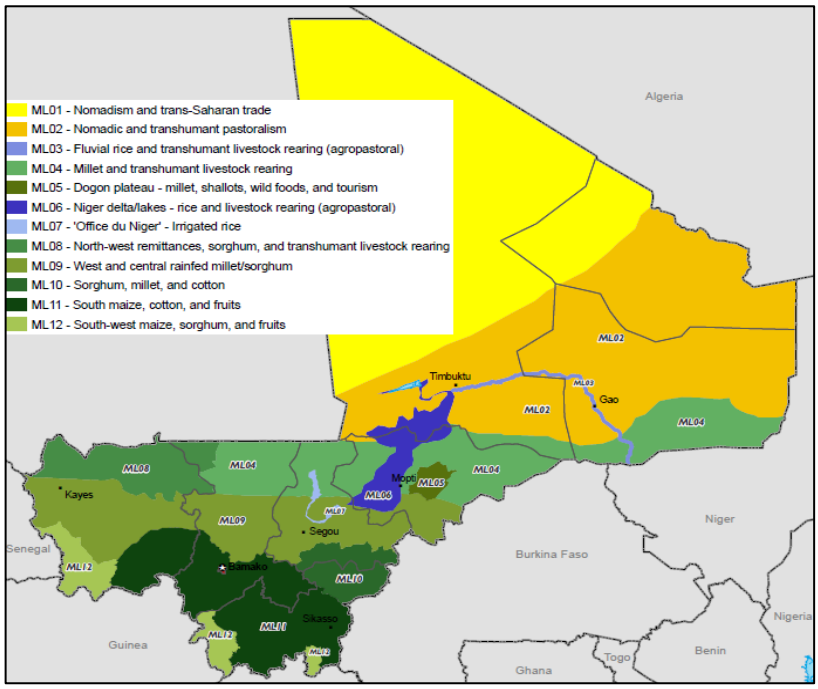
13. **Higher levels of consumption in Bamako are largely explained by higher levels of education**. Levels of consumption in Bamako are on average twice as high as elsewhere in the country. This can be attributed to levels of education being much higher in Bamako. Bamako also attracts the most qualified migrants (79 percent of internal migrants with a tertiary education end up in Bamako; by contrast only 55 percent of migrants with no education go to Bamako).

14. **Livelihoods in Mali vary from nomadic trade and pastoralism, to sedentary farming and fishing to living as city dweller and come with a clear spatial demarcation**. Rainfall is a decisive factor in identifying different rural livelihood areas as rainfall drives the degree of dependence on livestock herding in certain areas, the use of arable land in others and the degree of dependence on labor and other sources of income. Following the rainfall pattern, four broad livelihood areas are identified: (i) the dry area of the north, (ii) a transitional area stretching from Kayes in the west to the border with Niger in the east, (iii) the agricultural area of the south and (iv) various smaller areas defined by the potential to irrigate using water from the Niger river. Each of these areas can be further subdivided into a total of 12 rural livelihood zones and one urban livelihood zone (Bamako).

- *In the dry area nomadism, transhumant pastoralism and long distance trade are dominant. Kidal, Gao and Tombouctou lie in this area.* Households living in this area have strong commercial and social ties with Algeria, but also with Niger, Burkina Faso and Mauritania (livelihood zones 1 & 2 in Figure 2).

- *In the transitional area households rely on a mix of income derived from transhumant livestock rearing, remittances from migration and agriculture as*

Figure 2: Livelihood zones identified for Mali



Source: FEWSNET 2010.

rainfall is too low to make a living based on crop income alone. The further south one goes in this area, the less the dependence on livestock and the greater the importance of cultivation. The location of this transitional zone means that it dominates the north-south commercial axis with grain moving from the south towards the food deficit dry area in the north, and with livestock and seasonal migrants moving from the north towards the south (livelihood zones 4, 5, 8 & 9 in Figure 2).

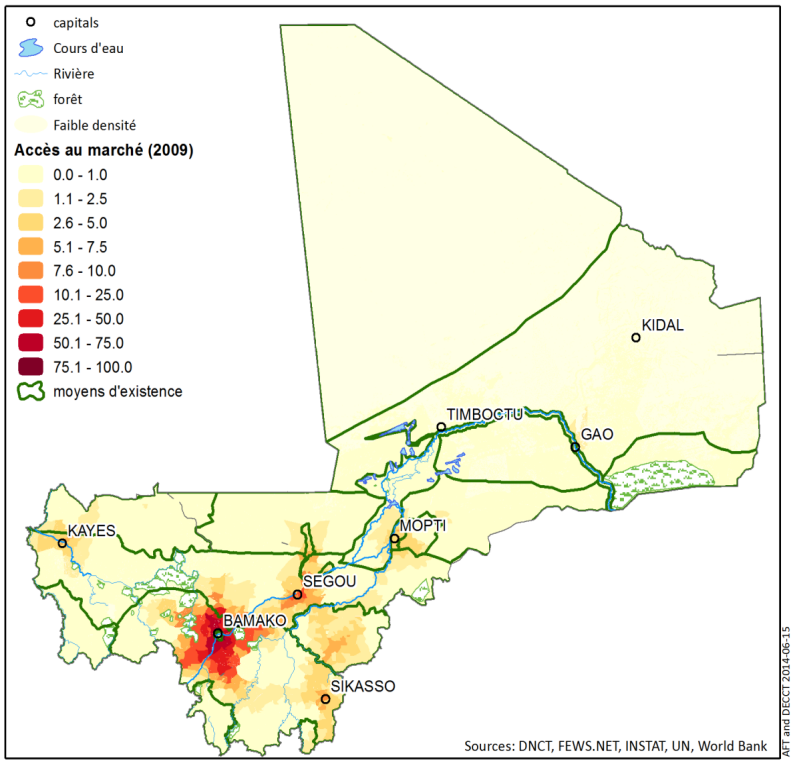
- *The agricultural area in the south where farming is most productive.* Income from livestock is no longer important in this area as rainfall is adequate for households to fully depend on income from cultivation. The main crops grown are cereals (sorghum, millet and maize), cotton as well as fruits. It is the area with the highest population density but also the area with the largest number of poor people (livelihood zones 10, 11 & 12 in Figure 2).

- *The potential to irrigate defines the last livelihood area.* This area includes the fluvial basin of the Niger stretching from Tombouctou to the international border between Mali and Niger, it includes the delta stretching from Tombouctou to south of Mopti as well as the Office du Niger, a manmade irrigation scheme reclaimed from the Sahel by irrigation canals and dams (livelihood zones 3, 6 & 7 in Figure 2).

15. **Livelihood areas not only characterize the ways household earn a living, they are associated with other factors such as population density and household size.** Population density increases with the productivity of the land and varies from less than 2 inhabitants / km^2 in the dry and inhospitable livelihood area of the north, to 18 in the transitional area to over 52 inhabitants / km^2 in southern Mali. Livelihood zones with irrigation potential have higher levels of population density than their surrounding areas: 27 inhabitants / km^2 in zone 3 along the borders of the river Niger as opposed to 1.9 in zone 2 through which the river flows; 33 inhabitants / km^2 in zone 6, the Niger delta as opposed to 7.7 in zone 4 in which the delta lies; 181 inhabitants / km^2 in the Office du Niger as opposed to 28 in the surrounding livelihood zones. Family size is also correlated with the different types of livelihood. The largest families (around 11 household members) are found in the southern agricultural area and smaller families (average household size of 7 to 8) in zones where fisheries and commerce are dominant (the dry area and zones with irrigation potential). The presence of large families in livelihood zones where agriculture is dominant is explained by the fact that labor markets function poorly (a characteristic common to all land-abundant tropical, rain-fed agriculture), which in combination with very high demands for labor during the short planting season, creates a preference for family labor.

16. **Access to markets, seasonal variations in consumption and differences in malnutrition are associated with different livelihood zones**. Access to markets (calculated as the number of consumers that can be reached within a given time frame) is best around the urban centers of south Mali (Figure 3), it is relatively good in the high agricultural potential areas of the south and poor in all other areas. The livelihood area with (irrigated) agricultural potential in the north such as the fluvial basin of the Niger (zone 3) and the Niger delta (zone 6) are characterized by limited market access. Differences in market access are, in turn, associated with differences in consumption vulnerability, which is the combined effect of low average levels of consumption and seasonal differences in consumption (possibly because the poorest who depend on food purchases pay higher prices in isolated areas). Of particular concern is the variation that occurs in the northern livelihood zones in which households practice agriculture (zones 3, 4, 5 and 6) but not in the desert (zones 1 and 2) where –at least prior to the security crisis, levels of household consumption were relatively elevated and its seasonal variation limited. The northern agricultural zones are also the zones where levels of acute malnutrition (wasting) are highest. By contrast, levels of chronic malnutrition (stunting) are particularly high in the southern parts of the country, where households rely almost exclusively on income from farming and where little animal protein is consumed.

Figure 3: Access to Markets.



Source: RGPH 2009. Authors' calculations.

Poverty and Inequality

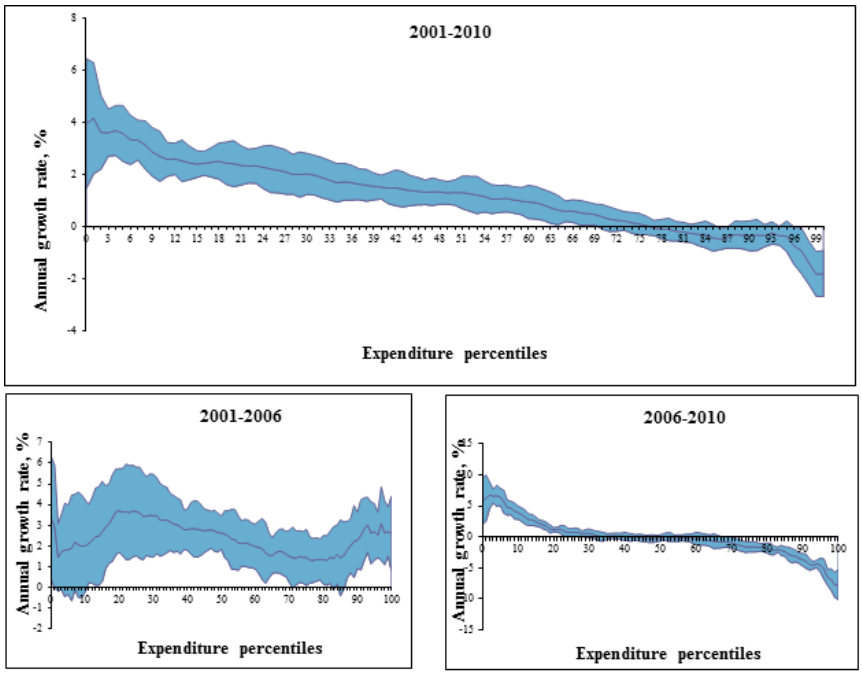
17. **Between 2001 and 2010 poverty as well as inequality decreased rapidly. Poverty incidence declined from 51 percent to 41 percent; the Gini coefficient dropped from 0.40 to 0.33**. Despite the decline in poverty incidence the number of poor increased by around 360,000 as a consequence of Mali's high population growth. The number of non-poor increased by approximately 3 million.

18. **The evolution of poverty since 2010 is not clear. In 2001, 2006 and 2010 EMEP/ELIM surveys collected comparable consumption information from which poverty**

estimates could be derived. In 2011 and 2013 EMOP surveys were fielded which collect consumption information differently. Consequently poverty estimates before and after 2010 should not be compared. A comparison of information from EMOP 2011 and 2013 suggests that in south Mali (the north was not covered by EMOP 2013) per capita consumption declined by 10 percentage points. Macro data and predictions from a general equilibrium model of the economy contradict this and suggest consumption declined by 2 percent per capita. Depending on which estimates are used to predict poverty starting from the latest comparable survey, one finds that all gains in poverty reduction were wiped out (poverty incidence returned to 51 percent) or that there was hardly any change since 2010. The EMOP data for 2013 are preliminary and it is critical that a final dataset becomes available. It is even more important that a survey is fielded that collects consumption information that is comparable to what was collected by EMEP/ELIM.

19. **Information on the ownership of consumer durables is comparable across surveys.** Ownership increased significantly between 2001 (EMEP) and 2011 (EMOP) and stagnated thereafter. Since 2001 the fraction of households owning fridges doubled from 5 percent to 11 percent, while the ownership of televisions almost tripled going from 14 percent to 37 percent. The increase of mobile phone ownership amongst households is remarkable. It increased from virtually zero in 2001 to 67 percent in 2011. A similar trend is observed with respect to motor bikes. Over the course of one decade ownership more than tripled from 17 percent to 48 percent. The increase in asset ownership among households can be attributed to the drop in real prices for many consumer durables and the increase in disposable income amongst the poorest households. Post 2011 asset ownership declined slightly.

Figure 4: Growth incidence curve national level: 2001-2010(*)



(*) The band around the line represents the 95% confidence interval

20. **To better understand the drivers of change in poverty, we focus our analysis on the 2001-2010 period for which three comparable household surveys are available**. Over this period per capita consumption increased 2.2 percent, from FCFA 142,000 to FCFA 145,000. That this tiny increase in consumption is associated with a 10 percentage point decline in poverty is explained by the fact that for the poorest consumption grew most rapidly, while for better off households consumption grew slowly or even declined (for households in the top wealth quintile

consumption fell – see Figure 4). These results have to be interpreted with care because the large dependence on rain fed agriculture implies that weather differences are likely to have more consequences for (short-term) welfare than policy changes. Moreover difficulties with the way in which consumption quantities are 'priced' (using local prices, implying low monetary levels of consumption in the grain baskets of the country) call for caution in the interpretation of consumption and poverty data, including the data presented on the 2009 poverty map.

21. **Most of the decline in poverty was realized between 2001 and 2006, while between 2006 and 2010 little changed.** This is illustrated by the growth incidence curves at the bottom of Figure 4. It shows how between 2001 and 2006 per capita incomes increased for all wealth groups. This changed in the period between 2006 and 2010. Now only the poorest households experienced positive consumption growth. The middle class experience no growth and per capita consumption for those in the top 30 percentiles declined.

Table 1: Poverty incidence, population and population density by livelihood zone

Zone	Description	2001	2006	2010	Population	Density
1	Nomadism and trans-Saharan trade	12.7	42.3	37.5	69,762	0.2
	Standard error	3.4	10.4	5.0		
2	Nomadic and transhumant pastoralism	20.6	17.1	22.3	593,743	1.9
	Standard error	7.9	4.6	2.3		
3	Fluvial rice and transhumant livestock rearing	46.0	37.8	29.7	165,566	27.3
	Standard error	8.9	9.6	3.7		
4	Millet and transhumant livestock rearing	68.2	42.5	58.2	1,043,451	7.7
	Standard error	4.7	4.2	4.3		
5	Dogon plateau -- millet, shallots, wild foods and	82.4	87.5	40.7	264,780	44.5
	Standard error	4.0	9.9	9.2		
6	Niger delta - rice and livestock rearing	23.7	19.5	29.6	881,758	33.0
	Standard error	4.9	5.3	2.9		
7	Office du Niger (irrigated rice)	40.8	57.0	21.2	351,805	180.9
	Standard error	8.3	9.2	6.3		
8	North-west remittances, sorghum and transhumant	62.6	30.4	19.6	791,037	18.4
	Standard error	4.4	3.7	3.8		
9	West and central rain-fed millet/sorghum	49.9	45.7	42.5	3,357,547	27.7
	Standard error	I	2.6	2.9		
10	Sorghum, millet and cotton	54.6	70.9	74.3	1,291,649	52.3
	Standard error	6.7	5.4	3.9		
11	South maize, cotton and fruits	71.8	56.2	52.0	3,393,992	33.7
	Standard error	3.0	2.8	3.1		
12	South-west maize, sorghum and fruits	80.1	63.0	52.7	510,350	19.2
	Standard error	5.6	6.4	6.0		
13	Bamako	14.1	6.3	7.6	1,810,366	7,380.0
	Standard error	3.4	2.3	1.1		
	Mali	50.9	41.7	41.1		
	Standard error	1.7	1.5	1.3	14,525,806	11.6

Source: ELIM 2001, 2006 and 2010. RHPH 2009. Authors' calculations.

22. **Internal (permanent) migration was not a driver of poverty reduction**. Decomposing the change in poverty that occurred between 2001 and 2010 (a decline by 9.9 percentage points) we find that most of this change (9.4 percent) was due to a reduction in poverty amongst people

who continued to reside in their location of origin (mostly in rural areas). The contribution to poverty reduction of people shifting from rural to urban areas is tiny (0.3 percent) suggesting that most of the migrants who move to urban areas were non-poor in their location of origin.

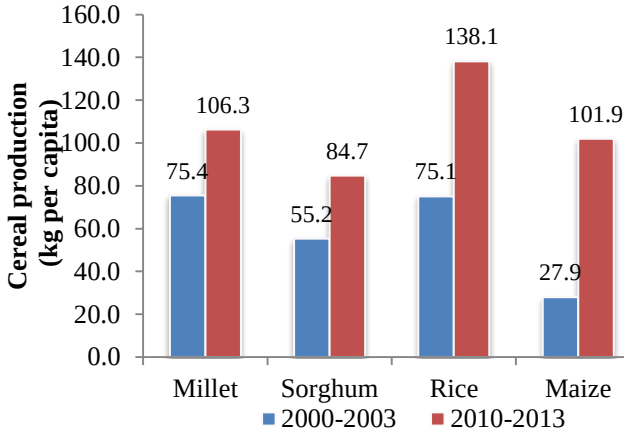
23. **Even though the household surveys were not designed to be representative by livelihood zone it is possible to estimate poverty by zone**. We present these estimates in table 1 but urge the reader to take into account the standard errors when interpreting the results as in some instances they are larger than usual.

24. **As rule of thumb poverty is highest in southern zones where households rely on rain fed agriculture (zones 4, 5, 9, 10, 11 and 12) and lower in the north of the country**. Households depending on nomadic and transhumant pastoralism living in zone 2, those depending on irrigated agriculture (zones 3, 6 and 7) and those in north west Kayes who combine income from remittances with livestock rearing (zone 8) are comparatively better off: their levels of poverty are below 30 percent. With a rate of poverty of 74.3 percent the incidence of poverty is highest in the area south of Ségou where sorghum, millet and cotton are grown (zone 10). The incidence of poverty is lowest in Bamako (7.6 percent) and in zone 8 in north-west Kayes (19.6 percent).

25. **In south Mali's most populous areas (zones 9, 10, 11 and 12) divergent poverty trends are observed**. In zone 10, the area south of Ségou, poverty increased from 55 percent in 2001 to 74 percent in 2010. By contrast in west and central Mali (zone 9: millet and sorghum) and in the two most southern zones (zones 11 and 12 where maize, cotton, fruits and sorghum are grown) poverty decreased. Particularly in the latter two zones did poverty decline significantly from 72 percent in 2001 to 52 percent in 2010. The divergent patterns of poverty reduction within the region of Sikasso (zones 10, 11 and 12 lie in Sikasso region) challenge the view that poverty in Sikasso is stagnant. Whereas this is holds for the regional as a whole, at sub-regional (zonal) level considerable dynamism.

26. **Rapid reductions in poverty and in inequality in livelihood zones 7, 11 and 12 where rice and maize are grown are closely associated with increased production of cereals**. Driven by increases in the production of maize and rice, per capita cereal production doubled between 2000 and 2010 (Figure 5). The close association between reductions in poverty and cereal production is no surprise. For poor households who rely, in part, on casual labor to supplement their income from cultivation and who purchase much of their food needs, increased cereal production affects their standard of living positively through three channels: (i) increased own production means higher incomes, (ii) increased cereal production leads to more demand for farm labor, and (iii) increased cereal production exercises downward pressure on (rural)

Figure 5: Cereal production per capita (annual averages)



Source: Ministry of Agriculture 2014

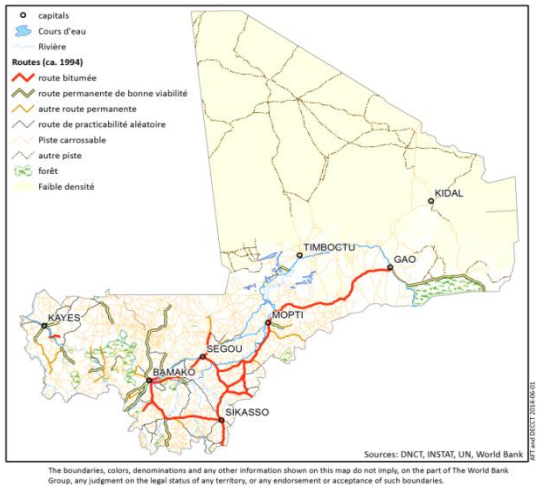
food prices. It is noteworthy that poverty amongst households living in the Niger delta (zone 6) has increased, suggesting that they have not been able to benefit from increased rice production – the reason why deserves to be explored.

27. **For households in livelihood zone 8 whose incomes come from remittances, sorghum cultivation and transhumant livestock rearing, the rapid decline in poverty is the combined effect of increases sorghum production (Figure 5) and a three-fold increase in per capita remittances.** We find no association between (the value of) cotton production and poverty reduction. This may be because ever since financial and management problems started to plague the CMDT, cotton is primarily grown by non-poor households while poor households switched to cereals. Consequently increased cotton production only benefits poor households indirectly through the labor market and through improved market accessibility and the increased availability of inputs brought about by the CMDT.

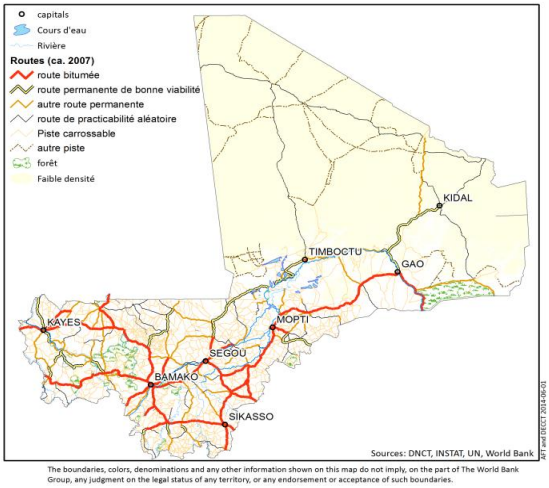
28. **The steady decline in poverty in livelihood zone 9 (west and central), but also in zones 8 (north of Kayes) and 12 (south of Kayes) coincides with increases in infrastructure (Figure 7).** The newly built infrastructure has substantially improved connectivity between Bamako and Senegal, a response, in part to the civil war that broke out in Côte d'Ivoire in 2002 and the opening of large gold mines in the region. Beyond that, infrastructure development kept pace with increases in population (between 1994 and 2007 Mali's population almost doubled).

Figure 6: Road infrastructure in 1994 and 2007

1994

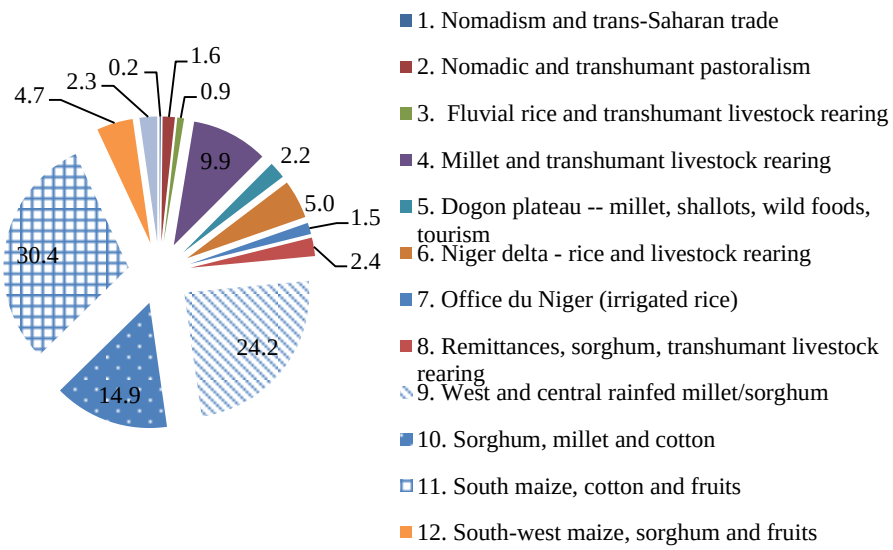


2007



29. **Using consumption as metric to identity the poor we find that 70 percent of all poor reside in three livelihood zones: zones 9 (west and central rain-fed millet/sorghum), 10 (north Sikasso: sorghum, millet and cotton) and 11 (south Sikasso, maize, cotton and fruits).** Amongst these zone 10 stands out as poverty in this area is on the increase! The high incidence of poverty in this zone 10 remains a puzzle. The agricultural potential of this zone is high and because of its association with cotton, market accessibility and the availability of inputs are relatively good. One explanation for the increase in poverty may be that data collection for ELIM 2010 coincided with a period of adverse weather. Another explanation is that high levels of population density (over 52 inhabitants/ km^2) and increasing land scarcity have made it difficult for households in this region to recover from the collapse in cotton production. A third explanation is that there may be a measurement problem as food prices in cotton production areas tend to be low (cotton and maize are often cultivated together), leading to a low valuation of quantities consumed (as local prices are used). Additional research will need to shed light on this, but one piece of conflicting evidence comes from measuring poverty using an asset index. When this index is used the vast majority of the poor are still in south Mali, but now distributed more evenly across space.

Figure 7: Distribution of poor people across livelihood zones



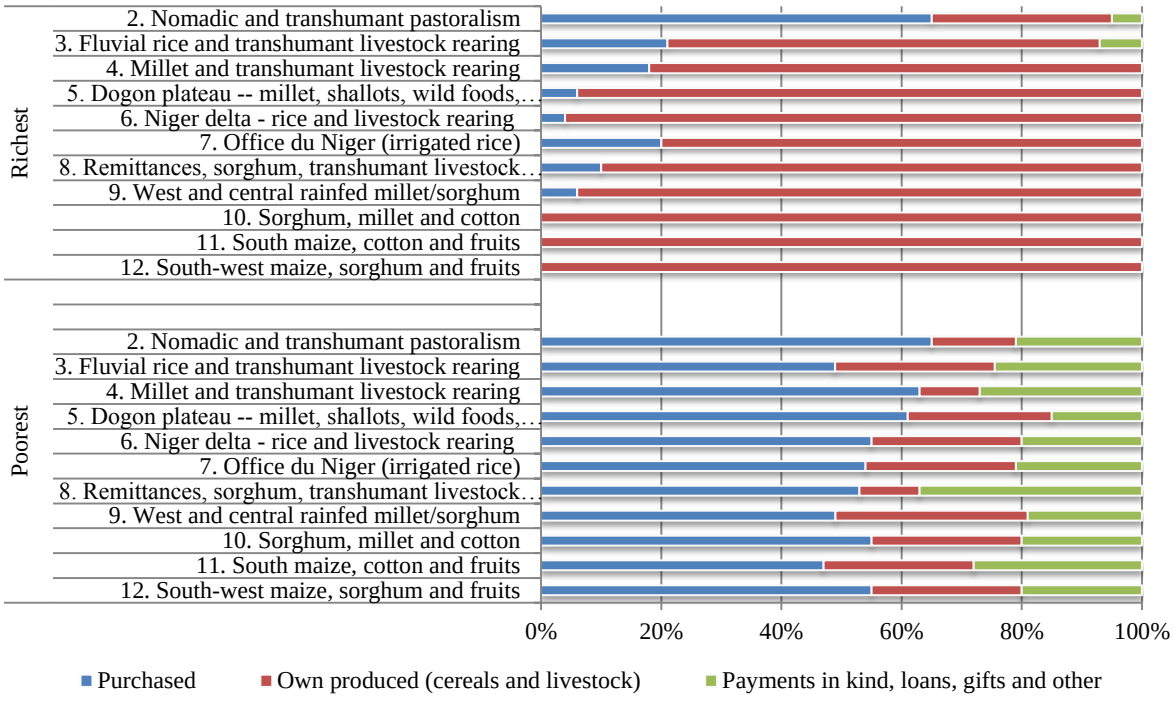
Source: ELIM 2010. Authors' calculations.

30. **As land for rain-fed farming is still relatively abundant the difference between poor and non-poor households in agricultural areas is largely determined by the ability to bring land under cultivation**. Poor households lack the able-bodied household members, the assets and access to inputs to cultivate substantial areas. Because poor households cultivate relatively small areas of land, own production is insufficient to cover their needs. As a consequence they purchase a large share of their food needs using cash earned through paid labor. This is illustrated in Figure 8 which shows how the poorest households in all agro-ecological zones (with the exception of zone 2) obtain the bulk of their food from purchases. Wealthy households, by contrast, meet most of their food needs from own-production. Poor households are thus dependent on food and labor markets, a dependence that may seem at odds with the perception of poor households as subsistence farmers.

31. **As net purchasers of food and as active participants in the labor market, well-functioning markets are critical to the welfare of poor households**. Low food prices –often considered critical for the urban poor - are equally important for poor people living in rural areas. Poor households are particularly vulnerable when food prices rise and casual labor opportunities are absent; for pastoralists the worst possible combination is one of falling livestock prices and rising food prices, a combination that typically occurs when a covariate shock (drought, insects, insecurity) affects an area.

32. **Policies that increase the demand for labor from poor pastoralists (the Office du Niger typically offers ample opportunities for seasonal labor) may be more astute to reducing poverty than interventions aimed at cattle or other large animals**. In zones where pastoralism is important, the poorest lack the livestock to be considered true pastoralists and their ownership of animals remains limited to poultry and at times a goat, a donkey or a sheep. Like poor farmers, the poorest 'pastoralists' thus depend on labor opportunities offered by middle class and better-off households and even interventions that focus on small ruminants can be expected to benefit non-poor households disproportionately.

Figure 8: Origin of food consumed by livelihood zone and household wealth



Source: FEWSNET 2010.

33. **Poor health reduces labor productivity and affects poor households disproportionately.** Malaria is a particularly important acute source of risk. Malnutrition is a more chronic risk: high levels of anemia (in part caused by frequent bouts of malaria and regular infections) and stunting caused by poor diets (poor households rarely drink milk) reduce labor productivity. Interventions to improve the health of Malians would not only be desirable in their

own right, it would have an immediate economic benefit as it would improve labor productivity. Moreover it would be a pro-poor policy measure. Not only is the capacity to work is the main (and often only) asset of poor households, with fewer able bodied household members, poor households are particularly vulnerable to the negative welfare consequences of a health shock.

34. **The poorest often lack the means to migrate to casual labor opportunities, either because they have too few able-bodied household members or lack the cash to pay for transport**. Many households engage in temporary labor migration as it offers an important source of cash, more so to households in the north where livelihoods are more uncertain and opportunities for work more restricted. Very poor households, however, lack the means to move to where demand for labor is highest and depend on casual labor opportunities nearby.

Population density and service delivery

35. **Low population density creates trade-offs between equity (access to public services for all) and efficiency (providing service access to as many people as possible for a given budget).** The unit cost of service provision is largely determined by fixed costs in relation to the number of people that use a service. Services requiring large investments such as piped water or electricity can only be offered in a cost-effective manner in areas where population density is high: cities. To offer a comparable service in a low density area, a service would have to require lower fixed costs. This explains why tarmacked roads are found in cities, and dirt tracks in low density areas like rural villages. It also explains why the provision of the same level of service in north Mali (where population density is low) will cost more than elsewhere in the country.

36. **Low levels of income, a small public resource envelope, low population density and a large unmet demand for public services, make the question how to make public services cost-effective, pressing**. How pressing this problem is can be illustrated with an example for secondary schools. Imagine that the maximum distance a secondary student can be expected to travel is 7 km (one way). The catchment area of a school is then 154 km^2 (πr^2). Next assume that a secondary school requires at least 250 students to operate in a cost-efficient manner. We know that 30 out of every 100 children complete primary school and are eligible to go to secondary school (Figure 11) and that children of secondary school age (those aged 13-18) make up 14 percent of the population. We can now calculate that to run a secondary school efficiently, population density needs to be about 39 people per square kilometer. Only 50 percent of the population of Mali lives in such areas. Does this mean that half the population should be deprived of the opportunity access to a secondary school? This example illustrates not only how efficiency is a prerequisite to achieve equity (spatially blind service delivery), it also shows that efficiency and equity are related to aspects of quality (if the primary school retention rate were higher, the density requirement for secondary schools would go down). The example also makes clear that the challenges of service delivery in low population density areas extend beyond north Mali. Only 12 of the 50 percent who live in areas with too low a density to offer secondary education stay in the north. The remainder lives elsewhere.

37. **To explore how to make public services available to all three case studies are presented.** They have been selected because they require different levels of fixed costs (relatively low in the case of primary education; high in the case of electricity) and because of

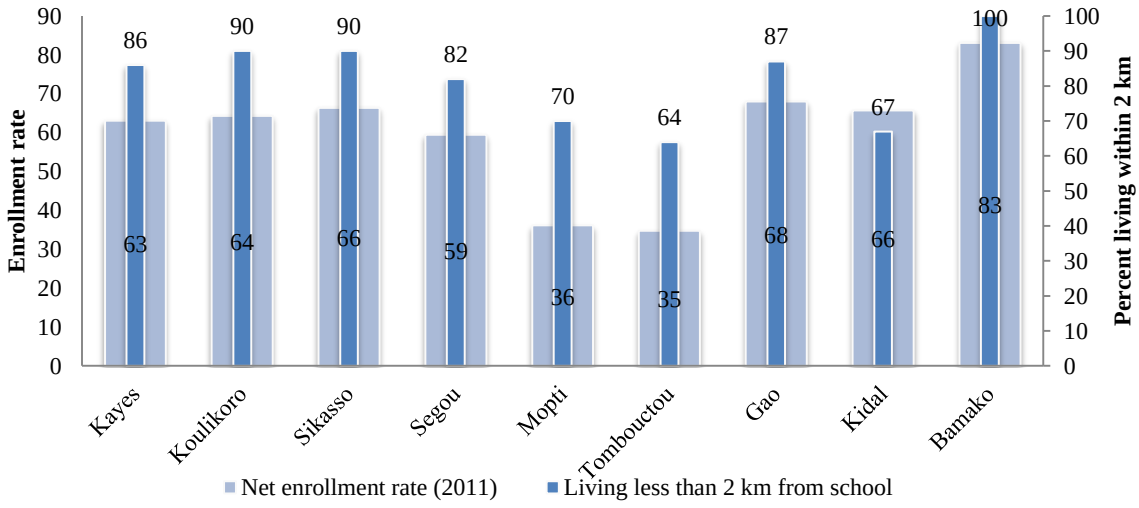
their relevance for economic integration (access to markets). Based on these case studies some policy implications are presented at the end of the section.

Primary education

38. **Levels of education in Mali are very low.** Almost sixty percent of the population aged six and above has no education at all, approximately 35 percent has primary education and less than eight percent has secondary education or higher. In the northern regions of the country, Mopti, Tombouctou and Kidal more than 80 percent of the population has not gone to school at all. In Bamako the situation is better but even here as many as 34 percent of the population never went to school. With an average of 2.38 years of education, Malians aged 15 and above are the third least educated in the world.[2] Only Mozambique and Niger do worse.

39. **Despite improvements, school enrollment remains low.** According to the EMEP/ELIM surveys net primary school enrollment increased from 31 percent in 2001 to 54 percent by 2010. Enrollment varies across the country from as low as 35 percent in Tombouctou and Mopti to 83 percent in Bamako (Figure 9). The poorest households who had the lowest enrollment rate in 2001 benefited most (in relative terms), but failed to close the gap in enrollment with the richest households. In 2010, the net enrollment rate for children from the poorest households was 46 percent; for children from the wealthiest households it was 71 percent. Enrollment in secondary schools went up from 10 percent in 2001 to 28 percent by 2010.

Figure 9: Net primary school enrollment and fraction of population living within 2km and 5km from primary school



Source: EMOP 2011 (enrollment) and RGPH 2009 (distance). Authors' calculations.

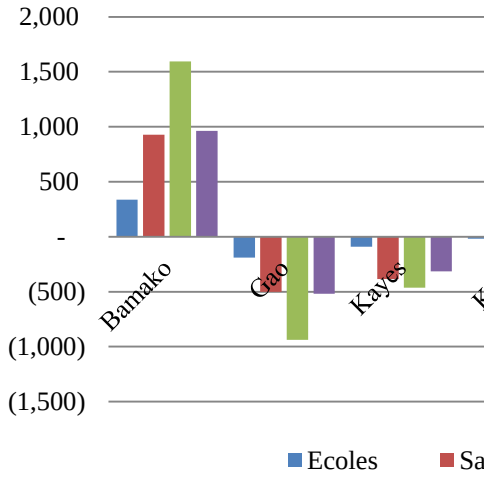
40. **In terms of school construction much has been achieved: more than 80 percent of the population lives within 2 km of a school. Comparisons of the fraction of the population that live within 2 km from a school with enrollment rates, suggest that access is not the**

[2] Data downloaded from www.barrolee.com (June 2014). Barro, Robert and Jong-Wha Lee, April 2010, "A New Data Set of Educational Attainment in the World, 1950-2010." *Journal of Development Economics*, 104(184-198).

binding constraint to increased enrollment. As Figure 9 illustrates, in all regions does the percentage of households with access exceed the enrollment rate. The largest difference between enrollment and the fraction of households living close to school is found in Mopti and Tombouctou where more than 60 percent of the population lives within two kilometers of a school, while attendance rates are 35 percent. The size of the gap, particularly in these two regions, argues for a better understanding of the reasons for (non)enrollment.

41. **There are differences in the allocations of school inputs by region, but there is no obvious evidence of one region being favored over another.** To explore the spatial allocation of schools, classrooms and teachers we calculate how many additional (fewer) schools, classrooms and teachers a region should get obtain an allocation that is spatially blind (i.e. it is equal to the national (per capita) average). Doing so (Figure 10) suggests that Bamako, Ségou and Mopti are underserved (they should receive additional schools, classrooms and teachers) while Kidal, Koulikoro, and particularly Sikasso, Kidal and Gao are over-served (they should have less). This approach is only a first approximation as many other factors determine whether a region should get additional or fewer scholastic inputs. Population density in Bamako is so high (and the cost of land so elevated) that it makes sense to have fewer but larger schools. Enrollment rates in Mopti are so low, that it may make sense to expect teachers to teach multiple grades. Gao, Tombouctou and Kidal are so lightly populated that it makes sense to build relatively more schools but schools that are small. This indeed happens. The average primary school in Bamako has 5.7 classrooms, in Tombouctou it only has 3.1 and in Gao and Mopti 3.4.

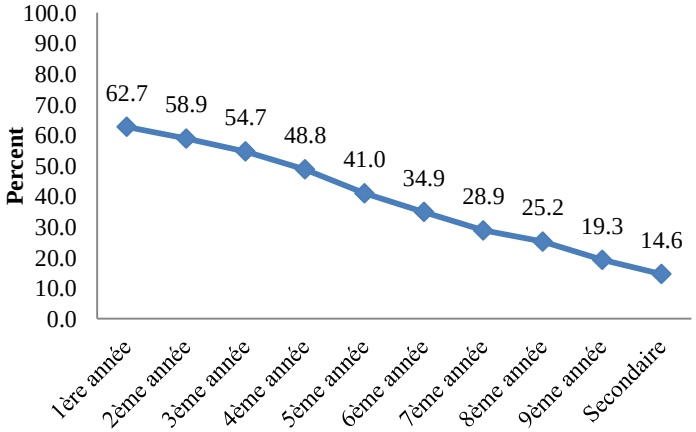
Figure 10: How school inputs would be reallocated if every region had to be at the national average (2010/11)



Source: Ministry of Education Statistical Abstract. Authors' calculations

42. **Addressing the low quality of primary education (a spatially blind policy) is more urgent than reducing differences in the allocation of**

Figure 11: Retention rates in 2013



Source: EMOP, 2013 wave 1. Authors' calculations.

school infrastructure through spatially targeted interventions. Whereas 63 percent of eligible children go to school, only 41 percent reach grade 5 (Figure 11). Education experts consider students who does not complete at least grade 5 a loss as they leave school before they master basic skills in reading, writing and arithmetic. The implication is that because 22 percent of children never make it till grade 5, there are huge efficiency losses. The actual situation is even worse as a national study carried out by PASEC in 2012/13 found that of the students that complete grade 5 only 13 percent are able to analyze a text in French and the express themselves in writing; 16 percent does not have any competence in French while 70 percent is able to extract specific information. The results for mathematics are even more devastating: almost half the students in grade 5 do not master the most basic math skills and only 10 percent performs at grade level.

43. **Low education quality is sustained by high student–teacher and student-classroom ratios and inadequate study materials**. The student-teacher ratio (60 to 1) and the number of students per classroom (62) are so high that it is hard to imagine how effective learning can take place. Moreover, the budget that is made available for education is not used efficiently. A financial audit of the management of school textbooks and teaching materials in 2008 conducted by the Office of the Auditor General revealed (i) the total absence of textbooks in some schools; (ii) overestimated contract amounts and overcharges; (iii) failure to deliver textbooks under several contracts; (iv) non-existence in most cases of allocative keys; and (v) unjustified commitments of CFAF 2.4 billion. Low retention rates, teacher shortages and inadequate procurement processes suggest a need to prioritize the quality of education while exploring the scope for ways to increase enrollment and efficiency in spending. There is an obvious crisis in the primary education sector that needs to be resolved.

Electricity

44. **Unsurprising for a sector characterized by high fixed costs, access to electricity is spatially unequal**. As predicted, access is closely correlated to population density. Only 1 percent of households in villages have access to electricity, 8 percent in rural towns, 17 percent in towns, 45 percent in cities and 68 percent in Bamako where population density is highest. Between 2001 and 2010 access to electricity increased: in urban areas access more than doubled from 28 percent in 2001 to 60 percent in 2010; in rural areas it quadrupled from 2.4 to 11.0 percent but remains strongly associated with rural towns. Access in the country's 10,000 villages remains negligible.

45. **The electricity sector faces three distinct challenges.** First, demand exceeds supply, necessitating load shedding which, in turn, has a negative impact on productivity. A second problem is that the sector is heavily subsidized. In 2014 alone, a subsidy of FCFA 50 billion (USD 100 million) has been budgeted to go to EDM. The third issue is that electricity is not available in rural areas, delaying growth and the reduction of poverty precisely in those areas where most progress needs to be made.

46. **If the objective is for all households to access electricity that can be used by demanding appliances then inequitable access is likely to persist as the entire nation would have to be connected to a network**. If the ambition is re-formulated and the objective is for households to have access to electricity for at least basic appliances then more equitable access is

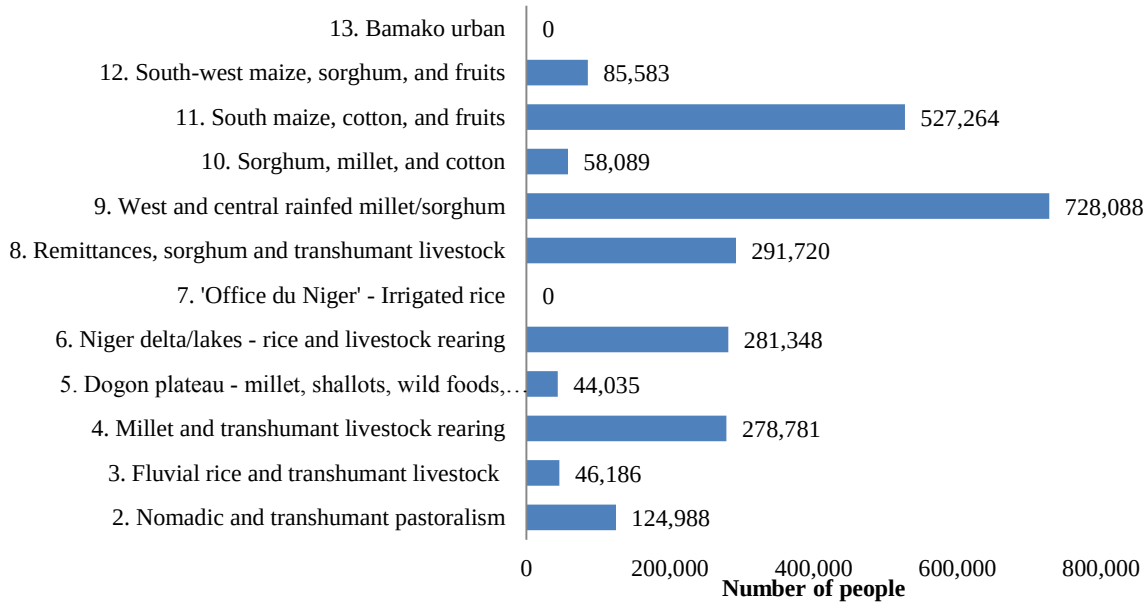
feasible. In that case limited investments in generating power and a network have to be made (mostly to connect urban centers where electricity will be needed for productive purposes) while most of the rural population could be served by local networks in rural towns (to support productive activities) and home based solar devices for less demanding uses such as lighting, playing a radio or charging a mobile phone.

47. **Greater spatial equity in access to electricity could be funded by a re-allocation of the existing electricity subsidy which is targeted to non-poor urbanites, requiring an increase in tariffs**. A reallocated subsidy would probably suffice to purchase one solar unit for every rural household (there are approximately 1.1 rural million households so as much as USD 90 is available per household). Such an approach would enhance equity and help close the rural-urban divide by making electricity provision more spatially blind. The impact of a tariff increase (which would be needed to compensate for the re-allocation of the subsidy) on enterprises can be expected to be limited as most spending on electricity does not make up a large share of their cost: load shedding and power surges are typically much more costly. The impact on urban poverty is insignificant, because the average share of spending on electricity is limited, because incomes in urban areas are amongst the highest in the country and because the poorest households have limited access to electricity in any case.

Access to markets

48. **To assess where to prioritize improving accessibility we estimate the number of households within each livelihood zone that do not live within 10 km of a road** (Figure 12). It suggests that despite relatively favorable access additional infrastructure in zones 9 and 11 (zones with good agricultural potential) could connect more than 1.2 million people to markets. Also the Niger delta deserves to benefit from better access. Not only is current access poor, the agro-ecological potential is high and the number of people that can be reached substantial. Moreover, as will be argued in the next section, better connectivity to the Niger delta would fit well a strategy to enhance security in north Mali through a stepwise approach.

Figure 12: Number of people per zone, living further than 10 km from a market



Source: RGPH 2009. Authors' calculations.

49. **Improving accessibility requires more than constructing new roads alone**. Limited road maintenance renders many roads unusable especially during the rainy season. Only 5 percent of the rural roads are in a good condition and as many as 47 percent are listed as being in a poor condition. Accessibility also means the absence of unnecessary road blocks. There is much to be improved in this respect as Mali is the worst performer in the UEMOA regarding the number of checkpoints per 100 km (2.8 / 100 km as opposed to 1.6 / 100 km in Burkina Faso).

50. **These three illustrations show the importance of enhancing cost-effectiveness if the intention is to offer services in a spatially blind way and to make them accessible to as many people as possible**. Where fixed costs remain high, spatial targeting of investments remains unavoidable (as in the case of roads).

- **A need for prioritization requires clarity about the objectives of public policy.** This is clear for the case of electricity. If the sector pursues an equity objective in addition to serving the productive sector then a strong case exists to increase tariffs and to abolish the existing subsidies in favor of the distribution of solar devices in rural areas. Also the primary education sector could benefit from clearer prioritization: given the discrepancy between enrollment and the percent of households living within 2 km from a school, a re-allocation of investment budget towards additional teachers, the purchase of scholastic materials and other activities that improve the quality of learning seems desirable.

- **A commitment to efficiency.** Wastage is never acceptable and the public sector needs to be vigilant about the unit cost at which various services are provided in different locations. High unit costs in one location imply the service cannot be offered somewhere else. Good planning is essential to avoiding wastage: constructing roads in the absence of means to maintain them, amounts to waste that could easily be avoided. Poor procurement processes and low

retention rates and little learning in primary school equally lead to waste that can be ill afforded.

- **Unit cost reducing innovations.** In a context of budgetary constraints the choice will often be between adopting an innovation and the non-delivery of the service. To address high student-teacher and high student - classroom ratios for example, the authorities could consider the introduction of a double shift system in which teachers teach two classes on the same day: one in the mornings and one in the afternoon. If a double shift system is too demanding for the available teachers, the system could be introduced while hiring additional teachers (maybe from neighboring countries). Instead of building schools in areas where nomadic pastoralism is the norm, ambulant teachers who move with the people could be considered. Identifying successful and scalable innovations and implementing these is an important task for the public sector, particularly in an environment in which (low) population density is such a dominant factor.

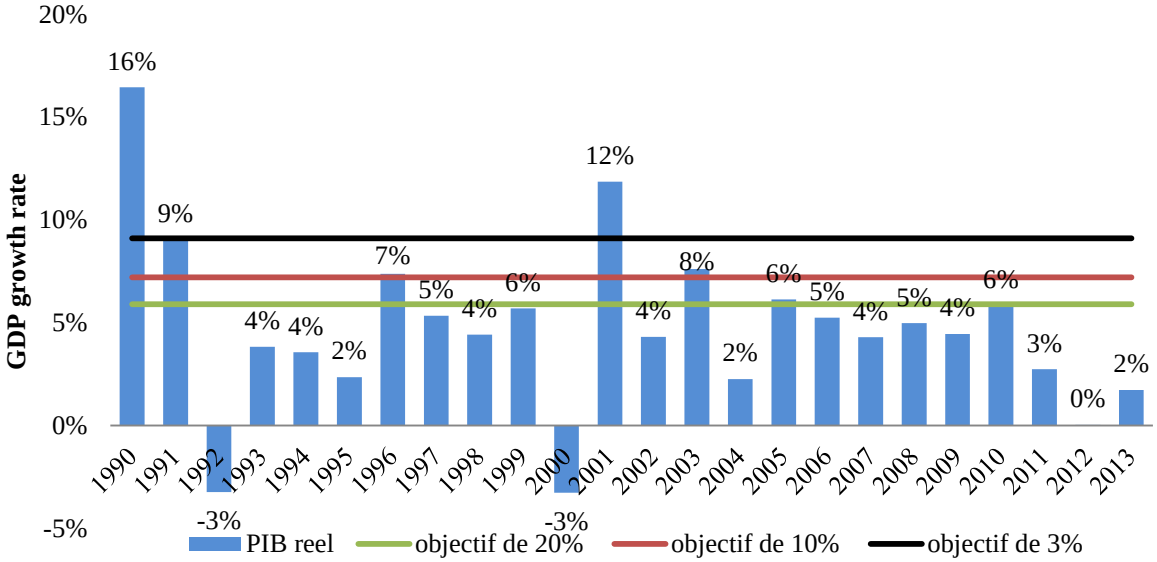
- **Migration.** Temporary labor migration as well as permanent migration are already common, and particularly in very low density areas, motivating people (and businesses) to move to the service rather than the service to the people deserves to be explored as a potentially cost-effective way of dealing with low-density problems. Policies could facilitate permanent internal migration (of businesses and people) by reducing its cost and by increasing its success rate (educated migrants are more likely to succeed than uneducated ones). Policies could also facilitate temporary migration to a service such as through boarding schools or outpatient facilities for pregnant women close to their delivery date.

What will it take to reduce poverty by 2030?

51. **Projections starting at 41 percent poverty in 2010, show that to reduce poverty to 20 percent by 2030 GDP growth has to reach 5.9 percent per annum.** Mali's low degree of inequality implies that even though the incidence of poverty is high, the average distance to the poverty line is not too large. Consequently much poverty reduction can be attained with relatively little growth. Projections show that if the objective is to reduce poverty by half by 2030, the GDP growth rate has to reach 5.9 percent per year on average. If the objectives are more ambitious then the average growth rate would have to be higher. Still even the target of 3 percent poverty by 2030 is attainable with a GDP growth rate that is less than 10 percent per year on average.

52. **The growth rates required to significantly reduce poverty in Mali, exceed the growth achieved over the past two decades.** As Figure 15 shows, growth rates in Mali have fluctuated considerably over the past 20 years and rarely did they reach 5.9 percent. It implies that halving poverty by 2030 is already an ambitious objective (the World Bank's objective is to reduce poverty to 3 percent) which requires a concerted effort to increase growth.

Figure 15: GDP growth rates and growth rates needed to achieve various poverty targets by 2030



Source: Staff calculation using ELIM 2010 and IMF.

53. **When it comes to designing a strategy to accelerate growth, security will need to be restored in the north.** In addition Mali's landlocked status and the large distances to the nearest ports need to be taken into account. Broadly speaking two growth enhancing approaches can be envisaged: (i) a strategy that takes the high transport cost as a natural advantage; and (ii) an export strategy for products in which Mali has a comparative advantage or for products of high value.

- **Taking advantage of Mali's landlocked status by expanding the production of cereals.** The first approach is de facto being followed by the manufacturing sector, which focuses on products that are too bulky, or too costly to be imported from elsewhere. This gives specific local industries a local comparative advantage (production of beverages, electricity; cotton ginning; construction). The potential for growth in this area is limited (although the construction sector may have potential) but Mali has huge potential to export cereals to the regional market for cereals. The Sahel is structurally food deficient (despite the increases in cereal production even Mali imports food) and with its irrigation potential (much of which still needs to be developed) and closeness to these markets, Mali is well placed to serve other landlocked countries with maize, rice and other cereals. Doing so would boost poverty reduction (i) as a strong link has been found between increasing cereal production and reducing poverty, and (ii) as the areas with good potential for cereal production are those where most poor people live. The poverty impact will be particularly large when poor households are able to cultivate more land for instance because investments in human capital improve their capacity to work (labor is the main asset of poor households) or when access to productive assets (including irrigated land) is expanded.

- **Export strategy for high value added products.** In the short run a growth strategy could focus on enhanced agricultural production, but at some point the domestic and regional

markets will be saturated and other sources of growth will need to be found. As domestic demand is too limited to fuel growth and export markets will need to be tapped more systematically. The growth potential of Mali's main exports, cotton and gold, seems limited, and markets will need to be developed for other products. Given the long distances to the port, it seems unlikely that Mali will soon develop a comparative advantage in the production of low value bulk produce, but with Paris only 5 hours away by plane, there is scope for developing exports of high value per unit of volume or services that could be traded through IT technology. High value products that could be considered include leather and leather products, cut flowers, dried fruits or horticultural products. On the service side Bamako is the music capital of West Africa, and Mali's colorful crafts and leather work are appreciated across the globe. Stimulating migration (and the remittances that are associated with it) and tourism present yet another approach to exporting services. Developing any of these markets is a long term objective requiring an educated labor force (which currently does not exist), cheap and reliable communication and internet (does not exist) as well concerted government action for which it is unclear whether the capacity exists.

54. **Poverty can also be reduced through (cash) transfers: the potential of safety nets to significantly reduce poverty is substantial.** Reducing poverty to 3percent by 2030 would take less than 2 percent of GDP in perfectly targeted transfers in combination with 2 percent per capita growth (amongst the poorest households). Done well, a transfer program would not only boost the consumption of households who are currently poor (and hence reduce their poverty), some transfers will be invested thereby increasing productivity and enhancing growth amongst the poor.

55. **The successful implementation of these strategies will depend on applying the right mix of spatially blind policies, policies to enhance spatial connectivity and spatially targeted interventions. Amongst these spatially blind policies are possibly of greatest importance as they benefit all.**

- **Spatially blind policies** are needed to create a secure environment (in the north as well as in the rest of the country); to enhance the quality of education; to improve health services; to provide access to the internet and cheap and reliable telecommunications; to reduce the unit cost of service provision; to enhance the efficiency of spending; to stimulate national and international migration (of skilled people) and to facilitate international trade. Other policies, such as those related to the provision of electricity are presently not spatially blind, but could be offered in a more spatially blind manner. While spatially blind are preferred, implementation mechanisms should not be spatially blind: they need to reflect different needs and conditions across livelihood zones.

- **Spatial connectivity needs to improve**. To enhance economic integration and accelerate growth travel times will need to be reduced through investments in road maintenance, a reduction in road blocks and investments in new roads. International road connections (to Senegal, Côte d'Ivoire, Burkina Faso and Niger) are relatively favorable (provided the roads to Burkina Faso and Niger are secure) but within the country there remain areas with high population density, economic potential and poor accessibility. Additional infrastructure in zones 9 and 11 could connect another 1.2 million people to markets. Improving connectivity

to the flood plains south of Tombouctou is equally interesting because this area has high productive potential, is already relatively densely populated and could become the area in which the Government of Mali demonstrates its commitment to security and its ability to restore service delivery after the crisis.

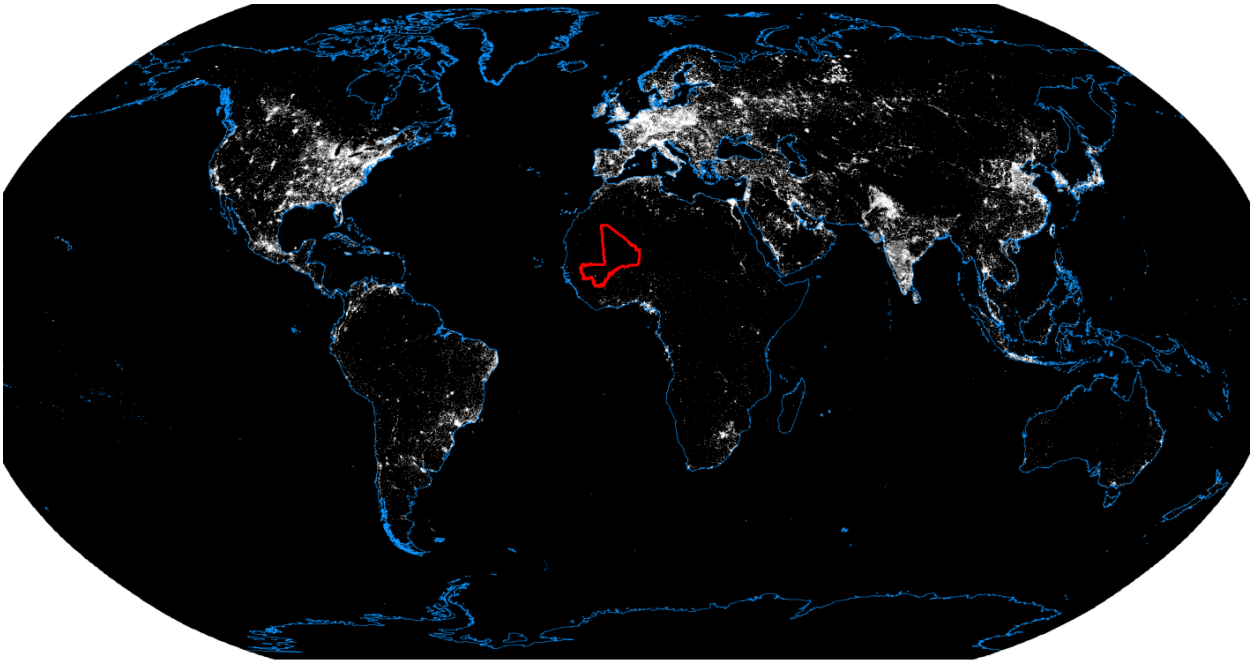
- **Targeted interventions are justified and needed to reduce poverty.** Where there are pockets of deep poverty specific (spatially targeted) interventions are justified. In areas with agricultural potential such interventions could focus on enhancing agricultural productivity and stimulating off farm employment. Targeted interventions are equally needed in north Mali to ensure security (from which all Malians will benefit) and to restore the delivery of services.

Chapter 1. Introduction

1.1 Space and development are intricately related.[3] This is immediately clear when considering the map of night time lights. Areas with high light intensity tend to lie in the northern hemisphere. They also come in clusters: the east coast of the United States of America, Europe, India and South East Asia. Areas with low levels of light intensity are also clustered: the mid-west of the United States, the Amazon in South America, eastern China, the Sahara and, actually, most of Africa. In areas with little light, coast lines lit up most. This is clear in South America, the west of the United States as well as the coasts of West and Southern Africa.

1.2 Night time light intensity has been found to be a good proxy for population density (hence the little light in the mid-west of the United States or the light in India) and for GDP per capita (Ghosh et al. 2013).[4] Thus the night time light intensity map serves to illustrate some important spatial aspects of development. Neighborhood matters for instance. It is easier to grow and develop if one lives near an area with great wealth. For those that do not live close to such areas, the ability to trade goods is important, which is why the coasts are lit up.

Figure 1.1: Night-time light intensity 2013



Source: World Bank, DECCT, 2013.

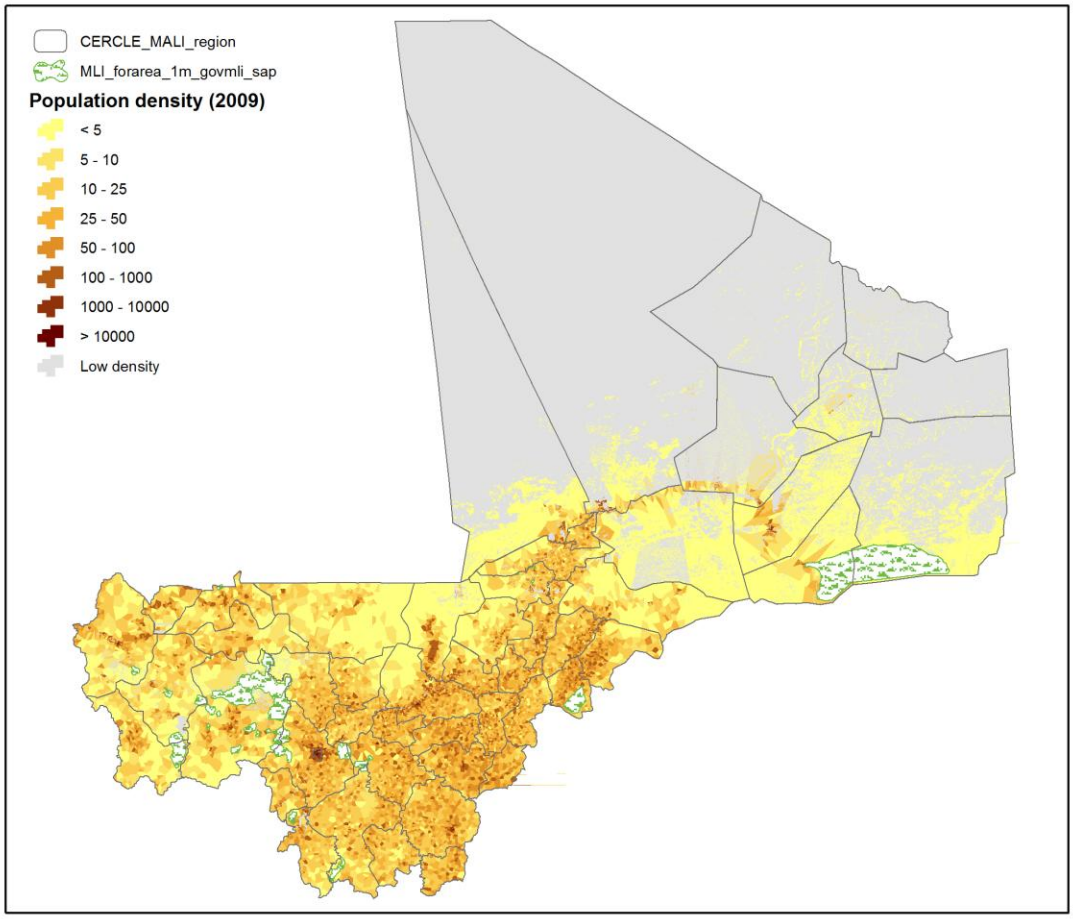
1.3 The night time light intensity map serves as reminder of some of the development challenges Mali faces. The country only has a few bright spots of which the one associated with

[3] See for instance Easterly, William and Ross Levine. (2003) "Tropics, germs, and crops: How endowments influence economic development." *Journal of Monetary Economics* 2003, 50: 3-39 or Sachs, Jeffrey D. 2000. 'Tropical Underdevelopment'. Center for International Development (CID) at Harvard University, Working Paper No. 57.

[4] Ghosh, Tilottama, Sharolyn J. Anderson, Christopher D. Elvidge and Paul C. Sutton (2013) "Using Nighttime Satellite Imagery as a Proxy Measure of Human Well-Being", *Sustainability* 2013, *5*, 4988-5019.

Bamako is the most visible. Mali's neighboring countries barely lit up, suggestive of being located in a neighborhood of limited wealth due to a combination of low per capita incomes and low population density. Mali is also far from West Africa's ports: the distance from Bamako to the port of Abidjan is 1,150 km, from Gao to Abidjan is 2,050 km; the distance from Bamako to the port of Dakar is 1,400 km and from Kidal it is a whopping 2,950 km. The nearest major market for Mali is Europe, but getting goods there requires either transporting them over long distances of land before they can be shipped, or transporting them by air.

Figure 1.2: Population density



Source: RGPH 2009. Authors' calculations.

1.4 Space not only matters for patterns of development at a global scale. At a local level space is equally important. One characteristic critical for Mali, is its low population density. With an average population of 13.3 people per km^2 Mali belongs to the 20 least densely populated countries in the world. Averages may hide large variations and this certainly holds for a country with vast swaths of desert where few people live. In Kidal in the north of the country, population density is only.5 persons per square kilometer. In Tombouctou and Gao it is higher but still low, respectively 2.0 and 3.1 people per square kilometer. In the south of the country population density is substantially higher. It varies from 16.2 people per km^2 in Kayes, to 26 in Koulikoro and Mopti, to about 38 in Sikasso and Ségou. At over 7,400 people per square kilometer, population density is highest in Bamako.

1.5 Because of the low population density, in 2009, only 9 percent of the population live in the North of the country (Gao, Tombouctou and Kidal) even though the north comprises some 65 percent of the land mass of Mali.

1.6 Spatial differences are correlated with welfare outcomes. A person born in Bamako can expect to live more than 6 years longer than a person born in Ségou or Sikasso. A person born in Kidal can expect to consume almost twice as much as a person born in Mopti. A person with no education living in Kayes can expect to consume 50 percent more than a person without education in Sikasso, while a person with no education living in Kidal can expect to consume the same amount as a person with an advanced degree living in Mopti.

1.7 Space is intrinsically related to geography, and as space matters, so does geography. In Kidal, in the midst of the desert, commerce is the activity of choice, while in Sikasso with ample fertile land available, agriculture is the primary activity. Family size is affected by geography too. In the absence of labor markets, large families are preferred in Mali's agricultural areas, but less so where commerce is dominant. Hence average family size in Kayes is 12.8, but in Gao it is 8.0 and in Kidal 6.3.

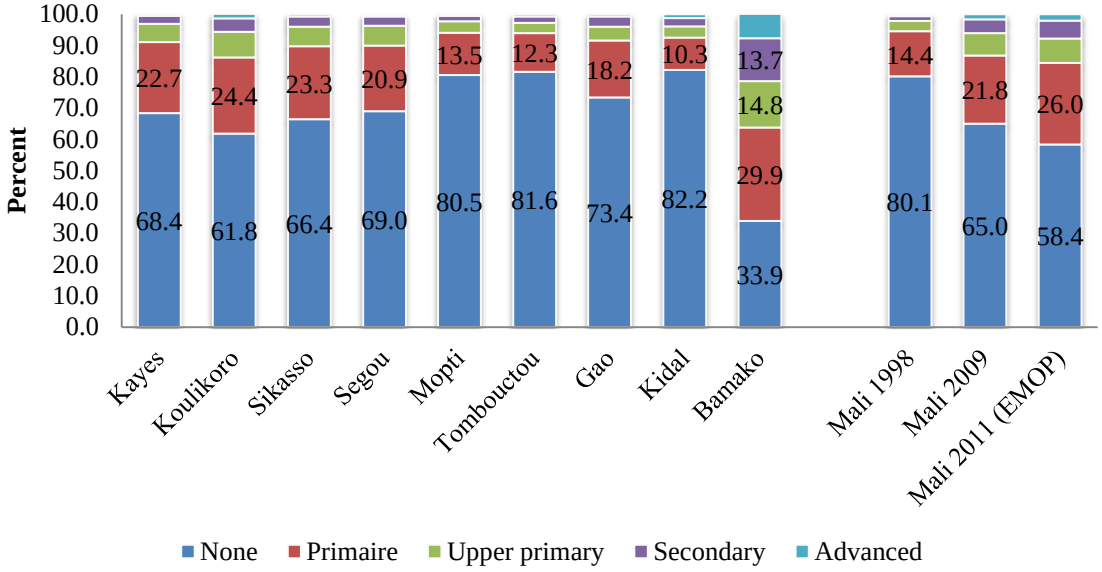
1.8 These disparities in living standards and livelihoods are the outcome of a striking attribute of economic development—its unevenness across space. This is true at all geographic scales, from local to national to global. Cities pull ahead of the countryside. Living standards improve in some regions while others lag. Entire countries and regions develop faster than others. The impact of geography and space and the unevenness of development poses challenges to decision makers who generally cannot simultaneously foster economic production and spread it out smoothly.

1.9 The spatial differences one observes on the production side are more pronounced than those on the welfare side. One observes that 90 percent of all formal enterprises are found in Bamako and that an estimated 39 percent of GDP is generated in the capital city.[5] Access to services is much less skewed than production, but overall levels of access are low and spatial differences exist: almost sixty percent of the population aged six and above has no education at all, approximately 35 percent has primary education and slightly less than eight percent of the population has secondary education or more.[6] In the Northern regions of the country, Mopti, Tombouctou and Kidal more than 80 percent of the population has not gone to school at all. Contrast this with Bamako (see Figure 1.3). But even in Bamako, as many as 34 percent of the population never went to school.

[5] Note de Prospective N°6, Répartition Régionale du PIB National ou Estimation des PIB Régionaux du Mali, CAP-Primature, Février 2014.

[6] The situation in 2011 is a considerable improvement relative to 1998 when 80 percent of the population was uneducated and less than 20 percent had gone to primary school.

Figure 1.3: Level of education of those aged 6 and above



Source: Regional data – RGPH 2009; trend data RGPH 1998, 2009 and EMOP 2011.

1.10 This study is the first in a series of annual, analytical documents on poverty and well-being prepared by the Cellule Technique of the CSLP. This series is meant to inform the Annual Review and to stimulate debate. The objectives of this document are twofold. Being the first in a new series, it takes stock of the available information on household welfare and access to services. It does so, taking an explicit spatial perspective. Next the study considers the question how geography and space matter for decisions about the provision of services. It does so by highlighting the trade-offs between equity (every Malian has right to access certain services), efficiency (how can as many people as possible be reached given the available budget), but also quality and care for the most vulnerable in society.

1.11 The study is organized as follows: the next two chapters provide an overview of selected spatial and geographic characteristics of Mali. Chapter two emphasizes differences in population density which allows distinguishing between types of agglomeration from villages, to rural town, to large cities. Chapter three categorizes the country into various livelihood zones and considers how the agro-physical environment affects the way people live. In Chapter four we turn to household welfare. We discusses outcomes on life expectancy, mortality, nutrition, consumption, poverty as well as the ownership of assets while stressing spatial patterns and trends. We also shed light on the 'Sikasso paradox', the apparent contradiction that the region with the greatest agricultural potential has the highest rate of poverty. Chapter five considers access to services. We investigate whether one region is being favored over another in terms of service delivery and explore how innovative approaches may help deal with some of the challenges posed by budgetary constraints. Chapter five considers one specific region, northern Mali and how its ongoing security crisis affects welfare for people living in the north and in the rest of the country. The chapter delves deeper into the causes for the crisis and seeks to formulate what might have to be done to reverse the current situation. Chapter six is forward looking. It asks the question how much growth is needed to significantly reduce poverty in Mali, and draws (spatially informed) implications for the growth process. A concluding section completes the study.

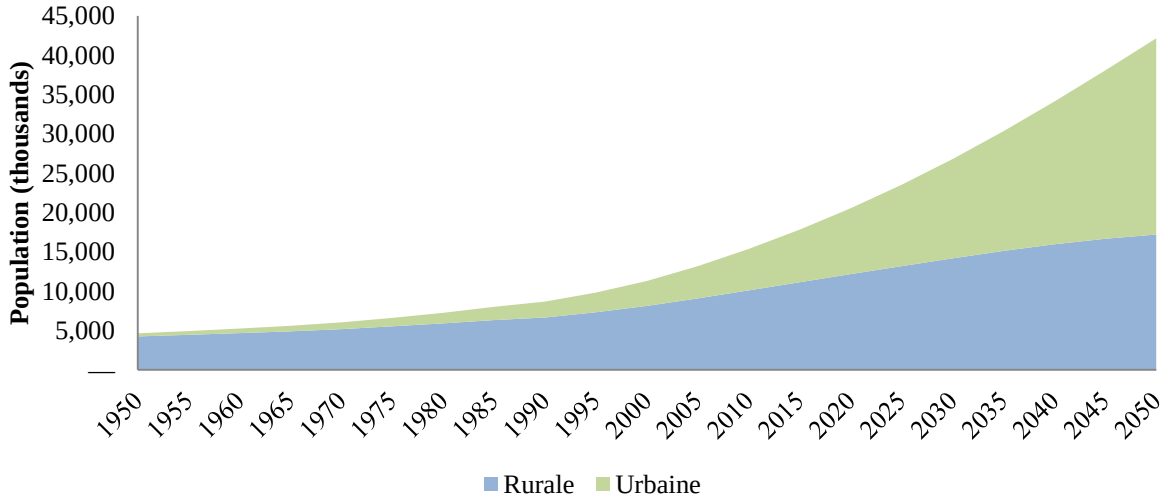
Chapter 2. Mali by Agglomeration Type

A. INTRODUCTION

2.1 Mali is urbanizing rapidly. Between 1987 and 2009 the population of Bamako tripled from around 760,000 to almost 2.2 million. According to UN population projections by 2035 about half of Mali's population will live in urban areas.

2.2 Rapid urbanization may be good news as urbanization has been associated with GDP growth and poverty reduction.[7] China and India are good examples of countries that manage to associate urbanization with income growth. But not in all instances is urbanization associated with per capita income growth. Particularly in Africa does one find countries where per capita incomes stagnate while urbanization continues (Spence et al. 2008).

Figure 2.1: Population urbaine et rurale au Mali



Source: United Nations, Department of Economic and Social Affairs, Population Division (2012). World Urbanization Prospects: The 2011 Revision, CD-ROM Edition.

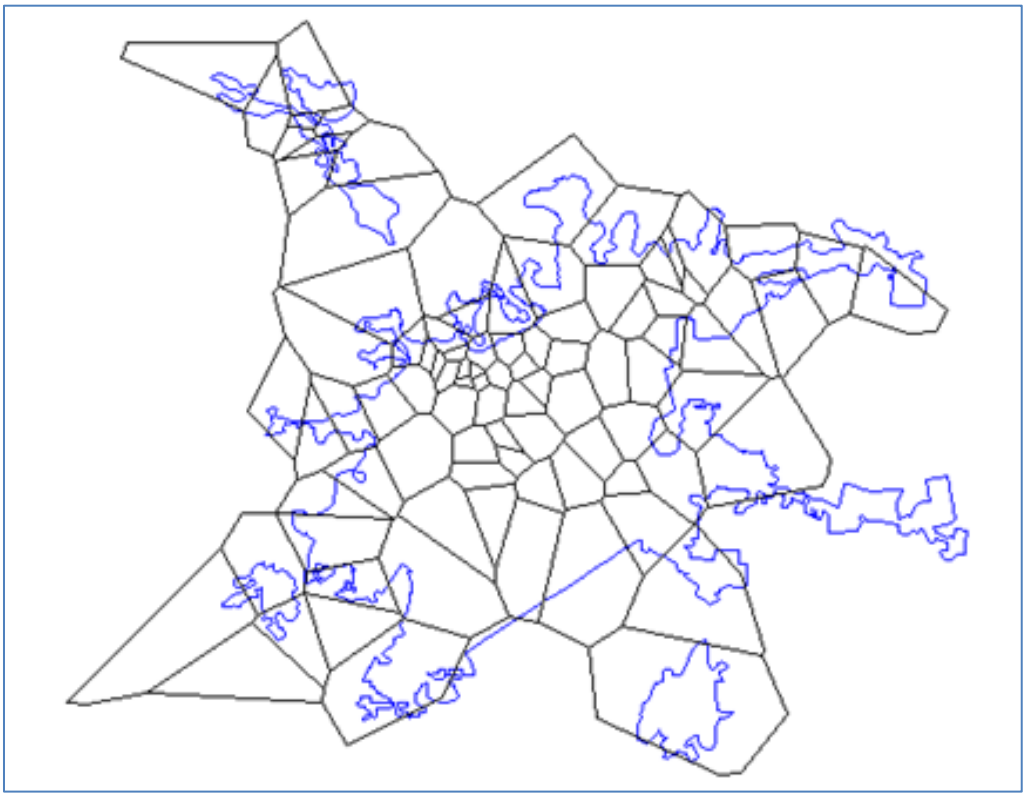
2.3 In this chapter we classify the country into four types of agglomerations, allowing a more fine grained description than the rural-urban dichotomy allows. We distinguish localities with a population of less than 5,000 and a low population density (villages), rural towns with a population between 5,000 and 30,000 with a low population density, urban localities (towns) with a population between 5,000 and 30,000 and a high population density, and cities with a population of over 30,000. Amongst these we separately identify the four largest cities: Kayes, Sikasso, Ségou and Bamako. In total we identify more than 10,000 villages, over 120 rural towns, 60 towns and 15 cities. We investigate where population growth has taken place and how migration contributes to this. We explore differences in income, economic activity and access to services between the various types of agglomeration and ask whether Bamako is an engine of economic growth.

[7] See Michael Spence, Particia Clarke Annez and Robert (2008). M. Buckley. Urbanization and Growth (Commission on Growth and Development).

B. CLASSIFYING MALI BY POPULATION DENSITY AND SIZE OF THE LOCALITY

2.4 To classify the country in rural and urban areas while avoiding jurisdictional boundaries we reconstruct boundaries for all urban areas in 2009 following a methodology proposed by Bernard *et al.* (2012).[8] This was done using the census data at the smallest geographic scale (the "neighborhood" and village), each location being characterized by a point in space (a pair of geographic coordinates for longitude and latitude) and its associated population. In the absence of maps for these small geographic units, space was partitioned into a set of convex polygons[9] defined to ensure that each contains a single point and has borders located at equal distance between its center and the most proximate point. Urban areas were then defined by aggregating all contiguous polygons whose density level exceeded the threshold of 250 inhabitants per km^2 (for each of the polygons).[10] As an example, Figure 2.2 shows the fit for Bamako between the aggregation of polygons and the actual footprint of the city as identified from satellite imagery for the year 2009.

Figure 2.2: Voronoi polygons as approximation for the urban footprint of Bamako (2009)



Source: District of Bamako, INSTAT and authors.

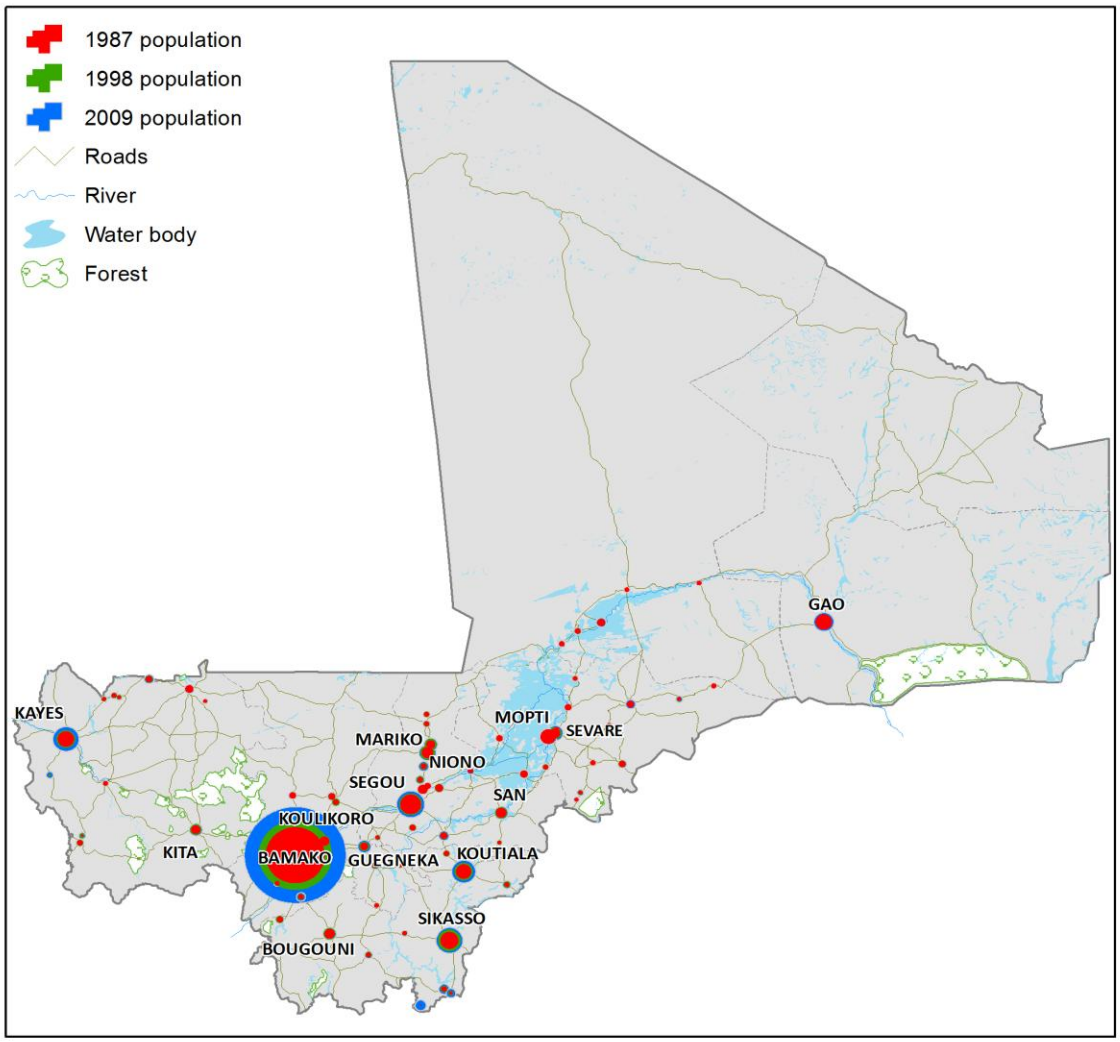
[8] Bernard C., S. Mesplé-Somps and G. Spielvogel (2012) Taille des villes, urbanisation et spécialisations économiques, une analyse sur micro-données exhaustives des 10 000 localités maliennes, working paper AFD n°130 and DIAL working paper n°2012/17.

[9] Known as Voronoi polygons.

[10] This threshold was chosen to reflect the observed density in peri-urban neighborhoods under recently initiated development.

2.5 Applying our algorithm to the whole country we find a total of 10,916 localities with less than 5,000 inhabitants and an average population of 882 individuals. There are 188 places with a population between 5,000 and 30,000 inhabitants, of which 60 have a density greater than 250 inhabitants per km^2. 15 cities have more than 30,000 inhabitants (and all of them have a density greater than 250 inhabitants per km^2). Figure 2.3 maps the locations of the 75 towns and cities of Mali that have more than 5,000 inhabitants and a density of population above 250 inhabitants per km^2.[11] Most urban places are located on rivers in the south of the country where land is more suitable for agriculture and where the transport network is denser. Bamako occupies a central place in the network.

Figure 2.3: Spatial distribution of urban areas (2009)

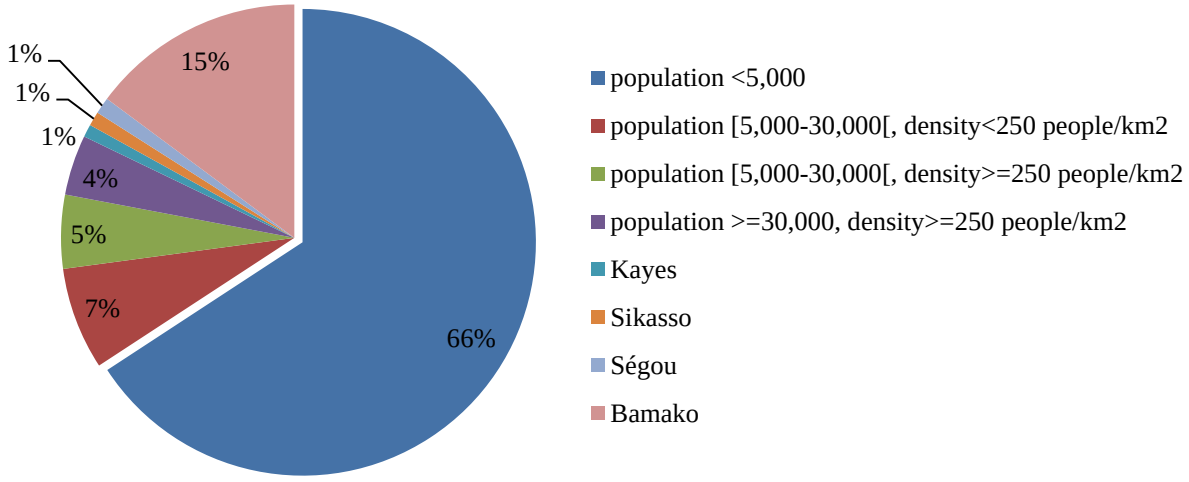


Source: UN COD-FOD, AICD (2009), INSTAT (1987, 1998 and 2009) and authors' calculations.

[11] Names are only mentioned on the map for the 15 agglomerations with 30,000 inhabitants or more.

2.6 These 75 towns and cities host 3.9 million inhabitants—out of a population of 14.3 million—whereas the rest—69.5 percent of the population—resides in rural places (Figure 2.4 below).[12] There is a very strong primacy of the capital city. Bamako hosts more than 2.1 million people (15 percent of the population) whereas the three largest cities after Bamako, i.e. Ségou, Sikasso and Kayes only host 166,000, 143,000 and 127,000 people respectively (3 percent of the population).

Figure 2.4: Spatial distribution of the population (2009)



Source: 2009 RGPH. Authors' calculations.

2.7 With urbanization the size of cities can be expected to increase but the relative size distribution typically remains unchanged. Size distributions are known to be stable over time demonstrating how settlements of different sizes complement one another and how within a country a wide range of city sizes coexist. The size-rank rule associates the population of any city to the population of the largest city, divided by the rank of the city in question within the country's urban hierarchy. This rank-size rule, discovered in 1913, can be expressed as the rank *r* associated with a city of size *S* is proportional to *S* to some negative power (World Bank 2009).[13] The rule holds in Mali. Ranking cities from largest to smallest and comparing their sizes with those predicted by the rank rule, one finds a closeness (the scale factor is 0.88 –suggesting a strong dominance of the largest city) and a stable relation over time.

2.8 Despite the stability of the relation, the ranking of cities did change over time. Bamako remains by far the largest city but Ségou and Sikasso have switched places: Sikasso took over second place from Ségou in 1998 but lost it in 2009. Kayes remains in fourth rank (Table 2.1).

[12] We define rural areas as places with less than 5,000 residents or with a population density below 250 people per km^2.
[13] World Bank 2009. *World Development Report 2009: Reshaping Economic Geography.*

Table 2.1: City size and city rank (1987, 1998 and 2009)

City rank		City size 1987		City size 1998		City size 2009
1	Bamako	757,051	Bamako	1,132,886	Bamako	2,156,177
2	Ségou	88,714	Sikasso	109,570	Ségou	166,128
3	Sikasso	69,840	Ségou	91,882	Sikasso	143,231
4	Kayes	58,720	Kayes	71,897	Kayes	127,473

Source: RGPH for 1998 and 2009, authors' calculations.

2.9 Disproportionate primacy of the capital city is often a characteristic of developing economies (Glaeser and Ades, 1994).[14] There can be various reasons for such primacy (see Overman and Venables, 2005);[15] we suspect that the main ones explaining the lack of specialization of cities and the dominance of Bamako have to do with the centralization of political power, long distances between cities, the poor quality of the intercity transport and communication network contributing to high communication and transport cost.

C. POPULATION CHARACTERISTICS

2.10 Interestingly, and unexpectedly, we find that demographic characteristics are not very different between rural and urban areas. The average proportion of children in villages, for instance, in towns (with a population below 30,000 inhabitants) and in cities (with a population larger than 30,000) stands at 48.4 percent, 45.5 percent and 43.6 percent respectively in 2009 (see Annex, Table 3).[16] It is only in the two biggest cities (Ségou and Bamako) where the proportion of children falls below 40 percent (with 39.3 percent in Ségou and 38.9 percent in Bamako).[17]

2.11 Average household size remains very high throughout Mali. Remarkably, as Table 2.2 demonstrates household size increases with the degree of urbanization. Average household size is 8.1 in villages, between 8.7 and 8.9 in towns and more than 9 in the largest cities. This is explained by the fact that urban households are more likely to accommodate extended family members than rural households: although the average proportion of extended family members in rural households is already high at 39.7 percent, it reaches about 50.0 percent in cities. This difference is partially due to the presence of students and adults looking for jobs in medium sized cities and in Bamako (as illustrated by the economic dependency ratios and the proportions of student household members in Table 2.2).

2.12 Both push factors such as poor living conditions, weather, insecurity or other shocks and limited economic opportunities in rural areas as well as pull factors may explain why so many migrate to urban areas. In view of our spatial analysis of economic activities (see the next

[14] Glaeser, E. and A. Ades (1994) Trade and Circuses: Explaining Urban Giants, *Quarterly Journal of Economics*, 110(1), 195-227.

[15] Overman, H.G. and A.J. Venables (2005) "Cities in the Developing World", *CEP Discussion paper* 695.

[16] The demographic dependency ratio, however, ranks inversely as it is much lower in urban than in rural areas. (see table 2.2).

[17] The gap between Bamako and rural areas in the proportion of children (almost 10 percentage points) was actually negative (-0.7 percentage points) in 1987 and only +7 percentage point in 1998, showing that the demographic transition started very late in Mali, even in Bamako (see tables Annex 2.1 and Annex 2.2).

section), we suspect that push factors are more likely to be the main determinant of migration. But pull factors, those associated to the relatively greater access to public infrastructure (secondary schools, electricity, hospitals), or the chance to land a well-paid formal sector job explain part of the attractiveness of urban areas (see Table 2.4).

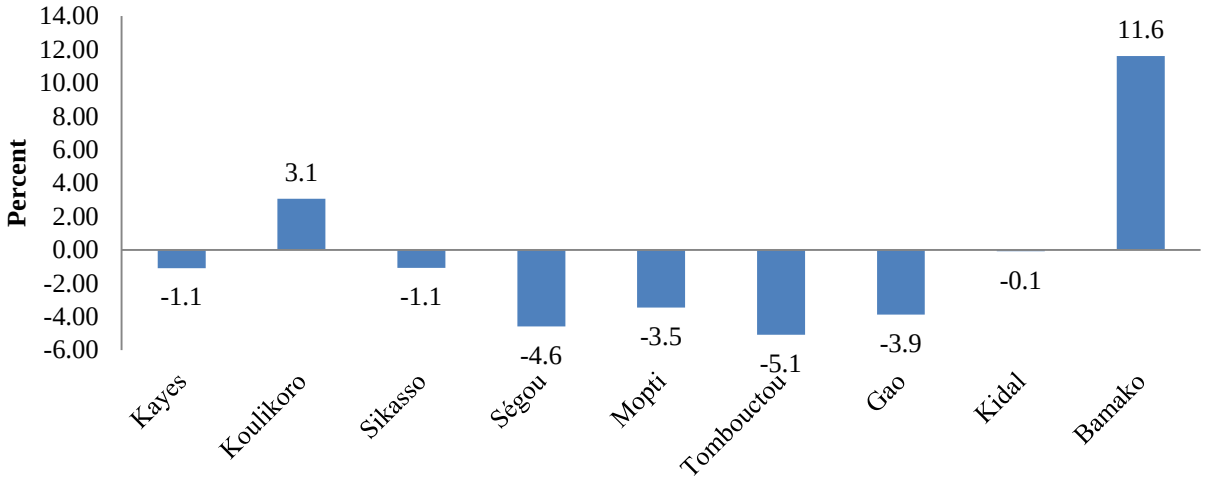
Table 2.2: Household characteristics by agglomeration type

Agglomeration type	Household size	Demographic dependency ratio[(1)]	Economic dependency ratio[(2)]	Proportion of student household members (aged 15-64)	Proportion of extended family members[(3)]
Village population <5,000	8.10	1.95	1.61	13.1%	39.7%
Rural town population [5,000-30,000], density<250 people/km2	8.91	1.88	1.72	21.8%	44.3%
Town population [5,000-30,000], density>=250 people/km2	8.66	1.79	1.78	24.6%	48.9%
City population >=30,000, density>=250 people/km2	8.87	1.53	1.89	29.0%	47.9%
Kayes	9.44	1.34	1.88	27.7%	50.3%
Sikasso	8.90	1.28	2.03	31.3%	46.4%
Ségou	9.49	1.28	1.96	29.9%	51.7%
Bamako	9.42	1.17	1.87	30.3%	49.8%

(1) The demographic dependency ratio is the sum of all children younger than 15 and of all adults over 64 divided by the number of adults of working age in the household (i.e. aged between 15 and 64).
(2) The economic dependency ratio is defined as the ratio between the number of adults and the number of working adults per household.
(3) The proportion of extended family members is the percentage of people in the households without a direct family link with the household head (i.e. everyone else expect the parents, children and spouses of the household head).
Source: 2009 RGPH. Authors' calculations.

2.13 Education levels are low throughout the country in spite of progress overtime in primary and secondary education in rural areas and small towns, and increasing levels of secondary and tertiary education in middle-sized cities and in Bamako (see tables in the annex to this chapter). One observes strong spatial variations and the stock of educated adults of working age increases with city size. Whereas in rural areas 85.9 percent of the population aged 15-64 has no schooling (down from 96 percent in 1987), the figure falls to 38.7 percent in Bamako. Only in the three major cities, Bamako, Ségou and Sikasso does one find that at least 20 percent of the working age population has a secondary school education or higher. Even in Bamako, more than half the adults of working age only have primary education or have no schooling at all.

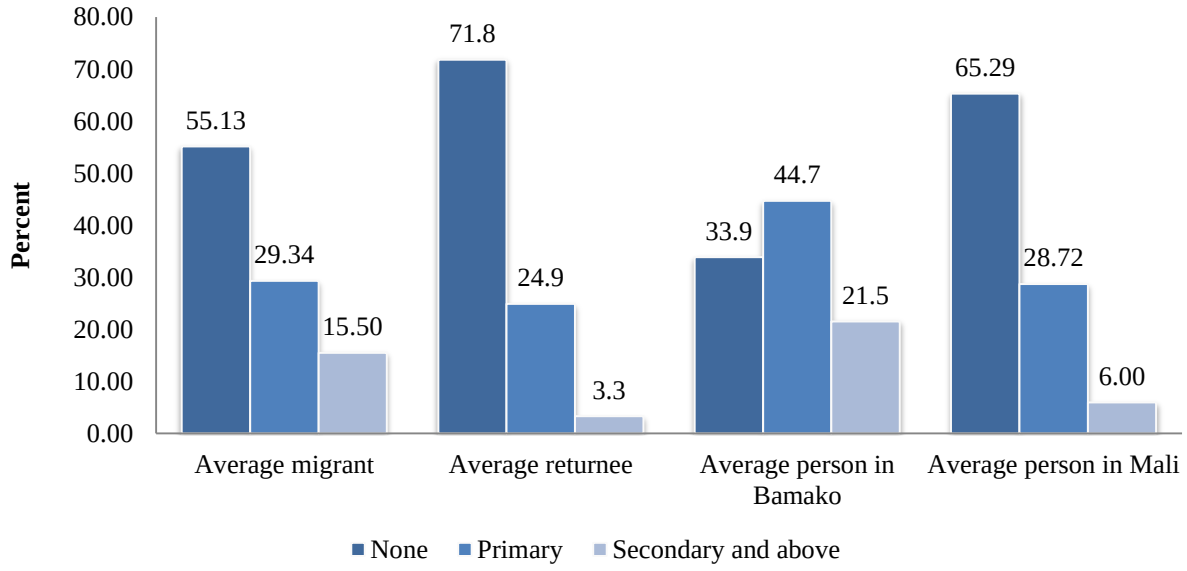
Figure 2.5: Net interregional migration as percentage of population



Source: RGPH 2009. Authors' calculations.

2.14 Levels of interregional migration[18] are high and an important contributor to city growth. Bamako and Koulikoro are net recipients of migrants, while the regions of Ségou, Mopti, Tombouctou and Gao are the largest net contributors of migrants. Levels of intra-regional migration are relatively marginal: migrants go to urban areas, and less to other (rural) localities in their region of origin.

Figure 2.6: Level of education of internal migrants as percentage of population



Source: Source: RGPH 2009. Authors' calculations.

2.15 Migrants tend to be better educated than the average person (Figure 2.6), but relative to the average person living in Bamako, migrants are less well educated: about 6 percent of people

[18] Here we mean permanent migration in which one changes his or her main residence and not temporary labor migration.

in Mali have a secondary education but 15 percent of the migrants have one. Better educated migrants have a greater likelihood of success and poorly educated migrants are more likely to return: amongst the returning migrants one finds few people with a secondary education (3 percent) while the vast majority (72 percent) has no education.

Table 2.3: Sorting of internal migrants (ages 15-64) by education level (2009)

Agglomeration type	No school	Primary	Second. 1	Second. 2	Tertiary	All migrants
Village population < 5000	20.5%	10.8%	8.5%	6.6%	3.9%	14.6%
Rural town population [5,000-30,000], density<250 people/km2	4.3%	4.6%	4.3%	3.9%	2.6%	4.2%
Town population [5,000-30,000], density>=250 people/km2	7.1%	6.6%	7.0%	6.1%	4.0%	6.6%
City (excl. KBSS) population >=30,000, density>=250 people/km2	8.0%	9.4%	10.5%	11.0%	6.6%	8.8%
Kayes	1.6%	2.2%	2.0%	2.1%	1.1%	1.7%
Sikasso	1.3%	1.7%	1.9%	2.1%	1.2%	1.6%
Ségou	1.5%	2.1%	2.7%	2.9%	1.7%	1.9%
Bamako	55.5%	62.7%	63.1%	65.4%	78.9%	60.5%
	100%	100%	100%	100%	100%	100%
Total number of migrants	525,874	135,114	102,019	138,041	77,921	978,969

Source: 2009 RGPH. Authors' calculations.

2.16 The strong migration selection according to level of education is illustrated by Table 2.3 which shows that skilled migrants are found in higher proportions in medium-sized cities and in Bamako.[19] Whereas 60.5 percent of all internal migrants are located in Bamako, the city hosts a disproportionate share of migrants with a tertiary education (78.9 percent). In contrast, Bamako's share of migrants with no education is below the national average (55.5 percent). Whereas 24.5 percent of uneducated migrants are in rural areas, only 10.9 percent and 6.5 percent of those with a high school or a tertiary education respectively migrate to rural areas. These patterns are likely to reflect relatively better opportunities for skilled workers and possibly higher returns to education in cities.

[19] Table 2 breaks down internal migration destinations by educational level for the stock of migrants in 2009. We are not able, however, to distinguish whether migrants acquired education before or after migrating.

Table 2.4: Access to basic utilities (2009) **Agglomeration type**	**Households whose main supply of water is from a faucet**	**Households whose main supply of water is from a well or bore hole**	**Proportion of households with electricity**	**Proportion of households with toilets**	**Proportion of households using latrines**
Village population <5,000	1.8%	87.5%	1.1%	5.7%	61.7%
Rural town population [5,000-30,000], density<250 people/km2	12.9%	67.9%	8.1%	7.6%	73.2%
Town population [5,000-30,000], density>=250 people/km2	15.8%	69.1%	17.1%	7.0%	81.6%
City population >=30,000, density>=250 people/km2	32.5%	54.1%	42.2%	10.1%	83.7%
Kayes	60.1%	8.2%	50.7%	14.5%	81.3%
Sikasso	43.8%	50.7%	48.6%	11.3%	84.5%
Ségou	23.0%	63.8%	47.0%	11.9%	83.2%
Bamako	40.1%	34.3%	68.2%	21.3%	74.1%

	Number of schools	**Number of health centers**	**Schools (per '000 residents)**	**Health centers (per '000 residents)**
Village population <5,000	0.74	0.15	0.96	0.12
Rural town population [5,000-30,000], density<250 people/km2	6.06	1.55	0.40	0.15
Town population [5,000-30,000], density>=250 people/km2	6.28	1.38	0.55	0.12
City population >=30,000, density>=250 people/km2	22.73	5.27	0.47	0.10
Kayes	53.00	7.00	0.37	0.05
Sikasso	70.00	13.00	0.46	0.08
Ségou	96.00	9.00	0.58	0.05
Bamako	1,182.00	206.00	0.54	0.09

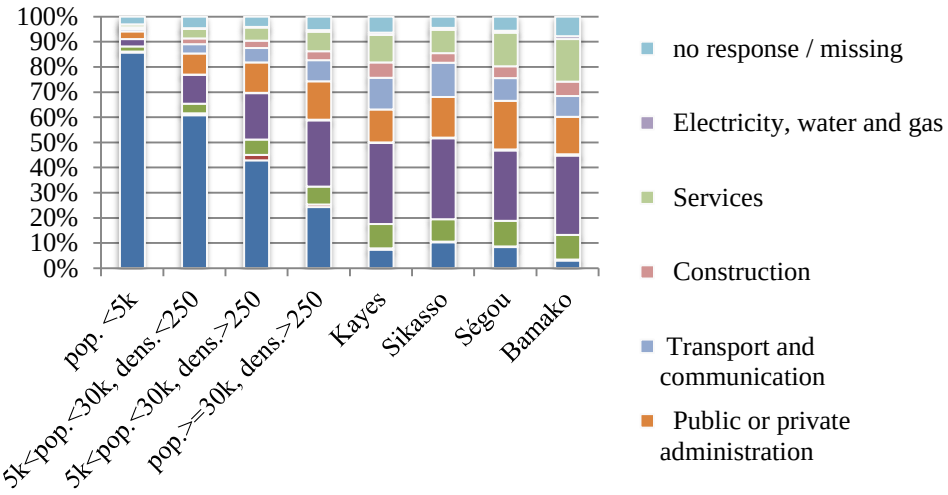
Source: 2009 RGPH. Authors' calculations.

2.17 The attractiveness of cities as migration destination, and in particular of Bamako, may be related to the availability of public services and infrastructures. We find that an important factor that discriminates between cities and rural areas is the availability of electricity. Although access to electricity is limited everywhere, urban households are more likely to have it than rural households (see Table 2.4). Only in Kayes and Bamako does a majority of households have access to electricity.[20] Access to other utilities and public goods is relatively less contrasted between urban and rural areas. Apart from Kayes, there is a high proportion of urban households drawing water from wells and boreholes (63.8 percent in Ségou, 50.7 percent in Sikasso and 34.3 percent in Bamako).[21] This reflects the lack of extension of piped water systems in cities as well as the development of peripheral neighborhoods on non-serviced land. Interestingly, the density of schools is lower in urban than in rural areas (Table 2.4). This may reflect both the dispersion of the population in rural areas requiring more schools per inhabitant and congestion within urban areas.

D. SPATIAL DISTRIBUTION OF ECONOMIC ACTIVITIES

2.18 Local labor markets characteristics differ depending on location. Labor force participation is slightly higher in rural places (65.5 percent) than in towns and cities (between 49.5 percent and 56.1 percent). This is explained by the higher proportion of students in cities (which reaches 20 percent or more of working-age adults in the three largest agglomerations). As expected, the proportion of salaried` workers increases with city size, which is consistent with firms being more likely to locate and hire workers in cities.[22]

Figure 2.7: Sectoral composition of employment by location (2009)



Source: 2009 RGPH. Authors' own calculations.

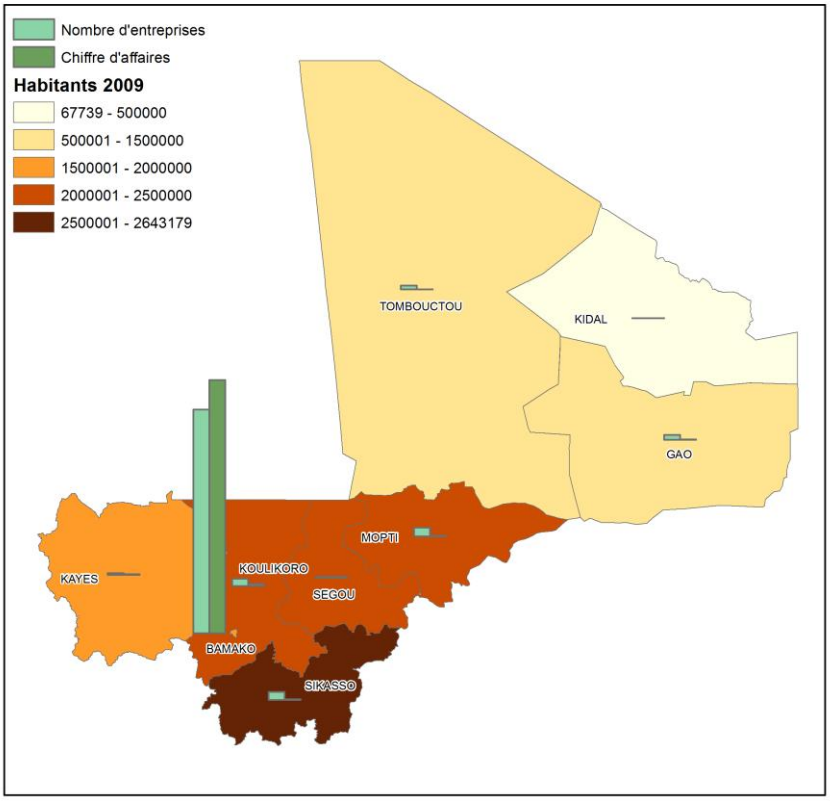
2.19 In terms of sectoral specialization, Figure 2.6 shows that employment in rural places and small towns is largely in agriculture and that the share of agricultural jobs decreases with city size from an average of 85.7 percent of all jobs in rural places to 3.1 percent in Bamako (also see

[20] When considering the district of Bamako rather than the agglomeration, the proportion of households with electricity goes to 72.5 percent, against 68.2 percent for the whole agglomeration.
[21] This proportion falls to 12.7 percent when considering the district of Bamako alone.
[22] We do not report occupations due to a lot of missing values in the census.

Table Annex 2.3). Strikingly however, agricultural jobs still represent a significant portion of employment in middle-sized cities where their share is 24.3 percent. Inversely, the shares of administrative jobs, of service jobs and, above all, of trade activities increase with city size. In the four largest cities, trade jobs account for between 28.1 percent and 32.2 percent of employment.

2.20 The location of formal economic activities is largely driven by the options for specialization, economies of scale and the availability services necessary for production (logistics, electricity, water, security, skilled labor). Formal economic activities are typically found where population density is highest: in cities, and Mali is no exception to this. The location of formal activities is highly skewed towards Bamako (Figure 2.7). Irrespective of whether one considers the number of formal enterprises, or their turnover, Bamako is the dominant location for formal sector activities.

Figure 2.8: Turnover of formal enterprises (2009-2010) and population (2009)



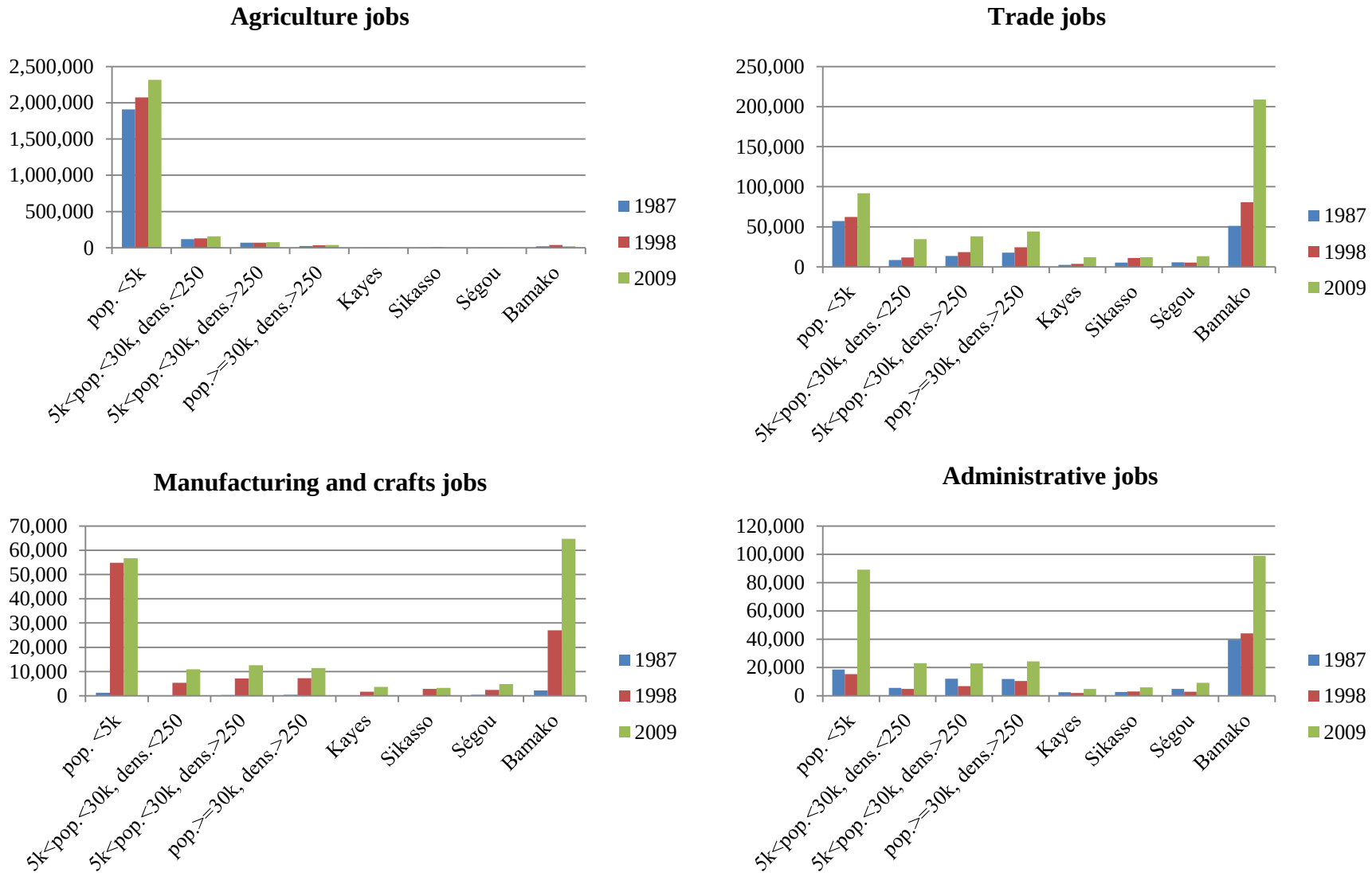
Source: Recensement des entreprises formelles (turnover) and RGPH 2009 (population).

2.21 Looking at the size and spatial distribution of each industry, we see that the biggest sector is agriculture which concentrates 63.2 percent of all jobs in Mali. Not surprisingly such jobs are almost exclusively found in rural places (upper left panel of Figure 2.8). The second biggest sector, trade, is much smaller and represents only 11.0 percent of the total number of jobs. Trade jobs are found across Mali but the bulk is in Bamako, confirming the important function of the capital for commerce (upper right panel of Figure 2.8). One then finds administrative jobs (6.7 percent) and services (4.7 percent), followed by manufacturing and craft (4.1 percent). The

spatial distribution of manufacturing and crafts is bimodal, with a peak in rural places (probably mostly for crafts) and another peak in Bamako (which likely encompasses both crafts and a tiny manufacturing sector). The small size of the manufacturing sector in Mali is particularly striking. By contrast, in neighboring Senegal, the share of employment in the industrial sector is much higher and had already reached 14.8 percent by 2006.[23] Noticeably, the extractive industry sector has increased a lot since 1998 reaching a total of 35,631 jobs in 2009, but the sector still represents only 0.9 percent of all jobs in Mali. These jobs are found mainly in cities with less than 30,000 inhabitants and in rural areas.[24]

[23] Source: African Development Indicators 2012/13.
[24] The histogram is available upon request.

Figure 2.9: Spatial distribution of jobs (1987, 1998 and 2009)

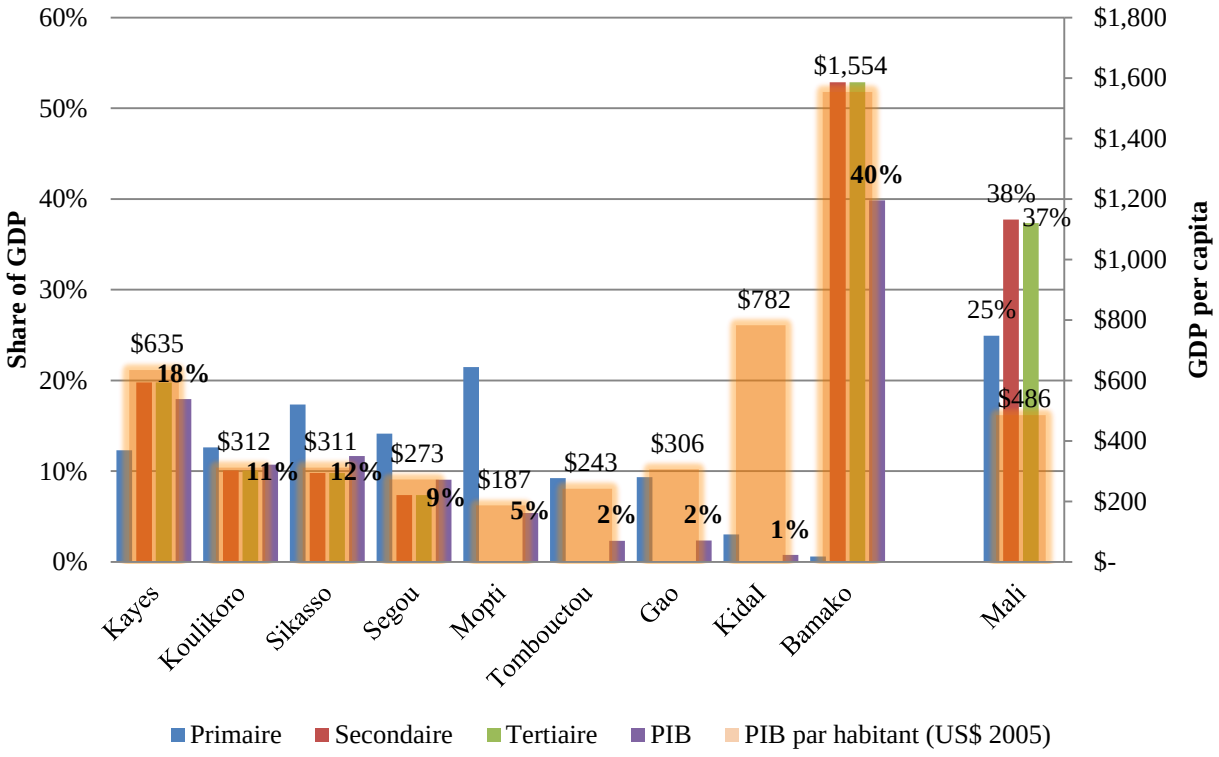


Source: 1987, 1998 and 2009 RGPHs. Authors' own calculations.

2.22 In terms of GDP the primary sector contributes about 25 percent. The contributions of the secondary and tertiary sectors are about equal: 38 and 37 percent respectively (Figure 2.9). Regions where the primary sector is largest contributor to income (Mopti, Ségou , Sikasso, Koulikoro, Tombouctou and Gao) are those with the lowest GDP per capita. Regions where the secondary and tertiary sectors are the important contributors to GDP (Kayes and Bamako) have much higher levels of GDP per capita. The differences are striking. GDP per capita in Bamako is five times more than that in Sikasso and eight times more than in Mopti. It illustrates the much higher levels of productivity that are attained in the secondary and tertiary sectors than in the primary.

2.23 The dominance of Bamako in generating income is such that with 15 percent of the population about 40 percent of GDP is generated in the capita city. With 18 percent, Kayes is another important contributor to GDP followed by Sikasso (12 percent) and Kouliloro (11 percent). It is no coincidence that the region with the highest levels of GDP per capita (Bamako) is also the region with the largest urban population. The strong correlation between population density and economic mass is consistent with urban areas being a conglomeration of consumers and producers and possibly marks the presence of a virtuous cycle where the areas with the highest contribution to GDP, attract most people.

Figure 2.10: Contribution sectorielle par région et PIB par habitant (2009)



Source: Repartition Regionale de la Population, de la Production et de la Consommation au Mali. Authors' calculations.

E. URBAN EXPANSION AND INCOME GROWTH

2.24 Using three waves of census data (1987, 1998 and 2009), we are able to characterize urban population growth holding the spatial extent of agglomerations constant at their 2009 levels. We find that the population of Bamako grew on average at 4.9 percent annually over the period 1987-2009, with an acceleration over the period 1998-2009, when it grew at an extremely high annual average of 6.1 percent.[25] By contrast, secondary cities and places in rural areas grew at lower rates (3.6 percent and 2.3 percent respectively over 1987-2009).

2.25 In spite of the lower rural population growth rate, because Mali remains predominantly rural, the population in rural locations grew by more than 4.1 million residents between 1987 and 2009 while the population of all towns and cities (defined as places with a density above 250 people per km2) "only" grew by 2.2 million. Hence cities and towns only contributed to 30.5 percent of the total population increase over the period whereas the bulk of the population increase came from rural areas with a total contribution of 69.5 percent. Because cities grew at a faster pace than rural areas Mali urbanized over the period. The urban population as we defined it more than doubled between 1987 and 2009 (+129 percent).

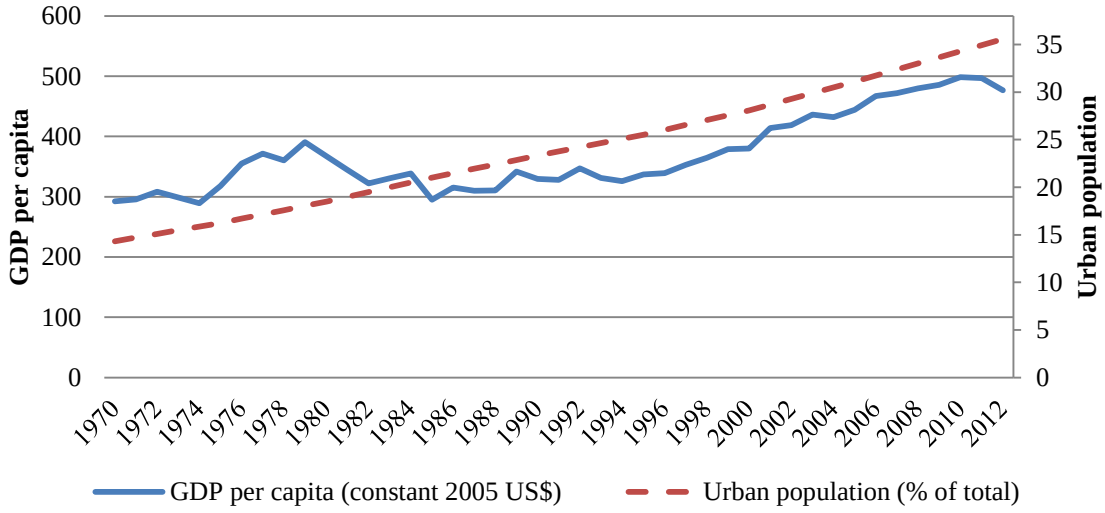
2.26 Urbanization is believed to contribute to higher incomes through multiple channels. Process industries, such as chemicals or steel operate more effectively at higher volumes; for this reason they have traditionally establish in urban areas. Specialized services—such as accounting or tax advice are easier to obtain in large cities. Specialization among input producers may allow cost reductions, making local purchasers of their inputs more productive. Particularly in countries with poor transportation and communication infrastructure are these important advantages of agglomeration. Public services such as hospitals or sports stadiums also require a minimum number of consumers to be economically viable.

2.27 High densities in cities allow workers with differentiated skills and firms with specific needs to reduce their search costs and agglomeration effects in cities affect knowledge sharing. By bringing together large numbers of people, cities facilitate the kinds of face to face interactions needed to generate, diffuse, and accumulate knowledge, especially in industries that experience rapid technological change.

2.28 Despite these various reasons as to why urbanization may lead to higher incomes we find no clear association between urbanization and per capita incomes. This is illustrated in Figure 2.10 which shows, using World Bank data, how prior to the year 1995, the correlation between urbanization and GDP was very weak: GDP per capita stagnated while urbanization continued. Since the mid-1990s up to 2010 urbanization and GDP per capita appear to move in parallel. The latest data suggest continued urbanization but stagnating GDP per capita.

[25] Because the administrative definition of Bamako excludes peripheral areas that were progressively incorporated into the agglomeration, our measure is greater than the official population figure of only 1.8 million for the six communes that form the Bamako district (core urban area).

Figure 2.11: GDP per capita and the degree of urbanization (1970-2012)



Source: World Development Indicators 2013.

2.29 An (indirect) way to get a sense as to whether urbanization is a driver of economic growth is by checking how much rural-urban migration contributes to poverty reduction. If structural transformation is taking place and people move from low productivity agriculture into higher productive occupations in urban areas, then a rural-urban population shift can be expected to contribute to poverty reduction. We find little evidence for this. Decomposing the change in poverty that occurred between 2001 and 2010 (a decline by 9.9 percentage points) one finds that most of this change (9.4 percent) was due to a reduction in poverty amongst people who continued to reside in their location of origin. The contribution of people who shift from rural to urban areas is tiny: 0.3 percent (Table 2.5).

Table 2.5: Decomposition of the change in poverty between 2001 and 2010

Change in poverty	**-9.93%**
of which: change of people who remained resident	-9.37%
of which rural-urban migration	-0.33%
.. of which interaction effect	-0.23%

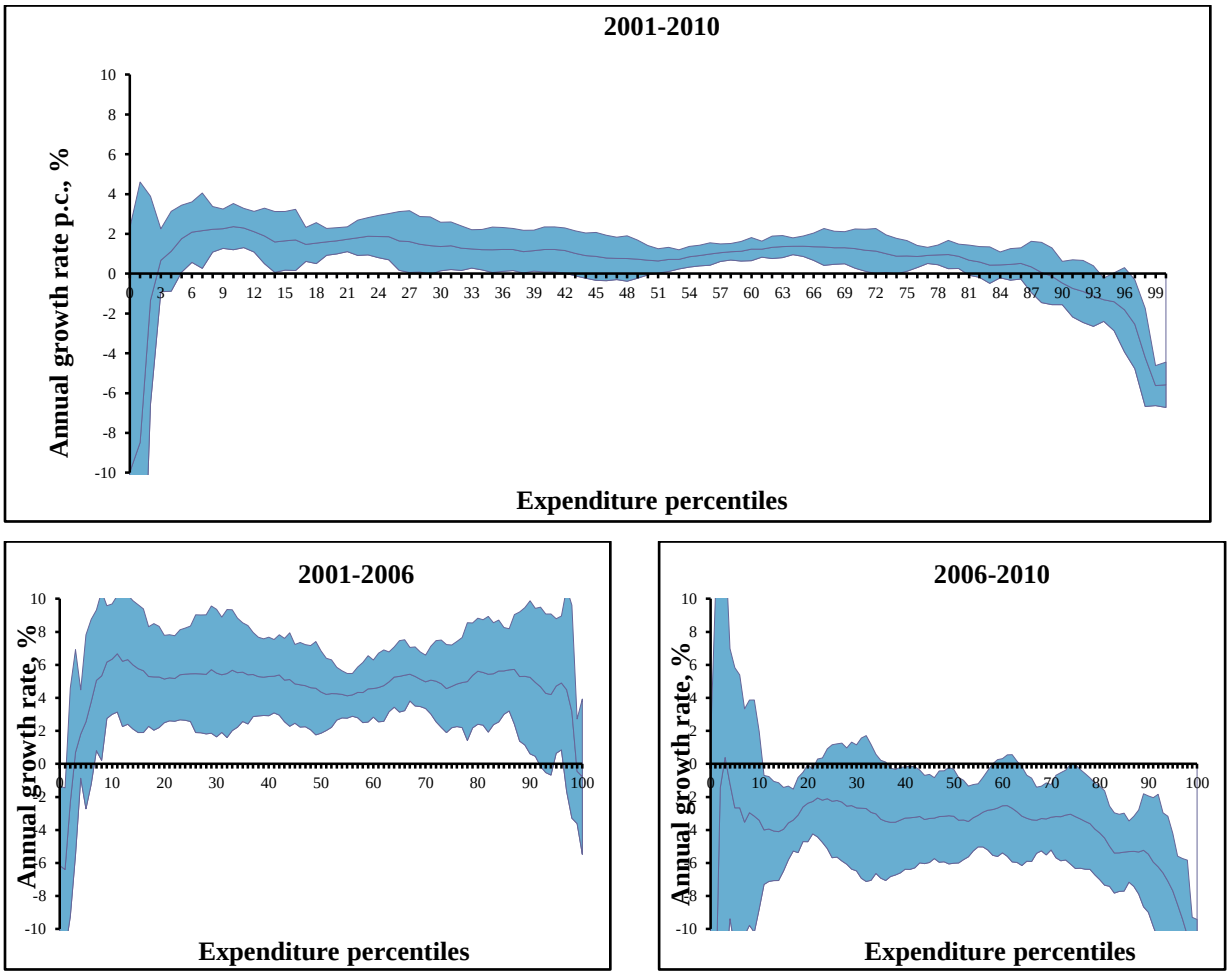
Source: EMEP 2001 and ELIM 2010. Authors' calculations.

2.30 The contribution of Bamako proper to national poverty reduction is also very limited: 0.7 percent. This comes as no surprise because between 2001 and 2010 per capita consumption levels remained more or less unchanged (at FCFA 279,000 per capita). That poverty fell none the less from 14 percent on 2001 to 8 percent in 2010 is because poor households benefited from (albeit) low levels of positive per capita growth while the wealthiest households started consuming less. This is illustrated with the growth incidence curves for Bamako (Figure 2.11). A growth incidence curve shows for every percentile in the consumption distribution the (annualized) percentage change in consumption.

2.31 The Figure illustrates how over the period 2001-2010 per capita consumption growth hovered around 1 percent per annum for most households, except for the top 10 percent who became less well off. If one decomposes the overall change in two period, 2001-2006 and 2006-

2010 then one notes how Bamako changed from a city with high levels of per capita growth to a city in which consumption growth is negative. In other words despite the dominance of Bamako in the national economy, and despite its specialization in trade, commerce and public sector jobs, and despite Bamako being the destination of choice for internal migrants and job-seekers, Bamako was not an engine of growth or of structural transformation over the 2001-2010 period and certainly not for the period since 2006.

Figure 2.12: Growth incidence curve for Bamako: 2001-2010



Source: EMEP 2001 and ELIM 2010. Authors' calculations.

F. CONCLUSION

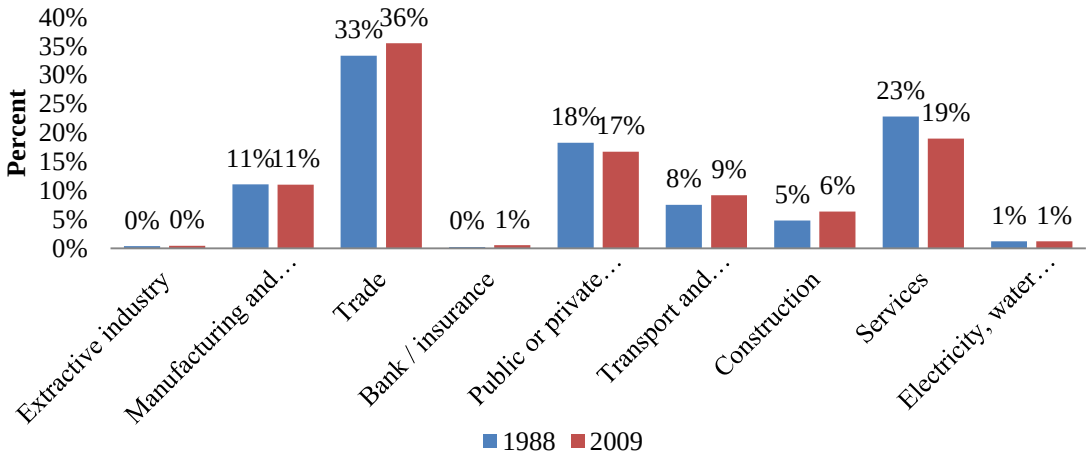
2.32 The economy remains predominantly rural: with over 10,000 rural localities with a population of less than 1,000 people and with as few as 75 urban agglomerations the country remains oriented versus the primary sector. With the exception of Bamako and in spite of a rapid urban expansion, cities remain rather small and only 15 agglomerations in the country host more than 30,000 people.

2.33 All cities in the country perform more or less similar functions with a similar mix of activities and apparent lack of economic specialization. The main difference between towns and

cities is the smaller share of the agricultural sector in cities which is replaced by a larger share of the trade, public, and service sectors, but not by a manufacturing sector. The lack of specialization suggests that the cities are not well connected among themselves, possibly due to long distances and the poor quality of roads resulting in high transport and communication costs.

2.34 The manufacturing sector, although more present in larger urban areas, remains small, even in Bamako. There is no evidence of the manufacturing sector expanding rapidly and the share of the population working in manufacturing and crafts in Bamako has remained unchanged since 1998 (while the trade and transport sectors have gained in importance, at the expense of services and the public sector).

Figure 2.13: Changes in economic sector of employment (*)



(*) Excludes those working in agriculture and non-responses.
Source: RGPH 1988 and 2009.

2.35 These traits –coupled with the observation that per capita incomes have not been growing since 2001 are suggestive of an economy where agglomeration is not accompanied by structural transformation towards productive industrial and services sectors and where a scattered urban population of modest skills and modest incomes does not generate sufficient market size to boost the demand for transformed goods or for high value-added services and does not provide the educated workforce necessary for the development of such activities.[26] It should equally be noted as there is potential for development in rural areas through commercial agriculture and better exploitation of mining resources, this requires functioning cities with adequate infrastructure for transit and export. At present this does not seem to be the case. Instead the relatively greater wealth of households in Bamako reflects more the sorting of educated workers into the city and into greater opportunities for rent capture than true agglomeration effects whereby density would be associated with higher productivity.

2.36 While Mali is likely to continue to urbanize, it will be important to reflect on the set of policies that can address the deficiencies that prevent urbanization from being conducive to sustained growth.

[26] Substantial structural population shifts without growth has been coined "pathological urbanization", a term that seems to be applicable to Mali.

Chapter 3. Mali by Livelihood Zone

A. INTRODUCTION

3.1 In the previous chapter we classified the country by agglomeration based on population density. In this chapter we introduce another type of classification: by economic activity or livelihood. Agro-ecology is an important determinant of livelihood, and since this factor is spatially correlated, it is possible to divide the country into a number of livelihood zones, defined as areas within which people share broadly the same production system.

3.2 We follow a classification developed by FEWSNET (2010) based on an elaborate research using key-informant interviews and stakeholder discussions. It identifies 13 livelihood zones. We borrow extensively from the document FEWSNET produced to describe these different zones.[27]

3.3 Livelihood zone boundaries do not follow administrative boundaries. One finds, for instance, three different patterns of livelihood in Sikasso. But at finer administrative levels –the commune, livelihood zones are defined by administrative boundaries. This makes it possible, using geographic matching tools, to combine livelihood zone information with data from other sources such as the population censuses and the various household surveys. This information is used to complement the analysis presented by FEWSNET.

B. LIVELIHOOD ZONES IN MALI

3.4 Rainfall is a decisive factor in identifying livelihood zones. Levels of rainfall help explain the degree of dependence on livestock herding and the uses to which arable land can be put. Rainfall levels vary from very low in the desert in the far north (receiving under 200mm of precipitation per year) to between 1,000 and 1,300mm per year in the lusher zones in the south. Following the broad rainfall pattern, 12 rural livelihood zones plus Bamako are distinguished (see Figure 3.1 for their location)

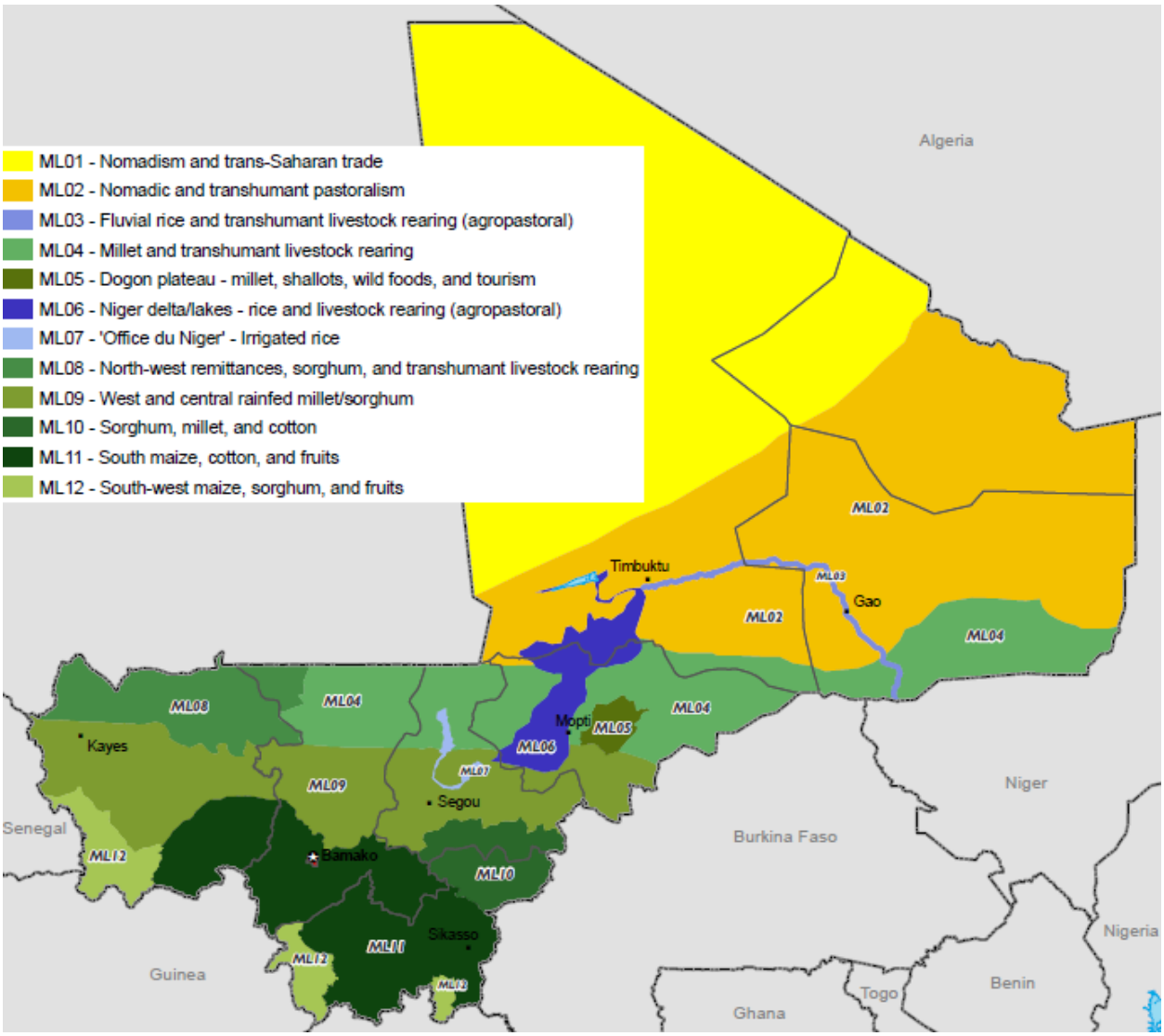
3.5 Zone 1 represents the desert, an area of low population density in which nomadism and commerce are the dominant activities. Kidal lies in zone 1. Like zone 1, zone 2 does not receive sufficient rainfall to support rain fed agriculture: it is where nomadic and transhumant pastoralism are the dominant activity. Gao and Tombouctou are the main urban centers in this zone, even though strictly speaking both lie in the fluvial basin of the Niger river which is classified as livelihood zone 3. The higher precipitation in zone 4 -the wide Sahelian band- allows cultivation of millet and cowpeas, but low and unreliable levels of rainfall means that depending on agriculture alone is risky. It explains why transhumant livestock rearing is an important activity in this zone.

3.6 Zone 9, the band stretching roughly from Kayes to Bamako to Ségou represents a transition from the north to the south; there is a decreasing dependence on livestock and an increasingly diverse range of food and cash crops that are being grown. With increasing agricultural potential, family size and population density increase. The three southern-most zones

[27] FEWSNET 2010: Livelihood Zoning and Profiling Report: Mali.

(10, 11, 12) which are demarcated by Bamako to the north and Sikasso to the south, are not only highly productive with the largest range of crops grown, these are also the zones with the largest families and greatest population density.

Figure 3.1: Livelihood Zones in Mali



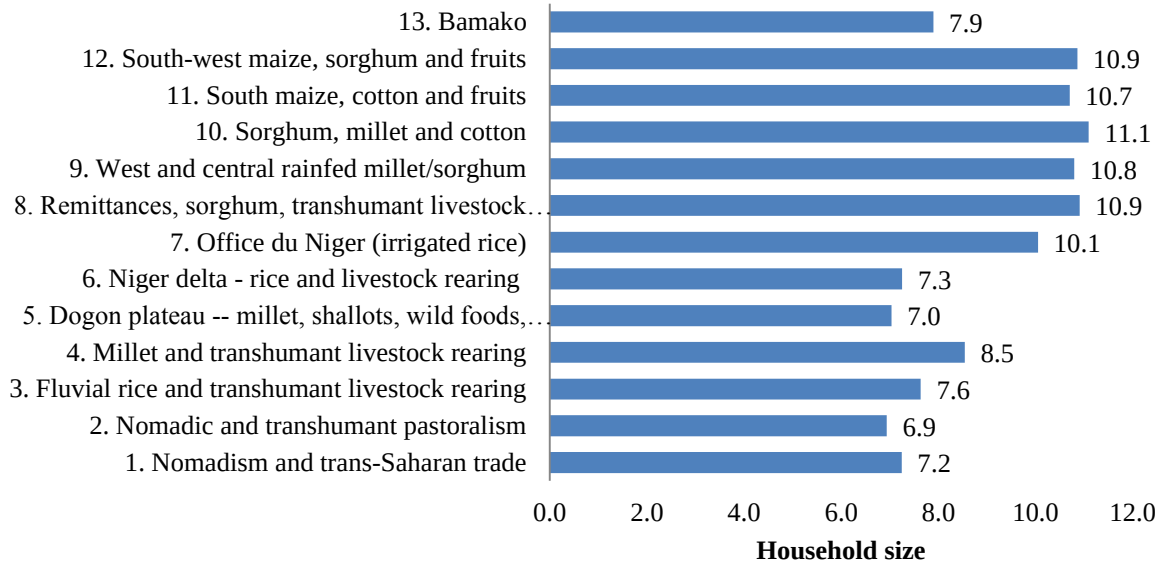
Source: FEWSNET 2010.

3.7 The Niger river defines another three livelihood zones. The delta (zone 6) near Mopti is a vast flood plain that is inundated for five months of the year; flooding is facilitated by another factor - the very low slope of the ground, which allows the waters to spread out. This creates a major resource in terms of pasture and allows households to cultivate rice and sorghum. The river also defines the livelihoods of households living along its banks (zone 3) from the north of the delta to the international border between Mali and Niger, where irrigated rice is a particular feature. In a still more direct way, Bozo fishermen (representing a subzone in zone 6), who operate along the length of the river, are dependent on it for survival. Finally the Office du Niger

(zone 7, north of Ségou) is a managed irrigation scheme dependent on water from the river. This zone is a manmade area reclaimed from the Sahel by irrigation canals and dams.

3.8 Cultural, historical and ethnic factors play a role in identifying different zones. Notably, in zone 8 north of Kayes and bordering Mauretania, the Soninke are well-known for their dependence on remittances from family members who live and work abroad (often in France). The geographical location of a zone can be important too. The location of zone 9 means that it dominates the north-south commercial axis of grain trade towards the deficit north and livestock trade and seasonal migration towards the south. Zones1 and 2 are linked to Algeria by the long tradition of trans-Saharan trade.

Figure 3.2: Household size by livelihood zone



Source: ELIM 2010. Authors' calculations.

3.9 While cultural and ethnic factors play a role in identifying different agro-ecological zones, at times the physical environment plays a critical role in cultural outcomes. There is, for instance, a strong relation between agro-ecological zone and household size and marriage patterns. In land abundant areas (most of Mali remains land abundant) with rain-fed agriculture and limited access to capital, household size is typically large as it compensates for absent labor markets (Binswanger and McIntire 1987).[28] Hence one notes the largest families in the southern zones (10, 11 and 12) and much smaller families in zones where fisheries or commerce are dominant (zones 1,2,3,4 5 and 7) –see Figure 3.2. Household size is also closely associated to wealth and poorest are small families with few physically capable members. Preferences for family size, in turn, affect marriage patterns in turn. Polygamy is more common where large families are valued for their labor and one notes that polygamy is much more common in Southern Mali, less around in Gao and Tombouctou where there is less demand for household labor as pastoralism is the dominant form of livelihood and significantly less so in Kidal where

[28] Binswanger, Hans P. and John McIntire. 1987. "Behavioral and Material Determinants of Production Relations in Land-abundant Tropical Agriculture." *Economic Development and Cultural Change*, Vol. 36, No. 1 (October): 73-99.

the main economic activity is commerce. The age at first marriage follows a similar pattern. Young people are more likely to be married in southern Mali and less so in Gao, Tombouctou or Kidal.

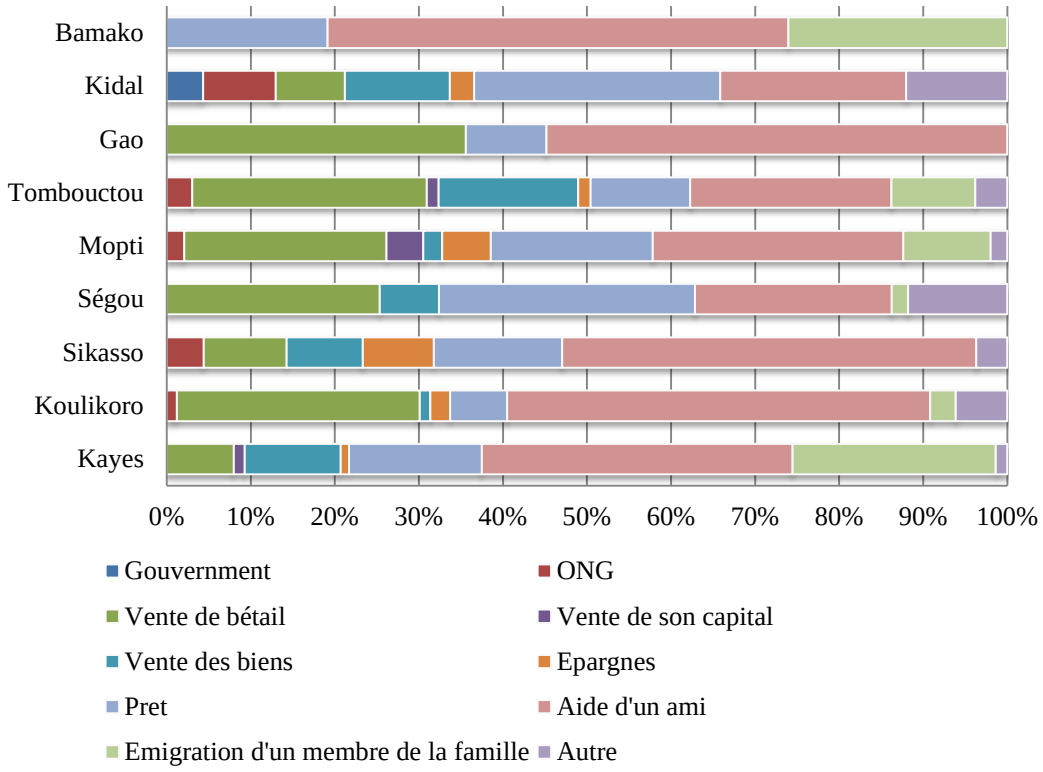
3.10 The livelihood zones interact both with each other and with neighboring countries in a number of ways. Transhumant livestock herders move their animals towards southern regions during the dry season to take advantage of pastures there; migrant laborers also travel to other zones, urban centers and neighboring countries in search of work. Every year, for example, laborers from zone 6 move to zone 4 for the millet harvest; following this, laborers from zones 4 and 5 travel to the delta (zone 6) to work on the rice harvest. Trade is one of the most important links between zones. The surplus producing southern zones provide cereals to the deficit north as well as exporting cash crops to other zones and abroad. Livestock from the north is traded in the south of the country as well as abroad (e.g. Algeria and Niger).

C. INCOME AND WEALTH

3.11 FEWSNET distinguishes four wealth categories: the very poor, poor, middle group and the better off. They estimate for each zone the percent of households in each category and provide a description of their wealth (Table 3.1). The Table demonstrates how small households (without livestock) are typically perceived as poor –an observation that makes sense since the ability to command labor and to share risks across household members is clearly associated to wealth. This observation is, however, at odds with what is typically reported by analyses using household surveys[29] which report that (all else being equal) larger households are poor. This deviation is caused by differences in definition; household surveys define as a household all those eating together implying that polygamous households are not considered one but multiple households. In the livelihoods approach this is not the case.

[29] For instance DNSI 2007 shows that in 2006 poverty incidence amongst households with 1-3 members is 14.1 percent, while for households with 10 members of more it is 62.4 percent.

Figure 3.3: Coping mechanisms for households affected by a crisis



Source: EMOP 2011. Authors' calculations.

3.12 There are several factors that determine wealth; the two cardinal factors are livestock and the ability to cultivate land.

3.13 Across the country wealthier households have larger livestock holdings. Livestock are a significant source of income, directly through the products they (re)produce and in zones where crop farming takes place because they are a source of traction power. Animals are an important way of saving and investing and a safeguard against a bad year. Particularly in regions where pastoralism is important, Tombouctou, Gap, Mopti and Koulikoro, do households in distress rely on the sale of livestock to deal with shocks (Figure 3.3).

3.14 The most valuable animals are camels (only found in zones 1, 2 and 4) and cattle; ownership of just one of these animals can bring a considerable degree of economic security. As Table 3.1 shows, only the middle and better-off possess these animals. Camels are only found in livelihood zones 1 and 2 while cattle are found throughout the country. Livestock owned by very poor households is limited to a few chickens and sometimes a goat or a sheep. Poor households, have a wider variety of livestock: chicken, sheep, goats, donkeys but not cattle or camels.

3.15 The ability to cultivate land is a key determinant of wealth in all zones but zone 2 (and perhaps zone 8). The acreage cultivated may depend on land availability, as in zone 7 where population density and pressure on irrigated land are high, but typically depends on the ability to work the land; across the country middle and better-off households have more able-bodied members than the poor and very poor. Additionally they employ members of the poorest

households as agricultural laborers. Wealthy households are also those who can afford agricultural and livestock inputs; and are those who own productive assets - often carts, plows and plow oxen -although the nature of productive assets differs from zone to zone.

3.16 Figure 3.4 summarizes the differing sources of cash for the poorest and wealthiest households in all livelihood zones. In broad terms, the better-off receive the majority of their cash income from own production, whether it be crop sales or livestock sales, while poor households earn their cash income through labor (typically local labor). Glancing from north to south one notes the decreasing importance of livestock and the increasing importance of crops.

3.17 There are some exceptions to this trend. Zones 5 and 7 are principally dependent on crops (market gardening and rice cultivation respectively), despite being towards the north of the country. Notable is the remittance-based economy of zone 8, where livestock sales are relatively unimportant despite the large holdings there.

3.18 Trade, including petty trade is dominated by the better-off households, because these households have the capital to invest. Trade is most important in the two most livestock-dependent zones (2 and 4). The movement inherent in nomadic and transhumant livestock rearing lends itself to trade and trade is one of the few ways in which wealthier pastoral households are able to diversify their livelihoods.

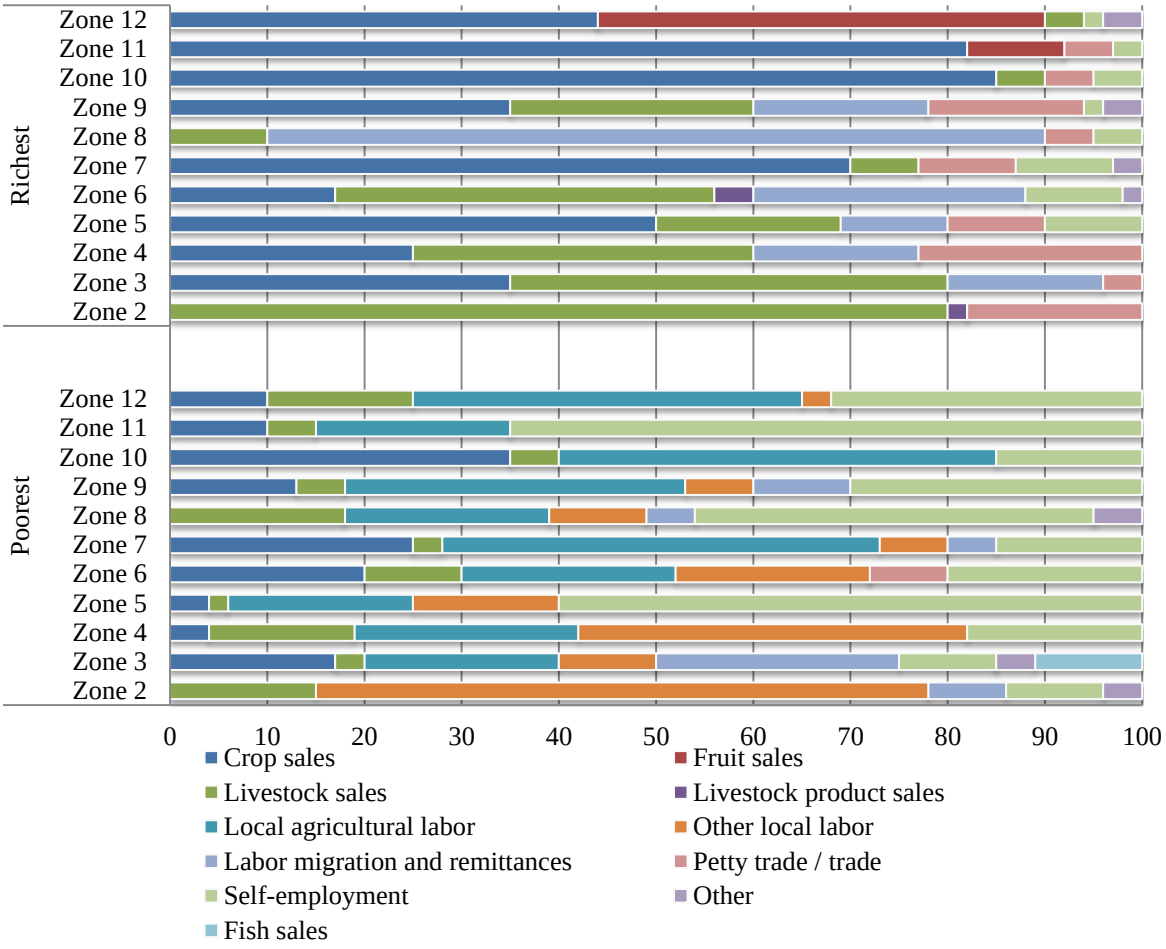
3.19 In contrast, the poor earn their money from labor and self-employment. Local labor can be divided into two categories. First, agricultural labor involves clearing and preparing fields and sowing, weeding and harvesting crops. Its peak period is often during and after the rains and it is most important in primarily agricultural zones (notice, for example, zones 7 and 12, where more labor is required than in food deficit zone 4). Second, other local labor takes place during the dry season, when there is little (or at least less) demand for agricultural labor. This often involves brick-making and construction.

3.20 Self-employment consists of several activities. Firewood/charcoal and wild food/product sales are the most common, followed by handicrafts and hay/bourgou sales. Exactly what is sold depends on the nature of the zone. In zone 12 where self-employment includes traditional gold mining.

3.21 The category ‘labor migration/remittances’ is important in many zones, although more so in the north of the country where livelihoods are more uncertain and opportunities for work within each zone are, in general, more restricted than in the south.

3.22 In the pastoral zone (2) livestock is the only productive asset and its ownership is concentrated among the better off. This creates a sharp distinction between the laboring poor and the livestock-selling wealthier households. In zone 8 remittances cause a similar skewing of wealth, as do cash crops in the southern zones, since poor households are mostly excluded from these activities, by their high cost in inputs.

Figure 3.4: Patterns of income generation by zone and household wealth



Source: FEWSNET 2010. Livelihood Zoning and Profiling Report: Mali.

Table 3.1: Wealth Characteristics According to Livelihood Zone

Very poor	Percent	Household size	Land cultivated	Sheep	Goats	Donkeys	Camels	Cattle	Plough Oxen	Poultry	Other assets
2. Nomadic and transhumant pastoralism	30.0	6	-	0	0	1	0	0	0	0	4-6 small ruminants on loan from better off
3. Fluvial rice and transhumant livestock rearing	25.0	7	0.8	0	1	0	0	0	0	5	2-3 small ruminants on loan from better off
4. Millet and transhumant livestock rearing	15.0	3	0.3	0	0	0	0	0	0	5	
5. Dogon plateau	15.0	4	0.5	0	0	0	0	0	0	5	
6. Niger delta - rice and livestock rearing	10.0	4	1	0	0	0	0	0	0	4	
7. Office du Niger (irrigated rice)	10.0	5	1	1	0	1	0	0	0	10	
8. Remittances, sorghum, transhumant livestock	8.0	5	1	0	5	0	0	0	0	10	
9. West and central rain-fed millet/sorghum	25.0	4	1	0	1	0	0	0	0	20	
10. Sorghum, millet and cotton	15.0	4	2	0	0	0	0	0	0	2	
11. South maize, cotton and fruits	10.0	4	2	0	0	0	0	0	0	10	
12. South-west maize, sorghum and fruits	10.0	4	2	0	0	0	0	0	0	5	
Poor											
2. Nomadic and transhumant pastoralism	27.0	8	-	6	15	2	0	0	0	0	4-6 small ruminants on loaned from better off
3. Fluvial rice and transhumant livestock rearing	30.0	9	1.5	1	4	1	0	0	0	5	0-2 fishing nets; 2-3 small ruminants on loan
4. Millet and transhumant livestock rearing	40.0	10	1.0	1	4	0	0	0	0	8	
5. Dogon plateau	43.0	10	3	2	1	1	0	0	0	10	
6. Niger delta - rice and livestock rearing	40.0	7	2	4	7	2	0	0	0	12	
7. Office du Niger (irrigated rice)	25.0	10	1	3	2	1	0	0	0	20	1 plow, 1 cart
8. Remittances, sorghum, transhumant livestock	25.0	12	2	2	10	2	0	0	0	20	
9. West and central rain-fed millet/sorghum	30.0	8	3	2	4	1	0	1	0	30	
10. Sorghum, millet and cotton	35.0	9	5	4	4	1	0	1	0	7	1 plow
11. South maize, cotton and fruits	20.0	10	5	0	5	0	0	0	0	30	1 plow
12. South-west maize, sorghum and fruits	30.0	6	4	0	2	0	0	0	0	10	1 plow

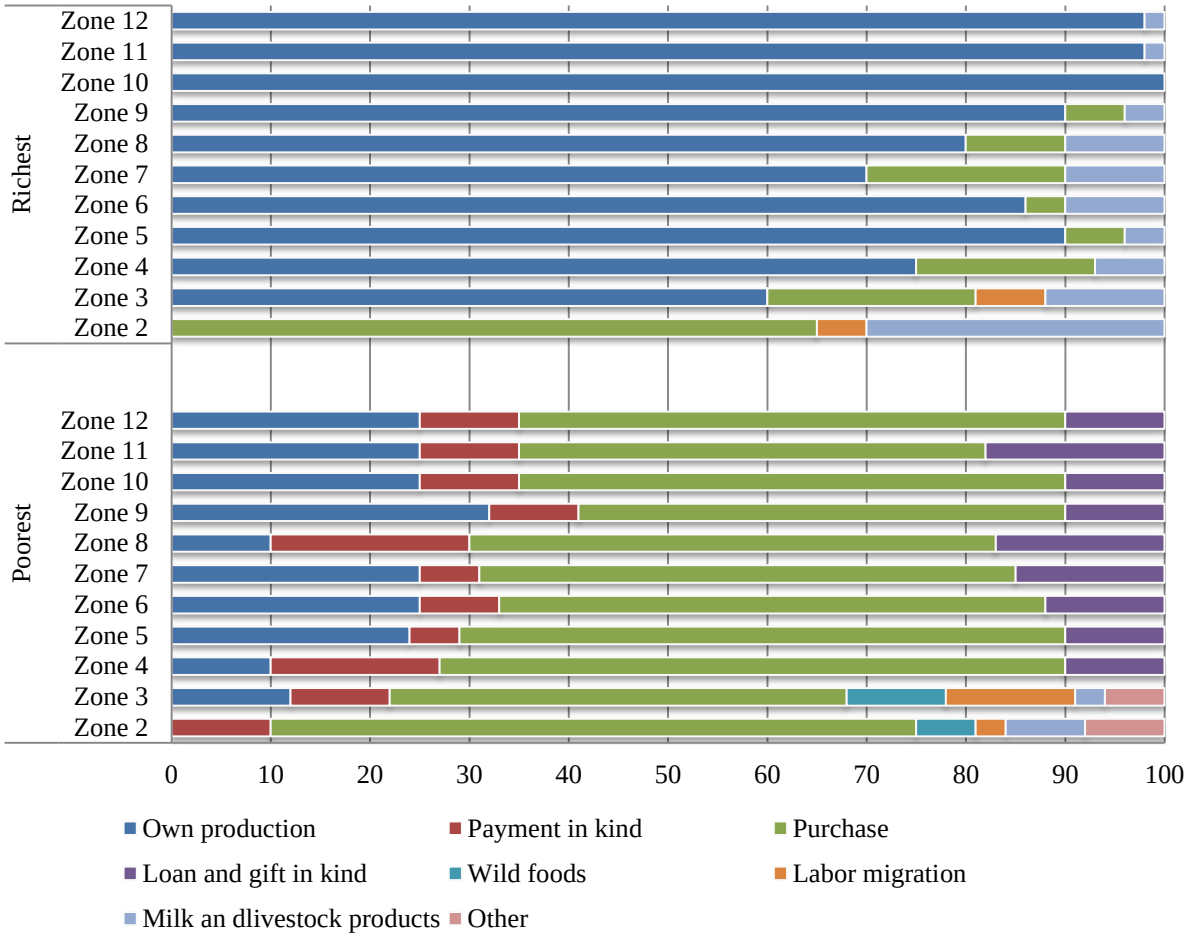
Middle	Percent	Household size	Land cultivated	Sheep	Goats	Donkeys	Camels	Cattle	Plough Oxen	Poultry	
2. Nomadic and transhumant pastoralism	23.0	11	-	40	35	4	25	10	0	0	
3. Fluvial rice and transhumant livestock rearing	25.0	11	5.5	8	13	2	0	9	2	6	0-1 canoe, 0-2 plows, 0-2 fishing nets
4. Millet and transhumant livestock rearing	35.0	20	4.0	7	20	2	1	22	0	18	1-2 carts, 1 plow
5. Dogon plateau	32.0	17	6	4	11	2	0	6	0	15	1-2 motorized pumps, 1 plow, 1 cart
6. Niger delta - rice and livestock rearing	35.0	11	7	10	15	2	0	25	0	25	1-2 plows, 1 cart
7. Office du Niger (irrigated rice)	50.0	20	4	7	5	2	0	6	0	20	2 plows, 1 cart
8. Remittances, sorghum, transhumant livestock	55.0	25	6	30	20	4	0	30	0	20	1-2 plows, 1 cart, 2-3 full time agricultural workers
9. West and central rain-fed millet/sorghum	40.0	12	8	10	10	2	0	6	0	40	1 plow, 1 cart, 1 seeding machine
10. Sorghum, millet and cotton	40.0	17	17	12	12	1	0	8	0	25	2 plows, 1 cart, 1 seeding machine, 1 motor cultivator
11. South maize, cotton and fruits	60.0	15	8	3	10	2	0	10	0	40	2 plows, 1 cart, 1 seeding machine, 1 motor cultivator, 2 fertilizer equipment
12. South-west maize, sorghum and fruits	50.0	10	11	6	8	2	0	10	0	30	1 plows, 1 cart, 1 seeding machine, 1 motor cultivator, 2 fertilizer equipment, orchards
Better off											
2. Nomadic and transhumant pastoralism	20.0	18	-	70	35	8	50	25	0	0	
3. Fluvial rice and transhumant livestock rearing	20.0	15	9.0	15	23	5	0	22	4		0-2 canoes, 1-2 plows, 0-2 fishing nets, 0-2 motor pumps
4. Millet and transhumant livestock rearing	10.0	35	8.0	17	40	4	2	35	0	25	3-4 carts, 2 plows
5. Dogon plateau	10.0	25	10	13	30	2	0	15	0	18	2-3 motorized pumps, 2-3 plow2, 2 carts
6. Niger delta - rice and livestock rearing	15.0	20	14	25	40	5	0	50	0	0	3-4 plows, 2-3 carts
7. Office du Niger (irrigated rice)	15.0	30	8	15	10	4	0	30	0	25	3-4 plows, 2-3 carts, 1 motorized cultivator
8. Remittances, sorghum, transhumant livestock	12.0	45	25	40	50	6	0	100	0	30	4-5 plows, 3-4 carts, 5-6 full time agricultural workers
9. West and central rain-fed millet/sorghum	5.0	20	15	30	30	4	0	30	0	60	2 plows, 2 carts, 1 seeding machine, 1 motorized cultivator, 2 full time agricultural laborers
10. Sorghum, millet and cotton	10.0	30	35	25	25	3	0	50	0	60	4 plows, 2 carts, 2 seeding machines, 2 motor cultivators
11. South maize, cotton and fruits	10.0	20	15	6	10	3	0	20	0	50	4 plows, 2 carts, 2 seeding machines, 2 motor cultivators, 2 fertilizer equipment
12. South-west maize, sorghum and fruits	10.0	15	20	10	8	3	0	35	0	60	4 plows, 2 carts, 2 seeding machines, 2 motor cultivators, 2 fertilizer equipment, orchards

Source: Calculated from FEWSNET 2010. Livelihood Zoning and Profiling Report: Mali.

D. PATTERNS OF CONSUMPTION

3.23 Patterns of food consumption differ across livelihood zones and across wealth categories. At the most general level, there is a north-south trend whereby households in the south depend more on own production for food and less on the market. A difference exists between zones 3 and 4 in the north, which produce a deficit, import staple foods and are food insecure, and zones 10, 11 and 12 in the south, which produce a surplus, export cereals and are food secure. However, households in *all* zones rely on the market for their food needs. Even in the south, the very poor and poor depend heavily on the market and must use cash income to purchase food. Thus the graph reveals something about the structure of poverty in that poor households are more dependent on food purchases than are the better off households who mostly rely on own production to meet their food needs.

Figure 3.5: Patterns of food consumption by zone and household wealth



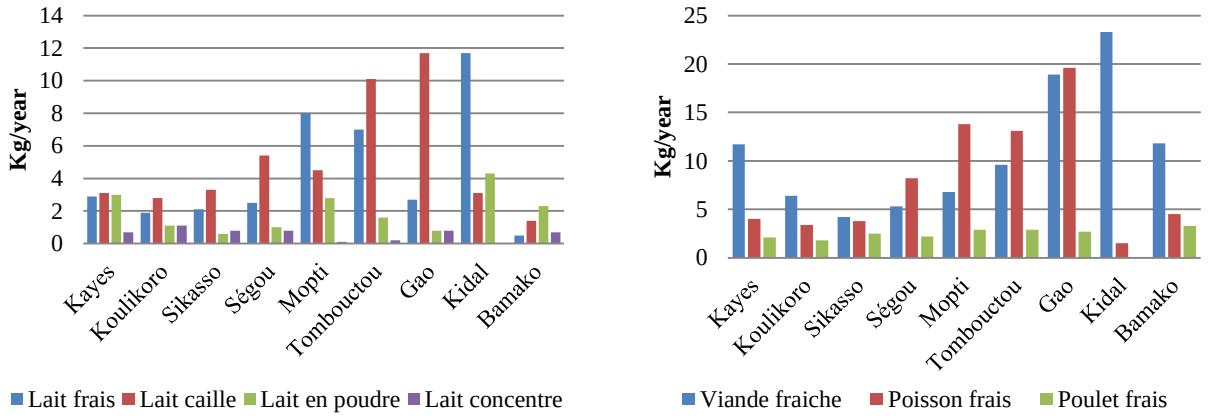
Source: FEWSNET 2010. Livelihood Zoning and Profiling Report: Mali.

3.24 In all zones the poorest households receive payments in-kind for work carried out for the middle and better-off. Under this type of arrangement wealthier households pay laborers using grain from their own harvests; zone 2 is distinctive in that there is payment in-kind in bought grain, but no agricultural production. In all zones the poor and very poor receive some of their

annual food requirement from a combination of loans and gifts in-kind, given by the middle and better-off. Loans are commonly taken during the hard hunger months when poor households are most dependent on the market and staple food prices are high. They are repaid after the harvest when the economic situation of these households has improved. The general trend across zones is for the very poor to depend more on these sources than the poor. One exception is zone 8 in the north-east where this category is large for both groups. This has to do with the importance of remittances, the benefits of which are partially received by the poorest households in the form of food gifts. The contribution of loans and gifts in-kind tells us something about the degree and nature of poverty in Mali. The graphs illustrate how dependent the poorest are on the wealthier groups in order merely to survive and meet their food needs.

3.25 In broad terms, milk and livestock product consumption decreases as one travels south. It is the highest in pastoral zone 2, where a poor household consumes more milk than typical middle and better-off households in all other zones. Within each zone it is the wealthier households who consume more than the poorer households.

Figure 3.6: Quantities of milk and meat consumed by region (2001)



Source: EMEP 2001. Authors' calculations.

3.26 Levels of milk consumption are closely tied to the size of livestock holdings. Less milk is consumed by households in the Office du Niger and Dogon plateau zones (7 and 5) than in the large Sahelian band (zone 4) because of lower livestock holdings. However, middle and better-off households in the southern zones own enough animals to consume more milk than they but milk consumption generally (including cows' milk) is not really part of the dietary habits of households in these areas. In those zones where milk is consumed in larger quantities, it provides a significant boost to the quality of households' diets, and it is no coincidence that the prevalence of chronic malnutrition is significantly higher in the southern parts of the country than it is in the north.

3.27 Zone 2 should be mentioned separately. While it fits with the general cross-country trends it is the only purely pastoral zone (excluding zone 1). The inhabitants of the zone primarily consume cereals purchased on the market. They are consequently vulnerable to poor terms of trade between the price of millet (the main staple) and the price of livestock.

E. ACCESS TO SERVICES

3.28 Access to services differs across livelihood zones. The first aspect to note is that in Bamako access to piped water, electricity as well as the use of (modern) toilet facilities is much higher than elsewhere. At the same time the number of schools per '000 residents, as well as the number of health facilities per '000 residents is amongst the lowest in the country. This pattern has been observed before in Chapter 2: better access to piped water and electricity are associated with high population density. The lower number of schools and health facilities is possibly also a reflection of high density in that in a high density environment one can benefit from economies of density and construct larger schools and health centers.

3.29 Between the different livelihood zones, access to piped water and electricity varies, but it is in essence uniformly low, with the exception of households in zone 8 (Northern Kayes) who rely on remittances amongst whom some 14 percent of households have access to electricity.

Table 3.2: Market access by livelihood zone

1	Nomadism and trans-Saharan trade	Very poor.
2	Nomadic and transhumant pastoralism	Sand and dirt roads are most frequent in this region, with very few surfaced with bitumen. Market access in the zone is poor and herders may have to travel long distances to take their animals to market.
3	Fluvial rice and transhumant livestock rearing (agropastoral)	Market access varies; communes in the middle section of the zone are fairly isolated as the river flows along the edge of the desert. During the rainy season, for example, it takes sometimes two to three days to travel by road from Téméra to Gao.
4	Millet and transhumant livestock rearing	Access to markets in this zone is generally easy during the dry season, although areas of the zone are isolated. Access becomes more difficult in the rainy season.
5	Dogon plateau -- millet, shallots, wild foods and tourism	Market access is relatively good and better than in zone 6.
6	Niger delta - rice and livestock rearing (agropastoral)	Market access in this zone is worse than in zones 4 and 5 and during the flooding many roads are impassable. Trading is also carried out by canoe and motorized canoes; this decreases from March to July when the water levels are low.
7	Office du Niger (irrigated rice)	Markets are generally accessible in all seasons, although during the rains some areas can be cut off.
8	North-west remittances, sorghum and transhumant livestock rearing	Access to markets is relatively poor; during the dry season roads can very sandy and in the wet season very muddy.
9	West and central rainfed millet/sorghum	Markets access in this zone is generally good; however, it can become very difficult in some areas during the wet season, because of rivers and muddy roads.
10	Sorghum, millet and cotton	Market access is generally good, but can become difficult in some areas during the rainy season.
11	South maize, cotton and fruits	Market access is generally good, apart from during the rains when areas can become isolated and lorries easily get bogged down on the roads. Roads may also be blocked by seasonal rivers.
12	South-west maize, sorghum and fruits	Market access is this zone is generally good, but can become difficult in some areas during the rainy season.
13	Bamako	Good

Source: FEWSNET 2010. Authors' compilation.

3.30 In the previous chapter it was noted that there is a clear pattern in the number of schools or health centers, with relatively more schools and health facilities in low density areas agglomerations (villages). Doing the breakdown by livelihood zone, one notes a substantial variation which can only be partially explained. For instance, in the desert (zone 1) one finds a relatively high number of schools, which is a reflection of the low population density necessitating the construction of relatively many (presumably small) schools. But in Southern Sikasso (zone 11) one finds a comparable number of schools, while in other low density areas such as in zones 2 and 4 the number of schools per '000 residents seems pretty low. In chapter 5 we will consider the placement of schools across the country in greater detail.

3.31 Access to markets also varies by livelihood zone and is closely associated with population density: it is worst in the north of the country (zones 1,2 and 3) better in the middle (zones 4, 8 and 9) and best in the south (zones 10, 11 and 12).

Table 3.3: Population density and access to basic utilities by livelihood zone (2009)

Livelihood zone	Population density	Households whose main supply of water is from a faucet	Households whose main supply of water is from a well or bore hole	Households with electricity	Households with toilets	Households using latrines	Schools (per '000 residents)	Health centers (per '000 residents)
1. Nomadism and trans-Saharan trade	0.2	2.5%	87.6%	0.6%	1.4%	15.8%	1.81	0.21
2. Nomadic and transhumant pastoralism	1.9	5.3%	73.2%	3.8%	2.5%	20.7%	0.77	0.23
3. Fluvial rice and transhumant livestock rearing	27.3	1.0%	63.0%	0.5%	2.5%	40.0%	0.88	0.11
4. Millet and transhumant livestock rearing	7.7	4.1%	77.1%	1.7%	4.3%	35.6%	0.57	0.05
5. Dogon plateau	44.5	2.5%	84.1%	3.4%	2.5%	15.4%	0.71	0.07
6. Niger delta - rice and livestock rearing	33.0	5.2%	72.4%	5.1%	5.1%	54.9%	0.39	0.06
7. Office du Niger (irrigated rice)	180.9	5.3%	85.9%	6.3%	8.4%	82.6%	0.84	0.05
8. Remittances, sorghum, transhumant livestock	18.4	14.1%	71.3%	2.4%	7.2%	71.9%	0.80	0.13
9. West and central rain-fed millet/sorghum	27.7	5.2%	83.0%	3.7%	7.1%	73.1%	0.90	0.10
10. Sorghum, millet and cotton	52.3	2.4%	92.0%	2.2%	5.4%	72.9%	0.89	0.12
11. South maize, cotton and fruits	33.7	3.2%	89.5%	4.1%	7.0%	79.4%	1.76	0.24
12. South-west maize, sorghum and fruits	19.2	2.2%	83.4%	3.0%	4.1%	65.1%	1.27	0.14
13. Bamako	7380.0	44.5%	27.9%	76.9%	21.5%	74.9%	0.54	0.09

Source: 2009 census of the Malian population. Authors' calculations.

F. CHARACTERISTICS OF POOR HOUSEHOLDS ACROSS LIVELIHOOD ZONES

3.32 In the predominantly agricultural zones of Mali the ability to cultivate is the most important determinant of wealth. In most livelihood zones access to land is not a limiting factor but access to labor, to agricultural inputs and productive assets is.[30] Hence a key difference between wealthier and poorer households is less how much land they possess and more how much land they are able to cultivate.

3.33 The number of able-bodied household members and the ownership of productive assets (plow, oxen, fishing nets, motorized pumps) are critical determinants of the acreage that can be cultivated and, consequently, of poverty. Poor households typically lack both and end-up with a production system in which they cultivate small plots of land, obtain low yields and depend on labor income to make ends meet. Once in it, it is very hard to escape this low productivity system.

3.34 Poor households do not own the livestock to provide them with organic manure, nor do they own carts (or the donkeys or the cattle to pull them) with which to transport manure to the fields. Hence the poorest households do not use manure and are not able to fertilize their fields.

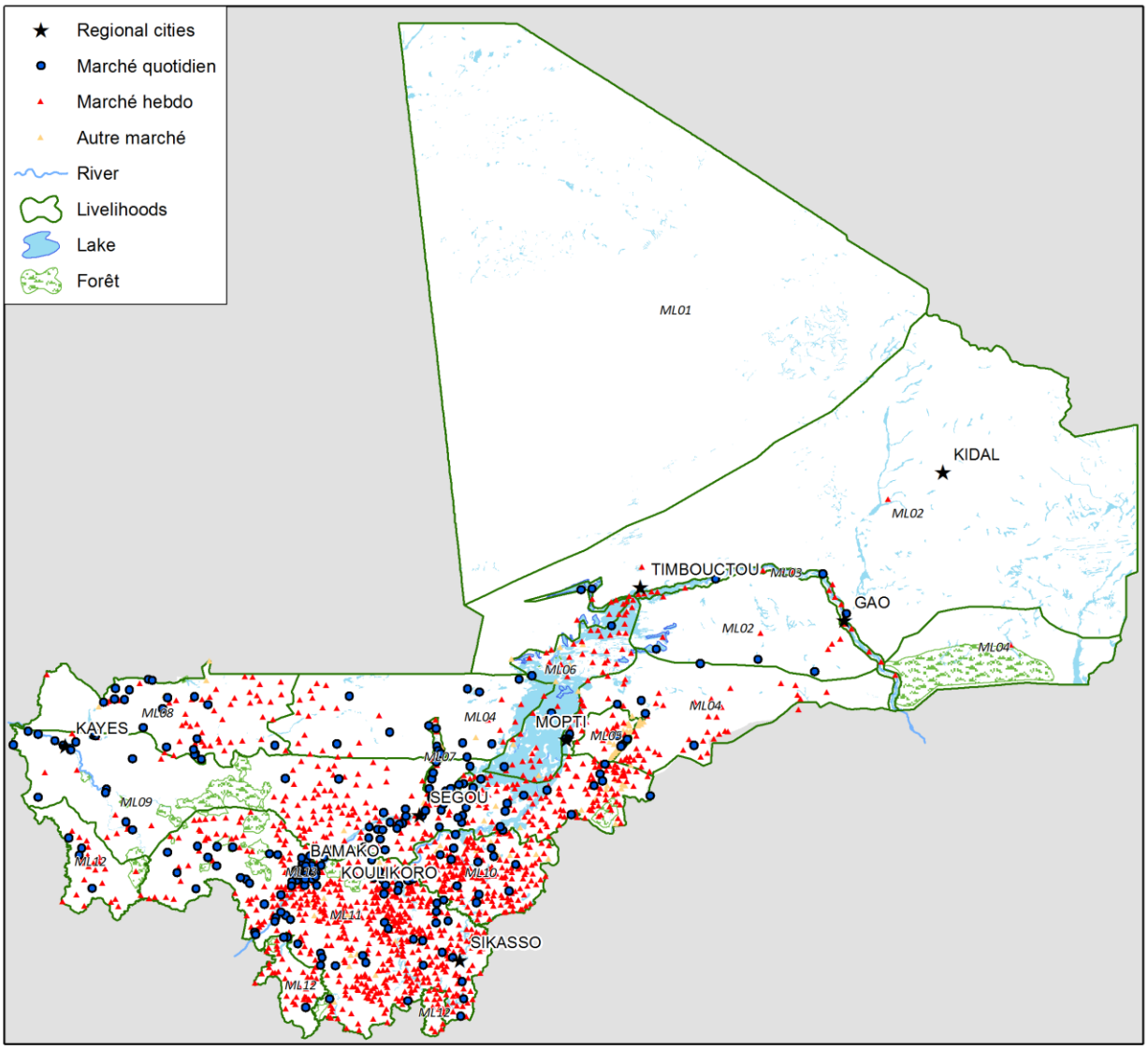
3.35 When the time for land preparation comes, access to a plow and plow oxen is important as land preparation is labor-intensive. Poor households may own a plow, but will typically lack the oxen. By the time oxen can be borrowed or rented, the better off households owning the animals have already completed planting and the optimal time for planting has past. In the meantime, poor households may prepare their land using the traditional daba (a type of hoe), thus limiting the acreage that can be sowed. Alternatively they may opt (or be forced to) first work for wealthier households, before devoting themselves to their own fields. In either case, poor households sow late, weed less, and consequently receive lower yields.

3.36 Since little land is brought under cultivation, poor households prefer to grow food crops over cash crops like cotton: these are predominantly grown by the better off households. It means poor households forego the possibility to access fertilizer on credit which is offered by the CDMT. So in comparison to better-off households, poor households not only have less able-bodied household members, they end up working for better off households as laborers, are unable to afford agricultural inputs such as fertilizer and pesticides, and do not grow cash crops such as cotton.

3.37 The food poor household obtain from their own plots is insufficient to sustain them till the next harvest (in fact some of it may be eaten prematurely prior to the harvest–thus reducing yields further) and poor households rely heavily on casual labor as a source of income and on markets to purchase their food. The dependence on food and labor markets may seem at odds with the perception of poor households being subsistence households. The subsistence aspect only references to the fact that poor households interact little with the market as a producer. As a net purchaser of food, and as an active participant in the labor market, access to markets is critical to poor households. Market access varies, however, across the county and is worst in the north and in the west (Figure 3.7). In chapter 5 we will note that limited market access, is in turn associated to high levels of consumption variability.

[30] About 3.2 million hectares out of a total of 12 million with cultivation potential is cultivated.

Figure 3.7: Daily and weekly markets



Source: RGPH 2009. Authors' calculations.

3.38 In the areas where pastoralism is important, the poorest lack the livestock to be called 'pastoralists'. Rather like poor agriculturalists, the poorest depend on work offered by the middle class and the better-off. To the extent that poor pastoralists have animals, they are less likely to move with them because their herd sizes are not large enough to warrant such movement and because their herd comprises mostly of goats.

3.39 Across Mali labor migration is important, more so in the north of the country where livelihoods are more uncertain and opportunities for work within each zone are, in general, more restricted than in the south. The poorest often lack the means to migrate for labor, either because

they have too few able-bodied members or lack the cash to pay for transport. Hence the very poor look for casual labor opportunities nearby, and often end up doing tasks like weeding, plowing, winnowing, harvesting and construction work. Other kinds of work include shepherding, fishing and punting/paddling canoes.

3.40 If poor households do migrate they tend to migrate less far than better off households who have the means to pay for travel over long distances. Poor household thus have to forego the most remunerative sources of income open to the better of who may end up working in Ghana, Mauretania, Côte d'Ivoire, Algeria or even in Europe.

3.41 To diversify their income base, poor households may seek to self-employ by collecting and sell firewood and wild fruits or by producing charcoal. Again the options open to the poor are limited as they lack the capital to engage in more remunerative self-employment options such as trade, commerce or agricultural transformation.

3.42 The dependence on labor as their main asset makes poor households extremely vulnerable to health shocks. Malaria is a particularly important acute source of risk. When malaria strikes during the lean season when food stocks have run out and households depend on the income able bodied household members are able to make, or during the planting season when the presence of able bodied household members determines the size of next years' harvest, the consequences can be severe. Malnutrition is a more chronic type of risk: high levels of anemia (in part caused by frequent bouts of malaria and regular infections) reduce labor productivity, and poor diets (poor households do not drink milk) increase the risk of stunting.

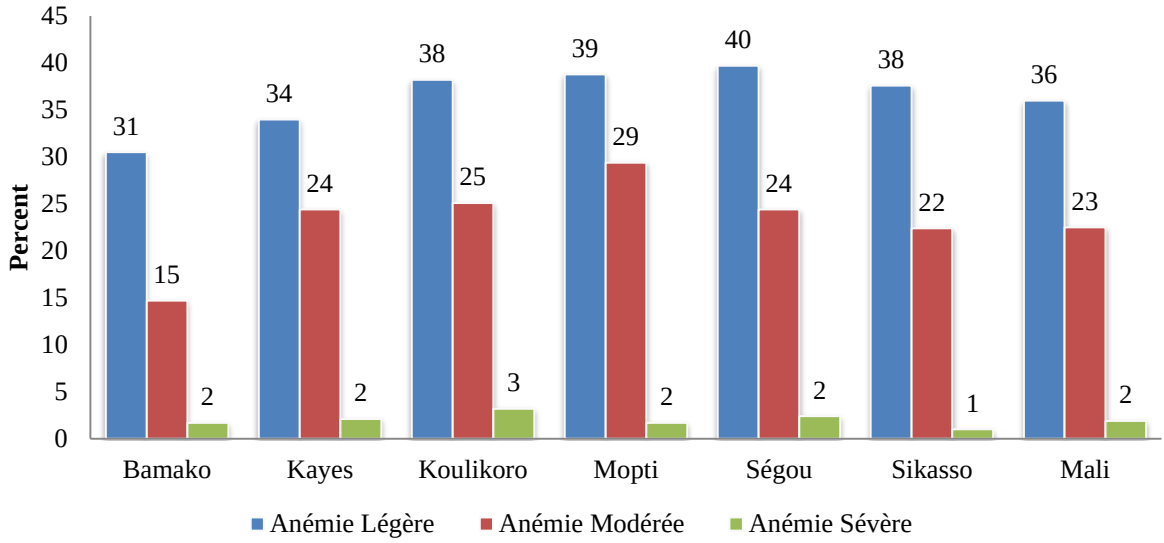
3.43 Dependence on purchased food during the lean season make poor households rely more on wild foods (which are labor intensive to collect) and exposes poor households to the vagaries of the market. Rising food prices and falling livestock prices are particularly harmful to the poorest; for pastoralists the worst possible combination is one of falling livestock prices and rising food prices, a combination that typically occurs when a covariate shock (drought, insects, insecurity) affects an area.

3.44 The need for able bodied people to work also means that children from very poor households are more likely to receive only a basic primary education (if at all), thus given an intergenerational dimension to poverty.

G. DISCUSSION

3.45 The 13 livelihood zones offer a rich description of the various ways production systems in the country. By delving deeper into the ways people earn a living it has become clear that poor households are not able to realize their full productive potential. Policies that allow poor households to break the cycle of poverty seem critical. As land is still relatively abundant, such policies should seek ways to increase the capital base of poor households and/or to increase their labor productivity. Policies leading to greater access to traction animals, improved seed or fertilizer seem critical as do policies that reduce exposure to malaria and anemia and policies that offer labor opportunities during the lean season.

Figure 3.8: Percent of adult, non-pregnant women (15-49) that is anemic



Source: SMART 2013.

3.46 Poor households are (surprisingly?) dependent on food and labor markets. Low food prices –often seen as critical for the urban poor, are equally critically for poor people in rural areas. Increasing food production would be pro-poor as it can be expected to increase the demand for labor and to reduce food prices. In the next section we will see that, indeed, livelihood zones where poverty has dropped the fastest are those where food production has increased.

3.47 Poor households are found not to have much livestock –even in pastoralist zones, and are less likely to be involved in transhumant livestock rearing – other than as herders. Hence policies that increase the demand for their labor may be more astute to reducing poverty than interventions aimed at cattle or other large animals; also interventions that focus on small ruminants can be expected to benefit non-poor households disproportionately.

3.48 The dependence on able-bodied household members for their labor is likely to exert a negative influence on children from poor households to go to school, and particularly to secondary school as the opportunity cost to labor is rises with age. Indeed for every 100 children from the poorest wealth quintile attending primary school, only 36 continue to secondary school; for children from the top wealth quintile the corresponding number is 57. Policies that reduce the opportunity cost to labor while increasing school attendance would be welcome. This could include reducing the age at school entry, but also offering school meals

Chapter 4. Explaining Well-being Using a Spatial Perspective

A. INTRODUCTION

4.1 Well-being has different dimensions from happiness to poverty and from life expectancy to literacy. In this chapter the focus is on those elements of well-being that are largely determined at the household level, while aspects determined by decisions of the state are discussed in the next chapter. Hence we discuss life expectancy, mortality and nutrition but not access to health care. We consider literacy, but not access to education. We primarily focus on consumption, ownership of assets as well as income poverty. In the next chapter we deal with access to services.

4.2 The perspective remains a spatial one. We combine information about the livelihood zone with household surveys and explore how poverty and poverty trends vary spatially and what might explain these trends. We also consider more typical correlates of welfare such as education and nutrition. At times the relation may be as expected: better educated people have, on average, higher levels of consumption and lower levels of poverty. In other instances, the relation is less obvious such as the relation between acute malnutrition and average levels of consumption.

B. CONSUMPTION

4.3 Consumption captures the ability of an individual to meet his or her basic and other needs. In doing so it is an important metric of well-being. Consumption data can be obtained from household surveys. For Mali three comparable nationwide household surveys are available. These surveys were administrated in 2001 (EMEP), 2006 (ELIM) and in 2009/2010 (ELIM) [31] and had sample sizes of 4966, 4494 and 9235 households respectively. The surveys had modules capturing information about household consumption as well as dwelling characteristics, durable goods ownership, education etc. The consumption measure we use is defined as the aggregate of all household consumption, expressed in 2001 prices. This aggregate includes cash expenditure on food and non-food items, consumption of home produced goods, and user values of owned durable goods. A provision for owner-occupied dwellings is also taken into account.

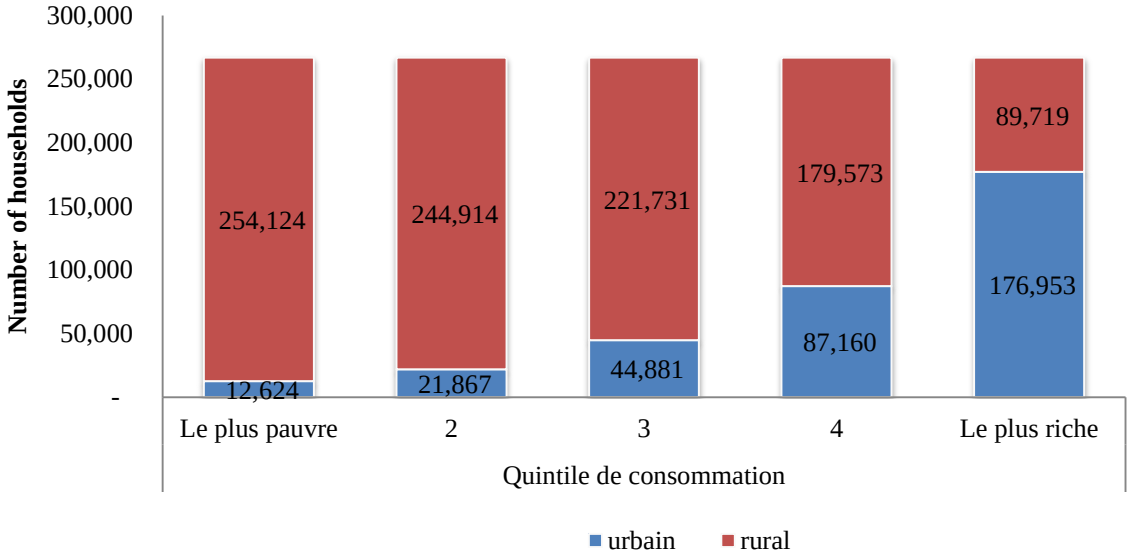
4.4 Two other household surveys, EMOP[32], were implemented in 2011 and 2013. Unlike the three annual surveys carried out between 2001 and 2010, the EMOP surveys are quarterly. The consumption information they collect, however, is not comparable to that collected earlier. Hence we treat this information separately. For 2013 only information for the first two waves is available. As we are interested in trends most of our analysis will focus on data collected between 2001 and 2010.

4.5 In 2010, levels of consumption in rural areas were approximately half (FCFA 119,000 per capita) those in urban areas (FCFA 239,000 per capita). Price differences between rural and

[31] The 2001 survey was the Enquête Malienne d'Évaluation de la Pauvreté (EMEP), the Enquête Légère Intégrée auprès des Ménages (ELIM) in 2006 and the Enquête par grappes à Indicateurs Multiples et de dépenses des ménages (MICS-ELIM) in 2009 /2010.
[32] Enquête Modulaire et Permanente auprès des Ménages (EMOP).

urban areas – life in urban areas is more expensive than in rural areas,[33] reduce the difference in real terms but it is evident that levels of consumption are considerably higher in urban than in rural areas. Because of the large differences in consumption, the poorest households – those in the first two wealth quintiles are almost exclusively found in the rural areas, whereas the richest households are almost exclusively found in urban areas (Figure 4.1). Out of approximately 1 million rural households, only 90,000 belong to the top wealth quintile, while of the approximately 330,000 urban households, more than half belong to the top wealth quintile.

Figure 4.1: Distribution of rural and urban households by consumption quintile



Source: ELIM 2010. Authors' calculations.

4.6 Breaking down the data by region one finds that expressed in consumption per capita, households in Sikasso are worst off and those in Bamako best off (Figure 4.2). By expressing consumption in per capita terms, we do not take into account that households in Sikasso are amongst the largest, nor that not all household members have equal consumption needs, or that certain consumption items (such as televisions or radios) can be shared. One approach to take these aspects into consideration is by defining the number of adult equivalents. This can be done using a formula where A is the number of adults in the household, and K is the number of children. The parameter α is the cost of a child relative to that of an adult, and lies somewhere between 0 and 1. The other parameter, β also lies between 0 and 1 and controls the extent of economies of scale.

$$\text{Adult equivalent} = (A + \alpha K)^{\beta}$$

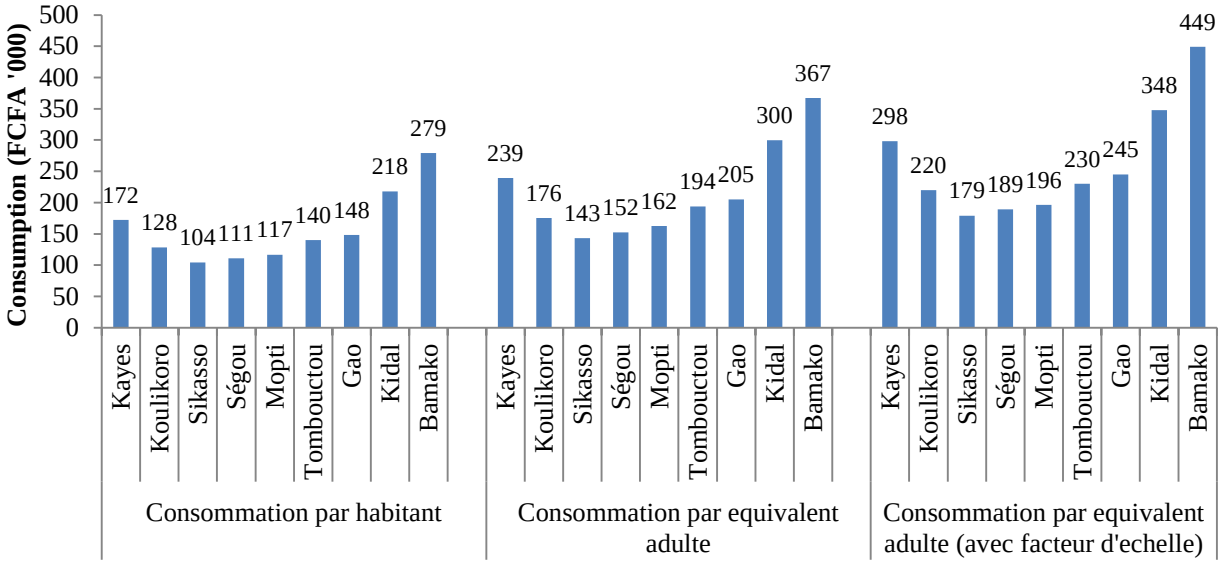
When both a and β are unity—the most extreme case—the number of adult equivalents is simply household size, and consumption is expressed on a per capita basis.

4.7 Values for a used by INSTAT are provided in the footnote.[34] The values suggest that children are relatively cheap: small children count for less than half an adult. If we think of

[33] This is reflected in the urban poverty lines which are approximately 20 percent higher than those for rural areas.
[34] In Mali the following adult equivalence scales are used.

economies of scale as coming from the existence of shared goods in the household, then β has to be high since households in Mali spend a large fraction of their budget on food and relatively little on shared public goods. Deaton and Zaidi (2002) suggest to set in such circumstances the economies of scale factor to 0.9.[35]

Figure 4.2: Consommation par région: définitions différentes



Source: ELIM 2010. Authors' calculations.

4.8 Figure 4.2 presents the results for consumption per adult equivalent under various assumptions. The first panel presents consumption per capita (setting α to 1 for all household members); the second panel presents consumption per adult equivalent. The third panel does the same but accounts for economies of scale at the household level as well (setting β equal to 0.9). The Figure demonstrates that irrespective of the assumptions made the patterns of consumption do not differ: those living in Sikasso invariably consume least, closely followed by those in Ségou and Mopti while those living in Kayes, Kidal and particularly in Bamako consume most. Because of the insensitivity of the pattern of consumption to the choice of adult equivalent measure, we use per capita consumption in the remainder of this document.

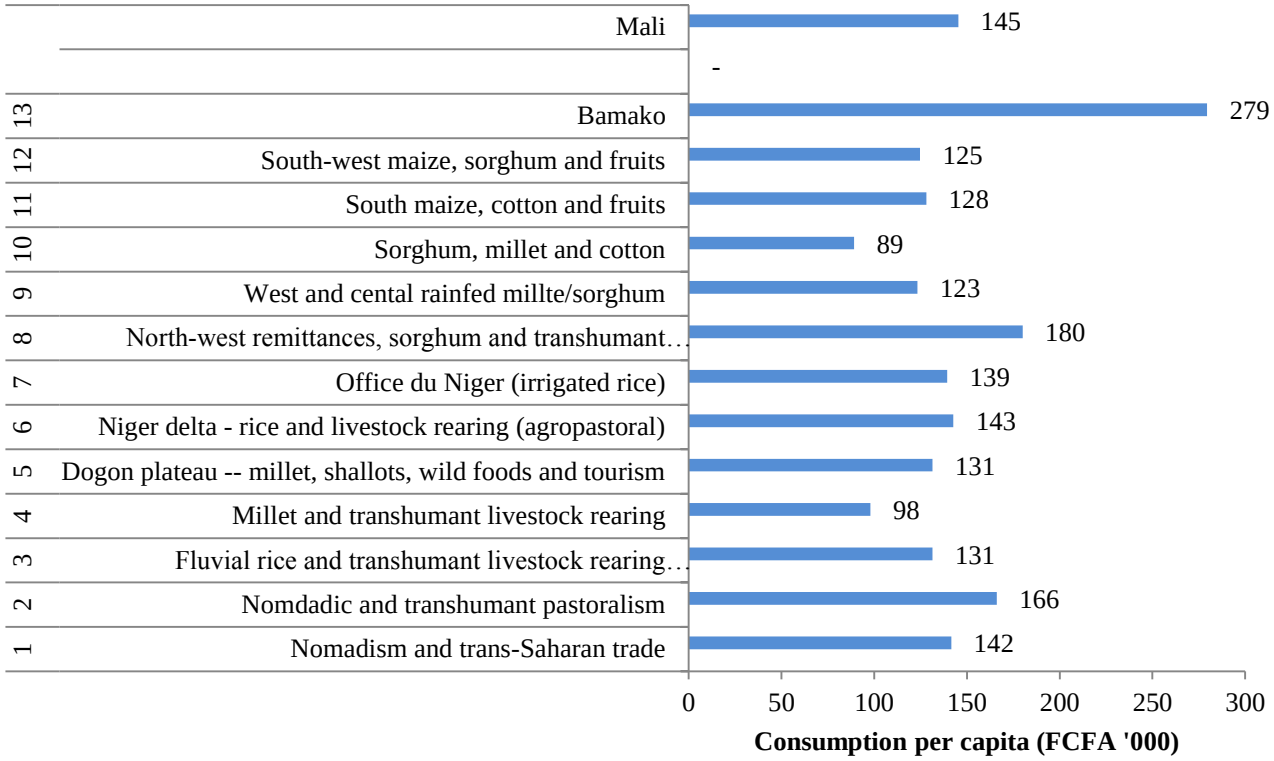
4.9 Consumption data can also be presented by livelihood zone (see Figure 4.3). It is informative in that – in addition to the large difference with Bamako, it demonstrates that average consumption in two livelihoods zones, 4 (millet and transhumant livestock keeping) and 10 (sorghum, millet and cotton) are particularly low, while two other livelihood zones 2

Age range	Male	Female	Age range	Male	Female
0-1	0.26	0.26	15-18	1.03	0.76
1-3	0.45	0.45	19-24	1	0.76
4-6	0.62	0.62	25-50	1	0.76
7-10	0.69	0.69	51-99	0.79	0.66
11-14	0.86	0.76			

[35] Deaton, A. and S. Zaidi (2002). A Guide to Aggregating Consumption Expenditures, Living Standards Measurement Study, Working Paper 135.

(nomadic transhumant pastoralism) and 8 (remittances, sorghum and transhumant livestock rearing) are doing considerably better than the other rural zones. As zones 2 and 4 lie entirely (2), respectively partly (4) in north Mali consumption in these zones is expected to have declined significantly as a result of the continuing security crisis.

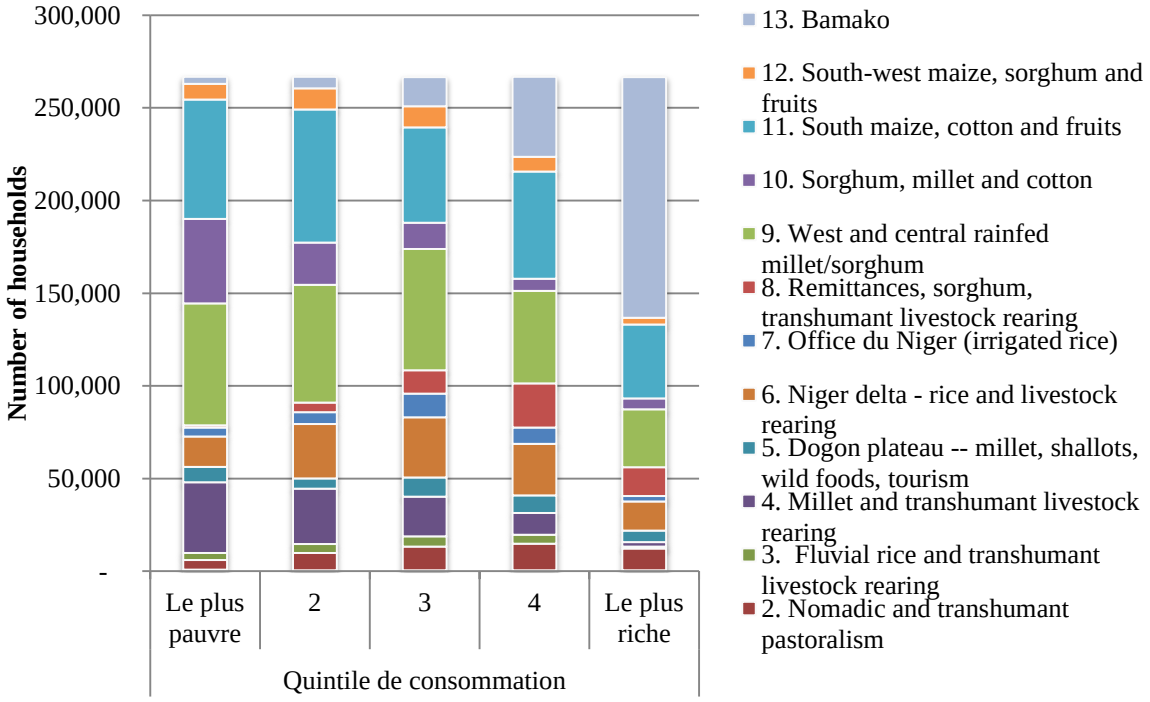
Figure 4.3: Consumption per capita by livelihood zone



Source: ELIM 2010. Authors' calculations.

4.10 By replicating Figure 4.1 by livelihood zone we can illustrate the relative wealth of households in Bamako. Approximately half of all households in the top consumption quintile reside in the capital city. Households in zone 8 whose livelihoods evolve around remittances, sorghum and transhumant livestock rearing are also relatively wealthy: they are predominantly found in the top two consumption quintiles. Compare this to households from zones 10 (sorghum, millet and cotton) and 12 (maize, sorghum and fruits) who are predominantly found in the bottom three consumption quintiles. It strongly suggests the existence of areas of relative wealth and pockets with widespread poverty.

Figure 4.4: Distribution of households by livelihood zone and by consumption quintile



Source: ELIM 2010. Authors' calculations.

C. NEW POVERTY LINES FOR THIS REPORT

4.11 Based on the 2001 EMEP survey poverty lines were constructed by a joint INSTAT/World Bank team following the cost of basic needs approach.[36] To this end food poverty lines were computed for each of the nine regions by identifying and costing the food baskets consumed by Malian households that provide 2450 kcal per capita per day. That food basket included some 20 items representing around 80% of the total food expenditure. The quantities in this basket were then scaled so that they would provide exactly 2450 kilocalories per day. The non-food component of the poverty line was estimated using the non-food expenditure level of the households whose food consumption was within five percent of the food poverty line. The poverty lines were estimated for rural and urban areas within each region except Bamako which is exclusively urban.

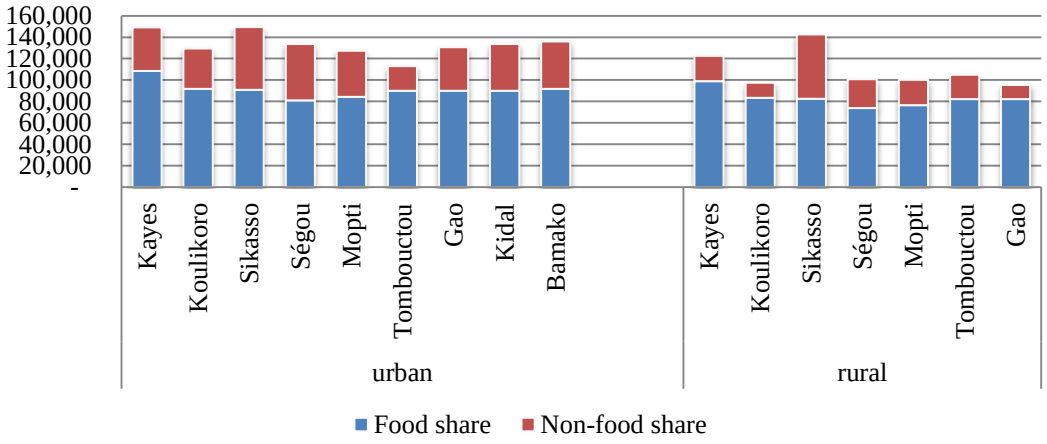
4.12 One of the drawbacks of the approach used is that the non-food poverty lines were based on a very small number of observations. For example the urban non-food poverty line for Kayes used the non-food expenditure of 14 households. For Sikasso 14 respectively 53 observations were used for urban and rural areas. The most extreme case was Gao where only four urban and nine rural observations were used.

4.13 A consequence of estimating non-food poverty lines using such a small number of observations is the considerable variation in the size of the non-food share components across regions. This is illustrated in Figure 4.5: in rural and urban Sikasso but also in urban Ségou are the non-food components very large relative to their comparators. Such large non-food

[36] See Backiny-Yetna *et al.* (2007).

components affect the measurement of poverty. Indeed amongst the explanations advanced for the Sikasso paradox (the coincidence of high levels of poverty with the region Sikasso with the greatest agricultural potential) is that the rural poverty line for Sikasso is unrealistically high.[37]

Figure 4.5: Decomposition of the 2001 regional poverty lines in food and non-food components

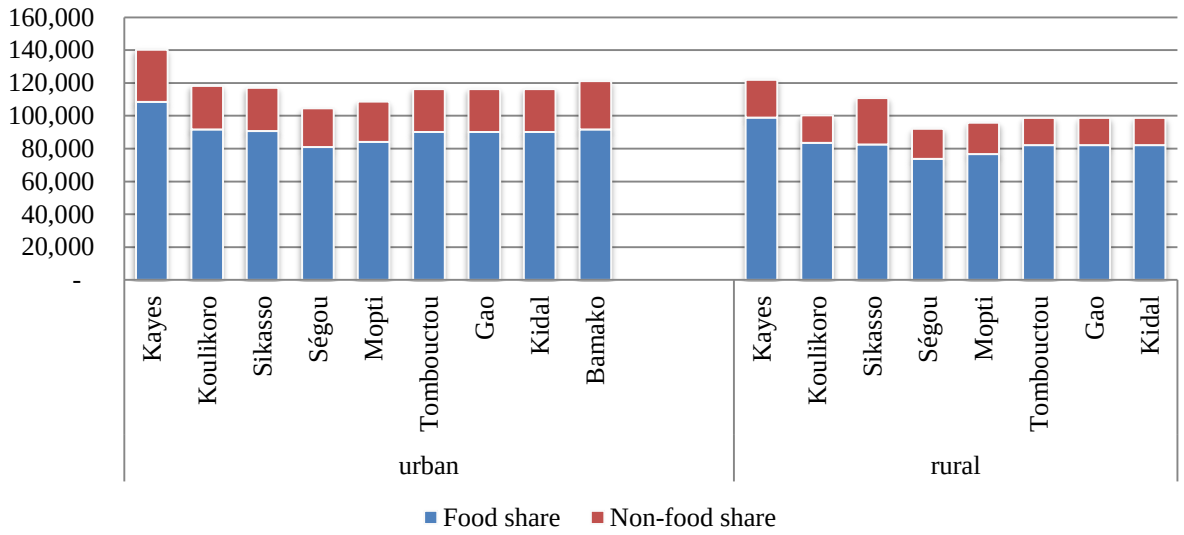


Source: EMEP 2001. Authors' calculations.

4.14 To address this problem and to explore whether the Sikasso paradox is indeed explained by an incorrectly defined non-food share, poverty lines were re-estimated, taking the existing food poverty lines as given, but calculating the non-food component as the median of the fraction of non-food expenditures for households whose food consumption is within 10 percent of the food poverty line. To avoid the problem of too few observations that affected the earlier estimation of poverty lines, Kidal, Gao and Tombouctou were lumped together into one region. The newly estimated poverty lines demonstrate less variation, although the non-food share in rural Sikasso remains relatively large.

Figure 4.6: Decomposition of the newly estimated 2001 regional poverty lines

[37] This explanation ignores that consumption per capita in Sikasso is amongst the lowest in the country.

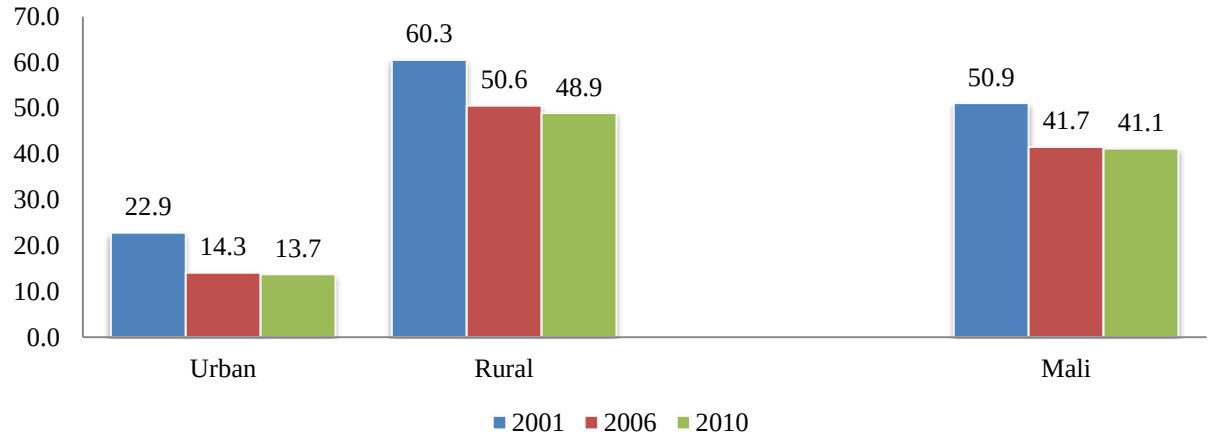


Source: EMEP 2001. Authors' calculations.

D. POVERTY AND POVERTY TRENDS

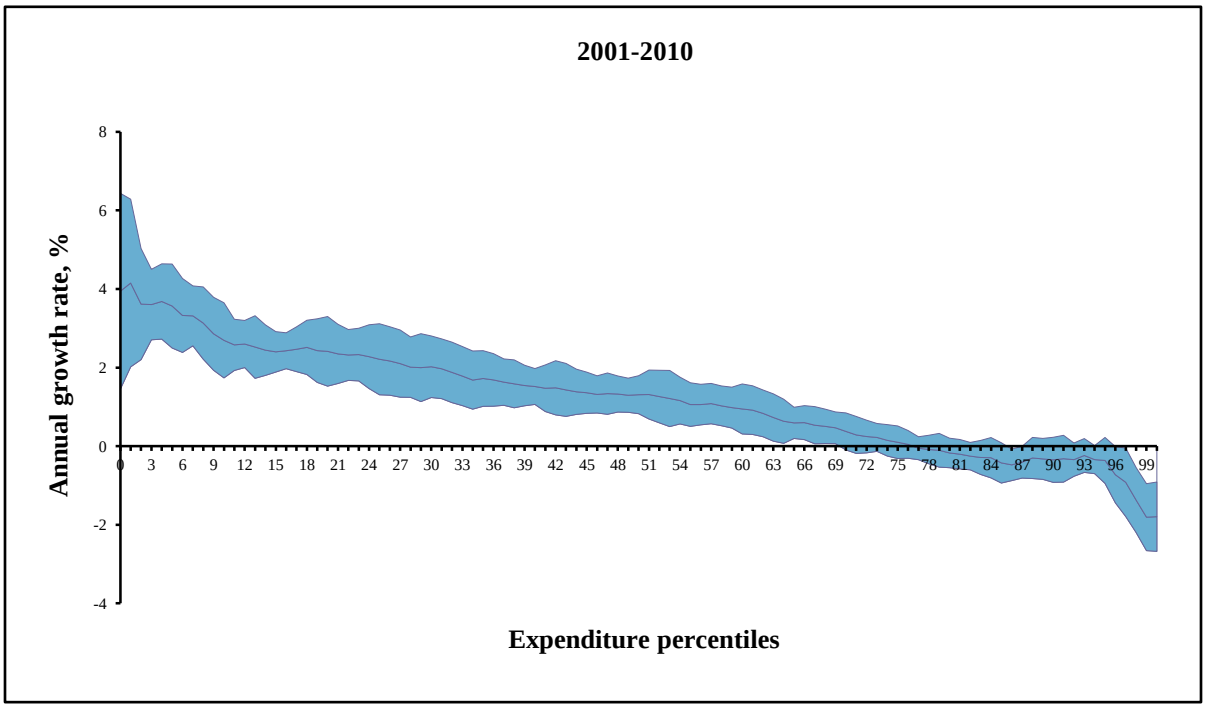
4.15 Using the new poverty lines poverty is calculated as the fraction of people consuming less than the poverty line. Levels of poverty are closely correlated to levels of consumption and one finds that poverty in rural areas is much higher than poverty in rural areas. Poverty trends, however, are found to be much more encouraging than trends in per capita consumption: despite the limited change in per capita consumption between 2001 and 2010 (it increased by 2.2 percent between 2001 and 2010 from FCFA 142,000 per capita to FCFA 145,000), the proportion of people living in poverty declined by 10 percent from 50.9 percent in 2001 to 41.7 percent in 2006 and to 41.1 percent in 2010. This decline, while impressive, still coincides with an increase in the absolute numbers of poor by around 360,000 people. Given the very high population growth rate (3.6% per year) in Mali a steeper decline in poverty is needed to lower the absolute number of poor individuals. The number of non-poor increased by approximately 3 million between 2001 and 2010.

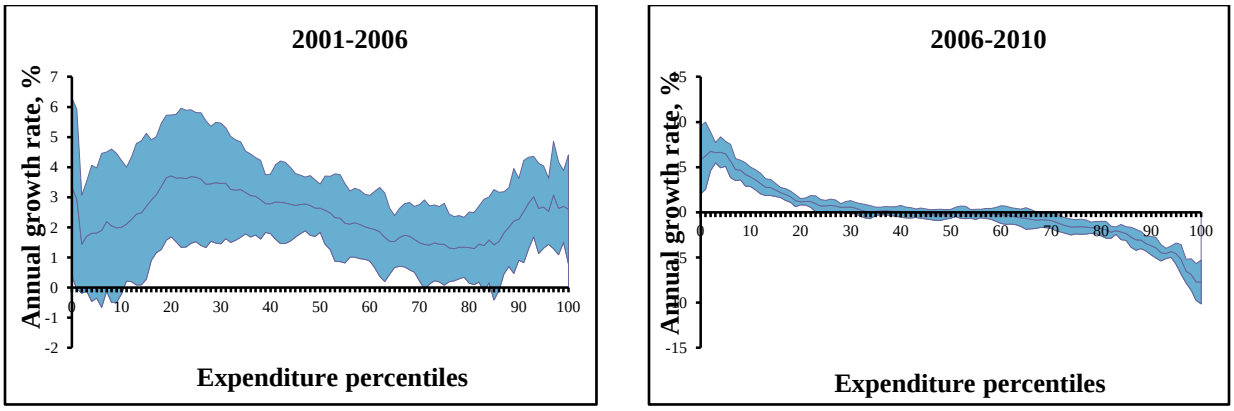
Figure 4.7: Poverty trends: 2001-2010 by rural and urban



4.16 Most of the decline in poverty was realized between 2001 and 2006, while between 2006 and 2010 very little changed. The rapid reduction in poverty is explained by the fact that for the poorest households consumption grew most rapidly, while for the better off households consumption grew much more slowly: in fact for households in the top wealth quintile consumption fell between 2001 and 2010. This is illustrated in Figure 4.8, presenting growth incidence curves for the period 2001-2010, and curves for the sub-periods 2001-2006 and 2006-2010. The Figure covering the entire period demonstrates that consumption growth was positive for households up to the 78th percentile (the curve lies above the zero line) and growth was highest for the poorest households. Consequently growth was pro-poor – even though the average per capita rate of growth was very low (only 0.2% per annum), consumption was being redistributed towards the poor. It is therefore unsurprising that the reduction in poverty coincided with a fall in the Gini coefficient from 0.40 in 2001 to 0.33 in 2010.

4.17 The curves for the sub-periods 2001-2006 and 2006-2010 demonstrate that the patterns of growth were very different for each sub-period. During the first half of the decade growth was positive for households in all wealth categories, with households in the 2nd and 3rd decile benefiting most. In the second half of the decade, between 2006 and 2010, growth continued to be positive for the poorest households, but for households in the 3rd till the 7th decile it was negligible, while for the wealthiest households it was negative. Figure 4.8: Growth incidence curve national level: 2001-2010

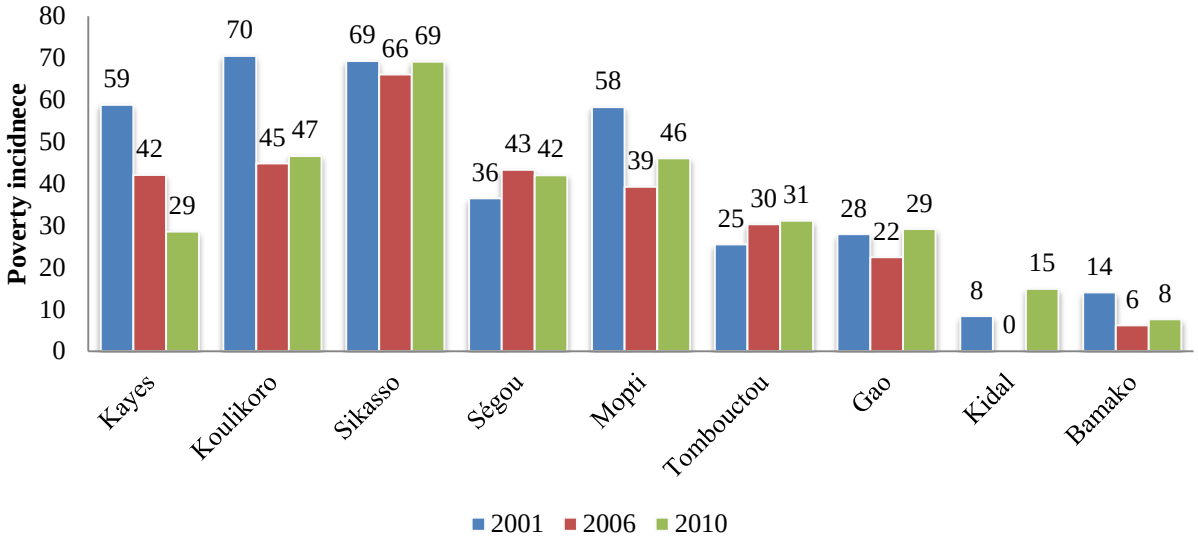




Source: EMEP 2001, ELIM 2006 and ELIM 2010. Authors' calculations.

4.18 Considering changes in poverty from a regional perspective one notes how poverty declined rapidly in Kayes, Koulikoro and Mopti. In Koulikoro and Mopti most of the decline occurred during the first half of the decade, in Kayes the reduction in poverty continued throughout the period. The reduction in poverty in these two regions, contrasts with that in Sikasso where poverty remained very high and largely unchanged. In Ségou, Tombouctou and Gao, finally, regions with the lowest incidence of poverty (apart from Kidal and Bamako which have even lower poverty levels), levels of poverty increased somewhat.

Figure 4.9: Poverty trends: 2001-2010, by region



Source: ELIM 2001, 2006 and 2010. Authors' calculations.

4.19 Table 4.1 presents poverty by livelihood zone (annex 4 repeats this Table while also providing standard errors). Since the household surveys were not designed to be representative at the livelihood zone one has to be cautious doing so: we only present poverty estimates for zones for which we have at least 100 observations.

Table 4.1: Poverty incidence by livelihood zone

Zone	Description	2001	2006	2010
1	Nomadism and trans-Saharan trade	-	-	37.5
2	Nomadic and transhumant pastoralism	20.6	17.1	22.3
3	Fluvial rice and transhumant livestock rearing (agropastoral)	-	-	29.7
4	Millet and transhumant livestock rearing	68.2	42.5	58.2
5	Dogon plateau -- millet, shallots, wild foods and tourism	-	-	40.7
6	Niger delta - rice and livestock rearing (agropastoral)	23.7	19.5	29.6
7	Office du Niger (irrigated rice)	40.8	57.0	21.2
8	North-west remittances, sorghum and transhumant livestock rearing	62.6	30.4	19.6
9	West and central rain-fed millet/sorghum	49.9	45.7	42.5
10	Sorghum, millet and cotton	54.6	70.9	74.3
11	South maize, cotton and fruits	71.8	56.2	52.0
12	South-west maize, sorghum and fruits	80.1	63.0	52.7
13	Bamako	14.1	6.3	7.6
	Mali	50.9	41.7	41.1

(*) only cells for which there are at least 100 observations are shown.

Source: ELIM 2001, 2006 and 2010. Authors' calculations.

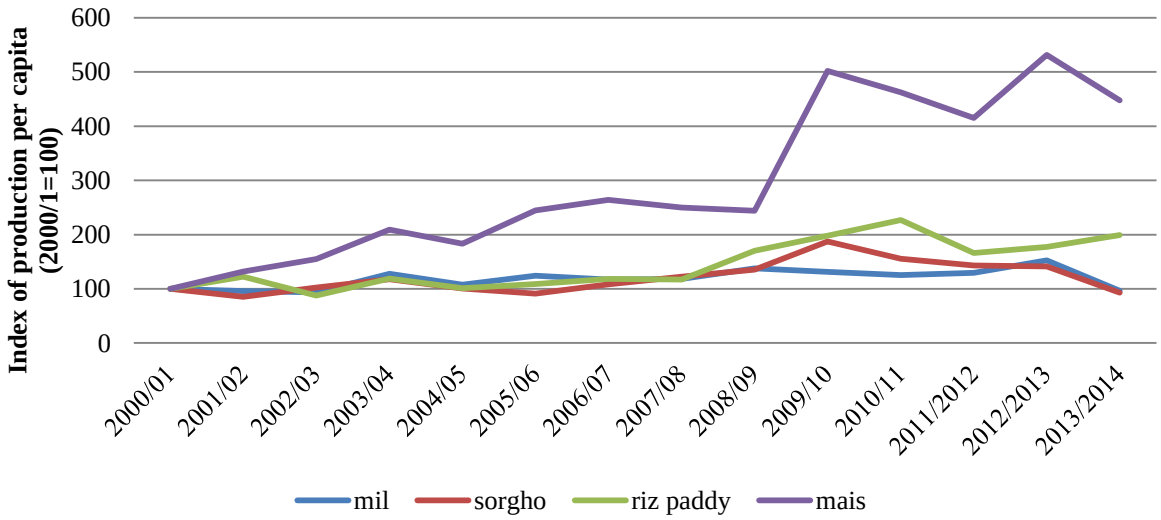
4.20 The first aspect that comes to attention is the high rate of poverty in livelihood zone 10. With a rate of poverty 74.3 percent, poverty is at least 15 percent higher than in the next poorest livelihood zone (that with millet and transhumant livestock rearing). Poverty incidence in the other two livelihood zones in Sikasso is substantially lower (52 percent). This puts a different perspective on the high levels of poverty in this region. There are three livelihood zones which lie in Sikasso with populations of respectively of 800,000 (zone 10), 1.5 million (zone 11) and 320,000 (zone 12). The high levels of poverty in Sikasso are driven by households in zone 10 as households in zones 11 and 12 experience an incidence of poverty that is substantially lower (52 percent) and not far above the average for rural areas in general (around 48 percent).

4.21 Poverty in livelihood zone 10 has been increasing rapidly (from 55 percent in 2001 to 74 percent in 2010), whereas in zone 11 it has been decreasing (from 72 percent in 2001 to 52 percent in 2010). Consequently stagnant levels of poverty in Sikasso hide the fact that underlying this has been a reversal of fortunes: households in zone 10 started to do worse, those in zone 11 did better.

4.22 The increase in poverty in zone 10 – as opposed to zones 11 and 12 may just be a reflection of bad weather. According to FEWSNET (2008/9 and 2009/10 were very poor agricultural years in zone 10, unlike in zones 11 and 12 where they were acceptable or even good.

4.23 Households depending on livestock rearing or who combine livestock rearing with other activities, those depending on nomadic and transhumant pastoralism living in zones 2 in the north, those living in the Niger delta combining rice and livestock rearing (zone 6) and those in the in the north West, combining remittances with livestock rearing (zone 8) are comparatively better off. Yet not all those rearing livestock are better off: those living in zone 4, growing millet and depending on transhumant livestock rearing are significant worse.

Figure 4.10: Index of cereal production per capita (2000/1=100)



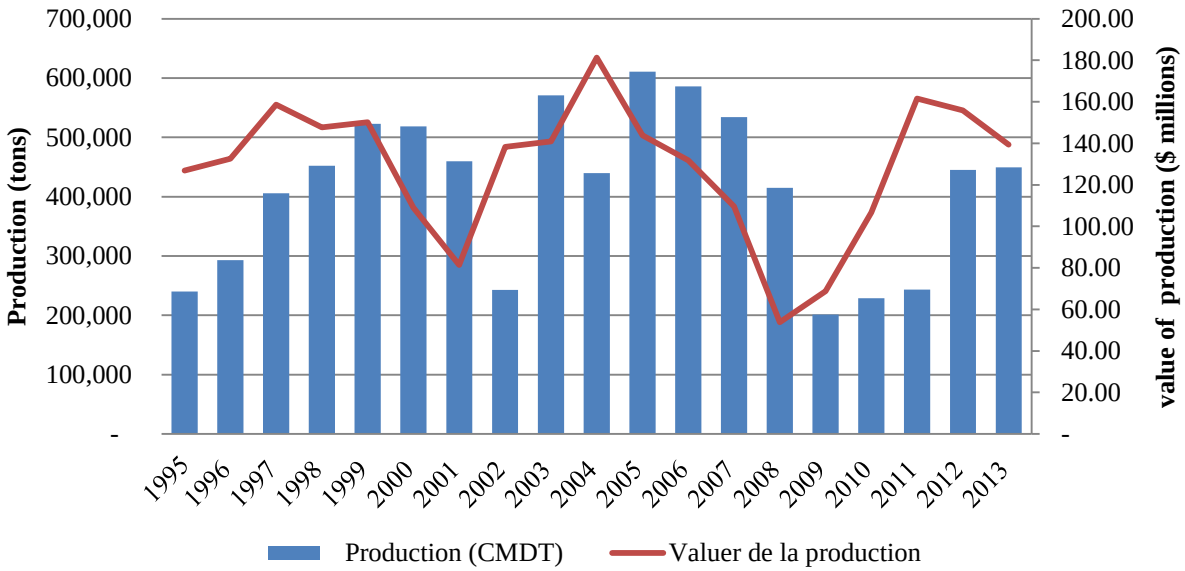
Source: IMF 2014.

4.24 The observed patterns of poverty reduction –rapid reductions in poverty and in inequality in livelihood zones growing rice and maize are closely associated with the increase in the

production of cereals. The remarkable increase is illustrated in Figure 4.10 presenting production per capita. Production is expressed as an index to illustrate for the four most important cereal crops, maize, rice, millet and sorghum the increase in production relative to the base year. Since 2000/1 maize production increased five-fold; particularly since 2008/9 one observes accelerating maize production. The rapid increase in maize production is associated to the rapid decline in poverty incidence in livelihoods zones 11 and 12, where most of the maize is grown. And, as the growth incidence curves for zones 11 and 12 demonstrate, the increase in maize production has been highly pro-poor. Poor households benefited even more from the boom in maize production than did better of households. This comes as no surprise. For poor households who rely, in part, on farm jobs for their income and who purchase much of their food needs, increased maize production affects their welfare positively through at least two channels. Increasing cereal production leads to more demand for farm work and secondly, increased cereal production exercises downward pressure on (rural) food prices.[38] Better off households also benefit from increased cereal production but as net sellers of maize the positive effect of increased production is mitigated by lower prices.

4.25 Like maize, rice production per capita increased significantly, doubling relative to 2001/1. The increase in rice production is equally reflected in the poverty trends: poverty in rice growing areas declined, especially in the zone office du Niger and the areas where rice is grown on the borders of the Niger around Tombouctou and Gao. As the growth incidence curve demonstrates, and as was the case for maize, poor households benefited most from the increase in rice production. It is somewhat surprising that households living in the Niger delta (zone 6) have not been able to benefit from increased rice production. It will be explored later whether this may be associated to a limited access to markets in the delta.

Figure 4.11: Production and value of production for cotton



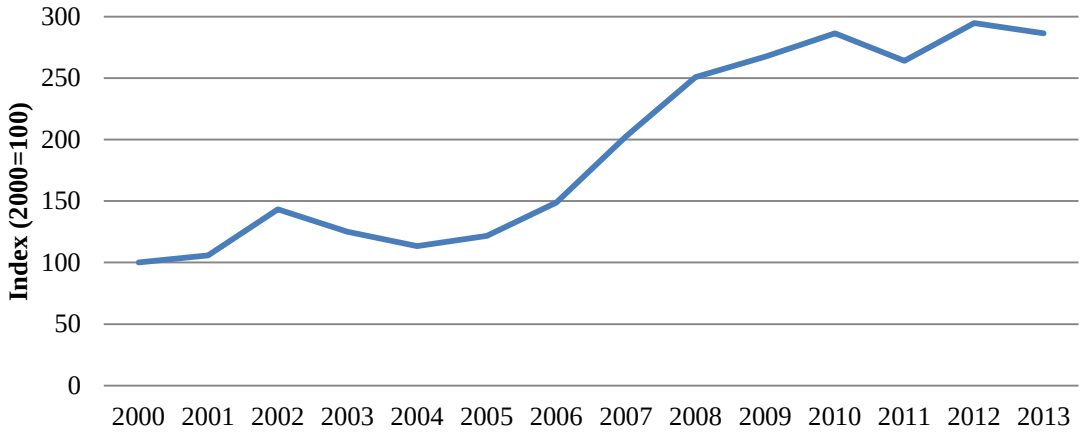
Source: IMF 2014.

[38] A third channel is that poor households themselves increased their production and became less deficient in food.

4.26 For households relying on cotton, millet and sorghum production, those living in livelihood zones 10 (where poverty incidence is 74 percent), the story is rather different. The production of millet and sorghum has barely increased (expressed in per capita terms) while the production, as well as the value of the most important cash crop has fluctuated considerably (Figure 4.11). Particularly around the year of the last survey, 2009/10 the value of cotton production was low –which is possibly reflected in the poverty incidence. Since that time, through a combination of increased production and high world market prices, the value of cotton production has increased significantly. Indeed, INSTAT (2013) reports based on the 2011/12 EMOP that Sikasso is no longer the poorest region in the country.[39] This dubious honor is now reserved for Mopti.

4.27 Unlike households in zone 10, households in zone 11 who grow maize, cotton and fruits experienced rapid poverty reduction, despite the variations in the value of cotton production: this is probably associated (but we are speculating here) that these households are opting to grow maize rather than cotton and rely on the sale of fruits as an additional source of income.

Figure 4.12: Index of per capita remittances from workers (2000=100)



Source: IMF 2014.

4.28 For households in Kayes whose livelihoods evolve around remittances, sorghum cultivation and transhumant livestock rearing, one notes a rapid decline in poverty (which is the combined effect of high rates of growth and a pattern of growth that favors poor households). The doubling of per capita sorghum production between 2000/1 and 2009/10 (Figure 3.8) coupled with the three-fold increase in per capita remittances, of which a significant share can be expected to have arrived in livelihood zone 8,[40] appears to be behind this rapid decline.

[39] Using the EMOP for 2011 survey the following estimates for regional poverty are derived: Kayes, 40,0; Koulikoro 46.6; Sikasso 58.1; Segou 52.2; Mopti 60.7; Tombouctou 47.0; Gao 34.4, Kidal 4.4 and Bamako 10.7. Because the EMOP and ELIM surveys collected consumption in different ways, poverty estimates based on the EMOP should not be compared to those of the ELIM. Source: INSTAT 2013: Consommation, Pauvrete, Bien-etre de ménages: avril 2011-avril 2012.

[40] 29 percent of all migrants from Mali who live abroad come from Kayes. The fraction of the population that has migrated is 2.5 time larger in Kayes than the average for the rest of the country (1.5% for Kayes versus 0.6% for the rest of the country. Source: calculated from RGPH 2009.

4.29 Finally the steady decline in poverty in livelihood zone 9 (West and Central), but also in zones 8 (North of Kayes) and 12 (South of Kayes) coincides with an increase in infrastructure. The newly built infrastructure has significantly improved connectivity between Bamako and Senegal. Beyond that, infrastructure development larely appears to have kept pace with increases in population (between 1994 and 2007 Mali's population almost doubled).

Figure 4.13: Road infrastructure in 1994 and 2007

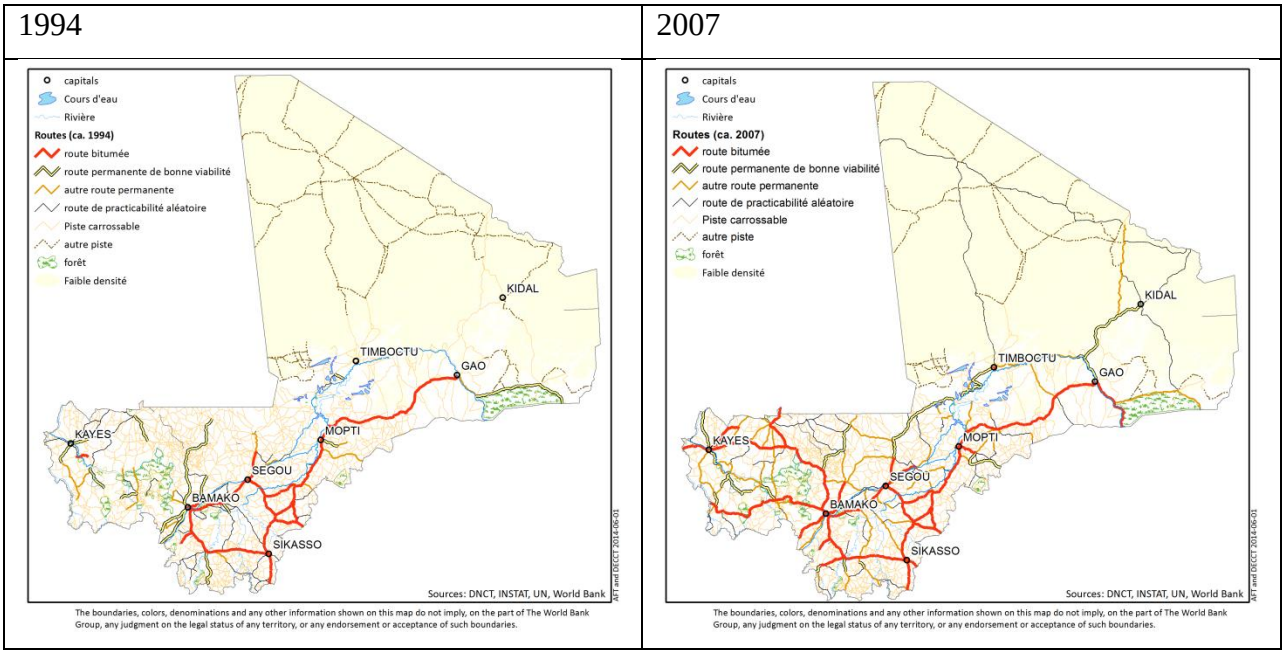
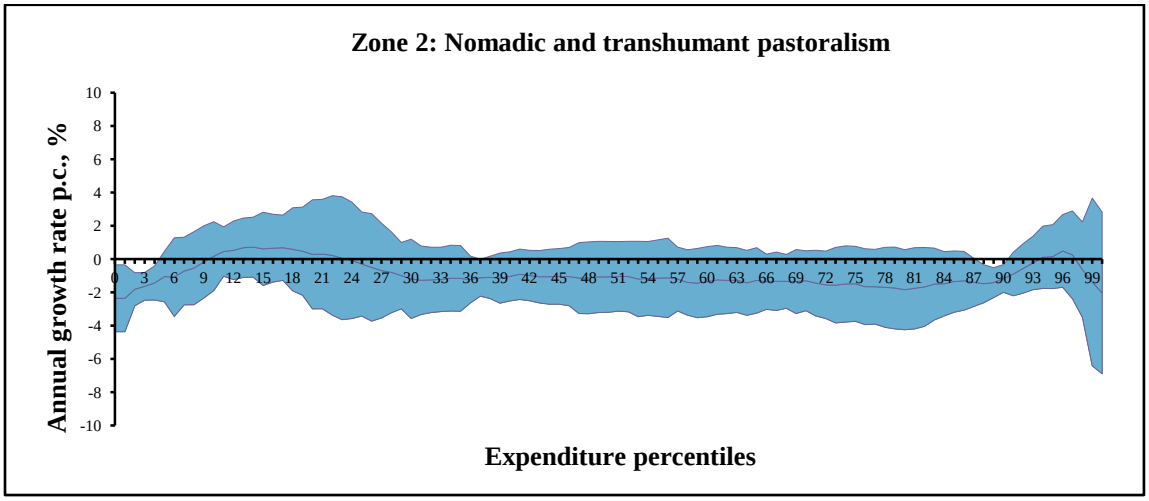
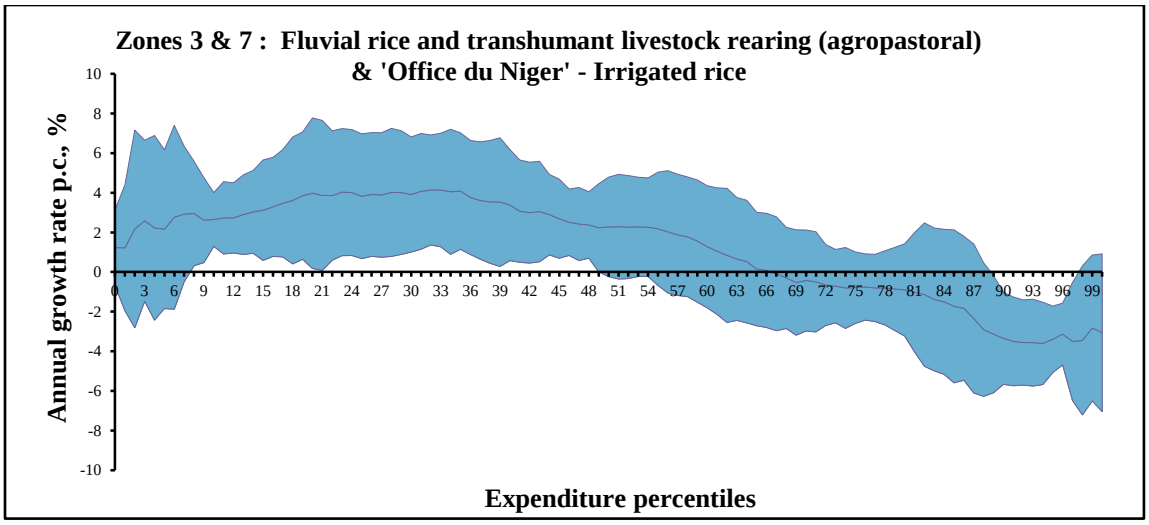
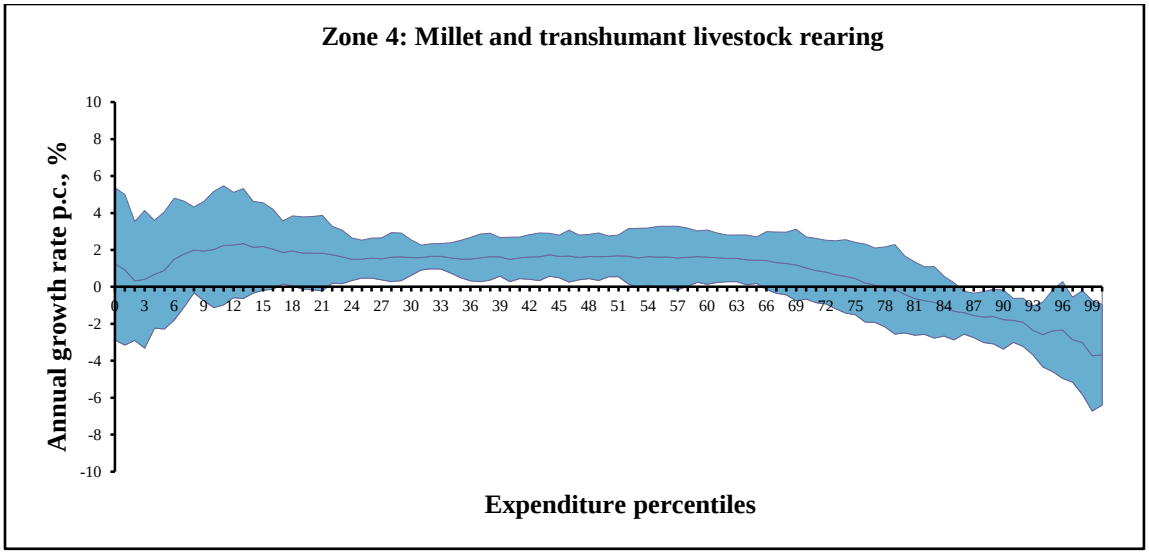
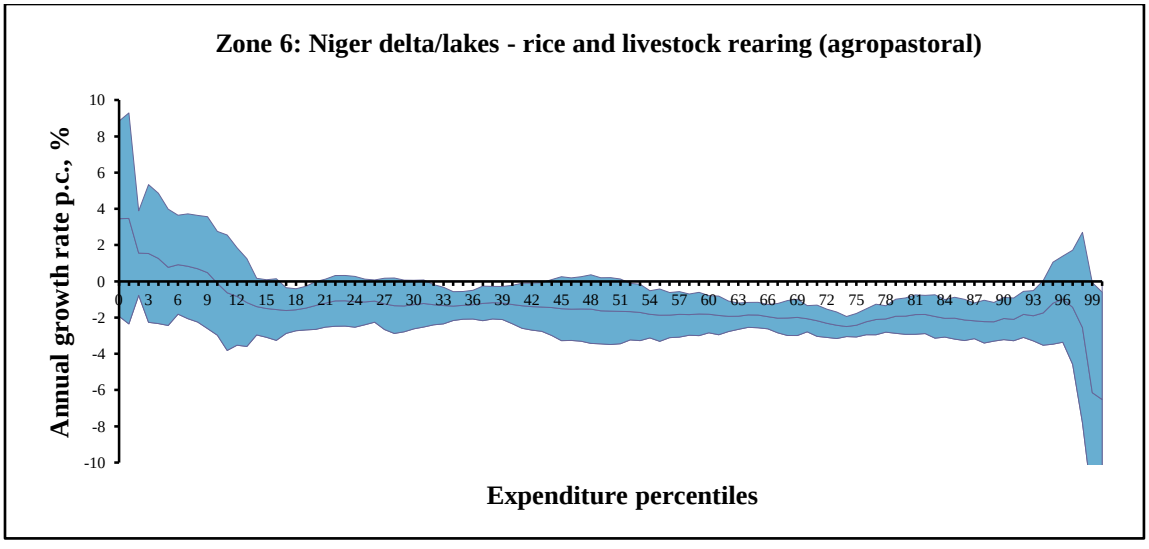


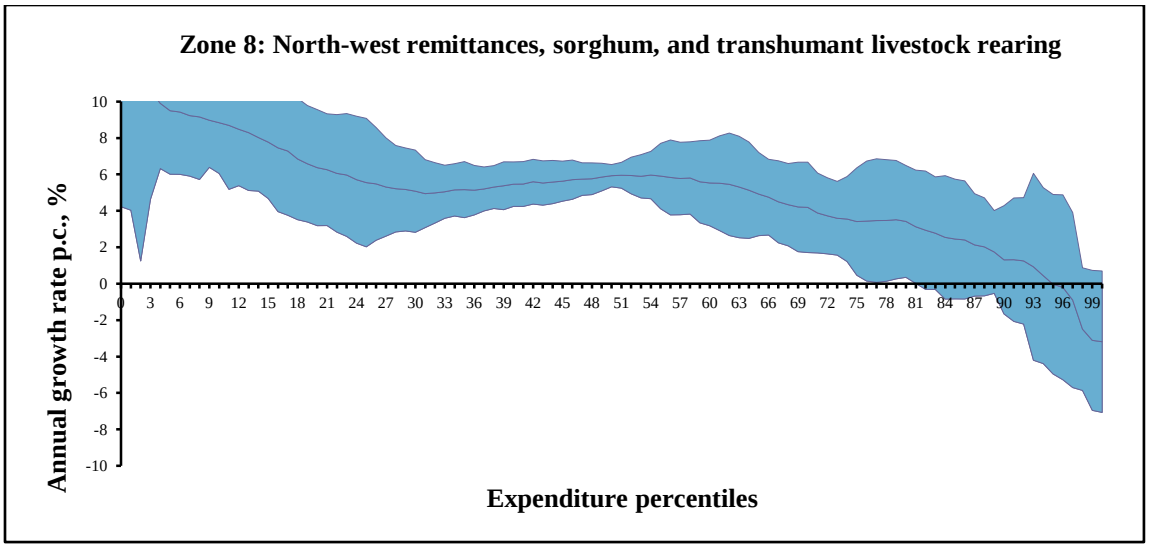
Figure 4.14: Growth incidence curves by livelihood zone (2001-2010)

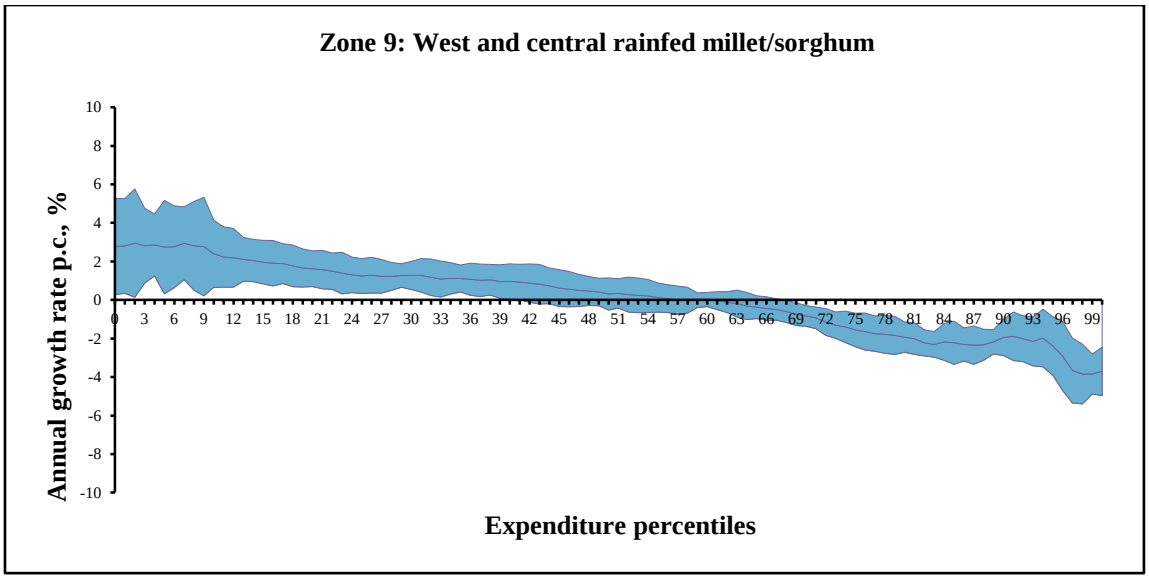


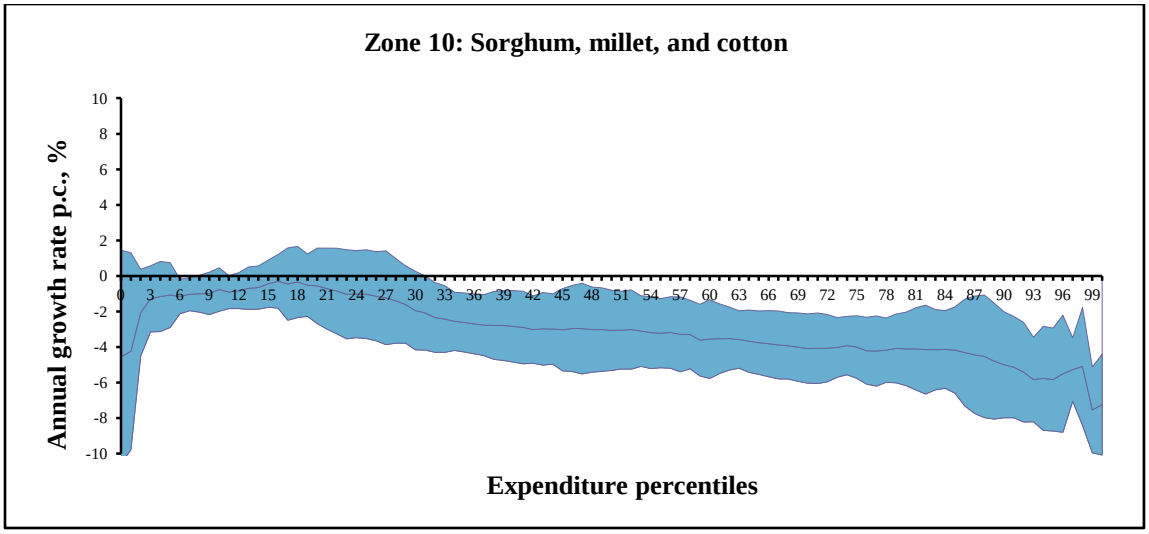

Zones 3 & 7 : Fluvial rice and transhumant livestock rearing (agropastoral)
& 'Office du Niger' - Irrigated rice
Annual growth rate p.c., %
10
8
6
4
2
0
-2
-4
-6
-8
-10
0 3 6 9 12 15 18 21 24 27 30 33 36 39 42 45 48 51 54 57 60 63 66 69 72 75 78 81 84 87 90 93 96 99
Expenditure percentiles

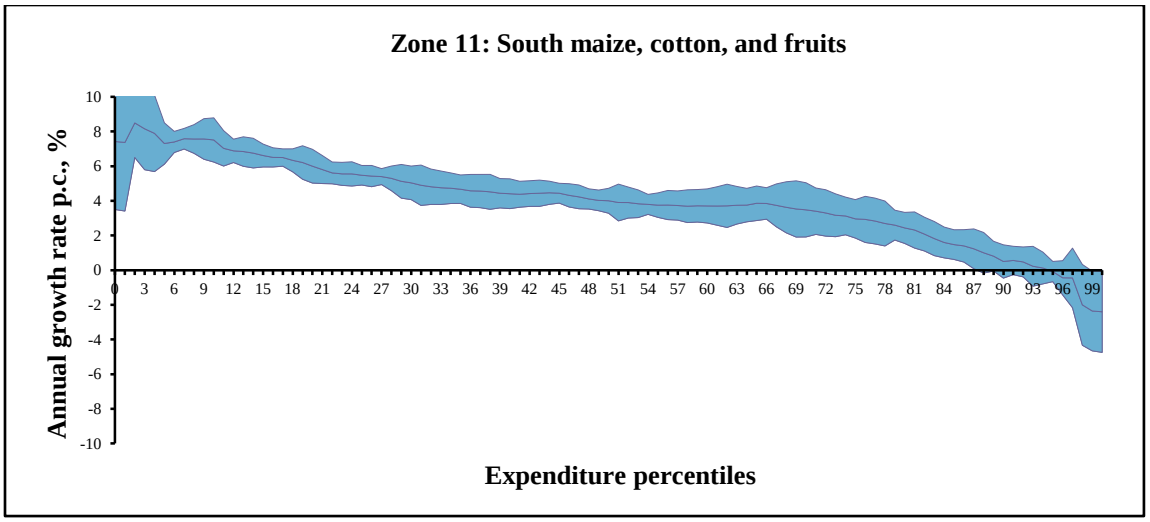

Zone 4: Millet and transhumant livestock rearing
Annual growth rate p.c., %
10
8
6
4
2
0
-2
-4
-6
-8
-10
0 3 6 9 12 15 18 21 24 27 30 33 36 39 42 45 48 51 54 57 60 63 66 69 72 75 78 81 84 87 90 93 96 99
Expenditure percentiles

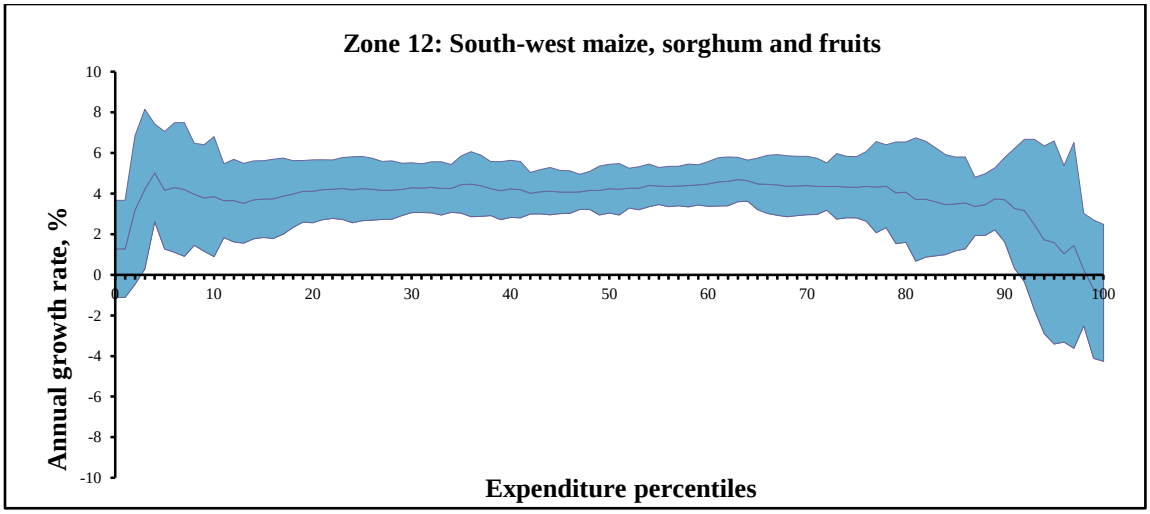

Zone 6: Niger delta/lakes - rice and livestock rearing (agropastoral)
Annual growth rate p.c., %
10
8
6
4
2
0
-2
-4
-6
-8
-10
0 3 6 9 12 15 18 21 24 27 30 33 36 39 42 45 48 51 54 57 60 63 66 69 72 75 78 81 84 87 90 93 96 99
Expenditure percentiles


Zone 8: North-west remittances, sorghum, and transhumant livestock rearing
Annual growth rate p.c., %
10
8
6
4
2
0
-2
-4
-6
-8
-10
0 3 6 9 12 15 18 21 24 27 30 33 36 39 42 45 48 51 54 57 60 63 66 69 72 75 78 81 84 87 90 93 96 99
Expenditure percentiles


Zone 9: West and central rainfed millet/sorghum
Annual growth rate p.c., %
10
8
6
4
2
0
-2
-4
-6
-8
-10
0 3 6 9 12 15 18 21 24 27 30 33 36 39 42 45 48 51 54 57 60 63 66 69 72 75 78 81 84 87 90 93 96 99
Expenditure percentiles


Zone 10: Sorghum, millet, and cotton
Annual growth rate p.c., %
10
8
6
4
2
0
-2
-4
-6
-8
-10
0 3 6 9 12 15 18 21 24 27 30 33 36 39 42 45 48 51 54 57 60 63 66 69 72 75 78 81 84 87 90 93 96 99
Expenditure percentiles

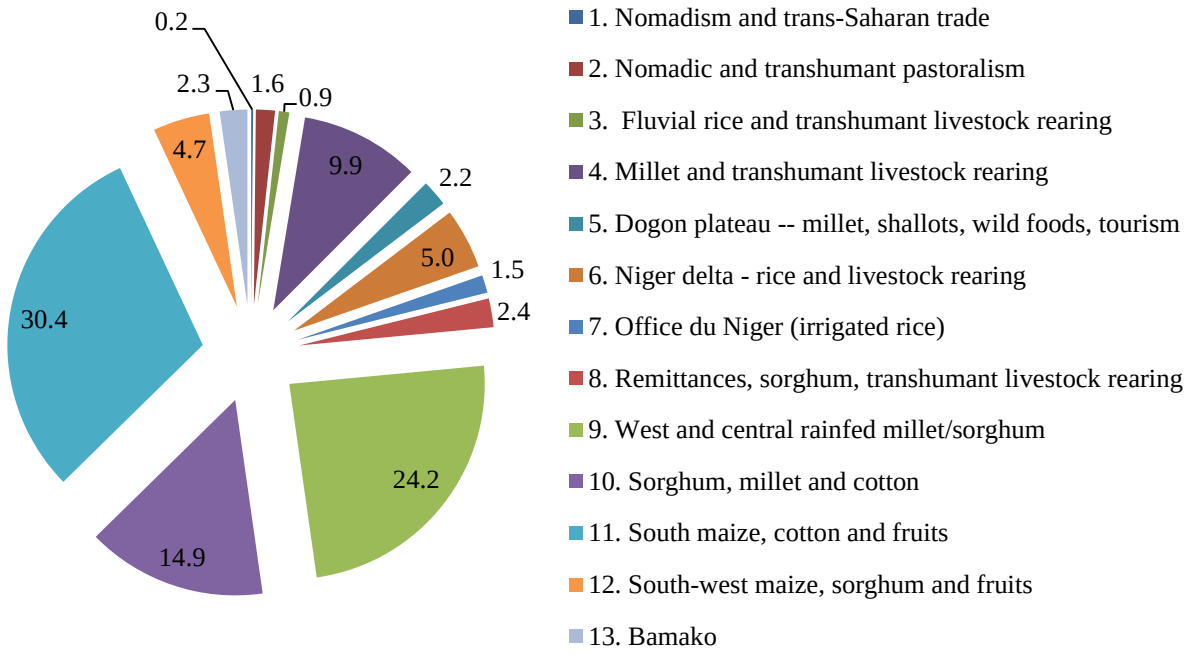




Source: EMEP 2001 and ELIM 2010. Authors' calculations.

4.30 Figure 4.16 presents the distribution of poor people across livelihood zones. One key message from the Figure is that 70 percent of all poor are located in only three livelihood zones: 9 (west and central rain-fed millet/sorghum), 10 (sorghum, millet and cotton) and 11 (south, maize, cotton and fruits). Encouraging is the fact that in the zone in which the greatest number of poor can be found (zone 11) poverty has been falling, while the potential for further declines in poverty seems real given the realistic prospect that the cotton and maize markets will continue to expand and the fact that access to markets is relatively good (see chapter 5). Also in zone 9 (west and central rain-fed millet/sorghum) poverty has been on the decline, albeit at a lower pace than in zone 11. The zone that is in need of the greatest attention is zone 10, where 15% of poor people reside and where poverty is on the increase. Zone 4 (millet and transhumant livestock rearing) also needs to be mentioned, not only because some 10 percent of all poor live in this zone, but also because it is not evident that much progress in poverty reduction is being made. Poverty in this livelihood zone declined rapidly between 2001 and 2006 and then rose again in 2010. It can be expected that after 2010 poverty has increased further, due to the exposure of households in this zone to the negative consequences of the conflict in the North.

Figure 4.15: Distribution of poor people across livelihood zones



Source: ELIM 2010. Authors' calculations.

E. CAUTION WHEN INTERPRETING POVERTY

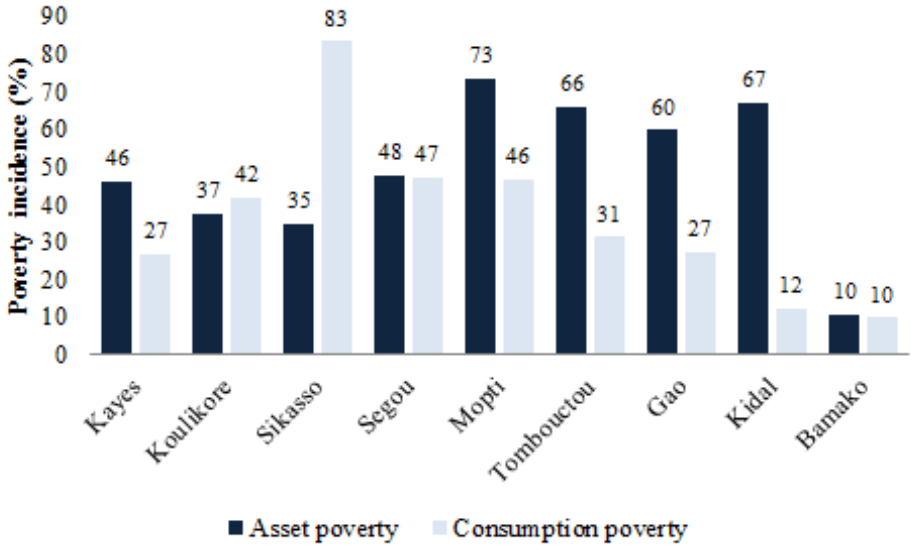
4.31 **A comparison of monetary and non-monetary estimates of poverty suggests that the measurement problem may extend beyond the poverty line.** In the previous section it was noted that updating the poverty line to make it more robust, has relatively little impact on poverty estimates. Irrespective of whether an updated or official poverty line is used, Sikasso remains the region with the highest incidence of poverty even though the region is generally believed to have relatively low levels of poverty on account of its agro-ecological potential and its association with cotton as a consequence of which market accessibility and the availability of inputs is relatively good. But using an asset based measure which yields the same poverty headcount at the national level as the consumption based measure (42.5 percent in 2010 – using the national poverty line), a rate of poverty incidence is found in Sikasso that is below the national average: 34.7 percent)[41].

4.32 **The large difference between the asset and consumption based measure of poverty seems closely associated with the fact that food prices vary across Mali.** Data from the Observatoire des Marchés Agricoles show, for October 2014, that the a kg of millet cost 240

[41] Asset poverty is estimated based on the Multiple Correspondence Analysis from several indicators of the ownership of durable goods (radio, television, landline phone, mobile phone, refrigerator, freezer, computer, air-conditioner, ventilator, time piece, jewelry, land, dish, bicycle, motorcycle, car, cart, canoe, stove, table, carpet, mat, chair, armchair, dressing table, sewing machine, bed, couch, sideboard, wardrobe). The asset poverty line is set such that the asset poverty is equal to monetary poverty at the national level.

FCFA in Kayes but only 187 FCFA in Ségou; for maize the difference was more pronounced: 250 FCFA in Tombouctou versus 128 FCFA in Sikasso. These price differences are not adequately reflected in the food poverty lines, leading to an overestimation of poverty in food surplus regions such as Sikasso, and an underestimation of poverty in the food deficit regions such as Tombouctou, Gao, Kidal and Mopti.

Figure 4. 16: Monetary and non-monetary poverty incidences

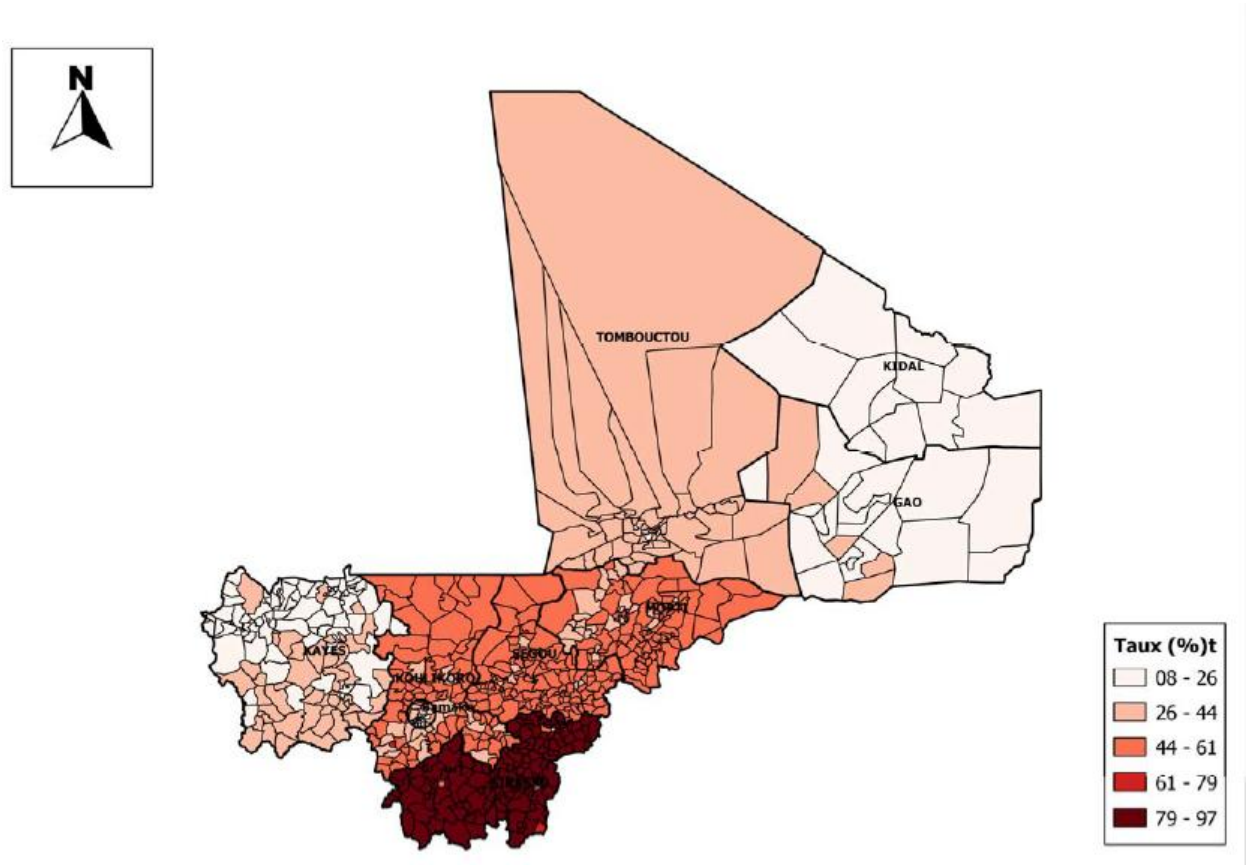


Source: ELIM 2010. Authors' calculations.

4.33 **In the absence of improvements in the way consumption and poverty are measured, the spatial pattern of poverty is subject to major uncertainties.** A new LSMS-ISA survey which addresses the shortcomings of the aforementioned surveys is in the field and first results are expected late 2015. This survey will allow reassessing the spatial patterns of poverty as well as the poverty profile. Meanwhile in this document we exert caution when interpreting poverty and poverty trends and combine different approaches (consumption poverty, asset based poverty and livelihoods approaches) to construct a narrative.

4.34 **Also the poverty map needs to be interpreted with caution.** By combining data from the 2009 population census and the 2010 ELIM household survey a poverty map was prepared. A quick glance at the map reveals an odd pattern: poverty incidence closely follows regional boundaries. This pattern is an artefact of the way the map was created (using regional regression models). One also notes how certain patterns of poverty incidence in for instance Sikasso, where levels of poverty poverty vary from 74 percent in zone 10 to 52 percent in zone 11, are not reflected on the poverty map. We suspect that this is because few spatial variables were incorporated in the regression models used to generate the data presented on the map. Information about livelihood zones was not used –even though this is a strong correlate for poverty, nor was information from the community census carried out by ODHD. Consequently spatial differences are not well captured.

Figure 4.17: Poverty map for Mali (2009)

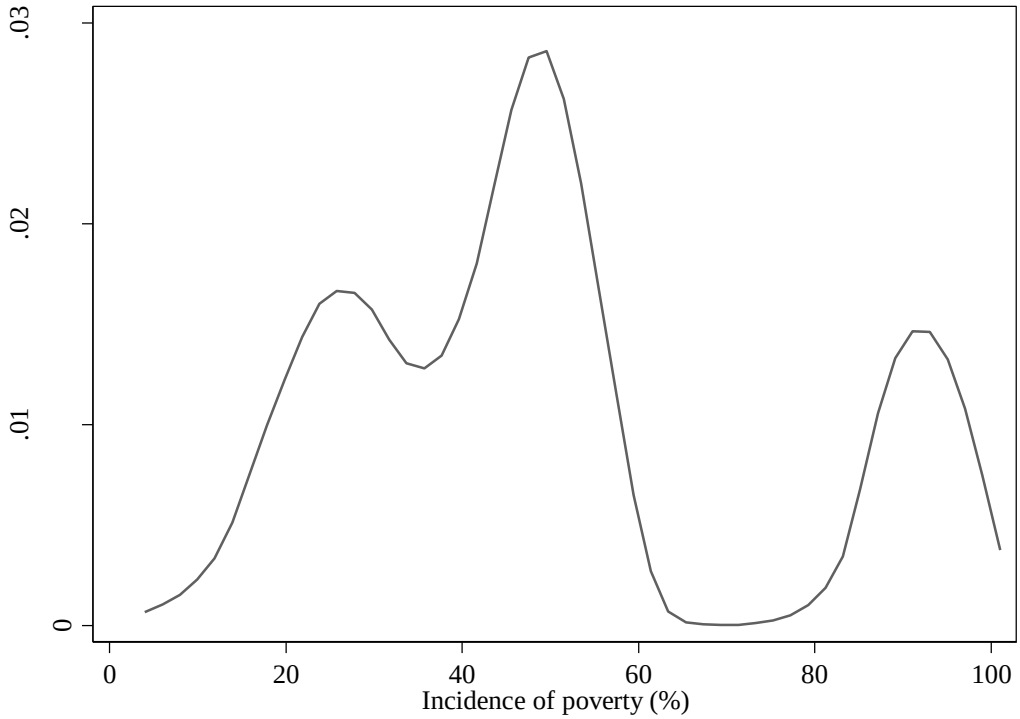


Source: INSTAT 2012: Cartographie de la pauvreté et des Objectifs du Millénaire pour le Développement (OMD) au Mali en 2009

4.35 **In addition, the poverty map reflects the fact that poverty in Sikasso may be overestimated.** This is illustrated in Figure 4.18 which shows the distribution of poverty incidence at the commune level. Instead of a normal (or lognormal) distribution, the distribution shows two clear humps, with the second hump comprising exclusively communes in Sikasso. It is another illustration of the fact that poverty in Sikasso may be overestimated.

4.36 **Given the importance of spatially accurate poverty data for decisions makers, it is proposed to re-estimate the poverty map in a way that controls better for spatial differences and which uses the new LSMS-ISA data for its estimates**. A new poverty map would also permit to use the newly calculated poverty lines presented in this study and could correct for the omission of very large households from the calculation of the existing map.

Figure 4.18: Density estimate of poverty incidence at commune level



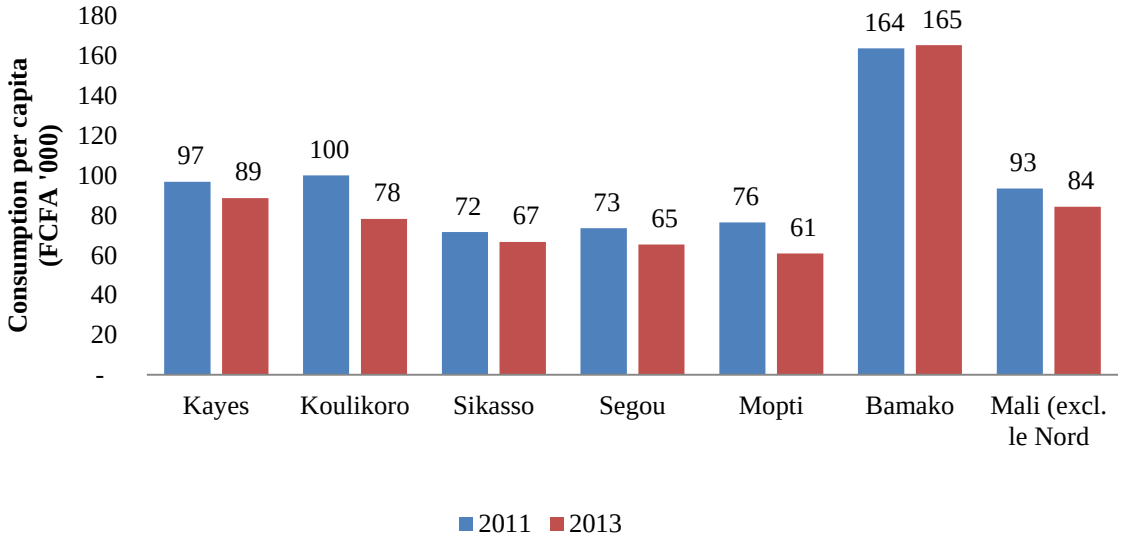
Source: Staff calculations based on 2009 poverty map

F. CONSUMPTION AND POVERTY AND SINCE 2010

4.37 The EMOP surveys can be used to explore what happened to consumption after 2010. The consumption aggregates derived from EMOP and ELIM are not comparable, so we only present a comparison between the two EMOP surveys. To ensure comparability we express the EMOP 2013 consumption in prices for 2011 (between the two surveys the rate of inflation was 6.0 percent, we only use waves 1 and 2 of both surveys (for EMOP 2013 preliminary data for the two waves are available) and we exclude the regions of the North (they were not covered by EMOP 2013 for reasons of security).

4.38 The data suggest that consumption declined significantly between 2011 and 2013: by 10 percent. This decline in consumption is unequally distributed. Consumption declined by as much as 22 and 20 percent per capita in respectively Koulikoro and Mopti, declined by between 7 and 11 percent in Kayes, Ségou and Sikasso and increased in Bamako. These dramatic changes in consumption are the combined effect of declines in the production of cereals as a result of bad rains, an increase in the value of cotton production (see Figures 4.10 and 4.11) and spillovers from the security crisis in North Mali.

Figure 4.16: Real consumption per capita between April-October in 2011 and 2013



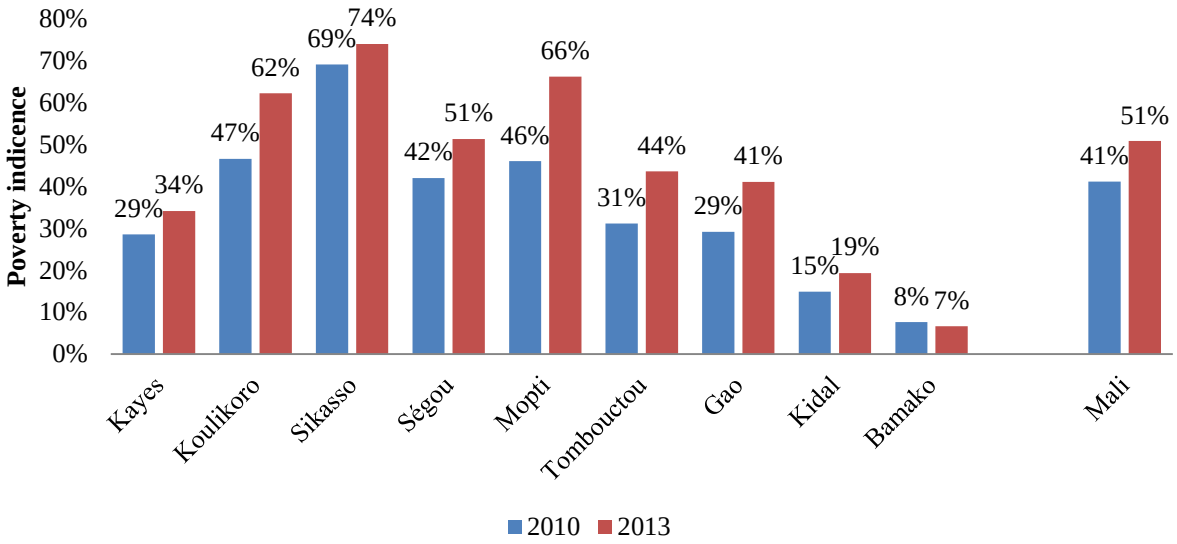
Source: EMOP 2011 and 2013, passages 1 & 2. Authors' calculations.

4.39 Using these estimates of regional changes in consumption and assuming that between 2009/10 and 2011 per capita consumption increased with the rate of growth of per capita GDP (2.2 percent), and assuming that per capita consumption for households living in the conflict affected areas not covered by EMOP 2013 declined by 15 percent, the evolution of poverty since 2009/10 can be estimated.

4.40 Poverty is estimated to have increased by 10 percentage points since 2009/10 from 41 percent to 51 percent. Poverty has gone up most dramatically in Mopti, where it is estimated to have increased by 20 percentage points from 46 percent to 66 percent in 2013. Sikasso remains the poorest region with an estimated rate of poverty incidence of 74 percent.

4.41 It is important to point out that the change in consumption calculated from the EMOP surveys is not collaborated by the General Equilibrium model of the Malian economy run by the World Bank. According to this model, which presents a consistent framework for all major aggregates of the economy, per capita consumption declined between 2011 and 2013 by approximately 2 percent. If this decline in consumption were modeled, estimated poverty incidence for 2013 is only marginally less than that in 2010: 40.9 percent. As the EMOP data for 2013 is still preliminary it is critical that a cleaned and final dataset is obtained soon, so that a better sense of the recent evolution of welfare can be gained.

Figure 4.17: Projected poverty for 2013 calculated using EMOP consumption data



Source: Calculated using ELIM 2009/10 and EMOP 2011, 2013, passages 1 & 2.

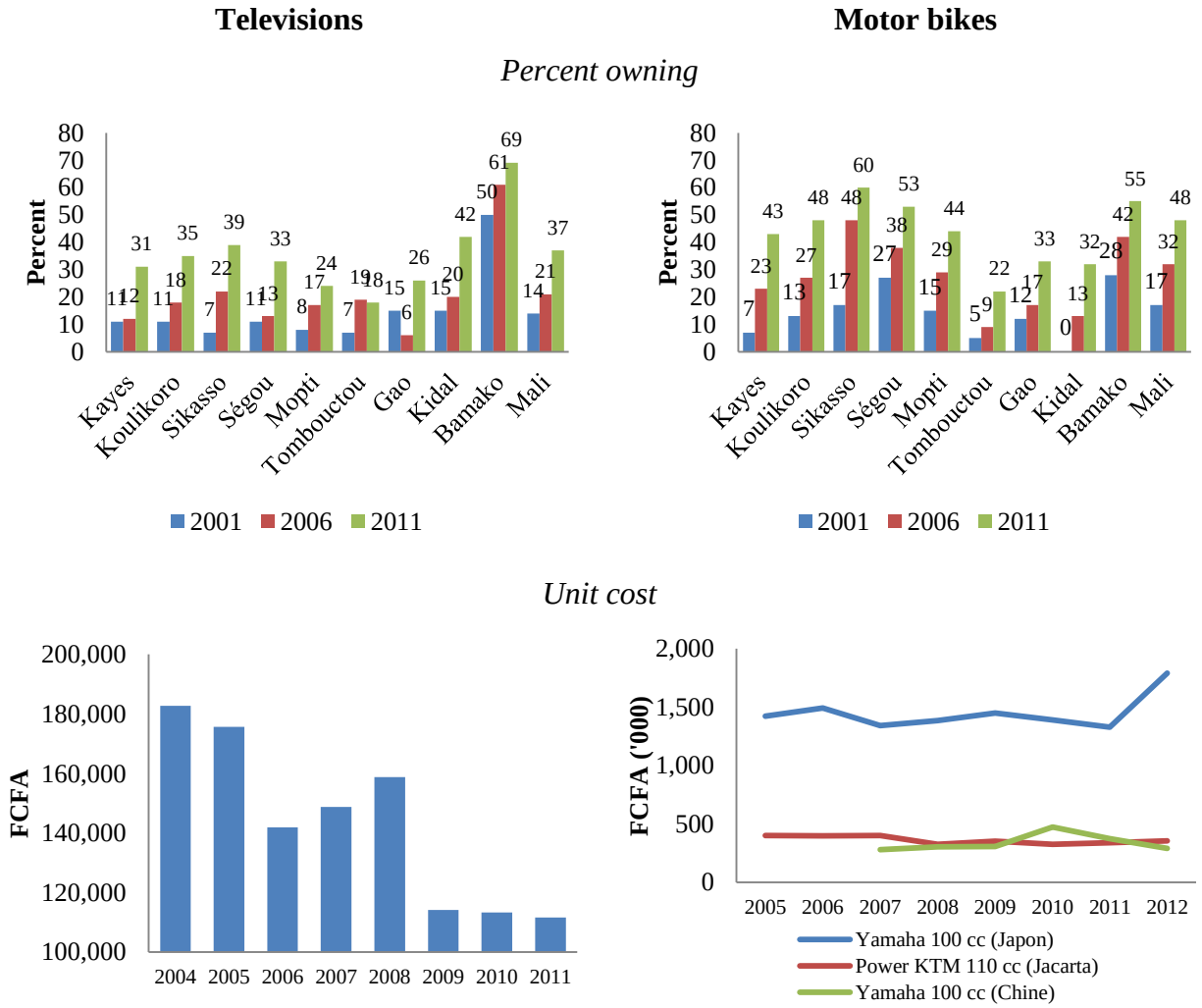
G. OWNERSHIP OF ASSETS

4.42 Even though per capita consumption did not increase much between 2001 and 2010 and as poverty increased in some regions, ownership of assets increased in all regions. Since 2010 and as the country became affected by the security crisis, asset ownership declined slightly.

4.43 The fraction of households owning fridges doubled between 2001 (EMEP) and 2011 (EMOP) from 5 percent to 11 percent, while the ownership of televisions almost tripled going from 14 percent to 37 percent. Most remarkable is the increase in the ownership of mobile phones, which were virtually absent in 2001 but which were owned by 67 percent of households in 2011. Equally remarkable is the increase in motor bikes. Over the course of one decade the ownership more than tripled from 17 percent of households to 48 percent. The increase in asset ownership occurred in all regions as is illustrated below for televisions and motor bikes.

4.44 More people enjoying consumer durables is positive and reflects an increase in welfare. The rapid increase in asset ownership in the face of very little change in average consumption deserves an explanation. Two trends occurring independent of each other, explain the rapid increase in asset ownership. First, consumption of poor households increased by much more than that of wealthy households: in fact between 2001 and 2010 consumption of households in the poorest wealth decile increased by 36 percent while consumption of households in the top wealth decile decined by 13 percent. This increase in income by the poorest made the purchase of consumer durables a possibility for those who did not have such opportunity before. This is borne out by the data: one observes a rapid increase in asset ownership amongst poorer households. For instance, in 2001 only 2 percent of households in the bottom wealth quintile owned a television; by 2011 this had increased to 11 percent. The ownership of mobile phones amongst households in the bottom wealth quintile increased even from 2 percent to 49 percent and the ownership of a motorbike from 10 percent to 40 percent.

Figure 4.18: Ownership and prices of televisions and motorbikes since 2001, by region



Source: Asset data (ELIM and EMOP), price data (Mercuriales 2005-2012).

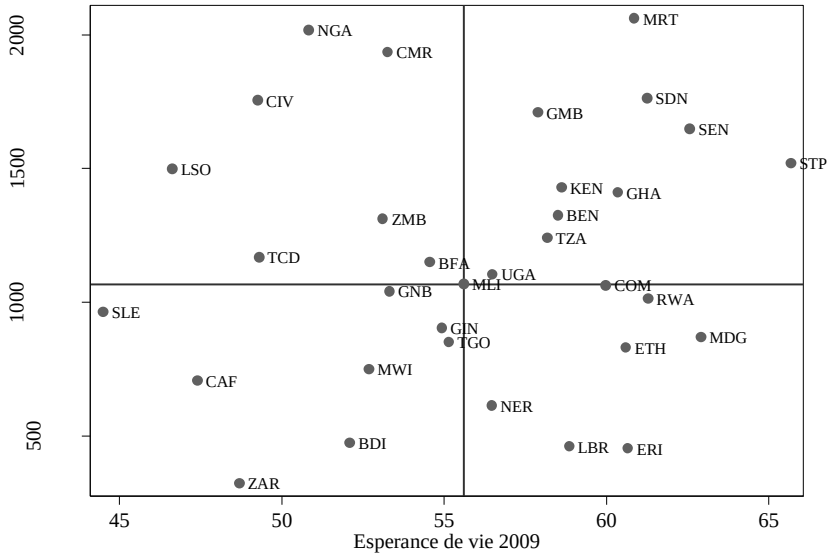
4.45 The second trend is that consumer durables became more affordable because prices dropped. Since the early 2000s East-Asian manufacturers have begun to flood the market with cheap consumer durables. Price data collected and published in the Mercuriale demonstrate how the nominal price of a 21 inch televisions dropped from FCFA 180,000 to 110,000 a 40 percent drop in nominal terms and an almost 50 percent drop if inflation is taken into account. The pattern for motor bikes is slightly different. Here the price of the premium brand from Japan did not drop much (in nominal terms at least), but the arrival of alternatives –they are first recorded in the Mercuriale in 2005, the power KTM and a Yamaha from China, meant that households now could purchase a motor bike which cost less than a third of the price of the Japanese bikes which previously dominated the market.

H. OTHER CORRELATES OF WELFARE

4.46 In 2009 life expectancy was 55.6 years, down slightly relative to 1987 when it was estimated at 56.9 years (RGPH 2009). Given Mali's level of income, life expectancy is in line

with that in comparator countries in Africa. Mali does better than Guinea Bissau or Sierra Leone and worse than for instance Togo which attains the same life expectancy for a lower level of per capita income. Countries like Eritrea, Ethiopia or Rwanda, which can be found in the bottom right quadrant of Figure 3.15 attain higher levels of life expectancy for lower levels of income, suggesting that though things could be worse (bottom left quadrant), they could be considerably better as well.

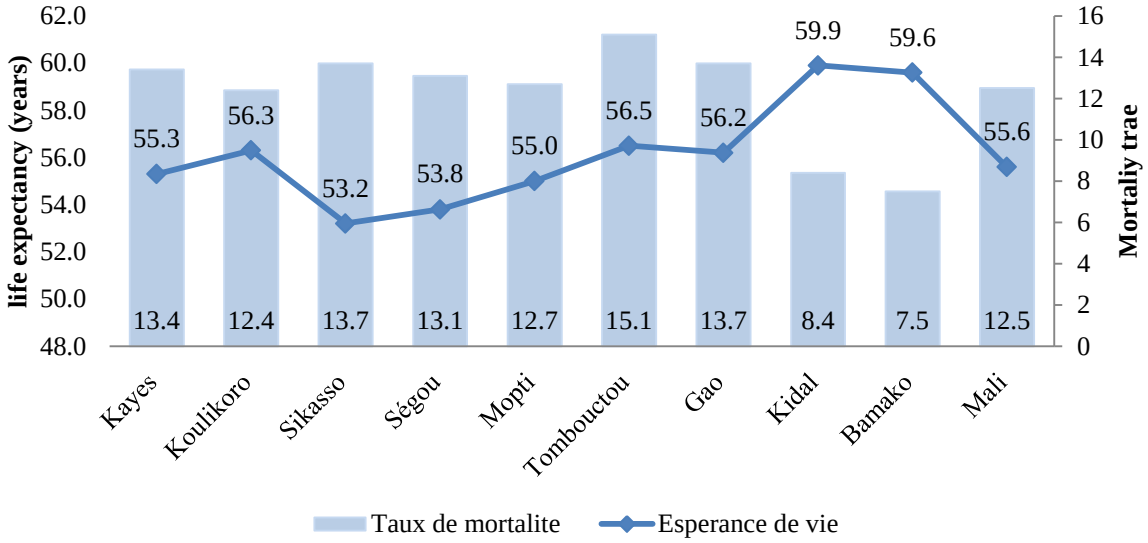
Figure 4.19: Life expectancy and GDP per capita across Africa



Source: WDI 2013.

4.47 Life expectancy varies from as low as 53 years in Sikasso to almost 60 in Bamako and Kidal. Mortality –here measured as comparative life expectancy, a measure that controls for differences in the composition of a population, follows a pattern which is the mirror image of that of life expectancy. Mortality is highest in Sikasso and Tombouctou and lowest in Kidal and Bamako.

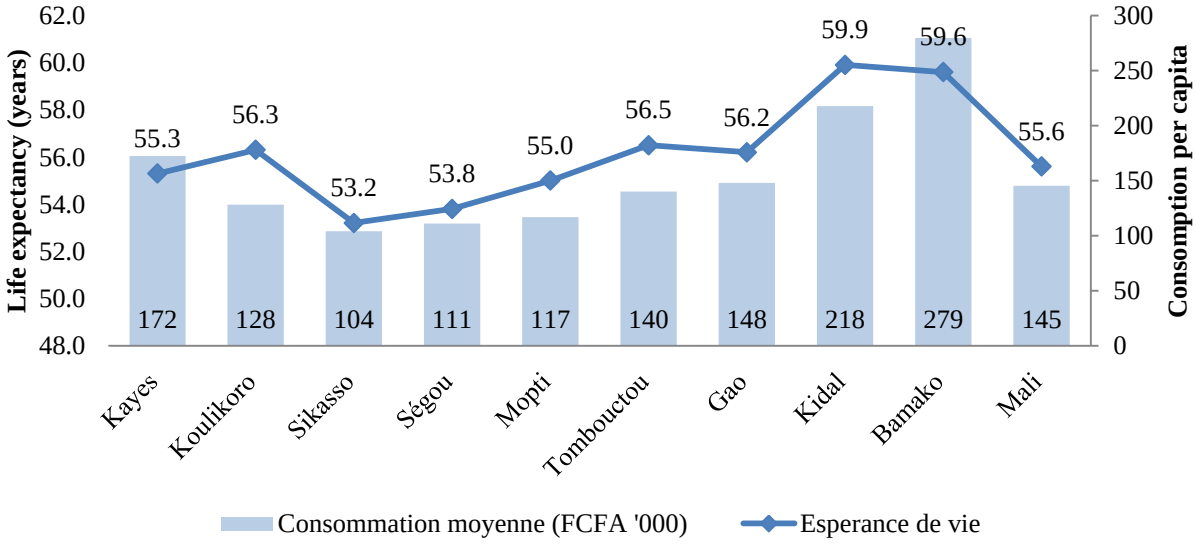
Figure 4.20: Mortality rate and life expectancy by region



Source: RGPH 2009.

4.48 There exists a strong association between life expectancy and income per capita. Those living in regions with higher levels of per capita consumption can expect to live longer. Sikasso is the region doing worst, Bamako is doing best.

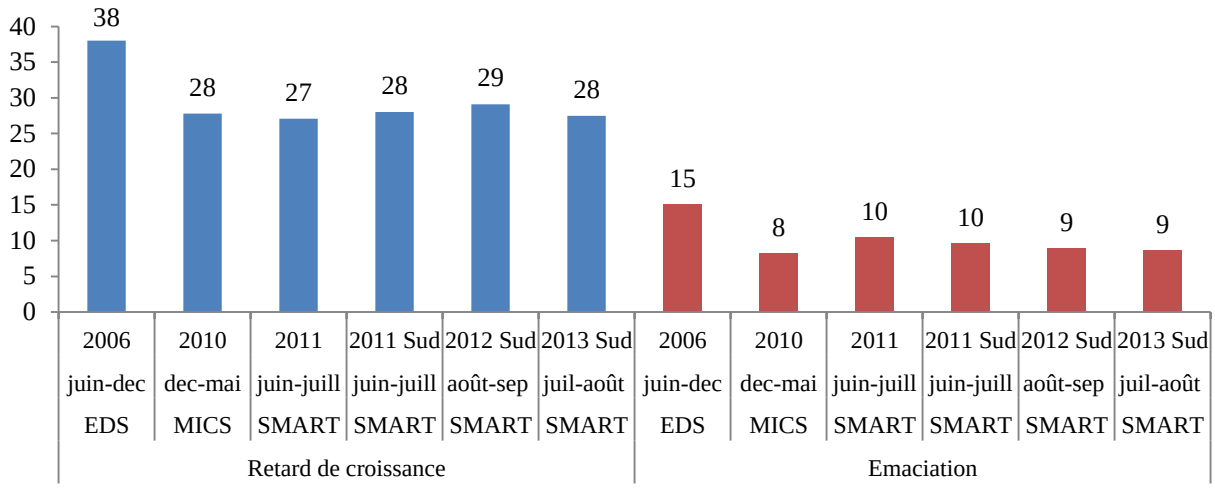
Figure 4.21: Life expectancy (2009) and consumption per capita ('000 FCFA)



Source: RGPH 2009 and ELIM 2010. Authors 'calculations.

4.49 Nutrition indicators for Mali are troubling. Almost three out of every 10 children aged 0 to 59 months are chronically undernourished and thus too short for their age; and one in 10 children are acutely malnourished. The incidence of malnutrition reduced significantly since 2006, but ever since 2010 the incidence of malnutrition has remained more or less unchanged.

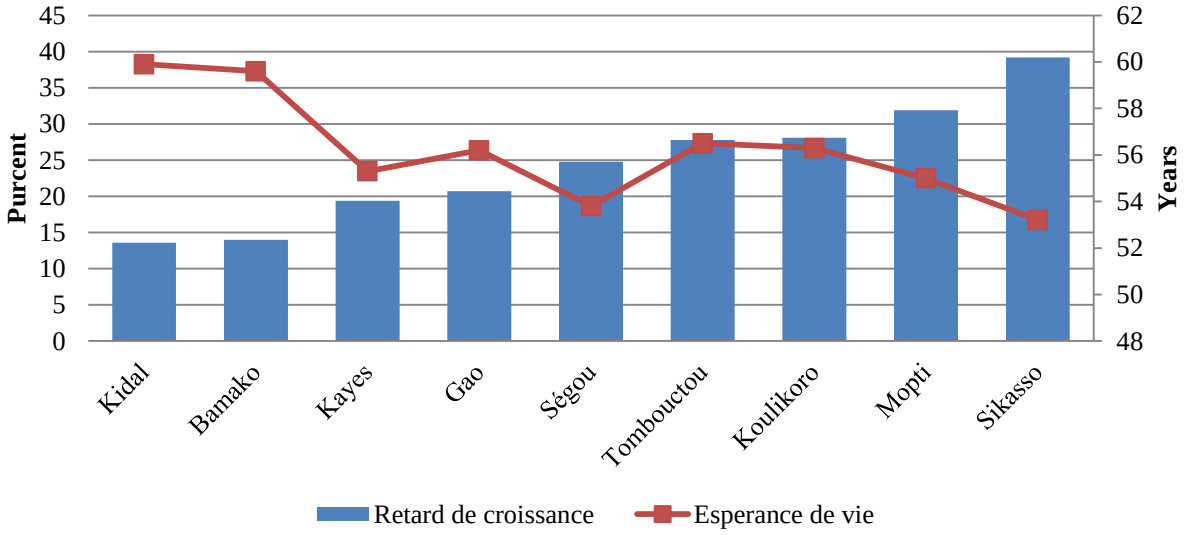
Figure 4.22: Malnutrition amongst children aged 0-59 months: 2006-2013



Sources: EDS 2006, MICS 2010 and SMART 2011, 2012 and 2013.

4.50 Malnutrition is associated with other correlates of well-being such as high maternal and infant and child mortality and life expectancy. Malnutrition is a major contributor to infant and childhood mortality. The negative correlation between chronic malnutrition and life expectancy is illustrated below: regions with the highest rates of chronic malnutrition (Sikasso, Mopti) have the lowest life expectancy.

Figure 4.23: Life expectancy and the degree of stunting (by region)



Source: RGPH 2009 and MICS 2011.

4.51 Regional patterns of malnutrition are different for different measures of malnutrition. With respect to chronic malnutrition –measured as height for age, Sikasso does worst and Bamako best. Ségou, Tombouctou, Koulikoro and Mopti take an intermediate position and the regions of the North do best. This pattern does not apply to acute malnutrition –measured as

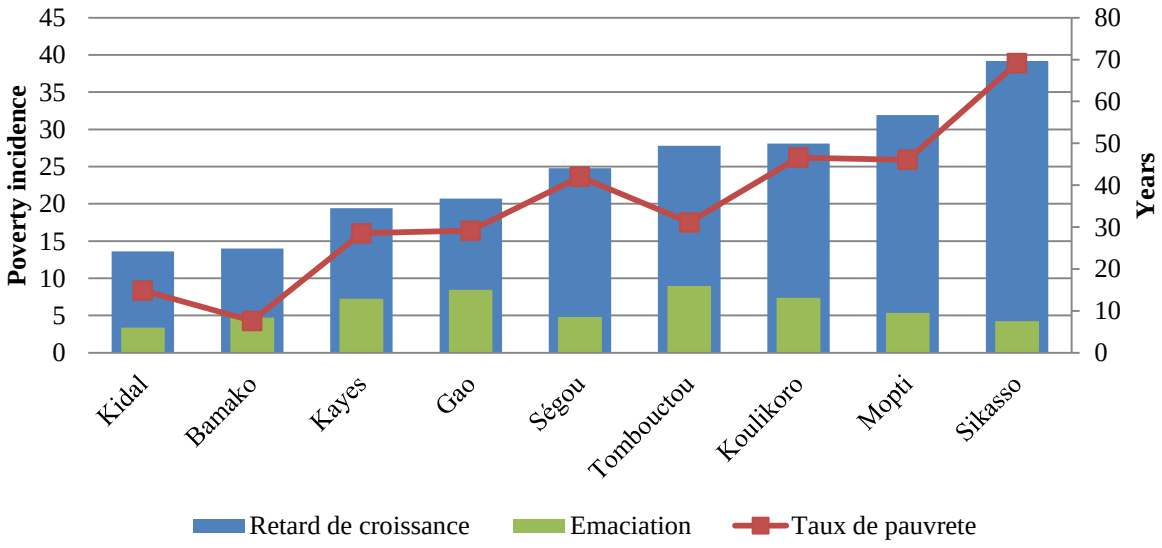
weight for height. Now Sikasso is amongst the best performers, while the Northern regions Gao and Tombouctou (but not Kidal) do worst.

4.52 Poor diets (quantity as well as quality), inadequate caring practices and unhealthy living environments are generally the major factors contributing to chronic malnutrition, while an urgent lack of food is the main driver of acute malnutrition. Hence it may be less surprising that a region like Sikasso (zones 10, 11 and 12) with high agricultural potential faces the highest level of chronic malnutrition in the country. Demands on labor are high (less time for child care), per capita of incomes are low and the diet is short on milk and livestock products: even the wealthiest households consume very little of this (see chapter 3).

4.53 Acute malnutrition is more closely correlated with an urgent inability to access food: either from one's own production or through purchases. In a normal agricultural year like 2011, overall levels of acute malnutrition should be relatively low. The fact that they are still high in Gao and Tombouctou underscores how during the lean season when food prices are high and prices for livestock low, when opportunities for gainful employment are limited, poor households in this zone, are vulnerable and susceptible to acute malnutrition.

4.54 Differing spatial patterns for different types of malnutrition implies different correlations with income poverty. Hence one finds a high and positive correlation between income poverty and chronic malnutrition, a correlation that does not exist for acute malnutrition, for which the most vulnerable populations live in Northern Mali (but not Kidal).

Figure 4.24: Malnutrition and poverty incidence ((by region) for children less than 5 years



Source: EMOP 2011 and MICS 2011.

I. CONSUMPTION REGRESSION

4.55 To more formally explore the effect of livelihood zone on consumption per capita we present a regression in which consumption depends on (1) household demographic characteristics, which affect household consumption choices, (2) the occupation of household

members, which determines household income, and (3) local characteristics, which influences choice sets. The model can be written as follows:

$$logC_h = H_h'\boldsymbol{\delta} + \sum_j \gamma_j \mathbb{1}_{w(h)=j} + \sum_l \theta_l \mathbb{1}_{z(h)=l} + \sum_l \rho_l \mathbb{1}_{z(h)=l}\mathbb{1}_{w(h)=AGR} + L_{c(h)}'\boldsymbol{\alpha} + \epsilon_h$$

where C_h is of per capita consumption expenditure for household h. H_h is a vector of demographic characteristics of the household, including demographic and educational characteristics of the household head (with $\boldsymbol{\delta}$ the corresponding vector of coefficients). The occupation of the household head is given by a set of indicator variables $\mathbb{1}_{w(h)=j}$ (equal to 1 if the household head in household h works in occupation $w(h) = j$ and 0 otherwise). The coefficient γ_j thus measures how consumption per head varies for different professions. $\mathbb{1}_{z(h)=l}$ is a dummy variable indicating livelihood zone l (it is equal to one is $z(h) = l$ and 0 otherwise) and it is interacted with another dummy variable $\mathbb{1}_{w(h)=AGR}$ which takes the value 1 if the household head is working in agriculture and 0 otherwise. Therefore, the estimates of our coefficients of interest $\theta_l$and ρ_l shed light on the possible effect of livelihood zones on consumption for people with non-agricultural occupations and for people working in agriculture respectively. The vector $L_{c(h)}$ further introduces local controls at the commune level which may affect consumption in ways not related to the livelihood zone, such as variations in the presence of public services. Although the model has as many controls as possible, we cannot completely rule out endogeneity, in particular that which is related to sorting of household across zones on unobservables that would impact consumption. The results should thus be interpreted more in terms of correlation than causation.

4.56 The results are presented in Table 3.2. We first present the model without commune controls (columns 1 and 2) and then add commune controls (columns 3 and 4). In columns 1 and 3, the interaction terms between livelihood zones and agricultural occupation is dropped. Most of the estimated coefficients remain stable across model specifications, including the effects of livelihood zones. Our preferred specification is the complete model which is presented in column (4).[42]

4.57 We find that consumption is higher if the household head is male. The estimated coefficient on gender reflects a 7 percent increase in the per-capita consumption of male headed households compared to those headed by females. Household consumption decreases with age of the household head.[43] Education of the household head has an important impact on per-capita consumption. Compared to the benchmark group (those with primary education), per-capita consumption for households headed by college graduates is about 41 percent higher. We interacted the education variables with livelihood zone dummies to explore whether returns differed by zone. The results –not presented here, demonstrate no differences in returns to education by zone, with the exception of zone 1 where the return to education was higher than elsewhere.

4.58 Not surprisingly –and in confirmation with the finding by the livelihoods approach that large households are wealthier, the number of labor-force participants in the household increases per-capita consumption, whereas having more children or additional old household members in

[42] To shorten the table, coefficients on commune level local controls and ethnic groups are omitted from the table.
[43] Although the relation is convex, the negative effect dominates for any plausible age.

the household decreases consumption. Urban residents consume significantly more compared to their rural counterparts.

4.59 The estimated coefficients on the occupational controls reflect the ranking of expected incomes for occupations in Mali. Compared to the benchmark group (people who work in agriculture), those working in mining, commerce, finance, public administration, health and extraterritorial organization enjoy noticeably higher per-capita consumption. This reflects better skilled jobs, opportunities for profit, and shortages in some sectors such as health occupations.[44] On the contrary, the advantage from working in education is not as high.

4.60 Addition of commune controls in the regression (columns 3 and 4) reduces the magnitude and significance of the estimated coefficients on livelihood zones—which are the focus of our regression. Therefore, in what follows, we only comment on columns 3 and 4. Noticing that zone 10 (Sorghum, millet, and cotton) had the lowest household per-capita consumption on average, we selected it to be the comparator. Column 3 reports the results for the model with commune controls only. We find that there are 10 out of 12 zones with significantly higher household per-capita consumption levels. Residing in zone 12 (South-west maize, sorghum, and fruits) provides the smallest significant increase compared to the benchmark zone, with a per-capita consumption that is higher by 18.2 percent. The largest increases are for zone 8 (North-west remittances, sorghum, and transhumant livestock rearing) and 13 (Bamako), which has household per-capita consumptions that are higher by 62 percent and 58 percent respectively.

4.61 Introducing interaction terms between zones and the agricultural occupation dummy for the household head provides a decomposition of the increase in per-capita consumption by zone accruing to agricultural and non-agricultural households. We find that many zone coefficients that were previously significant become insignificant, suggesting that residing in these zones does not affect non-agricultural households. In zone 8 and zone 13 however, the level effects (for non-agricultural households) remains significant at the 1 percent although their magnitude is reduced to 41 percent and 45 percent. Interestingly, interaction terms in 7 and 2 regions out of 13 are significant at the 5 percent and 10 percent level respectively. In zone 5 in particular, per-capita consumption for households whose household head works in the agricultural sector is 40 percent greater than that of the benchmark zone while the per-capita consumption of non-agricultural households is no different than that of the benchmark zone. The significance of these interaction terms combined to the lack of significance in the levels suggests that in many zones in Mali, differences in consumption levels between zone are driven by different returns to those working in agriculture.

4.62 In summary, the regression analysis shows important geographic differences in household consumption, especially across livelihood zones. The capital area, Bamako, and zone 8 (North-west remittances, sorghum, and transhumant livestock rearing) have the highest household consumption level, an effect which is driven both by agricultural and non-agricultural activities.

[44] There is roughly 1 hospital or clinic available for every 100,000 people in Mali (source: ODHD 2008).

Table 4.2: Determinants of per capita consumption
(Dependent variable: log per capita consumption in 2001 monetary value)

	(1)	(2)	(3)	(4)
Household characteristics:				
Gender	0.0799***	0.0750***	0.0745***	0.0721***
Age of household head	-0.00978***	-0.00990***	-0.0102***	-0.0103***
Age squared	0.0000761***	0.0000780***	0.0000796***	0.0000815***
Education: Middle school	0.0733**	0.0744**	0.0750***	0.0756***
Education : High school	0.215***	0.220***	0.210***	0.215***
Education: Advanced	0.415***	0.420***	0.405***	0.413***
Education unreported	-0.0785***	-0.0724***	-0.0705***	-0.0648***
# of people under 14	-0.0407***	-0.0402***	-0.0396***	-0.0393***
# of people in labor force	0.00849***	0.00824***	0.00725***	0.00715***
# of elderly	-0.0254**	-0.0252**	-0.0227*	-0.0230**
Urban residence other than Bamako	0.216***	0.203***	0.0877	0.0709
Occupational controls:				
Fishing	0.0348	0.190**	0.0111	0.204**
Mining	0.373***	0.515***	0.341***	0.527***
Manufacturing	0.151***	0.300***	0.131***	0.316***
Utilities	0.0374	0.180*	0.0113	0.194*
Construction	0.129***	0.272***	0.0987***	0.280***
Commerce	0.246***	0.389***	0.209***	0.391***
Hotel	0.212***	0.360***	0.179**	0.365***
Transportation	0.208***	0.347***	0.160***	0.341***
Finance	0.326***	0.453***	0.287***	0.454***
Real estate	0.204***	0.340***	0.163**	0.341***
Public administration	0.278***	0.415***	0.243***	0.418***
Education	0.0407	0.180**	0.0224	0.200**
Health	0.265***	0.408***	0.242***	0.421***
Collective self employment	0.166***	0.314***	0.129***	0.315***
Employs domestic workers	0.175***	0.332***	0.148***	0.341***
International organization	0.261*	0.396**	0.249*	0.420***
Employment unreported	0.206***	0.329***	0.171**	0.332***
Livelihood zones:				
Zone 1	0.0477	-0.0321	0.0955	-0.018
Zone 2	0.272***	0.164*	0.261***	0.119
Zone 3	0.193***	-0.00559	0.190**	-0.0179
Zone 4	0.0295	-0.147	0.02	-0.180*
Zone 5	0.412***	0.132	0.397***	0.108
Zone 6	0.226***	0.117	0.212***	0.0895
Zone 7	0.317***	0.163	0.262***	0.104
Zone 8	0.625***	0.451***	0.617***	0.416***
Zone 9	0.207***	0.108	0.194***	0.0548
Zone 11	0.228***	0.173**	0.195***	0.106
Zone 12	0.199***	0.0832	0.182**	0.0362

	(1)	(2)	(3)	(4)
Zone 13	0.732***	0.628***	0.582***	0.453***
Livelihood zone interacted with AGR:				
Zone 1*AGR		0.0891		0.127
Zone 2*AGR		0.156		0.195*
Zone 3*AGR		0.281***		0.288***
Zone 4*AGR		0.241**		0.267***
Zone 5*AGR		0.387***		0.396***
Zone 6*AGR		0.156**		0.162*
Zone 7*AGR		0.223**		0.237**
Zone 8*AGR		0.240***		0.270***
Zone 9*AGR		0.142*		0.195**
Zone 11*AGR		0.0609		0.113
Zone 12*AGR		0.163		0.202*
Zone 13*AGR		0.261***		0.268***
Constant	11.82***	11.79***	11.74***	11.70***
Ethnic group controls	Y	Y	Y	Y
Local characteristics controls	N	N	Y	Y
Observation	9036	9036	9036	9036
R-squared	0.53	0.533	0.538	0.541

*** significant at 1% level, ** significant at 5% level, * significant at 10% level
Source: ELIM 2010. Authors' calculations

J. DISCUSSION

4.63 This chapter discussed the importance of spatial characteristics, and particular livelihood zones, for welfare. Urban households do much better than rural households, explaining in part the attractiveness of urban areas for migrants. Amongst rural households the pattern that emerges is that households in livelihood zone 10 –those growing sorghum, millet and cotton in the Sikasso region are amongst the most destitute in the country. Relative to the rest of the nation, their consumption is amongst the lowest, as is life-expectancy while levels of chronic malnutrition and poverty are amongst the highest. In terms of other indicators Sikasso appears to be doing better: acute malnutrition is relatively low in Sikasso, and the ownership of assets and consumer durables is relatively elevated.

4.64 Increasing remittances and increases in the production of cereals, of maize and rice in particular, have driven the rapid poverty reduction that occurred between 2001 and 2010. The poorest households have benefited most from this. Improvements in welfare are strongly associated with livelihood zones relying on remittances (zone 8 in north-west Kayes), zones 11 and 12 in South Sikasso, zones 3 and 6 (producing rice on the borders of the Niger or as part of the office du Niger) and to a lesser degree zone 9 (west and central), producing millet and sorghum under rain-fed conditions. Households depending on livestock rearing in zone 2 in the regions of Gao and Tombouctou and those in the Niger delta (zone 6) have not been doing well.

4.65 Bamako and Kidal are the regions where households are best off in terms of consumption, though the situation in Kidal can be expected to have changed dramatically as a result of the security crisis.

4.66 There are a number of implications to be derived from the chapter. Mali has a comparative advantage to serve the region with food (see also chapter 6 on growth) and there seems to be potential for maize and rice to production to increase. To make this happen it is important to ensure that these products can effectively be exported otherwise increases in production might lead to declines in prices and incomes. With the continuing crisis in the North, this may not be self-evident as it is unclear whether the highway to Gao is secure.

4.67 The elevated levels of poverty in livelihood zone 10 remain somewhat of a puzzle. The agricultural potential of this zone is high. In part because of its association with cotton, market accessibility and the availability of inputs are also relatively good in this zone. It may be that the high levels of poverty are an artefact of the data because data collection for ELIM 2010 coincided with a period of adverse weather in this zone. Never the less, given the success of maize production elsewhere and the high fluctuations in the value of cotton production, one wonders–but additional research would have to clarify this, whether it is possible to expand maize production in this zone, or alternatively what is the potential to increase sorghum and millet production.

4.68 Zones 3 (on the borders of the Niger between Gao and Tombouctou and 7 -Office du Niger) already benefited from increases in rice production and, the security situation allowing, there seems to be potential to increase the production of rice in the Niger delta (zone 3). Doing so requires improving market accessibility as this zone is affected by poor market access.

4.69 The long run policy implication that follows from this chapter is a huge need to invest in education. Returns to education are high. Even though this is partly reflects the scarcity of educated people, it is unimaginable for sustainable growth to occur without addressing the huge education deficit. Doing so will require actions now that can only be expected to yield a return in 10 to 15 years' time.

4.70 Important lessons can be learned from the success of households in zone 8 in north-west Kayes who through migration and reliance on remittances have managed to build secure and improving livelihoods. There is a clear link with education, as better educated migrants are more likely to succeed–as discussed in chapter 2.

4.71 According to the 'traditional' poverty measure 70 percent of all poor are located in three livelihood zones: 9 (west and central rain-fed millet/sorghum), 10 (sorghum, millet and cotton) and 11 (south, maize, cotton and fruits). The case to focus policy interventions on households in zone 10 is particularly strong because many households live in this zone, because the incidence of poverty is high and because, unlike zones 9 and 11 poverty levels have been increasing. Zone 4, where 10 percent of poor households live, also deserves additional attention even though the much lower population density of this zone might hinder the design of cost-effective interventions. These results need to be interpreted with caution, however, as the asset based poverty measure (presented in Figure 4.16) suggests that poverty is much more equally spread across southern Mali.

4.72 Finally the north has been badly affected by the security crisis. A trade-off seems to have to be made between efficiency (the north has low population density) and need. However, there are many more aspects to interventions in the north than this simple trade-off. It is clear that important spillover effects have occurred from the crisis in the north as consumption levels have

fallen throughout the country since 2011 (with the exception of Bamako) and not just in the north: finding a solution to the crisis in the north is in the interest of all.

Chapter 5. Spatial Challenges to Service Delivery: Trading off Equity, Efficiency and Quality

A. INTRODUCTION

5.1 In this chapter we focus on service delivery. Services come in many forms and include social services such as health, water and education, economic services such as roads, markets, banks and electricity, information services (radio, television, telephone) as well as security services (police, military) or cultural services (sports facilities, theater). Not all services are provided by the public sector but many are. For services that are provided by the private sector – as is for instance the case with mobile telephony, or rural electricity, the public sector often plays an important regulatory role.

5.2 In previous chapters we noted how geographic differences have important consequences for livelihood choices, which in turn are closely associated to different levels of welfare. In this chapter we focus on the consequences of spatial aspects for the provision of services. In this instance we focus less on the livelihood zone, but more on the differences in population density and how it forces decision makers to choose between access for all (equity) and efficiency (providing access to as many people as possible for a given budget).

5.3 We illustrate this point with three examples: primary education, electricity and access to markets. Each of these services faces its own trade-offs. For primary education in 2009 there were almost 11,000 villages (Table Annex 2.3) and approximately 4,500 schools so in addition to the challenge that every village cannot be served by a school, a trade-off exists between improving access and improving quality. In electricity the trade-off is about whom to give access: the urban rich or the rural poor. With respect to access to markets, finally, in addition to access and efficiency issues, we again note that quality issues (road blocks, maintenance planning) are critical. For all three services we show how innovations –from the introduction to double shifting in schools, to solar lights and cheap motor bikes, help make certain trade-offs more palatable.

B. UNIT COSTS AND THE DELIVERY OF SERVICES

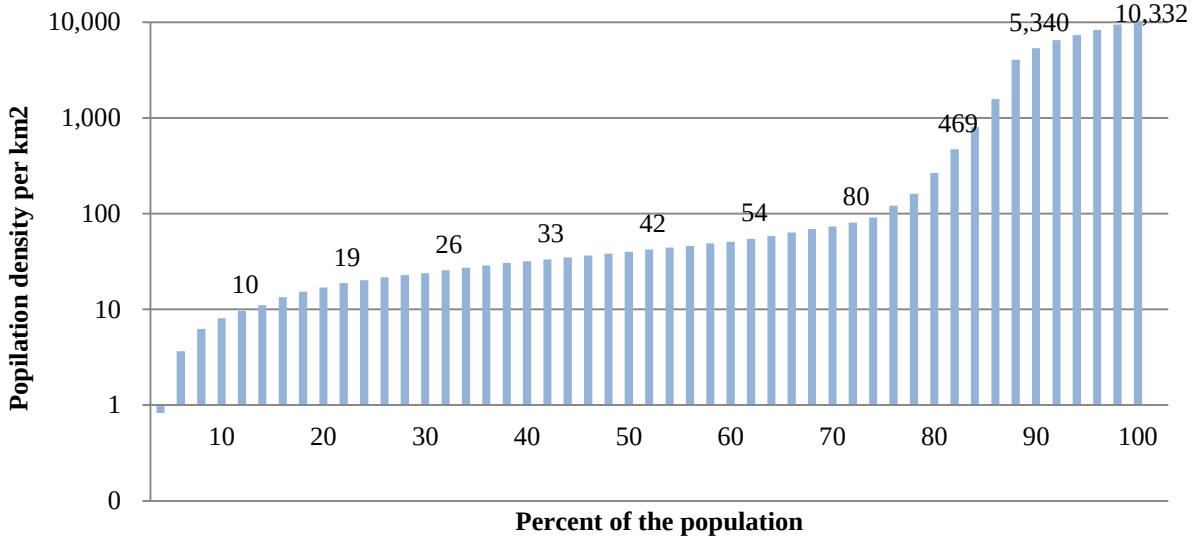
5.4 Unit costs, which are the costs that need to be made before a service can be offered, matter a great deal for whether a service can be offered, or in how many places a service can be offered efficiently. Unit costs, in turn, are largely determined by the size of fixed costs: services requiring large upfront investments such as piped water or electricity can only be offered in a cost-effective manner in areas where population density is high: cities. How pressing this problem is can be illustrated with an example for secondary schools. Imagine that the maximum distance a secondary student can be expected to travel is 7 km (one way), and that a secondary school requires at least 250 students to be cost-efficient. Moreover, assume that 30 out of every 100 children complete primary school (see section 5.2). Children of secondary school age (those aged 13-18) make up 14 percent of the population.[45] The catchment area of a school is 154 km2

[45] Estimated using 2009 census data.

(πr^2). To attract 250 students, population density needs to be about 39 people per square kilometer.[46] How many localities in Mali meet this criterion?

5.5 Figure 5.1 ranks the population of Mali by density. The graph is constructed using population and area at the commune level, assuming an even distribution of people across space. In reality people tend to cluster. As a consequence the graph places too many people in low density areas than is the case in reality. But for illustration purposes the graph suffices. One of the things that the graph illustrates is most people (85 percent) live in an area with a population density that exceeds the national average of 13.3 people per square kilometer. This simply follows from the fact that few people live in areas with low density. The graph also suggests that approximately 50 percent of the population lives in areas where, at least from an efficiency point of view, placing a secondary school would not be justified.

Figure 5.1: Cumulative distribution of population living in area with a certain population density



Source: calculated from RGPH 2009.

5.6 The same calculation can be done for primary schools. Let's assume that the minimum primary school size is 150 children. Primary schools do not require teachers who are specialized in a certain subject nor expensive chemistry laboratories; hence the minimum efficient school size is less than that for secondary schools. Children at primary school are not able to walk as far as those attending secondary. Let's assume that instead of 7 km, primary school children can walk at most 5 km to go to school. With 17.1 percent of the population of primary school age and an enrollment rate of 55 percent, population density has to be around 20 people per square kilometer. As can be seen in Figure 5.1 such a density is achieved for approximately 85 percent of the population. If, however, one were to reduce the maximum acceptable distance to travel to a primary school is reduced to 3 km (the current government policy) then the minimum population density for the cost-efficient placement of a primary school increases to around 50 people per square kilometer. Now almost half the population would live outside the catchment area. If, on the other hand, the minimum efficient size of a primary school is reduced from 150 students to 75 students (for instance because teachers in small schools teach two grades in the

[46] 250/(0.14*.3*154).

same class), then the minimum population density drops to 25 and approximately 70 percent of people live within the catchment area.

5.7 This example helps to illustrate a number of points that are important for service delivery in low density areas. First, one might be inclined to argue that not offering people access to primary or secondary education is unacceptable, that one has to accept some inefficiency, and build more schools. After all, it is the ambition of the Government under the education for all program to ensure that every child has the possibility to go to school. But under a budget constraint building more schools invariably means doing less of something else. Placing a school in an area with low density where few students benefit means not placing a school in an area with higher population density where more students benefit. Issues of cost-efficiency are intricately linked with those of equity, but also of quality (for instance when the construction of additional schools goes at the expense of hiring more teachers). A second aspect the example helps illustrate is that the higher the per capita investment cost, the higher population density needed to the investment. Or to say the same thing differently: to offer the same service in a low density area, a service would have to require less in fixed costs. This explains why tarmacked roads, piped water and hospitals are found in high density areas like cities, and dirt tracks, wells and clinics in low density areas like rural villages. It also suggests that if one wants to increase access to services in low density areas, one might have to be innovative and seek to reduce fixed costs.

C. EDUCATION: ACCESS VERSUS QUALITY

5.8 School enrollment, whether it was in primary or secondary, increased considerably in recent years. According to the household surveys net primary school enrollment increased from 31 percent in 2001 to 54 percent by 2010. Enrollment in secondary schools went up from 10 percent in 2001 to 28 percent by 2010. Households in every wealth quintile benefited and one observes an increase in enrollment rate by approximately 23 percentage points within every consumption quintile. The poorest households who had the lowest enrollment rate in 2001 benefited most (in relative terms), but failed to close the gap in enrollment with the richest households. In 2010, the net enrollment rate for children from the poorest households was 46 percent; for children from the wealthiest households it was 71 percent.

Table 5.1: Net enrollment in primary and secondary schools

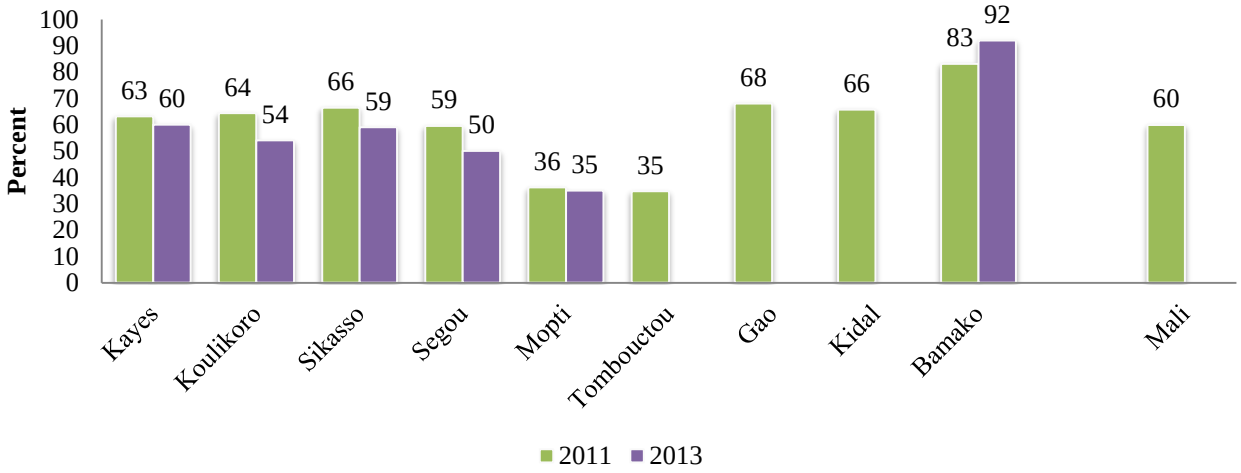
	Primary			Secondary		
Quintile	**2001**	**2006**	**2010**	**2001**	**2006**	**2010**
Poorest	22.6	39.8	45.8	3.7	8.9	16.6
Second	24.9	49.2	50.8	6.4	12.3	22.0
Third	29.4	52.9	52.1	7.5	19.5	23.4
Fourth	38.2	60.5	57.4	12.3	24.4	32.8
Richest	45.3	80.1	70.9	20.9	34.7	40.2
National	**31.3**	**55.2**	**54.3**	**10.4**	**20.2**	**27.7**

Source: EMEP 2001 and ELIM 2006 and 2009/10. Authors' calculations.

5.9 A similar pattern is observed for secondary school enrollment. Households in all wealth categories benefited, in a relative sense the poorest households benefited most but the gap in enrollment between poor and rich households remains large and, in fact, widened.

5.10 The regional pattern of enrollment is informative of between region differences; we do consider it in Figure 5.2. The data show the presence of large variations. Using the 2011 EMOP, which is the last household survey that was fielded in all regions, one observes how enrollment varies from as low as 35 percent in Tombouctou and Mopti to as high as 83 percent in Bamako. The Figure also shows the diversity of the North of the country: enrollment is extremely low in Tombouctou and Mopti while in Gao and Kidal enrollment rates are comparable to elsewhere in the country.

Figure 5.2: Net enrollment in primary school 2011 and 2013



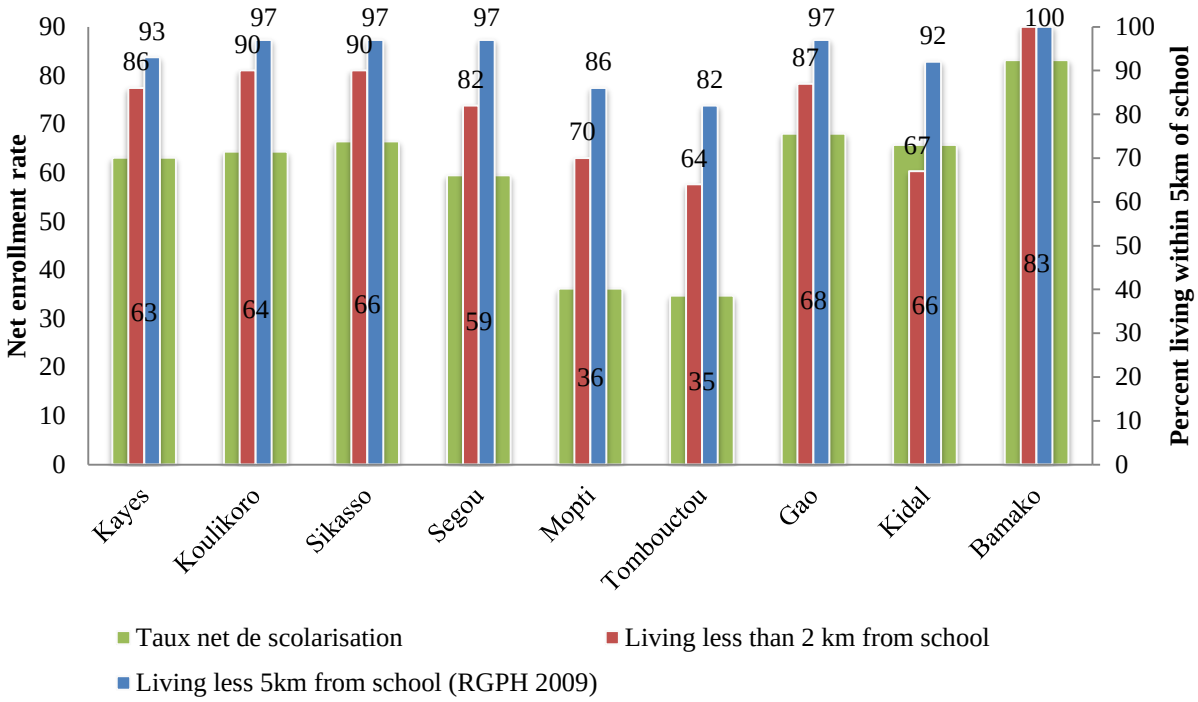
Source: EMOP 2011 & 2013.

5.11 Noteworthy is that the increase in enrollment has come to a halt. The 2013 EMOP did not collect information in the north–where as a result of the crisis school enrollment has fallen dramatically, however it did in south Mali. Its results show how with the exception of Bamako and relative to 2011 net enrollment rates went down in all regions.

5.12 Figure 5.3 presents the fraction of people living within a certain distance of a school. Distance is important for school attendance and children who live further from school have a smaller chance of attending it. A study carried out by DNSI (2007)[47] shows how children living more than 45 minutes from the nearest school are more than twice as likely not to attend school, than those who live less than 30 minutes away from school. The Figure shows that depending on where one lives between 92 and 100 percent of people live within 5km of a primary school, with the exception of households in Mopti and Tombouctou where between 82 and 86 percent live within 5 km of a school. 5 km is quite a distance to cover –particularly for young children, which is why we also present the fraction of the population living within 2 km. Again, the vast majority of the population (more than 80 percent) lives within 2km of a school, but in Kidal, Tombouctou and Mopti the percentage is significantly lower: around two-third live within 2 km of a school.

[47] DNSI 2007. *Pauvreté et Education au Mali: les determinants de la frequentation scolaire.*

Figure 5.3: Net primary school enrollment and fraction of population living within 2km and 5km from primary school



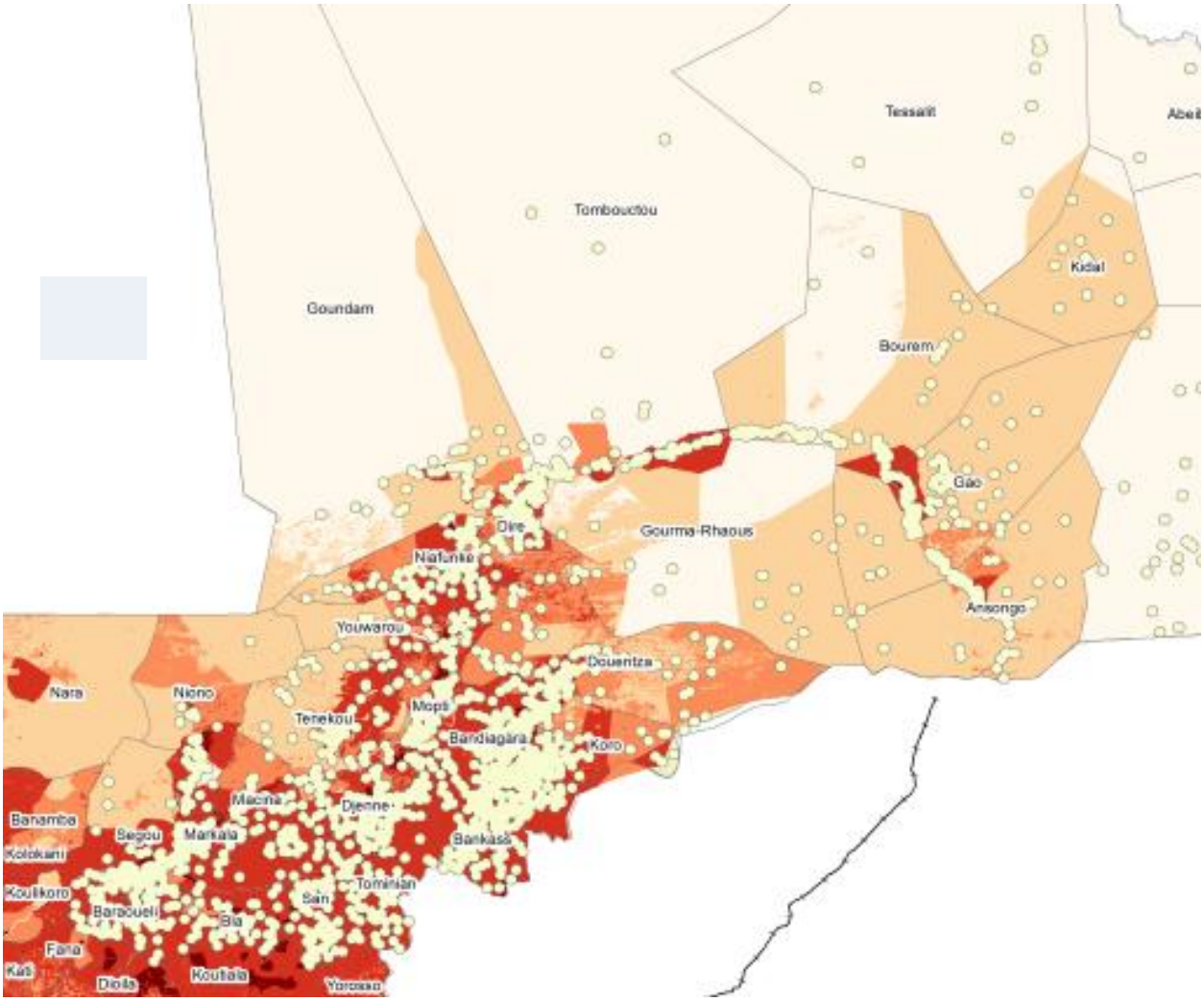
Source: EMOP 2011 (enrollment) and RGPH 2009 (distance). Authors' calculations.

5.13 Distance is obviously not the only factor explaining low attendance in Mopti and Tombouctou. In fact, with more than 60 percent of the population living within two kilometers of a school, attendance rates could be substantially higher than the 35 percent reported in Figure 5.2. Also in other regions, Kayes, Koulikoro, Sikasso and Ségou shows the difference between the fraction of the population that lives close to a school and the net enrollment rate significant. In other words, even without constructing any new schools attendance rates could be much higher. This is not to state that no new school construction should take place. Mapping the information available and creating a 5km radius around every school (Figure 5.4) demonstrates that certain localities do not benefit from a primary school, even though population density in the area is relatively high. Such areas deserve to be targeted for new school construction.

5.14 To further explore the overall spatial allocation of schools, classroom and teachers we use the data presented in Table 5.2, to calculate how many additional (fewer) schools a region should have if every region was at the national average. Doing this suggests that Bamako, Ségou and Mopti should receive additional schools, classrooms and teachers while Kidal, Koulikoro, and particularly Sikasso, Kidal and Gao should receive less. This, however, just presents a first approximation as many other variables determine whether a region should get additional or less resources. Population density in Bamako is so high (and the cost of land so elevated) that it makes sense to have fewer but larger schools. Enrollment rates in Mopti are so low, that it may make sense to expect teachers to teach multiple grades at the same time. So few people live within 2km of a school in Gao, Tombouctou and Kidal that it makes sense to put relatively more schools in these regions. It also makes sense for these schools to be relatively small. Indeed the

average primary school in Bamako has 5.7 classrooms, in Tombouctou it has only 3.1 and in Gao and Mopti 3.4.

Figure 5.4: Map showing a 5km radius around every public schools (population density is background color)

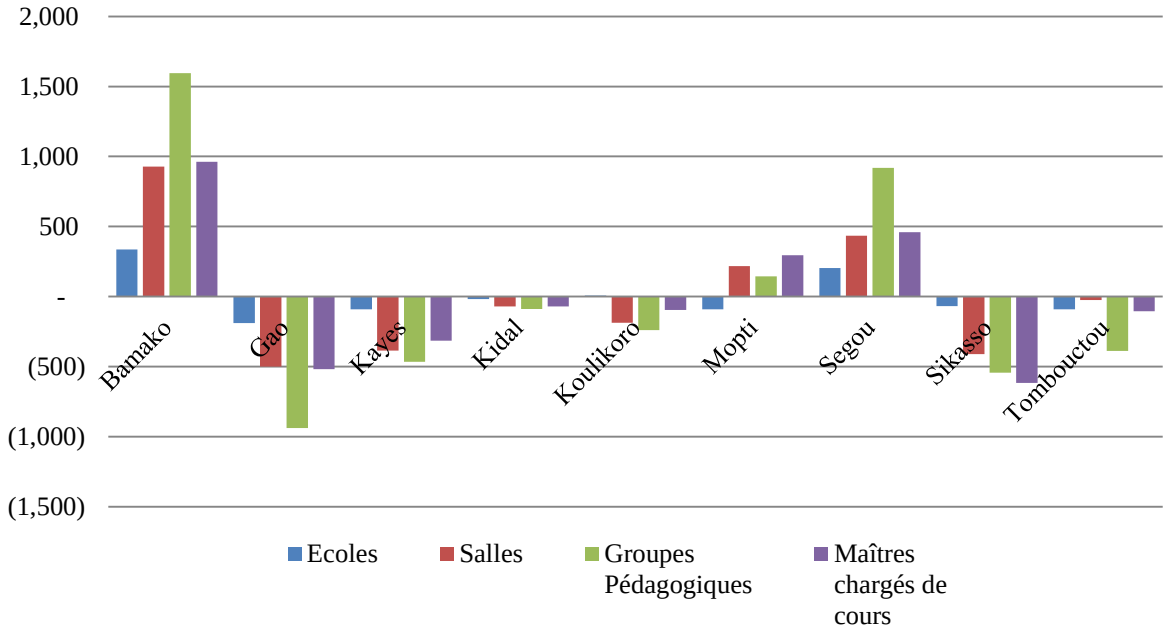


Source: UNICEF. Authors' calculations.

5.15 An interesting question to explore is where, given the observed inequalities, investments in new school are located. In the year following the 2009 census 508 new primary schools were constructed: 168 were in Sikasso, 90 in Ségou and Koulikoro, 46 in Mopti, 43 in Kayes, 30 in Tombouctou, 21 in Gao, 13 in Bamako and 7 in Kidal. When comparing the newly constructed schools with the stock of schools, one observes the absence of a clear correlation and one might be inclined to argue that school placement is unbalanced (top panel of Figure 5.6). Bamako got very few new schools relative to its population; Kidal constructed many new schools in relation to its population. Yet if one compares school placement to the fraction of people that live relatively far from a school, a different picture emerges. For instance: the number of schools constructed in Sikasso seems to be very large measured in absolute numbers, but once expressed in per capita terms, the fraction of new school constructed is less than the national average. A

lower construction rate than the national average seems appropriate given the fact that Sikasso already has more schools per citizen than the average for the country. Also the fraction of people living within 2km of a school is higher in Sikasso than the average for the nation. Based on these latter grounds, one could have argued for even less schools per capita to be constructed in Sikasso. Kidal, on the other hand, got the same number of additional schools as the national average, but based on the fraction of the population living close to a school, it could have received some more. This contrary to Ségou, which received –in per capita terms, many schools in an environment where the number of schools per capita was already much higher than the national average and where the fraction of people living close to a school also exceeds the national average.

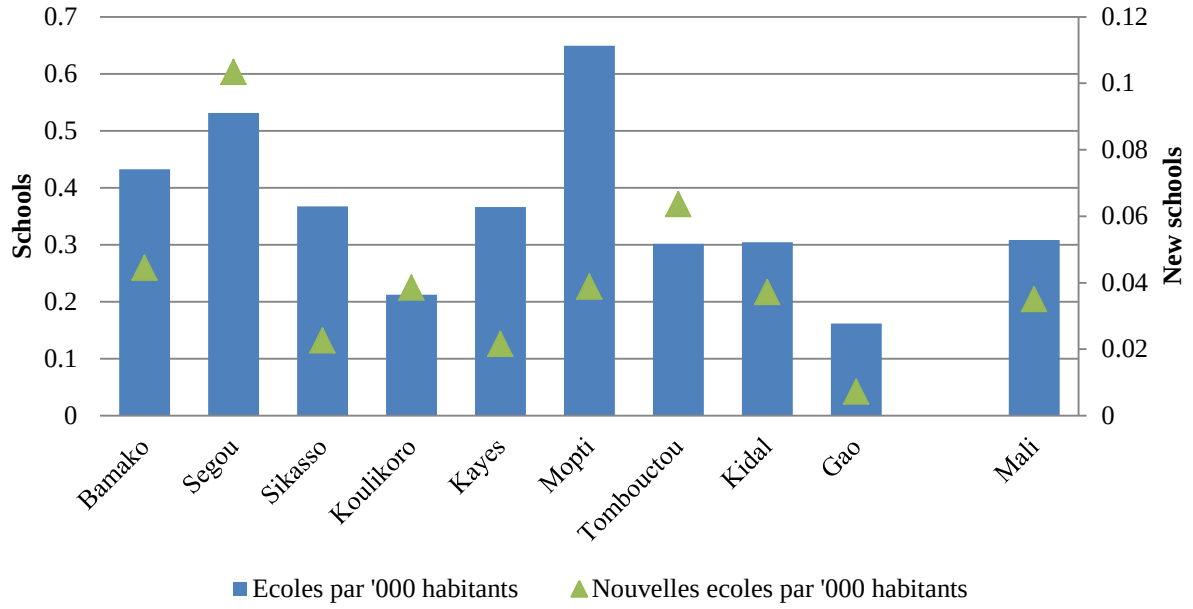
Figure 5.5: How school inputs would be reallocated for every region to be at the national average (2010/11)

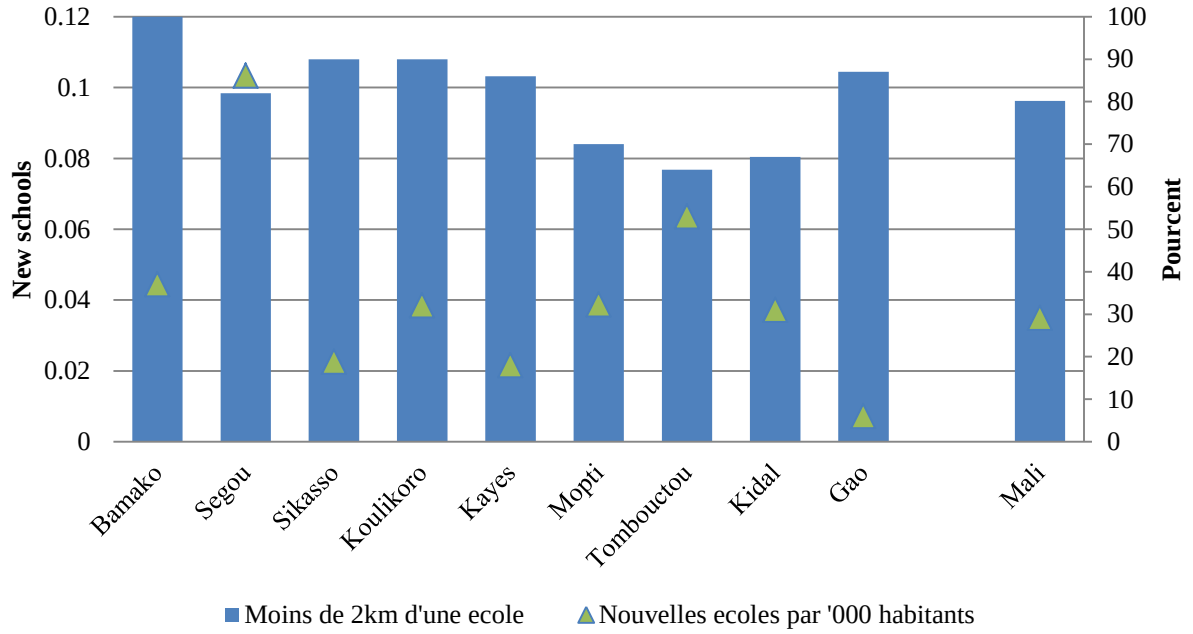


Source: Ministry of Education Statistical Abstract. Authors' calculations.

5.16 We also related new school construction to the number of additional students; we considered classroom construction and the placement of teachers and repeated the exercise for secondary schools. In all instances we do find sizeable regional differences, but no evidence of gross misallocations or of one region being favored over another.

Figure 5.6 a & b: Distribution of newly constructed schools across regions (2009/10) and existing schools (top panel) and people living within 2 km of a school (bottom panel)





Source: Ministry of education, statistical yearbooks. Authors' calculations.

5.17 Education is not about facilities but about learning; teachers are indispensable for this outcome. Unlike the number and allocation of schools across the country, the school system faces serious challenges with the total number of teachers and their distribution across the country. The total number of teachers is low as evidenced by the student – teacher ratio for the country in 2010/11 (Table 5.2): 60 to 1 (45 to 1 is generally considered an upper bound of what is acceptable). The average hides significant variation, which becomes already clear when

considering the regional level. The student – teacher ratio varies from as low as 35 to 1 in Kidal to as much as 73 to 1 in Bamako. These extremes are partly explained by population density as in Kidal there are relatively few students per grade - consequently student teacher ratios are low. In Bamako the reverse is the case.

5.18 Increasing the number of teachers –or for that matter increasing the number of classrooms as also the number of students per classroom is very high, seems to be a matter of policy priority even though it may be difficult to achieve in the short run, for both budgetary reasons and because sufficient trained teachers are simply not available. This raises an issue whether there might be other solutions –innovations if one likes, to this problem. Such innovations do exist: for instance, constrained by the number of classrooms and the number of available teachers, the authorities could consider the introduction of double shift system in which teachers teach two classes on the same day: one in the mornings and one in the afternoon. Needless to say, teachers would probably need to be paid extra in order to motivate them. Alternatively, if a double shift system is too demanding for the current teachers, the system could be introduced while hiring additional teachers (from neighboring countries?). Other innovations need to be considered as well. In a context of hard budgetary constraints and major challenges, the choice is between innovation and the non-delivery of the service.

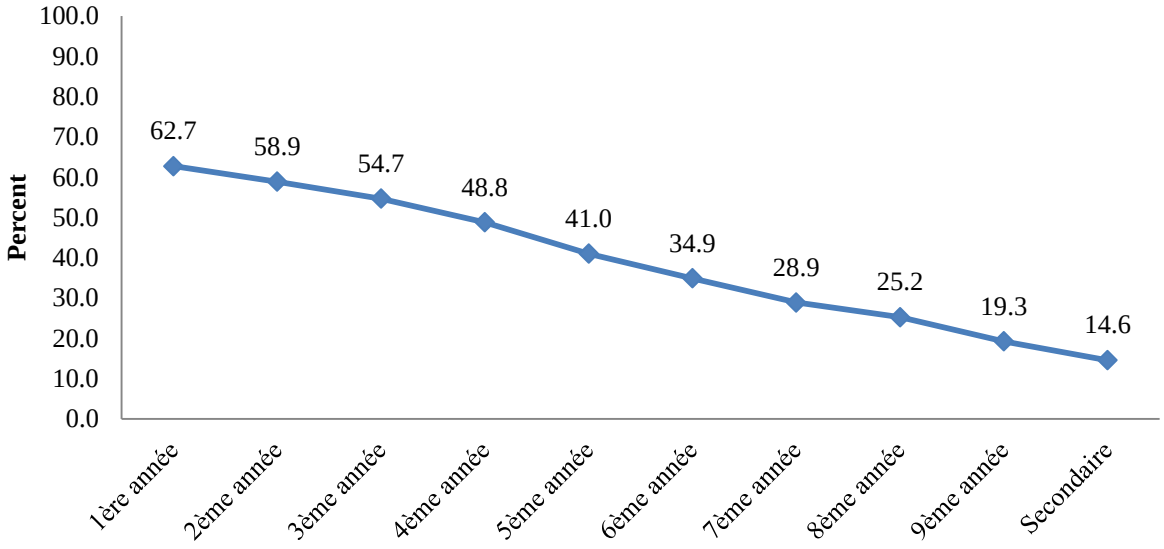
5.19 Associated to the presence of sufficient teachers is the need to ensure quality. A huge challenge lies here. Education experts consider any child who does not complete at least grade 5 a loss, which means that the child is considered not to have learned enough to contribute significant economic value to society during the rest of the child's life. Hence, it is important that those children that enter the education system complete at least five years of education. This is often not the case. Figure 3.6 shows that 63 percent of all children complete at least grade 1 (suggesting that 37 percent do not go to school at all) and that of these only 59 percent complete grade 2. By the time one arrives at grade 5 only 41 out of every 100 children have managed to complete this level. In other words, compared to a situation in which the 63 percent who attend the first year of primary school were retained, 44 percent[48] of all spending on children in grades one to five can be considered a use of resources with little (economic) return on investment.

5.20 We conclude that progress has been made in enhancing access in the education sector. With over 10,000 villages and approximately 5,000 schools, it is clear that choices have to be made and that not every village can be served by a primary school and when they do get a primary school it may be a one classroom school, or a school with multigrade teaching.

5.21 We also find that the education system is relatively balanced with respect to the distribution of schools across regions. There are areas in which new schools need to be placed to ensure access, but overall the evidence does not give reason to believe that one region is structurally favored over another or that the placement of schools is seriously skewed.

[48] Calculated as (34.9/62.7)-1.

Figure 5.7: Percent of children passing from one grade to the next in 2013



Source: EMOP, 2013 passage 1. Authors' calculations.

5.22 Education is much more than schools alone. Enrollment rates in primary and secondary schools remain low and they vary considerably by region. If the difference between actual enrollment rate and the fraction of people living within 2km or 5km of a school is taken as indicator of the scope to increase enrollment, then there is significant scope for improvement, particularly Mopti and Tombouctou.

5.23 The real challenge is how to improve the quality of education: there are too many students per teacher and too many students drop out of school before they have the opportunity to even gain the most basic skills. This is not only a human tragedy, it is a very poor investment on the side of the Government. Innovations are urgently needed: to make better use of the existing teachers and facilities, but also to convince some hard to reach populations and poor households to send their children to school.

Table 5.2: Summary Data for Primary and Secondary Schools

Primary	2007/8 Schools	Class rooms	Classes taught	Teachers	Students	Students per teacher	2008/9 Schools	Class rooms	Classes taught	Teachers	Students	Students per teacher
Bamako	277	1589	1790	1697	129657	76	286	1691	1864	1775	133755	75
Gao	287	888	1481	1049	61745	59	325	1129	1636	1164	63792	55
Kayes	681	2781	3505	2774	164309	59	702	2900	3633	2934	168920	58
Kidal	36	131	178	140	4994	36	37	152	192	152	5134	34
Koulikoro	675	2996	3952	2981	196705	66	708	3160	4101	3194	206157	65
Mopti	626	1815	2940	2294	135874	59	679	2319	3219	2518	141887	56
Ségou	432	2082	2494	2230	146593	66	464	2293	2671	2428	156499	64
Sikasso	656	2805	3868	3134	212646	68	728	3284	4224	3585	233068	65
Tombouctou	251	896	1260	891	48818	55	259	900	1340	950	51497	54
Mali	3921	15983	21468	17190	1101341	64	4188	17828	22880	18700	1160709	62
	2009/10						**2010/11**					
Bamako	293	1641	1875	1762	134080	76	306	1746	1916	1819	133628	73
Gao	352	1184	1767	1282	65686	51	373	1264	1941	1314	70391	54
Kayes	730	3081	3850	3100	176188	57	773	3222	4190	3266	183183	56
Kidal	36	142	192	150	5466	36	43	179	231	182	6332	35
Koulikoro	737	3342	4261	3295	213179	65	827	3661	4800	3708	232562	63
Mopti	748	2642	3483	2732	149410	55	794	2713	3703	2753	157399	57
Ségou	497	2435	2889	2593	166481	64	587	2863	3410	2970	181167	61
Sikasso	797	3575	4632	3904	249559	64	965	4146	5447	4501	269968	60
Tombouctou	292	967	1485	1054	54669	52	322	989	1653	1107	60219	54
Mali	4482	19009	24434	19872	1214718	61	4990	20783	27291	21620	1294849	60

Secondary	2007/8						2008/9					
	Schools	Class rooms	Classes taught	Teachers	Students	Students per teacher	Schools	Class rooms	Classes taught	Teachers	Students	Students per teacher
Bamako	161	763	903	1577	68499	43	168	887	927	1562	69467	44
Gao	55	123	185	296	8432	28	58	188	195	297	9733	33
Kayes	192	544	605	894	37876	42	220	695	712	1008	45468	45
Kidal	4	13	16	42	641	15	5	19	19	43	716	17
Koulikoro	241	772	891	1455	70220	48	263	906	952	1588	76887	48
Mopti	130	252	454	744	32807	44	147	479	502	689	34294	50
Ségou	148	580	622	1035	54783	53	171	678	710	1109	62350	56
Sikasso	241	719	877	1462	70500	48	265	934	979	1654	76540	46
Tombouctou	40	141	155	268	7979	30	42	156	159	257	8684	34
Mali	1212	3907	4708	7773	351737	45	1339	4942	5155	8207	384139	47
	2009/10						**2010/11**					
Bamako	174	933	960	1626	73364	45	189	925	989	1536	80395	52
Gao	65	197	205	375	11094	30	70	217	226	382	12218	32
Kayes	247	788	802	1213	50990	42	262	852	862	1286	54512	42
Kidal	5	19	19	49	847	17	5	19	19	86	981	11
Koulikoro	295	982	1042	1716	81304	47	336	1119	1178	2165	87617	40
Mopti	169	576	586	865	40832	47	200	653	666	1030	43538	42
Ségou	184	727	742	1316	70079	53	201	813	838	1339	80140	60
Sikasso	290	1000	1052	1860	84862	46	334	1147	1201	1961	95424	49
Tombouctou	48	187	187	337	9266	27	53	201	203	379	9758	26
Mali	1477	5409	5595	9357	422638	45	1650	5946	6182	10164	464583	46

Source: Ministry of Education, various statistical yearbooks.

Table 5.3: Percent of population living within a certain distance from a school

	<= 1km	<= 2 km	<= 3 km	<= 4 km	<= 5km	<=10km	<=20km
Kayes	83%	87%	90%	92%	94%	99%	100%
Koulikoro	86%	90%	93%	95%	97%	99%	100%
Sikasso	88%	91%	93%	96%	98%	100%	100%
Segou	78%	84%	91%	95%	97%	99%	100%
Mopti	64%	71%	77%	83%	87%	98%	100%
Tombouctou	66%	68%	74%	80%	83%	91%	100%
Gao	81%	88%	91%	96%	97%	100%	100%
Kidal	65%	70%	70%	92%	92%	92%	97%
Bamako	100%	100%	100%	100%	100%	100%	100%

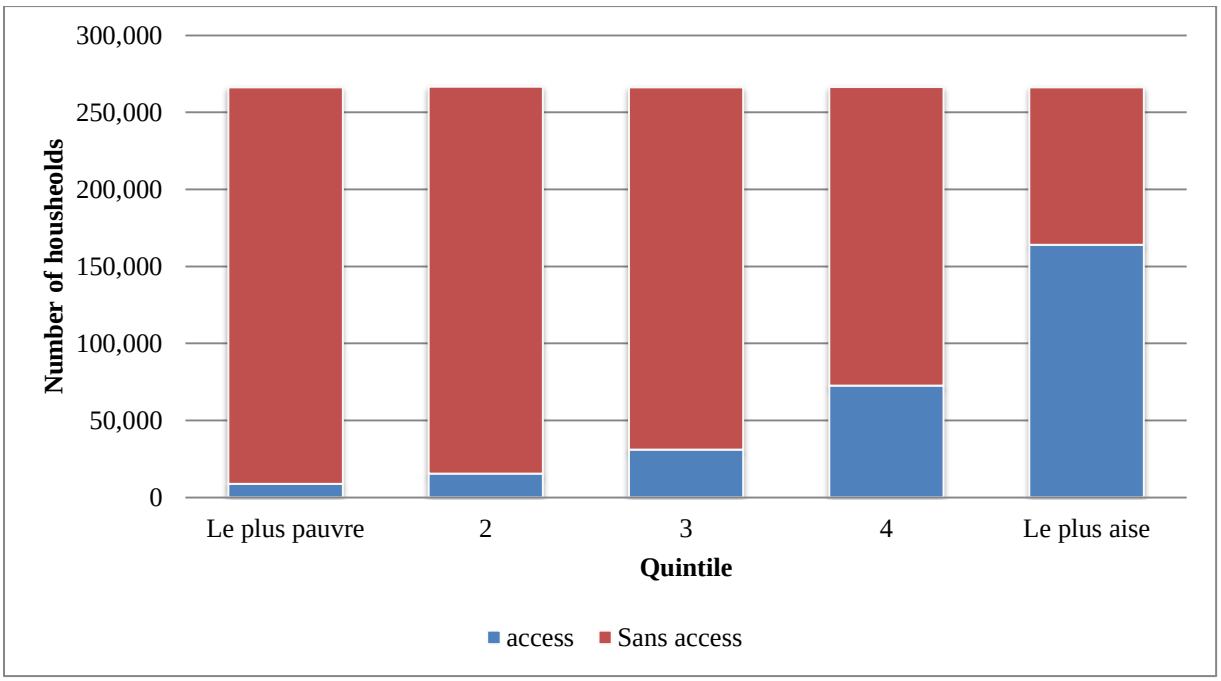
Source: RGPH 2009. Authors' calculations.

D. ELECTRICITY

5.24 More than education, access to electricity is complicated by the large investments in generating capacity and a distribution network that it requires. It is unsurprising that access to electricity is unequal and that access is closely associated to areas with high population density. As Table 2.4 already demonstrated, only 1 percent of households in villages have access to electricity, 8 percent in rural towns, 17 percent in towns and about 45 percent of the population in cities. Access to electricity is highest in Bamako where 68 percent of households have access.

5.25 The ability to use electricity remains a crucial dimension of growth and poverty reduction. It is encouraging that between 2001 and 2010 access to electricity increased from about 9 percent nationwide to around 24 percent.[49] Urban and rural areas have both seen their access increase. In urban areas, access has more than doubled from 28 percent in 2001 to 60 percent in 2010. In rural areas it started from a much lower base and access quadrupled (from 2.4 to 11.0 percent). The increase in rural areas remains strongly associated to rural towns; access in Mali's 10,000 villages remains negligible.

Figure 5.8: Number of households with access to electricity, by consumption quintile



Source: ELIM 2010. Authors' calculations.

5.26 The upward trend in access to electricity benefited households in the lower wealth quintiles more than the richer ones but at 3 percent the poorest households still have much less access to electricity than better off households: 62 percent of households in the top wealth quintile have electricity (see Figure 5.8).

5.27 Given the limited access to electricity it is no surprise that the vast majority of formal enterprises is located in Bamako, and if not in Bamako, then in one of the regional capitals.

[49] According to the EMOP 2011 access has increased to 34 percent. Relative to the access reported for 2009/10 based on the ELIM this increase seems very large. In this section we further use the ELIM.

Outside these localities electricity is not available. Even where electricity is available for productive purposes, it is unreliable. Power surges harm equipment and in certain months demand exceeds supply (by as much as 13 percent, February being the worst month) and electricity is rationed through load shedding.

5.28 The challenges facing the electricity sector are threefold. First demand exceeds supply, necessitating load shedding, which in turn has a negative impact on productivity. For future growth it is critical that electricity is not a constraint, hence additional investments in generating capacity are needed. A second problem is that the electricity sector is heavily subsidized. In 2014 alone, a subsidy of FCFA 30 billion has been budgeted to go to EDM. Even with this subsidy, EDM is expected to make a loss of more than FCFA 5 billion (Government of Mali, 2014). The third problem is that electricity is not available in rural areas, delaying growth and the reduction of poverty precisely in areas where most progress is needed.

5.29 The electricity sector focuses most of its attention to solving the first problem and largely ignores the second and third. But could the (urban) electricity sector not be made financially sustainable without the need for subsidization, and is equitable access to electricity indeed impossible?

5.30 To start with the last question: it depends. If the objective is for all households to access electricity that can be used for productive purposes, and to run heavy equipment like air conditioners, then inequitable access is likely to persist for a long time as the entire nation would have to be hooked up to a network. But if the ambition is formulated in a more realistic way and the objective is for all households to have access to electricity for basic appliances such as lighting, running a radio or charging a mobile phone, then it may be feasible. The reason being that to fulfill this ambition limited investments in generating power and a network have to be made to connect small town while solar powered devices could be offered as an alternative to the majority of the population who resides in rural areas.

5.31 What about subsidies. Could they be abolished? Doing so requires raising the electricity tariff (and reducing the efficiency losses) to a level where financial losses are no longer incurred. Doing so would help reduce the existing capacity problem as private electricity providers may now want to consider producing and selling electricity to the network (as is the case already in rural areas).

5.32 **A**bolishing the subsidy and increasing the electricity tariff could have negative consequences for enterprises (who face higher costs) and could lead to increases in (urban) poverty. The impact on enterprises can be expected to be limited as for most spending on electricity does not make up a large share of their cost: load shedding and power surges are typically much more costly. The impact on urban poverty has been shown to be limited, because the share of spending on electricity is limited, because incomes in urban areas are amongst the highest in the country and because the poorest households have limited access to electricity in any case. A paper prepared by the World Bank (2013) demonstrates how the effect of a 6.5 percent tariff increase on poverty would be extremely marginal: an increase in poverty incidence by less than 0.1 percent.[50]

[50] World Bank 2013. The Effect of Electricity Tariff Increases on Poverty and Welfare Distribution in Mali.

5.33 **Raising electricity tariffs might be politically unpalatable, unless a trade-off is proposed that is acceptable: like giving access to electricity to the majority of the population. The subsidy of** FCFA 30 – 35 billion envisaged for 2014 is sufficient to provide up to 1 million solar units, which could be used for lighting, listening to the radio or charging a mobile phone. One million units would be sufficient to light up rural Mali. Access to a unit could be made conditional on school enrollment, or on visiting a clinic during pregnancy, thus achieving multiple objectives at the same time while solving the problem of what to use as distribution channel. Access to the units would reduce the dependency on kerosene for lighting, would create new economic opportunities as people can work in the evening, would allow children to study at night (and do chores after school?), and could even help establish a new sector of enterprises serving the solar market.

5.34 In conclusion, there are huge challenges associated to providing access to electricity, which are associated to the high fixed cost of generating and distribution capacity. This section acknowledges these challenges and accepts that the provision of networked electricity will largely be limited to high density, urban areas. At the same time, it is argued that if the objective is to reduce poverty, existing ways of doing business may have to be reviewed and innovative and affordable approaches embraced.

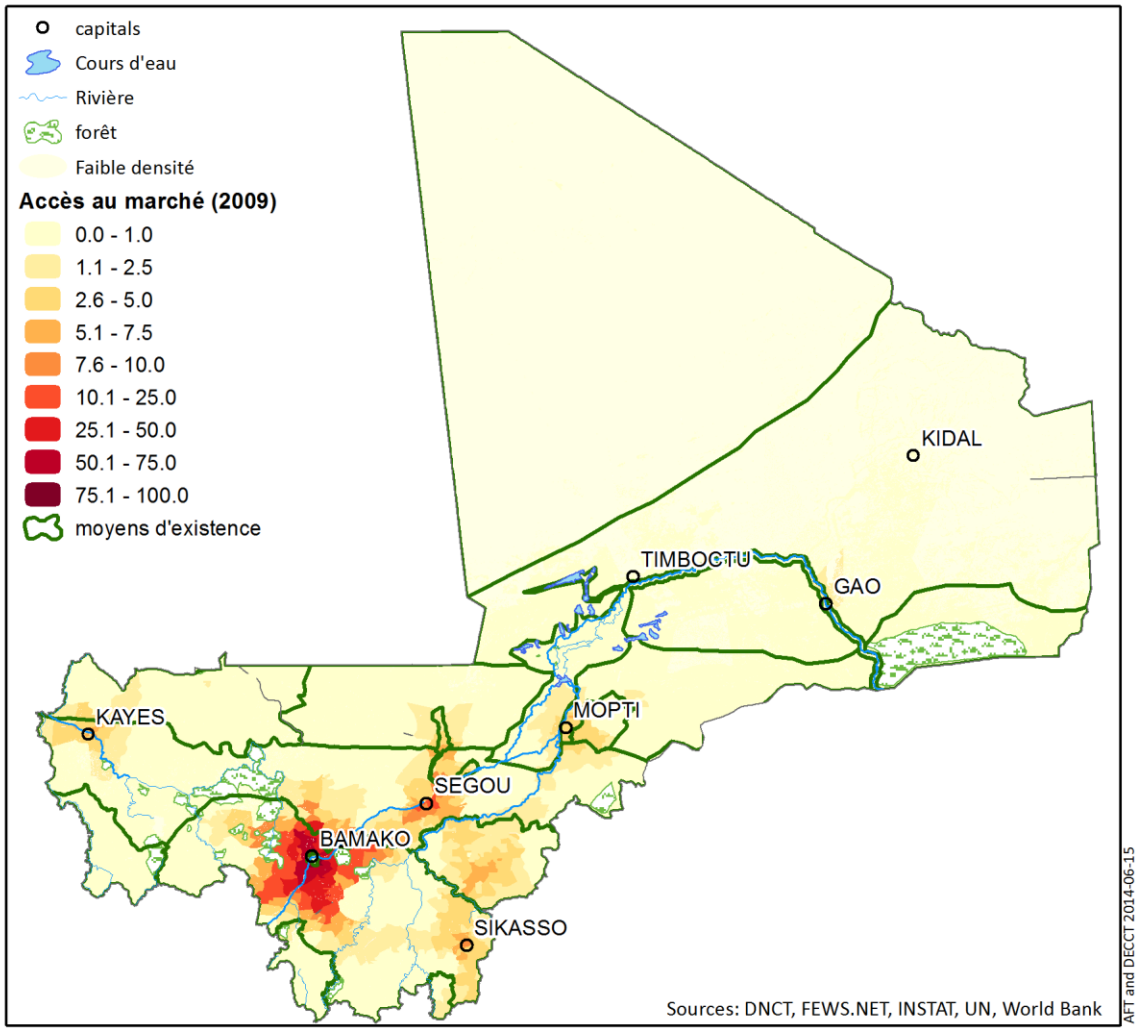
E. ACCESS TO MARKETS AND ROADS

5.35 Limited market access affects households in multiple ways. In chapter two we argued that that the high cost of inter-city transport and communication contributes to a lack of specialization between cities. Poor and non-poor households benefit from roads through the access they provide to services in areas such as health, education, agricultural extension, and provision of information. Improved access to markets also means improved economic opportunities. In rural areas it means opportunities to sell produce from the harvest or livestock and to purchase food and other consumer goods.

5.36 For people living in rural areas poor market access implies that prices obtained for agricultural produce are relatively low, while prices for products that are purchased are relatively high, which not only makes the cost of inputs higher, but also raises the prices of consumer goods bought with the money earned. High transport cost thus leads to poor 'terms of trade' for rural households and contributes to a decrease in the return to labor, which discourages the use of modern inputs and the production of a surplus and makes it rational for households to opt for subsistence agriculture. A recent study on Sub-Saharan Africa has shown that production areas that are nine hours away from the market realize only 8 percent of their agricultural potential, while those located four hours away from the market realize 46 percent of their potential.51 Hence, to enhance the agricultural production and rapidly reduce poverty, it is imperative that the distance between markets and households is reduced.

[51] Clesensio Tizikara and Loro George Leju Lugor, MAFCRD Post Conflict Development of Agriculture in South Sudan, perspective on approaches to capacity strengthening. Juba 2012.

Figure 5.9: Access to Markets



Source: RGPH 2009. Authors' calculations.

5.37 In order to explore which localities in the country have good market access, a market accessibility indicator was estimated following a methodology described by Deichmann (1997)[52] and Nelson (2008).[53] The approach estimates travel time from assumptions of speed on the road network based on road category (primary, secondary and tertiary) and then identifies the accessibility index as the sum of the population of urban/village centers in the vicinity of each point in the country, weighted inversely by the time of travel on the transportation network to each urban center along the road network. The index presented on a map in Figure 5.9, was calculated with the negative exponential potential model[54] with village level population from the

[52] Deichmann, U. (1997). Accessibility indicators in GIS. United Nations Statistics Division.

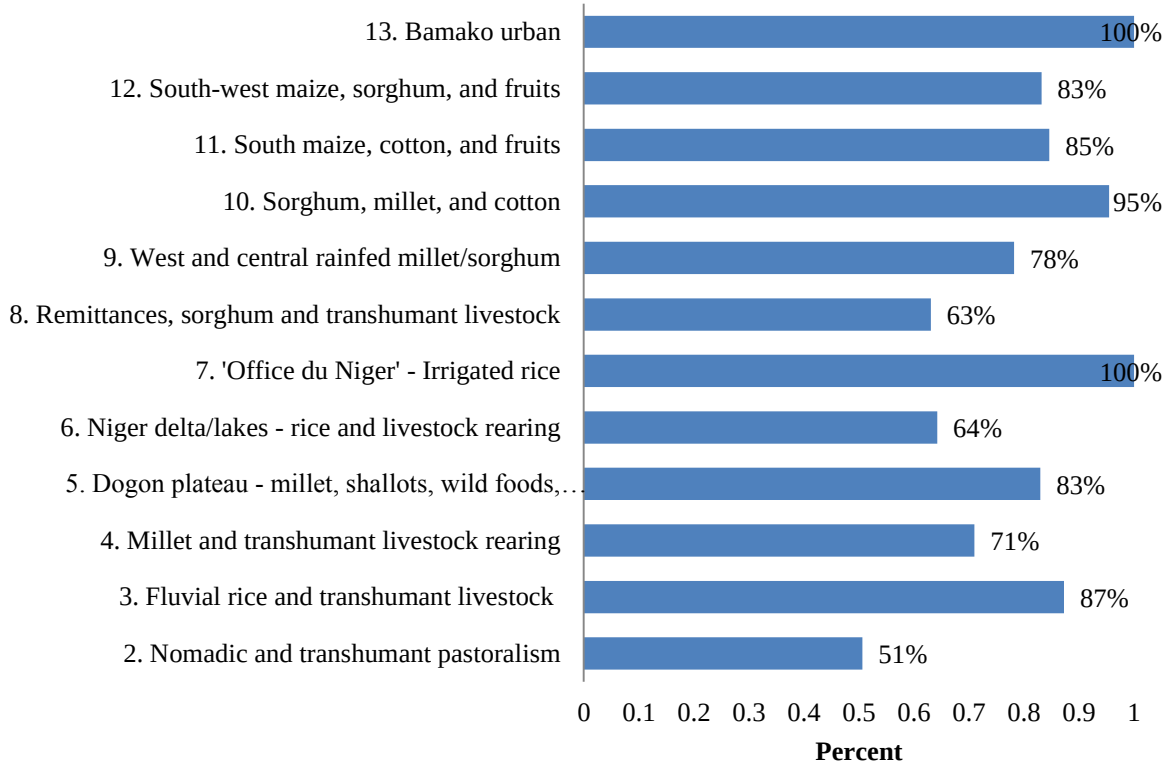
[53] Nelson, A. (2008). Travel time to major cities: A global map of Accessibility. Global Environment Monitoring Unit - Joint Research Centre of the European Commission, Ispra Italy. Available at http://gem.jrc.ec.europa.eu/

[54] The market accessibility index is calculated with the negative exponential potential model. The following parameters are in the accessibility model: cost-distance threshold = 3 hours, cost/distance decay exponent for the negative exponential model of 1.5; and cost/distance to the point of inflection of the distance decay function at 90;

2009 census, with populations ranging from a few persons to approximately 130.000 (a sub-division of Bamako) measured at 10.000 locations.

5.38 The index shows how market accessibility is uneven: it is reasonably good in the high agricultural potential areas of Southern Mali (zones 11 and 12) and the triangle made up by Bamako, Sikasso and Mopti (zones 9 and 10), but poor in other areas. Even zones with high agricultural potential like around the Niger where fluvial rice is grown (zone 3) or the Niger delta (zone 6) that stretches from south of Mopti all the way to Tombouctou have limited market access. Also in zone 8 in Northwest Kayes is access to markets poor –despite the fact that population density in this area is relatively high.

Figure 5.10: Percent of population living within 10 km of a market, by livelihood zone.



Source: RGPH 2009. Authors' calculations.

5.39 The uneven access to markets across livelihood zones can be illustrated by the percent of the population living within 10 km of a market. It is 100 percent for people living in Bamako and in the area covered by the Office du Niger, but only 51 percent in zone 2 in northern Mali where nomadic and transhumant pastoralism are the dominant way of life.

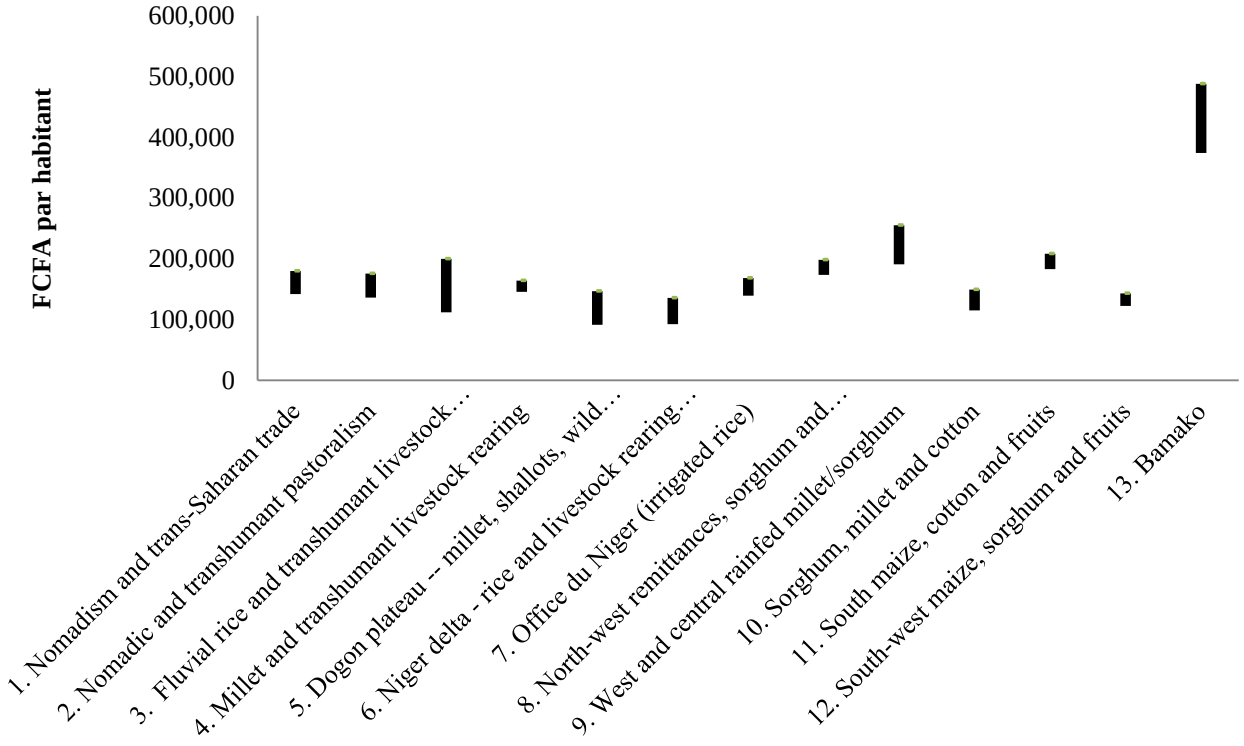
and input weights transformation – in scale a square root transformation on the input weights: 2 and choose the exponent to compute square roots: 0.5. Nodes from the transportation network are linked to the accessibility index. Then, the points are interpolated to a grid at 1km using IDW with 10 nearest neighbors with a power factor of 2. Finally, the mean market accessibility is summarized by the commune level administrative unit while accounting for the distance from the road network.

5.40 One of the aspects market access affects is the ability of households to smooth their consumption throughout the year. Since many households (and particularly poor households) do not produce sufficient food to last them till the next harvest, the ability to buy food and to have the means to do so is intricately related to market access. In zones with limited market access, one expects that households are less able to smooth their consumption.

5.41 To explore this Figure 5.11 presents minimum and maximum levels of per capita consumption for 2011 for each livelihood zone. The Figure is compiled using consumption data collected in each of the four quarterly waves of the EMOP. To enhance comparability we only use data for households that participated in each of the four waves of the survey.

5.42 The Figure demonstrates high levels of variation for some zones. The largest difference between highest and lowest quarterly per capita consumption is found for Bamako. This is a bit of a surprise, given the fact that in Bamako market access is good. However the lower bound of Bamako is still much higher than the higher bound in any of the other livelihood zones. It underscores the much higher levels of consumption in Bamako. We suspect that the differences in consumption are less a reflection of an inability to smooth in Bamako and more a reflection of seasonal spending on religious festivities or on school fees.

Figure 5.11: Minimum and maximum levels of quarterly per capita consumption, 2011.



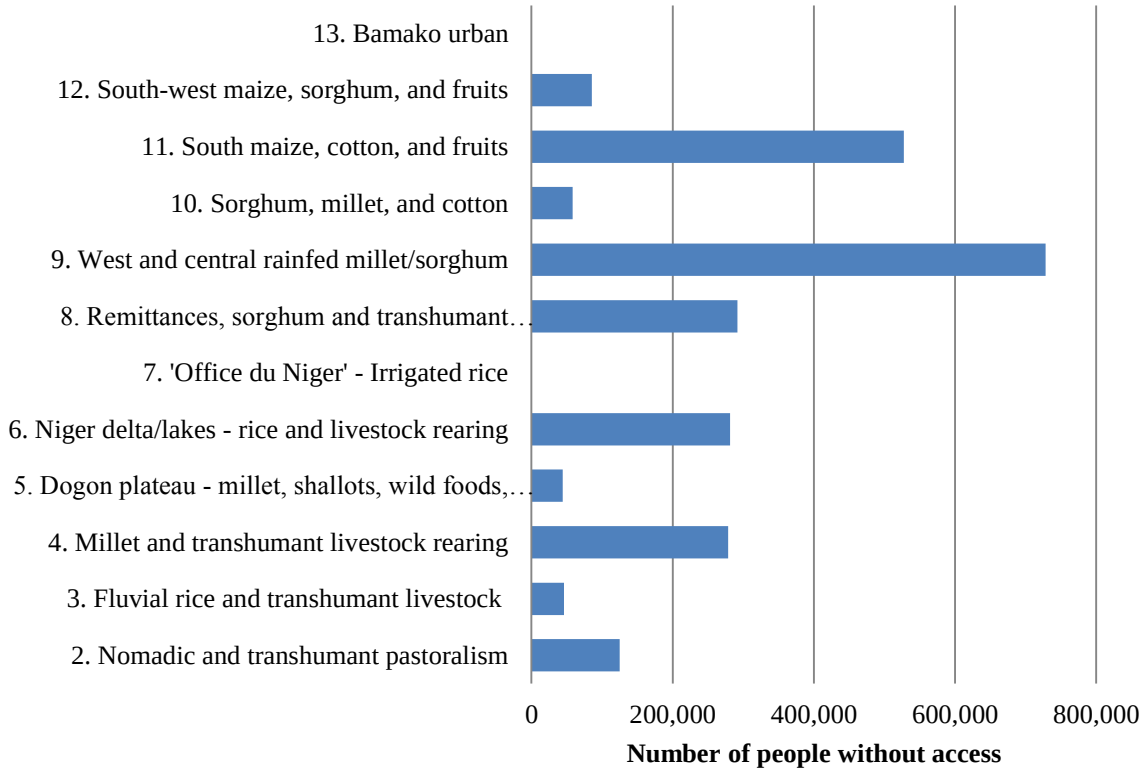
Source: EMOP 2011. Authors' calculations.

5.43 For the rural livelihood zones, the differences in quarterly averages in zones 3 (fluvial rice on the borders of the Niger), 5 (Dogon Plateau) and 6 (Niger delta) are of concern because these zones combine low average levels of consumption with significant variation in it. It comes as no surprise that these zones coincide with region where levels of acute malnutrition are

highest (Tombouctou, Figure 3.20). In zones 4 (millet and transhumant livestock rearing), 11 and 12 (South and South West) the variation in quarterly consumption is low, suggesting that household are able to smooth their consumption throughout the year. We thus find a close association between market access and food (in) security.

5.44 Much as the incidence of access to markets is informative and the association between lack of access and acute malnutrition of concern, decisions about fixed investments such as roads not only have to be informed by need but also by the number of people that are reached and their economic potential. To assess this, we repeat Figure 5.9 but now show the number of households within each livelihood zone that do not live within 10km of a road. This is presented in Figure 5.12, which suggests that despite relatively high access incidence rates of respectively 78 percent and 85 percent, additional infrastructure in zones 9 and 11 could connect more than 1.2 million people to markets. In combination with the relatively high agro-ecological potential of these zones, it suggests an investment strategy that considers these two zones, but also the Niger delta where not only the average access rate is poor, but the agro-ecological potential high and the number of people that can be reached substantial.

Figure 5.12: Number of people per zone, living further than 10km from a market



Source: RGPH 2009. Authors' calculations.

5.45 Accessibility is more than new road construction alone. Limited road maintenance renders many roads unusable especially during the rainy season: rural roads, the pistes améliorées, are in a poor state: only 5 percent are in a good condition and as many as 47 percent are listed as being in a poor condition (Table 5.4).

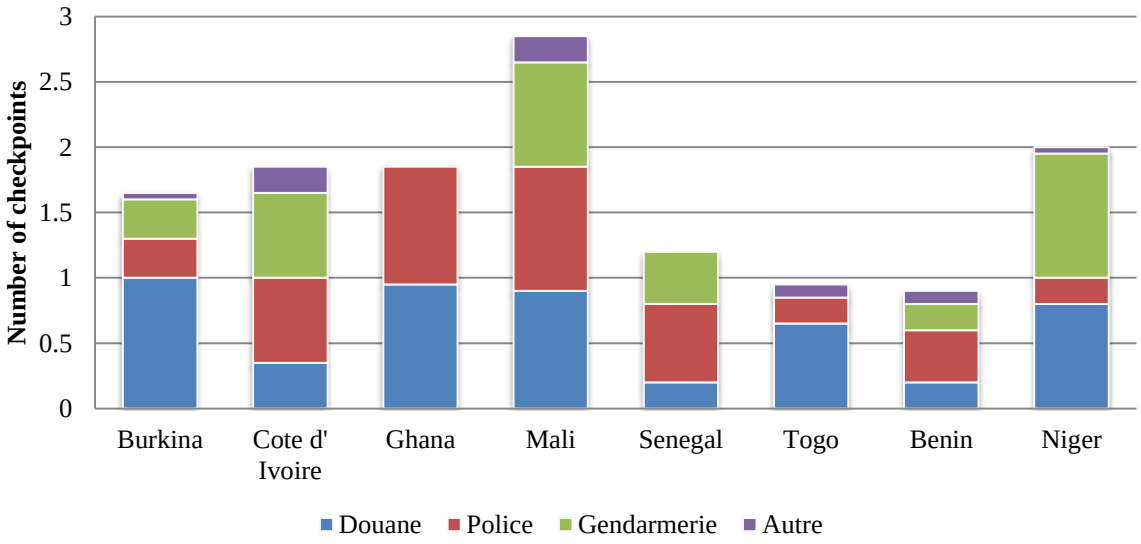
Table 5.4: Road type and state of maintenance

Road type	Length	Good state		Acceptable		Poor state	
		Km	%	Km	%	Km	%
Routes bitumées	5 694	3 164	55.6	1 292	22.7	1 238	21.7
Routes en terre moderne	1 767	894	50.6	739	41.8	134	7.6
Pistes améliorées	14 220	669	4.7	6 900	48.5	6 651	46.8
TOTAL	**21 681**	**4 727**	**21.8**	**8 931**	**41.2**	**8 023**	**37.0**

Source: Ministry of Transport, 2010.

5.46 Improved feeder and rural roads would enhance competiveness for local producers, but only if they are connected to good trunk roads. Good connectivity to neighboring countries is important to avoid the risk that increased agricultural production cannot find a market. Yet, as Figure 5.10 has shown, no major roads exist to Niger and Burkina Faso as well as to Dakar. And where they do exist, delays are many. In fact, Mali is the worst performer in the UEMOA as regards the number of checkpoints per every 100 km.

Figure 5.13: Number of checkpoints per 100 km (1st quarter of 2013)



Source: UEMOA: Observatoire des pratiques anormales.

5.47 We conclude with the obvious: Mali's road network is insufficient. The fraction of households living more than 10 km from a market is high, and in certain regions even extremely high. The inability to access a market is found to be closely associated with high levels of consumption variability and even acute malnutrition. Improved accessibility requires an improved road network: feeder and rural roads need to be constructed, and equally important, maintained. Additional trunk roads need to be constructed, and existing roads maintained to improve connectivity within the country and to develop areas of high potential (such as the Niger

delta) to major markets. International connectivity (Bamako-Dakar, Bamako-Niger and Bamako-Burkina Faso) also needs to be improved. Connections to other countries in the Sahel need to improve particularly to support a poverty reduction strategy poised towards an increased production of food crops. Without access to international markets a strategy that has brought impressive results in the years 2000 may not be sustained, particularly when the domestic demand for these crops become saturated.

F. DISCUSSION

5.48 High (fixed and other) costs and limited budgets create difficult choices for the provision of public services. Trade-offs have to be made between giving as many as possible access (i.e. offering the service where the cost per beneficiary is lowest) and ensuring that everybody has the same opportunity to access a service (comparable access rates across space irrespective of the cost of provision). This chapter noted how, in reality, the discussion is more complex than this simple dichotomy. Quality matters as do complementary measures such as an adequate road maintenance budget and policies to prevent unnecessary checkpoints.

5.49 The chapter illustrated how secondary schools could only be provided in a cost-efficient manner in a limited fraction of all communities, which is unacceptable from an equity perspective. Yet additional budget is unlikely to solve the problem, as the education system would become prohibitively expensive, implying cuts in spending in other, equally important sectors. So there is much pressure to deliver existing services to more people at lower cost.

5.50 The issue of high unit cost limiting the degree to which services can be provided exists across the globe, but is particularly pressing in a low population density environment like in Mali where the fixed cost of service provision can only be shared between relatively few beneficiaries. Finding solutions to the challenge of high unit costs is, therefore, critical.

5.51 There are various ways to deal with these challenges. One is efficiency. Wastage is never acceptable and it is critical that the public sector is vigilant about the unit cost at which various services are provided in different locations.55 Good planning is essential to avoiding wastage: constructing roads in the absence of means to maintain them amounts to waste that could easily be avoided; high drop-out rates in primary school is equally wasteful.

5.52 Another way to address the "how to provide services in a cost-effective manner in a low density environment challenge" is by embracing migration. In chapter two it was suggested that pull factors –particularly better access to services and economic opportunities are amongst the reasons for migration. Temporary labor migration as well as permanent migration are already common, and moving people to the service rather than the service to the people deserves to be embraced as a cost-effective way of dealing with low-density problems. Policies need to facilitate internal migration by reducing its cost and increasing the probability of success. Secondary schools or hospitals could offer boarding facilities. Pastoralists may be asked to travel with their animals to veterinary services; businesses can be facilitated to move to towns where electricity is can be offered. Improved education would increase the success rate of migration as unskilled migrants are found to be least likely to succeed.

[55] It is beyond the scope of this document to do so, but it is clear that the analysis that was prepared about the distribution of primary and secondary schools could be complemented with an analysis of the unit cost of investment.

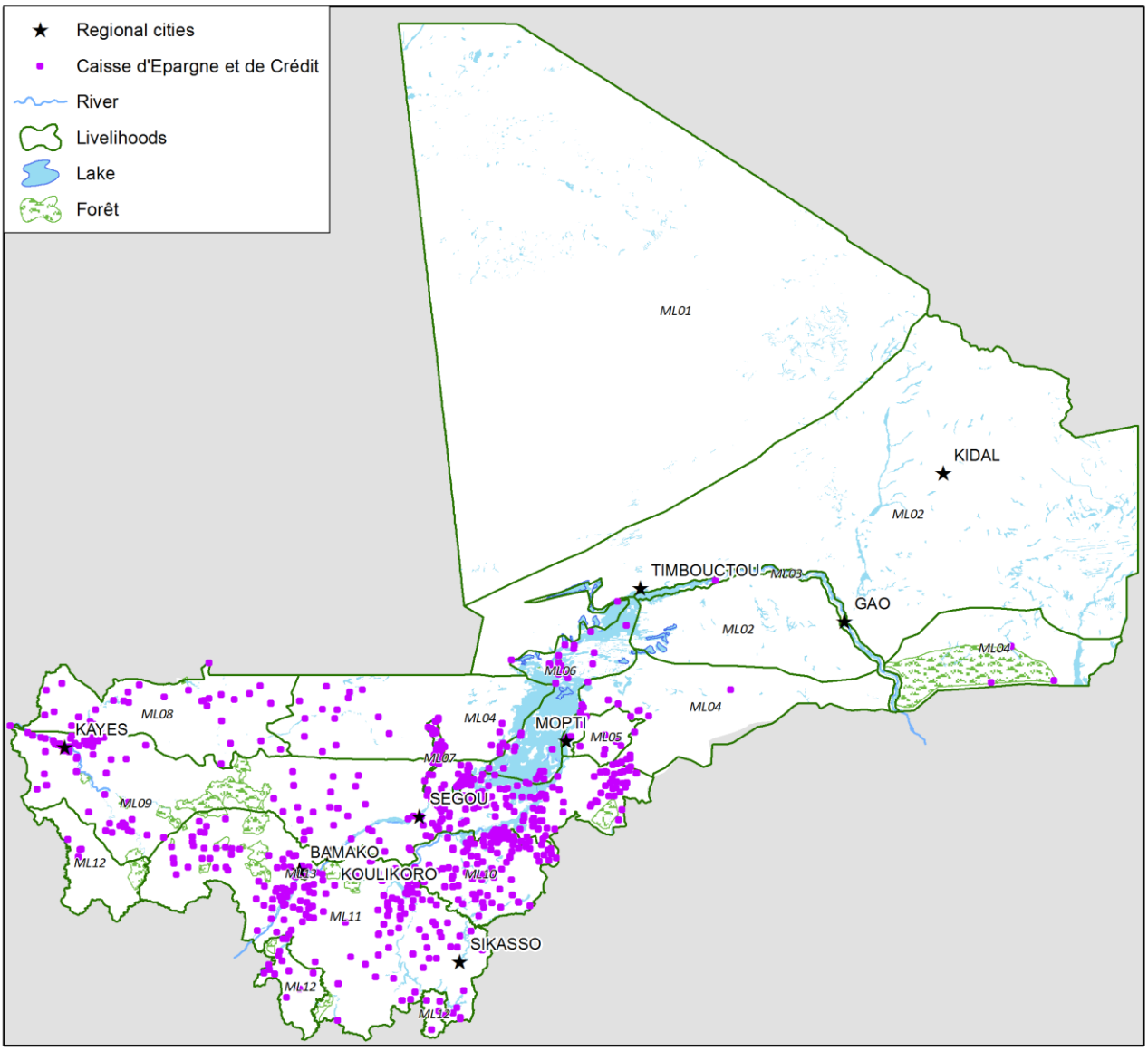
5.53 A third way to reduce the unit cost of service delivery is by embracing innovation. The challenge posed by low population density is so pressing that reducing the cost of service provision through innovation deserves to be embraced as a core objective of public policy. There are many ways to do so, some of which are already implemented as a matter of routine. Wells and dirt roads are constructed in areas where population density is low; piped water and tarmacked roads are available in cities where population density is high. Other approaches are un-tried: in low density areas students of different grades could share classrooms and teachers; secondary school teachers could be required to teach multiple subjects; veterinary and vaccination services could be offered in an integrated manner.

5.54 With the advent of new technologies, new opportunities to reduce the unit cost of service provision abound. Mobile phone technology allows offering a plethora of services from voice calls to internet access to mobile money transfers and banking and can do so without the need to invest in an expensive cable network. The implications of this for poor households living in isolated areas are far-reaching. Compare for instance the limited availability of financial services as presently offered by savings banks (Figure 5.14) with what would be feasible if mobile money transfers, mobile savings and even full fletched banking services were available as they are in Kenya, Uganda or Tanzania.

5.55 The options are not limited to mobile phone technology. In the chapter we discussed how advances in solar technology makes it affordable to offer lighting and cell phone charging services to all. Cheap tablet computers offer new –cheaper and faster- opportunities for data collection; cheap motor bikes allow households to deal with poor rural roads and have made the market for transport services more competitive.

5.56 Government can nurture innovations. In some cases (motor bikes for instance) Government needs to do very little as the market is already taking care of it. In other instances (mobile telephony) Government will need to provide the appropriate regulatory framework to ensure that competition is increased such that the benefits of mobile telephony become available to many. Vigilance is needed to avoid policies which go contrary to the objective of access for all. The mandatory registration of SIM cards which is being considered is an illustration of a policy that – if implemented, would yield little in benefits, but which would make it much harder for those who need the service most, people living isolated in low density areas, to benefit from mobile phone services.

Figure 5.14: Location of savings banks



Source: RGPH 2009. Authors' calculations

Chapter 6. Poverty Reduction and Growth in the Face of Spatial Challenges

A. INTRODUCTION

6.1 One importance of physical distance to the world's markets was illustrated by the night-time lights map presented in the introduction. In this chapter we explore the connection between poverty reduction and growth and conclude that Mali is well poised to rapidly reduce poverty, provided growth is accelerated. The required growth acceleration falls within the realm of the feasible. The chapter then considers how, in the face of spatial constraints, such an acceleration might be brought about.

B. POVERTY REDUCTION REQUIRES ACCELERATED GROWTH

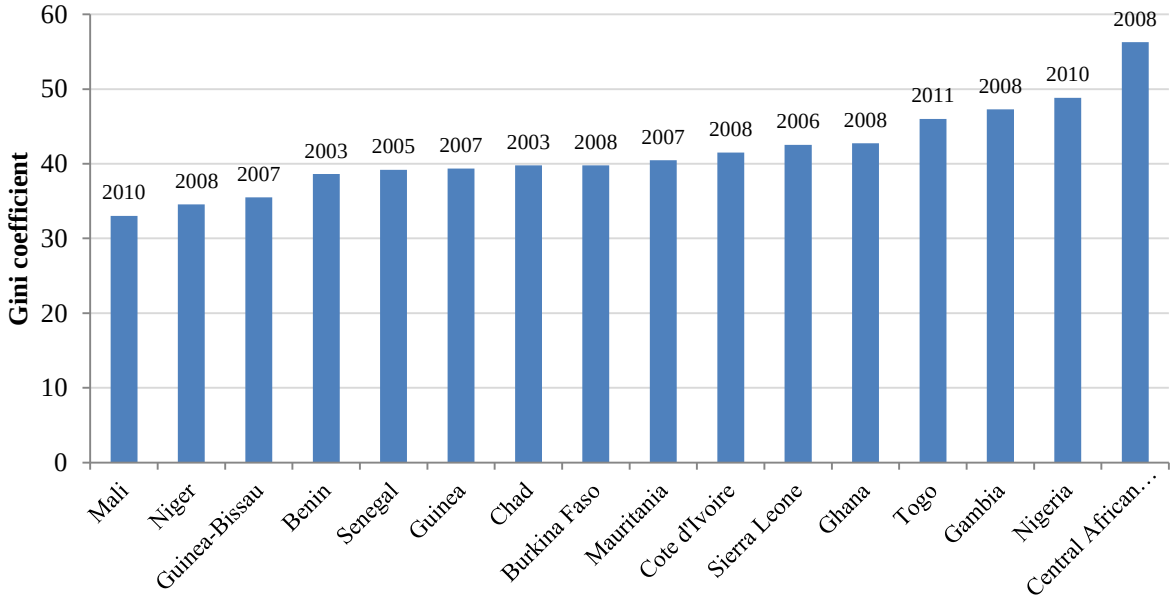
6.2 At an average rate of 1.5 percent per capita since 2000, growth has been lackluster. The main reason why poverty declined between 2001 and 2010 is because of the decline in inequality[56] as a consequence of the fact that consumption of the poorest segments of the population increased, while consumption of the wealthiest declined. As a consequence of this redistribution the Gini coefficient for Mali dropped from 0.40 in 2001 to around 0.33 in 2010.

6.3 Looking to the future it is relevant to know what the rate of growth would have to be to half poverty by, say, 2030. This is an ambitious objective as it implies that poverty would reduce to around 20 percent, but it is significantly less ambitious than the World Bank's objective of 3 percent poverty by 2030.

6.4 To prepare poverty projections, assumptions have to be made about future changes in inequality, the relation between GDP growth and consumption growth and the rate of population increase. With respect to inequality we make the simplifying assumption that inequality will not change. In other words, it is hypothesized that the shape of the consumption distribution will remain unchanged implying that poverty reduction will not come from changes in inequality but from consumption growth which benefits all households equally. The reason to assume this –in spite of the fact that in the recent past inequality reduction was the main driver of poverty reduction is that, while future decreases in inequality cannot be ruled out, already the level of inequality in Mali is the lowest in the region (Figure 6.1). Further decreases in inequality can be expected to be increasingly difficult to realize.

[56] A decomposition of the change in poverty between 2001 and 2010 shows that of the decline of 9.8 percentage points, 1 percentage point can be attributed to growth and 8 to a change in inequality. The remainder is attributable to the interaction between both effects.

Figure 6.1: Gini coefficients for selected countries in West Africa



* The year in which the data was collected is indicated above the bar

Source: World Development Indicators 2013.

6.5 The second assumption we make is that consumption growth tracks GDP growth: when household incomes rise, their consumption rises proportionally.

6.6 We also need to make assumptions about the rate of population increase. Table 6.1 presents data for the last four population censuses obtained from INSTAT (RGPH) and the World Bank (WDI). Both data sources demonstrate how the rate of population growth is increasing. Was the inter-census growth about 1.6-1.7 percent between 1976 and 1987 it increased to a rate of between 3.1 percent and 3.6 percent between 1998 and 2009. The rate of population increase is accelerating! It is beyond the scope of this study to look deeper into the causes and consequences of this but it goes without saying that it deserves further study and attention.[57]

6.7 For our purposes we assume that till 2030 the rate of population increase stabilizes at 3.6 percent. With this it is possible to calculate the rate of GDP growth that is needed to achieve our poverty objective. To reduce poverty by half by 2030, the GDP growth rate has to be 5.9 percent annum (starting 2014); to achieve 10 percent poverty, the growth rate has to be 7.2 percent per annum. To eradicate extreme poverty the growth rate has to be 9.1 percent per annum.

[57] On the impact of various demographic scenarios on economic growth, education and health sectors, as well as the "fiscal gains" associated with a slowdown in economic growth, see the note on Fertility Decline and Socioeconomic Development in Mali, published as chapter 2 in the Mali: Poverty and Gender Notes (World Bank 2013).

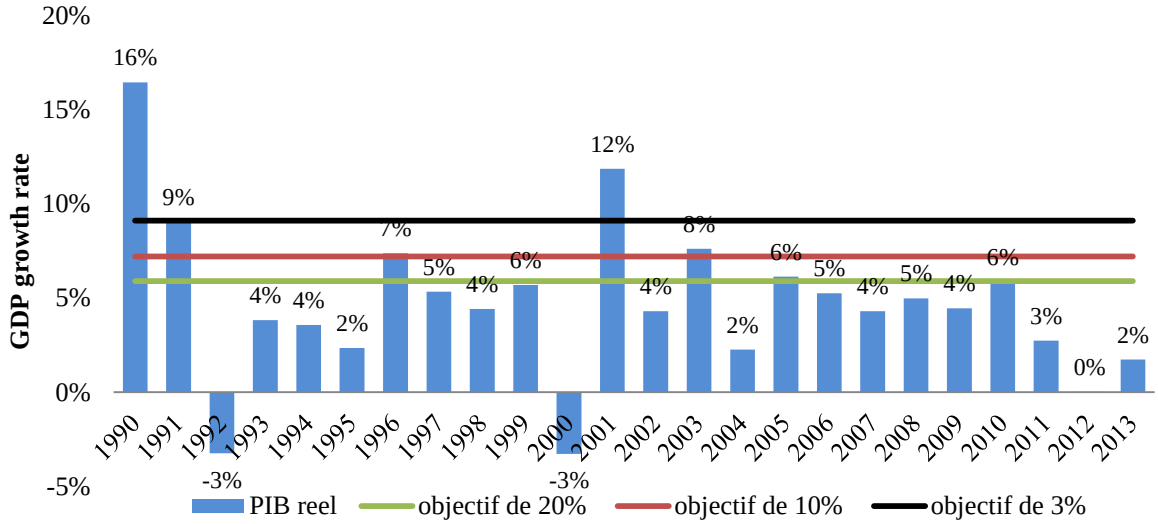
Table 6.1: Population estimates for census years

Census year	Population to WDI	Population according to RGPH	Growth rate according to WDI	Growth rate according to RGPH
1976	6,293,218	6,394,918		
1987	7,613,990	7,632,337	1.7%	1.6%
1998	9,712,365	9,810,911	2.2%	2.3%
2009	13,559,296	14,528,662	3.1%	3.6%

Source: World Development Indicators and Census Data.

6.8 These growth rates, even those needed to achieve the most ambitious objective of reducing poverty to around 3 percent, are not impossible. Mali's low degree of inequality implies that even though the incidence of poverty is high today, the average distance to the poverty line is not too far and can be bridged through rates of growth that are not out of the ordinary.

Figure 6.2: GDP growth rates and growth rates needed to achieve various poverty targets by 2030



Source: Staff calculation using ELIM 2010 and IMF.

6.9 Less encouraging is that ever since 1990 the required rates of growth have only been attained occasionally (Figure 6.2). To achieve the poverty targets for 2030, growth rates are needed that are consistently high. This has not been the case. The average annual growth rate between 1990 and 2013 was 4.0 percent; between 2000 and 2013 it was 4.7 percent and between 2010 and 2013 1.4 percent (equivalent to a negative per capita growth of 2.4 percent). Even if the crisis years 2012 and 2013 are excluded and we focus on the period during which consistently positive growth was recorded (2001-2011) growth was less (5.2 percent) than what is needed to achieve even the least ambitious of our poverty targets.[58]

[58] The consumption growth rate as calculated from the household surveys was 5.8 percent suggesting that the assumption of consumption and GDP growth rates being on par with each other may have been on too conservative. However, as incomes of the poorest households grew fastest during this period, and poor households tend to save less (consume more) a more than proportional increase in consumption can be expected. In our simulation we assume distribution neutral growth, so this effect does not occur.

6.10 One implication is that growth acceleration is needed. Doing so will require a serious policy effort. Before saying more about what would be needed to accelerate growth, another implication is equally important: it is critical that the low rates of inequality are maintained either by ensuring that growth remains broadly shared, or through redistributive measures. Particularly when more is being earned from natural resources, redistribution measures may have to be considered.

6.11 As an aside, poverty can also be reduced through transfers. These can be in kind (skill training) or in cash offered by a social safety net. Social safety nets can be used as short term instruments to help the poor cope with economic shocks, but also as medium/long-term poverty alleviation programs, supporting minimum consumption levels and promoting the accumulation of human and physical capital. When cash transfers are provided over multiple periods to poor households, it is typically first used it to pay off debts and later to accumulate productive assets or to buy inputs (fertilizer). [59] This enhances productive capacity and resilience such that eventually they no longer require support. Experience shows that these objectives are more effectively achieved when safety net support is combined with investments in livelihoods.[60] Adaptive social protection is one of the tools to be used. It enables beneficiaries to invest in productive assets, stimulates use of basic social services and reduces sensitivity to future shocks

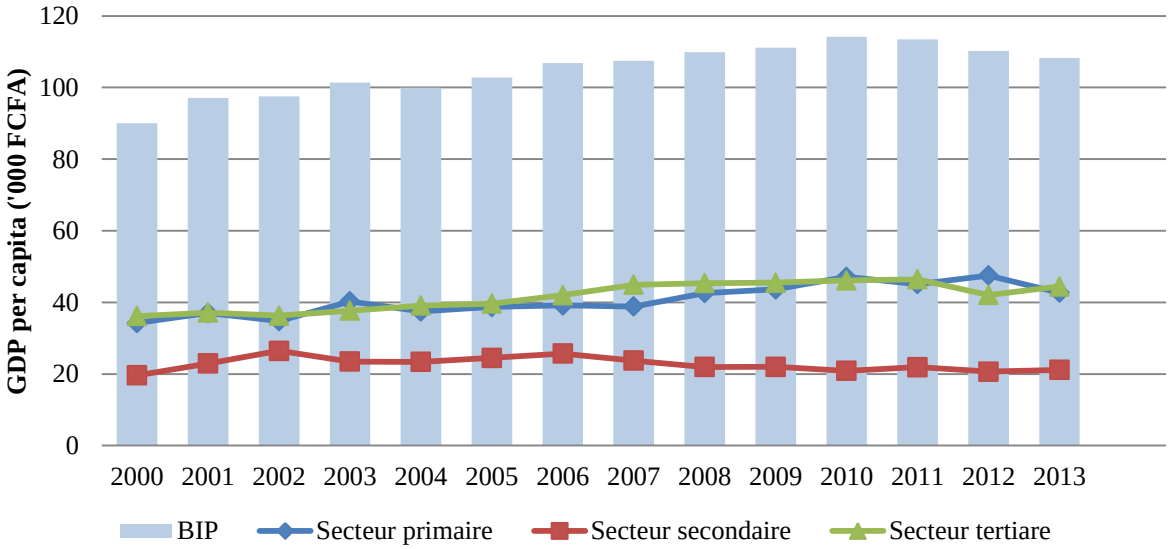
6.12 The combination on income growth with transfers has the potential to reduce poverty rapidly in Mali. Expanding the simulations presented above by including a (perfectly targeted) transfer equivalent of 2 percent of GDP shows that is feasible to reduce poverty to 3 percent by 2030 as long as the consumption growth amongst the poorest households is 2 percent per capita.

C. GROWTH BETWEEN 2000 AND 2013

6.13 Between 2000 and 2010, GDP per capita grew steadily, before much of the gains were lost as a result of the combined effects of poor rains and the crisis in the north. By 2013, GDP per capita was at the same level as it was in 2007-8 (Table 7.1). GDP growth has been driven by the primary and tertiary sectors, largely gold, cotton, cereals and aid while the secondary sector stagnated. Growth in the primary sector was driven by agriculture and within agriculture by food crops (57 percent of total agricultural production) and rice (28 percent of total agricultural GDP). Industrial crops, and cotton only play a limited role within the agricultural sector (both contribute 8 percent to agricultural GDP). Within the primary sector, livestock rearing is important but the sector has not grown much since 2010. It makes up about a quarter of primary sector GDP.

[59] See for instance for evidence from Niger: Quentin Stoeffler and Bradford Mills (2014): Households' investments in durable and productive assets in Niger: quasi-experimental evidences from a cash transfer project.
[60] Even so, for some households, depending on the context, this process can take a long time.

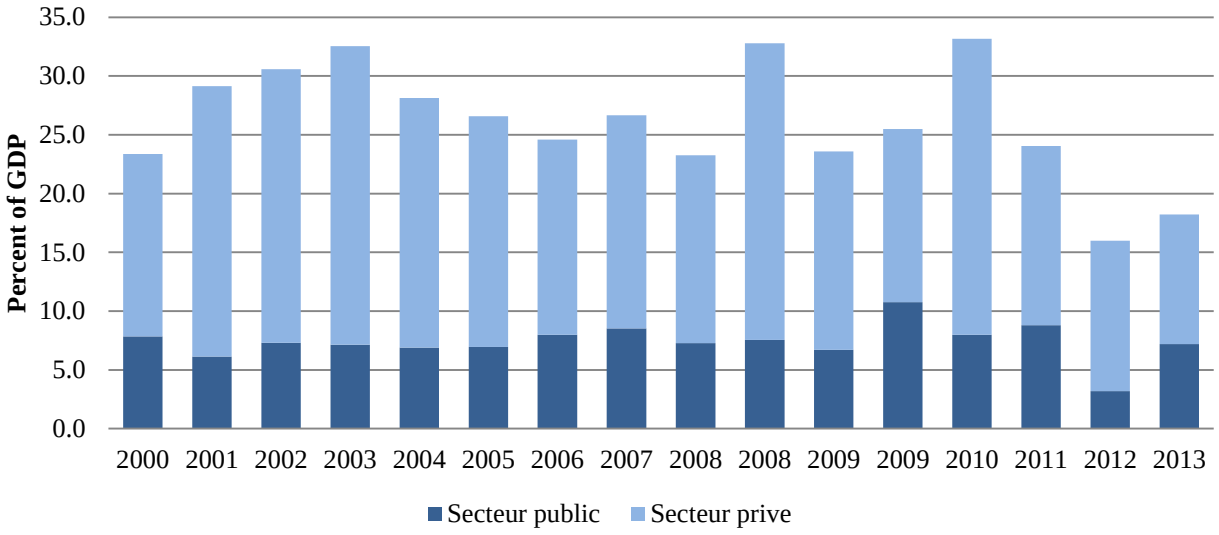
Figure 6.3: GDP per capita (columns) and its decomposition by sector



Source: calculated from IMF 2014.

6.14 In the tertiary sector growth was driven by trade, transport and telecom and fuelled in part by large private investments in the mining sector which led to large increases in the volume of trade (total imports quadrupled between 2001 and 2013 from CFAF 600 billion to over CFAF 2,500 billion). The high level of investments by the private sector is matched by significant public sector investments which comprised a significant part of the budget. Of concern are the large fluctuations in public investment spending – which hamper efficient planning and execution, and the fact that the level of public investments declined significantly during the crisis (Figure 6.4).

Figure 6.4: Public and private investments as a percent of GDP



Source: IMF 2014.

6.15 The lack of growth in the secondary sector was flagged in chapter two when it was found that despite rapid urbanization Bamako is not a driver of growth. Possibly with the exception of New Zealand there are no countries that have reached middle income status without going through a phase of industrialization. Particularly as the scope for increased mineral production or for increased aid (another important driver of consumption and investment) is limited –at least as long as the north remains insecure, and as domestic demand is limited, growth will need to come from factors that combine Mali's comparative advantages in the primary sector, with industrial processing and exports.

Table 6.2: GDP per capita in 1987 prices (in "000" FCFA)

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Primary sector	**34.2**	**37.0**	**34.8**	**40.3**	**37.5**	**38.7**	**39.1**	**38.9**	**42.6**	**43.6**	**47.1**	**45.1**	**47.5**	**42.7**
Agriculture	**18.2**	**21.0**	**18.8**	**24.2**	**21.0**	**22.4**	**22.7**	**22.2**	**25.8**	**26.6**	**29.9**	**27.7**	**30.6**	**25.7**
Food crops, excluding rice	11.4	11.4	11.5	14.7	12.6	13.6	14.5	14.9	16.5	16.9	18.7	17.8	20.4	14.7
Rice	4.2	5.1	3.8	5.0	4.2	4.6	4.7	4.7	6.7	6.9	8.3	6.1	6.5	7.2
Industrial crops, excluding cotton	1.0	0.9	0.9	1.0	0.8	1.3	1.3	1.3	1.6	1.6	1.7	1.7	1.7	1.7
Cotton	1.6	3.5	2.6	3.6	3.3	3.0	2.2	1.3	1.0	1.2	1.2	2.1	2.1	2.0
Livestock	10.6	10.6	10.6	10.7	11.1	11.0	11.1	11.2	11.3	11.4	11.5	11.6	11.3	11.4
Fishing and Forestry	5.5	5.5	5.4	5.4	5.4	5.4	5.4	5.5	5.5	5.6	5.7	5.8	5.6	5.7
Fishing	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Forestry	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.5	4.5	4.6	4.7	4.7	4.6	4.7
Secondary sector	19.6	22.9	26.5	23.5	23.4	24.5	25.7	23.7	21.9	22.0	20.9	21.9	20.6	21.1
Mining	5.5	9.9	11.8	9.3	7.6	8.8	10.1	8.9	8.1	8.0	6.6	6.4	6.8	6.7
Industry	8.2	6.9	8.3	7.6	8.7	8.5	8.3	7.1	5.9	5.7	5.6	6.5	6.6	6.7
Agrobusiness	2.8	2.6	3.1	2.8	3.3	3.2	3.1	3.0	2.3	2.4	2.5	2.8	2.3	2.6
Textile	3.6	2.3	2.7	2.5	2.9	2.8	2.8	2.1	1.4	1.4	1.4	1.8	2.4	2.3
Handicrafts (other manufact., incl. cotton)	1.8	2.0	2.4	2.2	2.6	2.5	2.5	1.9	2.2	1.9	1.7	1.9	1.8	1.9
Energy	1.6	1.7	1.9	2.1	2.2	2.4	2.5	2.7	2.9	3.1	3.3	3.4	3.2	3.5
Construction & public works	4.3	4.4	4.5	4.6	4.8	4.8	4.8	5.0	5.1	5.2	5.4	5.5	4.0	4.3
Tertiary sector	36.2	37.1	36.3	37.7	39.1	39.6	42.0	44.9	45.3	45.5	46.1	46.4	42.0	44.4
Transport and telecom	5.2	5.2	4.9	5.3	5.9	6.6	7.4	8.6	9.2	9.1	9.3	9.4	9.2	9.7
Trade	13.5	14.5	13.9	14.7	15.1	14.8	16.4	17.8	18.0	18.2	18.6	18.8	18.4	19.3
Other non financial services	7.6	7.4	7.4	7.5	7.9	7.6	7.7	8.0	7.8	8.0	8.1	8.0	5.0	5.6
Financial services	0.9	0.8	0.8	0.8	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.8	0.8
Public administration	9.7	9.7	9.8	9.9	10.0	10.4	10.3	10.1	10.0	9.8	9.8	9.9	9.2	9.5
Production imputed to banking services	-0.6	-0.6	-0.6	-0.6	-0.6	-0.6	-0.6	-0.5	-0.5	-0.5	-0.5	-0.6	-0.5	-0.5
GDP (at factor cost)	90.0	97.1	97.5	101.4	99.9	102.8	106.8	107.5	109.9	111.1	114.1	113.5	110.2	108.3
Import taxes and domestic VAT	6.3	7.6	8.4	9.2	9.7	10.0	8.2	8.7	8.3	8.5	8.6	8.8	8.4	8.8
GDP (at market prices)	96.3	104.7	106.0	110.6	109.7	112.8	115.0	116.2	118.2	119.6	122.7	122.3	118.6	117.1

Source: IMF 2014. Staff calculations.

D. SPATIALLY CONSCIOUS STRATEGIES FOR ACCELERATING GROWTH

6.16 When it comes to designing a strategy to accelerate growth, Mali's landlocked status and the large distances to the nearest ports (Table 7.3) need to be taken into account.

Table 6.3: Distance and time it takes to reach the main ports serving Mali

Destination	Origin	Distance	Time
Dakar	Bamako	1,400	13
	Gao	2,650	17
	Kidal	2,950	18
Abidjan	Bamako	1,150	19
	Gao	2,050	22
	Kidal	2,400	23

Source: CLRT, 2009.

6.17 Broadly speaking two growth enhancing approaches can be envisaged: (i) a strategy that takes the high transport cost as a natural advantage; and (ii) an export strategy for products in which Mali has a comparative advantage or for products of high value

6.18 The first strategy revolves around products in which Mali has a comparative advantage has de facto been followed. Mali's exports are largely made up of gold and cotton, sectors in which the country has a comparative advantage and which have potential for future growth. In the early 2000s the value of cotton production was at least 50 percent higher than it is today, and Mali has considerable unexploited mining potential, including in the north of the country (see Figure 6.7)

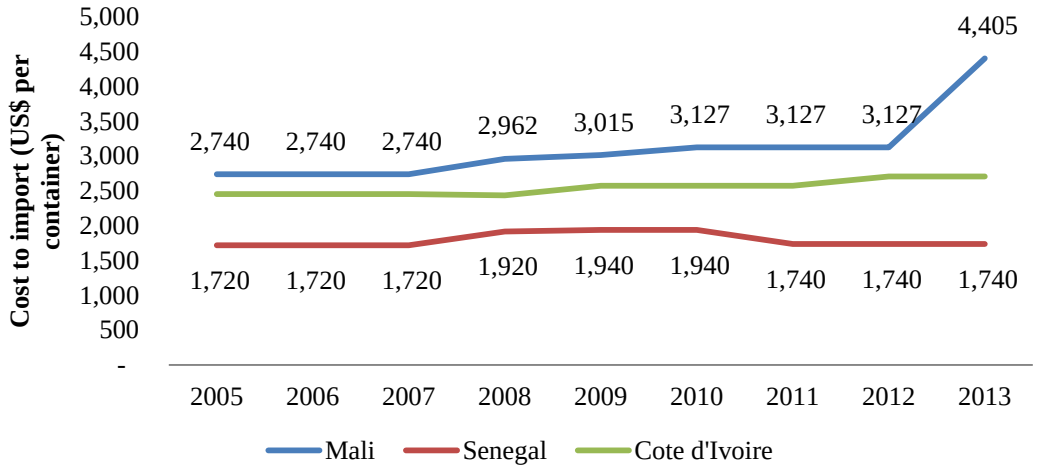
6.19 The manufacturing sector of Mali is dominated by industries that have a local comparative advantage: the production of electricity is the largest manufacturing sector in Mali, followed by cotton ginning. Together these two make up 40 percent of total sales of the industrial sector. Other major industries are fertilizer production and other chemicals (20 percent of total sales), transformation of steel (10 percent of sales) and beverages (5 percent of sales). The scope for rapid increases in these sectors (except for cotton ginning) is limited as the scope for exports to the region is marginal so that growth is premised on increases in domestic demand.

6.20 An import substitution strategy per se which in addition to the existing high transport costs, creates additional barriers to trade is unlikely to accelerate growth in a sustainable manner. Protection of industries and sectors has been found to have an initial positive effect on domestic employment, as it offers a captive market to local firms, but tends to run very quickly out of steam, as protectionism removes the incentives for productivity growth and innovation, gradually eroding a country's ability to meet the needs of its population. If such a strategy had been put in place earlier, it would have prevented (unexpected) improvements in welfare associated to the increased access to affordable means of transport (motorbikes), communication (cell phones) and other imported technologies (solar lights).

6.21 Mali could exploit other comparative advantages such as cereal production which could serve the country as well as the region. The Sahel is structurally food deficient and with its irrigation potential (much of which still needs to be developed) and closeness to the markets,

Mali is a well placed to serve other landlocked countries with maize, rice and other cereals. A strategy that focuses on increased maize, rice and other cereal production also has immediate benefits for Mali's food security, and as we have seen in Chapter 4 was one of the reasons behind the rapid reduction in poverty.

Figure 6.5: Cost to import a 20 foot container, 2005-2013



Source: World Bank, World Development Indicators 2013.

6.22 An agricultural growth strategy will only be viable in the long run if the country can to tap into the demand originating from the region. Even then, the regional market for cereals is tiny compared to the huge OECD market. For goods to reach this market they either need to be profitably shipped by airplane (Paris is only 5 hours away) implying that they need to be (i) of high value per unit of volume (cut flowers, dried mangos, horticultural products) or they need to be (ii) goods for which Mali experiences a large favorable productivity differential with the rest of the world like leather and leather products. Instead of physically transporting goods (iii) services could also be traded through IT technology. Bamako is the music capital of West Africa, and Mali's colorful crafts and leather work are appreciated across the globe. Migration and tourism (iv) present yet another approach to exporting services. One of the zones with the highest rate of consumption growth is in north Kayes (zone 8) in which international migration is a dominant (and successful) livelihood strategy.

6.23 This second approach which combines structural-transformation with exports will take a long gestation period, and requires a consistent, multi-faceted and active government involvement to facilitate coordination in the sector, to address information externalities and to reduce high levels of transaction costs. It can be done: Ethiopia, Kenya and Tanzania have successfully entered the cut flower industry, and Ethiopia has successfully developed its leather industry. However such a strategy requires considerable demands on Government capacity, and a long term vision, to be successful (see box 6.1).

Box 6.1: An active industrial policy helps Ethiopia's leather sector accelerate its growth

While many agree that the private sector is a driver of growth, there appears to have been little consensus on governments' ability to push the private sector to promoting growth and development; let alone on whether such interventions are necessary for industrial take-off. With the right polices, governments in poor countries can systematically improve the welfare of their society through technological catch up and industrial upgrading. Given

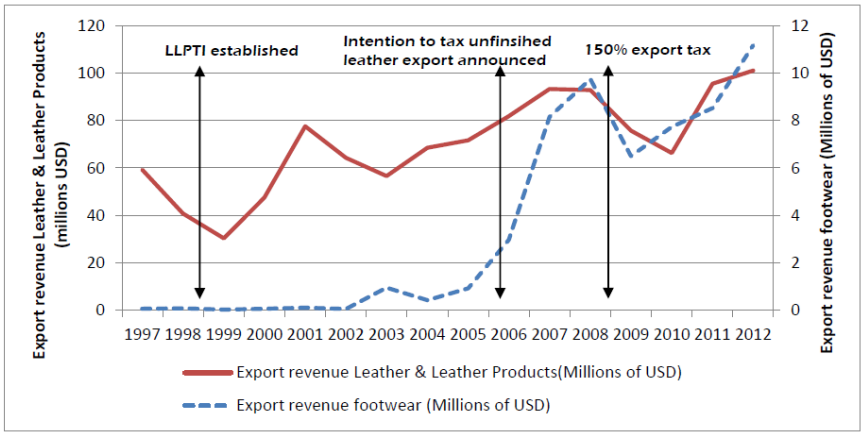
the ubiquity of market failures ranging from information externalities to high levels of transaction costs and co-ordination problems, government intervention in the allocation of productive resources is often unavoidable, but intervening successfully is demanding on government capacity and requires a long term vision.

The leather industry in Ethiopia can illustrate what an active industrial policy entails and what it can achieve. Like Mali Ethiopia is endowed with the resource base required for the commercial production of leather and leather products and like in Mali there is a history of leather processing in the country. Unlike Mali, Ethiopia also has a history of shoe manufacturing that dates back to the 1920s. Ethiopia's resources remained largely untapped due to a host of reasons ranging from poor hides and skins collection to limited technology knowhow at the leather processing phase.

The Ethiopian government employed multiple forms of industrial polices to reinvigorate the sector. In addition to non-discriminatory general incentives that are available to all investors, several interventions were aimed at upgrading the leather and leather products industry.

First the Ethiopian government helped organize six state-owned and two privately held companies to form the Ethiopian Tanners Association, as a first step to properly organize the markets for semi-processed leather and leather articles. The government also engaged in building the local production and marketing capacity through technology learning from abroad. To his end a local institute, LLPTI, was selected to facilitate technology diffusion and upgrade the skills of workers and managers in the industry and enterprises were encouraged enterprises to use foreign experts by subsidizing the costs involved in their employment. The leather and leather goods industry had preferential access to finance from the Development Bank of Ethiopia (DBE). The government also provided land and semi-constructed factories to large and medium sized tanneries and footwear producers at highly discounted lease rates. Finally, the government extensively used its tax and regulatory policies to encourage upgrading along the leather value chain. The export of raw hides and skins, for example, became banned to push local processing of leather. Similarly, the export of semi-finished leather products was subjected to a 150% export tax in 2008. In 2012, the same level of tax was imposed on the export of crust leather products. All these interventions had the combined effects of improving value addition, export and employment in the leather and leather products industry (Figure B5.1).

Figure B5.1: Export earnings in Ethiopia's leather and leather products industry



Despite Ethiopia's achievements there remains much room for improvements. Policies to improve facets of livestock management and hide and skin collection would greatly improve raw hides and skins supply and quality for the leather processing enterprises. Formal means of communication whereby all stakeholders are fairly represented would facilitate dialogue and facilitate finding solutions to issues impacting the industry and would help build greater trust among various stakeholders in the industry while enhancing the quality and ownership of regulations.

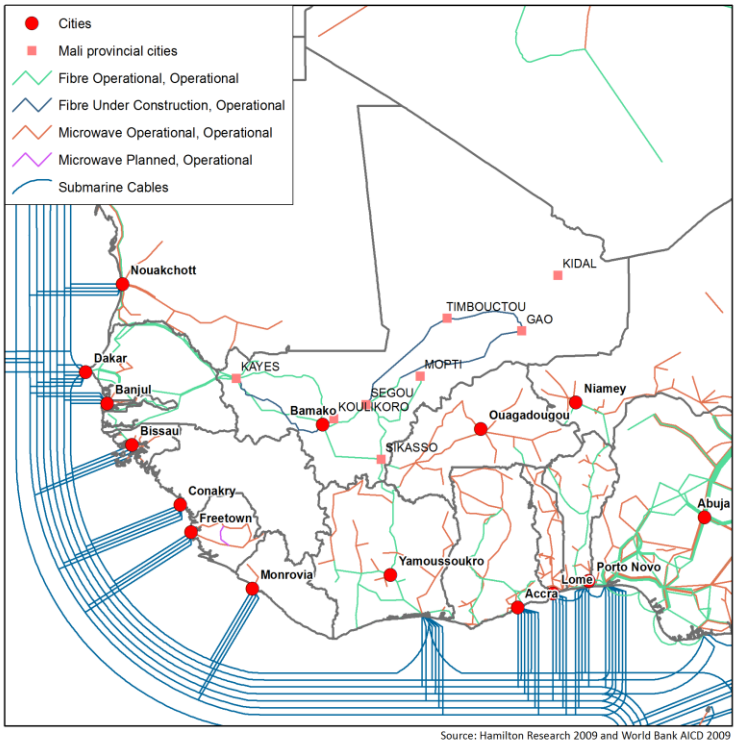
Source: Girum Abebe and Florian Schaefer (2013): High hopes and limited successes: experimenting with industrial policies in the leather industry in Ethiopia. Authors'compilation.

6.24 Realizing Mali's competitive potential requires addressing a number of cross-cutting constraints, many of which have been identified before. A first element is to address high transport and transit costs, both domestically, regionally and internationally. To stimulate trade to OECD countries, and it addition to efforts to reduce transport costs to the ports of Dakar and

Abidjan and to the Sahel it should be explored how Mali can become a regular (and cheap) destination for cargo planes, or alternatively, whether cargo and passenger transport can be combined efficiently.

6.25 Another cross cutting factor is the need to exploit the existing IT infrastructure. Mali has a fiber-optic network which links all major cities to the rest of the world, and most citizens live within reach of a mobile telephone network. In combination this could mean affordable internet access for (almost) all, but it requires that the right policies are put in place to stimulate innovation and competition. The present two internet service providers and two mobile telephone operators are insufficient to induce the competition needed to spur innovation and price reductions. International experience has shown that the mobile telephony market is most efficient and innovative when a dominant party who is able to innovate is challenged by 2 or 3 smaller and aggressive operators, suggesting that additional telecom and ISP licenses would have to be issued.

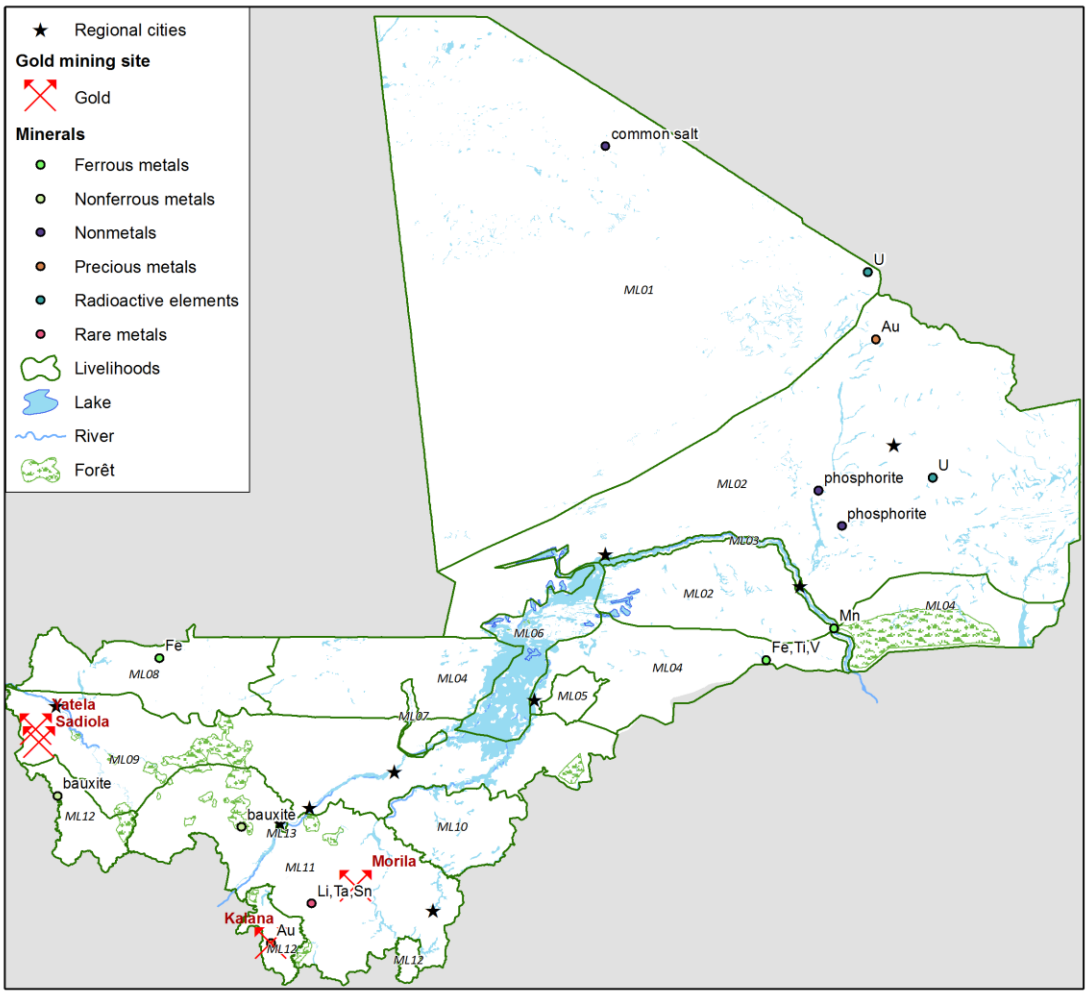
Figure 6.6: Internet Connectivity



6.26 A third cross cutting factor is the need to invest in human capital. This requires more than improving the quality of primary and secondary education, but also that the right skills are developed for international migrants to succeed or for entrepreneurs to benefit from the opportunities offered by access to internet and the mobile phone network.

6.27 A final and critical cross cutting factor is peace and stability in the north. The consequences of the continued crisis for economic growth are severe: resources which otherwise could be used for developmental purposes (whether from donors or the Government) are being re-allocated towards peace keeping efforts –viz. the decline in public investments. Meanwhile international investors can be expected to shy away as long as security concerns remain –viz. the increase in transport cost (Figure 6.5) and the decline in private investments. In the absence of stability throughout the country sectors with growth potential like mining and tourism will remain under-developed.

Figure 6.7: Map of Mineral Deposits



Mining sources: USGS and Wikipedia

Annex 1: Population characteristics by place type (1987)

	Village Population <5,000	Rural Town Pop ≥5,000 <30,000 density<250 people/km2	Town Pop ≥5,000 <30,000 density≥250 people/km2	City Population ≥30,000 density≥250 people/km2	Kayes	Sikasso	Ségou	Bamako
Number of places (agglomerations or villages)	11,365	124	60	11	1	1	1	1
Demographic characteristics								
Population size	513	3,739	6,849	30,385	58,720	69,840	88,714	757,051
Ages 0-14	41.4%	45.0%	44.6%	43.4%	40.3%	45.5%	42.2%	42.1%
Ages 15-64	47.9%	47.7%	51.0%	52.8%	54.9%	51.3%	54.2%	55.3%
Ages 65 and above	4.3%	4.1%	4.4%	3.7%	4.8%	3.2%	3.6%	2.7%
Origin of population								
Born in same region	89.3%	87.1%	83.4%	74.2%	85.0%	71.7%	76.5%	54.7%
Born in other region	9.4%	10.7%	13.7%	22.9%	11.8%	23.3%	20.4%	40.1%
Born in foreign country	1.3%	2.2%	2.8%	2.9%	3.2%	5.0%	3.0%	5.2%
Education of working-age population (ages 15-64)								
No school	95.6%	87.8%	81.4%	71.0%	61.9%	63.8%	60.8%	56.5%
Primary level ("primaire")	3.2%	7.2%	9.3%	13.7%	18.1%	15.2%	18.4%	17.8%
Secondary 1 level ("collège")	1.0%	3.6%	6.4%	10.4%	13.5%	13.4%	14.8%	13.8%
Secondary 2 level ("lycée")	0.2%	1.3%	2.5%	4.1%	5.5%	6.3%	4.5%	9.0%
Tertiary level ("supérieur")	0.0%	0.2%	0.5%	0.8%	1.1%	1.3%	1.4%	2.8%
Labor-market participation (ages 15-64)								
Share of population in labor force	67.6%	65.7%	60.8%	47.5%	43.2%	52.6%	50.2%	48.8%
Share of population working	67.4%	65.3%	60.0%	46.2%	40.6%	51.4%	48.2%	46.3%
Student share of population	-	-	-	-	-	-	-	-0.3%
Economic sector (occupied workers, ages 15-64)								
Agriculture	83.2%	77.6%	60.2%	34.2%	22.6%	16.8%	13.4%	9.4%
Extractive industry	0.0%	0.3%	0.2%	0.1%	0.1%	0.1%	0.1%	0.1%
Manufacturing and craft	0.0%	0.1%	0.2%	0.5%	0.3%	0.2%	1.8%	1.1%
Trade	2.1%	5.2%	11.0%	19.4%	18.3%	28.6%	23.5%	25.0%
Bank / insurance	0.0%	0.0%	0.0%	0.1%	0.2%	0.1%	0.1%	0.4%
Public or private administration	0.5%	3.7%	8.9%	15.7%	18.4%	14.4%	20.2%	19.4%
Transport and communication	0.1%	0.6%	1.4%	4.2%	5.6%	8.4%	4.1%	5.3%
Construction	0.1%	0.8%	1.1%	2.1%	2.1%	1.6%	1.6%	2.5%
Services	0.6%	2.9%	5.9%	12.7%	14.8%	16.7%	17.9%	21.0%
Electricity, water and gas	0.0%	0.1%	0.1%	0.3%	0.5%	0.4%	0.4%	1.2%
no response / missing	13.3%	8.6%	11.0%	10.8%	17.1%	12.7%	17.0%	14.5%
Occupational status (occupied workers, ages 15-64)								
Wage labor	1.5%	6.7%	13.7%	24.9%	30.6%	27.4%	32.9%	35.0%

Annex 2: Population characteristics by place type (1998)

	Village Population <5,000	Rural Town Population ≥5,000 <30,000 density<250 people/km2	Town Population ≥5,000 <30,000 density≥250 people/km2	City Population ≥30,000 density≥250 people/km2	Kayes	Sikasso	Ségou	Bamako
Number of places (agglomerations or villages)	10,713	128	60	11	1	1	1	1
Average demographic characteristics of place								
Population size	646	4,902	7,564	36,746	71,897	109,570	91,882	1,132,886
Ages 0-14	46.8%	47.9%	45.7%	43.4%	41.0%	42.6%	39.7%	39.7%
Ages 15-64	48.9%	48.2%	50.0%	52.9%	54.6%	54.8%	56.5%	57.4%
Ages 65 and above	4.3%	3.9%	4.2%	3.7%	4.4%	2.6%	3.8%	2.9%
Origin of population								
Born in same region	96.7%	91.3%	86.1%	79.4%	88.5%	79.0%	82.1%	62.3%
Born in other region	2.5%	6.7%	11.4%	18.0%	9.1%	16.5%	14.8%	33.1%
Born in foreign country	0.8%	2.0%	2.5%	2.6%	2.4%	4.5%	3.1%	4.6%
Education of working-age population (ages 15-64)								
No school	94.3%	84.2%	76.9%	65.5%	58.8%	58.1%	58.2%	54.1%
Primary level ("primaire")	4.1%	9.1%	11.0%	14.7%	19.1%	18.3%	16.1%	16.6%
Secondary 1 level ("collège")	1.0%	4.4%	8.0%	12.3%	13.7%	13.5%	17.0%	15.3%
Secondary 2 level ("lycée")	0.3%	1.7%	3.1%	6.1%	7.1%	8.6%	7.2%	10.5%
Tertiary level ("supérieur")	0.3%	0.6%	1.0%	1.4%	1.3%	1.5%	1.4%	3.5%
Labor-market participation (ages 15-64)								
Share of population in labor force	68.1%	56.4%	54.7%	46.7%	39.5%	53.3%	40.2%	45.9%
Share of population working	67.9%	56.0%	54.1%	45.7%	37.7%	52.4%	38.8%	44.4%
Student share of population	1.5%	5.4%	9.0%	13.0%	15.5%	16.3%	19.3%	17.6%
Economic sector (occupied workers, ages 15-64)								
Agriculture	91.9%	78.5%	59.8%	32.4%	20.3%	17.6%	17.0%	13.4%
Extractive industry	0.1%	0.3%	0.6%	0.6%	0.3%	0.2%	0.3%	0.3%
Manufacturing and craft	2.4%	3.2%	5.7%	7.2%	10.9%	8.9%	11.7%	9.0%
Trade	2.3%	6.7%	15.6%	23.7%	24.8%	34.5%	25.7%	27.0%
Bank / insurance	0.0%	0.0%	0.1%	0.1%	0.3%	0.1%	0.1%	0.2%
Public or private administration	0.5%	3.2%	5.7%	11.4%	12.2%	9.4%	14.0%	14.8%
Transport and communication	0.1%	1.0%	2.2%	5.0%	7.0%	8.8%	6.0%	6.1%
Construction	0.3%	1.0%	1.3%	2.5%	3.6%	2.4%	2.2%	3.9%
Services	0.9%	3.6%	6.2%	12.4%	12.9%	13.2%	15.4%	18.5%
Electricity, water and gas	0.0%	0.1%	0.2%	0.5%	0.6%	0.5%	0.9%	1.0%
no response / missing	1.4%	2.3%	2.7%	4.2%	7.3%	4.5%	6.6%	5.6%
Occupational status (occupied workers, ages 15-64)								
Wage labor	1.1%	5.2%	9.7%	18.2%	16.0%	15.9%	23.7%	26.0%

Annex 3: Population characteristics by place type (2009)

	Village Population <5,000	Rural Town Population ≥5,000 <30,000 density<250 people/km2	Town Population ≥5,000 <30,000 density≥250 people/km2	City Population ≥30,000 density≥250 people/km2	Kayes	Sikasso	Ségou	Bamako
Number of places (agglomerations or villages)	10,713	128	60	11	1	1	1	1
Average demographic characteristics of place								
Population size	882	7,521	12,360	55,148	127,473	143,231	166,128	2,156,177
Ages 0-14	48.4%	48.0%	45.5%	43.6%	41.7%	42.1%	39.3%	38.9%
Ages 15-64	46.1%	47.0%	49.2%	52.3%	54.8%	54.6%	57.2%	57.5%
Ages 65 and above	3.6%	3.0%	3.2%	2.7%	2.5%	2.1%	3.0%	2.1%
Origin of population								
Born in same region	95.1%	87.3%	84.9%	81.3%	78.5%	80.7%	80.0%	57.4%
Born in other region	4.0%	10.4%	11.9%	16.0%	18.2%	14.9%	15.7%	37.1%
Born in foreign country	0.9%	2.2%	3.2%	2.8%	3.3%	4.5%	4.3%	5.5%
Education of working-age population (ages 15-64)								
No school	85.9%	70.2%	63.3%	49.1%	44.8%	42.1%	39.3%	38.7%
Primary level ("primaire")	7.8%	13.5%	14.9%	17.0%	20.8%	18.9%	19.0%	16.6%
Secondary 1 level ("collège")	4.3%	8.8%	11.6%	15.1%	16.0%	15.9%	19.3%	15.9%
Secondary 2 level ("lycée")	1.6%	6.0%	8.1%	15.5%	15.6%	19.5%	18.7%	18.5%
Tertiary level ("supérieur")	0.4%	1.6%	2.1%	3.4%	2.8%	3.7%	3.8%	10.3%
Labor-market participation (ages 15-64)								
Share of population in labor force	63.5%	56.1%	53.0%	50.9%	53.4%	47.4%	49.5%	53.4%
Share of population working	63.1%	55.3%	52.2%	49.4%	51.5%	46.2%	47.3%	50.4%
Student share of population	3.6%	8.8%	11.4%	18.0%	14.9%	22.6%	21.1%	20.0%
Economic sector (occupied workers, ages 15-64)								
Agriculture	85.7%	60.8%	42.9%	24.3%	7.4%	10.2%	8.4%	3.1%
Extractive industry	0.4%	0.8%	2.2%	1.0%	0.4%	0.3%	0.2%	0.4%
Manufacturing and craft	2.1%	3.7%	6.1%	7.1%	9.8%	8.8%	10.1%	9.8%
Trade	2.9%	11.6%	18.5%	26.4%	32.2%	32.2%	28.1%	31.6%
Bank / insurance	0.0%	0.1%	0.1%	0.2%	0.2%	0.3%	0.3%	0.5%
Public or private administration	3.0%	8.4%	12.1%	15.3%	13.1%	16.2%	19.3%	14.9%
Transport and communication	0.9%	3.6%	5.7%	8.4%	12.6%	13.6%	9.0%	8.2%
Construction	0.7%	2.3%	2.9%	3.5%	6.1%	3.8%	4.7%	5.7%
Services	1.2%	3.8%	5.3%	7.8%	11.0%	9.3%	13.4%	16.9%
Electricity, water and gas	0.0%	0.3%	0.3%	0.7%	0.9%	0.7%	0.8%	1.1%
no response / missing	3.1%	4.7%	4.1%	5.4%	6.4%	4.5%	5.6%	7.9%
Occupational status (occupied workers, ages 15-64)								
Wage labor	2.3%	8.9%	13.0%	17.5%	20.0%	20.8%	24.3%	25.5%

Annex 4

Poverty incidence by livelihood zone (including standard errors)

Livelihood zone	2001	2006	2010
1. Nomadism and trans-Saharan trade	12.7	42.3	37.5
standard error	*3.4*	*10.4*	*5.0*
2. Nomadic and transhumant pastoralism	20.6	17.1	22.3
standard error	*7.9*	*4.6*	*2.3*
3. Fluvial rice and transhumant livestock rearing	46.0	37.8	29.7
standard error	*8.9*	*9.6*	*3.7*
4. Millet and transhumant livestock rearing	68.2	42.5	58.2
standard error	*4.7*	*4.2*	*4.3*
5. Dogon plateau -- millet, shallots, wild foods, tourism	82.4	87.5	40.7
standard error	*4.0*	*9.9*	*9.2*
6. Niger delta - rice and livestock rearing	23.7	19.5	29.6
standard error	*4.9*	*5.3*	*2.9*
7. Office du Niger (irrigated rice)	40.8	57.0	21.2
standard error	*8.3*	*9.2*	*6.3*
8. Remittances, sorghum, transhumant livestock rearing	62.6	30.4	19.6
standard error	*4.4*	*3.7*	*3.8*
9. West and central rain-fed millet/sorghum	49.9	45.7	42.5
standard error	*3.6*	*2.6*	*2.9*
10. Sorghum, millet and cotton	54.6	70.9	74.3
standard error	*6.7*	*5.4*	*3.9*
11. South maize, cotton and fruits	71.8	56.2	52.0
standard error	*3.0*	*2.8*	*3.1*
12. South-west maize, sorghum and fruits	80.1	63.0	52.7
standard error	*5.6*	*6.4*	*6.0*
13. Bamako	14.1	6.3	7.6
standard error	*3.4*	*2.3*	*1.1*
Mali	50.9	41.7	41.1
standard error	*1.7*	*1.5*	*1.3*