Education and poverty impact on health: evidence from Morocco in recent years.

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Introduction – aim of the paper

In this paper we present first results of a project aiming to study the impact of education and poverty on health status, effect and behaviour in Morocco[1]. First of all we present some basic statistics - deriving from different data sources - for the principal variables related to poverty, education and health for Morocco. Then, we deepen the analysis on two localities belonging to the Region of Marrakech-Tensift-Al Haouz. The Region presents - in recent years - among the worst levels of socio-demographic indicators in the Country.

This paper includes:
a) A preliminary analysis of the links between socio economic status, education and health;
b) The description of data and methods;
c) The consideration of the links between poverty, education and health deriving from poverty maps and DHS surveys carried out in Morocco;
d) First results from the CBMS survey 2007 conducted in the Region of Marrakech-Tensift-Al Haouz.

- Data referring to 2003-2004 Moroccan Demographic and Health Survey (DHS) include information on individual characteristics (education, selected health indicators), household characteristics and household assets and facilities. Another advantage of the DHS estimate is that it can be presented for separate subpopulations, including those grouped by household wealth status (synthesized by Wealth index[2]). Using the household wealth index we can highlight trends in inequality in education and health by household wealth in the different Regions of the country, in the urban-rural areas and from a gender perspective.

- The new data set published in 2007, the Community Based Monitoring Survey (CBMS), was produced by the Ministry of Finance in cooperation with UNIFEM. In the recent years there has been a rising interest in community-based initiatives to address differentials in health status associated with social inequalities. Morocco is the only country where such analysis has been done so far in the Middle East and North Africa Region (Iqbal, 2006). The survey questionnaire addresses the following themes: demographic characteristics, culture and education, economic activities, employment and unemployment, poverty, micro-credit, health, housing, violence, environment, governance and gender.

We test a number of hypothesis using logistic estimation. The link between education, poverty and health is evaluated for the urban and the rural sector of the Region of Marrakech-Tensift-Al Haouz.

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[1] This research has benefited from the CBMS data provided by the Ministry of Finance, Direction des Etudes. The content of this publication is the sole responsibility of the authors.
[2] The Wealth Index is a composite measure of the cumulative living standard of a household. It is obtained by a factor analysis procedure, and synthesizes information on household about assets, facilities and the number of members per sleeping room. Households are placed on a continuous scale of relative wealth (Rudstein and Johnson, 2004).

1- Socio economic status, health and education: a complex relationship

Biological, cultural, environmental, economic and institutional conditions influence health risk and susceptibility among different populations. Health is more than survival and mortality, and should include reflection of factors that capture the worsening of health, such as nutritional status and diseases; for infant and child ages it is important to also consider both nourishment status and measures that protect children's health, like immunization coverage (Kawaya et al., 2008).

Many of the inequalities in health, both within and between countries, are due to inequalities in the social conditions in which people live and work. Poverty and inequality influence health status.

The impact of poverty on health seems obvious but here again the links as studied in the developed world do not directly apply to the context of developing countries. This trend of research due to data limitations has been concerned essentially with developed countries, through the difference in the behavior of poor people versus rich people and in the difference of health care system distinguishing between market based health care and universal health care. In the developing countries the mechanism will be of course different and probably more basic, linked to nutrition at early ages, immunization and existence or not of health facilities etc... The direction of the link may be more pronounced from health to poverty than the other way around.

Income is the common way of measuring poverty, but poverty has many dimensions: poor are deprived of services, resources and opportunities as well as money. These social determinants have an important effect on health status and general wellbeing. A large body of economic and social science literature links education and poverty to health. The obvious link is that education affects income which itself influences health status and behaviour. The literature finds that education and poverty have a strong impact on health and that poor health is both a cause and effect of poverty. Education and employment opportunities have both direct and indirect impacts on life quality (including health), and prospects for development.

On the other hand, health and education are the two essential areas for the analysis of poverty. Access to basic health services and education are essential to the well being of every human being, and the lack of these services contributes to the persistence of poverty. People's health, education, gender relations and degree of social inclusion all promote or diminish their well-being and help to determine the prevalence of poverty.

Escaping poverty depends on improving personal capacities and increasing access to a variety of resources, institutions and support mechanisms. Apart from considerations of human rights, justice and equity, both the level of available resources and the equity of their distribution contribute to a society's health. It has been found however that the impact of education on health is more complex and can not be completely explained by income or the labour market (Grossman, 2005; Cutler and Lleras Muney, 2006; Phipps, 2003). As rightly pointed out by Cutler, Lleras-Muney and Vogl (2008) the link between socio economic status (SES) and health applies to countries at different levels of development however "the SES health gradient and its mechanisms demand further attention in poor countries". Health outcomes are not always closely correlated with income levels. The combination of poor general health and high prevalence of disease can sometime extend still to the highest income groups. Sometimes it is also important to consider the distinction between lack of income and lack of capacity, often more marked for women (Fukuda-Parr, 1999).

When some segments of the population do not have easy access to public resources, this might contribute to the development of health disparities. This may interfere with the mechanisms linking poverty and health.

In the case of developing countries there is evidence that there is a link between socio economic status and health but this link is more often pointed out by studies that are quasi experiments and undertaken by researchers in fields other than economics such as demography or medical scientists (Strauss and Thomas, 1998; Edwards and Kremer 2004). Further this link is poorly understood. We do not know through which mechanisms a higher education level allows better health. Is it simply because it allows for better information through the ability to read or could it be that the social network through schools allows for a better inclusion into society.

Poor health is strictly related to poor education (a condition generally more evident in less advantaged groups), but at the same time poor health itself is a cause of income poverty. It diminishes personal capacity, lowers productivity and reduces earnings. The effect of ill health on productivity and earnings is likely to be greater on the poor. This is because, among other things, low-paid, less-educated workers are more likely to do physically demanding and often unsafe work in which they can easily be replaced (UNPFA, 2002; 2003).
Also the age at which education is reached can reveal a positive benefit on health, and we will distinguish in the following study how reading and writing skills were acquired and see if acquiring these skills at school or through alphabetization or others programs at older ages makes a difference. Alphabetization programs are advanced in Morocco and represent an important issue of country's social policies. In 2008 more than 700,000 individuals attended alphabetization programs: among them many women was involved.

The discussion confirms that relationships among poverty, education and health are multiple, and in the literature many studies help us to deepen our understanding of the links. Besides economic inequalities, social and geographic factors such as gender, race, rural/urban residency and ethnic background also contribute for the large differences in health status and the exclusion of some groups from access to health services (Carr, 2004).

More and more researchers underline the relationship between income inequality and health. Not only does income equality promote health because income does more for the health of the poor, but it also corresponds to an indicator for other desirable features of society. According to this account, equal societies are healthier: they offer their citizens more social cohesion, more solidarity, more social support and more social capital, and they satisfy humans' evolved preference for equality (Deaton, 2001).

We can summarise some important areas of interest:

Social exclusion and powerlessness
Poor people define poverty in the conventional way-lack of income-but also as instability, worry, shame, bad health, humiliation and powerlessness (Kishor, 1996). Poverty in another form can be seen in social systems that deny some groups of people the freedom to interact as equal partners in society or assert their personal interests in the wider community. In many developing countries, this sort of exclusion prevents large numbers of people from participating in the development process.

Gender-based poverty
Both in developed and in developing countries, particular attention is dedicated to the problem of "feminisation of poverty". That "women are poorer than men" has become an axiom. In many

countries, the lack of equal access by women and girls to resources, opportunities and political power remains pervasive. Material poverty interacts with gender-based discrimination, so that poor women's levels of health, education and social participation are even lower than their male counterparts' (Floro, 2001). Additionally, in many countries of the MENA region the number of woman-headed households is increasing, because of extensive male migration, the increased number of disabled males (due to conflict), widowhood and divorce. On average, as in other developing countries, these households (and their children) tend to be considerably poorer and more vulnerable than households headed by men (Ahmed et al., 2001; IFAD, 2007).

<u>Illiteracy and inadequate schooling</u>

Illiteracy restrains people even in the most basic day-to-day activities. Inadequate schooling prevents them from taking advantage of new opportunities. Like other dimensions of poverty, education and health outcomes interact. It is more difficult for illiterate or less-educated people to obtain information about health care, for example, in a form they can use. Poor health and lower survival rates reduce the incentive to invest in children's education. Poor health and low levels of education make it more difficult to translate additional income into improved well-being, preventing people from establishing or reaching personal goals (UNFPA, 2008).

Not only the adequacy of schooling, but also the way in which education was reached can have an impact on health behaviors. Does it make a difference at which age you acquire education for the positive benefit on health? The fact that some individuals go through alphabetization program and learn how to read and write only at a latter age allows us to test for possible differences. This also relates to the question of the importance of early age conditions for future health.

2. Poverty and inequality in Morocco: a representation from different sources

For Morocco in recent year's relevant data on demographic behaviour, poverty and human development are available. Research on spatial patterns of poverty and inequality across districts, municipalities, and communities has accelerated over the past decade. The distribution of the poor in Morocco results from household surveys, DHS surveys, detailed maps on the distribution of poverty throughout the country in 1994 and 2004, and from 2004 census.

Figures in table 1 show that the number of poor people was falling in recent years. Between 1985 and 2007 the decrease in the number of rural poor people reached 42% and 33% in the number of urban poor. Nevertheless, 70% of poor people continue to be gathered in rural areas in 2007.

Table 1 - *Trends in poverty and in vulnerability. Total number (thousands) and percentage distribution by residence. Morocco 1985-2007.*

	Poor people			Vulnerable people		
	Total number	% Urban	% Rural	Total	% Urban	% Rural
1985	4,574	27.3	72.7	5,263	31.4	68.6
1999	4,534	31.8	68.2	6,665	45.8	54.2
2001	4,461	27.7	72.3	6,613	40.8	59.2
2007	2,756	30.1	69.9	5,381	41.2	58.8

Source: Haut Commissariat au Plan, Maroc

Other poverty indicators in table 2 confirm the persistence of considerable regional disparities and the worse situation in rural areas. The poverty rate varies from 21% in 1984/85 to 9% in 2007, but differences between rural and urban values are increasing: in 2007 less than 5% of the urban population was poor, while in rural areas poverty reached 14.4% of the population.

Table 2 - *Poverty indicators[3]. Morocco 1985-2007.*

	Population below the poverty line (%)			Poverty gap			Severity of poverty		
	Urban	Rural	Total	Urban	Rural	Total	Urban	Rural	Total
1984/85	13.3	26.8	21	3.5	7	5.5	1.5	2.8	2.2
1998/99	9.5	24.1	16.2	1.5	3.8	2.7	0.4	1.2	0.8
1994*	10.4	23.0	16.5						
2000/01	7.6	25.1	15.3	1.5	6	3.5	0.5	2.2	1.2
2004*	7.9	22.0	14.2						
2007	4.8	14.5	9	0.8	3.3	1.9	0.2	1.2	0.6

* Data from « Poverty maps » 1994 and 2004. Source: Haut Commissariat au Plan, Maroc ;
 Royame du Maroc (2007) ; Douidich et al. (2007).

The poverty gap measure, that captures the magnitude of poverty, shows that in 2007 the average consumption of the poor population falls short of the poverty line level by 3.3% in the rural areas, while in urban areas it is less than 1%.
The rural dimension of poverty in recent years is common to other north-African countries as Algeria, Egypt and Tunisia (Gouvernement Algérien, 2005; World Bank PovcalNet).

At present about 15% of the Moroccan population is poor, with two-thirds living in rural areas, even if pockets of poverty exist in both urban and rural areas. An additional 25% of the population lives at or below 50% above the poverty line; they are considered "economically vulnerable" to illness and disability, bad weather, or loss of jobs (Douidich et al., 2007; Royaume du Maroc, 2007; World Bank, 2007).

The outcomes of the analysis from the 2004 poverty maps show considerable geographic variations in the distribution of well-being among and between regions, provinces and communes. At the most disaggregated level, that of the commune, high concentrations of poverty coexist with low rates, in spite of where the communes are located[4]. In particular, there are large differences in the concentration of poverty across rural communes. In Morocco, poverty in rural communes is significantly more homogenous than in other countries. In contrast, urban areas show a much higher level of heterogeneity than do rural areas. Urban areas are more heterogeneous, with a great diversity of living standard within the much larger urban communes. Rural-urban migration may have occurred, and poverty rates may thus have risen in urban areas and perhaps moved within rural areas too (Lanjouw, 2004; Litvack, 2007). Data underline that for Morocco it is important to look at poverty within-groups.

Morocco presents among the highest rural-urban disparities in the MENA Region in the fraction of the total population with access to safe water and sanitation facilities in 2006 (table 3).
The incidence and distribution of poverty vary considerably among regions in relation to the quality and availability of natural resources. Although there has been progress in the country's standing in the human development index, the gap between urban and rural areas remains a large one.

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[3]The poverty gap expresses, as a percent of the poverty line, how much the income (or consumption) of the average poor person is lower than the poverty line. The severity of poverty is the average value of the square of the depth of poverty for each individual. The poverty severity index gives more weight to very poor than to less poor.
[4] This result suggests that in Morocco (unlike many other countries) directing social programs in the *rural areas* at the commune level may be a very reasonable approach to reach the poor. This suggests that there may be efficiency benefits from designing antipoverty programs that can target the commune level. The INDH program identifies 403 rural communes and 264 urban neighbourhoods for the programs to fight poverty and exclusion. These programs include better access to health services.

Table 3 – *Morocco. Socio-economic indicators of development.*

	year	Female	Male
Children out of school°°	2007	237,316	157,497
Net primary school attendance ratio (%)	2007	87	91
Adult literacy rate (% 15+)	2007	43	69
Youth literacy rate (15-24)	2007	67	84
Maternal mortality ratio (*100,000 live birth)	2005	240	
Lifetime risk of maternal death (1in)	2005	150	
		Rural	Urban
Improved sanitation facilities	2006	54	85
Improved water source	2006	58	100

°°The number of primary-school-age children not enrolled in primary or secondary school.
Source: WDI online

Poverty also presents a strongly gendered character in education. Among children out of school the majority is represented by rural girls, and gender indicators in literacy and health, especially in rural areas, are among the worst in the MENA region. Low overall primary education completion rates are accompanied by the high gender disparities: 55 per cent for boys, 38 per cent for girls. In rural areas only 43% of women (aged 15+) are literate (World Bank WDI online; IFAD, 2007).

2003-04 Demographic and Health Survey

Another picture of (relative) poverty at the beginning of 21st century in Morocco is provided by the 2003-2004 Demographic and Health Survey (DHS). The DHS estimate can be presented for separate subpopulations, including those grouped by household wealth status, synthesized by Wealth index. The wealth index is used to rank individuals according to the index value for the household to which they belong; the individuals are then divided into population quintiles; each quintile is designated by a rank, from 1 (poorest) to 5 (wealthiest), and individuals are ranked according to the total score of the household in which they live (table 4[5]; figure 1).

Data reveal socio-economic differences in many dimensions of population life, such as health, nutrition, education and demographic behaviour.
Moroccan DHS data confirm a positive association between the women's education and wealth status and the various pregnancy indicators for the births during the five-year period before the survey (Ministere de la Santé et ORC Macro, 2005). The relationships are marked in the case both of antenatal care and delivery attendance.

The proportion of women who had antenatal care visits to a doctor or to a medically trained person increases with both the mother's education level and with the wealth quintile. Only 40% of the Moroccan mothers in the lowest wealth have received antenatal care from a medically trained person, compared to 93% for those in the richest quintile.

The same trend is evident in delivery attendance: medically assisted deliveries were common for births to highly educated mothers (94%); only half of the deliveries to mothers without education

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[5] Rates for all health, nutrition, and population indicators are calculated after applying the DHS sampling weights. DHS surveys often over-sample certain small subgroups of interest – residents of a particular geographic area, for example – in order to get sample sizes large enough to produce statistically-significant results. The DHS sampling weights are used to compensate for such over-sampling in order to ensure that the results are representative of the population as a whole and not just of the DHS sample.

were assisted by a trained health professional. On the other hand, rich women are three times more likely to be attended by a skilled health professional during childbirth.

Nutritional status of children and women[6] show some other important relations. Nutritional status is a principal determinant of a child's health and well-being. The educational level of the mother is inversely related to the level of stunting. Among children whose mothers never attended school 8.2% are stunted, compared to 3.4% for children of mothers who completed the secondary level or higher. The rate of stunting among children in the lowest wealth quintile is 12.1% compared to 3.4% among children in the highest quintile.

The different care indicators in general are higher for urban than for rural births. As expected, urban mothers received antenatal care during pregnancy more often than rural mothers. Moroccan mothers received medical care for 55% of urban births compared to 23% of rural births (85% and 48%, respectively if we consider all trained health professional).
School participation of girls and boys also shows differences in attendance by gender and by socio-economic status of the household.

Table 4 - *Some basic information about health, nutrition, and population (Percentages by Wealth quintile and by female education) Morocco DHS 2003-04.*

	Average	Wealth quintile						Female education			
		Poorest	Poorer	Middle	Richer	Richest	Low/ High Ratio	No education.	Primary	Second/ higher	Low/ High Ratio
Infant survival											
Infant mortality rate ‰	44.0	62.2	53.1	36.8	33.4	24.0	2.59	52	33	23	2.26
Under-five mortality rate‰	2.98	77.6	65.5	46.7	37.3	26.1	2.98	63	42	27	2.33
Fertility											
Total fertility rate	2.5	3.3	3.1	2.5	1.8	2.5	1.70	3.0	2.3	1.8	3.75
Adolescent fertility rate ‰	32.4	50.7	35.7	44.3	21.0	12.5	4.05				
Nutritional status											
Children: Severe stunting %	6.5	12.1	7.0	4.6	3.4	3.4	3.52	8.2	4.0	3.4	2.4
Women: Malnutrition (%)	7.0	7.8	7.9	7.1	6.9	5.7	1.37				
Vaccination coverage (%)											
No basic coverage %	1.4	2.8	1.9	0.4	0.7	0.7	3.98	1.9	0.8	0.6	3.17
Maternal health care (%)											
Antenatal care visits:											
To a medically trained person*	67.8	39.7	56.4	70.6	86.8	93.1	0.43	55.5	78.5	93.4	0.59
No person	32.0	60.0	43.0	29.2	13.0	6.9	8.7	44.1	21.4	6.6	6.7
Delivery attendance (%):											
By a medically trained person*	62.6	29.4	49.4	70.3	86.1	95.4	0.31	48.8	76.7	94.4	0.52
Contraceptive prev. (%)°	54.8	51.4	55.2	55.4	54.8	56.8	0.90	53.7	56.8	56.4	0.95
Education (%)											
School completion:											
Women	37.0	6.5	16.0	31.9	52.1	68.7	0.10				
Men	54.7	26.2	35.9	50.4	69.4	85.0	0.31				
School participation°°:											
Girls	86.7	67.3	82.7	95.6	96.6	97.5	0.69				
Boys	90.7	82.0	87.2	93.4	97.4	98.4	0.83				

° Modern methods; * A doctor or a trained nurse or midwife; °°girls/boys aged 6-10 years attending school at the time of the survey (%).
Source: Gwatkin et al. (2007); Ministère de la Santé, ORC Macro (2005); our elaborations on DHS data.

DHS data underline that poor rural women and their children suffer manifold discrimination, as in general for deprived groups and conditions in developing countries. Mutangadura et al. (2007)

[6] Children aged 0-4; women aged 15-49; Percentages.

found lower health outcomes for disadvantaged groups in all the African countries studied of which Morocco and Egypt[7].

Martin (2008) in studying the perception that rural women in Morocco have of their health shows that better access to own as well as to collective resources contributes to the creation of capabilities to maintain a decent health status which ease the association between socio economic status and health but also highlight the complexity of the mechanisms associating the two. Here notions such as freedom, governance and equity all take part in the explanation of the link and all have relevance in terms of policy implications.

The distribution of households by wealth quintiles (and then the distribution of population) explains different conditions if we consider urban or rural residence, or sex of the head of the household.

Taking into account the region of residence, we can underline some other characteristics of the Region Marrakech-Tensift-Al Haouz considered in next pages. Data in tables 4 and 5 show - both for the whole country and for the Region – the distribution of individuals by wealth status and sex of head of the household. The percentage of poor households in the rural area of the Region is among the highest in the Country, while in the urban area the Region presents the highest percentage of households in the middle quintile of wealth index. For the country as a whole a large percent of the total population is poor in rural areas, but in the region Marrakech-Tensift-Al Haouz this percentage approaches 90% (fig. 1).

Figure 1 - *DHS 2003-04. Morocco and Region Marrakech-Tensift-Al Haouz. Urban and rural population by Wealth index and sex of the household head (% within sex of head of the household).*
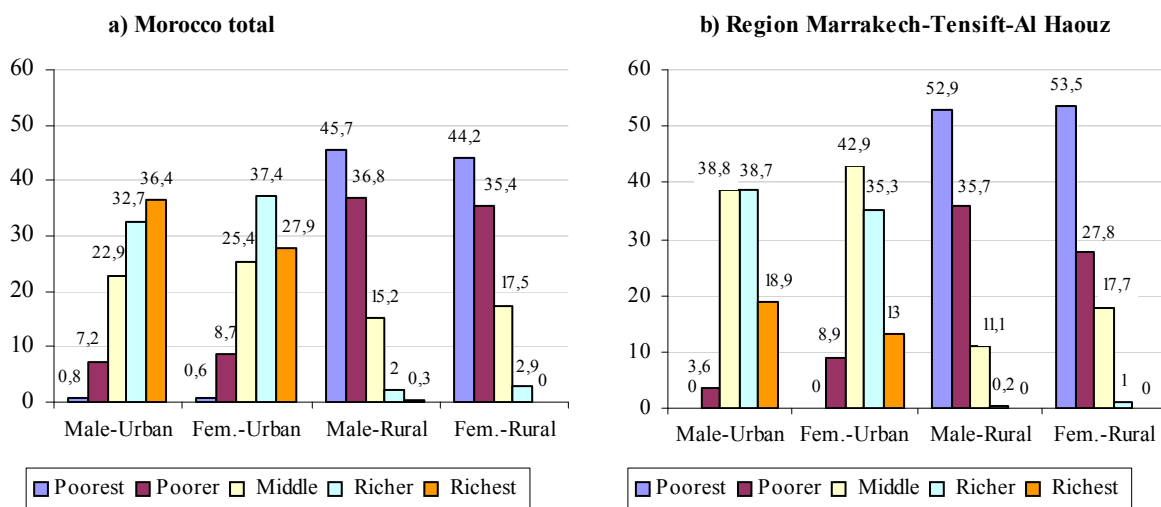
Source: Our elaborations of Moroccan DHS survey 2003-04. Data calculated after applying the DHS sampling weights.

If we consider sex of the head of the household, we see that in the Region of Marrakech-Tensift-Al Haouz the proportion of female among the poorer urban families is very high (43%); at the national level the value reaches 18,5% (table 5).

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[7] They use bivariate analysis of Demographic Health Survey data and identify geographical and financial access as the main source of inequities.

Table 5 - *Households by sex of Household head. DHS 2003-04 Morocco.*

	Type of place of residence		
	Urban	Rural	Total
a)Percentage of female headed families			
Morocco	20.2	12.0	17.1
Region Marrakech-Tensift-Al Haouz	21.2	11.8	16.0
b) Percentage of female headed families among poor families			
Morocco	23.8	12.0	13.7
Region Marrakech-Tensift-Al Haouz	43.3	11.6	13,2

Source: our elaborations on DHS 2003-04 data. The survey includes 11.514 households; 1.155 in the Region Marrakech-Tensift-Al Haouz. Data calculated after applying the DHS sampling weights.

DHS data confirm also the lack in education in Marrakech-Tensift-Al Haouz region. The percentages of women and men without any level of education (58.5% and 42.1% respectively) are the highest when compared to other Moroccan regions. As in other developing countries or world regions, with the decline in educational disparities between boys and girls, the gap in schooling that remains in Morocco is between the poorest and the richest households (Lloyd and Hewett 2003).

Data on maternal health care point out that the lowest accesses of women to antenatal care from a medical provider are found in the Regions of Taza-al Hoceima-Taounate and (again) Marrakech-Tensift-Al Haouz. Once more, in this Region a very large proportion of births occur outside of a health facility: about 55% of the births during the five-year period preceding the survey occurred in the woman's own home. In contrast, about 39% of births in the whole country took place at home (Ministère de la Santé et ORC Macro, 2005).

4. Poverty, education and health in the Region of Marrakech-Tensift-Al Haouz. CBMS survey

In the following analysis we use data from computer based monitoring survey (CBMS) - which we have briefly described - to study the link between socio-economic status and health in the Region of Marrakech-Tensift-Al Haouz. We have to point out that the survey we use deals with only the Region of Marrakech-Tensift-Al Haouz, but it looks at both a rural community (Bouaboud) and an urban community (Essaouira). The survey is to be undertaken in different regions of Morocco and as it becomes available the analysis made here will be extended to other regions of Morocco.

The two localities where the CBMS was first conducted were chosen on the basis of data from the population census of 2004 and from the poverty map of Morocco, carried on by World Bank (2004). The number of observations differs depending on the hypothesis tested. We consider here individuals aged 15 or more, and we have more than 1000 observations for both localities. All the observations are included when we study the link between education, poverty and health status; however when we analyze health behaviour looking for example at the prenatal consultation or use of contraceptive methods we have a smaller number of observations.

The impact of education and poverty on the probability to suffer from a chronic disease is evaluated for both the urban (Essaouira) and the rural community (Bouaboud).

The poor recognize multiple dimensions of health: good health is identified as a central component of a good quality of life. In their descriptions of well-being, three different types can be identified: material well-being, often expressed as having 'enough'; bodily well-being, to be strong, healthy and good-looking; and social well-being, which includes having children and caring for them, self-

respect, security and confidence in the future, freedom of choice and action, and being able to help others" (Floro, 2001). Those with lower level of education attainment are more likely to report poor health. At the same time those with lower financial resources and those that do not work are more likely to report that they are ill.

For the health status we use the most widely used measure which is the self reported health status. It has been demonstrated in other studies that the self reported health status and objective measures of health are highly correlated.
We take into account three domains of economic status: education attainment, poverty and occupational status. Various measures of education attainment are used. Activity is subdivided only in terms of whether the person is active or not and not by type of occupation because of data availability.

Individuals (aged 15 or more) who live in Essaouira (the urban context) present a relatively good situation as concerns economic status and a worse situation as concerns health status. They are poor (36%), vulnerable (17%) or otherwise (46%). If we consider poor and vulnerable conditions, we find that 53 % of those interviewed are either poor or vulnerable. Among the population of Bouaboud (the rural context), the percentage increases to 90 %. In both communities we do not find remarkable differences between men and women.

Out of the population of Essaouira 16% declare that they have a chronic illness; the percentage is smaller for Bouaboud, the rural community (table 6). Women present higher proportions of chronic illness.
Then the question refers to the type of disease. The most common chronic diseases are diabetes (19%), hypertension (17%), allergies (17%) and heart diseases (7%). We will not conduct the tests disease by disease because we do not have enough observations for particular illness. The CBMS data gives information on education, based on the Moroccan education system which includes levels from primary to higher education.

Table 6 - *CBMS survey 2007. Economic status, self reported health status and education.*
Percentages of population aged 15+.

	Essaouria (urban)			Bouaboud (rural)		
a) Conditions (%)	Men	Women	Total	Men	Women	Total
2) To be poor	53.5	53.3	53.4	89.7	90.3	90.0
1) Suffer from a chronic diseases	11.0	21.0	16.2	3.9	4.3	4.1
Number of cases	580	615	1.195	464	610	1.074
b) Educational level (%)						
No education	19.48	40.65	30.4	73.71	86.89	81.2
Preschool, first cycle	24.14	15.45	19.6	20.26	11.80	15.4
Secondary, higher	56.38	43.90	50.0	6.03	1.31	3.4
c) Marital status						
Single	45.69	35.45	40.4	26.51	29.02	27.9
Married	52.41	49.43	50.9	72.41	61.31	66.1
Number of cases	**580**	**615**	**1195**	**464**	**610**	**1074**

Source: our elaborations on CBMS data

In Essaouira 30% of the individual (aged 15+) has not been to school, 20% completed the first cycle, 42% secondary school (21% first level and 21% second level), and almost 8% completed higher education. In the rural community 81% of the individual (aged 15+) has reached no level of education, 15% primary education and less than 4% a higher educational level.

Maternal health represents an important aspect of the health context. We present data on the use of contraceptive for married women and the prenatal consultation for women that have given birth during the previous year to synthesize the health behaviour (tables 7; 8).

Table 7 - *Reproductive health care by level of education as a percentage of a) women who have given birth and b) total married women: Essaouira (urban). CBMS survey 2007.*

	No education	Preschool &Primary	Secondary education		Higher education	Total
			1st level [a]	2nd level [b]		
a) *Prenatal consultation* (378 women)						
No antenatal consultation	48.8	19.7	9.76	10.9	16.7	33.3
Consultation	51.2	80.3	90.2	89.1	83.3	66.7
Total	100.0	100.0	100.0	100.0	100.0	100.0
Number of cases	209	64	41	46	18	378
b) *Contraceptive use* (367 women)						
No utilisation	46.5	28.0	28.3	33.3	21.1	37.9
Utilisation	53.5	72.0	71.7	66.7	78.9	62.1
Total	100.0	100.0	100.0	100.0	100.0	100.0
Number of cases	**187**	**64**	**46**	**51**	**19**	**367**

a: college education; b= high school. Source: our elaborations on CBMS data

Table 8 - *Reproductive health care by level of education as a percentage of a) women who have given birth and b) total married women: Bouaboud (rural). CBMS survey 2007.*

	No education	Preschool / Primary	Secondary/Higher	Total
a) *Antenatal consultation* (361 women)				
No antenatal consultation	97.7	100.0		97.8
Consultation	2.3	-		2.2
Total	100.0	100.0		100.0
Number of cases	346	13	2	361
b) *Contraceptive use* (416 women)				
No utilisation	25.9	25.0		25.7
Utilisation	74.1	75.0		74.3
Total	100.0	100.0		100.0
Number of cases	**402**	**12**	**2**	**416**

Source: our elaborations on CBMS data

CBMS data confirm a positive association between women's level of education and antenatal care; the trend is less evident for contraception prevalence in both the rural and the urban community.
67% of urban women that have given birth went through prenatal consultation; 63% of married urban women used contraceptives. Data for the rural community are more uncertain, given the low percentages of educated women.

Impact of poverty and education on health: the model and the data

The manner in which education affects health is still poorly understood and more research in this area is needed. To better understand the suggestions deriving from bivariate analysis, we will in this study explore the link between education, poverty and health. We report some first results for the urban community of Essaouira, and then the specificities of the rural sector will be presented briefly afterwards.

The number of observations differs depending on the hypothesis tested. We have about 1600 observations (population aged 15+) for the link between education and poverty and health status

however when we analyze health behavior looking for example at the prenatal consultation or use of contraceptive we have a smaller number of observations, related to women[8].

In the following regressions:

$$H_i = c + \beta \, SES_i + \delta X_i + \varepsilon$$

H_i measures individual's health[9] or health behaviour, SES_i is a measure of socio economic status that can take the form of education, financial resources and or activity, X_i is a vector of individual characteristics including gender and age, c is a constant and ε is the error term.

The first hypothesis to be tested is the link between education and health status. The socio economic status can be measured through different variables. Some of course clearly linked one to the other. Here we have 3 measures of economic status: education attainment, income (feel poor or not) and occupational status (activity). Activity is subdivided only in terms of whether the person is active or not and not by type of occupation because of data availability. Education is measured both by the level of education attained[10] and by the number of years of schooling. Another measure of education included in CBMS survey is the type of education, or the way in which education was reached.
Gender and age are used as control variables.

To delineate factors impacting on the propensity of the individual to declare that he/she suffers from a chronic disease[11], we have performed a logistic model where the group analysed is represented by individuals aged 15+; the explanatory variables are gender, age, education attainment, economic status and occupational status (tab. 9, model 1).

The first results confirm our hypothesis that is – all other things being equal – the probability to suffer from a chronic disease decreases as the level of education rises. It is only at higher levels of education attainment (higher than college education) that the impact of education on health becomes significant.

As shown in table 9 (**model 1**), reaching higher levels in the education system reduces the likelihood of the individuals self reporting of poor health. It should be reminded that only a small portion of the population studied (29 percent) reach those levels of education. This says that a high level of education has to be reached for the positive impact of health to be realized. This has strong implications for the Moroccan context because of the fact that many students drop out before they reach the fourth level which is the high school level. Results confirm that the returns to education in terms of health improvements are important in developing countries.

Gender is positive and significant; being female increases the probability to suffer from a chronic disease. Here it is difficult to identify whether this means that women have a smaller access to health services and thus are less likely to be cured and thus have more chance to declare being ill. However other existing studies have shown that household resources are not distributed equally

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[8] As in tables 6,7,8.
[9] Self reported health status.
[10] The variable takes the value of 0 if the individual has not been to school, 1 if he went to preschool or f he completed primary education, 2 if he completed college education, 3 if he completed high school (secondary) and 4 if he completed higher education.
[11] We create a dummy variable that inform us on whether the individual declares that he/she suffers from a chronic disease (value 1) or not (value 0).

among girls and boys and among women and men inside the household. This will impact health outcome.

Increase in age – as expected - increases the probability to suffer from chronic disease. The other two measures of socio economic status included here, income and activity, are not significant.

Table 9 - *Logistic model of self reported health status (suffer from a chronic disease).*
Population living in Essaouria, aged 15+, CBMS survey 2007.

	Reference category	Beta coeff.	Std. Err.	P. Value	Exp. (Beta)
Variables	**Model 1**				
Gender	Male	.7211	.2439	0.003	1.1997
Age	Age at survey	.0464	.0065	0.000	.0592
Reached education	No education				
1- primary education*		-.3241	.2524	0.199	.1711
2- college education		-.4214	.2846	0.139	.1369
3- high school		-.6293	.3044	0.039	-.0320
4- university/higher educ.		-1.1796	.4827	0.015	-.2327
Poverty	Is not poor	-.2342	.1911	0.221	.1408
Occupational status	Not working	-.1053	.2331	0.651	.3519
Intercept		-3.5213	.5361	0.000	-2.4694
	Model 2				
years of schooling	Number of years	-.0251	.0390	0.519	.0513
Gender	Male	.7773	.2056	0.000	1.1806
Age	Age at survey	.0437	.0073	0.000	.0582
Health insurance	Covered	.3875	.2099	0.065	.7995
Marital status	Single				
Married		.6188	.2746	0.024	1.1576
Other		.7913	.4018	0.049	1.5797
Intercept		-4.6748	.4169	0.000	-3.8567

* preschool/primary education; Number of obs.= 1195 Population size = 77083.

In **model 2** a larger set of explicative variables is included. Variables are whether or not the individual is covered by health insurance, marital status, and the number of years of schooling is the variable for education (instead of the reached level).

Results confirm a higher risk to suffer from chronic diseases for women, as the age rises, and if the individual is not covered by health insurance. In addition, the condition of married, divorced, widowed and separated has a positive sign and then increases the probability to suffer from illness.

Results regarding the rural community (not reported in this paper) reveal a main role of marital status in the model, and a stronger risk to be ill for widowed, divorced and separated individuals.

As formerly introduced, another information about education is represented by the type of education, that is the way in which education was reached (school or social alphabetization programs). We think that it is an interesting question - that is very little studied - for the relationships between both education and own health status and mother's education and child health. We have not introduced this variable in the paper, because of the limited number of individuals that went through the alphabetisation program, but our first elaborations suggest a higher risk of poor health if individuals got reading and writing skills out of school. This recommends us to extend the analysis when more surveys in different regions will be available.

Other results shown in table 10 indicate a very significant and consistent impact of education on health behavior when the later is measured by prenatal consultation of women.

Here all the levels of education present in the sample of women that have given birth during the year preceding the survey are significant and of the expected sign. The likelihood of prenatal consultations of women increases with the education for all levels of education. Age, as could be expected, reduces the probability of prenatal consultations.

The other socio economic variables are not significant. However when the use of contraceptive is used as an indicator of health behavior the results are inconclusive: do not show a link between education and the use.

Table 10 - *Logistic model for reproductive health (prenatal consultation and contraceptive use). Women living in Essaouria, CBMS survey 2007.*

Variables	a) dependent variable: prenatal consultation				b) dependent variable: contraceptive use			
	Beta coeff.	Std. Error	P. Value	Exp. (Beta)	Beta coeff.	Std. Err.	P. Value	Exp. (Beta)
Age	-.0672	.0098	0.000	-.0479	-.0313	.0083	0.000	-.0149
Reached education								
1- primary education*	1.1246	.3951	0.005	1.9016	.4472	.3371	0.185	1.1101
2- college education	1.7708	.6529	0.007	3.0547	.3141	.4124	0.447	1.1253
3- high school	1.8452	.6086	0.003	3.0418	.1641	.3940	0.677	.9389
4- higher education	1.6951	.7213	0.019	3.1134	.9608	.6727	0.154	2.2837
Poverty	.07516	.2870	0.794	.6395	-.4445	.2575	0.085	.0619
Occupational status	-.5395	.3755	0.152	.1988	-.1051	.2972	0.724	.4793
Const.	3.4098	.5607	0.000	4.5123	2.0179	.5146	0.000	3.0298

* preschool/primary education; Reference categories: see table 9; model a) Number of observations= 378; Population size = 24396; model b) Number of observations= 367; Population size = 23458.

This might be due to the fact that contraception use is very prevalent and represents a nearly common and accepted social norm, even in rural areas and at all levels of education.
It is interesting to remark the different role of women's economic status on reproductive health: poverty impacts on contraceptive use (table 10b).

The link between education and health status and behavior could be working through the impact of education on poverty which would explain in part why poverty appears insignificant with regard to the self reported health status and the health behavior.
The risk of the individual to be poor is analyzed in table 11. The hypothesis that we want to verify is the impact of education and health and poverty.
Higher levels of education attained (college, high school and university) have a strong and significant impact on poverty. Data confirm that the probability that an individual is poor is reduced for the level of schooling attained.

Table 11 - *Logistic model for economic status. Population living in Essaouira, aged 15+.CBMS survey 2007.*

Variables	Reference category	Beta coeff.	Std. Err.	P. Value	Exp. (Beta)
Self reported health status	Does not suffer from a chronic disease	-.2020	.1871	0.280'	.1651
Gender	Male	-.1332	.1335	0.318	.1286
Age	Age at survey	-.0158	.0045	0.001	-.0069
Reached education	No education				
1- primary education*		-.2851	.1997	0.154	.1068
2- college education		-.7528	.2081	0.000	-.3443
3- high school		-1.2462	.2006	0.000	-.8526
4- higher education		-2.0698	.2906	0.000	-1.4996
Intercept		1.4645	.2822	0.000	2.0182

* Preschool/primary; Number of obs. = 1195; Population size = 77083

We have shown for the urban areas that it is only at relatively high levels of education that the positive benefits of health materialize. In the rural sectors the share of the population reaching these levels of education is so small in our sample that it renders the analysis difficult. The low levels of education reached in Bouaboud do not bring the health improvements seen in Essaouira.

Some concluding remarks

In Morocco, until recently, health was considered as a non-productive sector. Indeed, during the last four decades, the budget affected to health represented, on average, 1% of GDP each year (Boutayeb, 2006). Only 60% of births are attended by skilled health personnel, maternal mortality ratio still reaches 240 per 100,000 live birth and infant mortality rate remains relatively high.
Data and results from different sources highlight that in the kingdom of Morocco there is a clear link between socio economic status - first of all education - and health.

Douidich et al. (2007), in the study of key correlates of poverty from 1994 and 2004 Moroccan poverty maps outline the role of education in combating poverty, with a raising importance of female education. In 1994 only male educational attainment was significantly and negatively correlated with poverty rates; in 2004 female education also plays a poverty reducing role.

The insufficiency of infrastructure access is correlated with higher poverty rates. Rural communes with lower access to electricity, worse access to public transportation (buses, train and cabs), and fewer primary schools experience higher poverty rates.
First of all low income represents an obstacle to get at health services; in addition a lack of knowledge about hygiene, nutrition, and the availability of treatment options, particularly among the uneducated, represent additional barriers that lower access health services.

Moroccan 2003-04 DHS data underline a positive association between the women's education and wealth status and the various pregnancy indicators (for the births during the five-year period before the survey). The relationships are marked in the case both of antenatal care and delivery attendance DHS data reveal great discriminations by wealth quintile in maternal and child health, and in the other socio-economic indicators. Above all DHS data allow us to underline the relationship between socio-economic characteristics of the mother and well-being of their children.

CBMS data and results (here considered for those aged 15+) allow us to highlight strong links between socio-economic conditions and health. Our first results confirm that individuals with lower level of education attainment are more likely to report poor health. As the level of education raises the probability to suffer from a chronic disease decreases. The probability to be sick increases with age and is higher for women than for men. It is also higher if the individual is poor. Education above all shows an impact on self-reported health status and on maternal health. Economic condition is less evident. Our attempt to distinguish between the rural and urban sector raised the issue of the very low level of school attainment in the rural areas.

One channel that seems evident in this study is that education affects health behavior. The impact of poverty on health is not evident at the same degree from all the available sources.
Recognizing that education and poverty are related we also add a variable that takes this interaction into account. During the paper we use poverty as one of the control variable but we give it a special attention due to its link to education achievement but also because of the importance of the variable in terms of policy implication. A better understanding of the links between education, poverty and health and of the pathways through which education and poverty affects health in both the urban and rural sector has obvious relevance in terms of policy (Abdelkhalek, 2005; Cherkaoui, 2006).

The analysis of the pattern of rural poverty between 1994 and 2004 at the commune level, carried out by Douidich et al. (2007), reveals that in the rural context improvements in education (particularly increases in the share of the adult population with lower secondary education) are associated with falling poverty.

Our results, associated with outcomes of the analysis from poverty maps, suggest the need to repeat the analysis and improve it when the survey is conducted on more localities in Morocco and as new data becomes available. Among the others, we intend to deepen the analysis on the way in which education was reached (type of education) on a larger number of observations.

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