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Working Paper 0123

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POVERTY, HUMAN CAPITAL AND GENDER: A COMPARATIVE STUDY OF YEMEN AND EGYPT*

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* The findings, interpretations, and conclusions expressed in this paper are entirely those of the authors. They do not necessarily represent the views of the World Bank, its affiliates, or its Executive Directors

Abstract

This study examines the impact of poverty on human capital development using DHS data from Yemen and Egypt. Our findings show that children from poor households are less likely to attend school and if they attend, they are more likely to drop out and engage in child labor. With regards to health, children from poor households are more likely to be undernourished, more susceptible to disease incidence and less likely to receive medical treatment and immunization. In general girls are more disadvantaged than boys, particularly in poor households. Human capital development in terms of education and health of children is generally worse in Yemen than in Egypt.

Introduction

Good health and educational attainment are the corner stones of high quality human capital. Educational attainment and child health are the two conventional measures that are frequently used to assess the quality of human capital and it's development. Prolonged education as well as good health across the human life span are indispensable ingredients for high quality labor in terms of higher skills and qualifications and consequently higher productivity. Thus, education and health have recently been added by researchers and scientists to the list of basic needs[1]. However, poor families may not have enough resources to provide education and good health for their children. The Conditions that inhibit development in the early years affect the poor more than the rich, reinforcing social inequities. Poor children fall quickly and progressively behind their more advantaged peers (UNICEF 1989).

The objective of this study is to examine the impacts of poverty on children's health status and educational attainment in Yemen and Egypt. To observe the links between poverty, early childhood health status and educational attainment, the target age group will be 0 to 15 years. The hypothesis is children from poor families; particularly girls have lower health status, lower educational attainment, and are most likely to engage in child labor. We will test for wealth and gender inequalities in the educational attainment and the health status of children.

This paper is organized as follows: section one offers findings of earlier studies and a brief background on the two respective countries. Section two presents the data and analytical methods used. Section three focuses on the links between poverty and education and section four discusses the association between poverty and child health. Finally, section five presents concluding remarks and policy recommendations.

1. Background

The literature is rich with studies linking poverty, health and education in various countries and regions of the world, but there is not much work done in the MENA region. An attempt to review the general literature in depth is beyond the limited scope of this study. However, some studies are cited below. Various works have consistently shown that malnutrition and poor educational outcomes are common characteristics of the poor. Nagi (2001) stated that, "[p]overty, unemployment, low income, low education, and ill health and disability generally breed each other". McKeown (1976) and Fogel (1994) attributed improvements in longevity in the 19th century to improvements in nutrition (mainly due to increased income), not medicine or public health[2]. Other studies pointed to the negative impact of malnutrition on educational outcomes. Children who grow up with repeated incidences of malnutrition and illness have a very slight chance of compensatory catch-up in the future. Jensen and Ahlburg (1998) pointed out that, severe mal-nourishment in childhood can cause diminished intellectual functioning in adulthood, and also may harm the performance of children in school. Bundy (1996) stated that, the long-term consequences of events in early childhood for human capital and productivity are difficult to assess directly, but associations have been shown with proxy measures such as physical growth. Short stature, a frequent outcome of many of the most prevalent infections and conditions of early childhood, is associated with late or non-enrollment in school, slow progression through school, and enhanced risk of dropping out. Stunting is also associated with reduced physiological capacity and work output; also reduced physical growth and poor educational achievement both have negative consequences for employability.

According to the World Bank classification of countries, Yemen is one of the poorest countries in the world. Ranked at 171 out of 206 countries Yemen's per capita income is US $350, which is lower than the average income for low-income countries and much lower than the average for other countries in the Middle East and North Africa region (MENA). With a population of 17 million in 1999, the social indicators in Yemen, although improving, remain to be among the lowest in the region and the world. Egypt, on the other hand, is classified among the Lower Middle Income countries, ranking at 120 with a per capita income of US$1,400 – which is 4 times the per capita income in Yemen. A significant proportion of the population in both countries live below the poverty line -- based on the

[1] See for example Nagi, S. 2001 for list of basic needs which includes, food, clothing, shelter, health and education.

[2] Cited in Case, A., 2001

national poverty lines, 19 percent in Yemen and 23 percent in Egypt. However, according to the international poverty line, 36 percent in Yemen and 53 percent in Egypt live below two US dollars a day (World Development Report, 2000/2001).

The first nine years of education in Yemen and Egypt are compulsory. However, formal education in Yemen started only in the early 1970s while in Egypt it began more than a century ago. Despite, major developments in both countries, both countries have not reached universal basic education and have serious gender and urban/rural disparities. For example, in Yemen only 58 percent of school age children (6-15 years) were enrolled in 1997 of which 75 percent were boys and 40 percent were girls. In Egypt, about 79 percent of children in the same age group were enrolled in schools in 1995 of which 84 percent were boys and 74 percent were girls (Demographic and Health Survey- DHS reports for Yemen, 1997 and Egypt, 1995).

Child health indicators in Yemen reflect serious health problems among children under five years of age. More than one in ten Yemeni children will die before their fifth birthday, with almost three quarters of these deaths taking place before the child's first birthday. There are also significant levels of malnutrition. More than half of the children under five are short for their age (stunted), reflecting chronic malnutrition (Yemen DHS, 1997). In Egypt, also about one in ten children die before reaching their fifth birthday with a little more than half of these death taking place before the child's first birthday. Thirty percent of Egyptian children under five are stunted (Egypt DHS, 1995).

2. Data and Methods

Data

The data used in this paper come from Yemen 1997 and Egypt 1995 DHS rounds. The DHS uses standard survey instruments to collect data on household members (sex, age, relation to head, education, work status, etc.) and household living conditions (possession of consumer goods and sanitary and housing characteristics). It also collects information on fertility, mortality and mother and child health from ever married women in reproductive ages (15-49 years). The DHS is based on national samples and it allows for breakdowns by urban-rural and major regions and governorates in both countries. The sample design is similar in both countries and it is a complex sample design (Multi-stage stratified cluster sampling). Both Yemen and Egypt DHS have designated sample weights that should be employed in order to derive nationally representative indicators. In this paper we use the designated weights, and we restrict the analysis to only the usual residents in the sample (De Facto population). The Yemen 1997 DHS has successfully interviewed 10,701 and 10,414 households and ever married women aged 15-49 years, respectively. The Egypt 1995 DHS has successfully interviewed 15,567 and 14,779 households and ever married women aged 15-49 years, respectively.

Methods

The standard of living index

In absence of information on variables needed for computing conventional measures of poverty, namely household income and consumption data, use of alternative measures of living standards and welfare has become increasingly documented in the recent literature. These measures are derived mainly from information on household ownership of durable goods and assets. A number of studies have recently used the principle component technique to extract a standard of living index from a set of household durable goods and assets for a group of developing countries participated in the DHS rounds (e.g. Gwatkin et al., 2000 and Filmer D. and Pritchett L., 1998). Filmer and Pritchett (1998), argue that an index constructed from the questions about household assets and housing characteristics (e.g. construction materials, drinking water and toilet facilities) works as well, and arguably better, than income and consumption as a proxy for household long-run wealth. The aforementioned studies have both used the first principle component as the proxy for the standard of living. Filmer and Pritchett (1998), argue that the first principle component is the linear index of the variables used in the factor analysis and it captures the most common variation among them.

The DHS data we are using in this study lacks information on household income and consumption. However, in both countries under study good information on household ownership of durable goods have been collected through both the household and the respondent's questionnaires. The respondent's questionnaire has collected information on a far larger set of consumer goods as compared to the household questionnaire. In this study we use only the information on items included in the household

questionnaire since the education data is collected as part of household roaster questions.

We shall note that the DHS questionnaire did not distinguish between ownership and use of the consumer durables, hence one could argue that information on the use of these durable goods is important as well, since use creates utility. Unfortunately, it is only the information on ownership that is made available through the DHS questionnaire. Nevertheless, empirical evidence from the studies cited above provides a strong ground for the reliability of an index of wealth generated from the ownership of consumer goods.

In this paper, we use a similar approach for constructing a standard of living index (data reduction based on the principle component analysis), but a different methodology for the build up of the final index (for details on the items used and the process of the construction of the final index see Appendix A). We believe that the consumer goods or items used in the principle component analysis in this paper are economically valuable and reasonably sufficient to reflect differences in household wealth and living standards.

The mean and standard deviation values of the final index are presented in Appendix B. For the purpose of the analysis in this paper, the final index is grouped into three equal categories ranging from the lowest to the highest, where the lowest third of values designates the poor households, the second third designates the middle and the top third designates the rich households. By this classification strategy we adopt a relative poverty perspective in which we assume that the lowest third of the standard of living index distribution are 'poor' by definition.

Measures of educational attainment and child health

We focus our analysis in this paper on two broad dimensions of education, the school enrolment and the school retention. We limit our analysis to the sample of children ages 6-15 years, that is the age range for basic education. We further classify the total sample of children into two categories: ever been to school (currently enrolled, enrolled in the past but dropped out), and never been to school. For children who have ever been to school we create two variables, one consisting of those currently enrolled and those who dropped out among children 6-15 years, and the other variable consisting of currently enrolled, dropped out and working, and dropped out but not working. The latter variable is designed for an attempt to examine whether there is any association between drop out and child labor. Due to lack of data on the work status of individuals below age 10, we will limit our analysis to the sample of children aged 10-14 years. Age 15 is excluded since it represents the official age of entry into the labor force.

We additionally calculate drop out rates at the end of the primary stage (Grade 6) and the end of the basic education stage (Grade 9). Since children in our sample who are still in school are of different ages, and thus some are at the beginning of their schooling experience and others are at a relatively later stage, we use life table technique to compute drop out rates after accounting for the censoring of events. That is we observed drop out events only at the time of the survey and we don't know what will happen thereafter. We employ the life table technique assuming that the sample of the children 6-15 years represent a synthetic cohort in which the children at early ages would follow the same risk of drop out experienced by children at later ages (i.e. near to completing the basic education stage).

With regard to measures of child health for children under age 5 years, we focus our analysis on: first, child morbidity (prevalence of diarrhea, fever and cough with difficulty breathing – a symptom of acute respiratory infection particularly pneumonia); second, curative care provision for children who experience episodes of child morbidity (demand for medical treatment of diarrhea and cough and fever); third, preventive care (demand for child immunization); and finally, child nutritional status (prevalence of malnutrition). Prevalence of child morbidity is measured by the DHS to be within a period of two weeks before the survey date. Demand for medical treatment in this paper is restricted to medical treatment received from a health facility (public or private clinic or a hospital).

Measures of child malnutrition in the DHS are derived for children under five years based on comparisons with the standard reference population developed by the United States National Center for Health Statistics (NCHS) and accepted by the World Health Organization (WHO) and the United States Center for Disease Control (CDC). Two measures of malnutrition will be used in this paper. First, the prevalence of stunting, which refers to the percent of children whose height-for-age is below minus two standard deviation of the reference population. Stunting of a child's

growth may be the result of a failure to receive adequate nutrition over a long period of time or of the effects of recurrent or chronic illness. Stunting, therefore, represents a measure of the outcome of under nutrition in a population over a long period. Second, the prevalence of underweight, which refers to the percent of children who's weight-for-age is below minus two standard deviation of the reference population. A child can be underweight for his/her age, because he/she is stunted, because he/she is wasted (weight-for-height below –2 SD of the reference population), or because he/she is both stunted and wasted (DHS reports for Yemen 1997 and Egypt 1995). And finally, child immunization is measured by full immunization (all doses) against the major preventable diseases of childhood. The WHO guidelines for childhood immunization call for all children to receive BCG vaccination against tuberculosis; three doses of DPT to prevent diphtheria, pertussis and tetanus; three doses of polio vaccine; and a measles vaccination (DHS reports for Yemen 1997 and Egypt 1995).

All these variables of child education and child health will later be examined in relation to the standard of living index descriptively using simple percentage distribution. We will further explore the association between poverty and gender (represented by sex of child and sex of head of household) in relation to child education and health measures. We will then examine the net effect of poverty (controlling for the effect of other confounding variables) through a multivariate analysis. Description of the models to be estimated is provided below.

The Model

$H_{ij} = h(C_{ij} , X_{ij} , Z_j , \Omega_j , e_{ij})$

Where the subscript i denotes the child, and the subscript j denotes the household characteristics or the mother characteristics (in case of health measures). Then, H_{ij} is a measure of any of the child education and child health indicators. X_{ij} is a vector of head of household or parents specific variables, Z_j is a vector of household variables, Ω_j accounts for unobserved family fixed effects common to all siblings (e.g. preferences, knowledge, and access, related to education and health), C_{ij} is a vector of child specific variables, and e_{ij} is the individual specific errors. Appendix B provides names of the variables used in the model with information on the sample size, mean or percent and standard deviation for each.

The above model specifies a causal link that runs from poverty to human capital and not the opposite. But, one could argue that household wealth and children's human development attributes are likely to be determined simultaneously. While this argument could absolutely be true and valid over a long time period, yet the current inability of poor families to afford education and health care costs, their need for children as unpaid family labors or as labors who could generate income, all point to causation from poverty to human development.

The dependent variable for educational outcomes is classified into three mutually exclusive and exhaustive categories, namely the currently enrolled (coded as zero), the dropouts (coded as one), and the never been to school (coded as two). Given the trichotomous nature of this variable we fit a multinomial logit model in which the currently enrolled are kept as reference category. We are mainly interested in examining the impact of poverty and gender on the likelihood of school drop out and never attending school, after controlling for the effect of other important correlates. By this classification we do not differentiate between drop out at early or late stages of the basic education, but rather, merely a drop out before completing the basic education level.

An alternative modeling strategy that could be more informative and detailed is to fit a Heckman two-equation model:

1. The participation equation: Can be estimated using the full sample of children, who are scored 1 if at school, and 0 if not at school by fitting logit or probit models.
2. The duration equation: Which use the completed years of schooling as the dependent variable, can be estimated simultaneously using only data for those children currently at school and those who attended school before dropping out.

The major problem with this procedure is the truncation (censoring) of events, i.e. children are observed only once at the time of the survey and we don't know what will happen to their schooling status later in life, particularly the very young who just entered school. One solution to this problem is to normalize the completed years of schooling with age of child, and another solution is to apply a multivariate life table analysis. The most appropriate model to use here is the proportional hazard, with completed

years of schooling used as dependent variable and age of child used as time dependent explanatory variable along with other covariates. Another potential solution is to use data for cohorts of children aged 16 and above, who presumably already passed the basic education age. However, this solution may entail an implicit assumption that the educational experience of older cohorts is the same as the educational experience of the current cohorts, in order to draw any conclusions.

Given the sophistication and complexity of the latter model we relegate its use for future work on this issue and we will, in this paper, use the multinomial logit model.

For children ages 10-14 years who have ever been to school, we code those who are currently enrolled with a value zero, and those who dropped out and working with a value one and those who dropped out but not working with a value two. The currently enrolled in either case are kept as reference category and thus will be omitted from the multinomial logit results.

All measures of child health will be used with dichotomous codes taking a value of one in each case of the following: a child had diarrhea, had cough, received no treatment for diarrhea, received no treatment for cough, not fully vaccinated, stunted, and if underweight, and will otherwise be coded with a value of zero in each case.

Given the fact that we are estimating models using data with multiple siblings in a household we use Huber's 1967 heteroskedasticity correction to control for the family effects common to all siblings and the cluster-based sampling design used in both Yemen 1997 and Egypt 1995 DHS. We simply use the robust standard errors instead of the ordinary ones.

3. Poverty and Education

This section addresses the links between poverty and education using simple cross tabulations. While causality cannot be inferred at this level of analysis, the tabulations are nonetheless telling of the stark differences in the educational status of poor and rich children. Differentials are observed by urban/rural location and by gender (using the sex of the child and the sex of the head of household). Moreover, the relationship between poverty, education and child labor are addressed.

Table 1 shows the schooling status of children ages 6 to 15 by household standard of living in Yemen and Egypt. The table shows striking trends in poverty. Consistently, the poor are worse off than the rich in terms of school enrollment and retention. In Yemen, only 39 percent of school age children from poor households attended school in 1997 compared to 76 percent of those who come from rich households. The ratio of poor to rich children among those who were enrolled in school in Yemen was 0.5. That is in Yemen, rich children are almost twice as likely to be enrolled in school as poor children. In Egypt, while the gap in enrollments between poor and rich children is smaller than in Yemen, it is nonetheless a significant gap at 0.7. The gap is starker among children who never attended school. In Yemen, more than half of school age children from poor households have never been to school (54 percent) compared to 18 percent of those from rich households. That is, children from poor households are three times more likely to never attend school as children from rich households. While school enrollments among the poor in Egypt are far better than even the middle class children in Yemen, the gap between the poor and rich children who never attended school is twice as big as in Yemen as shown by the poor/rich ratio of 7.6.

Data on school retention shows similar trends. Children from poor households are much more likely to drop out of school than those from rich households – in Egypt more than in Yemen. Almost a quarter of children drop out of school after the primary level (grade 6), in Yemen and more than a third drop out by the end of grade nine. These totals conceal significant differences among the poor and rich: 31 percent of poor children drop out after grade 6 and almost half (49 percent) drop out by the end of grade 9. In Egypt, although overall dropout rates are less than those in Yemen (but are also significantly high), the gap between the rich and poor is greater whereby poor children are more than three times as likely to dropout at the end of the 6^{th} grade and 9^{th} grade as rich children.

Generally, basic education indicators in both Yemen and Egypt are low, compared to other countries in the region and to other low-income countries. While poverty may be associated with lower enrollment and retention levels, there appears to be other major factors, which constrain universal basic education in the two countries. In Egypt, where formal education started more than a century ago, and basic education is both

compulsory and free, universal basic education has not yet been achieved -- even among the rich.

Gender gaps in school enrollment are prevalent among the poor, the middle class and the rich in both Yemen and Egypt as shown in table 1. Girls' school attendance is lower than boys' consistently but the gap decreases with higher living standards. Girls from poor households are the most disadvantaged. In Yemen, only 17 percent of school age girls from poor households attended school in 1997; 78 percent have never been to school. In Egypt, where enrollments are generally higher, only half of school age girls from poor households were enrolled in school in 1995; more than a third have never attended school. The gender gap among children from rich households is also significant: 64 percent of girls were enrolled in school compared to 87 percent of boys. Even among the rich, a quarter of girls have never attended school, which suggests that perhaps, factors other than poverty constrain girls' education in Yemen.

Similarly, girls are more likely to drop out than boys, especially among poor households, but there are different patterns between the two countries. In Yemen, the gap between girls and boys who dropped out increases with the level of living standard. That is, the gender gap among drop-outs was higher among rich households than among poor ones – girls in poor households are twice as likely to drop out as boys whereas in rich households girls are more than 4 times as likely to drop out as boys. This supports the claim made above that factors other than poverty may be constraining girls' education in Yemen. In Egypt the gender gap among students who dropped out is significant only among the poor, suggesting that dropping out of school may be associated with poverty.

Observing school enrollments and retention by the sex of the head of household also shows an interesting pattern. In Yemen, children from female-headed households (FHH) are more likely to attend school than children from male-headed households (MHH), consistently, regardless of the level of living standard. The proportion of children who dropped out is also consistently lower among FHH than MHH across all levels of living standards. This may suggest that women in Yemen give greater weight to education than men. In Egypt, Children from FHH are more likely to go to school than children from MHH but those who come from MHH are more likely to stay. This is supported by the fact that the proportion of children who dropped out of school in Egypt was higher among FHH than MHH as shown in Figure 2 below. However, we shall note that, the results on female headship in this section and the later ones should be interpreted with caution. FHHs are likely to be an extremely heterogeneous group and may contain (at least) the following: wives whose husbands have migrated and who receive remittances, abandoned wives (who do not receive remittances), and widows (with varying numbers of children). The data at hand does not permit for such finer distinctions to be drawn within the category of FHHs, and hence any conclusions based on the current FHH variable are premature.

Figure 3 shows enrollments and dropout for school age children in Yemen and Egypt by urban/rural residence. Children from rural areas in both Yemen and Egypt are less likely to attend school than children from urban areas. The rural poor are the most disadvantaged: in Yemen, more than half of the school age children in rural areas have never been to school, and only about 40 percent were enrolled in 1997. Even among rich households in rural areas, only two-thirds of children were enrolled in school. School enrollments tend to increase with higher living standards such that children from rich households are more likely to be enrolled in school than children from poor households. However, as with the gender gap, the urban/rural gap tends to also increase with the standard of living – the gap among rich households in Yemen in 1997 was more than 4 times the gap among poor households. Overall, Egypt has a smaller gap in enrollment between children from rural and from urban households, but there is no clear relationship between the standard of living and the urban/rural gap in enrollments.

Figure 3 also shows the percentage of students who dropped out in Yemen and Egypt by urban/rural residence. Interestingly, in both Yemen and Egypt, children from urban poor households are the most likely to drop out of school. About one fifth of urban poor children have dropped out of school in Yemen and in Egypt – four times more than children from urban rich households.

The link between household living standard, school drop out and child labor is shown in Figure 4 below for Yemen and Egypt. The figure shows a significant proportion of children who drop out in Yemen and Egypt engage in child labor – a fifth in Yemen and a quarter in Egypt. In Yemen, drop

outs from poor households are three times more likely to work than children from rich households and over a third of Yemeni children from poor households who dropped out were working in 1997 compared to about one fifth among those who have never been to school – thus suggesting a link between poverty and child labor. In Egypt there is no clear association between the household standard of living and child labor. A quarter of dropouts from poor households and almost a third of those from rich households worked in 1995.

Multivariate Analysis

The above analysis suggests the existence of certain gross associations between poverty and several aspects of education. In this subsection, we examine the net impact of poverty on child schooling status after controlling for important child and household variables. The child variables include sex and age, and the household variables include age, sex and education of head of household, and urban/rural residence. The age of head of household is used as a continuous variable while the others are categorical. The dependent variable used consists of three categories: 'currently enrolled in school' (the comparison group), 'dropped out', and 'never been to school'. The reference categories for the independent variables are: male for sex of child, 'rich' for standard of living, 'male' for household headship, 'no education' for household head education, and 'urban' for residence.

Table 2 shows the results of the multinomial logistic regression of schooling status of children 6 to 15 years in Yemen, 1997 and Egypt, 1995. The table shows that children from poor households are significantly (at the 1 percent level) less likely to attend school in both countries. Girls in both Yemen and Egypt are significantly more likely not to attend school. However, children from female-headed households are significantly more likely to attend school. The table also shows that poverty appears to be significantly associated with an increased risk of dropping out from school in both countries. Females tend to be at a higher risk of dropping out in Yemen but not in Egypt. Moreover, children from female-headed households are significantly more likely to drop out in Yemen but not in Egypt.

Given the significant association of poverty to schooling status shown above, we stratify the analysis by poverty. Table 3 shows the logistic regressions results of school dropout and non-enrollment among children from poor households. The table shows that among poor households in both countries, girls are at a higher risk of not attending school; if they attended school, they are at a significantly higher likelihood of dropping out. It is worth noting that in the above analysis the likelihood of female drop out in Egypt was not significant whereas it is highly significant (at 1 percent level) when the analysis is restricted to the poor. Similar to the findings of Filmer, 2000 in other countries, the observed patterns in female school dropout is best described as "'generalized' female disadvantage" in Yemen and "female disadvantage only for the poor" in Egypt.

In Yemen, children from poor female-headed households are significantly less likely to drop out and less likely not to attend school as well. In Egypt, children from poor female-headed households are significantly less likely to attend school, whereas the likelihood of dropping out is not significant. The greater likelihood of girls entering and staying in school among poor female-headed households in Yemen lends support to the argument stated earlier that female heads of households tend to value the education of their children more than male heads. This may suggest a positive link between female empowerment and school attendance.

Other variables, which have a significantly positive association with school enrollment and retention, include the education of the head of household, particularly at the level of secondary and above, and the age of household head in both countries. Older heads of poor households tend to send their children to school more than younger heads in Yemen. In Egypt, children from poor households headed by younger persons tend to drop out more than those from households where the heads are older. Further research is encouraged to look into why young heads of households in Yemen tend to not send their children to school.

Observing the links between poverty, education and urban/rural residence, results from Table 3 show that children from rural poor households are at a significantly higher likelihood of not attending school, in both Yemen and Egypt. However, in Egypt, rural poor children are significantly less likely to drop out of school, indicating that children from urban poor households are at a higher risk of dropping out.

4. Poverty and Child Health

In this part we provide a detailed analysis of the association between the household standard of living and a selected set of child health indicators. We highlight the differentials in child health across the three levels of the standard of living and the extent of inequality and vulnerability of the children living in poor as compared to rich households. We further discuss gender and urban/rural inequalities in child health across the different levels of household standard of living. Five important child health indicators were chosen for a detailed analysis in relation to poverty, namely child morbidity (prevalence of diarrhea, fever and cough), medical treatment of child morbidity, child immunization and child nutritional status (prevalence of stunting and underweight). We use simple descriptive analysis in which we show only gross level of association, with no inference about the possible causality between the variables under study.

Table 4 shows the distribution of child health indicators for children under age 5 years, by household standard of living for Yemen 1997 and Egypt 1995. As shown, prevalence of child morbidity among Yemeni children consistently decreases as the standard of living increases. High prevalence of child morbidity among the poor is clearly seen in Yemen with a substantial value for the ratio of inequality between the poor and the rich (1.3 or more). Poor to rich differences in child morbidity are non-existing among Egyptian households. The overall prevalence of diarrhea among children under 5 years is much higher in Yemen (28 percent) as compared to Egypt (16 percent), with a prevalence rate among poor Yemeni households (32 percent) that is as twice as much as the one observed for Egyptian households (16 percent).

With regard to medical treatment of child morbidity, profound poor to rich differences are observed in the percentage of children who received treatment among Yemeni households for both the treatment of diarrhea and cough and fever, whereas among Egyptian households, substantial differences between poor and rich are observed only for treatment of cough and fever. A plausible explanation for why clear poor to rich differences in treatment of diarrhea are non existent among Egyptian households is perhaps attributable to the widespread knowledge of use of the packages of oral dehydration therapy (ORT) and the recommended home fluids (RHF) which provide cheap and very effective treatment. While knowledge of use of ORT and RHF among Egyptian mothers with a birth in the five years preceding the DHS is almost universal (98 percent), only 75 percent of Yemeni mothers reported knowledge of use of ORT and RHF (DHS reports of Yemen 1997 and Egypt 1995). Overall, only 28 percent of Yemeni children who had diarrhea and cough or fever had received medical treatment, whereas nearly 50 percent or a little more of Egyptian children have had a medical treatment.

Levels of child full immunization among children aged 12-23 months are terrifyingly low among Yemeni children (27 percent), with a huge gap when compared to levels of immunization among Egyptian children (77 percent). In both countries, levels of child immunization increase as the standard of living increases, with strong poor to rich level of inequality in Yemen (poor to rich ratio of 0.27) as compared to Egypt (poor to rich ratio of 0.81). It is worth noting that, children from poor Yemeni households are at the deepest level of deprivation from getting immunized, with only 12 percent of children being fully immunized.

High levels of child malnutrition are observed among Yemeni children, with around 50 percent of children under age 5 being either stunted or underweight. Comparatively, levels of malnutrition in Egypt are much lower, with 35 percent of Egyptian children being stunted and only 15 percent being underweight. Apart from the level of underweight among Egyptian children, levels of malnutrition are considerably high in both countries. In both countries, levels of malnutrition steadily decrease as the standard of living increases, with identical extent of poor to rich inequality (poor to rich ratio of 1.3) except for the poor to rich inequality in prevalence of underweight among Yemeni children (poor to rich ratio of 1.5).

Gender and Urban/Rural Inequalities in Child Health

We examine the gender inequalities in child health through two gender variables; first the sex of child and second the sex of head of household. Preliminary analysis shows that gender difference in child morbidity are non-existent, i.e. susceptibility to episodes of childhood diseases is not associated with gender (results not shown). However, other child health variables (curative care, preventive care, and nutrient intake) that are more related to human behavior show evidence of gender inequalities.

Figure 5 shows the treatment of diarrhea, cough and fever by sex of child and household standard of living for Yemen 1997 and Egypt 1995. The figure shows that female children are less likely to receive medical treatment. Female children from poor households are at a greater level of deprivation from receiving medical treatment when compared to their peer males of poor households or to their peer females of rich households. If we look at gender inequalities along a continuum of two extreme ends, where the lower end represents females of poor households and the upper end represents males of rich households, we find that the gender gap is widening. The percent of females from poor households who received medical treatment is less than one fifth in Yemen and a little higher than two fifth in Egypt.

Figure 6 shows the treatment of diarrhea, cough and fever by sex of head of household and household standard of living for Yemen 1997 and Egypt 1995. The figure shows a similar pattern of gender inequalities by sex of head of household in the case of Yemen, where children from poor households that are headed by females have much lower chances of receiving medical treatment. At the lower end of the continuum, only around 9 percent and 15 percent of Yemeni children from poor households headed by females received medical treatment for diarrhea and cough or fever respectively, compared to 38 percent and 41 percent of children from rich Yemeni households headed by males, in respective order. Interestingly, on the contrary, a higher percentage of Egyptian children from poor households headed by females received medical treatment for child morbidity as compared to children from poor households headed by males.

Figure 7 shows the treatment of diarrhea, cough and fever by residence and household standard of living for Yemen 1997 and Egypt 1995. It is obvious that children from rural poor households are less likely to receive medical treatment for child morbidity when compared to their peers of urban poor households or rural rich households. Disparities between the two ends of the residence and standard of living continuum (rural poor VS urban rich) are greater in Yemen.

Preliminary analysis shows no clear differences in the levels of child immunization by sex of child or by sex of head of household, except for Yemen where poor female-headed households show higher levels of child immunization as compared to poor male-headed households. Children from rural poor households in both countries are less likely to receive immunization, with greater disparities observed for children from Yemeni rural poor households (see Figure 8).

There are no obvious differences in prevalence of malnutrition by sex of child within the poor or the rich categories. Similarly, no obvious differences are observed by sex of head of household for the prevalence of stunting in Yemen and the prevalence of underweight in Egypt, whereas a slightly higher prevalence of underweight and stunting among children from poor female-headed households are observed for Yemen and Egypt, respectively. Interestingly, among the rich category, children from female-headed household show lower prevalence of malnutrition when compared to male-headed households in the same category (see Figure 9).

Multivariate Analysis

In this subsection, we examine the net impact of poverty on child health status after controlling for important child and household variables. In this set of regressions, we used the same variables used in the education multivariate analysis (age and sex of child, age and sex of head, and urban/rural residence); parents' level of education was considered instead of the education of head of household[3]. The age of child in this section is in months with 0 to 5 months being the reference category. With regard to parents' education, the reference category is no education.

Table 5 shows the logistic regression results of child morbidity and treatment in Yemen and Egypt. The table reveals a significantly high positive association between poverty and child morbidity in Yemen. On the other hand, poverty is significantly negatively associated with medical treatment for diarrhea and cough in Yemen. Whereas in Egypt, the negative association between poverty and medical treatment is significant only for treatment of cough. That is to say, children from poor households in Yemen have a lower chance of receiving medical treatment for episodes of both diarrhea and cough but in Egypt they only have a lower chance of receiving treatment for cough. As suggested earlier, the widespread knowledge of

[3] Data on child health was obtained from the mother questionnaire where questions on parents' education were asked.

ORT and HMF use among Egyptian mothers may explain the statistical insignificance of the association between poverty and treatment of Diarrhea.

Although, the incidence of diarrheal disease and cough is significantly lower among females as compared to males in both Yemen and Egypt, there are significant gender disparities in medical treatment in Egypt. Females in Egypt are significantly less likely to receive medical treatment when they get sick, whereas in Yemen, there are no significant gender disparities. Observing the association between poverty, morbidity and treatment by the sex of the head of household shows that children from Yemeni female-headed households have a significantly higher likelihood of contracting cough and a significantly lower likelihood of receiving medical treatment for diarrhea, whereas children from Egyptian female-headed households have a significantly higher chance of receiving medical treatment for diarrhea.

Table 6 shows the logistic regression results of child immunization and nutritional status among children less than 5 years in Yemen and Egypt. Children from poor households have a significantly lower likelihood of being immunized than children from rich households in Egypt and Yemen. Children from poor households have an increased risk of malnourishment in both countries, particularly stunting. The association between poverty and malnourishment appears to be stronger in Yemen than in Egypt. With regards to gender disparities, female children are significantly more likely to be underweight in Yemen and stunted in Egypt. Children from female-headed households have a significantly lower chance of being malnourished in Yemen but not in Egypt.

Given the significant association found between poverty and child health indicators discussed above, we further stratify by restricting the analysis to poor households and we focus on the indicators which showed statistically significant association with poverty in table 6 above. Table 7 shows the logistic regression results of child morbidity and treatment for children under 5 years from poor households. The table shows females from poor households in Yemen have a significantly lower chance of contracting cough, and in both Yemen and Egypt they have a significantly lower chance of receiving medical treatment for cough. Similarly, females from poor Yemeni households are significantly less likely to receive treatment for diarrhea. Children from Yemeni poor households, with ages between 6 to 48 months have a significantly elevated risk of contracting diarrhea and cough. One likely explanation for this finding is that children less than 6 months of age are most likely to be exclusively breast fed which reduces their exposure to contaminated food or drinks, and increases their immunity against infectious diseases. There is no clear significant pattern of association between age of child and medical treatment in either country. Among poor households, there is a significantly positive association between the education of mothers at the primary level and the treatment of diarrhea among children in Yemen and the treatment of cough in Egypt. Among poor households, there does not appear to be statistically significant urban/rural disparities in child morbidity and treatment.

Table 8 shows the logistic regression results of nutritional status of children less than 5 years of age from poor households in Yemen and Egypt. The table shows that the sex of the child does not have a statistically significant association with child immunization and malnutrition among poor households. Generally, stunting among children from poor Yemeni households significantly decreases with age. Similarly, children ages 6 to 23 months from poor households are significantly less likely to be underweight in Yemen. In Egypt, the pattern of stunting among children of poor households is mixed. While children ages 6 to 11 months are significantly less likely to be stunted, children ages 12 months and over are significantly more likely to be stunted. This also may be associated with the nutritional benefit of breastfeeding among poor households. The relatively stronger negative association between age and malnutrition for children ages 6 to 23 in Yemen as shown by relatively larger size of the coefficients may also lend support to the benefits of breastfeeding. Table 8 also shows that children from poor female-headed households in Egypt have a significantly higher likelihood of stunting. Once again, mother's education appears to be insignificantly related to immunization and malnutrition of children from poor households in Yemen, while it is significantly related to immunization and stunting of children in Egypt. Father's education on the other hand is significantly positively associated with immunization of children from poor households in Yemen but is not significant in Egypt. However, children from rural poor households are significantly less likely to be immunized in both Yemen and Egypt and are significantly more likely to be stunted in Egypt.

5. Concluding Remarks and Policy Implications

In this paper, we examined the association between poverty and human capital development with special attention to gender, using DHS data from Yemen and Egypt. As conventional measures of poverty are lacking, we developed a standard of living index from household consumer goods using the principle component analysis. The index was classified into three equal categories with the lowest third classified as 'poor' the second as 'middle' and the top third as 'rich'. We approached the analysis through bivariate and multivariate methods. The human capital indicators we used include child education (school enrollment and retention) and child health (child morbidity and treatment, immunization, and malnutrition).

With regard to educational attainment, the results show that the poor are consistently worse off than the rich in terms of school enrollment and retention. Children from poor households are less likely to enroll and more likely to drop out. Girls from poor households are the most disadvantaged, particularly in Yemen where more than three quarters of girls from poor households have never attended school. Although in Egypt school enrollment is higher than in Yemen, yet only half of school age girls from poor households attended school. The results suggest that female headship; especially in Yemen improves the likelihood of children's school enrollment and retention. Moreover, children from rural households are at a significantly higher likelihood of not attending school in both Yemen and Egypt. However, children from urban poor households in Egypt are at a higher risk of dropping out. An investigation of the links between poverty, schooling and child labor reveals that child labor is more prevalent among dropouts than among children who never attended school. This may suggest that children from poor households drop out of school for work.

Our findings on the links between poverty, child health and gender show that children from poor households in Yemen have a higher risk of child morbidity and are less likely to get medical treatment. No significant association between poverty and child morbidity is observed for Egypt, however, a negative association between poverty and medical treatment of cough is found. The widespread knowledge of ORT and HMF use among Egyptian mothers may explain the weak association between poverty and treatment of diarrhea. Significant gender disparities in medical treatment are found in Egypt but not in Yemen. Although female headship in Yemen is found to be positively associated with educational attainment, it is found to be positively associated with child morbidity and negatively associated with medical treatment.

The absence of poor/rich differences in child morbidity in Egypt may perhaps be attributed to seasonality of the diseases. While seasonality of the disease episodes could definitely affect the incidence rate of the disease, however we do not know whether it also affect the poor and the rich differentially or not. To control for the potential impact of seasonality we need to adopt a different survey design that: (i) interview households in a given cluster throughout the year, or (ii) apply a multi-visit questionnaire to each household.

Children from poor households have a significantly lower likelihood of being immunized and a higher risk of malnutrition than children from rich households in both Yemen and Egypt. It is noteworthy to mention that the level of child immunization in Yemen is terrifyingly low – About a quarter of children ages 12 to 23 months and only 12 percent of those from poor households were fully immunized. With regard to gender disparities, female children are significantly more likely to be underweight in Yemen and stunted in Egypt. Children from female-headed households have a significantly lower chance of being malnourished in Yemen but not in Egypt. When we stratify by poverty, we find that females from poor households in both Yemen and Egypt have a significantly lower chance of receiving medical treatment. Children from Yemeni poor households with ages 6 to 48 months have a significantly elevated risk of contracting diarrhea and cough as compared to children ages less than 6 months. Moreover, stunting among children from poor households appears to increase with age. This may point to the benefit of exclusive breastfeeding at age 0 to 5 months. The results also reveal that while mother's education may have a positive impact on immunization and a negative impact on malnutrition among poor Egyptian households, no significant relationship was found in Yemen. Children from rural poor households are less likely to be immunized in both countries. If poor nutrition does indeed impair educational performance, these high rates of malnutrition (particularly stunting) and child morbidity in the first five years of life imply that a large proportion of children in Yemen and Egypt begin school with a serious learning handicap.

These findings have serious and extensive policy implications for Yemen and Egypt. Genuine national efforts to increase education enrollment in general and for girls in particular are urgently needed in both countries, especially in Yemen. Priority should be given to children from poor households, particularly girls. Supply policies should be well targeted and incentives should be put in place to encourage poor families to send their children to school. Moreover, constraints other than poverty should be identified and addressed. Experience has shown that an active role of the community is critical in the design and implementation of educational policies. Policy incentives need to go beyond enrollment targets to reduce dropout rates and child labor.

Policies that empower women are also necessary for poverty reduction and human capital development. Policies should target women -- especially female heads of households and women within poor households -- by enhancing their access to resources and programs such as literacy programs, credit schemes, training, etc.

Given the underlying benefits of breastfeeding particularly for the poor, campaigns that promote exclusive breast-feeding for the first five months of life for children and prolonged breastfeeding with proper supplementation up to the 2nd year of the child's life are needed. Yemen could learn from the positive experience Egypt had with ORT and HMF as low cost technology for treating diarrheal diseases. Moreover, Yemen needs to seriously accelerate efforts to expand immunization coverage.

References

Bundy D. 1996. "Synergistic Effects of Nutrition, Health and Education." Early Child Development: Investing in the Future Conference. Atlanta, Georgia, 8-9 April.

Case, A. 2001. Health, Income, ad Economic Development. Annual Bank Conference on Development Economics. World Bank, Washington, D.C.

El-Zanaty et al. 1995. Egypt Demographic and Health Survey 1995. Calverton, Maryland: National Population Council [Arab Republic of Egypt] and Macro International Inc.

Filmer, D. and L. Pritchett. 1998. "Estimating Wealth Effects Without Income or Expenditure Data -- or Tears: Educational Enrollment in India." mimeo, DECRG, World Bank, Washington, D.C.

Glewwe, P. and E. King. 2001. "The Impact of Early Childhood Nutritional Status on Cognitive Development: Does the Timing of Malnutrition Matter?" *The World Bank Economic Review*, Vol. 15 no. 1: 81-113.

Gwatkin, D. R. et al. 2000. "Country Reports on Socio-Economic Differences in health, Nutrition, and Population." World Bank, Washington, D.C.

Huber, J. 1964. "Robust Estimation of Location Parameters." *Annals of Mathematical Statistics*, Vol. 35.

Jensen, E. and D. Ahlburg. 1998. "Within-family Resource Pressures and Child Health in Indonesia, Korea and the Philippines." East West Center, Honolulu.

Nagi, S. Z. 2001. *Poverty in Egypt: Human Needs and Institutional Capacities*. Lexington Books, USA.

_____. 2001. "Partners in Health and Poverty." SAGE publication, Vol. 44 no. 1, March 2001.

World Bank. 2001. World Development Report, 2000/2001. Oxford University Press.

Yemen Demographic and Health and Maternal and Child Health Survey 1997. Calverton, Maryland: Central Statistical Organization [Republic of Yemen] and Macro International Inc.

Figure 1: School Enrollments and Drop out by Sex and Household Standard of Living, Yemen, 1997, Egypt, 1995 (Children 6-15 years)

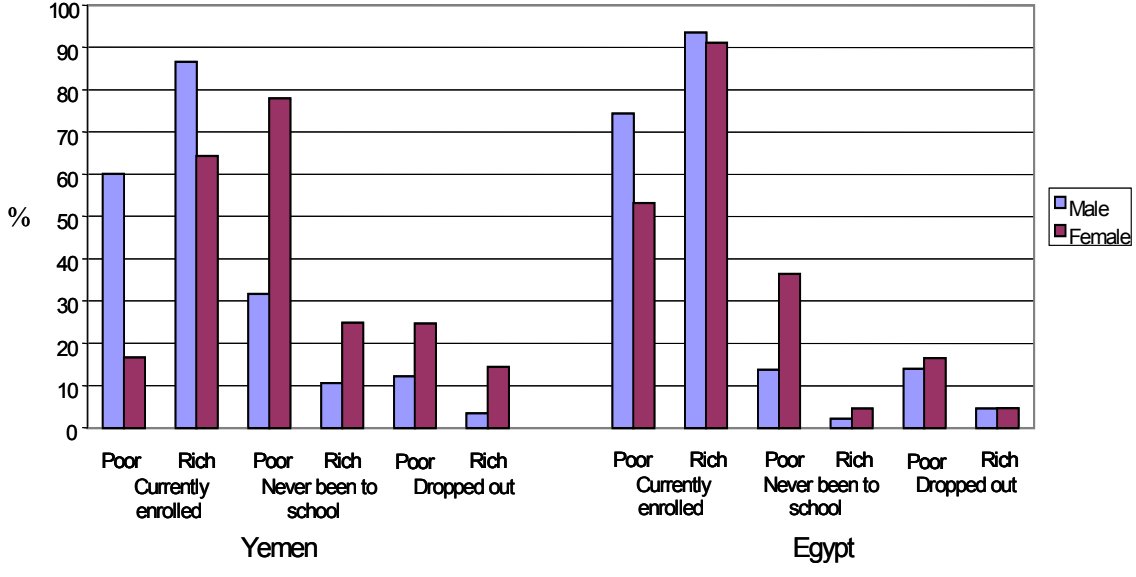

Figure 2: School Enrollments and Drop Out by Sex of Head of Household; and Standard of Living, Yemen 1997, Egypt 1995; (Children 6-15 years)

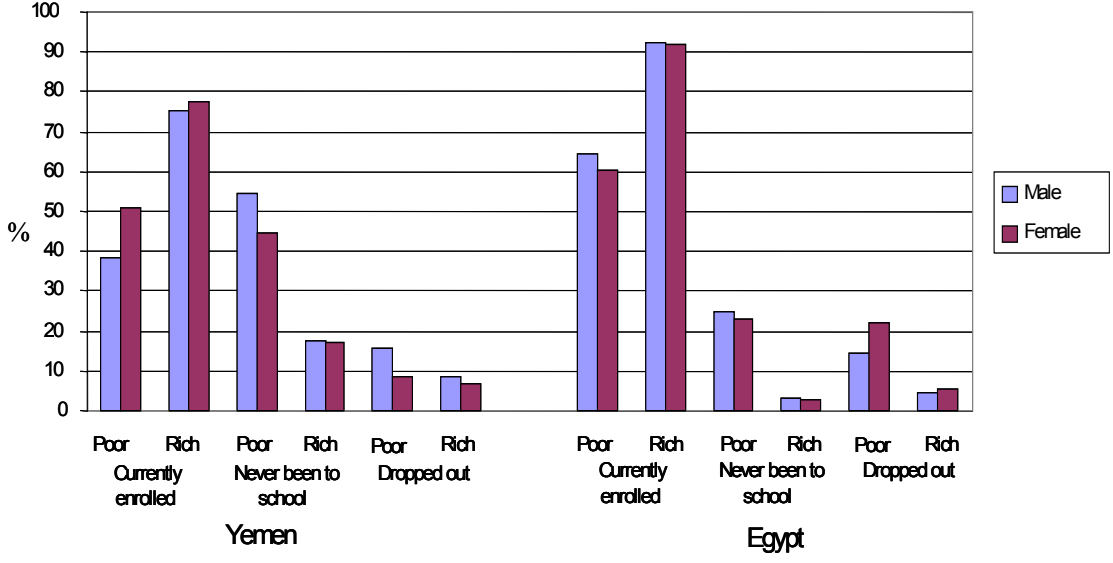

Figure 3: Enrollments and Drop out by Urban/Rural Residence, Yemen 1997, Egypt, 1995; (Children 6-15 years)

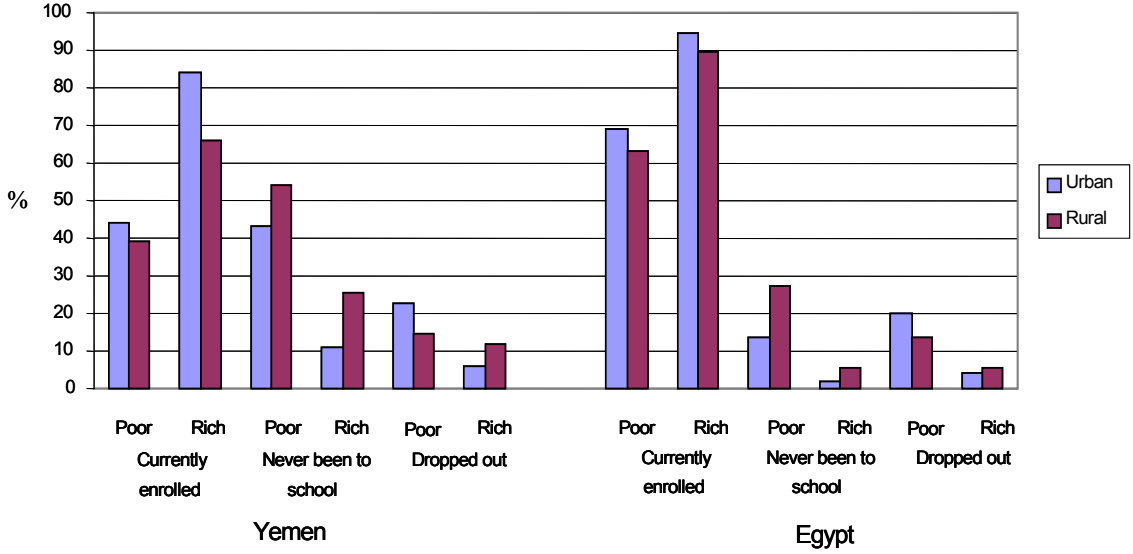

Figure 4: School Drop Out and Child Labor by Sex and Household Standard of Living; Yemen 1997, Egypt, 1995 (Children 10-14 years)

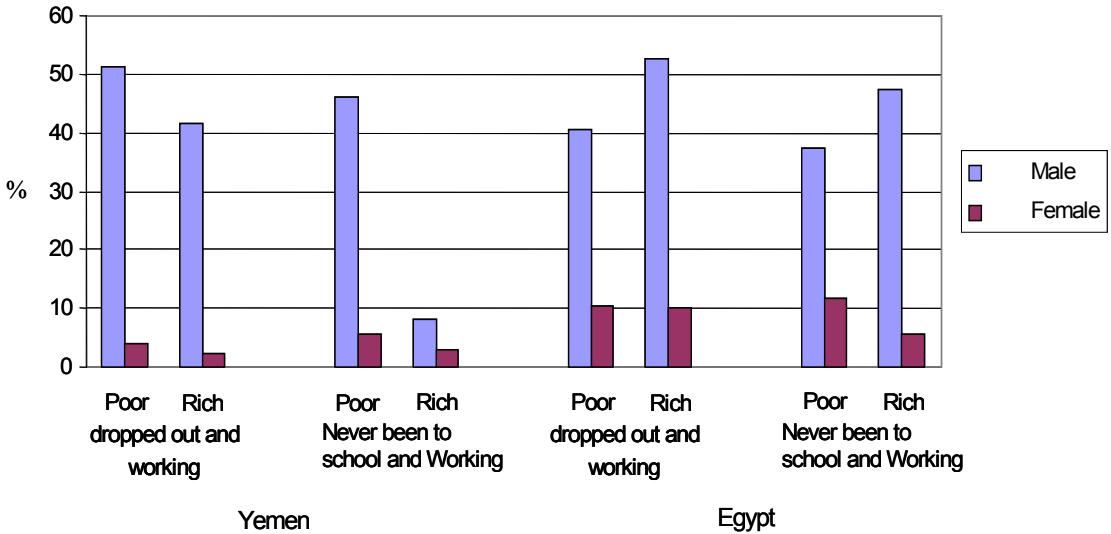

Figure 5: Treatment of Diarrhea and Cough by Sex and Household Standard of Living, Yemen 1997 and Egypt, 1995

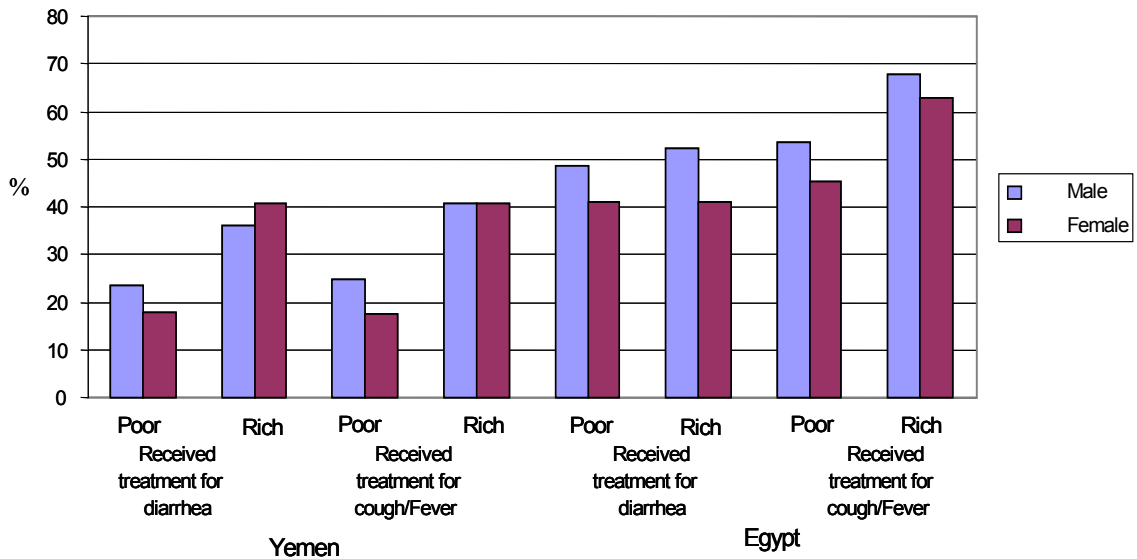

Figure 6: Treatment of Diarrhea and Cough by Sex of Household Head and Standard of Living, Yemen 1997 and Egypt, 1995

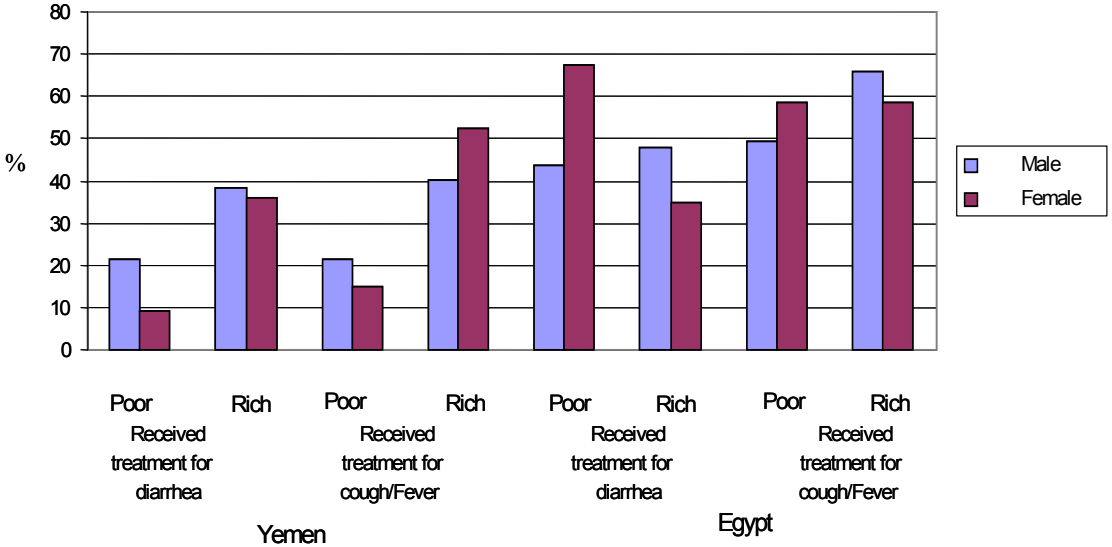

Figure 7: Treatment of Diarrhea and Cough by Residence and Household Standard of Living, Yemen 1997 and Egypt, 1995

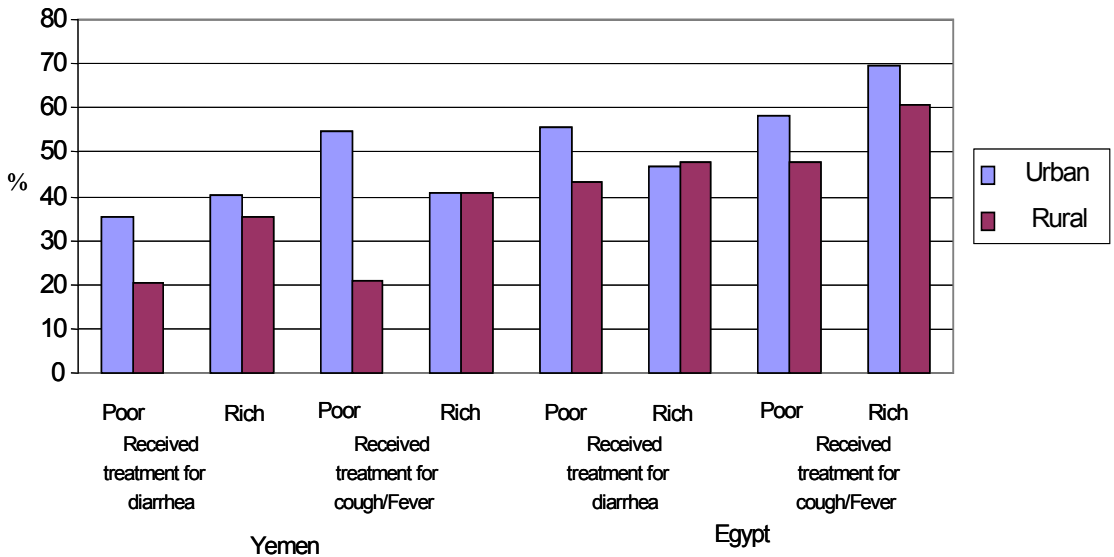

Figure 8: Child Immunization and Malnutrition by Residence and Household Standard of Living, Yemen, 1997 and Egypt, 1995

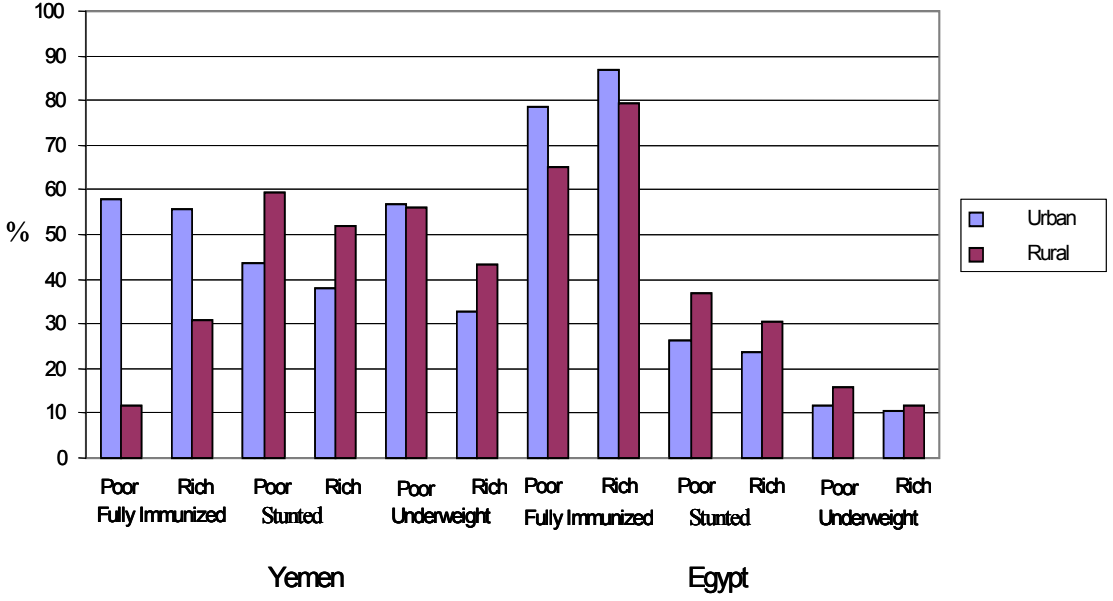

Figure 9: Immunization and Malnutrition by Sex of Household Head and Standard of Living, Yemen 1997, Egypt, 1995

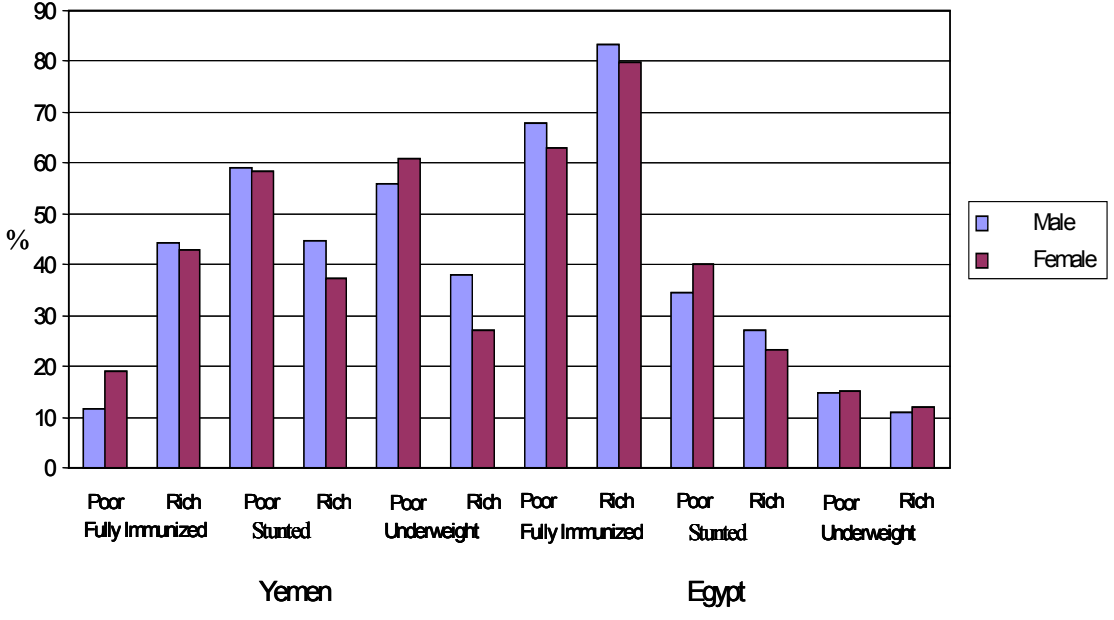

Table 1: Schooling Status By Child Characteristics and Household Standard of Living, Yemen 1997 and Egypt 1995 (Children 6-15 years)

Schooling status	Yemen					Egypt				
	Poor	Middle	Rich	Total	Poor/Rich Ratio	Poor	Middle	Rich	Total	Poor/Rich Ratio
Current Status	N=7476	N=8536	N=7924	N=23936		N=7929	N=7067	N=6951	N=21946	
Currently enrolled (%)	39.3	56.7	75.6	57.5	0.52	64.1	83.5	92.3	79.3	0.69
Been to school in the past (%)	6.9	7.6	6.8	7.1	1.02	11.2	8.5	4.4	8.2	2.54
Never been to school	53.8	35.6	17.6	35.3	3.06	24.7	8.0	3.3	12.6	7.56
Total (%)	100.0	100.0	100.0	100.0		100.0	100.0	100.0	100.0	
Ever been to school	N=3455	N=5494	N=6530	N=15479		N=5969	N=6500	N=6723	N=19192	
Currently in school (%)	85.1	88.1	91.8	89.0	0.93	85.1	90.8	95.4	90.7	0.89
Dropped out (%)	14.9	11.9	8.3	11.0	1.81	14.9	9.2	4.6	9.4	3.27
Total (%)	100.0	100.0	100.0	100.0		100.0	100.0	100.0	100.0	
Drop out rates(per 1000 enrolled)	N=3455	N=5494	N=6530	N=15479		N=5969	N=6500	N=6723	N=19192	
By end of grade 6	309	278	173	234	1.79	231	130	66	135	3.52
By end of grade 9	485	441	259	358	1.87	318	209	100	196	3.19

Table 2: Multinomial Logistic Regression Results of Children Schooling Status (Children 6-15 Years)

	Yemen		Egypt	
Group/Variables	**Coefficient**	**Robust S.E.**	**Coefficient**	**Robust S.E.**
Group: Dropped out				
Sex (Female)	1.0826**	0.0546	0.1019	0.0547
Age (in Years)	0.3556**	0.0119	0.4330**	0.0120
Standard of Living				
Middle	0.2016**	0.0697	0.5778**	0.0777
Poor	0.2686**	0.0802	0.9732**	0.0808
Age of Head of HH	-0.0038	0.0024	-0.0122**	0.0028
Sex of Head of HH	-0.4432**	0.1091	0.0488	0.0911
Education of Head				
Primary	-0.1737*	0.0879	-0.2295**	0.0607
Secondary and Above	-0.5275**	0.0927	-1.3775**	0.0980
Residence (Rural)	0.6996**	0.0770	0.0528	0.0638
Constant	-7.2321	0.2019	-7.2284	0.2076
Group: Never been to School				
Sex (Female)	1.9439**	0.0364	1.3439**	0.0460
Age (in Years)	-0.2300**	0.0066	-0.0244**	0.0083
Standard of Living				
Middle	0.7621**	0.0470	0.7400**	0.0774
Poor	1.5577**	0.0511	1.7163**	0.0726
Age of Head of HH (in Years)	-0.0034*	0.0014	-0.0014	0.0019
Sex of Head of HH (Female)	-0.5785**	0.0659	-0.3545**	0.0816
Education of Head				
Primary	-0.5209**	0.0565	-0.7429**	0.0495
Secondary and Above	-0.7457**	0.0583	-1.6500**	0.0855
Residence (Rural)	1.0315**	0.0537	1.1022**	0.0633
Constant	-0.5259	0.1094	-3.6016	0.1623
N	24057		23339	
Pseudo R-Square	0.24		0.21	

Note: Currently enrolled is the comparison group; ** Significant at 0.01; * Significant at 0.05
Source: Authors calculations from DHS datasets.

Table 3: Logistic Regression Results of School Dropout and Non Enrollment among Children of Poor Households (Children 6-15 Years)

	Yemen		Egypt	
Variables	**Drop Out**	**Non enrollment**	**Drop Out**	**Non enrollment**
Sex (Female)	1.2580**	2.2442**	0.2383**	1.4030**
	-0.1195	-0.0618	-0.0823	-0.0549
Age (in Years)	0.3598**	-0.2283**	0.4380**	-0.0534**
	-0.0249	-0.0108	-0.0174	-0.0096
Age of Head of HH (in Years)	-0.0063	-0.0052*	-0.0131**	0.0019
	-0.0047	-0.0024	-0.004	-0.0023
Sex of Head of HH (Female)	-0.8365**	-0.6888**	0.2174	-0.3145**
	-0.2313	-0.1112	-0.126	-0.0958
Education of Head				
Primary	-0.2079	-0.6573**	-0.1938*	-0.7457**
	-0.2039	-0.1102	-0.0895	-0.0607
Secondary and Above	-0.9582**	-0.9880**	-0.6482**	-1.4269**
	-0.2464	-0.1323	-0.165	-0.133
Residence (Rural)	0.0698	0.5148*	-0.2855**	0.9294**
	-0.3643	-0.2554	-0.0993	-0.0906
Constant	-6.0377	1.3538	-6.0845	-1.7904
	-0.5167	-0.2888	-0.2844	-0.1785
N	3224	6914	6181	8475
Pseudo R-Square	0.13	0.23	0.17	0.11

Note: ** Significant at 0.01; * Significant at 0.05; Robust standard errors are in parenthesis
Source: Authors calculations from DHS datasets.

Table 4: Child Health Indicators (for Children under Age 5 Years), by Household Standard of Living, Yemen 1997 and Egypt 1995

Child Health Indicator	Yemen					Egypt				
	Poor	Middle	Rich	Total	Poor/ Rich Ratio	Poor	Middle	Rich	Total	Poor/ Rich Ratio
Child morbidity[1]	N=3708	N=4047	N=3764	N=11519		N=3809	N=3671	N=3173	N=10652	
Diarrhea prevalence (%)	32.1	28.4	22.2	27.6	1.45	16.3	16.0	15.5	16.0	1.05
Fever prevalence (%)	45.2	40.1	34.6	39.9	1.31	40.4	40.6	39.9	40.3	1.01
Cough prevalence (%)	26.2	23.8	20.9	23.6	1.26	22.8	24.0	23.1	23.3	0.99
Medical treatment for diarrhea	N=1188	N=1152	N=834	N=3174		N=619	N=587	N=493	N=1699	
Received treatment (%)	20.7	28.2	38.1	28.0	0.54	45.2	50.2	47.3	47.5	0.96
Medical treatment for cough/fever	N=1472	N=1422	N=1149	N=4043		N=1350	N=1433	N=1205	N=3988	
Received treatment (%)	21.3	25.5	40.7	28.3	0.52	49.9	58.8	65.4	57.8	0.76
Child Immunization[2] (Children 12-23 months)	N=696	N=756	N=732	N=2184		N=698	N=754	N=629	N=2082	
Received all vaccine doses (%)	12.1	24.8	44.1	27.2	0.27	67.6	79.9	83.2	76.8	0.81
Nutritional Status	N=2194	N=2585	N=2702	N=7481		N=3461	N=3392	N=2907	N=9760	
Stunted (%)	59.1	55.2	44.1	52.3	1.3	34.9	28.3	26.9	30.3	1.3
Underweight (%)	56.2	48.9	37.3	46.8	1.5	14.9	12.0	11.1	12.8	1.3

Note: 1 Reference period for child morbidity is 2-weeks before the survey date; 2 Immunization includes 8 vaccine doses (BCG, POLIO 1-3, DPT 1-3, and MEASLES)

Source: Authors calculations from DHS datasets.

Table 5: Logistic Regression Results of Child Morbidity and Treatment (Children Under 5 years)

	Yemen				Egypt			
Variable	**Had Diarr.**	**Had cough**	**Diarr. Treat.**	**Cough. Treat.**	**Had Diarr.**	**Had cough**	**Diarr. Treat.**	**Cough. Treat.**
Sex (Female)	-0.1247**	-0.1220**	-0.0424	-0.1011	-0.1080*	-0.1293**	-0.2200*	-0.2210**
	0.0442	0.0457	0.0847	0.0738	0.0523	0.045	0.0962	0.0643
Age (in Months)								
11-Jun	0.7056**	0.2155*	0.1596	0.0092	1.1698**	-0.0401	0.7919**	0.3373**
	0.0909	0.0898	0.2009	0.1592	0.1103	0.0915	0.2156	0.1341
23-Dec	1.2842**	0.5322**	0.5392**	0.3503**	1.8799**	0.5623**	1.1141**	0.5898**
	0.0843	0.0836	0.1751	0.1345	0.103	0.0831	0.2003	0.1203
24 - 35	1.2918**	0.4310**	0.5992**	0.4697**	1.4243**	0.3390**	0.7088**	0.2635**
	0.0753	0.0739	0.1638	0.1209	0.0955	0.0714	0.1914	0.1002
36 - 47	0.8854**	0.2528**	0.2336	0.2716*	0.9054**	0.2661**	0.2111	0.0347
	0.0762	0.0742	0.172	0.1243	0.1004	0.0723	0.2035	0.1016
48 - 59	0.4149**	0.1351	0.3033	0.1523	0.3283**	0.043	0.1795	0.0171
	0.0807	0.076	0.1812	0.1281	0.1085	0.0737	0.2221	0.1045
Standard of Living								
Middle	0.2293**	0.1228*	-0.2081	-0.4579**	0.0292	0.021	0.0168	-0.2317**
	0.0607	0.0633	0.1151	0.1017	0.069	0.0584	0.126	0.0834
Poor	0.3735**	0.2422**	-0.5205**	-0.6280**	0.0899	0.005	-0.0005	-0.3204**
	0.068	0.0714	0.1337	0.1158	0.0761	0.0653	0.1386	0.0923
Age of Head(Years)	-0.0057	-0.0048**	0.0025	-0.0024	-0.0022	-0.0014	0.002	-0.0027
	0.0016	0.0017	0.0029	0.0026	0.002	0.0018	0.0036	0.0025
Sex of Head(Female)	-0.1212	0.2190*	-0.5474**	-0.1205	0.0487	0.1491	0.4686*	0.2079
	0.0946	0.0904	0.1965	0.1496	0.1202	0.1003	0.2242	0.1451

Table 5: Contd.

	Yemen				Egypt			
Variable	**Had Diarr.**	**Had cough**	**Diarr. Treat.**	**Cough. Treat.**	**Had Diarr.**	**Had cough**	**Diarr. Treat.**	**Cough. Treat.**
Mother's Education								
Primary	0.121	0.1885**	0.3017*	0.2066	0.1183	0.0459	-0.0275	0.2967**
	0.0716	0.0729	0.1287	0.1127	0.0712	0.0619	0.1281	0.0866
Secondary and Above	-0.0896	-0.1459	0.2607	0.2757	-0.079	-0.0936	0.1437	0.5434**
	0.0994	0.1029	0.184	0.1566	0.084	0.0719	0.1421	0.0973
Father's Education								
Primary	-0.1045	-0.1401*	0.084	0.2109*	0.0566	0.2135**	-0.1404	0.1970*
	0.0604	0.0623	0.116	0.1018	0.0703	0.0607	0.1293	0.0857
Secondary and Above	-0.2869**	-0.3461*	0.3119**	0.2790**	0.004	0.1382*	0.0181	0.0683
	0.0566	0.0589	0.108	0.0945	0.0824	0.0709	0.1403	0.0966
Residence (Rural)	0.1084	-0.2496**	-0.2208	-0.2941**	-0.0119	-0.0327	-0.2327*	-0.2753**
	0.0643	0.0647	0.1191	0.1044	0.0618	0.0533	0.1096	0.0727
Constant	-1.6613	-1.0311	-1.1404	-0.5968	-2.4886	-1.3574	-0.6167	0.2714
	0.1111	0.1116	0.222	0.1711	0.1532	0.1209	0.2775	0.1694
N	11131	11129	2943	3810	11229	11231	1854	4148
Pseudo R-Square	0.05	0.01	0.04	0.04	0.06	0.01	0.03	0.04

Note: ** Significant at 0.01; * Significant at 0.05; Robust standard errors are in parenthesis

Source: Authors calculations from DHS datasets.

Table 6: Logistic Regression Results of Child Immunization and Nutritional Status (Children Under 5 years)

	Yemen			Egypt		
Variable	**Fully immunized**	**Stunted**	**Underweight**	**Fully immunized**	**Stunted**	**Underweight**
Sex (Female)	-0.0162	-0.092	-0.1033**	0.0251	-0.1010*	-0.0715
	0.1045	0.0507	0.0498	0.102	0.0445	0.0568
Age (in Months)						
11-Jun		-2.3682**	-2.1030**		-1.2792**	-0.7695**
		0.1128	0.1203		0.1312	0.1757
23-Dec		-1.3429**	-0.4466**		0.2594**	1.0825**
		0.0924	0.088		0.0874	0.1077
24 - 35		-0.1654*	0.1025		0.8890**	1.1150**
		0.0811	0.0787		0.0694	0.0938
36 - 47		-0.3164**	0.0443		0.5902**	0.7279**
		0.0818	0.0801		0.0702	0.0972
48 - 59		-0.1278	-0.0286		0.6292**	0.4773
		0.084	0.0821		0.0699	0.1001
Standard of Living						
Middle	-0.2814*	0.2881**	0.2836**	-0.0781	0.0209	-0.0974
	0.1338	0.0671	0.0659	0.1411	0.0596	0.0764
Poor	-0.9043**	0.3946**	0.5270**	-0.3971**	0.1529*	0.0296
	0.1784	0.0791	0.0774	0.1437	0.0649	0.0797
Age of Head(Years)	0.0031	-0.0056**	-0.0019	0.0025	0.0029	0.0013
	0.0035	0.0018	0.0018	0.0038	0.0017	0.0021
Sex of Head(Female)	0.3468	-0.4927**	-0.3771**	0.0604	0.0669	-0.1064
	0.2077	0.1038	0.102	0.2447	0.1005	0.1356

Table 6: Contd.

	Yemen			Egypt		
Variable	**Fully immunized**	**Stunted**	**Underweight**	**Fully immunized**	**Stunted**	**Underweight**
Mother's Education						
Primary	0.3756**	-0.0348	-0.0316	0.2701*	-0.0744	-0.0116
	0.1443	0.0759	0.076	0.1355	0.0606	0.0761
Secondary and Above	0.5395**	-0.7495**	-0.4825**	0.5797**	-0.1511*	-0.3121**
	0.1949	0.1022	0.1011	0.1591	0.0705	0.091
Father's Education						
Primary	0.2589	-0.0151	-0.063	0.3494**	-0.1434**	-0.2079**
	0.1436	0.0712	0.0692	0.1302	0.0582	0.0726
Secondary and Above	0.3147**	-0.1787**	-0.2048**	0.4247**	-0.2074**	-0.2835**
	0.1334	0.063	0.062	0.1485	0.0682	0.0851
Residence (Rural)	-1.1182**	0.3860**	0.3415**	-0.5868**	0.3852**	0.1696**
	0.133	0.0682	0.0684	0.1272	0.0536	0.067
Constant	-0.238	0.566	-0.1631	1.0564	-1.4492	-2.19325
	0.2096	0.1187	0.1172	0.2515	0.1185	0.1539
N	2104	7340	7340	2217	10298	10298
Pseudo R-Square	0.13	0.12	0.09	0.06	0.06	0.05

Note: ** Significant at 0.01; * Significant at 0.05; Robust standard errors are in parenthesis

Source: Authors calculations from DHS datasets.

Table 7: Logistic Regression Results of Child Morbidity and Treatment (Children Under 5 years from Poor Households)

		Yemen			Egypt
Variable	**Had Diarr.**	**Had cough**	**Diarr. Treat.**	**Cough. Treat.**	**Cough. Treat.**
Sex (Female)	-0.104	-0.2917**	-0.3703*	-0.4024**	-0.4391**
	0.0768	0.0816	0.1614	0.1432	0.1095
Age (in Months)					
11-Jun	0.4471**	0.3577*	0.2352	0.2945	0.2623
	0.1522	0.1559	0.3594	0.3036	0.225
23-Dec	0.9308**	0.5711**	0.3095	0.4426	0.8588**
	0.1428	0.1487	0.3271	0.2678	0.1985
24 - 35	1.0664**	0.3833**	0.7276**	0.7929**	0.1947
	0.1261	0.1339	0.2894	0.2419	0.1749
36 - 47	0.6370**	0.2849*	0.5065	0.6748**	0.0315
	0.1266	0.1325	0.2993	0.2437	0.174
48 - 59	0.1497	0.1136	0.5453	0.4735	-0.0885
	0.1339	0.1367	0.318	0.2542	0.1815
Age of Head(Years)	-0.0085**	-0.0044	0.0007	-0.0106*	-0.003
	0.0031	0.0033	0.0062	0.0053	0.004
Sex of Head(Female)	-0.0133	0.223	-0.8653*	-0.4638	0.5584**
	0.1614	0.1653	0.439	0.3171	0.2256
Mother's Education	-0.092	0.0529	0.7559*	0.4055	0.4016**
Primary	0.1922	0.1996	0.3667	0.3331	0.1387
Secondary and Above	-0.032	0.2491	0.7593	1.2828	0.5953**
	0.3855	0.4031	0.8495	0.6845	0.2087

Table 7: Contd.

	Yemen				Egypt
Variable	**Had Diarr.**	**Had cough**	**Diarr. Treat.**	**Cough. Treat.**	**Cough. Treat.**
Father's Education					
Primary	-0.2298*	-0.0595	-0.0627	0.1039	0.2366
	0.1079	0.1139	0.2338	0.2023	0.1221
Secondary and Above	-0.2811**	-0.187	0.2606	0.1724	0.1802
	0.1097	0.1159	0.2318	0.1941	0.1643
Residence (Rural)	0.2587	0.5738	-0.7855	-1.3995	-0.3661
	0.3422	0.3973	0.6809	0.7618	0.1452
Constant	-1.0878	-1.5845	-0.98	0.097	0.0547
	0.3755	0.4304	0.7722	0.8217	0.2561
N	3269	3274	1032	1289	1469
Pseudo R-Square	0.03	0.01	0.03	0.03	0.04

Note: ** Significant at 0.01; * Significant at 0.05; Robust standard errors are in parenthesis

Source: Authors calculations from DHS datasets.

Table 8: Logistic Regression Results of Child Immunization and Nutritional Status (Children Under 5 years from Poor Households)

		Yemen		Egypt	
Variable	**Fully immniz.**	**Stunted**	**Underweight**	**Fully immniz.**	**Stunted**
Sex (Female)	0.1155	-0.0035	-0.1017	-0.0416	-0.0549
	0.2568	0.1015	0.0978	0.1528	0.0706
Age (in Months)					
11-Jun		-2.4190**	-1.9654**		-1.6050**
		0.2065	0.2058		0.2222
23-Dec		-1.4586**	-0.4636**		0.3719**
		0.1807	0.1696		0.1341
24 - 35		-0.0494	0.3212*		0.9548**
		0.1739	0.1612		0.1104
36 - 47		-0.4013*	0.2445		0.6471**
		0.1738	0.1652		0.11
48 - 59		-0.1378	-0.0325		0.5592**
		0.1825	0.1679		0.1092
Age of Head(Years)	0.0155	-0.0043	-0.0092*	0.0057	-0.0001
	0.0083	0.004	0.0039	0.0055	0.0026
Sex of Head(Female)	0.6253	-0.0847	0.1519	0.0406	0.3200*
	0.4857	0.2002	0.1935	0.3704	0.1558
Mother's Education	0.7178	0.0207	0.1713	0.6507**	0.0008
Primary	0.4754	0.2187	0.2188	0.207	0.0925
Secondary and Above	-0.4124	-0.66	0.0432	0.8081*	-0.3055*
	0.7629	0.4766	0.4456	0.3432	0.1559

Table 8: Contd.

	Yemen			Egypt	
Variable	**Fully immniz.**	**Stunted**	**Underweight**	**Fully immniz.**	**Stunted**
Father's Education					
Primary	1.2457**	-0.0776	0.012	0.2076	-0.0851
	0.3126	0.1415	0.1363	0.1724	0.0795
Secondary and Above	1.3107**	-0.0479	-0.2409	0.4074	-0.0844
	0.3274	0.1335	0.1298	0.2334	0.1143
Residence (Rural)	-2.4928**	0.7112	0.1428	-0.4484*	0.2082*
	0.67	0.4565	0.4374	0.2322	0.1029
Constant	-0.9089	0.5177	0.688	0.4031	-1.0654
	0.7319	0.5004	0.4789	0.3315	0.1733
N	611	1905	1905	797	3802
Pseudo R-Square	0.09	0.12	0.08	0.03	0.06

Note: ** Significant at 0.01; * Significant at 0.05; Robust standard errors are in parentheses

Source: Authors calculations from DHS datasets.

Appendix A: Results from the Principle Component Analysis

		Eigen	Variation			Factor Loading		
	Component	values	% of Variance	Cumulative %	Variable	Component 1	Component 2	Component 3
Yemen	1	2.93	41.84	41.84	Has electricity	0.85	0.22	0.18
	2	0.95	13.57	55.41	Has radio	0.30	0.09	0.92
	3	0.88	12.59	68.00	Has television	0.82	0.23	0.34
					Has refrigerator	0.78	0.38	0.20
					Has bicycle	0.25	0.90	0.04
					Has car/motorcycle	0.30	0.58	0.51
					Main floor material (Cement/Marble/Parquets)	0.71	0.13	0.25
Egypt	1	2.56	36.57	36.57	Has electricity	0.66	-0.23	-0.03
	2	0.99	14.11	50.68	Has radio	0.63	0.22	0.28
	3	0.96	13.65	64.33	Has television	0.76	0.01	0.16
					Has refrigerator	0.74	0.33	0.22
					Has bicycle	0.16	0.05	0.98
					Has car/motorcycle	0.17	0.92	0.07
					Main floor material (Cement/Marble/Parquets)	0.68	0.25	0.03

As shown above seven items have been used in the principle component analysis. We assume that all these items are interrelated and accordingly we have applied the direct oblimin rotation method. To comply with the minimum requirement for a good principle component (an eigen value of 0.8 or more) and make sure that all of the seven items have good factor loading in at least one factor we decided to use the first three principle components in the construction of the final standard of living index. The three components explains a substantial amount of the total variation, with 68 percent and 64 percent of the total variance for Yemen and Egypt respectively.

In the case of Yemen, the first principle component shows high factor loading for availability of electricity, television, refrigerator, and good quality floor material (Cement/Marble/Parquets), the second principle component shows high factor loading for availability of bicycle and car or motorcycle, and the third principle component shows high factor loading for radio and a car or motorcycle. In the case of Egypt, the first principle component shows high factor loading for availability of electricity, radio, television, refrigerator, and good quality floor material (Cement/Marble/Parquets), the second principle component shows high factor loading for availability of a car or motorcycle, and the third principle component shows high factor loading for availability of bicycle.

To assign relative weights for the three components extracted, each of components was weighted by the proportion of the percent of variance it explains to the total percent of variance explained by the three principle components together. The final index is the sum up of the weighted three components.

Appendix B: Distribution of Children Under 5 and 6-15 Years of Age by Own Characteristics and Household Characteristics, Yemen 1997 and Egypt 1995

Characteristics	Children 6-15 years						Children under 5 years					
	Yemen			Egypt			Yemen			Egypt		
	N	Mean or %	SD	N	Mean or %	SD	N	Mean or %	SD	N	Mean or %	SD
Child												
Sex (% Females)	24475	48.51		23360	48.53		12451	48.16		12135	48.36	
Age (in years)	24475	10.31	2.85	23360	10.43	2.84	12451	2.42	1.44	12135		
Education of Mother												
% with no education							12451	79.82		12135	49.00	
% with primary							12451	12.66		12135	20.12	
% with secondary and above							12451	7.53		12135	30.89	
Education of father												
% with no education							12235	46.60		12119	30.02	
% with primary							12235	19.55		12119	28.96	
% with secondary and above							12235	33.85		12119	41.02	
Household												
Standard of Living Index	24412	1.31	0.78	23348	2.03	0.71	12414	1.28	0.78	12130	1.98	0.70
Age of Head of Household (years)	24454	45.93	13.21	23360	46.04	10.90	12442	42.37	14.45	12135	42.98	13.26
Sex of Head of Household (% Females)	24460	7.95		23360	7.08		12445	6.42		12135	5.24	
Work Status of Head of Household (% Currently working)	24454	79.14		23360	86.02		12439	80.98		12135	86.20	
Education of Head of Household												
% with no education	24416	71.67		23359	41.39		12423	62.38		12135	38.82	
% with primary	24416	12.70		23359	30.49		12423	15.87		12135	28.27	
% with secondary and above	24416	15.63		23359	28.11		12423	21.76		12135	32.9	
Residence (% Rural)	24475	73.80		23360	61.59		12451	74.70		12135	65.63	