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ARAB REPUBLIC OF EGYPT

Inequality of Opportunity in Access to Basic Services among Egyptian Children

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US$ 1.00 = EGP 6.04

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ACRONYMS AND ABBREVIATIONS

AIDS	Acquired Immunodeficiency Syndrome
ARI	Acute Respiratory Infection
BCG	Bacillus Calmette-Guérin (vaccine)
CAPMAS	Central Agency for Public Mobilization and Statistics
DHS	Demographic and Health Survey
DTP	Diphtheria, Tetanus, and Pertussis (vaccine)
ECD	Early Child Development
FY	Fiscal year
GDP	Gross Domestic Product
GOE	Government of Egypt
H/A	Height – for – Age
HIECS	Egypt Household Income, Expenditure and Consumption Survey
HIV	Human Immunodeficiency Virus
HOI	Human Opportunity Index

IQ	Intelligence Quotient
LAG	Least Advantaged Group
MAG	Most Advantaged Group
MDG	Millennium Development Goals
MENA	Middle East and North Africa
MOF	Ministry of Finance
MOH	Ministry of Health
OECD	Organization for Economic Co-operation and Development
PPP	Purchasing Power Parity
UNDP	United Nations Development Program
USAID	United States Agency for International Development
W/A	Weight-for-Age
W/H	Weight –for-Height
WHO	World Health Organization
WDI	World Development Indicators
WDR	World Development Report
WVS	World Value Survey

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Arab Republic of EGYPT

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Acknowledgements

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Executive Summary

I. Background and Objectives

1. **There is broad consensus in the economic literature about the important role early childhood development interventions play on long term educational, health and labor market outcomes, and therefore in the development of children's full potential as adults.** This individual effect in turn translates into large losses or gains in human capital accumulation and economic growth for the society. The connection between early human development and life-long outcomes tends to replicate between generations, giving way to either a virtuous circle of prosperity or a vicious cycle of exclusion and poverty.

2. **Egypt's children and youth, representing more than one-third of the country´s population and its future, face several significant challenges**, as shown by higher child poverty rates and unequal access to basic services. Recent evidence shows that the human development indicators are uneven and low considering the country´s income level. This uneven progress in human development, heightened by the challenges and opportunities presented by the current favorable demographic transition and the demands brought to the forefront by the Arab Spring, is likely to draw the attention of all emerging political actors in Egypt, as a matter of not only social justice but also economic and social development.

3. **This report is aimed at contributing to the debates and discussions, within and outside the Government of Egypt (GOE), on the importance of equality of opportunity among Egyptian children and youth.** It analyzes the extent of equality of opportunity in access to basic services and identifies the main circumstances beyond the control of a child that affect access to basic services. More specifically, it intends to answer a simple question: what are the chances that an Egyptian child will have access to quality basic services regardless of his or her circumstances at birth, such as gender, place of birth, and family background?

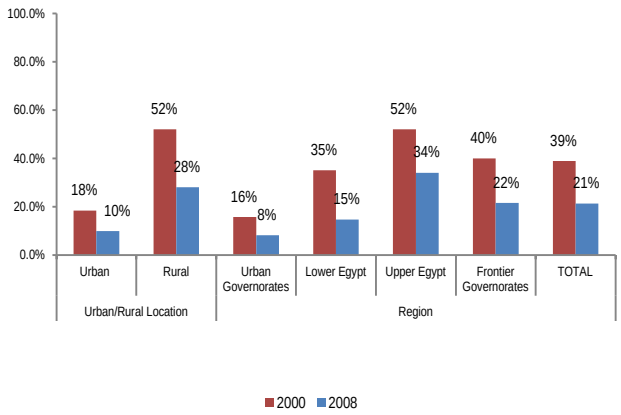
4. **The analytical approach draws on the concepts and methodology developed in the recent and growing literature on inequality of opportunity** (see, for example, John Roemer, 1998; 2006 World Development Report; Barros et al., 2009). It follows a life cycle framework that identifies an individual's outcomes and opportunities from conception to adulthood and analyzes the extent to which these opportunities are determined by circumstances beyond individuals´ control. The report uses data from two main sources, which combine information on different outcomes and circumstances, including health, access to basic services and income: (a)

the Egypt Demographic and Health Survey (DHS) for 2000 and 2008; and (b) the Egypt Household Income, Expenditure and Consumption Survey (HIECS) for the same years.

II. Early Health and Education Outcomes in Egypt

5. **The assessment of the availability and evolution of access to the most relevant basic services shows that there has been a significant improvement in access to antenatal and skilled birth care between 2000 and 2008, especially in rural areas** (see Figure 1). Most of the improvements in access to care during birth over the 2000s were progressive, benefiting the poorest more and reducing regional disparities. However, the majority of children in Egypt are not taken for postnatal care visits to a doctor within two months of birth, with family wealth and parental educational attainment explaining the bulk of the existing disparities. At the same time, Egypt has a good track record of immunizations among young infants, showing levels that are on par with countries with similar per capita income. Geographic location and wealth status are the main determinants of observed differences in access to full immunization packages.

Figure 1: Share of births that were not attended by skilled health staff (%)

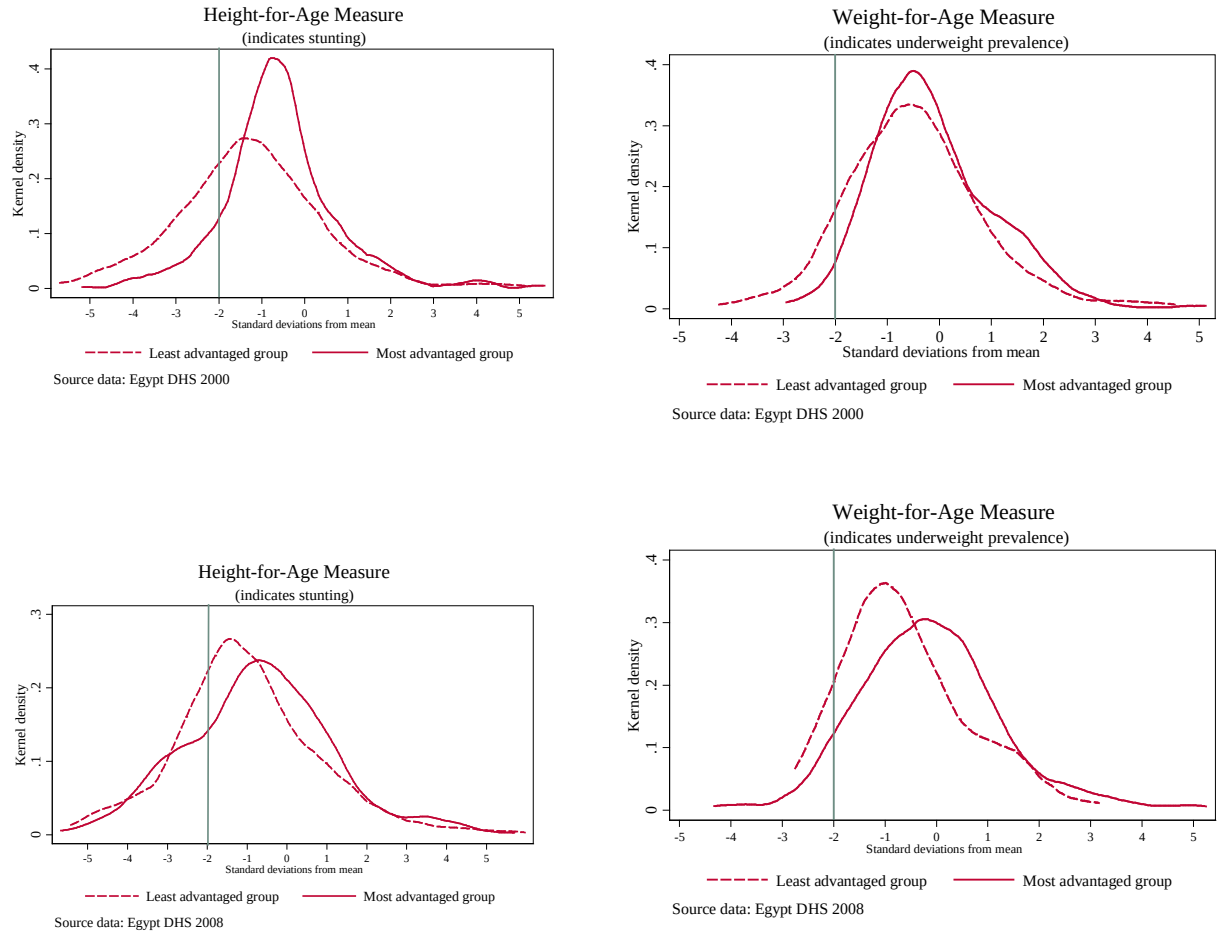


6. **Stunting is a major problem in Egypt, affecting a quarter of young children, and the situation has worsened during the 2000s, particularly in rural areas**. The prevalence of stunting is more strongly linked to location than household characteristics in 2008 relative to the year 2000, when socioeconomic levels mostly explained the differences in this outcome. The prevalence of stunting and underweight does not vary significantly between the most and least advantaged circumstance groups (see Figure 2). In fact, in 2008 those groups considered to be most advantaged[1] appear to have a slightly higher prevalence of underweight in 2008. On the

[1] Most and least advantaged groups of children are constructed based on circumstances. These two groups make up both extremes and account for about 5 percent of the children in the 0-4 age group. Least advantaged children are defined as those from rural areas, parents with no formal education, in households with five or more children at home, and from families in the poorest wealth class. On the other hand, most advantaged children are defined as those from urban area, parents with higher education, in households with less than four children, and from families in the richest wealth class.

other hand, Egypt has achieved a significant reduction in iodine deficiency over the 2000s, although disparities in access based on wealth still exist. Iron supplementation during pregnancy has also increased between 2000 and 2008, particularly among women with lower levels of educational attainment.

Figure 2: The prevalence of stunting and underweight does not vary significantly between the most and least advantaged circumstance groups

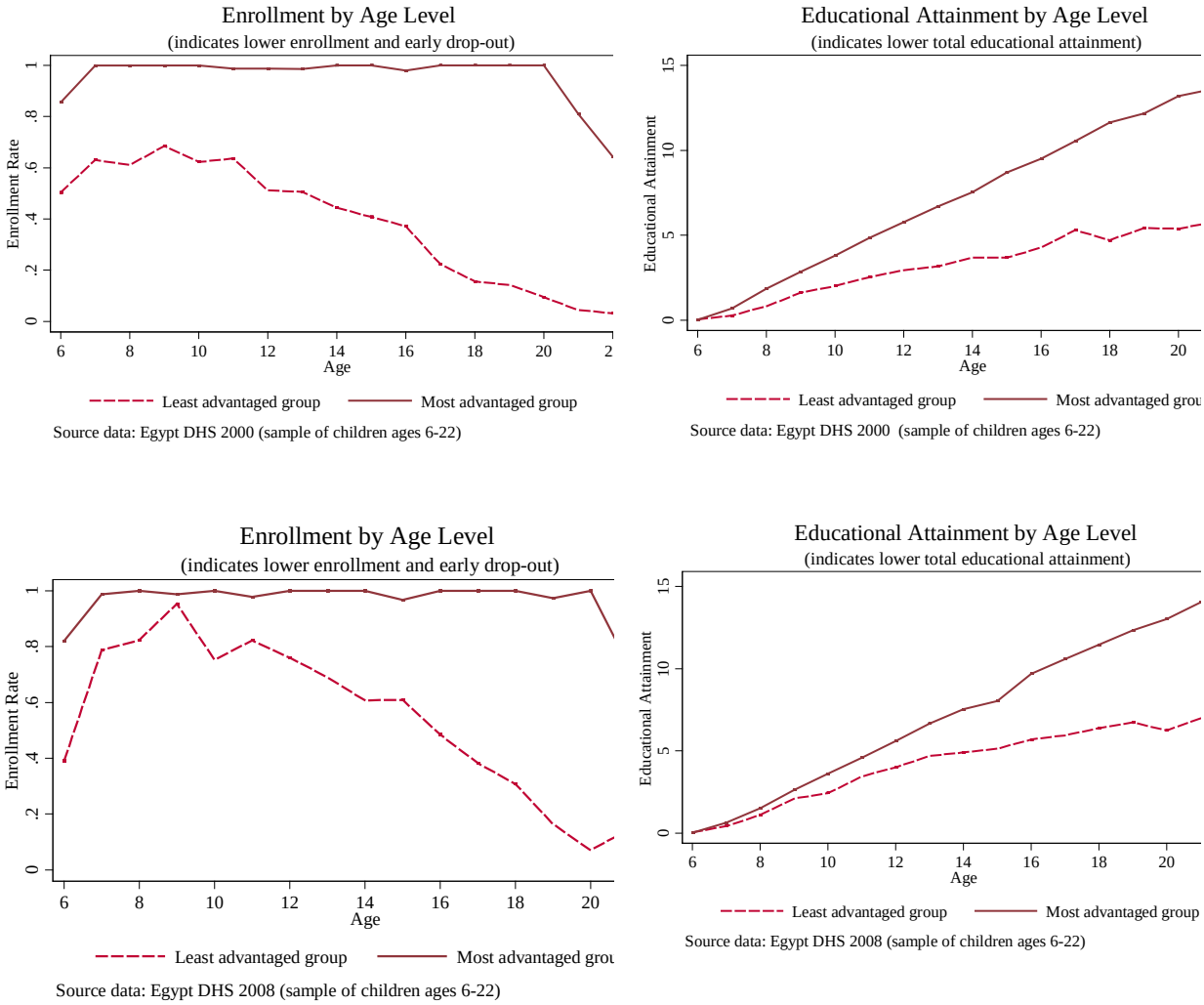


7. **Access to drinking water has significantly improved in the 2000s, and this expansion has been generally pro-poor**. The remaining inequalities in access to improved water are largely due to geographical differences. With regard to sanitation, over 6 percent of all the children in the 0-4 age group live in households without own toilets, and wealth appears to be the strongest determinants of whether a household has own toilet or shares a toilet with other households.

8. **Although enrolment rates in basic and secondary education have improved across all income levels in the period under study, there are still significant differences in enrolment based on wealth.** While almost full enrolment exists for the richest quintiles, the poorest quintile still registers enrolment rates of about 73% in basic education and below 50% in

secondary levels (see Figure 3). The enrolment gap between the least and most advantaged groups has narrowed between 2000 and 2008, with a pro-poor expansion of enrolment in basic and secondary school. Dropout rates are higher for the least advantaged children. Household wealth and parental education variables are the strongest correlates of enrolment in basic and secondary education. The gender gap in enrolment is nearly closed in Egypt, controlling for other household characteristics.

Figure 3: The enrolment and educational attainment gap between least and most advantaged circumstance groups is large, but narrowed in the 2000s.



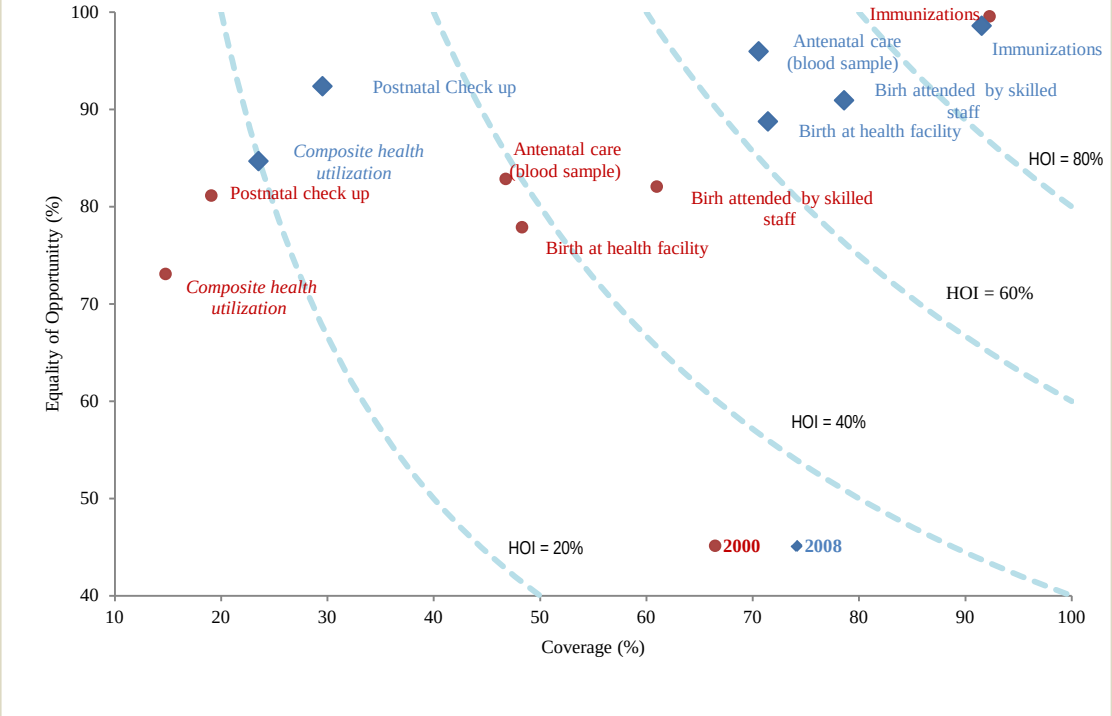
9. **Children who are exposed to multiple risk factors in their early years are less likely to develop to their full potential**. In the poorest wealth group, about 75 percent of children are exposed to at least two biological or psycho-social risk factors, while about 35 percent are exposed to at least 3 such risk factors, including nutritional deficiencies and lack of cognitive

stimulation. Regional and parental education variables and wealth quintiles are important determinants of exposure to multiple risk factors.

III. Inequality of opportunity in access to basic services

10. **While inequality of opportunity in healthcare utilization during birth decreased, there are persistent regional differences in healthcare utilization.** Despite the general expansion of healthcare utilization and the reduction in disparities, Upper Egypt and the Frontier Governorates significantly lag behind the other regions. There is high degree of equality of opportunity in immunizations, continuing with the trend observed at beginning of 2000 (Figure 4). The decomposition of the changes in inequality of opportunity between 2000 and 2008 shows that the scale effect (increase in the coverage of services) dominates over the improvement in redistribution, although the latter has also made an important contribution. Location and wealth are the most important determinants of access to public health services. Parental educational attainment variables, particularly mother's education, additionally play an important role.

Figure 4: Human Opportunity Index for Healthcare Utilization Indicators

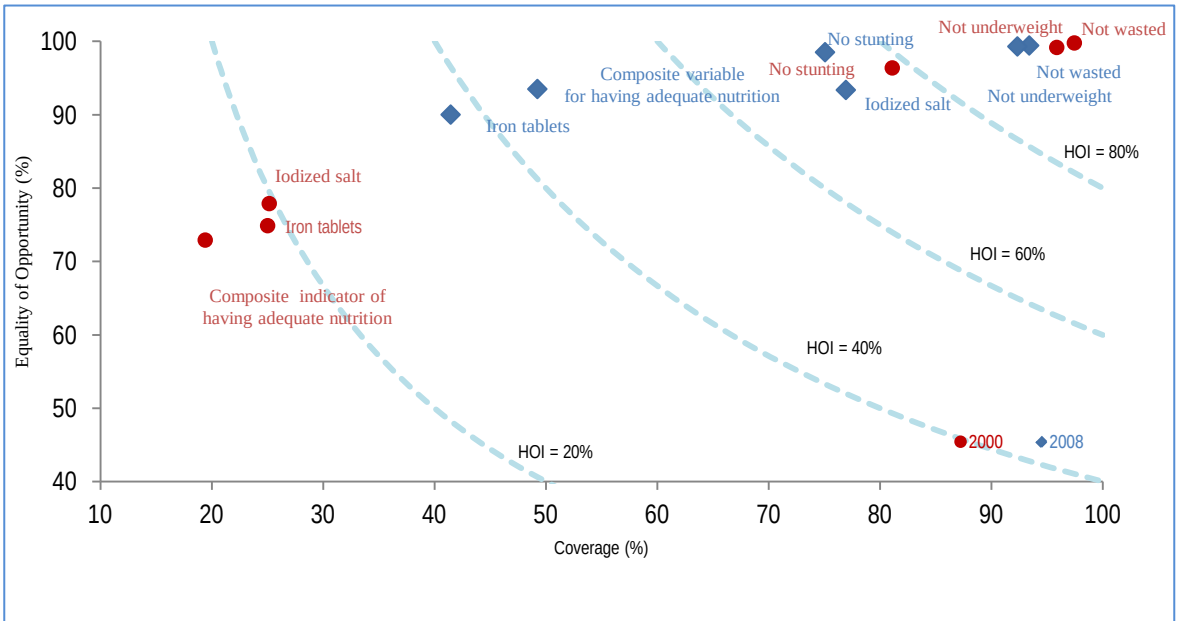


Source: DHS 2000 and 2008; HIECS 2000 and 2008 used for the imputation of household consumption

11. **While malnutrition indicators such as stunting, wasting and underweight prevalence have deteriorated in Egypt, inequality of opportunity for these indicators remains low,**

suggesting no significant disparity among circumstance groups. Similarly, the HOI for nutrition indicators does not vary widely across regions. The decomposition of the variability in anthropometric measures explained by circumstances further shows that circumstances explain only a small percentage of their variance. On the other hand, equality of opportunity concerning micronutrient intake has largely improved between 2000 and 2008 (see Figure 5). The increase in the HOI has been mainly due to the scale effect with more households overall having access to adequately iodized salt. The Shapley decomposition of inequality of opportunity in malnutrition indicators shows that females are more likely to be stunted than males, while household wealth explains the largest portion of the variation in access to micronutrient intake in 2008.

Figure 5: Human Opportunity Index for nutritional status indicators

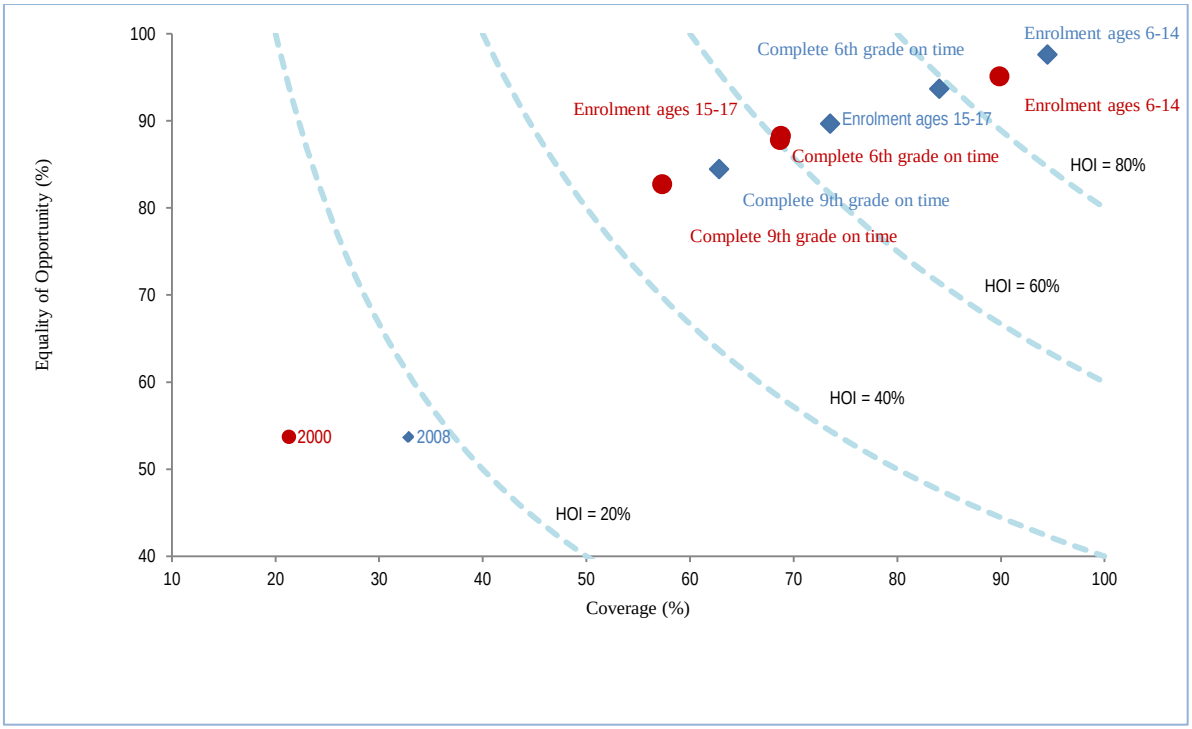


Source: DHS 2000 and 2008; HIECS 2000 and 2008 used for the imputation of household consumption

12. **Access to an improved water source, electricity and a non-shared toilet at the household level, as well as children´s possession of an identity card, all show high human opportunity indexes.** These indicators are associated with quite high coverage levels and low dissimilarity indexes. In addition, there have been improvements in the coverage of some of these services (such as improved drinking water at the household level) over the time period analyzed, which had a positive impact on HOI measures. However, disparities still remain across circumstance groups, particularly by location, with rural Upper Egypt and the Frontier Governorates generally showing lower levels of HOI for all categories. Regional variables mostly explain the variation in access to improved water at home and whether the child is registered, while wealth is the main explanatory factor of the differences in access to a non-shared toilet and electricity at home.

13. The HOI for enrolment in compulsory primary education and non-compulsory secondary education have both improved over the 2000s. However, at the secondary school level inequality of opportunity is more pronounced, as shown by a higher dissimilarity index. Inequality of opportunity in enrolment for both age groups varies significantly by region, although the disparities have declined over time. On time completion of 6th and 9th grade rates show similar improvements over the period, although the HOI for both is lower than that of enrolment (see Figure 6). Again, the changes in HOI in the education sector are mostly a result of the expansion of coverage for children overall (the scale effect) rather than the distribution effect. Parental education variables are consistently the most important factors explaining variation in enrolment rates in Egypt, at both the basic and secondary education levels, followed by wealth.

Figure 6: Human Opportunity Index for Educational Enrolment and Attainment



Source: DHS 2000 and 2008; HIECS 2000 and 2008 used for the imputation of household consumption

IV. Conclusions and Policy Implications

14. **The study shows that significant progress has been attained in Egypt with regards to the availability of and access to basic services for children and mothers, in some cases with**

a pro-poor overall effect. In particular, improvements can be observed in connection with health care utilization before and during pregnancy, and in children´s immunization. As a result, there has been decline in measures of inequality of opportunity in access to these basic services over the last decade, mostly through increased coverage rather than through redistribution effects. However, there are some areas of persistent and emerging concerns where further efforts are required to ensure full and more equitable access crucial for children´s development and their chances to attain their full potential later in life. These include postnatal care utilization, adequate nutrition and schooling. The findings confirm that wide differences in school enrolment persist, notably at the higher levels, and mostly based on the family´s socio-economic background. In addition, large regional disparities in access to household level basic infrastructure and healthcare utilization continue to exist, with Upper Egypt and the Frontier Governorates lagging behind other regions.

15. **Children´s nutrition emerges as a key area where large room for improvement exists in Egypt.** It is noteworthy that the levels of malnutrition and stunting have worsened over time and reached high levels for all children in Egypt, regardless of their background. Inequality of opportunity concerning these outcomes barely exists, with gender appearing to be the main source of disparities. Nutritional deficiencies combine with other risk factors such as lack of cognitive stimulation for a large share of the least advantaged children, which makes this group particularly vulnerable.

16. **The report's findings point to family background, especially the level of parents' education and wealth, and geographic factors, as key factors determining child development outcomes.** Targeted interventions aimed at enhancing access for these groups could thus offer significant potential to enhance overall and relative postnatal care utilization and access to education. In the case of nutrition, a more inclusive approach would be needed, since no significant differences across circumstance groups exist. Regional disparities in access to health services and proper household-level basic inputs should be addressed in a systematic way, for instance through targeted investments in the regions that exhibit significantly lower and unequal availability or utilization levels. Special efforts would be needed for those exposed to multiple risk factors.

I. Introduction and Background

I.1. Introduction

1. **Children and youth, representing more than one-third of Egypt's population, face several significant challenges.** Recent evidence shows that the human development indicators of Egyptian children are low (UNDP, 2011). Additionally, a large body of research indicates that children's human and cognitive development in the early years have important long term repercussions, determining their education, health and labor market outcomes, and thus their life-long income-earning potential. The uneven progress in human development among children, exacerbated by the current demographic trend of rapid population growth and the demands brought to the forefront by the Arab Spring, is likely to draw the attention of the new Egypt's policy-makers to reaching out to those young segments of the population.

2. **As in many other countries, Egypt's children face a higher rate of poverty than the general population and the gap has widened during the past decade** (World Bank, 2011). Poverty is a circumstance beyond the control of children in their early years as they cannot contribute to the income or assets of their families. Children born into and living in poverty are more likely to be deprived of the most basic opportunities and therefore are more prone to becoming poor adults, unable to break the vicious cycle of poverty. As long as some children do not have adequate access to some basic services that are critical for future advancement in life and while that access is influenced by circumstances beyond their control, inequality of opportunity will prevail.

3. **Ensuring equal opportunity for all children, particularly during their formative years, is considered as a matter of social justice by most actors across the political spectrum.** While the acceptable level of inequality of outcomes (such as income) in a society is debatable, policies to give all children equal opportunity early in life, regardless of their socioeconomic background, is likely to be embraced by all emerging political parties in Egypt. As the intergenerational transmission of poverty is pervasive in the country, it is important to understand how children's opportunities develop from conception onwards and identify policy interventions that contribute to reducing the impact of factors predetermined at birth. If inequality of outcomes today reflects past inequality in access to basic services, it is all the more important now for policy makers to be able to track the allocation of basic opportunities among children in order to design policies that help break intergenerational cycles of poverty and inequality and improve future outcomes.

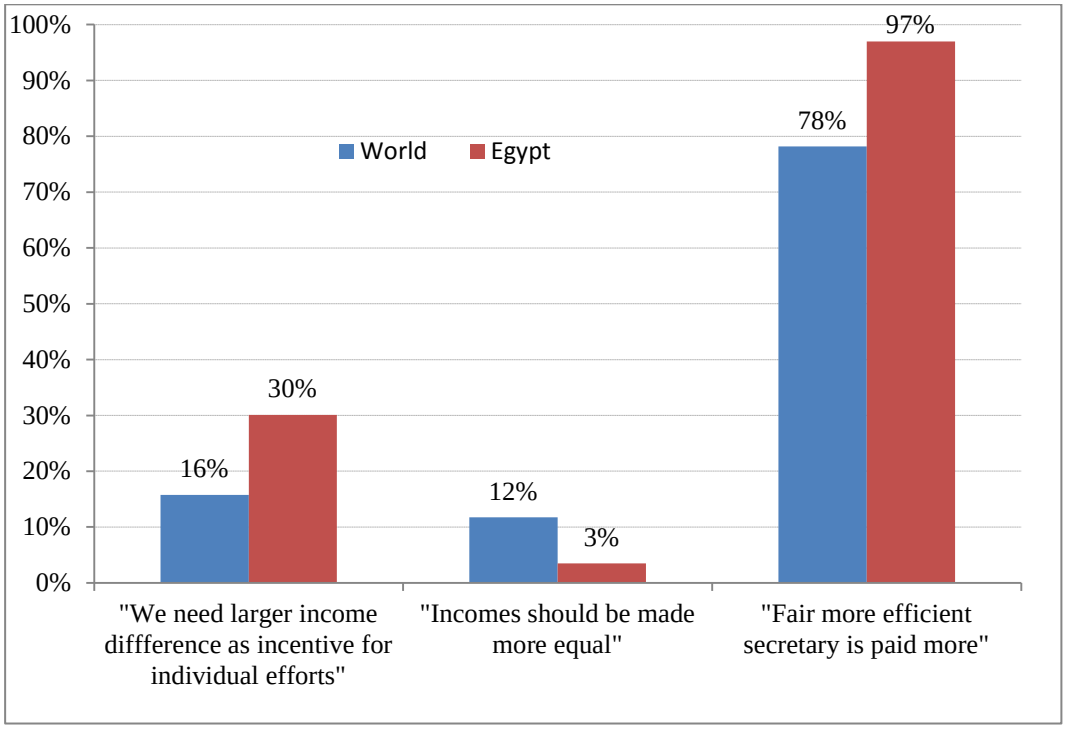
4. **The objective of this report is three-fold:** (i) to analyze the extent of inequality of opportunity among Egyptian children; (ii) to inform government policy on how success in life is influenced by factors predetermined at birth; and (iii) to identify policies and interventions that may contribute to improving equality of opportunity. The underlying premise is that ensuring equality of opportunity entails leveling the playing field in such a way that every child, regardless of the circumstances of his/her birth, would have an equal chance to succeed in life. This report analyzes the extent of provision of equal access to basic opportunities to all children (including healthcare, education, clean water and sanitation), and identifies the main circumstances that affect it and therefore determine human development outcomes. The analysis in this report builds on the concepts and ideas developed in the World Development Report (WDR) 2006: *Equity and Development* and the WDR 2007: *Development and the Next Generation*. The findings are aimed at supporting debates and discussions, within and outside the Government of Egypt, on the need to ensure equality of opportunity, to contribute to the development of policies and institutions for children and youth, and to provide an improved sense of hope and social justice for the future and help build a more equitable society in the post-Mubarak era.

5. **The report is structured as follows:** Section I presents the background and motivation for the study. Section II deals with early risk factors and associated health and education outcomes for children. Section III presents the estimates of inequality of opportunity among children. Details about the data sources and various analyses presented are included in the Annexes.

I.2. Background and Motivation

6. **The core of the analysis undertaken in this report can be illustrated by visualizing the following scenario**. Imagine Hana, a six-year old girl living in rural Suhag (Upper Egypt). Hana has four siblings and lives with her widowed illiterate mother who works in subsistence agriculture. Now imagine Abdullah, a boy, also six years old, living in Cairo. Abdullah has one sibling and lives with his mother and father, both university graduates from the American University of Cairo. Abdullah's father works for a multinational corporation and his mother works in the Egyptian civil service. What are the chances that both Hana and Abdullah will become successful university graduates and professionals? The study on inequality of opportunity will assess the difficulties faced by children like Hana in leading a successful life due to circumstances beyond their control, such as their gender, place of birth, and family background. Therefore, rather than focusing on final outcomes, such as educational attainment or earnings, in this analysis we step back and ask a simple question: what are the chances for a girl like Hana to have access to quality basic services such as healthcare, education and sanitation compared to Abdullah?

Figure 1.1 Perceptions of Income Inequality and Fairness in Egypt

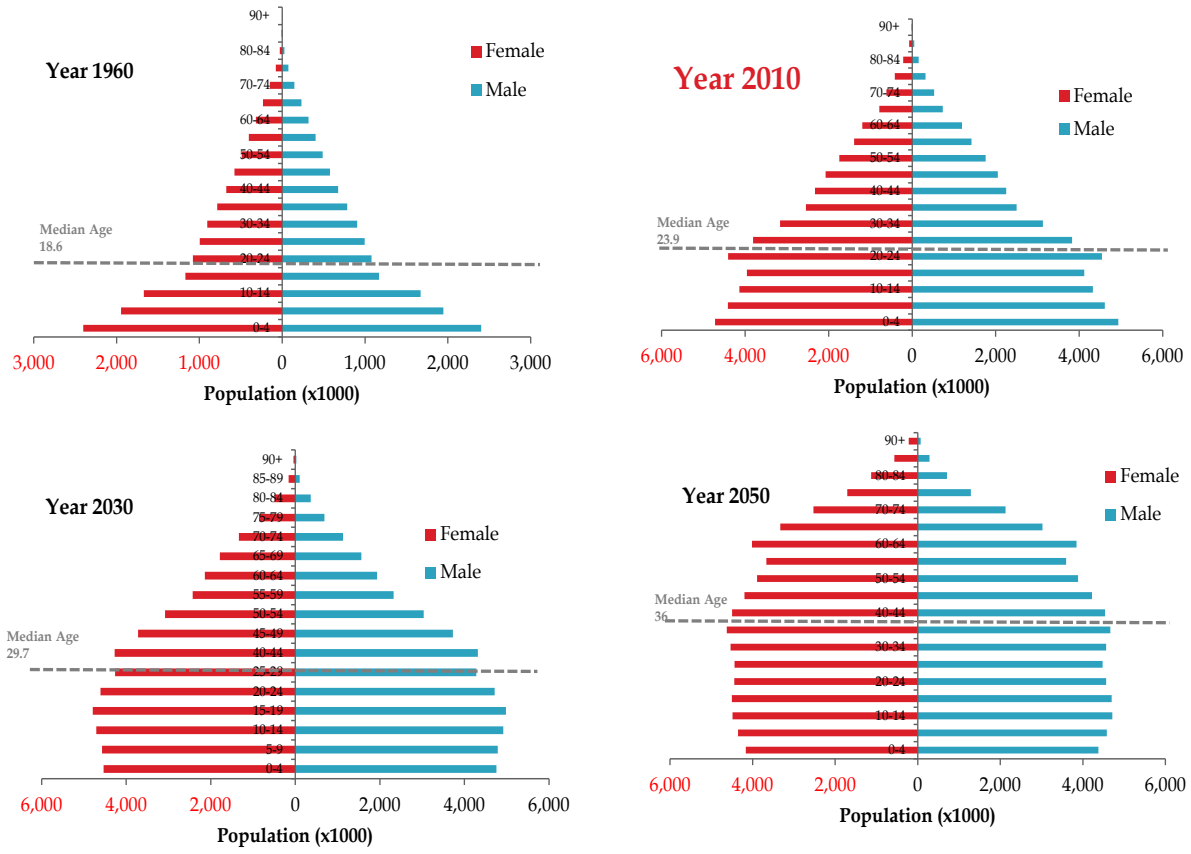


Source: World Value Survey, 2000-2008

7. **While the public perception of income inequality in Egypt is low, unequal access to basic social services and social exclusion are perceived to present challenges to social stability and inclusive growth.** According to the World Value Survey (WVS) conducted in around 70 countries in 2005-2008, while about 16 percent of all WVS respondents agreed that "incomes should be made more equal in my country," the corresponding figure in Egypt was less than 3 percent (see Figure 1.1 above). In addition more than 30 percent of Egyptians felt that "we need more income differences as incentives for individual efforts", compared to 18 percent for all participating countries. Overall (income) inequality arises from differences both in individual efforts as well as in circumstances and opportunities faced by individuals (Roemer, 1998, 2006; Bourguignon et al., 2003, 2007). Those latter differences due to predetermined characteristics such as race, gender, ethnicity, family background, and place of birth, are generally viewed as undesirable. However, it is important to note that some inequalities in outcomes are socially acceptable insofar as they are correlated with differences in individuals' efforts. Again, according to the WVS, nearly all respondents from Egypt agreed with the statement "if someone worked harder, it is fair for him or her to be better rewarded". As the Arab Spring has amply demonstrated, Egyptians are more concerned about inequality of opportunity, which they are likely to view as unfair and undesirable, than about income inequality.

8. **The favorable ratio of young to old people in the coming decades presents opportunities as well as challenges for Egypt**. As shown in Figure 1.2, Egypt has about a 20 year "demographic window of opportunity" to prepare today's youth for the challenges ahead. In 2030 about 70 percent of Egypt's population is projected to be of working age (ages 15+) and this group will continue growing, although at a decreasing rate, until 2050. This demographic transition, characterized by declining population growth rates while increasing working age population is considered a "demographic opportunity", since such an episode is a one-off occurrence in a country's history. If Egypt can ensure adequate opportunities for its children and youth today and invests in their education in order to prepare them for higher value-added jobs in the future, the demographic window of opportunity can be utilized effectively. On the downside, there is also a risk that this window of opportunity is mismanaged, which potentially could lead to increased unemployment, poverty and social unrest.

Figure 1.2 Demographic Transition in Egypt (1960-2050 projection)



Source: UN 2008

I.3 Analytical Approach

9. **The importance of addressing the various dimensions of deprivation early on in the life-cycle is gaining recognition**. There is a better understanding that risks are not homogeneously distributed over the life-cycle and are typically higher in earlier stages of life, with important long-term and sometimes irreversible consequences. Risks are particularly high in the period from 0 to 5 years old, and during adolescence and youth. Longitudinal studies show that investments in poor children can translate into higher earnings in adulthood. Therefore, more equal human development in the early years could lead to more human capital accumulation, which in turn could translate into higher economic growth (see Galor and Zeira, 1993 for theoretical evidence; Birdsall and Londono 1997 and LoÂpez et al. 1998 for empirical evidence). Early childhood development is thus generally considered as one of the few policy areas where the traditional equity-efficiency trade-off in policy interventions does not exist (Heckman and Masterov 2007).

10. **The study follows a life cycle approach that identifies an individual's outcomes and opportunities from conception to adulthood, emphasizing the linkages between health, education, employment, and social protection.** The premise underlying this approach is that throughout the individual's life cycle, some critical factors directly related to his or her development will remain out of his or her control and to some extent will influence how his or her outcomes will materialize. During the individual's early years, birth weight, nutrition level, and cognitive development will be influenced by the quality of the health care and public services he/she will be exposed to, which can be – at the same time – influenced by his/her circumstances at birth. Later on, the child's test scores, overall educational attainment, and his/her likelihood to drop out of school will be associated with the quality and quantity of the education he/she can access, which can again be influenced by exogenous circumstances. Afterwards, during the individual's early working years, his/her productivity levels, probability of having a formal or an informal job, and his or her income and consumption levels may continue to be influenced by circumstances, such as access to education and ability to cognitively acquire relevant skills (dependent on nutrition and stimulation in the earliest years) as well as the access to and density of social networks, which constitute an important mechanism for obtaining a decent job. The focus of this report is on the first phase, i.e., the early years. The latter two phases are covered under two other reports in the series.

11. **The analytical approach draws on the concepts and methodology developed in the recent and growing literature on inequality of opportunity.** John Roemer (1998) developed an influential formalization of the concept of unequal opportunities, which was adopted for the purpose of this study. In brief, the methodology first identifies a set of advantages or outcomes that are deemed to be socially desirable, such as having more income, more human capital, and/or high-quality/high-pay employment. Second, it analyzes the extent to which these advantages are determined by circumstances at birth. Within this framework, if a society is able to provide

opportunities equally, the distribution of advantages should be similar across different circumstance groups for a given level of effort.[2] It is necessary to highlight that the strategy of equalizing opportunities is not uniquely concerned with a general increase in a specific socially desirable outcome, but mostly with taking the steps to ensure that all individuals in a society have similar opportunities to enjoy these advantages through their own effort.

12. **Several tools are employed to analyze the extent of inequality of opportunity among the Egyptian children.** They include: (a) analyzing the relationship between early risks and outcomes and circumstances at birth; (b) comparing distributions of outcomes across circumstance groups to provide a simple way to visibly "signal" the extent to which inequality of opportunity exists and is important; (c) employing the concept of Human Opportunity Index (HOI) in access to basic services (such as whether or not a child completes primary school on time); and (d) estimating the relative contributions of the different circumstances to inequality of opportunities, through Shapley value and other decomposition procedures.

I.4 Data

13. **The report uses data from two main sources: (a) the Egypt Demographic and Health Survey (DHS) for 2000 and 2008; and (b) the Egypt Household Income, Expenditure and Consumption Survey (HIECS) for the corresponding years**. The DHS is a nationally representative population and health survey conducted in Egypt on ever-married women aged 15 to 49. The survey was carried out by the Egyptian Ministry of Health, and funded by USAID in Cairo, UNICEF, and the Ford Foundation. It provides data on key indicators such as fertility, use of contraceptives, infant and child mortality, immunization levels, coverage of antenatal and delivery care, nutrition, and prevalence of anemia. The DHS also collected information on a number of other health topics such as avian influenza; HIV/AIDS and hepatitis C; previous history of hypertension, cardiovascular illness diabetes and liver disease; attitudes and behavior with respect to female circumcision; health care costs; and health insurance coverage for women and men aged 15 to 49 living in a subsample of one in four of the households surveyed. In addition, height and weight measures were collected for children under six years of age and never-married youths and young adults aged 10 to19 in all households in the survey.

14. On the other hand, the HIECS is a large scale and nationally representative survey conducted by CAPMAS every five years since 1995 and every year starting in 2008. The HIECS is the main (and the only official) source for poverty and inequality data in Egypt. There have been some improvements in 2008, compared to 2000. Most importantly, the later survey bases its sampling frame on the 2006 Population Census and the length of the recall period for food consumption diary was reduced to 15 days —as opposed to 30 days for the earlier survey. However, CAPMAS maintained identical principles and procedures for quality control for both

[2] For instance, according to Roemer's framework, equality of opportunities in education quality for children in 5th grade (as proxied by test scores) would be achieved if the distribution of test scores is the same for different circumstance groups, such as urban boys with educated parents and rural girls with uneducated parents.

surveys. By combining information both from the DHS and the HIECS, the report analyzes in detail the impact of circumstances on access to basic infrastructure and health outcomes of children under 6 years of age, and documents changes over time.

II. Circumstances and Early Health and Education Outcomes

II.1. Introduction

15. **The first few years are crucial to the growth and development of a child and to his/her wellbeing later in life.** All early childhood development outcomes are influenced by nature and nurture, and are largely attributable to circumstances beyond a child's control. Circumstances such as place of birth, gender, parental education, wealth and other socioeconomic backgrounds are not under the control of a child, but play a critical role from conception to adulthood in shaping success in life. Poor health and inadequate nutrition early in life impede cognitive and physical development, leading to adverse health, productivity and wellbeing outcomes that persist into adulthood. Studies on child development in developing countries show that poverty can lead to poor child development, increase exposure to biological and psychosocial risks and impede the child's ability during school entry (e.g., Walker et al., 2007). These risk factors in early childhood affect readiness for school and therefore subsequent school performance and later labor market outcomes through channels such as cognitive ability, socio-emotional competence and sensory-motor development (Grantham-McGregor et al., 2007). Furthermore, these risks often occur together or cumulatively, with increased adverse effects on children from least advantaged backgrounds.

16. **Many of the critical inputs for early childhood development, such as the quantity and quality of food, early education, and healthcare, and the availability of clean water and sanitation, are unequally distributed across children**. The unequal distribution of these factors contributes in turn to inequality in desirable outcomes, and, as such, represents an important source of inequality of opportunity later in life. The objective of this report is to analyze the patterns of inequality of opportunity among Egyptian children during the early and formative years. By combining data from the Egypt's Demographic and Health Survey (DHS) and the Household Income, Expenditure and Consumption Survey (HIECS), we examine inequality in access to basic services among children with differing circumstances at birth and the resulting inequality in human development outcomes early in life. The Egypt's DHS for 2000 and 2008 are the main sources of data for health utilization, nutrition, access to basic services and school enrolment. The DHS is nationally representative and includes interviews with 15,573 ever-married women in the 15-49 age group in 2000 and 16,527 ever-married women in 2008. It provides estimates for fertility, maternal and child health, immunization levels and nutrition focusing on children in the early age group (ages 0-5) living in these households. Educational

enrolment analysis is also carried out for older age groups, using as observations once more the children born to the women in the DHS samples.

II.2. Conceptual Framework

17. **Desirable outcomes, such as educational attainment and earnings, are affected by both individual efforts and circumstances beyond the control of an individual.** Circumstances such as place of birth, gender, parental education, wealth and other socioeconomic background factors, are not under the control of an individual, but can play a critical role in shaping success in life. On the other hand, individuals can exert efforts that improve, for example, their educational achievements and subsequently their labor market outcomes. **However, for young children (ages 0-5), it is not appropriate to speak about "efforts" since children are too young to exert efforts that improve, for example, their health outcomes.** Since children are too young to exert efforts, we can reasonably assume that outcomes are fully determined by circumstances beyond their control. We consider a set of seven circumstances: child's residence (i.e., urban/rural), region or governorate, parents' educational attainment, number of siblings at home, household wealth, and gender.[3]

18. **Several outcomes of interest can be measured based on the DHS survey.** These include: (1) access to healthcare (during pregnancy, birth and early postnatal period); (2) nutrition (malnutrition, micronutrient intake); (3) access to basic services (clean water, sanitation); and (4) school enrolment. Early childhood period starts at conception and thus pregnancy is an important period of cognitive and emotional development and physical growth for infants. The quality of health care that a woman receives during pregnancy and birth can reduce the risk of illness and death for both the mother and the infant. There are several questions on maternal and infant health in the DHS. For the purpose of the report, the following are considered: (i) lack of antenatal care (proxied by incidence of mother not having any blood tests during pregnancy), (ii) birth not taking place at a health facility, (iii) birth not being assisted by skilled health staff, (iv) child not having a postnatal check-up within two months of birth, and (v) immunizations within one year after birth.

19. The second set of outcomes is related to levels and trends in malnutrition and micronutrient intake for children in the early age group. Anthropometric measures such as height-for-age[4] (stunting), weight-for-height[5] (wasting) and weight-for-age[6] (underweight) are

[3] See Annex 1 for details on variable definitions and categories.

[4] Height -for-age (H/A) reflects cumulative linear growth. Height for age deficits indicate past or chronic inadequacies of nutrition and/or chronic or frequent illness, but cannot measure short-term changes in malnutrition. Low H/A relative to a child of the same sex and age in the reference population is referred to as "shortness." Extreme cases of low H/A, in which shortness is interpreted as pathological, are referred to as "stunting." H/A is used primarily as a population indicator rather than for individual growth monitoring (World Bank, 2008).

used to analyze the differences in malnutrition levels across circumstance groups. Stunting is a measure of chronic malnutrition and is caused by poor nutrition often compounded by infectious diseases (Grantham-McGregor et al. 2007). Child malnutrition is often linked to poverty, low levels of education, and poor access to health services. Malnourishment in turn, even moderate, increases the risk of death, inhibits cognitive development, and affects health status later in life (O'Donnell et al. 2008). While growth potential in preschool children is similar across countries, not dependent on genetic differences, stunting in early childhood is known to be caused by poor nutrition and infection (Grantham-McGregor et al. 2007). The first of the series of Lancet articles on child development in developing countries refer to longitudinal studies that show how early stunting predicts later cognition, school progress or both[7]. It is therefore important to consider early nutrition variables, since these biological factors in the early years are closely related to children's later cognitive ability, school performance and hence social and economic success as adults.

20. In connection with the above, it is also important that children have the necessary level of micronutrient intake for healthy development. Adequate access to iodized salt, iron tablets during pregnancy and Vitamin A in early infancy are key indicators for micronutrient intake. It is well established that iodine, a constituent of thyroid hormones, affects the development of the central nervous system and regulates many physiological processes. Iodine deficiency can lead to hypothyroidism and irreversible mental retardation in children, making it "the most common form of preventable mental retardation" (Walker, 2007). A worldwide program on reducing iodine deficiency through salt iodization has produced substantial progress on this indicator around the world, although iodine deficiency still remains a problem for the mental development of many children. Similarly, iron deficiency is reported to cause poorer mental, motor, socio-emotional and neurophysiologic functioning in infants and it is identified as one of the key biological risk factors that children face in their early years. Large supplementation trials in infants in developing countries show the benefits of iron, especially on motor and socio-emotional outcomes (Walker, 2007). This study uses two variables available in the DHS and that are important for determining and supplementing iron deficiency anemia during pregnancy: (i)

[5] Weight-for-height (W/H) measures body weight relative to height and has the advantage of not requiring age data. Normally, W/H is used as an indicator of current nutritional status and can be useful for screening children at risk and for measuring short-term changes in nutritional status. At the other end of the spectrum, W/H can also be used to construct indicators of obesity. Low W/H relative to a child of the same sex and age in a reference population is referred to as "thinness." Extreme cases of low W/H are commonly referred to as "wasting." Wasting may be the consequence of starvation or severe disease (in particular, diarrhea). (World Bank 2008).

[6] Weight-for-age (W/A) reflects body mass relative to age. W/A is, in effect, a composite measure of height-for-age and weight-for-height, the term "underweight" is commonly used to refer to severe or pathological deficits in W/A. W/A is commonly used for monitoring growth and to assess changes in the magnitude of malnutrition over time. However, W/A confounds the effects of short- and long-term health and nutrition problems. (World Bank, 2008).

[7] Stunting at 24 months was related to cognition at 9 years in Peru and, in the Philippines to intelligent quotient (IQ) at 8 and 11 years, age at enrolment in school, grade repetition, and dropout from school. In Jamaica, stunting before 24 months was related to cognition and school achievement at 17–18 years and dropout from school. In Guatemala, height at 36 months was related to cognition, literacy, numeracy, and general knowledge in late adolescence, 114 and stunting at 72 months was related to cognition between 25–42 years. In Indonesia, weight-for-age at 1 year of age did not predict scores on a cognitive test at 7 years, whereas growth in weight between 1 and 7 years did (Lancet 2007, page 63).

whether the mother has had blood tests during her pregnancy, and (ii) whether she has taken any iron supplementation tablets.

21. The third set of outcomes is related to access to basic services and infrastructure that determine children's health and the development of cognitive potential. The WHO estimates that every year 1.4 million children under the age of five die from diarrheal diseases attributed to unsafe water supply and inadequate sanitation and hygiene (Molinas, de Barros, and Saavedra 2010). Two infrastructure variables have been analyzed in this analysis, by circumstance group: (i) access to improved water; and (ii) a proxy variable for sanitation (whether the household has its own toilet). The final outcome of interest for the study is educational attainment. Educational enrollment rates are calculated for the basic education level age group (6-14 year olds) and the secondary education level (15-17 year olds) in the sample.

22. As the dependent variables (O) take the value of 1 if the desired outcome is positive, or 0 otherwise, a simple empirical specification of the above equation can be:

$$Prob(O = 1|\, C) = g\,(\beta_0 + \beta_1\, urban + \beta_2\, region + \beta_3\, mothereduc + \beta_4\, fathereduc + \beta_5\, siblings + \beta_6\, assets + \beta_7\, gender)$$

where O takes 1 if a child achieves the outcome of interest and 0 otherwise. A probit model is employed to analyze the relationship between the desirable outcomes and the circumstances (C) that children face. In other words, the probit analysis provides information on the likelihood of children in the sample to face a certain risk depending on the circumstances at birth. The analysis allows to diagnose the strongest correlates of early childhood risks and to identify how these correlates have changed over time in Egypt. The partial correlation coefficient on each of the seven circumstance variables provides the marginal effects associated with changes in each circumstance variable holding other circumstances constant. The descriptive statistics and the probit results are presented in Annex 3.

23. **The key results of the analysis are discussed below under each of the four outcomes**: (1) access to healthcare; (2) access and availability of essential nutrition; (3) access to basic services; and (4) school enrolment. In addition, the report presents the contrast in these outcomes between the least and most advantaged[8] children groups and discusses the likelihood of exposure

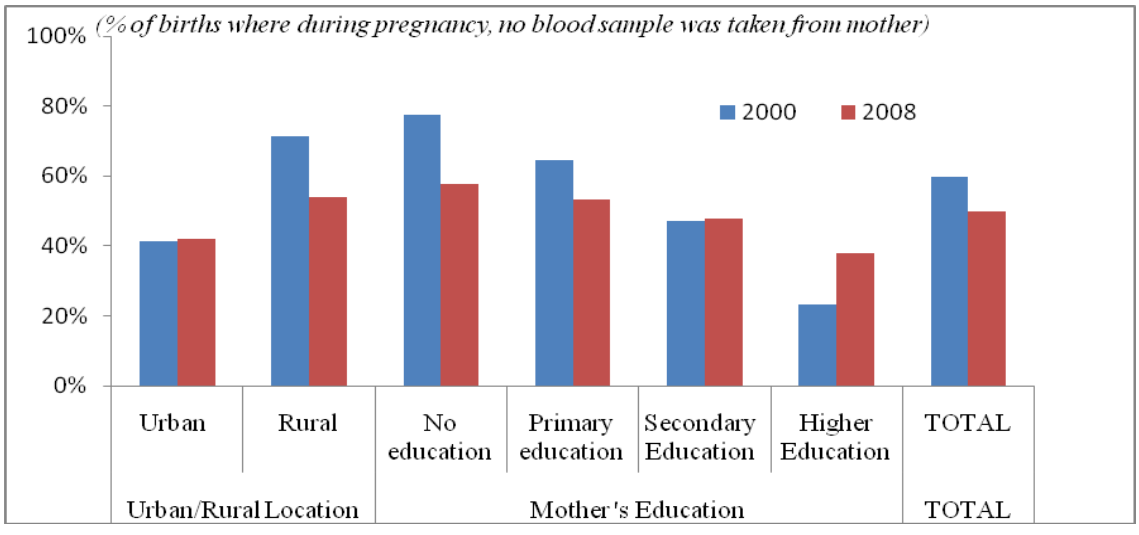
[8] Most and least advantaged groups of children are constructed based on circumstances. These two groups make up both extremes and account for about 5 percent of the children in the 0-4 age group. Least advantaged children are defined as those from rural areas, parents with no formal education, in households with five or more children at home, and from families in the poorest wealth class. On the other hand, most advantaged children are defined as those from urban area, parents with higher education, in households with less than four children, and from families in the richest wealth class.

to multiple risk factors and how circumstances beyond the children´s control affect the degree of such exposure.

II.3. Access to Health Care during Pregnancy, Birth and the Early Postnatal Period

24. **Although regional disparities in access to antenatal care persist, they have become less pronounced over time as a result of improvements in access in rural areas.** About half of the births registered in 2008 did not involve blood tests during pregnancy. This figure however represented an improvement compared to earlier (2000) results, which showed that about 60 percent of women did not have their blood sample taken during pregnancy (Figure 2.1). Yet half of the pregnant women do not have access to the diagnosis of problems related to nutritional intake and infant growth. The probability of not having a blood sample taken during pregnancy was 71.5 percent in rural areas in 2000, and declined to 54.1 percent in 2008, while access in urban areas remained relatively stable (Figure 2.1). The improvement in access to care in remote and rural areas is also reflected in the results of the multivariate analysis: while in 2000 rural location was associated with an 11.9 percentage point increase in the probability of having no blood sample taken from the mother, in 2008 the rural variable is no longer significant (see Annex 3, Tables 1C-D). The educational attainment and wealth of the mother were the strongest correlates of antenatal care in 2000. However, the relative significance of these variables has become smaller in 2008.

Figure 2.1 Access to antenatal care has improved over time particularly in rural areas and for women with low levels of educational attainment



Source: Egypt DHS 2000 and 2008 (see Annex Tables 1A-1B for details)

25. **About one-in-five births were not attended by skilled staff in Egypt.** When births do not take place in health facilities or are not attended by skilled staff, the risk of complications leading to maternal and infant death increases[9]. The results show that there has been a significant reduction in the percentage of births not attended by skilled staff and in the percentage of births not taking place in health facilities during the 2000s (Figure 2.2). While in 2000 about 39 percent of births were not attended by skilled staff, and 52 percent of births did not take place in a public or private health facility, by 2008 these levels had decreased to about 21 and 29 percent respectively.

26. **Most of the improvements in access to care during birth were progressive over the 2000s, benefiting the poorest more and reducing regional disparities**. For instance, about 70 percent of births in the poorest quintile took place without trained staff and 79 percent of births took place outside of health facilities in 2000. By 2008, these levels had declined to about 46 percent and 55 percent, respectively. For the richest quintile, only about 6.6 percent of births were not attended by skilled staff in 2000, and this level declined to 4.2 percent by 2008. Regional disparities also diminished with increased availability of care in rural areas. While in 2000 about 52 percent of births in rural areas took place without skilled health staff, this level had declined to 28 percent by 2008 (see Figure 2.2).

Figure 2.2 Regional disparities have been significantly reduced in access to care during birth…

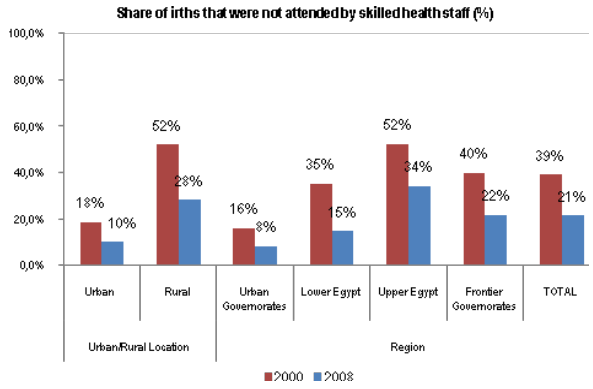
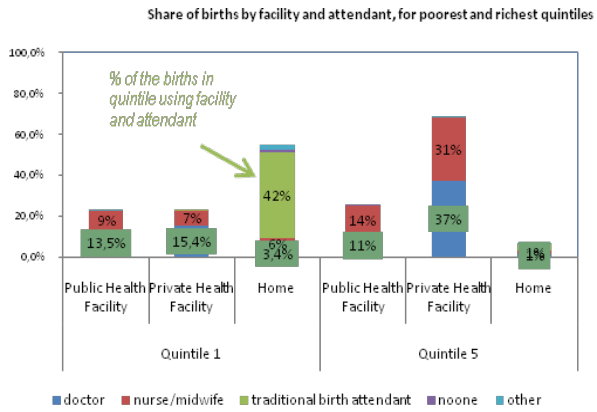


Figure 2.3 ….however, even as of 2008, home births attended by traditional birth attendants remain common for women in the poorest asset quintile.



Source: DHS 2000 and 2008

[9] In the developing country setting, home births usually imply that the birth is not attended by skilled personnel and therefore pose a risk to the mother and the newborn infant.

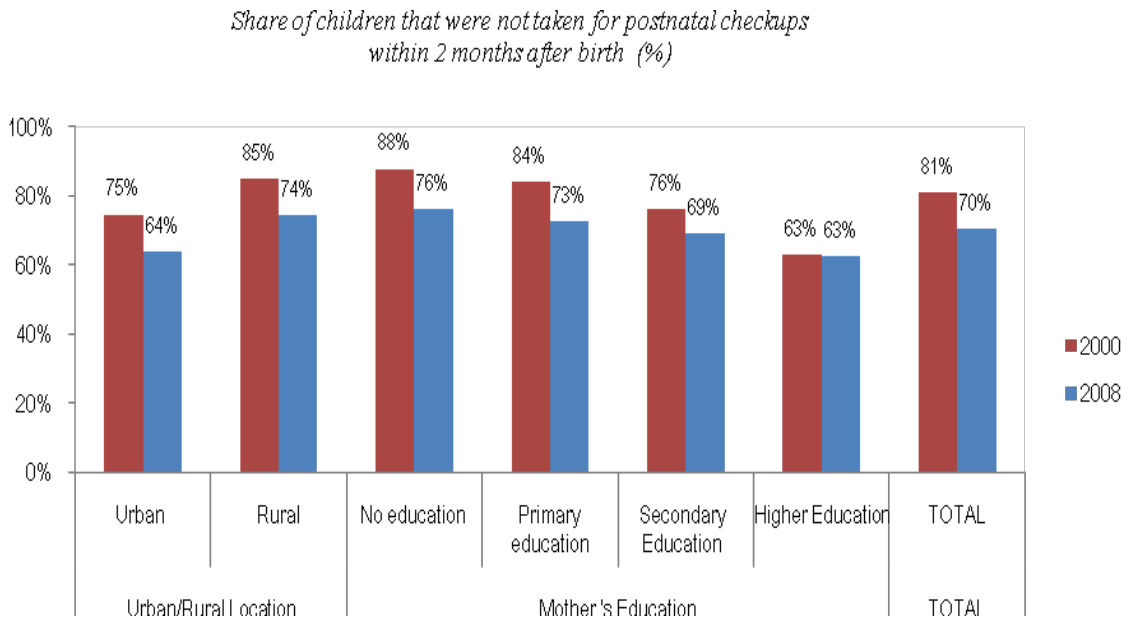
27. **In spite of the progressive expansion of benefits for health care during birth, births assisted by traditional birth attendants were still the most common phenomenon among the poorest.** In the poorest quintile, traditional birth attendants assisted 42 percent of all births for children in 2008 (Figure 2.3). Births in rural areas, Upper Egypt and Frontier Governorates remained much more likely to be unattended by skilled personnel. As of 2008, asset quintiles and women's educational attainment variables remained the most significant correlates of not having access to care during birth. In this sense, a woman with no formal education was 13 times more likely to have a birth not attended by skilled staff, compared to a woman with a university degree.

28. **The majority of children in Egypt are not taken for postnatal care visits to a doctor within two months of birth.** According to 2008 DHS, about 70 percent of children were not taken to a doctor within two months of birth, down from 81 percent of children in 2000. There is little variation across wealth groups for postnatal checkups of children. The inequities are overall low, although mother's educational attainment variables are the most significant determinant of these postnatal health visits. On the other hand, medical treatment of the child after showing symptoms of acute respiratory infection (ARI) is higher than routine postnatal visits. In 30 percent of cases, these children were not taken to the doctor. The gender of the child (being female) is associated with a higher likelihood of not being taken to the doctor in the face of these symptoms. Otherwise, health care utilization in case of need does not seem to be strongly associated with wealth or the educational level of parents.

29. **Although postnatal health care utilization for infants remains low, Egypt has a good track record of immunizations among young infants.** The coverage of BCG, DTP1 and Polio1 are quite high: less than 1 percent of 1 year olds (12-23 months) lack these vaccines in Egypt[10]. However, follow up rates for DTP 2 and 3, as well as Polio 2 and 3, need to be higher for the vaccines to be effective. The multivariate analysis provided in Tables 1C and 1D show that the lack of a full set of immunizations is associated (weakly) with geographic location and wealth status. Other circumstance variables are not correlated with the probability of not receiving the full set of vaccinations. Egypt fares well in international comparisons of immunizations coverage. The WDI indicators on immunizations of DTP3 (among 1 year olds) indicates that Egypt's level of immunizations coverage is on par with levels predicted by per capita income levels (see Figure 2.1A in Annex 2).

[10] In this analysis we concentrate on a sub-sample of 1 year old children - between 12-23 months of age. The set of immunizations considered in this section of the paper are: BCG, DTP (1, 2, and 3), Polio (1, 2, and 3) and Measles.

Figure 2.4: The majority of infants in Egypt are not taken to the doctor for postnatal visits within 2 months of birth

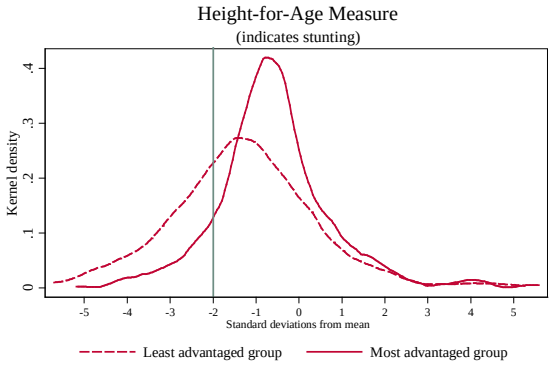


Source: Egypt DHS 2000 and 2008

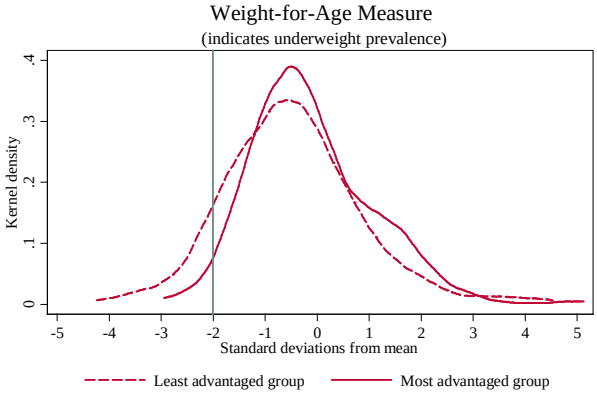
II.4. Nutrition

30. **The existing evidence suggests that stunting is a significant problem in Egypt affecting a quarter of young children, and that its level has increased during the 2000s.** According to the DHS, the rate of stunting was at about 24.9 percent of children in the 0-4 year age group in 2008, compared to 18.9 percent in 2000. Similarly, the prevalence of severe stunting among the 0-4 age group worsened from 6.3 to 10.8 percent between 2000 and 2008. The prevalence of underweight, which may reflect both chronic and/or acute malnutrition, has also increased from 4.1 percent to 7.6 percent between 2000 and 2008 for the 0-4 age group.

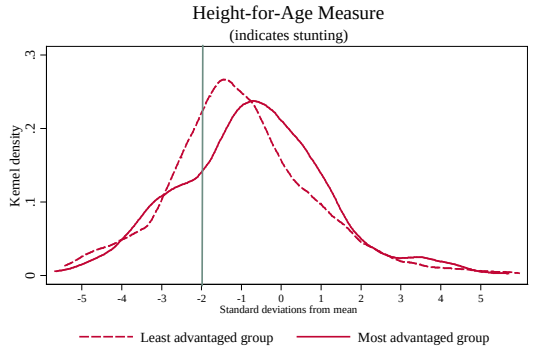
Figure 2.5 Height-for-age and Weight-for-age measures do not vary significantly for the most and least advantaged circumstance groups in Egypt (2000 and 2008)



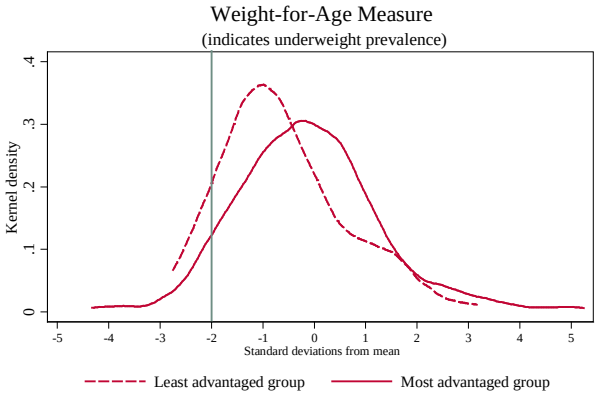
Source data: Egypt DHS 2000



Source data: Egypt DHS 2000



Source data: Egypt DHS 2008



Source data: Egypt DHS 2008

31. **The variation in stunting across circumstance groups is not large.** In fact, in 2008, those circumstance groups considered to be most advantaged appear to have higher prevalence. Among the "most advantaged" group of children in the sample, the prevalence is 30.2 percent, compared to 21.9 percent among the "least advantaged" group[11]. Figure 2.5 provides height-for-age and weight-for-age z-scores (standardized around the international median) for children ages 0-4 in Egypt as of 2000 and 2008, for the most and least advantaged groups. As the chart indicates, while there is some variation across circumstance groups, the divergence in the z-scores is not as dramatic as that observed with regard to access to healthcare.

[11] These circumstance groups are set up on the basis of parental educational attainment, urban/rural location, number of siblings, and household asset quintiles. See Annex 1 for description of "least advantaged" and "most advantaged" circumstance groups.

32. **The prevalence of stunting is more strongly associated with geographic (regional) disparities than household characteristics.** In 2008, the main determinants of stunting were regional and were not based on household characteristics. There is almost no difference in stunting and severe stunting prevalence by household wealth stunting prevalence among the poorest quintile was 25 percent in 2008, compared to 24 percent for the top quintile. The situation was quite different back in 2000 when asset quintiles as well as the educational attainment variables for the father were significant correlates of stunting, in addition to regional variables. Regional variables are the strongest determinants of stunting in 2008, with a child in Lower Egypt being 11.5 percentage points more likely to be stunted (or similarly a child in Frontier Governorates being 6.9 percentage points more likely to be stunted) compared to a child with the same household characteristics in Urban Governorates.

Figure 2.6 There was a successful expansion in the availability of iodized salt in Egyptian households between 2000-2008, though the program's outreach was more limited among the poor

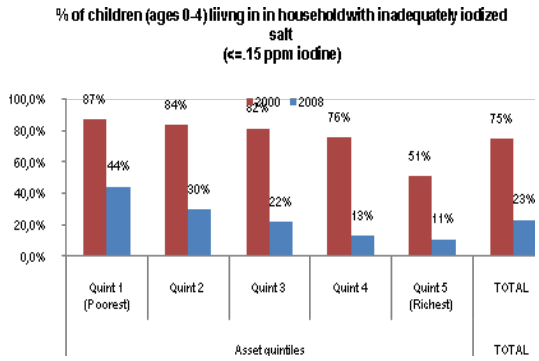
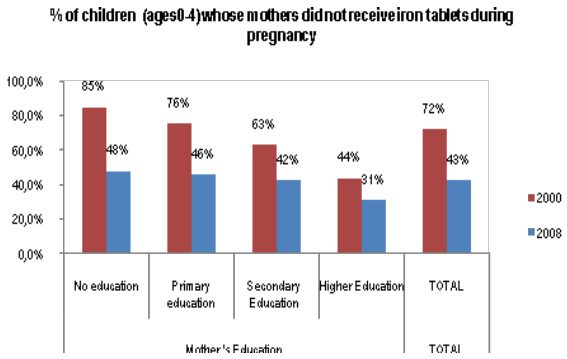


Figure 2.7 Access to iron supplementation during pregnancy increased between 2000-2008, particularly among women with lower levels of educational attainment



Source: DHS 2000 and 2008

33. **With a successful fortification program, Egypt has achieved a significant reduction in iodine deficiency over the 2000s**. For instance, in 2000, 3-in-4 children under the age of 5 lived in households where salt was not adequately iodized[12] and by 2008 this level was down to 1-in-4 children. The rapid expansion in availability of iodized salt benefited households in all regions, and across all income groups. In rural areas, the share of children living in households with inadequately iodized salt declined from 82.5 percent in 2000 to 27.6 percent in 2008, and from 86.5 to 44.4 percent among the poorest quintile (sees Figure 2.6).

[12] Inadequate iodization is defined as <=.15 ppm iodine in salt consumed by the household. (EDHS 2008 report)

34. **However, disparities in access to iodine based on wealth still exist.** While less than 11 percent of children in the top quintile are reported to have insufficient iodine, over 44 percent of children in the bottom quintile live in households with inadequate (or no) iodized salt. The multivariate analysis also reveals that controlling for all other household characteristics, being in the poorest quintile is associated with a 28.3 percentage point higher likelihood of inadequate access to iodine at home, when compared to the top quintile (Annex 3, Table 2.2D).

35. **The use of iron supplements by pregnant mothers improved significantly between 2000 and 2008.** In about 42.6 percent of pregnancies that ended in birth in 2008 mothers did not receive iron supplementation tablets, which represents a significant improvement from the 72.1 percent registered in 2000 (Figure 2.7). As analyzed earlier in the antenatal care section, mother's education level and household wealth are strong correlates of whether blood samples are taken from during pregnancy in order to determine any need for supplementation. In 2000, mother's educational variables and household assets were the strongest determinants of whether women received iron supplementation. A child born to a mother with no formal education and in the poorest wealth quintile was 36 percentage points less likely to receive iron supplements during pregnancy, compared to a child born to a mother with higher education and in the richest wealth quintile. By 2008, the differences across circumstance groups relating to this variable were less stark: a child born to a mother with no formal education and in the poorest quintile was 18 percentage points less likely to receive iron supplementation (see multivariate analysis results in Table 2.2C and 2.2D, Annex 3). As shown in Figure 2.7, iron supplementation became more common during pregnancy over the 2000s, and women with lower educational attainment benefited more from this expansion.

36. **The incidence of Vitamin A supplementation is quite low in Egypt, with about 90 percent of children in 2008 ages 0-4 reportedly not receiving Vitamin A tablets in the past 6 months**. While this level does not imply that these children are all Vitamin A deficient, the low incidence of supplementation is potentially problematic. Vitamin A deficiency can lead to eye-sight problems and diminish a child's ability to fight infections. Vitamin A deficiency can also increase children's risk of developing respiratory and diarrheal infections, and decrease the likelihood of survival from serious illness. However, as lack of Vitamin A supplementation is widespread in Egypt, this phenomenon does not vary widely depending on wealth or parental education variables, and thus it is not strongly linked to any of the circumstances considered. In fact, it is overall very high for all children in Egypt, suggesting a supply side problem.

II.5. Access to Basic Services

37. **Access to improved drinking water has significantly expanded in the 2000s in Egypt, and the expansion has been pro-poor.** In 2008, only 2.5 percent of children in the 0-4 age

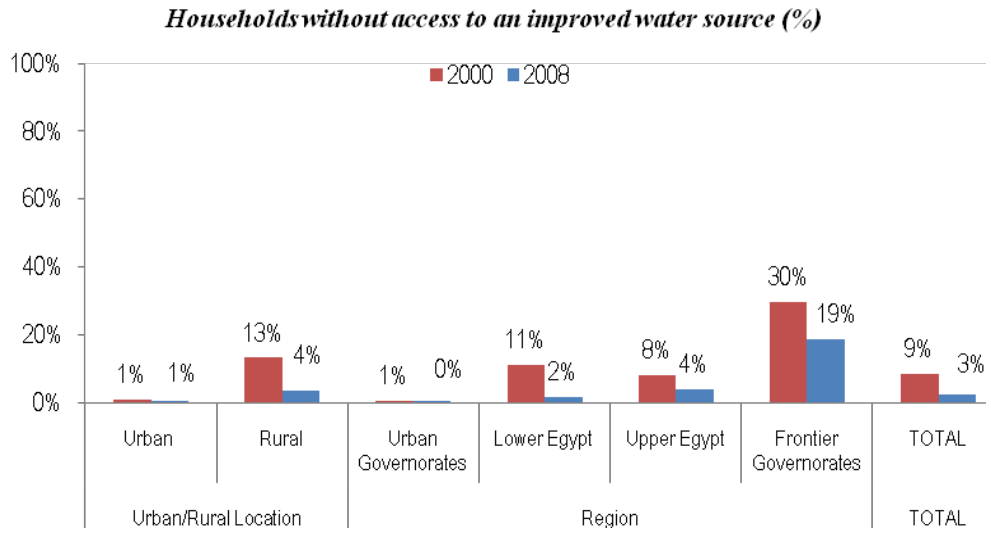
group lived in households without access to improved water, compared to 8.5 percent in 2000. Overall, there has been a pro-poor expansion of access to improved water: while over 21 percent of children in the poorest quintile did not have access to improved drinking water in 2000, this figure had dropped below 5 percent in 2008. In rural areas, the percentage of children with no access to improved water at home declined from 13.2 percent to 3.7 percent during the same period.

38. **The remaining inequalities in access to improved water are largely due to geographical differences.** About 20 percent of children in the Frontier Governorates did not have access to improved water in 2008, down from about 30 percent in 2000. In fact, the Frontier Governorates identifier is the single most important predictor of lack of access to an improved water source. For example, after controlling for all other household circumstance variables, a child in the Frontier Governorates is about 21 percentage points more likely to live in a household with no access to improved water, compared to a child from the Urban Governorates of Cairo, Alexandria, and Port Said.

39. **With regard to sanitation, of all the children in the 0-4 age group, slightly more than 6 percent live in households with shared toilets.**[13] Wealth quintile variables are the strongest determinants of having a shared toilet at home. A child living in a household in the bottom quintile is about 19 percentage points more likely to be using a shared bathroom than a child living in a top asset quintile household. Regional variables are however less significant (note that this would not necessarily be the case for access to sanitation since toilet availability is only a proxy variable).

[13]The DHS does not have any sanitation variables that could help assess whether the households have access to improved sanitation. Instead, in this analysis we look at whether the household has their own toilet or whether they share a toilet with other households.

Figure 2.8 The remaining inequalities in access to improved water are largely due to geographical differences.



Source: DHS 2000 and 2008

II.6. Educational Attainment

40. **The overall probability of enrolment has increased from 86.2 to 89.6 in basic education (ages 6-14), and from 71.9 percent to 77.2 percent in secondary education (ages 15-17) during the 2000s**. Educational enrollment and attainment levels vary for children in the different circumstance groups in Egypt (Figure 2.9). For the most advantaged group of children, the enrollment rate in basic and secondary education is at about full coverage (99 percent) while for the disadvantaged group[14] the enrollment rates are only around 73.5 percent in basic education (6-14 year old group) and below 50 percent in the secondary school level.

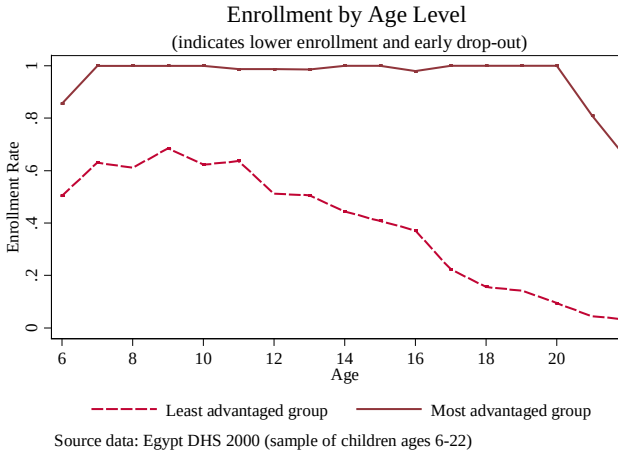
41. **The enrolment gap between the advantaged and disadvantaged groups has narrowed between 2000 and 2008, with a pro-poor expansion of enrolment in basic and secondary school.** Most of the benefits of the expansion in enrolment have been captured by the poorest wealth quintiles. The increase in the enrolment probability of children in the poorest quintile was about 10 percentage points (from 70.4 to 80.2 percent) for the basic education age group, and close to 12 percentage points (from 46.5 to 58.2 percent) for the secondary school age group.

42. **The least advantaged group of children are likely to enroll later and drop out sooner at around age 12 before the onset of preparatory school.** However, the difference between

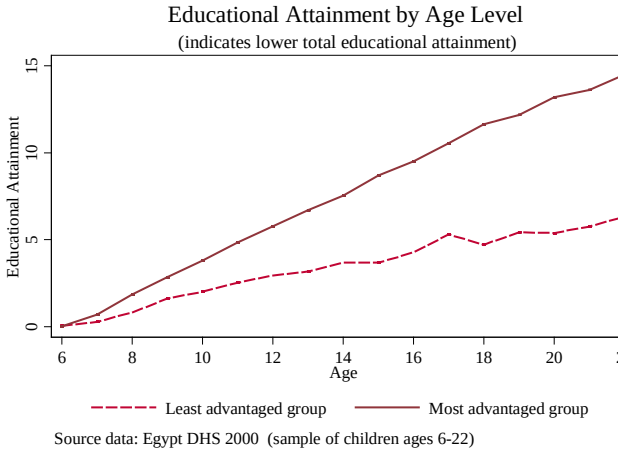
[14] See Technical Annex for descriptions of how the advanatge variable are created.

enrolment probabilities of the two opportunity groups has narrowed over time. Figure 2.9 provides mean enrolment rates and educational attainment by age group for the most and least advantaged circumstance groups in 2000 and 2008. While the advantaged group of children accumulate on average one year of education for each age group from age 6 onwards all the way up to age 22 (reaching 15.2 years of educational attainment on average for children older than 22 in these households), in the least advantaged group, educational attainment remains at less than 7 years on average.

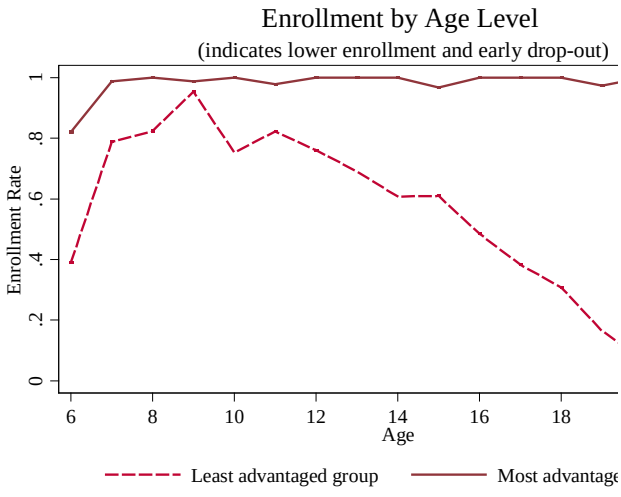
Figure 2.9 The enrolment and educational attainment gap between least and most advantaged circumstance groups is large, but narrowed in the 2000s.



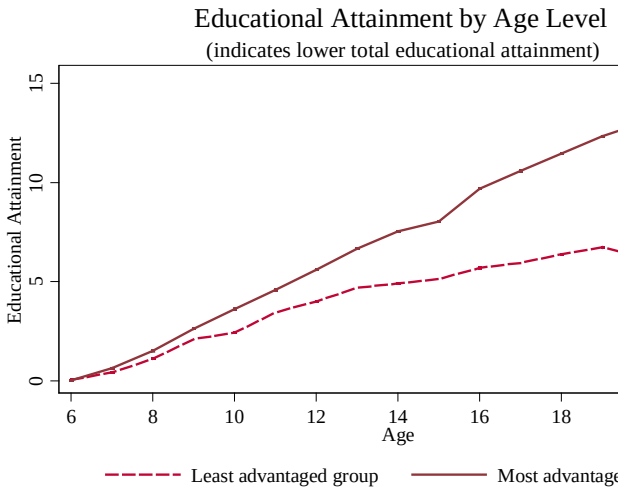
Source data: Egypt DHS 2000 (sample of children ages 6-22)



Source data: Egypt DHS 2000 (sample of children ages 6-22)



Source data: Egypt DHS 2008 (sample of children ages 6-22)



Source data: Egypt DHS 2008 (sample of children ages 6-22)

43. **Household wealth and parental education variables are the strongest correlates of enrolment in basic and secondary education.** A child in the bottom asset quintile and with a

father who has no formal schooling is about 16 percentage points less likely to be enrolled in basic education, compared to a child whose father has a higher education and belongs to the top asset quintile. The link between circumstances and enrolment becomes even stronger at the secondary school level. In this sense, a child with similar disadvantaged characteristics (poorest quintile, father with no formal education) is over 50 percentage points less likely to be enrolled when compared to a child whose father has a higher education level and belongs to the top asset quintile.

44. **The gender gap in enrolment is nearly closed in Egypt, controlling for other household characteristics**. In 2008, the gender variable (female) takes on a very small and negative coefficient at the basic education level and becomes insignificant at the secondary school level, controlling for all other variables. For example, a girl child was only 0.6 percentage points less likely to be enrolled in basic school (ages 6-14) compared to a boy with similar household characteristics, and the difference among the 15-17 year old boys and girls was not statistically significant. Comparatively, a girl child in 2000 was about 4 percentage points less likely to be enrolled in basic education (ages 6-14) and slightly over 5 percentage points less likely to be enrolled in secondary school (ages 15-17) than a boy with similar household characteristics. This suggests that Egypt has nearly closed the gap in enrolment between girls and boys from households with similar characteristics.

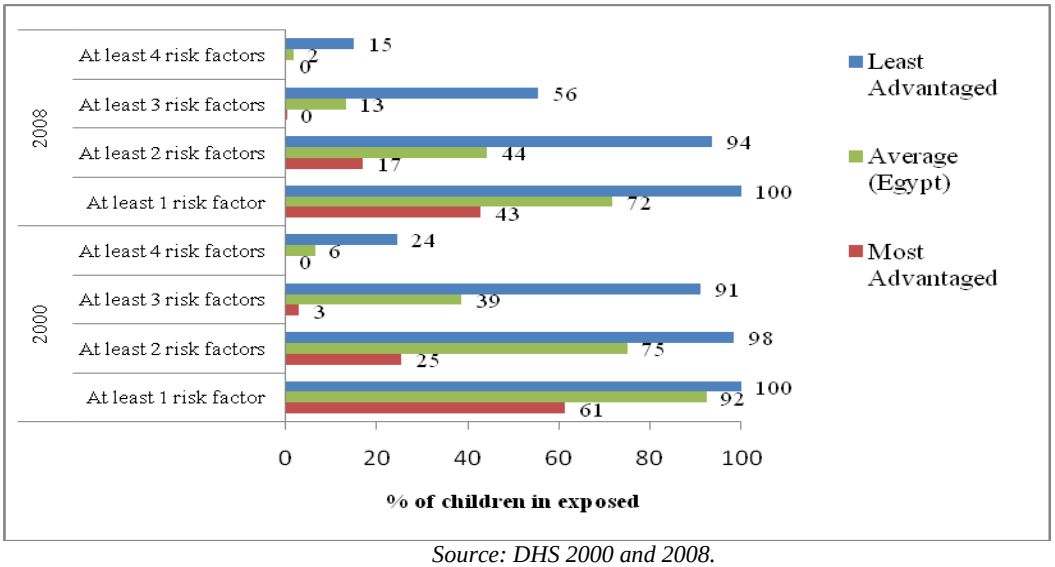
45. **While Egypt has made impressive progress in terms of expanding educational opportunities to children from poor family backgrounds and to girls, there are still certain disadvantaged groups of children not capable of benefitting from public educational investments.** There is a significant pattern of low enrolment and large early dropout among the most disadvantaged groups, which is likely to perpetuate the cycle of poverty. Education is considered to be a great equalizer and public investments in education can help build human capital to break the chains of intergenerational poverty. However, the public education system can only fulfill this role if children from disadvantaged backgrounds are school-ready (or have developed the biological/cognitive requirements for succeeding in school satisfactorily) by the time they enter school. While further analysis is needed to better understand the key factors for early drop-out among these children, Egypt's lagging early childhood development indicators described in the earlier section are likely to play a role. It is possible that problems that already arise in early childhood development may potentially be the "demand-side causes" of low enrolment rates among disadvantaged children. If this is the case, investments in early childhood would be essential to make sure the returns to public investments in basic and secondary education are fully realized and benefit those most in need of human capital investment.

II.7. Exposure to Multiple (Overlapping) Risk Factors

46. **The ECD literature on ecological risk factors emphasizes that children who are exposed to multiple risk factors in their early years are less likely to develop to their full potential** (Seifer and Sameroff 1987; Shonkoff and Meisels 2000). A child that is exposed to one risk factor, for instance poverty, may still be able to recover if his/her entourage is able to provide the cognitive and social stimulation the child needs. If the parents are missing from the picture, the extended family or the neighborhood may play a role. However, young children facing multiple risk factors are likely to have a much more compromised future and thus require policy interventions. So far, the study has only examined individual risk factors that children may face in their early years. However, many children in Egypt, as elsewhere, are in fact facing multiple risks at the same time.

47. **A group of children that make up a large percentage of the total are exposed to a wider set of critical risk factors in Egypt.** Out of the 4 major biological and psychosocial risks listed by Lancet (Walker, 2007), we are able to directly measure: (i) stunting (from anthropometric measures), (ii) risk of potential iodine deficiency (from household salt assessment), and (iii) risk of iron deficiency anemia using the 2000 and 2008 DHS data. However, the fourth risk factor, i.e., lack of cognitive stimulation at home, is not directly measurable from the available data. To proxy for this risk factor, we take the sample of children with mothers having no formal education as the risk group for potentially not receiving enough cognitive stimulation at home.

Figure 2.10: Exposure to Multiple Risk Factors in Early Childhood by Circumstances



Source: DHS 2000 and 2008.

48. **In 2008, of all children in the 0-4 age group, over 70 percent and about 44 percent were exposed, respectively, to at least one and two risk factors in their early years.** An estimated 13 percent of children of 0-4 year olds face at least three overlapping biological or psychosocial risks (see Figure 2.10). The analysis of the exposure to biological and psychosocial risk factors by wealth status reveals that about 75 percent of children in the bottom asset quintile are exposed to at least 2 risk factors and 35 percent to at least *3* risk factors at the same time. These groups of children face the highest risks to their cognitive development and should be a priority target group for early interventions.

49. **Regional variables, parental education variables and wealth quintiles are important determinants of exposure to multiple risk factors.** A multivariate analysis measuring the relative risk of exposure to multiple risk factors shows that children in Lower Egypt faced a 10 percentage point higher likelihood of suffering at least 2 risk factors compared with those in urban governorates in 2008 (see Table 2.5C in Annex 3). Similarly, being in the Frontier Governorates was associated with a 7 percentage point higher likelihood of facing at least 2 risk factors for children in the age group 0-4. Children in the poorest asset quintile are 19.2 percentage points more likely to be exposed to at least 2 risk factors and 11.5 percentage points more likely to be exposed to at least 3 risk factors when compared to children in the top quintile.

II.8. International Comparisons on Selected Indicators

50. **How does Egypt perform in international comparison on early child development outcomes?** Figure 2.1A in Annex 3 provides international comparisons on 4 key outcome variables for the latest year of available data[15]. The color coding in the figures indicates categories of countries by levels of per capita income with red bubble countries indicating high income OECD, green bubbles indicating upper middle income countries, light blue bubbles indicating lower middle income countries (where Egypt falls), and blue bubbles indicating low income countries. The size of the bubbles provides an indication of the population size. The indicators used in the analysis include: (i) births attended by health care staff; (ii) under-5 mortality; (iii) DTP 3 immunizations; and (iv) the ratio of girls to boys in primary and secondary school enrolments. These variables are in turn plotted against per capita income (measured as PPP adjusted GDP/capita).

51. **According to the 2006 data, births attended by skilled staff in Egypt remained slightly below the level predicted by per capita income**. Many countries in the region (including Iran, Tunisia and Algeria) fare better on this indicator. Egypt under-5 mortality rate is consistent as of 2009 with predicted levels of per capita income. DTP3 Immunization rates are also high and closely aligned with levels of income. The ratio of girls to boys in school

[15] The data is compiled using the Gapminder software and is downloadable from www.gapminder.org (Rosling 2011)

enrolment rates has improved in recent years and shows similar levels to those that would be predicted by income. When compared to other majority Muslim countries (such as Indonesia, Syria and Turkey), Egypt fares better on girls-to-boys school enrolment ratio—at about a 0.93.

II.9. Conclusion

52. **This section examined levels and trends in child health and education outcomes in Egypt and how they are affected by circumstances beyond a child's control.** Overall, while Egypt has made significant progress during the 2000s in weakening the links between children's circumstances and their ability to access health, education and basic services, significant disparities remain. More specifically, the main findings of the note are summarized as follows:

- Between 2000 and 2008, Egypt has made significant progress in reducing disparities across circumstance groups in terms of healthcare utilization during pregnancy and birth. Access to antenatal care has been expanded through improvements that benefit rural households as well as mothers with lower levels of educational attainment. However, during half of pregnancies, women were not administered blood tests in the antenatal period.

- Access to birth attended by skilled staff or that took place in health facilities improved during the 2000s. Most of the improvements in access to care during birth were progressive, benefiting the poorest more and reducing regional disparities. However, about one-in-five births of children in the 0-4 age group are still not attended by skilled staff.

- While postnatal utilization of health services for children is not common, Egypt has a good track record of immunizations. Only about 6 percent of children in the 12-23 month group lacked the complete set of immunizations as of 2008.

- Stunting remains a significant problem in Egypt and has worsened during the 2000s, affecting about a quarter of children in the 0-4 age group. In 2008, stunting is not strongly linked to household level characteristics such as wealth and parental education variables. Regional variables play a more significant role in determining the probability of stunting.

- Through the salt iodization program, significant improvements have been made in making iodized salt available in Egypt with the percentage of households with inadequately iodized salt decreasing from 75 to 23 percent during the 2000s. Similarly, there has been an increase in the availability of iron tablets during pregnancy with the percentage of pregnancies where there was no iron supplementation declining from 72 to 43 percent.

Changes in access to both micronutrients have been pro-poor, benefiting disproportionately the poorest (and women with lower educational attainment).

- Significant improvements in expanding enrolment in basic and secondary education have been registered, particularly for girls and for children from disadvantaged backgrounds. The gap across opportunity groups has narrowed in the early years of education. Controlling for all other household characteristics, a girl child in Egypt is no longer less likely to be enrolled in school, which indicates that the gender gaps in enrolments have nearly closed. This is also confirmed by international comparisons that show that Egypt fares well on indicators of gender equality in education when compared to other countries in the region.

- There is a large group of children facing multiple risks to their growth and development in the early years, for which prevalence is highly correlated with wealth. In the poorest wealth group, about 75 percent of children are exposed to at least two biological or psycho-social risk factors, while about 35 percent are exposed to at least 3 such risk factors. These children face the highest cumulative risk to fulfilling their potential, and should be a priority target group for early childhood interventions.

III. Inequality of Opportunity in Basic Services

III.1. Introduction

53. **The objective of this section is to measure inequality of opportunity in access to basic services among Egyptian children.** Inequality of opportunity here is defined as inequality in access to basic services due to differences in circumstances beyond children's control, such as parental characteristics, household wealth, place of birth, and gender. Children have no control over these circumstances, but their success in life will invariably be affected by them. The premise is that every child deserves universal access to basic services such as healthcare, education, clean water and sanitation and that inequality of opportunity exists if a child's access to them depends on circumstances beyond her or his control. As children's choice and efforts do not play a role in the availability and distribution of these services, inequality in access to basic services can be interpreted as inequality of opportunity. While the previous section looked at the availability of and access to these services and its trends during the 2000s, this section focuses on measuring the degree of inequality in access to these services and how each circumstance contributes to the disparity.

III.2. Data and Methodology

54. **Unlike the previous section, which relied mainly on the Egypt DHS, this section uses two sources of data.** The 2000 and 2008 DHS data are complemented by the corresponding year's Egypt Household Income, Expenditures and Consumption Survey (HIECS) to provide a more adequate measure of inequality of opportunity. Variables on children's risk factors and outcomes as well as on circumstances beyond their control are compiled from both data sources. Combining the two data sources has several advantages. As both surveys were not conducted with the analysis of inequality of opportunity in mind, neither of them is fully adequate on its own for measuring inequality of opportunity in access to basic services. While the DHS offers rich information on health indicators and other basic services, it lacks data on household incomes and expenditures. On the other hand, the HIECS contains information on household income and expenditures. The analysis imputes household income and consumption from the HIECS into the DHS data, which allows to better account for household wealth as one of the circumstance variables (see Technical Annex 2 for details).

55. The first step for measuring inequality of opportunity is to identify outcome variables of interest ("opportunities"). Based on the existing data sources, and as discussed in the last section, we define four main categories of outcome variables of interest for children in Egypt: (i) healthcare utilization, (ii) nutrition intake, (iii) housing and access to basic infrastructure, and (iv) education. A total 19 different indicators of outcomes and risk factors children in Egypt may be facing under each category are used for the purpose of this report. In addition, we have constructed 3 composite indicators of healthcare utilization, nutrition intake, and access to basic infrastructure.

56. The second step lies in identifying the circumstances which are exogenous to a child but affect his/her chances of access to basic services. There are a number of such circumstances that can be obtained from either the DHS or HIECS, including geographic location, gender, number of siblings, parental characteristics, and wealth. Significant regional disparities exist in Egypt in terms of access to and quality of services and in living standards (Hassine, 2011; Assaad, et al., 2011). Whether a child is born into a rural or urban area affects his/her chances of getting admitted to a good school and his/her access to other services such as electricity and safe drinking water. Additionally, gender can be a factor that influences the chances for a child to access basic services, such as education (Saleh-Isfahani, et al., 2011). Evidence from across the world shows that female children may often be neglected by their families, in comparison with male children, for example, when it comes to providing for education. In addition, parental characteristics may affect the overall development of a child. Extensive demographic literature suggests that parental education is one of the most important determinants of the overall development of children, in Egypt and elsewhere (Davis 2005; Eccles 2005; Mukherjee and Das 2008; Assaad, et al., 2011). There are various channels through which parents can affect the attainments of their children, including the development of cognitive ability, the formation of beliefs and skills, family culture and investments, genetic transmission of native abilities, instillation of preferences and aspirations, and provision of social connections. The number of siblings is also an important circumstance which may affect the chances of access to basic services such as education. Evidence of parents selectively sending their children (not all children) to schools and preferring one child above other when it comes to sharing their limited resources, including food, is not hard to find.

57. While there are different circumstances that affect child's success in life, what is common to all of them is the fact that they are beyond a child's control. In the specific case of Egypt and for this study, seven circumstance variables are used for measuring inequality of opportunity (see Annex 1 for more detailed description).

58. There are a number of techniques to measure inequality of opportunity, once the outcomes of interest and the exogenous circumstances are identified. First, the report draws on the concept of the human opportunity index (see Barros et al., 2009; Molinas et al., 2010). The human

opportunity index (HOI) measures how successful a country is in equitably supplying basic opportunities (such as access to education, healthcare, adequate clean water and sanitation) to its children. HOI is a composite indicator with two elements: (a) how many opportunities are available represented by the coverage rate of a basic opportunity; and (b) how equitably those opportunities are distributed, or whether the distribution of that coverage is influenced by circumstances beyond the children's control. There are several persuasive reasons that justify the application of the HOI concept for children. First, access defines opportunity in the case of children unlike adults, since they cannot be expected to make the efforts needed to access basic goods and services. Second, there is evidence that interventions to equalize opportunity early in the lifecycle are more cost effective and successful than interventions at a later stage. Third, focusing on children helps put inequality of opportunity at the center of the policy debate. As pointed out by the 2006 World Development Report: *Equity and Development*, on the day of their birth, children cannot be held responsible for their family circumstances, despite the fact that these circumstances will make major differences in the lives they lead.

59. Second, the report attempts to measure the relative contributions of each circumstance to total inequality of opportunity. To estimate the contributions of individual circumstances to total inequality of opportunity, the study applies Shapley decomposition (see Annex 2 for description of the methodology). The procedure allows measuring how many individual circumstances such as gender, location and parental characteristics contribute to inequality in access to critical services.

60. Finally, the report also assesses the changes in inequality of opportunity in the 2000s and the factors driving these trends. Once the level of HOI for each outcome variable is estimated for 2000 and 2008, it is possible to decompose the changes in the index by scale and distribution effects and try to understand the sources of the estimated change over time (Barros et al., 2009). One property of the HOI is that changes are additively decomposable.

61. The results of the analysis are discussed below under the four main categories of outcomes. The detailed results of the measurement of inequality of opportunity, its change over time, and the Shapley decompositions, are presented in Annex 3.

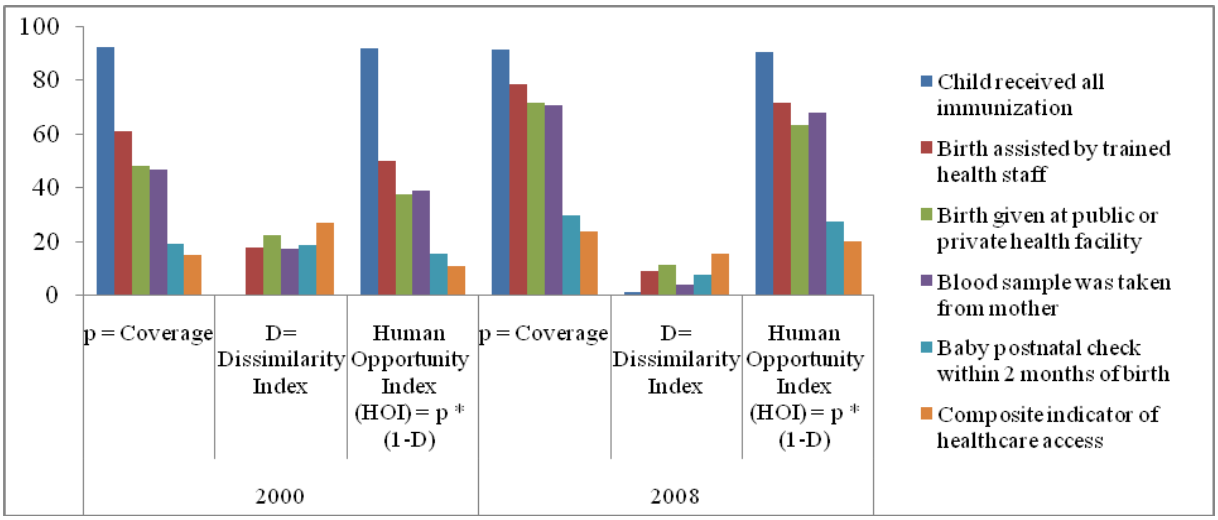
III.3. Healthcare Utilization

62. This section of the report describes the main findings about inequality of opportunity and its trends in healthcare utilization during pregnancy, birth and in the early postnatal period after birth for children in the 0-4 year old age group. In addition, the report measures inequality in whether a child has received a complete set of immunizations between the ages of 12-24 months. For antenatal care, the probability gap in whether a blood sample was taken from the mother

during pregnancy is examined. The importance of this latter indicator stems from the fact that having such a sample taken helps to detect nutritional deficiencies affecting the infant before birth.

63. **During the 2000s, inequality of opportunity decreased and the coverage (prevalence) of antenatal care increased in Egypt.** The probability of a blood sample being taken increased from 46.8 70.6 percent of pregnancies between 2000 and 2008 (see Figure 3.1). During the same period, the dissimilarity index[16], which measures inequality of opportunity related to this specific outcome, went down from 17.2 to 4.1. As a result, the human opportunity index (HOI) improved significantly for antenatal care, evolving from 38.8 to 67.7. The utilization of healthcare services during birth has similarly improved, with increases in coverage and reductions in the dissimilarity index. The HOI associated with births assisted by trained staff has increased from 50.0 to 71.5 between 2000 and 2008, and the HOI for birth taking place at a health facility has increased from 37.6 to 63.4.

Figure 3.1 Coverage (p), HOI and D of healthcare utilization in Egypt, 2000 and 2008



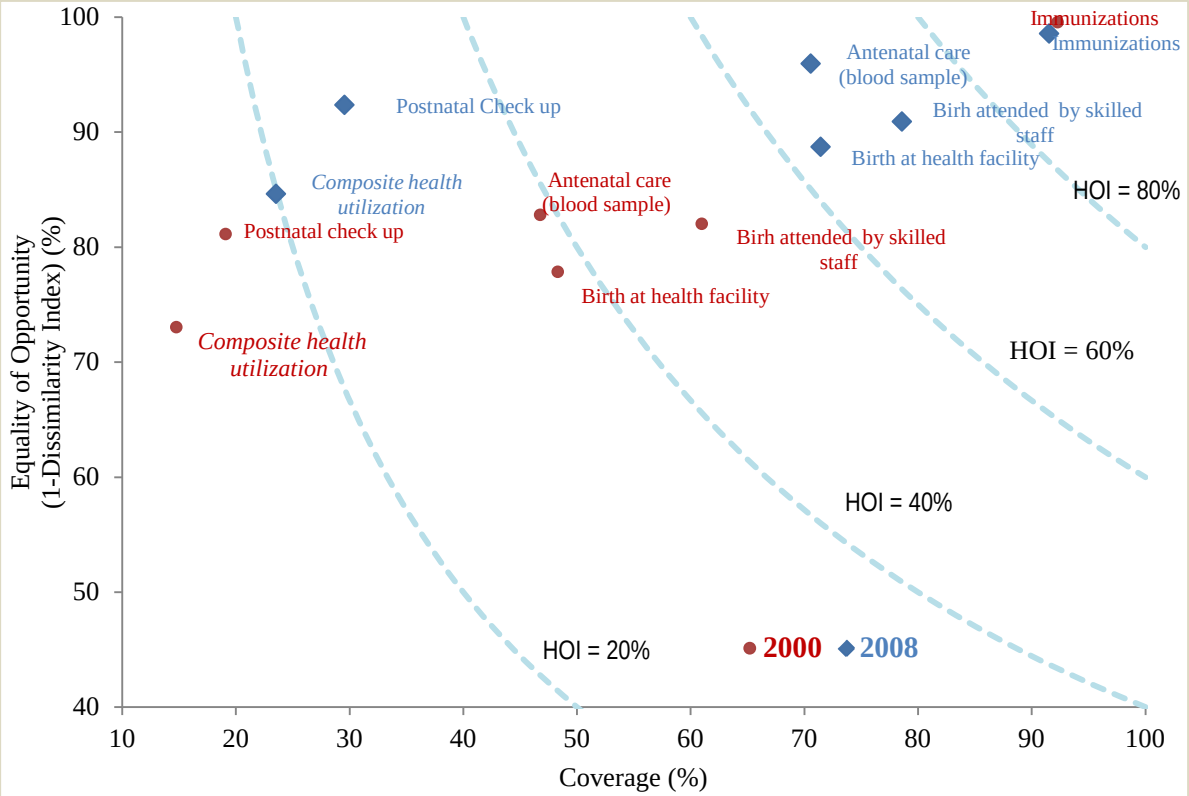
Source: DHS 2000 and 2008; HIECS 2000 and 2008 used for the imputation of household consumption.

64. **As shown in Figure 3.2 below, the utilization of health services overall has moved toward better coverage and reduced inequality in access.** Figure 3.2 provides an analysis of the coverage and dissimilarity index across selected indicator variables. Each of the variables is assigned a value for both the coverage and dissimilarity indexes, which combined produce a certain level of HOI. The figure provides thresholds for HOI at 20%, 40%, 60% and 80%. This allows comparison of outcomes according to their coverage and dissimilarity components separately, for a given level of HOI. As one moves to the right side of the graph, the coverage increases, while inequality of opportunity decreases with upward movement. Therefore, the top

[16] Dissimilarity index ranges from minimum of 0 (no inequality) to maximum of 1 (perfect inequality)

right hand corner of the graph represents a situation of perfect coverage (100%) and equal distribution of opportunities (where the dissimilarity index=0). It can be observed that most health utilization indicators moved toward better coverage and reduced inequality in access between 2000 and 2008. Immunizations coverage was already high in 2000 and it remained that way in 2008. The post-natal check up variable remains at lower levels of coverage (with only 29.6 percent of children in the 0-4 year age group having had a post-natal check up) and falls below the 40% threshold for HOI in 2008, while the other utilization variables are all above the 60% threshold.

Figure 3.2 Human Opportunity Index for Healthcare Utilization Indicators



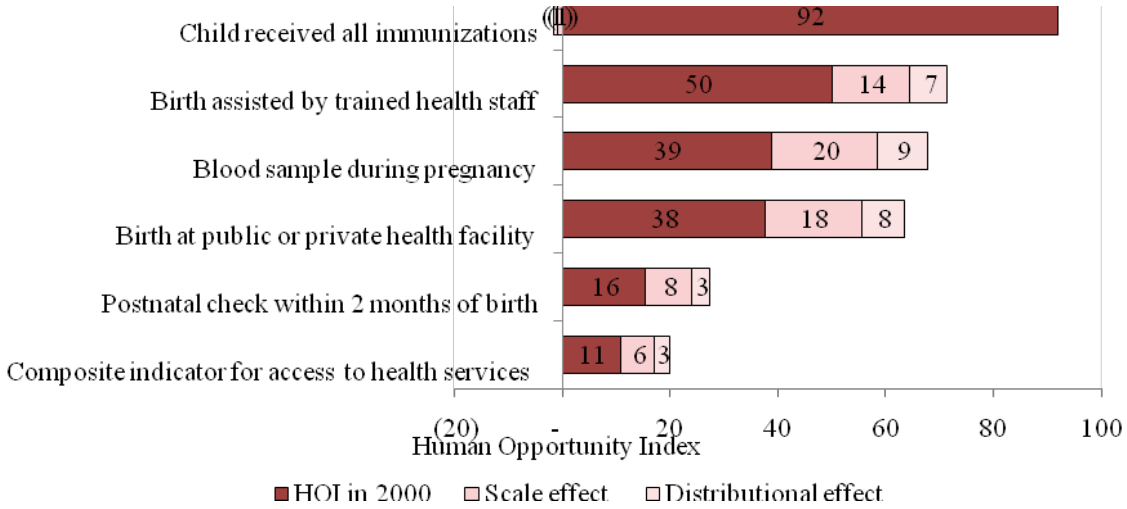
Source: DHS 2000 and 2008; HIECS 2000 and 2008 used for the imputation of household consumption.

65. **Egypt has also improved its composite healthcare utilization indicator, although the coverage rate remains low.** As children face multiple risks and their ability to utilize all necessary healthcare services is crucial, we constructed a composite health utilization variable for a child having adequate access to health care during birth and in the postnatal period. The composite outcome variable takes a value of 1 for children whose births were attended by skilled health staff (a midwife, doctor or nurse), who were born in a health facility, and who had a postnatal check up within 2 months of birth. Since this variable requires all of these conditions to

be met, it has a lower coverage, but improved over time: in 2000, only less than 15 percent of children in the 0-4 age group benefited from all of these services, while in 2008 this figure had improved to 23.5 percent. The HOI on the composite health utilization indicator increased from 10.8 to 19.9 during the same period (see Figure 3.2).

66. **There are marked regional differences in the human opportunity index in healthcare utilization.** Table 3.3A in Annex 3 presents the HOI for the healthcare utilization variables. In 2008, rural regions, particularly rural Upper Egypt and the Frontier Governorates, lagged behind others. However, a significant convergence process can be observed over time, since rural regions and Frontier Governorates improved their HOI measures more rapidly than urban regions between 2000 and 2008. For instance, rural Lower Egypt has seen its HOI of birth attended by skilled staff increase by 29.9 percentage points, while the corresponding increase in urban Lower Egypt was 10.1 percentage points—11.1 percentage points in urban governorates.

Figure 3.3 Decomposition of HOI into scale and redistribution effects



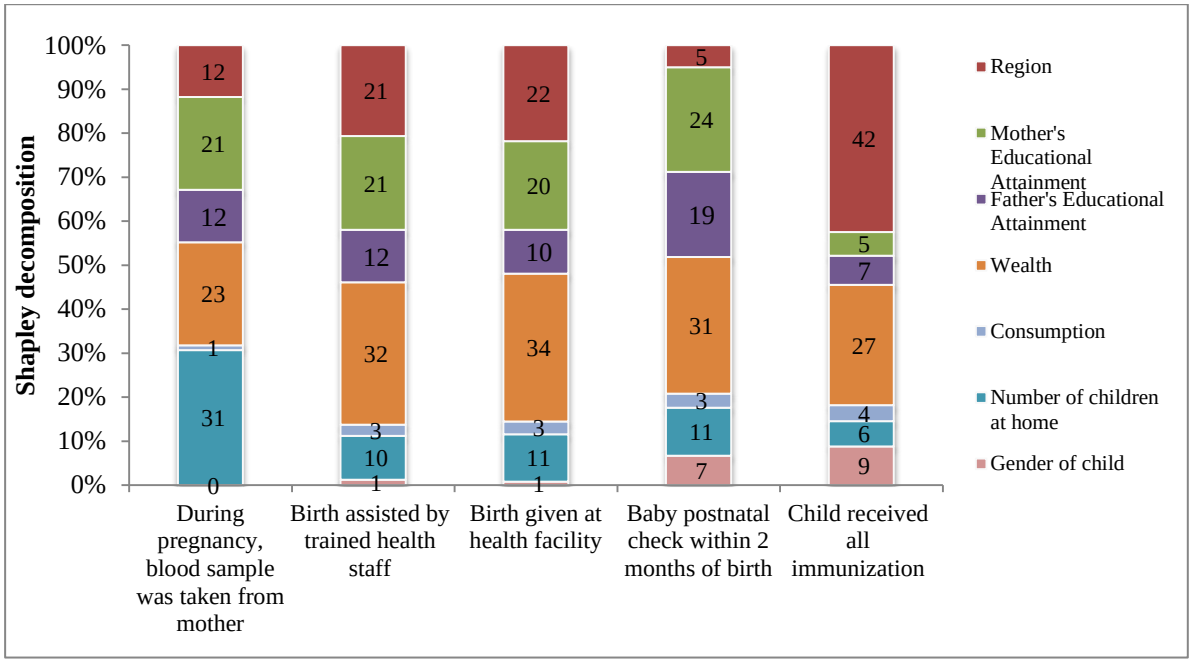
Source: DHS 2000 and 2008; HIECS 2000 and 2008 used for the imputation of household consumption.

67. **The decomposition of the changes in inequality of opportunity between 2000 and 2008 shows that the scale effect (increase in the coverage of services) dominates the improvement in redistribution**, **although the latter has also made an important contribution**. Figure 3.3 presents the decomposition of the changes in HOI into scale and distribution effects. As shown earlier, the HOI for all health utilization indicators has increased, and the scale effect (the increases in coverage of services) has been the major source of the improvement. For instance, the HOI for the indicator on births taking place at a health facility has increased from 37.6 % to 63.4 % during the 2000s. Around 18 percentage points of the increase can be attributed to the scale effect (services becoming more widely available and being utilized)

while only a 7.8 percentage points is attributable to the distribution effect (services becoming more equitably available across circumstance groups).

68. **Location is the most important determinant of access to public health services, as measured by the variation in whether a child (ages 12-23 months) receives a complete set of immunizations.** The Shapley decomposition for health utilization indicators in 2008 reveals that wealth status is another major factor in determining access to and utilization of health care during pregnancy and the postnatal period (Figure 3.4). About a third of the differences across circumstances in terms of whether the birth was assisted by skilled staff and whether it took place in a health facility is explained by wealth (proxied by asset quintiles) (see Figure 3.4, panel A). In addition, parental educational attainment variables, particularly mother's education, play an important role in the utilization of health services during pregnancy and birth (one-fifth of the variation in the D-index is attributable to mother's educational attainment).

Figure 3.4 Family and mother's education are key factors of access to healthcare



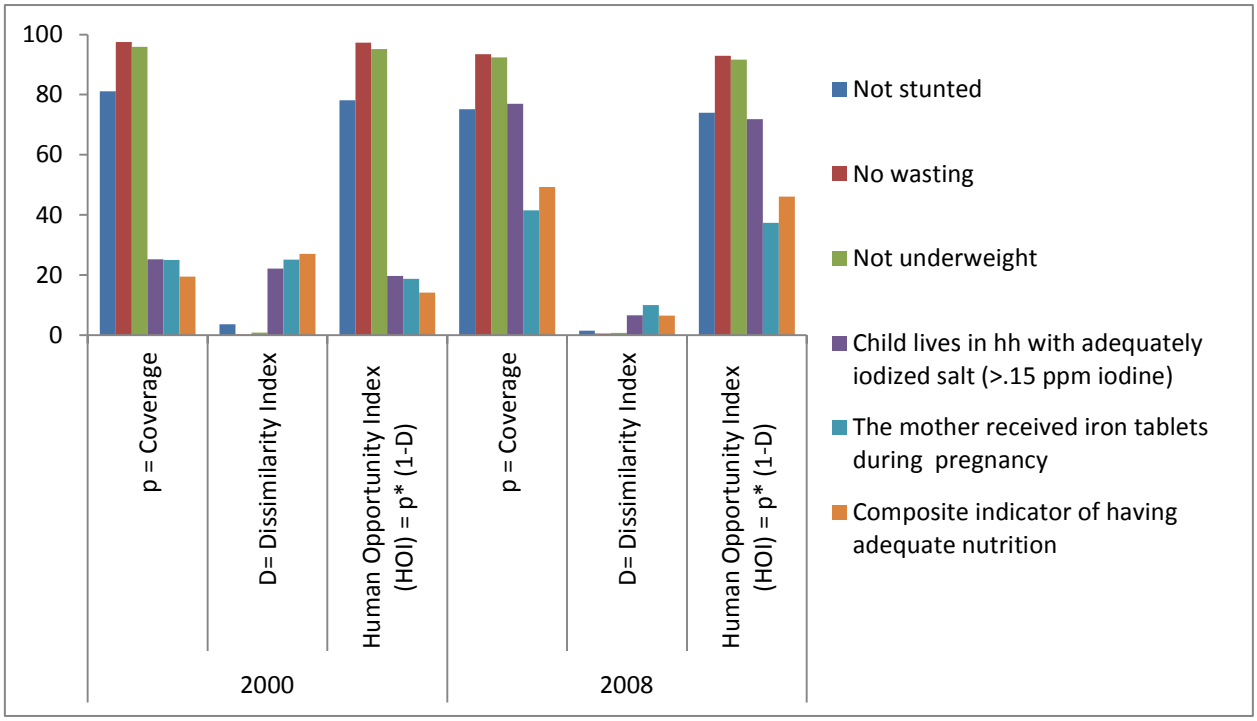
Source: DHS 2000 and 2008; HIECS 2000 and 2008 used for the imputation of household consumption.

III.4. Malnutrition and Micronutrient Intake

69. **Malnutrition indicators such as stunting, wasting prevalence and underweight prevalence have deteriorated in Egypt during the time period analyzed.** In connection with that trend, the HOI indicators of malnutrition correspondingly show worse results. The HOI for not being stunted has decreased from about 78 to 74 percent. Stunting (defined as being 2

standard deviations below the median reference child in the height-for-age measure) is the most prevalent form of malnutrition in Egypt. Wasting and underweight prevalence have also increased in this time period, reducing the HOI measure of these indicators from 97.3 to 92.9 and from 95.1 to 91.7 respectively.

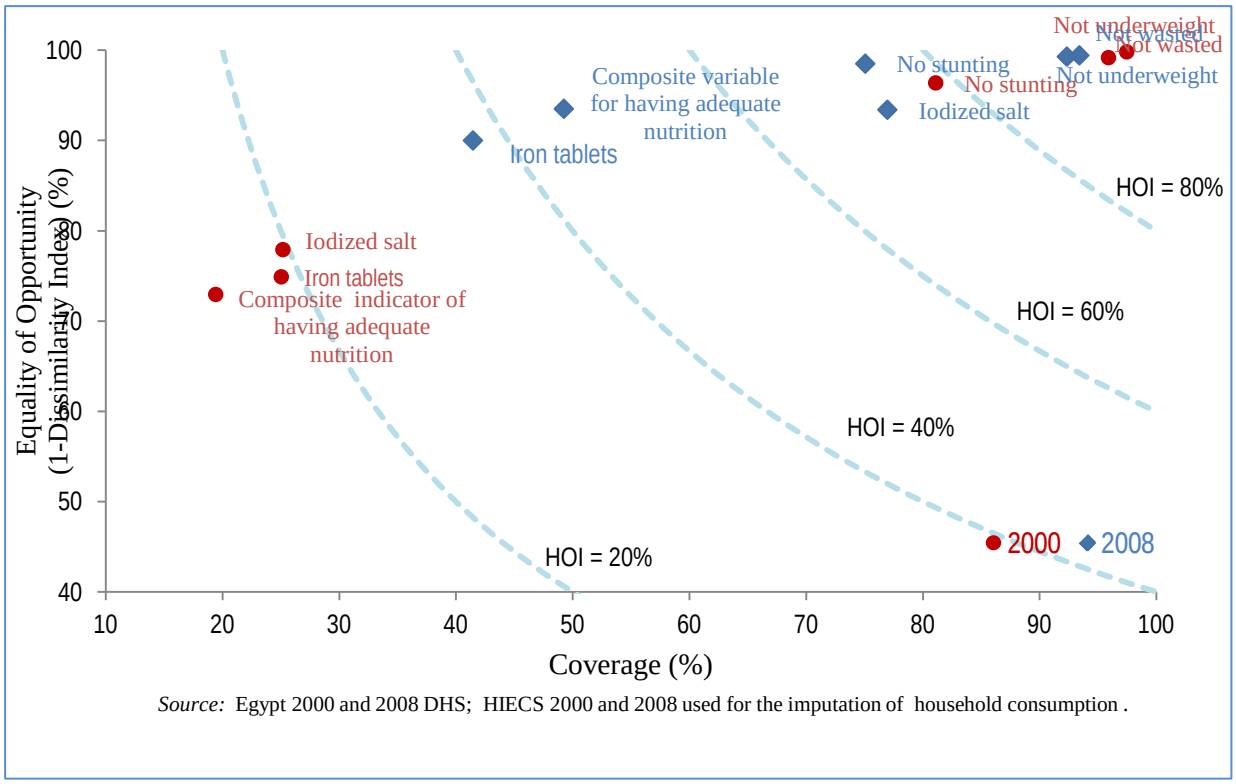
Figure 3.5 Coverage (p), HOI and D of malnutrition status in Egypt, 2000 and 2008



Source: DHS 2000 and 2008; HIECS 2000 and 2008 used for the imputation of household consumption.

70. **Malnutrition is a problem for Egyptian children regardless of their circumstances.** The estimates of inequality of opportunity for these indicators are very low, suggesting no significant disparity by circumstances when it comes to malnutrition. This can also be observed in Figure 3.6 for nutrition: nutrition indicators are among those with highest "equality of opportunity" (high on the y axis), since the circumstances that children are born into do not matter as much in determining their probability of being malnourished. Similarly, as across different circumstance groups, the HOI for nutrition indicators such as "not being stunted" do not vary widely across regions. The HOI for not being stunted ranges between 63.5 percent in urban lower Egypt and 79.3 percent in rural upper Egypt in 2008 (see Annex for details).

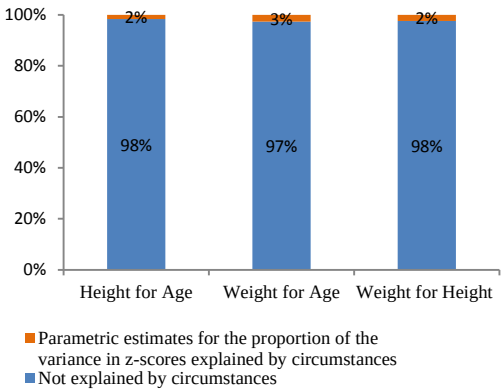
Figure 3.6 Human Opportunity Index for nutritional status indicators



Source: Egypt 2000 and 2008 DHS; HIECS 2000 and 2008 used for the imputation of household consumption .

71. **The decomposition of the variability in anthropometric measures further shows that circumstances explain only a very small percentage of the observed variance.** The results of this decomposition are presented in Figure 3.7. They show that circumstances explain only 1.6 percent of the variance in the height-for-age z-scores and 2.6 percent of the variance in the weight-for-age z-scores for children in the 0-4 age group. Hence, malnutrition in Egypt is an issue for the overall population of children and might thus be better addressed through general supply side information campaigns or policies that ensure food availability rather than through targeted interventions. Finally, the scale and distribution decomposition of changes in the HOI based on nutrition indicators reveals that most of the change (deterioration) in nutrition among children is due to the scale factor rather

Figure 3.7 Most of the variation in z-scores for anthropometric measures are not explained by circumstances in Egypt

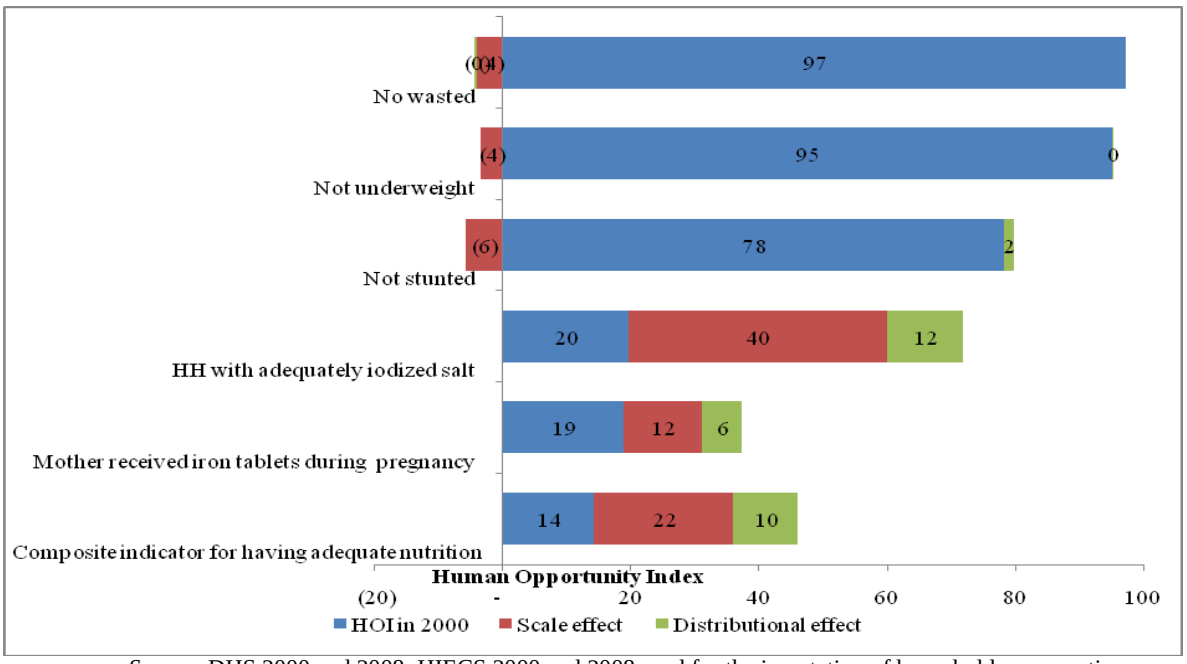


Source: DHS 2008

than the distribution factor, meaning that children across Egypt have been impacted by increased malnutrition prevalence regardless of their circumstances.

72. **Equality of opportunity concerning micronutrient intake has largely improved between 2000 and 2008.** In terms of micronutrient intake, we looked at two outcome variables for early opportunities of children: (i) adequate salt iodization at the household where the child resides, and (ii) whether the mother of the child has taken iron tablets during pregnancy. Both of these factors can influence the brain and physical development of children and are therefore considered to be important opportunity variables that can have an impact on later outcomes. In the time period analyzed, Egypt has massively scaled up the iodization of salt available at the household level, which has significantly enhanced the HOI measure for this indicator. Whereas in 2000 the HOI for a child living in a household with adequately iodized salt was 19.6 percent, this level had increased to 71.9 percent in 2008 (Figure 3.8). The human opportunity index on whether the mother has received iron tablets during pregnancy has also increased from 18.8 to 37.3 percent over this time period. The dissimilarity index for these micronutrient intake variables is higher than those for malnutrition variables analyzed earlier, suggesting that the circumstances of children still play an important role in determining micronutrient intake, at least as measured by these two specific outcome variables. As can be observed in Figure 3.8 the increase in the HOI is mainly explained by the scale effect (40.3 percentage points), with more households overall having access to adequately iodized salt, and less so to the redistribution effect (11.9 percentage points).

Figure 3.8 Decomposition of HOI into scale and redistributions effects

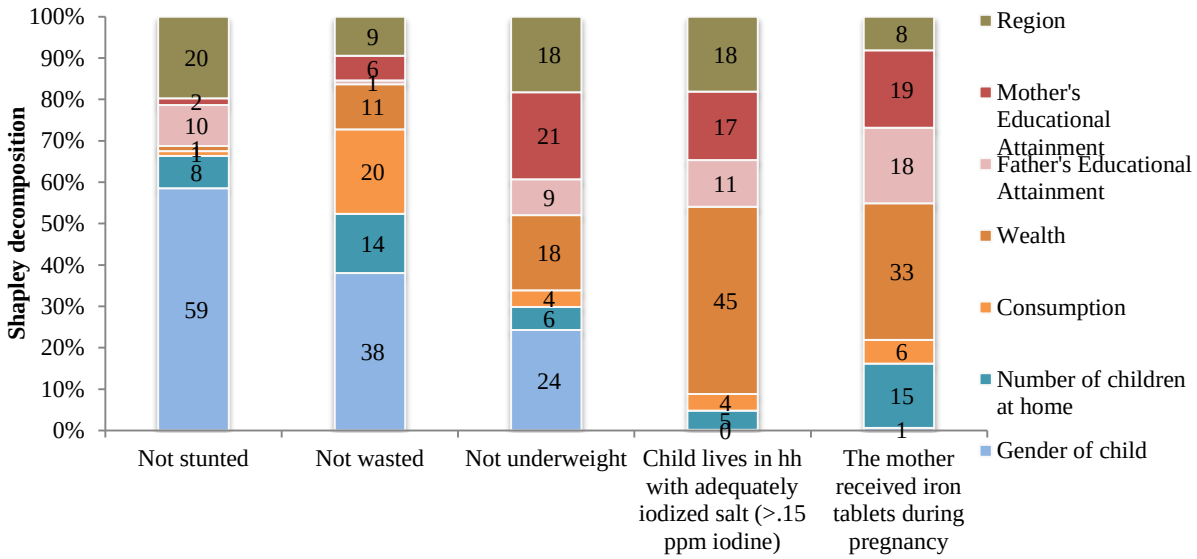


Source: DHS 2000 and 2008; HIECS 2000 and 2008 used for the imputation of household consumption.

73. **The Shapley decomposition for malnutrition indicators shows that gender is the most important determinant for children not being stunted**. Gender explains a quarter and 58.5 percent of the variation in the dissimilarity index for stunting and underweight, respectively, with girls more likely to be stunted and underweight (Figure 3.9). Wealth index or consumption does not factor into the probability of the child being stunted, although these welfare indicators are more important for wasting and underweight prevalence (explaining about 1/3 of variation in wasting prevalence).

74. **Household wealth explains the largest portion of the variation in access to micronutrient intake in 2008**. About 45 percent of the differences in whether a child lives in a household with adequately iodized salt and 1/3 of the variation in whether the mother received iron tablets during pregnancy are explained by wealth. Mother's educational attainment is also a big factor in determining micronutrient intake during pregnancy, explaining close to 1/5 of the variation on the iron intake indicator (Figure 3.9).

Figure 3.9 Family wealth explains the largest portion of the variation in access to nutrient intake



Source: DHS 2000 and 2008; HIECS 2000 and 2008 used for the imputation of household consumption.

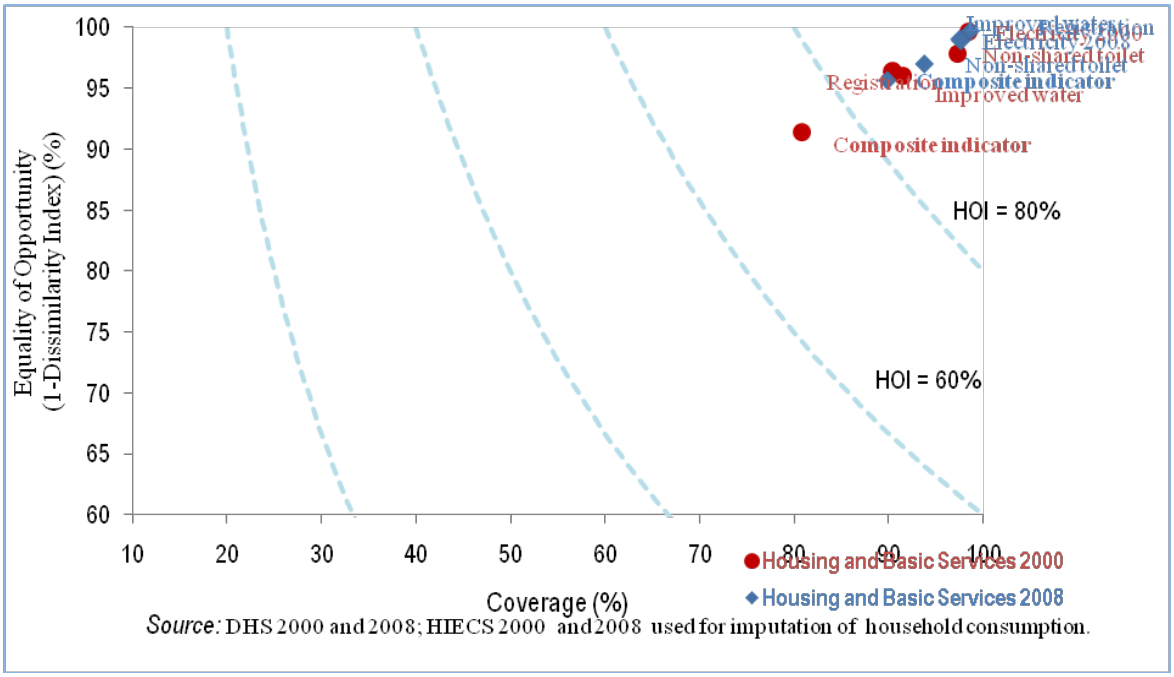
III.5 Housing and Access to Basic Services

75. In terms of housing and access of young children to basic services, we consider 4 variables: (i) whether the child has access to an improved water source at the household level, (ii) whether the household has electricity, (iii) whether the household has a non-shared toilet and (iv)

whether the child has an identity card, or in other words whether the child is a registered citizen – which would have an effect on the child's access to all public services in life. In Egypt, the human opportunity index for these variables is quite high with high coverage levels, as well as a low dissimilarity indexes (Figure 3.11).Significant improvements in the coverage of some of these services (such as improved drinking water at the household level) have been registered over this period, which have positively impacted the HOI measures. As of 2008, these 4 indicators have HOI levels all above 90 percent.

76. **The study has additionally examined the evolution of a composite measure of access to services.** This composite indicator is defined as the child being formally registered (having an identity card), and living in a household with improved water source, with electricity and a non-shared toilet. The results show that the HOI has increased for this composite indicator from about 74 to 86 percent in the period under analysis (Figure 3.10).

Figure 3.10 Coverage, HOI and D for access to basic infrastructure



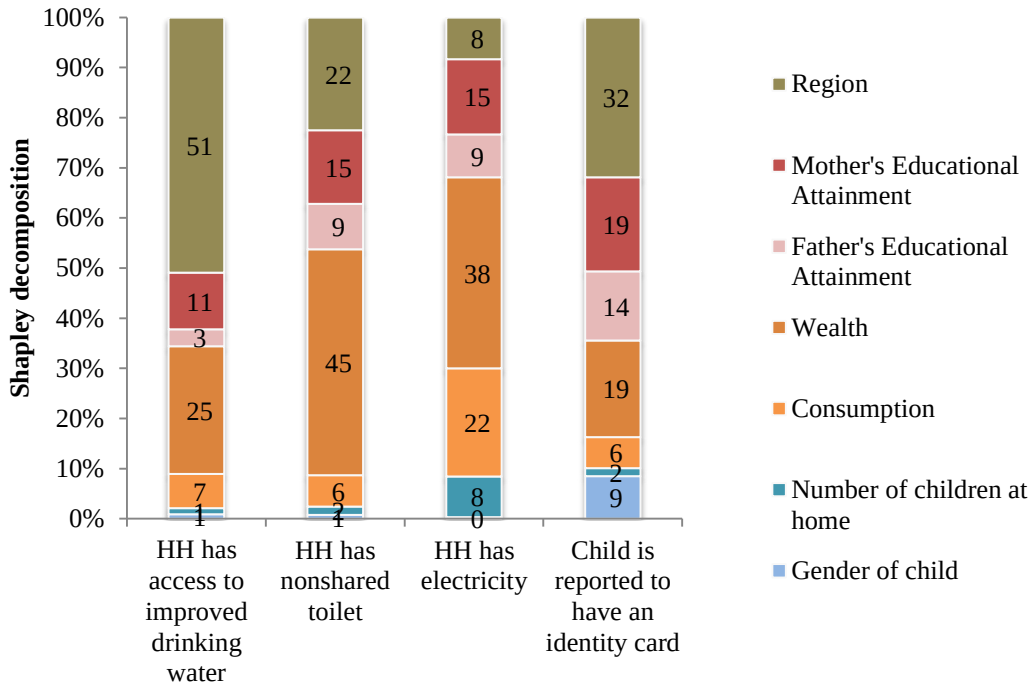
Source: DHS 2000 and 2008; HIECS 2000 and 2008 used for imputation of household consumption.

77. **However, significant disparities remain across circumstance groups, particularly by location.** For instance, when looking at a child's probability of having access to an improved water source, we find that the Frontier Governorates registered HOI of about 75 percent in 2008, lower than those of the Urban Governorates at nearly 100 percent. The increases in the HOI across regions indicate once again that there has been a significant reduction in regional differences between 2000 and 2008 (see Table 3.3A-3.3B, Annex 3). In 2000, the percentage of

children with access to an improved water source was only 70.4 percent in the Frontier Governorates, with a high dissimilarity index (at around 23 percent) leading to a low HOI of around 54 percent. By 2008, the coverage of this indicator had increased in the Frontier Governorates to over 81 percent and the dissimilarity index had declined. Similarly, there are variations across regions based on the composite access indicator: as expected, rural Upper Egypt and the Frontier Governorates show lower levels of HOI at about 75 and 66 percent, respectively, in 2008 (see Table xx, Annex 3)

78. **The Shapley decomposition indicates that regional variables explain the largest share of the variations in access to improved water at home and in whether the child is registered.** In fact, regional variables explain more than half of the variation in access to improved drinking water at home and about a third of the variation in whether the child is registered (Figure 3.11). For access to a non-shared toilet and electricity at home, the asset index of the household is the main indicator that explains variation in outcomes.

Figure 3.11 Location explains the largest share of inequality in access to basic infrastructure



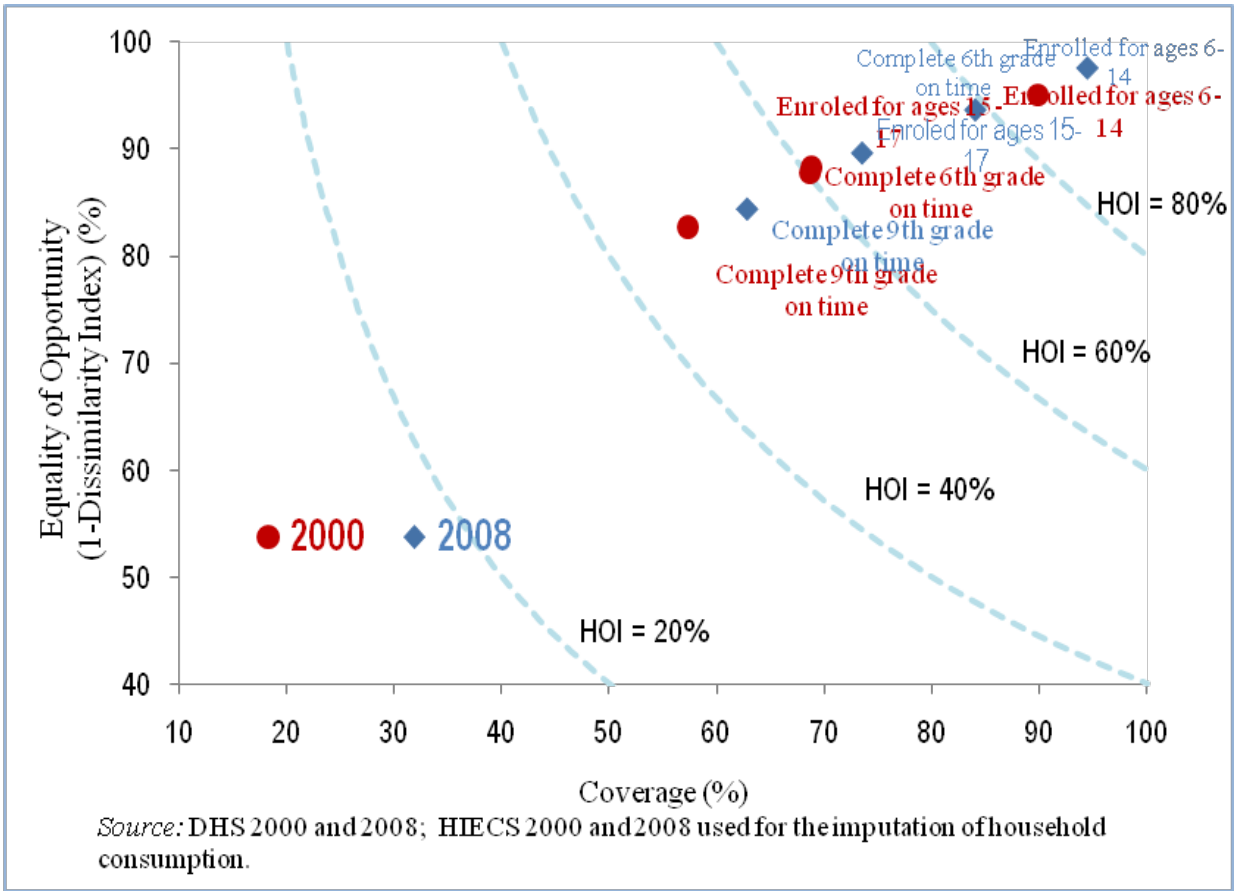
Source: DHS 2000 and 2008; HIECS 2000 and 2008 used for the imputation of household consumption.

III.6 Educational Enrolment Indicators

79. **Four main educational indicators are used to assess inequality of opportunity in access to education in Egypt.** The first two are related to enrolment separately for compulsory and non-compulsory levels: (a) the probability of enrolment for children in the age group 6-14 years old in primary and preparatory levels; and (b) the probability of enrolment for children in the age group 15-17 years old in non-compulsory secondary school education. The third and fourth indicators are related to educational attainment: (c) the probability of completion of 6th grade on time; and (d) the probability of completion of 9th grade on time (preparatory).

80. **The human opportunity index (HOI) for enrolment in the age group of 6-14 years old has increased from about 85 to over 92 percent between 2000 and 2008** (Figure 3.12). The enrolment rate and the HOI indicators for the older age group (15-17 year olds) are lower but improved during the 2000s. The probability of enrolment for the latter age group increased, leading to an improvement in the HOI, from about 61 to 66 percent between 2000 and 20008. At the secondary school level (ages 15-17), the degree of inequality of opportunity is higher than at the basic education level, as shown by a higher dissimilarity index.

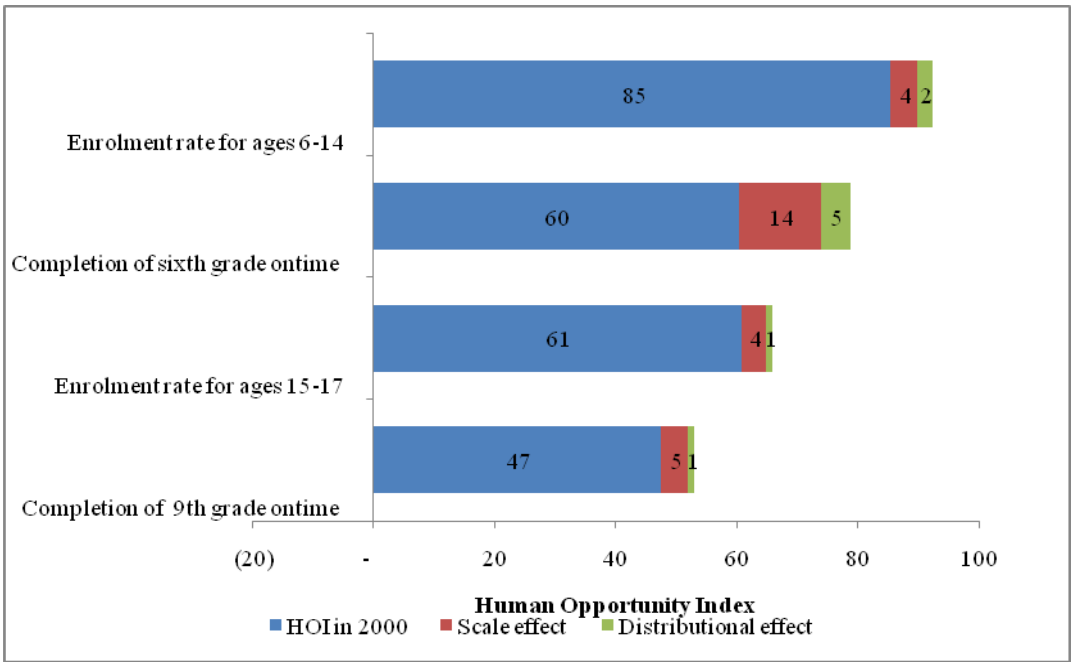
Figure 3.12 Coverage and Dissimilarity Index for Educational Enrolment and Attainment



Source: DHS 2000 and 2008; HIECS 2000 and 2008 used for the imputation of household consumption.

81. **Inequality of opportunity in enrolment for both age groups varies significantly by region**. For example, in 2000, rural Upper Egypt presented the lowest HOI at about 76 percent and 48 percent for 6-14 and 17-17 age groups respectively (Table 3.4A-3.4B, Annex 3). On the other hand, urban Lower Egypt had the highest HOI at about 92 and 75 percent for 6-14 and 17-17 age groups respectively. However, it is important to note that the disparities across regions in terms of educational enrolment have declined: at the secondary school level, the difference in HOI between rural Upper Egypt and urban Lower Egypt decreased from about 27 to about 19 percentage points (see Table xx, Annex 3). Similar improvements can be noticed in 6th and 9th grade on-time completion rates. The changes in the HOI for the education sector are mostly a result of the expansion of coverage for children overall (the scale effect) rather than the distribution effect. The decomposition in Figure 3.13 shows that the expansion in coverage across all children dominates the changes (improvements) in the HOI measure.

Figure 3.13 Scale and Redistribution Effects for Education Variables (2000-2008)

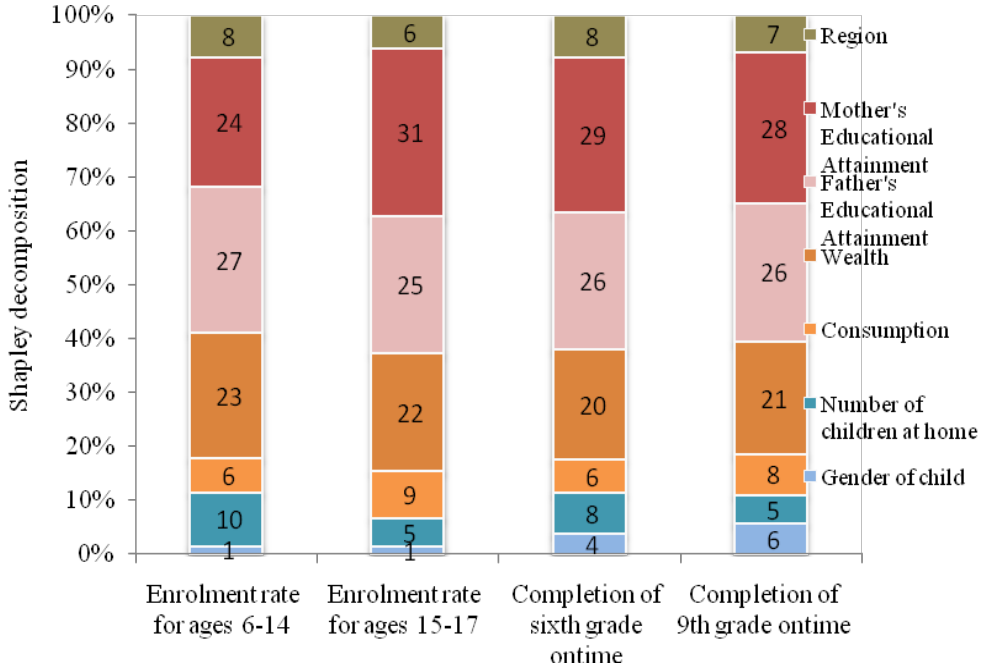


Source: DHS 2000 and 2008; HIECS 2000 and 2008 used for the imputation of consumption in DHS.

82. **Parental education variables are consistently the most important factors explaining variation in enrolment rates in Egypt, at both the basic and secondary education levels.** Mother and father's educational attainment combined explains more than half of the variation in the probability of being enrolled for children. Similarly, these variables explain more than half of the variation in the probability of completion of 6th and 9th grades on time (Figure 3.14).

Following parental education variables, the asset index and consumption level of the household together explain about one-fourth of the variation in educational enrolment. Regional variables, on the other hand explain less than 10 percent of the variation in enrolment rates in Egypt.

Figure 3.14 Parental education is the most important factor in educational outcomes



Source: DHS 2000 and 2008; HIECS 2000 and 2008 used for the imputation of consumption in DHS.

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Annex 1 - Data and Variables Used

1. Data and Definition of Variables

The empirical analysis for this report is based on the 2000 and 2008 Egypt Demographic and Health Survey (DHS) and the 2000 and 2008 Egypt Household Income Expenditure and Consumption Survey (HIECS). Outcome variables of interest as well as circumstance variables beyond the control of the children are derived mostly from the DHS. The HIECS data is used for imputation of household consumption aggregate (as a proxy for wealth) into the DHS.

Circumstance Variables. Circumstances are defined as those factors beyond the control of the individual, but which have influence on his/her life outcomes. Seven circumstance variables are analyzed in this report:

1. Location: Urban or Rural (2 categories)
2. Region: Urban Governorates, Lower Egypt, Upper Egypt, Frontier Governorates (4 categories)
3. Mother's Education: No formal education, primary, secondary, higher education (4 categories)
4. Father's Education: No formal education, primary, secondary, higher education(4 categories)
5. Number of Children at home: 1-2 children, 3-4 children, 5 or more children (3 categories)
6. Household wealth (asset) quintiles : 5 quintiles (5 categories)
7. Household income (continuous variable)

Most and Least Advantaged Groups. For comparison, "most advantaged" and "least advantaged" opportunity groups of children are constructed based on the circumstance variables. These two groups make up both extremes and account for about 5 percent of the children in the 0-4 age group. The circumstances for these most and least opportunity groups are defined as follows:

- Least advantaged: rural location, no formal education of parents, large family size (5 or more children at home) and poorest wealth class.

- Most advantaged: urban location, higher education of parents, small family size (maximum 4 children), and richest wealth class.

Outcome Variables. We examine several set of outcomes of interest for healthy and productive growth and development of children. They are categorized into four main groups:

- *Healthcare utilization***:** Under this category, several indicators of access to healthcare during pregnancy, birth and early postnatal period are considered: (1) whether a blood sample taken from the mother during pregnancy; (2) whether birth took place at a health facility or not; (3) whether there was a postnatal check up for the baby within 2 months of birth; and (4) immunization. In addition, a composite indicator of healthcare utilization was constructed.

- *Nutrition and micronutrient intake:* The second set of outcomes is related to levels and trends in malnutrition and micronutrient intake for children in the early age group. Anthropometric measures such as height-for-age (stunting), weight-for-height (wasting) and weight-for-age (underweight) were derived from the DHS data to analyze the differences in malnutrition levels across circumstance groups. Stunting is a measure of chronic malnutrition and is caused by poor nutrition often compounded by infectious diseases (Grantham-McGregor et al. 2007). Also included are variables related to access to micronutrients: access to iodized salt and iron tablets in pregnancy.

- *Access to basic services***:** Improved drinking water sources include: piped water into dwelling, plot or yard; public tap/standpipe; tube well/borehole; protected dug well; protected spring; and rainwater collection. Unimproved drinking water sources include: unprotected dug well; unprotected spring; cart with small tank/drum; bottled water; tanker-truck; and surface water (river, dam, lake, pond, stream, canal, irrigation channels).

- *Education:* the educational enrolment variable is constructed using hv121 in the DHS datasets which gathers information on whether the child is currently attending school. The educational attainment is calculated using the hv108 “completed years of education variable".

International Comparison. Four indicators were used to compare Egypt’s children development outcomes to those of comparator countries:

- Births attended by skilled health staff (percent of total): Births attended by skilled health staff are the percentage of deliveries attended by personnel trained to give the necessary supervision, care, and advice to women during pregnancy, labor, and the postpartum period; to conduct deliveries on their own; and to care for newborns.

- Under-five mortality rate (per 1,000 live births): The probability that a child born in a specific year will die before reaching the age of five if subject to current age-specific mortality rates. Expressed as a rate per 1,000 live births.

- DTP3 immunized (percent of 1 year olds) One-year-olds immunized with three doses of diphtheria tetanus toxoid and pertussis (DTP3) (percent) Source: WHO Statistical Information System.

- Ratio of girls to boys in primary and secondary education (percent). Ratio of girls to boys in primary and secondary education is the percentage of girls to boys enrolled at primary and secondary levels in public and private schools.

2. Imputation of Consumption Aggregate

The HIECS measures household expenditures in detail and allows for consumption aggregates. In the absence of adequate welfare measures in the DHS, we impute per adult equivalent consumption aggregates into the DHS data by using assets and household head characteristics that are available in both datasets. The dependent variable in the HIECS when we run the consumption imputation is log of per adult equivalent consumption. The independent variables are household demographics and household head characteristics, regional variables, household assets and characteristics (ownership of assets, access to basic services). The descriptive statistics of these variables is provided in Tables 1.1A and 1.2A for 2000 and 2008 respectively. Note that the number of variables that are common to both the DHS and HIECS in 2000 are more limited than in 2008, hence the specifications for both years are not exactly the same. (For instance in 2000, the DHS does not have some of the asset variables that are available in 2008 data). The actual consumption imputation is provided in Table 1.3A for both years in the HIECS data. Column 1 in each year's analysis is used for the consumption imputation: whereby the coefficients coming from the regression analysis are then used in DHS to predict the level of log consumption and derive the level of per adult equivalent consumption.

Table 1.1A: Summary Statistics of Variables Used in the Imputation of Consumption (HIECS 2000 and DHS 2000)

		HIECS 2000					DHS 2000				
	Variable	Obs	Mean	Std. Err.	[95% Conf.	Interval]	Obs	Mean	Std. Err.	[95% Conf.	Interval]
Household Head Characteristics:	Illiterate / No education	11,919	0.374	0.004	0.365	0.382	12,326	0.273	0.004	0.265	0.281
	Primary education/Preparatory	11,919	0.322	0.004	0.313	0.330	12,326	0.310	0.004	0.302	0.318
	Secondary	11,919	0.157	0.003	0.150	0.163	12,326	0.272	0.004	0.264	0.279
	Higher education	11,919	0.148	0.003	0.142	0.154	12,326	0.146	0.003	0.139	0.152
	Number of people in the household	11,919	5.996	0.024	5.949	6.044	12,331	6.095	0.024	6.047	6.143
	Gender of HH head is male	11,919	0.896	0.003	0.891	0.902	12,331	0.923	0.002	0.918	0.928
	Age of HH head	11,919	47.431	0.116	47.204	47.659	12,331	43.770	0.101	43.571	43.969
Region	Urban Governorates	11,919	0.179	0.004	0.172	0.186	12,331	0.206	0.004	0.199	0.213
	Lower Egypt Urban	11,919	0.111	0.003	0.105	0.116	12,331	0.136	0.003	0.130	0.142
	Lower Egypt Rural	11,919	0.315	0.004	0.307	0.324	12,331	0.302	0.004	0.294	0.310
	Upper Egypt Urban	11,919	0.111	0.003	0.106	0.117	12,331	0.120	0.003	0.114	0.126
	Upper Egypt Rural	11,919	0.269	0.004	0.261	0.277	12,331	0.224	0.004	0.217	0.231
	Frontier Governorates	11,919	0.014	0.001	0.012	0.016	12,331	0.012	0.001	0.010	0.014
Housing Assets & Characteristics	Piped water in house through public reservoir (h05==1	11,919	0.785	0.004	0.778	0.792	12,331	0.775	0.004	0.767	0.782
	TV	11,919	0.928	0.002	0.924	0.933	12,331	0.900	0.003	0.895	0.905
	Car	11,919	0.052	0.002	0.048	0.056	12,331	0.081	0.002	0.077	0.086
	Refrigerator	11,919	0.702	0.004	0.694	0.710	12,331	0.641	0.004	0.633	0.650
	Bicycle	11,919	0.140	0.003	0.134	0.147	12,331	0.156	0.003	0.149	0.162
	Motorcycle	11,919	0.012	0.001	0.010	0.014	12,331	0.020	0.001	0.018	0.023
Consumption and Poverty Status	Actual consumption / Predicted consumption (in DHS)	11,919	10,274	75	10,126	10,421	12,326	10,062	54	9,955	10,169
	Log consumption	11,919	9.077	0.005	9.067	9.086					
	Poverty status using upper poverty line	11,919	0.434	0.005	0.425	0.443					
	Poverty status using lower poverty line	11,919	0.167	0.003	0.160	0.173					

Source data: Egypt HIECS 2000 and DHS 2000

Table 1.2A: Summary Statistics on Variables Used in the Imputation of Consumption (HIECS 2008 and DHS 2008)

		HIECS 2008					DHS 2000				
	Variable	Obs	Mean	Std. Err.	[95% Conf	Interval]	Obs	Mean	Std. Err.	[95% Conf	Interval]
Household Head Characteristics:	Illiterate / No education	11,634	0.363	0.004	0.354	0.371	13,334	0.202	0.003	0.196	0.209
	Primary education/Preparatory	11,634	0.272	0.004	0.264	0.280	13,334	0.267	0.004	0.259	0.274
	Secondary	11,634	0.250	0.004	0.242	0.258	13,334	0.367	0.004	0.359	0.375
	Higher education	11,634	0.115	0.003	0.110	0.121	13,334	0.164	0.003	0.158	0.170
	Number of people in the household	11,634	5.684	0.024	5.638	5.731	13,334	5.480	0.020	5.440	5.520
	Gender of HH head is male	11,634	0.881	0.003	0.875	0.886	13,334	0.919	0.002	0.914	0.923
	Age of HH head	11,634	47.764	0.120	47.530	47.999	13,334	43.175	0.096	42.987	43.363
Region	Urban Governorates	11,634	0.171	0.003	0.164	0.178	13,334	0.186	0.003	0.179	0.193
	Lower Egypt Urban	11,634	0.111	0.003	0.105	0.117	13,334	0.127	0.003	0.121	0.132
	Lower Egypt Rural	11,634	0.320	0.004	0.311	0.328	13,334	0.339	0.004	0.331	0.347
	Upper Egypt Urban	11,634	0.116	0.003	0.111	0.122	13,334	0.114	0.003	0.108	0.119
	Upper Egypt Rural	11,634	0.264	0.004	0.256	0.272	13,334	0.222	0.004	0.215	0.229
	Frontier Governorates	11,634	0.018	0.001	0.015	0.020	13,334	0.013	0.001	0.011	0.015
Housing Assets & Characteristics	Non-shared bathroom in HH	11,634	0.940	0.002	0.935	0.944	13,334	0.959	0.002	0.956	0.962
	Piped water in house	11,634	0.945	0.002	0.941	0.949	13,334	0.893	0.003	0.888	0.898
	ColorTV	11,634	0.030	0.002	0.027	0.033	13,334	0.881	0.003	0.875	0.886
	BlackandWhiteTV	11,634	0.729	0.004	0.721	0.737	13,334	0.077	0.002	0.072	0.081
	VideoDVD	11,634	0.841	0.003	0.834	0.847	13,334	0.069	0.002	0.065	0.074
	Electricfan	11,634	0.131	0.003	0.125	0.137	13,334	0.907	0.003	0.902	0.911
	Aircondition	11,634	0.362	0.004	0.353	0.371	13,334	0.035	0.002	0.031	0.038
	SatelliteDish	11,634	0.055	0.002	0.051	0.059	13,334	0.717	0.004	0.709	0.725
	Waterheater	11,634	0.163	0.003	0.156	0.169	13,334	0.380	0.004	0.372	0.388
	Dishwasher	11,634	0.061	0.002	0.057	0.066	13,334	0.013	0.001	0.011	0.015
	Automaticwashingmachine	11,634	0.773	0.004	0.766	0.781	13,334	0.200	0.003	0.193	0.207
	Car	11,634	0.050	0.002	0.046	0.054	13,334	0.075	0.002	0.070	0.079
	Refrigerator	11,634	0.881	0.003	0.875	0.887	13,334	0.900	0.003	0.895	0.905
	Bicycle	11,634	0.126	0.003	0.120	0.132	13,334	0.111	0.003	0.106	0.116
	Motorcycle	11,634	0.029	0.002	0.026	0.032	13,334	0.028	0.001	0.025	0.031
	Telephone	11,634	0.544	0.005	0.535	0.553	13,334	0.486	0.004	0.477	0.494
Consumption and Poverty Status	Actual consumption / Predicted consumption (ir	11,634	18,811	115	18,585	19,037	13,334	20,612	76	20,462	20,761
	Log consumption	11,634	9.714	0.004	9.705	9.722					
	Poverty status using upper poverty line	11,634	0.413	0.005	0.404	0.422					
	Poverty status using lower poverty line	11,634	0.215	0.004	0.207	0.222					

Source data: Egypt HIECS 2008 and DHS 2008

Table 1.3A: Regression of per adult equivalent consumption on assets and household characteristics in HIECS 2000 and HIECS 2008

	HIECS 2000			HIECS 2008		
	(1)	(2)	(3)	(1)	(2)	(3)
	Log consumption	Poverty status	Poverty status	Log consumption	Poverty status	Poverty status
Primary education/Preparatory	0.076***	-0.083***	-0.036***	0.028***	-0.019	-0.009
	(0.010)	(0.017)	(0.010)	(0.009)	(0.015)	(0.009)
Secondary	0.139***	-0.182***	-0.065***	0.032***	-0.073***	-0.043***
	(0.012)	(0.017)	(0.010)	(0.010)	(0.017)	(0.009)
Higher education	0.273***	-0.288***	-0.103***	0.109***	-0.144***	-0.065***
	(0.013)	(0.016)	(0.009)	(0.015)	(0.023)	(0.014)
Number of people in the household	0.090***	0.088***	0.034***	0.085***	0.075***	0.033***
	(0.002)	(0.008)	(0.003)	(0.002)	(0.006)	(0.002)
Gender of HH head	0.057***	0.044**	0.014	0.046***	0.084***	0.031***
	(0.013)	(0.021)	(0.013)	(0.010)	(0.018)	(0.010)
Age of HH head	0.024***	0.030***	0.012***	0.020***	0.028***	0.013***
	(0.002)	(0.004)	(0.003)	(0.002)	(0.003)	(0.002)
Age squared of HH head	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Lower Egypt Urban	-0.237***	0.058***	0.012	-0.110***	0.024	0.018
	(0.012)	(0.020)	(0.016)	(0.013)	(0.025)	(0.020)
Lower Egypt Rural	-0.277***	0.007	-0.030**	-0.107***	0.049**	0.028*
	(0.011)	(0.018)	(0.013)	(0.011)	(0.021)	(0.015)
Upper Egypt Urban	-0.334***	0.256***	0.161***	-0.217***	0.232***	0.167***
	(0.014)	(0.018)	(0.020)	(0.014)	(0.023)	(0.025)
Upper Egypt Rural	-0.429***	0.177***	0.124***	-0.247***	0.254***	0.194***
	(0.014)	(0.021)	(0.018)	(0.013)	(0.022)	(0.021)
Frontier Governorates	-0.069**	-0.096**	-0.007	-0.022	-0.023	-0.018
	(0.032)	(0.043)	(0.033)	(0.026)	(0.045)	(0.028)
Non-shared bathroom in HH				0.104***	-0.061***	-0.050***
				(0.014)	(0.024)	(0.016)
Piped water in house (h05==1)	0.018	-0.016	-0.003	0.061***	-0.078***	-0.042**
	(0.011)	(0.019)	(0.011)	(0.016)	(0.030)	(0.018)
ColorTV *	0.127***	-0.041	-0.034**	0.107***	-0.037	-0.030
	(0.016)	(0.026)	(0.017)	(0.023)	(0.045)	(0.028)
BlackandWhiteTV				0.065***	-0.069***	-0.031***
				(0.009)	(0.015)	(0.010)
VideoDVD				0.070***	-0.071***	-0.058***
				(0.010)	(0.017)	(0.012)
Electricfan				0.140***	-0.130***	-0.063***
				(0.013)	(0.031)	(0.022)
Aircondition				0.086***	-0.146***	-0.071***
				(0.009)	(0.017)	(0.011)
SatelliteDish				0.136***	-0.080**	-0.028
				(0.019)	(0.033)	(0.023)
Waterheater				0.149***	-0.138***	-0.067***
				(0.015)	(0.026)	(0.016)
Dishwasher				0.092***	-0.157***	-0.075***
				(0.018)	(0.032)	(0.016)
Automaticwashingmachine				0.037***	-0.048**	-0.019
				(0.013)	(0.023)	(0.014)
Car	0.759***	-0.379***		0.448***	-0.244***	-0.113***
	(0.022)	(0.020)		(0.023)	(0.036)	(0.013)
Refrigerator	0.159***	-0.225***	-0.120***	0.079***	-0.083***	-0.037***
	(0.010)	(0.017)	(0.012)	(0.012)	(0.020)	(0.013)
Bicycle	0.051***	-0.023	-0.012	0.046***	-0.019	-0.027***
	(0.013)	(0.022)	(0.013)	(0.010)	(0.018)	(0.010)
Motorcycle	0.140***	-0.130**	-0.083***	0.099***	-0.129***	-0.073***
	(0.035)	(0.051)	(0.021)	(0.019)	(0.031)	(0.014)
Telephone				0.073***	-0.079***	-0.048***
				(0.008)	(0.015)	(0.009)
Constant	7.746***			8.240***		
	(0.053)			(0.046)		
Observations	11,919	11,919	11,023	11,634	11,634	11,634
R-squared	0.537			0.577		
Robust standard errors in parentheses	*** p<0.01, ** p<0.05, * p<0.1					

Note: In 2000, the variable used is TV (no distinction between color or black and white TV)

Note: The dropped categories in the consumption imputation regression include: (i) the household head has no formal education and (ii) Regional variable is Urban Governorates.

Annex 2 - Human Opportunity Index and Shapley Decomposition

Human Opportunity Index

1. In its simplest interpretation, the HOI measures the average availability of basic services, discounted by how inequitably the services are distributed among the population. This is done by measuring the coverage rate of a particular service and then adjusting it according to how equitably the available services are distributed among circumstance groups. The construction of the HOI involves aggregating circumstance-specific coverage rates in a scalar measure that increases with overall coverage and decreases with the differences in coverage among groups with different sets of circumstances. This implies that two societies that have identical coverage or average access rate of a particular service may have different HOI if the access to the service on one country is more concentrated among children of a certain set of circumstances.[4]

2. Empirically, the HOI of a given basic service or opportunity is the coverage rate ($\bar{p}$), adjusted for difference in access to basic services. The level of opportunity measured by this index can be interpreted as the number of existing opportunities in a given society that have been allocated based on an equal opportunity principle:

$$\mathbf{HOI} = \bar{\mathbf{p}}(\mathbf{1} - \mathbf{D}) \qquad \text{(A2.1)}$$

Where D is a dissimilarity index, which is widely used in the sociology literature for dichotomous outcomes. D measures the dissimilarity or inequality of opportunity in access rates to a given basic service for groups defined by circumstances, compared with the average access rate to the same service for the population as a whole (Barros et al. 2009). D can be interpreted as the share of the total number of opportunities that needs to be reallocated among circumstance groups to ensure equal access. $(1 - \mathbf{D})$ is equal to one if access to opportunity is independent of the circumstances, in which case HOI is equal to the average coverage rate ($\bar{p}$). With mutually exclusive circumstance groups, one can compute D as follows:

$$D = \frac{1}{2p}\left(\sum_{k=1}^{m} \alpha_k |p - p_k|\right) \qquad \text{(A2.2)}$$

Where *k* denotes a circumstance group (group of children with a specific set of circumstances); p_k is the specific coverage rate of group *k*; α_k is the share of group *k* in total population of children; and m is the numbers of groups defined by circumstances. D is equal to zero when $\bar{p} = p_k$ for all *k* circumstance groups, in which case HOI is equal to the coverage rate $\bar{p}$. It can also be shown that D is equal to the *share* of total opportunities that are "misallocated" in favor of (against) circumstance groups that have coverage rates higher (lower) than $\bar{p}$.

3. The first component of HOI, $\bar{\mathbf{p}}$, the coverage of basic services, can be calculated using household survey data. Intuitively, the HOI takes access to a basic opportunity, the coverage rate, and discounts it if those opportunities are allocated inequitably. Two factors drive the index: for a given level of D, an increase in the prevalence of opportunities (that is, a higher) increases the index, while an improvement in the way existing opportunities are allocated (a reduction in D) will also improve the index. The index is also Pareto-consistent, in the sense that it will improve if the overall average access to a given opportunity increases, no matter how access is distributed, at least someone is better off, and no one is worse off. If the equal opportunity principle is consistently applied, an exact correspondence between population and opportunity distribution would be observed.

4. Note that access probability gaps are at the heart of the dissimilarity index (D). D is a weighted average of the absolute differences of group specific access rates, pi (the average probability in the subgroup i that a child will have access to a certain basic service such as primary education), from the overall access rate, $\bar{\mathbf{p}}$ (the average probability in the entire population) ((Barros et al. 2009; Azevedo et al. 2010). There can be as many probability gaps as there are possible combinations of groups defined by circumstances. D can be interpreted as showing the fraction of all available opportunities that needs to be reassigned from better-off groups (groups whose access rate is higher than the access rate for the population) to worse-off groups (groups whose access rate is lower than the access rate for the population) to achieve equal opportunity for all. D gives much greater weight to those opportunities allocated to a disadvantaged group of the population than to those allocated to an advantaged group, and is therefore a distribution-sensitive measure. D ranges from 0 to 1 (0 to 100 in percentage terms), and in a situation of perfect equality of opportunity, D will be 0. In other words, D depends on the circumstances and will be zero if no circumstances are considered. Therefore, the maximum value HOI can take is the average coverage rate by a particular basic service, given by $\bar{\mathbf{p}}$. It also implies that an HOI of 100 is possible only when access is universal ($\bar{\mathbf{p}}$ is 100 and D is 0).

5. The report also assesses the changes in inequality of opportunity in the 2000s and the factoring driving the trend. Once the level of HOI for each outcome variable is estimated for 2000 and 2008, it is possible to decompose the changes in the index by scale and distribution effects and try to understand the sources of the estimated change over time (Barros et al., 2009). One property of the HOI is that changes are additively decomposable. Any improvement in the index can be attributed either to an increase in the coverage rate, $\bar{\mathbf{p}}$ (scale effect), or a reduction in the

index of inequality of opportunity, D (distributional effect). The changes in HOI between 2000 and 2008 can be decomposed into scale and equalization effects for each of the outcome variable as:

Change in HOI: $$HOI^{2008} - HOI^{2000} = \Delta\bar{p} + \Delta D \quad \text{(A2.3)}$$

Scale effect: $$\Delta p^{-} = p^{-\dagger}(2008)(1 - D^{\dagger}2000) - p^{-\dagger}(2000)(1 - D^{\dagger}2000) \quad \text{(A2.4)}$$

Distribution effect: $$\Delta D = p^{-\dagger}(2008)(1 - D^{\dagger}2008) - p^{-\dagger}(2008)(1 - D^{\dagger}2000) \quad \text{(A2.5)}$$

Shapley Decomposition

6. To measure the contributions of different circumstance variables to inequality of opportunity, we employ the decomposition procedure proposed by Shorrocks (2012), which is based on the concept of Shapley Value[17] in cooperative games. The procedure allows us to measure how much individual circumstances (such as gender, location, parental characteristics) contribute to inequality in access to critical services. Shapely decomposition consists of computing the marginal effect on the inequality index, in this case HOI, of adding or removing each contributing factor in a given sequence of elimination (Betti and Lemmi 2008; Shorrocks 2012). The decomposition involves calculating the marginal impact of each of the circumstances as they are eliminated in succession, and then averaging these marginal effects over all the possible elimination sequences. The contribution of all circumstances yields an exact, additive decomposition of between group inequalities (in this case the dissimilarity index). The resulting formula is formally identical to the Shapley value in a cooperative game[18]. To illustrative the procedure, we apply it to the anthropometric measures for children's height and weight-for-age and estimate the relative contributions of each circumstances to the observed variance in anthropometric indicators.

7. Following Barros et al. (2009, 2011), inequality of opportunity is measured by the dissimilarity index (D), as defined in equation 3.1. The value of D is dependent on the set of circumstances considered. Moreover, they have the important property that adding more circumstances always increases the value of D. For example, If we have two sets of circumstances C1 and C2, and set C1 and C2 do not overlap, then HOI(C1,C2)≤HOI(C1). Similarly, D(C1,C2)≥D(C1). The impact of adding a circumstance A is given by:

[17] In game theory, the Shapley Value solution generates a unique distribution of the total surplus generated in a cooperative game among the participants. In a setup where a coalition of players produces certain gains (where some players may contribute more to the coalition than others or may possess different bargaining power), Shapley Value provides a unique solution that satisfies all participants.

[18] The Shapley decomposition has two useful properties: The first is symmetry, ensuring that the contribution of each factor is independent of the order in which it appears in the initial list or sequence of factors. The second property is exactness and additivity; whereby the contributions of all s circumstances (or factors) add up to 1.

$$D_{C1} = \sum_{S \subseteq N \setminus \{C1\}} \frac{|s|!(n-|s|-1)!}{n!} [D(S \cup \{C1\}) - D(S)] \qquad \text{(A2.6)}$$

Where *N* is the set of all circumstances, which includes *n* circumstances in total; *S* is a subset of *N* (containing *s* circumstances) that does not contain the particular circumstance C1. *D(S)* is the dissimilarity index estimated with the set of circumstances *S*. $D(S \cup \{C1\})$ is the dissimilarity index calculated with set of circumstances *S and* the circumstance C1. We can define the contribution of circumstance C to the dissimilarity index as:

$$\theta_{C1} = \frac{D_{C1}}{D(N)}, \quad \textit{where} \sum_{i \in N} \theta_i = 1 \qquad \text{(A2.7)}$$

In other words, the sum of the contributions of all circumstances to the dissimilarity index adds up to 100 percent – a critical property satisfied by the Shapley decomposition.

8. To measure the contribution of each circumstance to inequality of access to an opportunity, we apply the above procedure on the dissimilarity index (i.e., A2.2). We apply it for all seven circumstances and most of the outcomes of interest. Consider any opportunity (e.g. whether a blood sample taken from the mother during pregnancy), defined as a discrete (0-1) variable, with "1" denoting "yes" and "0" denoting "no". Our objective is to obtain the conditional probabilities of access to this opportunity for each child based on his/her circumstances. In order to do so, a logistic model, linear in the parameters β, where the event I corresponds to "whether a blood sample taken from the mother during pregnancy" and C is the set of circumstances. The following logistic regression is fitted using DHS data:

$$\ln\left(\frac{P\{I=1|C=(c_1,\ldots\ldots,c_n)\}}{1-P\{I=1|C=(c_1,\ldots\ldots,c_n)\}}\right) = \sum_{k=1}^{n} c_k \beta_k \qquad \text{(A2.8)}$$

Where c_k denotes the row vector of variables representing n circumstances and β_k a corresponding column vector of parameters. From the estimation of the above regression one obtains estimates of the parameters $\{\beta_k\}$, denoted as $\{\beta_{k,m}\}$, where m denotes the sample size. Given the estimated coefficients, one can obtain for each individual in the sample his/her predicted probability of access to a given opportunity under consideration:

$$\hat{p}_{i,m} = \frac{Exp(c_i \hat{\beta}_m)}{1 + Exp(c_i \hat{\beta}_m)} \qquad \text{(A2.9)}$$

Using the predicted probabilities ($\hat{p}$) and sample weights (w_i), we can find the predicted overall coverage rate ($\hat{\bar{C}}$) and D-index ($\widehat{D}$) as:

$$\hat{\bar{C}} = \sum_{i=1}^{m} w_i \hat{p}_{i,m} \qquad \text{(A2.10)}$$

$$\widehat{D} = \frac{1}{2\hat{\bar{C}}} \sum_{i=1}^{m} w_i \left| \hat{p}_{i,m} - \bar{C} \right| \qquad \text{(A2.11)}$$

$$\widehat{HOI} = \bar{\mathbf{P}}\left(1 - \widehat{D}\right) \qquad \text{(A2.12)}$$

9. The decomposition method outlined earlier allows us to estimate the contribution of each covariate to the estimated D-Index. The contribution of covariate *k* to the D-index for a particular opportunity can be estimated as in (A2.6) and (A2.7), with $\widehat{D}$ substituted for D. The contribution of each circumstance to $\widehat{D}$ should add up to 100 percent.

Annex 3 - Tables and Figures

Table 3.1A Health Care Utilization and Maternal Health through Pregnancy, by circumstance (2000)

			(1) During pregnancy, no blood sample taken from mother	(2) Birth not attended by skilled staff	(3) Birth did not take place in public or private health facility	(4) Child did not have postnatal check-up within 2 months of birth	(5) Child did not get medical treatment after symptoms of ARI	(6) Child did not receive complete set of immunizations
Urban/Rural Location	Urban	mean	0.415	0.184	0.299	0.746	0.227	0.071
		se(mean)	0.007	0.006	0.007	0.007	0.023	0.009
	Rural	mean	0.715	0.520	0.655	0.848	0.392	0.081
		se(mean)	0.006	0.006	0.006	0.004	0.018	0.008
Region	Urban Governorates	mean	0.374	0.158	0.231	0.771	0.202	0.077
		se(mean)	0.011	0.009	0.010	0.010	0.037	0.014
	Lower Egypt	mean	0.618	0.351	0.487	0.819	0.313	0.073
		se(mean)	0.008	0.008	0.008	0.006	0.027	0.009
	Upper Egypt	mean	0.667	0.521	0.657	0.811	0.379	0.078
		se(mean)	0.007	0.008	0.007	0.006	0.020	0.009
	Frontier Governorates	mean	0.607	0.400	0.598	0.859	0.378	0.144
		se(mean)	0.018	0.018	0.018	0.013	0.079	0.028
Mother ‘s Education	No education	mean	0.776	0.602	0.708	0.878	0.399	0.086
		se(mean)	0.006	0.007	0.007	0.005	0.022	0.010
	Primary education	mean	0.644	0.425	0.560	0.841	0.392	0.068
		se(mean)	0.012	0.012	0.012	0.009	0.039	0.014
	Secondary Education	mean	0.471	0.223	0.373	0.760	0.267	0.074
		se(mean)	0.008	0.007	0.008	0.007	0.023	0.009
	Higher Education	mean	0.233	0.045	0.156	0.631	0.154	0.058
		se(mean)	0.014	0.007	0.012	0.016	0.048	0.018
Father ‘s Education	No education	mean	0.785	0.608	0.715	0.892	0.429	0.093
		se(mean)	0.008	0.009	0.009	0.006	0.031	0.013
	Primary education	mean	0.677	0.477	0.594	0.834	0.333	0.075
		se(mean)	0.010	0.011	0.010	0.008	0.029	0.012
	Secondary Education	mean	0.528	0.302	0.448	0.788	0.321	0.070
		se(mean)	0.007	0.007	0.007	0.006	0.022	0.008
	Higher Education	mean	0.349	0.122	0.243	0.682	0.210	0.073
		se(mean)	0.013	0.009	0.011	0.012	0.043	0.015
Number of children at home	1-2 children	mean	0.475	0.263	0.385	0.765	0.300	0.068
		se(mean)	0.007	0.006	0.007	0.006	0.021	0.007
	3-4 children	mean	0.659	0.442	0.583	0.832	0.340	0.092
		se(mean)	0.008	0.008	0.008	0.006	0.026	0.011
	5 or more children	mean	0.788	0.604	0.717	0.873	0.433	0.077
		se(mean)	0.009	0.011	0.010	0.007	0.034	0.013
Asset quintiles	Quint 1 (Poorest)	mean	0.805	0.699	0.791	0.882	0.467	0.094
		se(mean)	0.009	0.010	0.009	0.007	0.032	0.014
	Quint 2	mean	0.747	0.572	0.699	0.878	0.376	0.074
		se(mean)	0.010	0.012	0.011	0.008	0.034	0.013
	Quint 3	mean	0.670	0.425	0.581	0.833	0.381	0.084
		se(mean)	0.010	0.011	0.011	0.008	0.033	0.014
	Quint 4	mean	0.528	0.282	0.440	0.802	0.194	0.063
		se(mean)	0.010	0.009	0.010	0.008	0.028	0.011
	Quint 5 (Richest)	mean	0.319	0.066	0.166	0.680	0.242	0.072
		se(mean)	0.009	0.005	0.007	0.009	0.032	0.012
Gender of Child	Female	mean	0.609	0.389	0.514	0.813	0.321	0.079
		se(mean)	0.007	0.007	0.007	0.005	0.019	0.008
	Male	mean	0.587	0.390	0.520	0.804	0.363	0.074
		se(mean)	0.007	0.007	0.007	0.005	0.022	0.008
Advantage Group	Least Advantaged	mean	0.893	0.818	0.872	0.926	0.613	0.119
		se(mean)	0.015	0.019	0.016	0.013	0.078	0.035
	Most Advantaged	mean	0.167	0.013	0.070	0.609	0.205	0.084
		se(mean)	0.017	0.005	0.011	0.022	0.090	0.029
TOTAL		mean	0.599	0.390	0.517	0.809	0.340	0.077
		se(mean)	0.005	0.005	0.005	0.004	0.015	0.006

Source data: Egypt DHS 2000

Table 2.1B Health Care Utilization and Maternal Health through Pregnancy, by circumstance (2008)

			(1) During pregnancy, no blood sample taken from mother	(2) Birth not attended by skilled staff	(3) Birth did not take place in public or private health facility	(4) Child did not have postnatal check-up within 2 months of birth	(5) Child did not get medical treatment after symptoms of ARI	(6) Child did not receive complete set of immunizations
Urban/Rural Location	Urban	mean	0.421	0.100	0.150	0.640	0.263	0.067
		se(mean)	0.008	0.005	0.006	0.008	0.022	0.009
	Rural	mean	0.541	0.281	0.365	0.742	0.325	0.095
		se(mean)	0.006	0.005	0.006	0.005	0.019	0.008
Region	Urban Governorates	mean	0.359	0.082	0.113	0.613	0.257	0.062
		se(mean)	0.013	0.007	0.009	0.013	0.037	0.014
	Lower Egypt	mean	0.524	0.147	0.219	0.763	0.262	0.063
		se(mean)	0.008	0.006	0.007	0.007	0.029	0.009
	Upper Egypt	mean	0.520	0.341	0.429	0.672	0.336	0.117
		se(mean)	0.007	0.007	0.007	0.007	0.019	0.010
	Frontier Governorates	mean	0.528	0.216	0.272	0.821	0.161	0.138
		se(mean)	0.020	0.017	0.018	0.015	0.054	0.029
Mother ‘s Education	No education	mean	0.576	0.408	0.486	0.763	0.319	0.086
		se(mean)	0.009	0.009	0.009	0.008	0.027	0.012
	Primary education	mean	0.532	0.248	0.347	0.726	0.342	0.133
		se(mean)	0.015	0.013	0.015	0.014	0.043	0.023
	Secondary Education	mean	0.479	0.153	0.224	0.690	0.286	0.075
		se(mean)	0.007	0.005	0.006	0.006	0.020	0.008
	Higher Education	mean	0.380	0.041	0.083	0.625	0.263	0.084
		se(mean)	0.014	0.006	0.008	0.014	0.040	0.017
Father ‘s Education	No education	mean	0.569	0.386	0.450	0.795	0.312	0.103
		se(mean)	0.012	0.012	0.012	0.010	0.038	0.017
	Primary education	mean	0.515	0.262	0.332	0.698	0.318	0.089
		se(mean)	0.012	0.011	0.012	0.011	0.033	0.015
	Secondary Education	mean	0.489	0.188	0.267	0.696	0.303	0.079
		se(mean)	0.007	0.005	0.006	0.006	0.019	0.008
	Higher Education	mean	0.432	0.084	0.140	0.650	0.242	0.082
		se(mean)	0.012	0.007	0.009	0.012	0.036	0.015
Number of children at home	1-2 children	mean	0.431	0.155	0.218	0.682	0.308	0.077
		se(mean)	0.007	0.005	0.006	0.006	0.019	0.007
	3-4 children	mean	0.562	0.255	0.334	0.729	0.278	0.097
		se(mean)	0.008	0.007	0.008	0.007	0.024	0.012
	5 or more children	mean	0.631	0.402	0.497	0.739	0.320	0.094
		se(mean)	0.014	0.014	0.015	0.013	0.043	0.020
Asset quintiles	Quint 1 (Poorest)	mean	0.582	0.462	0.549	0.740	0.323	0.119
		se(mean)	0.011	0.011	0.011	0.010	0.029	0.015
	Quint 2	mean	0.555	0.329	0.419	0.755	0.387	0.108
		se(mean)	0.011	0.010	0.011	0.010	0.035	0.015
	Quint 3	mean	0.530	0.203	0.297	0.732	0.317	0.070
		se(mean)	0.011	0.009	0.010	0.010	0.033	0.012
	Quint 4	mean	0.443	0.101	0.163	0.693	0.204	0.077
		se(mean)	0.011	0.007	0.008	0.010	0.030	0.013
	Quint 5 (Richest)	mean	0.402	0.042	0.074	0.619	0.279	0.059
		se(mean)	0.011	0.004	0.006	0.010	0.031	0.011
Gender of Child	Female	mean	0.485	0.203	0.277	0.691	0.267	0.092
		se(mean)	0.007	0.005	0.006	0.006	0.018	0.009
	Male	mean	0.508	0.225	0.294	0.718	0.336	0.076
		se(mean)	0.007	0.006	0.006	0.006	0.021	0.008
Advantage Group	Least Advantaged	mean	0.699	0.574	0.617	0.780	0.244	0.191
		se(mean)	0.032	0.034	0.033	0.028	0.111	0.073
	Most Advantaged	mean	0.328	0.013	0.043	0.588	0.205	0.053
		se(mean)	0.021	0.005	0.009	0.022	0.058	0.021
TOTAL		mean	0.497	0.214	0.286	0.704	0.299	0.084
		se(mean)	0.005	0.004	0.004	0.004	0.014	0.006

Source data: Egypt DHS 2008

Table 2.1C Multivariate Probit Analysis for Health Utilization (Multivariate Probit Analysis) (2000)

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	During pregnancy, no blood sample taken from mother	Birth not attended by skilled staff	Birth did not take place in public or private health facility	Child did not have postnatal check-up within 2 months of birth	Child did not get medical treatment after symptoms of ARI	Child did not receive complete set of immunizations
Location: Rural	0.1185***	0.1259***	0.1192***	0.0326***	0.0923**	0.0034
	(0.014)	(0.014)	(0.015)	(0.011)	(0.042)	(0.017)
Region: Lower Egypt	0.0573***	-0.0428**	0.0397**	-0.0506***	-0.0563	-0.0336*
	(0.017)	(0.020)	(0.020)	(0.013)	(0.062)	(0.020)
Region: Upper Egypt	0.0453***	0.0528***	0.1685***	-0.0782***	-0.0432	-0.0289
	(0.017)	(0.020)	(0.019)	(0.013)	(0.065)	(0.020)
Region: Frontier Gov.	0.0621***	0.0195	0.1997***	-0.0008	0.0081	0.0235
	(0.022)	(0.025)	(0.023)	(0.018)	(0.092)	(0.030)
Mother's Educ: None	0.2683***	0.3053***	0.1962***	0.0588***	0.1528*	0.0064
	(0.024)	(0.036)	(0.029)	(0.018)	(0.091)	(0.031)
Mother's Educ: Primary	0.1930***	0.2498***	0.1412***	0.0494***	0.2340**	-0.0056
	(0.022)	(0.039)	(0.029)	(0.016)	(0.101)	(0.031)
Mother's Educ: Secondary	0.1301***	0.1638***	0.0965***	0.0240*	0.1348	0.0116
	(0.022)	(0.035)	(0.026)	(0.015)	(0.087)	(0.026)
Father's Educ: None	0.0826***	0.0951***	0.0880***	0.0760***	0.0054	-0.0049
	(0.022)	(0.025)	(0.024)	(0.014)	(0.074)	(0.025)
Father's Educ: Primary	0.0365*	0.0557**	0.0411*	0.0356**	-0.0654	-0.0157
	(0.021)	(0.025)	(0.024)	(0.014)	(0.068)	(0.023)
Father's Educ: Secondary	0.0168	0.0372*	0.0345*	0.0405***	-0.0137	-0.0240
	(0.018)	(0.022)	(0.021)	(0.012)	(0.064)	(0.020)
# of children: 3-4	0.1451***	0.1293***	0.1564***	0.0471***	0.0278	0.0137
	(0.011)	(0.012)	(0.012)	(0.008)	(0.035)	(0.014)
# of children: >=5	0.1658***	0.1359***	0.1482***	0.0481***	0.0578	-0.0057
	(0.013)	(0.015)	(0.015)	(0.010)	(0.042)	(0.017)
Asset quintile: 1	0.1820***	0.4632***	0.3389***	0.0892***	0.1467**	0.0306
	(0.020)	(0.023)	(0.019)	(0.013)	(0.074)	(0.032)
Asset quintile: 2	0.1675***	0.4124***	0.3227***	0.0936***	0.0738	0.0173
	(0.018)	(0.023)	(0.018)	(0.012)	(0.069)	(0.028)
Asset quintile: 3	0.1354***	0.3147***	0.2405***	0.0658***	0.0804	0.0181
	(0.017)	(0.023)	(0.018)	(0.012)	(0.065)	(0.025)
Asset quintile: 4	0.0676***	0.2475***	0.1880***	0.0603***	-0.0683	0.0010
	(0.016)	(0.021)	(0.017)	(0.010)	(0.054)	(0.020)
Child's gender==female	-0.0090	0.0211**	0.0225**	0.0011	0.0414	-0.0101
	(0.010)	(0.010)	(0.011)	(0.007)	(0.030)	(0.012)
Observations	10,886	10,886	10,886	10,886	1,056	2,186

Note: Reporting Marginal Effects (dy/dX) of the probit regression
Reference categories are: (i) urban location, (ii) regional variable being Urban Governorates, (iii) higher education degree for mother and father, (iv) having a small household with 1-2 children, (v) richest asset quintile, and (vi) the gender of the child being male.

Source data: Egypt DHS 2000

Table 2.1D Multivariate Probit Analysis for Health Utilization (Multivariate Probit Analysis) (2008)

VARIABLES	(1) During pregnancy, no blood sample taken from mother	(2) Birth not attended by skilled staff	(3) Birth did not take place in public or private health facility	(4) Child did not have postnatal check-up within 2 months of birth	(5) Child did not get medical treatment after symptoms of ARI	(6) Child did not receive complete set of immunizations
Location: Rural	0.0208	0.0801***	0.0832***	0.0386***	0.0416	0.0209
	(0.014)	(0.011)	(0.012)	(0.012)	(0.038)	(0.017)
Region: Lower Egypt	0.0758***	-0.0338*	-0.0121	0.0536***	-0.0496	-0.0596***
	(0.019)	(0.018)	(0.020)	(0.016)	(0.055)	(0.020)
Region: Upper Egypt	0.0421**	0.0620***	0.1012***	-0.0611***	0.0149	-0.0209
	(0.019)	(0.018)	(0.020)	(0.016)	(0.051)	(0.023)
Region: Frontier Gov.	0.0871***	0.0210	0.0229	0.1099***	-0.1719***	0.0243
	(0.025)	(0.023)	(0.026)	(0.019)	(0.061)	(0.032)
Mother's Educ: None	0.0908***	0.1746***	0.1714***	0.0901***	-0.0223	-0.0685***
	(0.024)	(0.027)	(0.027)	(0.019)	(0.069)	(0.021)
Mother's Educ: Primary	0.0506**	0.1113***	0.1224***	0.0446**	0.0277	-0.0316
	(0.026)	(0.030)	(0.030)	(0.021)	(0.077)	(0.024)
Mother's Educ: Secondary	0.0428**	0.0769***	0.0794***	0.0365**	-0.0034	-0.0458*
	(0.019)	(0.021)	(0.021)	(0.017)	(0.056)	(0.024)
Father's Educ: None	-0.0171	0.0325*	-0.0151	0.0561***	0.0353	0.0178
	(0.022)	(0.020)	(0.021)	(0.019)	(0.070)	(0.031)
Father's Educ: Primary	-0.0300	0.0232	-0.0099	-0.0392**	0.0895	0.0012
	(0.021)	(0.019)	(0.020)	(0.020)	(0.067)	(0.028)
Father's Educ: Secondary	-0.0152	0.0083	-0.0051	-0.0104	0.0640	0.0028
	(0.017)	(0.016)	(0.017)	(0.015)	(0.050)	(0.023)
# of children: 3-4	0.1267***	0.0688***	0.0922***	0.0454***	-0.0579*	0.0226
	(0.011)	(0.009)	(0.010)	(0.010)	(0.031)	(0.014)
# of children: >=5	0.1548***	0.0767***	0.1089***	0.0389***	-0.0241	0.0201
	(0.016)	(0.014)	(0.017)	(0.015)	(0.047)	(0.022)
Asset quintile: 1	0.0849***	0.3006***	0.3508***	0.0407**	-0.0244	0.0914**
	(0.022)	(0.025)	(0.024)	(0.019)	(0.060)	(0.040)
Asset quintile: 2	0.0782***	0.2330***	0.2710***	0.0577***	0.0247	0.0688*
	(0.020)	(0.024)	(0.023)	(0.017)	(0.061)	(0.036)
Asset quintile: 3	0.0662***	0.1649***	0.2046***	0.0439***	-0.0058	0.0300
	(0.018)	(0.022)	(0.021)	(0.015)	(0.054)	(0.029)
Asset quintile: 4	0.0143	0.0782***	0.1003***	0.0369***	-0.0888*	0.0388
	(0.017)	(0.020)	(0.020)	(0.014)	(0.046)	(0.026)
Child's gender==female	0.0141	0.0221***	0.0188**	0.0276***	0.0707**	-0.0153
	(0.010)	(0.008)	(0.009)	(0.009)	(0.029)	(0.012)
Observations	10,508	10,537	10,537	10,537	1,061	2,191

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1
Source: Egypt DHS 2008
Note: Reporting Marginal Effects (dy/dX) of the probit regression
Reference categories are: (i) urban location, (ii) regional variable being Urban Governorates, (iii) higher education degree for mother and father, (iv) having a small household with 1-2 children, (v) richest asset quintile, and (vi) the gender of the child being male.

Table 2.2A Malnutrition Prevalence and Micronutrient Intake Variables By Circumstance Group (2000)

			(1)	(2)	(3)	(4)	(5)	(6)	(7)
			Stunting Prevalence	Severe Stunting Prevalence	Wasting Prevalence	Underweight Prevalence	Lives in household with inadequately iodized salt *	Mother did not receive iron tablets during pregnancy	Child did not receive Vitamin A supplement in past 6 months
Urban/Rural Location	Urban	mean	0.139	0.040	0.023	0.031	0.629	0.600	0.840
		se(mean)	0.005	0.003	0.002	0.003	0.007	0.007	0.006
	Rural	mean	0.221	0.078	0.026	0.047	0.824	0.798	0.872
		se(mean)	0.005	0.003	0.002	0.003	0.005	0.005	0.004
Region	Urban Governorates	mean	0.086	0.021	0.018	0.026	0.584	0.583	0.843
		se(mean)	0.007	0.003	0.003	0.004	0.012	0.012	0.009
	Lower Egypt	mean	0.163	0.042	0.031	0.026	0.811	0.756	0.838
		se(mean)	0.006	0.003	0.003	0.003	0.006	0.007	0.006
	Upper Egypt	mean	0.259	0.103	0.022	0.064	0.754	0.737	0.885
		se(mean)	0.007	0.005	0.002	0.004	0.007	0.007	0.005
	Frontier Governorates	mean	0.169	0.043	0.008	0.023	0.631	0.776	0.941
		se(mean)	0.014	0.007	0.003	0.006	0.017	0.015	0.008
Mother ‘s Education	No education	mean	0.228	0.082	0.025	0.054	0.838	0.849	0.883
		se(mean)	0.007	0.004	0.002	0.004	0.006	0.005	0.005
	Primary education	mean	0.200	0.065	0.024	0.036	0.796	0.755	0.848
		se(mean)	0.010	0.006	0.004	0.005	0.010	0.011	0.009
	Secondary Education	mean	0.153	0.046	0.027	0.032	0.691	0.633	0.846
		se(mean)	0.006	0.003	0.003	0.003	0.007	0.008	0.006
	Higher Education	mean	0.141	0.044	0.022	0.026	0.485	0.437	0.827
		se(mean)	0.012	0.007	0.005	0.005	0.017	0.017	0.013
Father ‘s Education	No education	mean	0.235	0.087	0.023	0.057	0.846	0.862	0.887
		se(mean)	0.008	0.006	0.003	0.005	0.007	0.007	0.006
	Primary education	mean	0.188	0.064	0.030	0.041	0.815	0.768	0.863
		se(mean)	0.008	0.005	0.004	0.004	0.008	0.009	0.007
	Secondary Education	mean	0.182	0.057	0.023	0.034	0.719	0.679	0.850
		se(mean)	0.006	0.004	0.002	0.003	0.007	0.007	0.005
	Higher Education	mean	0.127	0.036	0.027	0.031	0.555	0.517	0.832
		se(mean)	0.009	0.005	0.004	0.005	0.013	0.013	0.010
Number of children at home	1-2 children	mean	0.176	0.053	0.026	0.035	0.727	0.669	0.851
		se(mean)	0.006	0.003	0.002	0.003	0.006	0.007	0.005
	3-4 children	mean	0.181	0.062	0.025	0.038	0.747	0.740	0.862
		se(mean)	0.006	0.004	0.003	0.003	0.007	0.007	0.006
	5 or more children	mean	0.235	0.091	0.022	0.061	0.802	0.814	0.877
		se(mean)	0.009	0.006	0.003	0.005	0.009	0.008	0.007
Asset quintiles	Quint 1 (Poorest)	mean	0.270	0.101	0.025	0.067	0.873	0.855	0.886
		se(mean)	0.010	0.007	0.004	0.006	0.007	0.008	0.007
	Quint 2	mean	0.222	0.072	0.027	0.049	0.838	0.827	0.886
		se(mean)	0.010	0.006	0.004	0.005	0.009	0.009	0.007
	Quint 3	mean	0.199	0.071	0.025	0.039	0.816	0.776	0.873
		se(mean)	0.009	0.006	0.004	0.004	0.009	0.009	0.007
	Quint 4	mean	0.160	0.051	0.027	0.032	0.756	0.704	0.841
		se(mean)	0.008	0.005	0.003	0.004	0.009	0.009	0.007
	Quint 5 (Richest)	mean	0.116	0.030	0.022	0.023	0.508	0.495	0.823
		se(mean)	0.007	0.003	0.003	0.003	0.010	0.010	0.008
Gender of Child	Female	mean	0.200	0.067	0.029	0.045	0.750	0.732	0.859
		se(mean)	0.006	0.003	0.002	0.003	0.006	0.006	0.005
	Male	mean	0.176	0.059	0.022	0.037	0.746	0.709	0.860
		se(mean)	0.005	0.003	0.002	0.003	0.006	0.006	0.005
Advantage Group	Least Advantaged	mean	0.322	0.144	0.027	0.108	0.874	0.900	0.858
		se(mean)	0.023	0.018	0.008	0.015	0.016	0.015	0.017
	Most Advantaged	mean	0.121	0.034	0.022	0.029	0.355	0.392	0.811
		se(mean)	0.015	0.008	0.007	0.008	0.021	0.022	0.017
TOTAL		mean	0.189	0.063	0.025	0.041	0.748	0.721	0.860
		se(mean)	0.004	0.002	0.002	0.002	0.004	0.004	0.003

Source data: Egypt DHS 2000. Note: Inadequately iodized salt defined as <=.15 ppm iodine.

Table 2.2B Malnutrition Prevalence and Micronutrient Intake Variables by Circumstance Group (2008)

			(1) Stunting Prevalence	(2) Severe Stunting Prevalence	(3) Wasting Prevalence	(4) Underweight Prevalence	(5) Lives in household with inadequately iodized salt	(6) Mother did not receive iron tablets during pregnancy	(7) Child did not receive Vitamin A supplement in past 6 months
Urban/Rural Location	Urban	mean	0.233	0.105	0.072	0.071	0.152	0.375	0.888
		se(mean)	0.007	0.005	0.004	0.004	0.006	0.008	0.005
	Rural	mean	0.258	0.110	0.062	0.079	0.276	0.456	0.904
		se(mean)	0.006	0.004	0.003	0.003	0.005	0.006	0.004
Region	Urban Governorates	mean	0.198	0.091	0.079	0.068	0.150	0.301	0.877
		se(mean)	0.011	0.008	0.008	0.007	0.010	0.012	0.009
	Lower Egypt	mean	0.301	0.150	0.060	0.066	0.188	0.489	0.900
		se(mean)	0.008	0.006	0.004	0.004	0.006	0.008	0.005
	Upper Egypt	mean	0.212	0.069	0.067	0.091	0.307	0.405	0.905
		se(mean)	0.006	0.004	0.004	0.004	0.007	0.007	0.004
	Frontier Governorates	mean	0.261	0.116	0.048	0.059	0.292	0.455	0.887
		se(mean)	0.020	0.015	0.010	0.011	0.018	0.020	0.013
Mother ‘s Education	No education	mean	0.255	0.101	0.071	0.099	0.335	0.479	0.914
		se(mean)	0.008	0.006	0.005	0.006	0.009	0.009	0.005
	Primary education	mean	0.238	0.103	0.057	0.074	0.279	0.459	0.904
		se(mean)	0.014	0.010	0.007	0.008	0.014	0.015	0.009
	Secondary Education	mean	0.247	0.111	0.065	0.064	0.199	0.423	0.893
		se(mean)	0.006	0.005	0.004	0.004	0.005	0.007	0.004
	Higher Education	mean	0.252	0.116	0.062	0.079	0.109	0.308	0.881
		se(mean)	0.013	0.010	0.007	0.008	0.009	0.013	0.009
Father ‘s Education	No education	mean	0.261	0.118	0.076	0.096	0.334	0.504	0.919
		se(mean)	0.011	0.008	0.007	0.007	0.011	0.012	0.007
	Primary education	mean	0.254	0.108	0.057	0.079	0.280	0.469	0.899
		se(mean)	0.011	0.008	0.006	0.007	0.011	0.012	0.007
	Secondary Education	mean	0.247	0.105	0.063	0.071	0.213	0.418	0.893
		se(mean)	0.006	0.004	0.003	0.004	0.006	0.007	0.004
	Higher Education	mean	0.238	0.110	0.073	0.072	0.137	0.333	0.893
		se(mean)	0.011	0.008	0.007	0.007	0.009	0.012	0.008
Number of children at home	1-2 children	mean	0.245	0.109	0.069	0.073	0.214	0.408	0.886
		se(mean)	0.006	0.004	0.004	0.004	0.005	0.007	0.004
	3-4 children	mean	0.252	0.107	0.064	0.078	0.228	0.431	0.911
		se(mean)	0.007	0.005	0.004	0.005	0.007	0.008	0.005
	5 or more children	mean	0.264	0.108	0.055	0.089	0.333	0.513	0.922
		se(mean)	0.013	0.009	0.007	0.009	0.014	0.015	0.008
Asset quintiles	Quint 1 (Poorest)	mean	0.249	0.091	0.063	0.092	0.444	0.480	0.914
		se(mean)	0.010	0.007	0.006	0.007	0.011	0.011	0.006
	Quint 2	mean	0.255	0.115	0.077	0.096	0.299	0.465	0.909
		se(mean)	0.010	0.007	0.006	0.007	0.010	0.011	0.006
	Quint 3	mean	0.237	0.095	0.068	0.067	0.220	0.462	0.902
		se(mean)	0.010	0.007	0.006	0.006	0.009	0.011	0.006
	Quint 4	mean	0.260	0.123	0.060	0.066	0.131	0.407	0.898
		se(mean)	0.010	0.008	0.005	0.006	0.007	0.011	0.007
	Quint 5 (Richest)	mean	0.244	0.115	0.062	0.067	0.109	0.337	0.873
		se(mean)	0.010	0.007	0.006	0.006	0.007	0.010	0.007
Gender of Child	Female	mean	0.269	0.125	0.074	0.085	0.229	0.434	0.898
		se(mean)	0.006	0.005	0.004	0.004	0.006	0.007	0.004
	Male	mean	0.228	0.091	0.057	0.067	0.231	0.418	0.899
		se(mean)	0.006	0.004	0.003	0.004	0.006	0.007	0.004
Advantage Group	Least Advantaged	mean	0.302	0.129	0.064	0.095	0.485	0.598	0.949
		se(mean)	0.033	0.024	0.017	0.021	0.034	0.034	0.015
	Most Advantaged	mean	0.219	0.098	0.086	0.073	0.082	0.246	0.869
		se(mean)	0.020	0.014	0.013	0.012	0.012	0.019	0.015
TOTAL		mean	0.249	0.108	0.066	0.076	0.230	0.426	0.898
		se(mean)	0.004	0.003	0.003	0.003	0.004	0.005	0.003

Source data: Egypt DHS 2008. Note: Inadequately iodized salt defined as <=.15 ppm iodine.

Table 2.2C Malnutrition Prevalence Dependent Variables (Multivariate Probit Analysis) (2000)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
VARIABLES	Stunting Prevalence	Severe Stunting Prevalence	Wasting Prevalence	Underweight Prevalence	Lives in household with inadequately iodized salt *	Mother did not receive iron tablets during pregnancy	Child did not receive Vitamin A supplement in past 6 months
Location: Rural	0.0051	0.0080	-0.0026	-0.0028	0.0092	0.0484***	0.0060
	(0.011)	(0.006)	(0.004)	(0.005)	(0.012)	(0.013)	(0.009)
Region: Lower Egypt	0.0707***	0.0156	0.0158**	-0.0035	0.1322***	0.0324**	-0.0001
	(0.016)	(0.010)	(0.006)	(0.007)	(0.013)	(0.014)	(0.011)
Region: Upper Egypt	0.1459***	0.0630***	0.0084	0.0273***	0.0497***	-0.0419***	0.0472***
	(0.016)	(0.011)	(0.006)	(0.008)	(0.014)	(0.015)	(0.011)
Region: Frontier Gov.	0.0719***	0.0110	-0.0123**	-0.0093	-0.0308	0.0603***	0.0988***
	(0.022)	(0.014)	(0.006)	(0.008)	(0.021)	(0.018)	(0.009)
Mother's Educ: None	-0.0141	-0.0171	0.0001	0.0020	0.0827***	0.1900***	0.0187
	(0.021)	(0.012)	(0.008)	(0.011)	(0.022)	(0.020)	(0.016)
Mother's Educ: Primary	-0.0125	-0.0194*	0.0007	-0.0036	0.0853***	0.1305***	-0.0003
	(0.021)	(0.011)	(0.008)	(0.010)	(0.020)	(0.018)	(0.017)
Mother's Educ: Secondary	-0.0321*	-0.0226**	0.0037	0.0010	0.0554***	0.0888***	0.0154
	(0.018)	(0.011)	(0.007)	(0.009)	(0.018)	(0.018)	(0.013)
Father's Educ: None	0.0453**	0.0244*	0.0005	0.0054	0.0757***	0.0984***	0.0144
	(0.019)	(0.013)	(0.007)	(0.009)	(0.018)	(0.018)	(0.014)
Father's Educ: Primary	0.0193	0.0123	0.0034	-0.0017	0.0669***	0.0333*	0.0041
	(0.019)	(0.012)	(0.007)	(0.008)	(0.017)	(0.018)	(0.014)
Father's Educ: Secondary	0.0356**	0.0112	-0.0038	-0.0051	0.0303**	0.0326**	0.0049
	(0.016)	(0.010)	(0.005)	(0.007)	(0.015)	(0.015)	(0.012)
# of children: 3-4	-0.0057	0.0020	-0.0021	-0.0035	-0.0054	0.0409***	0.0061
	(0.009)	(0.005)	(0.003)	(0.004)	(0.010)	(0.010)	(0.007)
# of children: >=5	-0.0038	0.0050	-0.0046	0.0019	-0.0173	0.0275**	0.0003
	(0.011)	(0.006)	(0.004)	(0.005)	(0.013)	(0.013)	(0.010)
Asset quintile: 1	0.0677***	0.0196*	0.0079	0.0291**	0.2243***	0.1701***	0.0382***
	(0.020)	(0.012)	(0.008)	(0.012)	(0.013)	(0.015)	(0.013)
Asset quintile: 2	0.0463**	0.0122	0.0051	0.0239**	0.1962***	0.1461***	0.0523***
	(0.018)	(0.011)	(0.007)	(0.011)	(0.012)	(0.014)	(0.011)
Asset quintile: 3	0.0363**	0.0187*	0.0074	0.0235**	0.1791***	0.1208***	0.0458***
	(0.016)	(0.011)	(0.007)	(0.010)	(0.012)	(0.014)	(0.011)
Asset quintile: 4	0.0143	0.0053	0.0064	0.0152*	0.1341***	0.0935***	0.0197**
	(0.014)	(0.009)	(0.006)	(0.008)	(0.011)	(0.012)	(0.010)
Child's gender==female	-0.0162**	-0.0062	-0.0072**	-0.0066*	0.0028	-0.0148*	0.0032
	(0.008)	(0.004)	(0.003)	(0.004)	(0.009)	(0.009)	(0.007)
Observations	10,292	10,292	10,292	10,292	10,886	10,886	10,886

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Source data: Egypt DHS 2000

Note: Reporting Marginal Effects (dy/dX) of the probit regression
Reference categories are: (i) urban location, (ii) regional variable being Urban Governorates, (iii) higher education degree for mother and father, (iv) having a small household with 1-2 children, (v) richest asset quintile, and (vi) the gender of the child being male.

Table 2.2D Malnutrition Prevalence Dependent Variables (Multivariate Probit Analysis) (2008)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
VARIABLES	Stunting Prevalence	Severe Stunting Prevalence	Wasting Prevalence	Underweight Prevalence	Lives in household with inadequately iodized salt *	Mother did not receive iron tablets during pregnancy	Child did not receive Vitamin A supplement in past 6 months
Location: Rural	-0.0088	-0.0073	-0.0184**	0.0016	0.0227*	-0.0429***	-0.0036
	(0.012)	(0.009)	(0.007)	(0.007)	(0.012)	(0.014)	(0.008)
Region: Lower Egypt	0.1148***	0.0573***	-0.0077	-0.0071	-0.0404**	0.1622***	-0.0012
	(0.018)	(0.013)	(0.009)	(0.010)	(0.017)	(0.019)	(0.011)
Region: Upper Egypt	0.0115	-0.0315***	-0.0100	0.0062	0.0047	0.0446**	-0.0080
	(0.017)	(0.011)	(0.009)	(0.010)	(0.017)	(0.019)	(0.011)
Region: Frontier Gov.	0.0685**	0.0255	-0.0288***	-0.0164	0.0375	0.0954***	-0.0078
	(0.027)	(0.019)	(0.009)	(0.013)	(0.024)	(0.025)	(0.016)
Mother's Educ: None	0.0053	-0.0031	0.0113	-0.0055	0.0437*	0.1063***	0.0077
	(0.021)	(0.014)	(0.013)	(0.013)	(0.023)	(0.024)	(0.013)
Mother's Educ: Primary	-0.0058	-0.0002	-0.0022	-0.0120	0.0733***	0.1096***	0.0058
	(0.023)	(0.015)	(0.013)	(0.013)	(0.026)	(0.026)	(0.015)
Mother's Educ: Secondary	-0.0128	-0.0051	0.0084	-0.0206*	0.0405**	0.0795***	-0.0001
	(0.017)	(0.011)	(0.010)	(0.011)	(0.019)	(0.019)	(0.011)
Father's Educ: None	0.0287	0.0270*	-0.0007	0.0107	0.0310	0.0750***	0.0032
	(0.021)	(0.015)	(0.011)	(0.013)	(0.021)	(0.022)	(0.013)
Father's Educ: Primary	0.0166	0.0064	-0.0189**	0.0077	0.0397**	0.0349	-0.0140
	(0.020)	(0.014)	(0.009)	(0.013)	(0.020)	(0.021)	(0.013)
Father's Educ: Secondary	0.0139	0.0028	-0.0145*	0.0052	0.0146	0.0196	-0.0138
	(0.015)	(0.010)	(0.009)	(0.010)	(0.016)	(0.017)	(0.010)
# of children: 3-4	0.0059	-0.0049	-0.0046	0.0010	-0.0060	0.0137	0.0190***
	(0.010)	(0.007)	(0.005)	(0.006)	(0.009)	(0.011)	(0.006)
# of children: >=5	0.0246	0.0124	-0.0154**	-0.0015	0.0082	0.0892***	0.0230**
	(0.016)	(0.011)	(0.008)	(0.009)	(0.014)	(0.017)	(0.009)
Asset quintile: 1	0.0014	-0.0080	0.0244*	0.0165	0.2829***	0.0743***	0.0280**
	(0.020)	(0.013)	(0.013)	(0.013)	(0.022)	(0.022)	(0.011)
Asset quintile: 2	-0.0025	-0.0042	0.0424***	0.0303**	0.1517***	0.0617***	0.0233**
	(0.018)	(0.012)	(0.013)	(0.013)	(0.020)	(0.020)	(0.010)
Asset quintile: 3	-0.0315**	-0.0261***	0.0250**	0.0049	0.0893***	0.0527***	0.0231**
	(0.016)	(0.010)	(0.011)	(0.011)	(0.018)	(0.018)	(0.009)
Asset quintile: 4	-0.0062	-0.0114	0.0135	0.0039	-0.0115	0.0236	0.0186**
	(0.015)	(0.009)	(0.009)	(0.010)	(0.016)	(0.017)	(0.009)
Child's gender==female	-0.0314***	-0.0258***	-0.0134***	-0.0204***	-0.0021	-0.0202**	0.0032
	(0.009)	(0.006)	(0.005)	(0.005)	(0.009)	(0.010)	(0.006)
Observations	9,487	9,487	9,487	9,487	10,537	10,537	10,537

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Note: Reporting Marginal Effects (dy/dX) of the probit regression
Reference categories are: (i) urban location, (ii) regional variable being Urban Governorates, (iii) higher education degree for mother and father, (iv) having a small household with 1-2 children, (v) richest asset quintile, and (vi) the gender of the child being male.

Source data: Egypt DHS 2008

Table 2.3A Access to Basic Services, By Circumstance Group (2000)

			2000		2008	
			(1)	(2)	(1)	(2)
			Household does not have access to improved water	HH has a shared toilet	Household does not have access to improved water	HH has a shared toilet
Urban/Rural Location	Urban	mean	0.010	0.057	0.006	0.023
		se(mean)	0.002	0.003	0.001	0.002
	Rural	mean	0.132	0.121	0.037	0.086
		se(mean)	0.004	0.004	0.002	0.003
Region	Urban Governorates	mean	0.006	0.069	0.002	0.019
		se(mean)	0.002	0.006	0.001	0.004
	Lower Egypt	mean	0.111	0.054	0.017	0.033
		se(mean)	0.005	0.004	0.002	0.003
	Upper Egypt	mean	0.081	0.148	0.038	0.113
		se(mean)	0.004	0.005	0.003	0.005
	Frontier Governorates	mean	0.296	0.139	0.188	0.073
		se(mean)	0.016	0.012	0.016	0.010
Mother ‘s Education	No education	mean	0.133	0.154	0.037	0.122
		se(mean)	0.005	0.005	0.003	0.006
	Primary education	mean	0.096	0.111	0.042	0.061
		se(mean)	0.007	0.008	0.006	0.007
	Secondary Education	mean	0.044	0.047	0.019	0.046
		se(mean)	0.003	0.003	0.002	0.003
	Higher Education	mean	0.014	0.010	0.012	0.013
		se(mean)	0.004	0.003	0.003	0.003
Father ‘s Education	No education	mean	0.138	0.164	0.033	0.111
		se(mean)	0.007	0.007	0.004	0.007
	Primary education	mean	0.105	0.128	0.030	0.083
		se(mean)	0.006	0.007	0.004	0.007
	Secondary Education	mean	0.063	0.064	0.024	0.054
		se(mean)	0.004	0.004	0.002	0.003
	Higher Education	mean	0.023	0.021	0.019	0.022
		se(mean)	0.004	0.004	0.003	0.004
Number of children at home	1-2 children	mean	0.071	0.075	0.023	0.060
		se(mean)	0.004	0.004	0.002	0.003
	3-4 children	mean	0.084	0.094	0.029	0.062
		se(mean)	0.004	0.005	0.003	0.004
	5 or more children	mean	0.122	0.152	0.025	0.081
		se(mean)	0.007	0.008	0.005	0.008
Asset quintiles	Quint 1 (Poorest)	mean	0.213	0.231	0.048	0.183
		se(mean)	0.009	0.009	0.005	0.008
	Quint 2	mean	0.164	0.113	0.044	0.104
		se(mean)	0.009	0.007	0.005	0.007
	Quint 3	mean	0.058	0.101	0.021	0.037
		se(mean)	0.005	0.007	0.003	0.004
	Quint 4	mean	0.016	0.054	0.013	0.011
		se(mean)	0.003	0.005	0.002	0.002
	Quint 5 (Richest)	mean	0.006	0.009	0.008	0.007
		se(mean)	0.001	0.002	0.002	0.002
Gender of Child	Female	mean	0.088	0.097	0.024	0.066
		se(mean)	0.004	0.004	0.002	0.003
	Male	mean	0.082	0.095	0.027	0.060
		se(mean)	0.004	0.004	0.002	0.003
Advantage Group	Least Advantaged	mean	0.226	0.290	0.052	0.143
		se(mean)	0.020	0.022	0.015	0.024
	Most Advantaged	mean	0.008	0.015	0.007	0.006
		se(mean)	0.004	0.005	0.004	0.003
TOTAL		mean	0.085	0.096	0.025	0.063
		se(mean)	0.003	0.003	0.002	0.002

Source data: Egypt DHS 2000 and 2008

Table 2.3B Access to Basic Services Dependent Variables (Multivariate Probit Analysis) (2000 and 2008)

	2000		2008	
	(1)	(2)	(1)	(2)
VARIABLES	Household does not have access to improved water	HH has a shared toilet	Household does not have access to improved water	HH has a shared toilet
Location: Rural	0.0515***	0.0116	0.0170***	0.0149***
	(0.006)	(0.007)	(0.003)	(0.005)
Region: Lower Egypt	-0.0114	-0.0729***	0.0021	-0.0148
	(0.009)	(0.009)	(0.007)	(0.009)
Region: Upper Egypt	-0.0487***	-0.0313***	-0.0010	0.0292***
	(0.009)	(0.009)	(0.007)	(0.011)
Region: Frontier Gov.	0.1015***	-0.0251***	0.2132***	0.0276
	(0.025)	(0.008)	(0.050)	(0.017)
Mother's Educ: None	-0.0004	0.0425**	0.0016	0.0206
	(0.012)	(0.020)	(0.005)	(0.014)
Mother's Educ: Primary	0.0036	0.0457*	0.0089	0.0102
	(0.013)	(0.025)	(0.008)	(0.015)
Mother's Educ: Secondary	-0.0055	0.0258	-0.0015	0.0180
	(0.011)	(0.019)	(0.005)	(0.012)
Father's Educ: None	0.0042	0.0406***	-0.0065**	0.0045
	(0.009)	(0.015)	(0.003)	(0.009)
Father's Educ: Primary	0.0041	0.0335**	-0.0070**	0.0118
	(0.009)	(0.015)	(0.003)	(0.010)
Father's Educ: Secondary	0.0011	0.0160	-0.0065	0.0008
	(0.008)	(0.012)	(0.004)	(0.008)
# of children: 3-4	-0.0005	-0.0069	0.0012	-0.0116***
	(0.004)	(0.005)	(0.002)	(0.004)
# of children: >=5	-0.0001	-0.0064	-0.0049*	-0.0247***
	(0.004)	(0.006)	(0.003)	(0.004)
Asset quintile: 1	0.3202***	0.3159***	0.0236***	0.1921***
	(0.039)	(0.028)	(0.008)	(0.028)
Asset quintile: 2	0.2308***	0.2026***	0.0177**	0.1382***
	(0.034)	(0.025)	(0.007)	(0.024)
Asset quintile: 3	0.0907***	0.1769***	0.0029	0.0602***
	(0.022)	(0.022)	(0.005)	(0.017)
Asset quintile: 4	0.0202	0.1045***	-0.0006	0.0077
	(0.014)	(0.017)	(0.004)	(0.012)
Child's gender==female	0.0003	0.0049	0.0024	-0.0029
	(0.003)	(0.005)	(0.002)	(0.004)
Observations	10,886	10,886	10,537	10,537

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Note: Reporting Marginal Effects (dy/dX) of the probit regression
Reference categories are: (i) urban location, (ii) regional variable being Urban Governorates, (iii) higher education degree for mother and father, (iv) having a small household with 1-2 children, (v) richest asset quintile, and (vi) the gender of the child being male.

Source data: Egypt DHS 2000 and 2008

Table 2.4A Probability of Enrolment by Age Group and by circumstance group (DHS 2000 and 2008)

			2000		2008	
			(1) Age Group (6-14) inclusive Grades 1-9 (Compulsory)	(2) Age Group (15-17) inclusive Grades 10-12	(1) Age Group (6-14) inclusive Grades 1-9 (Compulsory)	(2) Age Group (15-17) inclusive Grades 10-12
Urban/Rural Location	Urban	mean	0.906	0.808	0.929	0.845
		se(mean)	0.003	0.009	0.003	0.009
	Rural	mean	0.830	0.652	0.875	0.723
		se(mean)	0.004	0.010	0.003	0.009
Region	Urban Governorates	mean	0.905	0.821	0.932	0.828
		se(mean)	0.006	0.013	0.006	0.016
	Lower Egypt	mean	0.879	0.725	0.915	0.790
		se(mean)	0.004	0.010	0.004	0.010
	Upper Egypt	mean	0.823	0.659	0.864	0.731
		se(mean)	0.005	0.012	0.004	0.010
	Frontier Governorates	mean	0.821	0.661	0.855	0.730
		se(mean)	0.012	0.029	0.011	0.028
Mother ‘s Education	No education	mean	0.797	0.610	0.846	0.633
		se(mean)	0.005	0.010	0.004	0.010
	Primary education	mean	0.898	0.790	0.894	0.785
		se(mean)	0.005	0.013	0.006	0.016
	Secondary Education	mean	0.940	0.956	0.934	0.931
		se(mean)	0.004	0.008	0.003	0.007
	Higher Education	mean	0.975	0.975	0.958	0.981
		se(mean)	0.005	0.011	0.006	0.009
Father ‘s Education	No education	mean	0.761	0.567	0.828	0.600
		se(mean)	0.006	0.012	0.006	0.013
	Primary education	mean	0.871	0.731	0.883	0.725
		se(mean)	0.005	0.013	0.006	0.015
	Secondary Education	mean	0.930	0.873	0.924	0.873
		se(mean)	0.004	0.010	0.003	0.009
	Higher Education	mean	0.961	0.972	0.953	0.973
		se(mean)	0.004	0.008	0.005	0.007
Number of children at home	1-2 children	mean	0.893	0.824	0.887	0.817
		se(mean)	0.007	0.019	0.006	0.017
	3-4 children	mean	0.895	0.785	0.916	0.810
		se(mean)	0.003	0.009	0.003	0.008
	5 or more children	mean	0.805	0.636	0.855	0.686
		se(mean)	0.005	0.010	0.005	0.012
Asset quintiles	Quint 1 (Poorest)	mean	0.704	0.465	0.802	0.582
		se(mean)	0.008	0.018	0.007	0.016
	Quint 2	mean	0.835	0.606	0.876	0.702
		se(mean)	0.007	0.017	0.006	0.015
	Quint 3	mean	0.874	0.750	0.911	0.774
		se(mean)	0.006	0.015	0.005	0.014
	Quint 4	mean	0.904	0.779	0.931	0.845
		se(mean)	0.005	0.014	0.005	0.013
	Quint 5 (Richest)	mean	0.955	0.918	0.957	0.940
		se(mean)	0.003	0.008	0.004	0.008
Gender of Child	Female	mean	0.881	0.749	0.907	0.765
		se(mean)	0.004	0.009	0.003	0.009
	Male	mean	0.842	0.685	0.885	0.780
		se(mean)	0.004	0.010	0.004	0.009
Advantage Group	Least Advantaged	mean	0.599	0.366	0.735	0.497
		se(mean)	0.016	0.027	0.015	0.032
	Most Advantaged	mean	0.985	0.994	0.970	0.982
		se(mean)	0.005	0.006	0.007	0.010
TOTAL	TOTAL	mean	0.862	0.719	0.896	0.772
		se(mean)	0.003	0.007	0.002	0.006

Source data: Egypt DHS 2000 and 2008

Table 2.4B Educational Enrolment (Multivariate Probit Analysis) (2000 and 2008)

	2000		2008	
VARIABLES	(1) Probability of Enrolment Age Group (6-14) inclusive	(2) Probability of Enrolment Age Group (15-17) inclusive	(3) Probability of Enrolment Age Group (6-14) inclusive	(4) Probability of Enrolment Age Group (15-17) inclusive
Location: Rural	0.0125**	0.0258	0.0011	0.0250
	(0.006)	(0.023)	(0.005)	(0.021)
Region: Lower Egypt	0.0379***	0.0563**	0.0230***	0.0457
	(0.007)	(0.028)	(0.006)	(0.029)
Region: Upper Egypt	0.0240***	0.0378	0.0285***	0.0610**
	(0.007)	(0.029)	(0.006)	(0.029)
Region: Frontier Gov.	0.0126*	-0.0284	0.0022	-0.0051
	(0.007)	(0.039)	(0.007)	(0.039)
Mother's Educ: None	-0.0708***	-0.2709***	-0.0399**	-0.4136***
	(0.024)	(0.083)	(0.016)	(0.073)
Mother's Educ: Primary	-0.0471	-0.2345**	-0.0224	-0.4138***
	(0.031)	(0.097)	(0.018)	(0.091)
Mother's Educ: Secondary	0.0201	-0.1097	-0.0018	-0.2841***
	(0.020)	(0.096)	(0.014)	(0.092)
Father's Educ: None	-0.1118***	-0.4231***	-0.0855***	-0.2705***
	(0.023)	(0.052)	(0.016)	(0.043)
Father's Educ: Primary	-0.0568***	-0.3528***	-0.0625***	-0.2387***
	(0.021)	(0.057)	(0.016)	(0.046)
Father's Educ: Secondary	-0.0161	-0.2403***	-0.0151	-0.1399***
	(0.017)	(0.058)	(0.010)	(0.042)
# of children: 3-4	-0.0213**	0.0250	0.0002	0.0014
	(0.009)	(0.030)	(0.005)	(0.024)
# of children: >=5	-0.0513***	-0.0072	-0.0230***	-0.0423
	(0.010)	(0.030)	(0.007)	(0.026)
Asset quintile: 1	-0.1762***	-0.3325***	-0.0720***	-0.2363***
	(0.021)	(0.039)	(0.013)	(0.038)
Asset quintile: 2	-0.0890***	-0.2053***	-0.0399***	-0.1529***
	(0.016)	(0.038)	(0.011)	(0.036)
Asset quintile: 3	-0.0496***	-0.1109***	-0.0162*	-0.1180***
	(0.013)	(0.035)	(0.009)	(0.034)
Asset quintile: 4	-0.0259**	-0.1179***	-0.0034	-0.0770**
	(0.010)	(0.030)	(0.008)	(0.032)
Child's gender==female	-0.0388***	-0.0515***	-0.0058**	0.0011
	(0.004)	(0.016)	(0.003)	(0.015)
Observations	15,719	4,095	15,769	4,172

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Source data: Egypt DHS 2000 and 2008

Note: Reporting Marginal Effects (dy/dX) of the probit regression
Reference categories are: (i) urban location, (ii) regional variable being Urban Governorates, (iii) higher education degree for mother and father, (iv) having a small household with 1-2 children, (v) richest asset quintile, and (vi) the gender of the child being male.

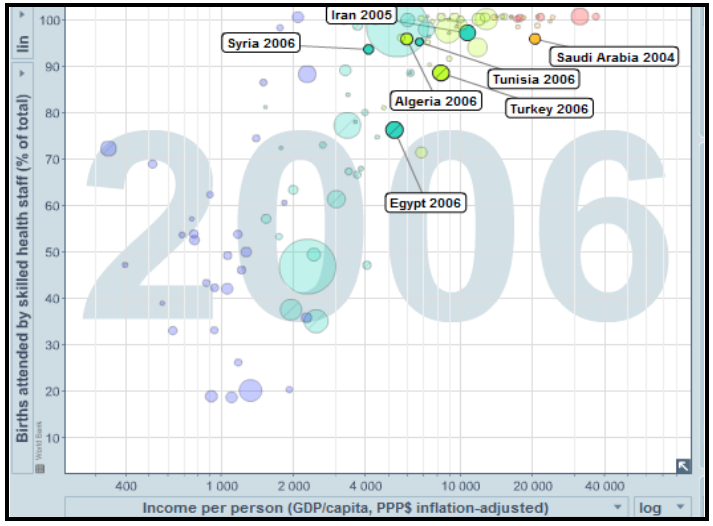
Table 2.5A Exposure to Overlapping (Multiple) Risk Factors by Poverty Status for children ages 0-4 (2008)

			At least 1 risk factor	At least 2 risk factors	At least 3 risk factors	All 4 risk factors
Urban/Rural Location	Urban	mean	0.606	0.312	0.062	0.005
		se(mean)	0.008	0.007	0.004	0.001
	Rural	mean	0.782	0.519	0.174	0.024
		se(mean)	0.005	0.006	0.005	0.002
Region	Urban Governorates	mean	0.532	0.267	0.049	0.003
		se(mean)	0.014	0.012	0.006	0.002
	Lower Egypt	mean	0.746	0.430	0.097	0.010
		se(mean)	0.007	0.008	0.005	0.002
	Upper Egypt	mean	0.757	0.524	0.202	0.030
		se(mean)	0.006	0.007	0.006	0.002
	Frontier Governorates	mean	0.745	0.499	0.211	0.023
		se(mean)	0.018	0.020	0.016	0.006
Mother ‘s Education	No education	mean	1.000	0.865	0.418	0.065
		se(mean)	0.000	0.006	0.009	0.005
	Primary education	mean	0.697	0.363	0.048	0.000
		se(mean)	0.014	0.015	0.007	0.000
	Secondary Education	mean	0.631	0.302	0.035	0.000
		se(mean)	0.007	0.006	0.003	0.000
	Higher Education	mean	0.505	0.218	0.019	0.000
		se(mean)	0.014	0.012	0.004	0.000
Father ‘s Education	No education	mean	0.915	0.730	0.318	0.054
		se(mean)	0.007	0.011	0.011	0.005
	Primary education	mean	0.804	0.551	0.197	0.029
		se(mean)	0.010	0.012	0.010	0.004
	Secondary Education	mean	0.684	0.385	0.087	0.007
		se(mean)	0.006	0.007	0.004	0.001
	Higher Education	mean	0.544	0.241	0.035	0.000
		se(mean)	0.013	0.011	0.005	0.001
Number of children at home	1-2 children	mean	0.679	0.387	0.095	0.010
		se(mean)	0.006	0.007	0.004	0.001
	3-4 children	mean	0.735	0.467	0.145	0.016
		se(mean)	0.007	0.008	0.006	0.002
	5 or more children	mean	0.870	0.667	0.301	0.058
		se(mean)	0.010	0.014	0.013	0.007
Asset quintiles	Quint 1 (Poorest)	mean	0.919	0.746	0.349	0.058
		se(mean)	0.006	0.009	0.010	0.005
	Quint 2	mean	0.826	0.565	0.200	0.024
		se(mean)	0.008	0.011	0.009	0.003
	Quint 3	mean	0.745	0.439	0.096	0.007
		se(mean)	0.009	0.011	0.006	0.002
	Quint 4	mean	0.625	0.308	0.048	0.002
		se(mean)	0.011	0.010	0.005	0.001
	Quint 5 (Richest)	mean	0.528	0.232	0.021	0.002
		se(mean)	0.011	0.009	0.003	0.001
Gender of Child	Female	mean	0.725	0.448	0.136	0.017
		se(mean)	0.006	0.007	0.005	0.002
	Male	mean	0.708	0.436	0.129	0.017
		se(mean)	0.006	0.007	0.005	0.002
Advantage Group	Least Advantaged	mean	1.000	0.936	0.555	0.150
		se(mean)	0.000	0.017	0.034	0.025
	Most Advantaged	mean	0.428	0.171	0.002	0.000
		se(mean)	0.022	0.017	0.002	0.000
TOTAL	TOTAL	mean	**0.717**	**0.442**	**0.133**	**0.017**
		se(mean)	0.004	0.005	0.003	0.001

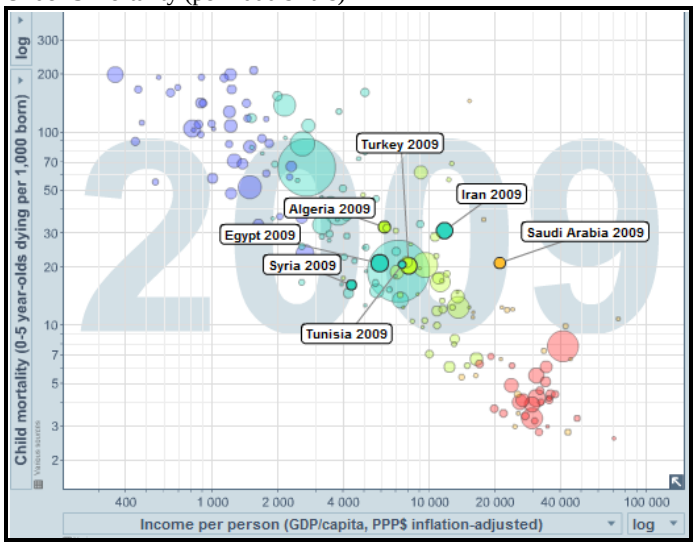
Source data: Egypt DHS 2008, Birth recode module

Figure 2.1A International Comparisons on Selected Indicators

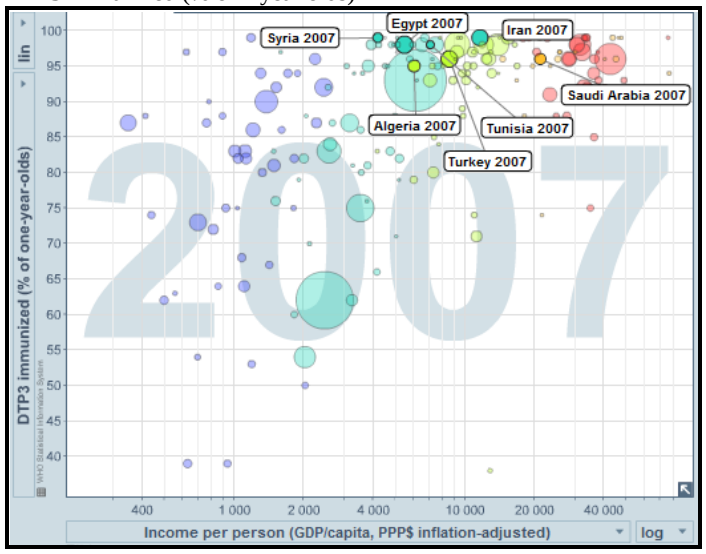
Births attended by Skilled Staff (percent of total)



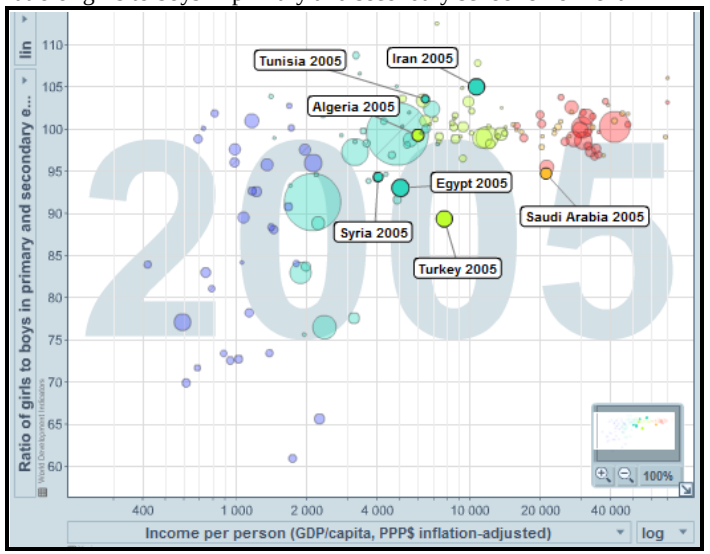
Under-5 mortality (per 1000 births)



DTP3 immunized (% of 1 year olds)



Ratio of girls to boys in primary and secondary school enrolment



Source: Data compiled using Gapminder software (Rosling 2011)

Table 3.1A Summary Table: Human Opportunity Index on Selected Indicators for Egypt (2000, 2008)

		2000				2008			
		C = Coverage	D= Dissimilarity Index	(1-D)= 1 - Dissimilarity Index	Human Opportunity Index (HOI) = C * (1-D)	C = Coverage	D= Dissimilarity Index	(1-D)= 1 - Dissimilarity Index	Human Opportunity Index (HOI) = C * (1-D)
Health Utilization	During pregnancy, blood sample was taken from mother	46.8	17.2	82.8	38.8	70.6	4.1	95.9	67.7
	Birth assisted by trained health staff (doctor/midwife/nurse)	61.0	18.0	82.0	50.1	78.6	9.1	90.9	71.5
	Birth given at public or private health facility	48.3	22.2	77.8	37.6	71.5	11.3	88.7	63.4
	Baby postnatal check within 2 months of birth	19.1	18.9	81.1	15.5	29.6	7.6	92.4	27.3
	Child received all immunization (ages in months 12-24)	92.3	0.5	99.5	91.9	91.6	1.4	98.6	90.3
	Composite variable for having adequate access to health services (birth by skilled staff, in health facility, with postnatal checkup)	14.8	27.0	73.0	10.8	23.5	15.4	84.6	19.9
Nutrition	Not stunted	81.1	3.6	96.4	78.2	75.1	1.5	98.5	74.0
	No wasting	97.5	0.2	99.8	97.3	93.4	0.6	99.4	92.9
	Not underweight	95.9	0.8	99.2	95.1	92.4	0.7	99.3	91.7
	Child lives in hh with adequately iodized salt (>.15 ppm iodine)	25.2	22.1	77.9	19.6	77.0	6.6	93.4	71.9
	The mother received iron tablets during pregnancy	25.1	25.1	74.9	18.8	41.5	10.0	90.0	37.3
	Composite variable for having adequate nutrition (not stunted, not underweight & lives in hh with adequate salt iodization)	19.4	27.1	72.9	14.2	49.3	6.5	93.5	46.1
Housing and access to basic serv	HH has access to improved drinking water (hv201 variable is used)	91.5	4.0	96.0	87.9	97.5	1.0	99.0	96.5
	HH has non-shared toilet	90.4	3.6	96.4	87.1	93.7	3.0	97.0	90.9
	HH has electricity	97.3	2.2	97.9	95.2	97.6	1.1	98.9	96.5
	Child is reported to have an identity card	98.5	0.4	99.6	98.1	98.6	0.3	99.7	98.3
	Composite variable for having access to basic infrastructure (registered child in hh with improved water source, electricity and non-	80.8	8.6	91.4	73.8	89.9	4.4	95.7	86.0
Education enrolment and attainm	Enrollment rate for ages 6-14 (inclusive)	89.9	4.9	95.1	85.4	94.5	2.4	97.6	92.2
	Enrollment rate for ages 15-17 (inclusive)	68.8	11.7	88.3	60.7	73.5	10.4	89.7	65.9
	Probability of completing sixth grade ontime (among children ages <=13)	68.7	12.2	87.8	60.3	84.1	6.3	93.7	78.8
	Probability of completing 9th grade (preparatory) ontime (among children ages <=16)	57.3	17.3	82.7	47.4	62.8	15.6	84.4	53.0

Table 3.2A Human Opportunity Index, by region for Selected Health Care Utilization Variables

			During pregnancy, blood sample was taken from mother	Birth assisted by trained health staff (doctor/midwife/nurse)	Birth given at public or private health facility	Baby postnatal check within 2 months of birth	Child received all immunization (ages in months 1224)	Composite variable for having adequate access to health services (birth by skilled staff, in health facility, with postnatal checkup)
2000	EGYPT TOTAL	Coverage (C)	46.81	61.02	48.34	19.13	92.32	14.80
		Dissemilarity (D)	17.19	18.02	22.17	18.88	0.52	26.95
		Human Opportunity Index (HOI)	38.76	50.03	37.63	15.52	91.84	10.81
	1. Urban Governorates	Coverage (C)	70.42	84.23	76.94	22.93	92.26	21.81
		Dissemilarity (D)	8.72	7.87	9.13	14.53	0.96	16.39
		Human Opportunity Index (HOI)	64.28	77.60	69.91	19.60	91.37	18.23
	2. Lower Egypt Urban	Coverage (C)	59.88	84.91	72.76	24.30	92.52	22.48
		Dissemilarity (D)	6.77	5.93	6.95	11.69	1.61	12.97
		Human Opportunity Index (HOI)	55.82	79.88	67.70	21.46	91.04	19.56
	3.Lower Egypt Rural	Coverage (C)	36.26	57.80	43.64	15.90	92.80	11.35
		Dissemilarity (D)	16.70	12.64	13.86	16.64	1.16	21.51
		Human Opportunity Index (HOI)	30.20	50.50	37.59	13.26	91.72	8.91
	4 Upper Egypt Urban	Coverage (C)	60.59	74.46	58.78	30.79	94.98	25.68
		Dissemilarity (D)	11.16	12.09	16.01	18.09	1.85	23.25
		Human Opportunity Index (HOI)	53.83	65.46	49.37	25.22	93.22	19.71
	5. Upper Egypt Rural	Coverage (C)	32.56	38.33	25.51	14.56	91.25	8.08
		Dissemilarity (D)	12.18	18.62	21.95	17.53	0.92	28.11
		Human Opportunity Index (HOI)	28.59	31.19	19.92	12.01	90.41	5.81
	6. Frontier Governorates	Coverage (C)	52.55	60.04	40.21	14.13	85.63	10.04
		Dissemilarity (D)	16.93	22.26	19.46	24.59	2.59	27.53
		Human Opportunity Index (HOI)	43.66	46.67	32.39	10.66	83.41	7.27
2008	EGYPT TOTAL	Coverage (C)	70.58	78.61	71.45	29.56	91.56	23.54
		Dissemilarity (D)	4.06	9.07	11.26	7.63	1.45	15.35
		Human Opportunity Index (HOI)	67.71	71.47	63.40	27.31	90.23	19.93
	1. Urban Governorates	Coverage (C)	85.13	91.84	88.68	38.69	93.78	34.63
		Dissemilarity (D)	2.70	3.41	4.36	5.71	1.18	8.10
		Human Opportunity Index (HOI)	82.84	88.71	84.81	36.48	92.67	31.83
	2. Lower Egypt Urban	Coverage (C)	66.52	92.01	87.40	28.10	95.88	27.02
		Dissemilarity (D)	6.70	2.19	3.08	10.42	1.81	10.99
		Human Opportunity Index (HOI)	62.06	89.99	84.71	25.18	94.15	24.05
	3.Lower Egypt Rural	Coverage (C)	64.55	83.44	75.46	22.48	93.06	19.47
		Dissemilarity (D)	5.48	3.69	4.92	8.43	0.66	10.86
		Human Opportunity Index (HOI)	61.01	80.36	71.75	20.59	92.44	17.35
	4 Upper Egypt Urban	Coverage (C)	77.25	85.71	77.84	40.57	90.31	34.02
		Dissemilarity (D)	3.09	7.29	9.86	10.38	3.38	15.61
		Human Opportunity Index (HOI)	74.86	79.46	70.16	36.36	87.26	28.71
	5. Upper Egypt Rural	Coverage (C)	68.10	58.39	49.34	29.91	87.56	17.59
		Dissemilarity (D)	3.28	10.98	12.60	7.46	1.70	16.60
		Human Opportunity Index (HOI)	65.87	51.98	43.13	27.68	86.07	14.67
	6. Frontier Governorates	Coverage (C)	71.14	78.38	72.83	17.89	86.23	15.17
		Dissemilarity (D)	7.35	10.31	10.40	12.17	4.36	18.04
		Human Opportunity Index (HOI)	65.91	70.30	65.26	15.71	82.47	12.43

Table 3.3A Human Opportunity Index, by region for Selected Nutrition Variables

		Not stunted	No wasted	Not underweight	Child lives in hh with adequately iodized salt (>.15 ppm iodine)	The mother received iron tablets during pregnancy	Composite variable for having adequate nutrition (not stunted, not underweight & lives in hh with adequate salt iodization)
EGYPT TOTAL	Coverage (C)	81.12	97.48	95.91	25.20	25.06	19.44
	Dissemilarity (D)	3.63	0.20	0.83	22.12	25.08	26.98
	Human Opportunity Index (HOI)	78.17	97.29	95.11	19.63	18.77	14.20
1. Urban Governorates	Coverage (C)	91.43	98.21	97.42	41.62	38.81	36.65
	Dissemilarity (D)	0.89	0.31	0.53	21.14	20.45	21.12
	Human Opportunity Index (HOI)	90.62	97.90	96.91	32.82	30.88	28.91
2. Lower Egypt Urban	Coverage (C)	86.14	96.70	98.05	30.43	33.63	26.39
	Dissemilarity (D)	1.07	0.85	0.54	18.94	15.83	18.10
	Human Opportunity Index (HOI)	85.22	95.88	97.52	24.67	28.31	21.62
3.Lower Egypt Rural	Coverage (C)	82.88	96.95	97.18	14.80	17.05	11.74
	Dissemilarity (D)	1.48	0.38	0.30	14.78	24.62	17.41
	Human Opportunity Index (HOI)	81.65	96.57	96.89	12.61	12.86	9.69
4 Upper Egypt Urban	Coverage (C)	78.05	97.68	94.99	37.02	37.44	27.56
	Dissemilarity (D)	2.50	0.22	0.75	15.95	18.42	19.75
	Human Opportunity Index (HOI)	76.10	97.46	94.28	31.12	30.55	22.12
5. Upper Egypt Rural	Coverage (C)	72.59	97.78	93.12	20.17	18.50	11.98
	Dissemilarity (D)	2.30	0.29	0.80	14.99	18.73	18.86
	Human Opportunity Index (HOI)	70.92	97.49	92.37	17.14	15.03	9.72
6. Frontier Governorates	Coverage (C)	83.12	99.20	97.65	36.87	19.76	30.43
	Dissemilarity (D)	3.31	0.35	0.25	9.98	34.38	10.64
	Human Opportunity Index (HOI)	80.37	98.85	97.41	33.19	12.97	27.20
EGYPT TOTAL	Coverage (C)	75.10	93.44	92.36	76.97	41.49	49.26
	Dissemilarity (D)	1.49	0.59	0.72	6.60	9.99	6.48
	Human Opportunity Index (HOI)	73.98	92.89	91.70	71.89	37.34	46.07
1. Urban Governorates	Coverage (C)	80.21	92.14	93.16	84.97	60.59	54.94
	Dissemilarity (D)	2.06	0.89	0.66	2.49	7.06	3.09
	Human Opportunity Index (HOI)	78.55	91.32	92.55	82.85	56.32	53.25
2. Lower Egypt Urban	Coverage (C)	66.09	94.25	94.57	89.41	33.92	49.72
	Dissemilarity (D)	3.90	0.87	1.22	1.89	9.72	4.93
	Human Opportunity Index (HOI)	63.51	93.42	93.42	87.73	30.62	47.27
3.Lower Egypt Rural	Coverage (C)	71.03	93.88	93.09	78.86	33.78	47.66
	Dissemilarity (D)	2.34	1.06	0.99	3.70	9.66	4.85
	Human Opportunity Index (HOI)	69.37	92.89	92.16	75.94	30.52	45.35
4 Upper Egypt Urban	Coverage (C)	81.56	92.17	90.93	81.23	51.13	59.03
	Dissemilarity (D)	2.75	1.91	1.17	6.49	11.79	8.59
	Human Opportunity Index (HOI)	79.31	90.41	89.87	75.96	45.10	53.96
5. Upper Egypt Rural	Coverage (C)	77.73	93.73	90.86	64.83	38.98	44.84
	Dissemilarity (D)	2.25	0.59	0.91	7.28	10.41	8.54
	Human Opportunity Index (HOI)	75.98	93.18	90.03	60.11	34.92	41.00
6. Frontier Governorates	Coverage (C)	73.85	95.24	94.14	70.76	37.73	36.89
	Dissemilarity (D)	2.35	1.08	1.54	8.25	17.18	9.20
	Human Opportunity Index (HOI)	72.12	94.21	92.69	64.93	31.24	33.50

Table 3.4A Human Opportunity Index, by region for Selected Housing and Access to Basic Services Variables

		HH has access to improved drinking water	HH has nonshared toilet	HH has electricity	Child is reported to have an identity card	Composite variable for having access to basic infrastructure (registered child in hh with improved water source, electricity and nonshared toilet)
EGYPT TOTAL	Coverage (C)	91.52	90.37	97.26	98.46	80.78
	Dissemilarity (D)	3.96	3.69	2.15	0.38	8.63
	Human Opportunity	87.89	87.03	95.16	98.09	73.81
1. Urban Governorates	Coverage (C)	99.40	93.10	99.49	98.33	90.98
	Dissemilarity (D)	0.38	3.03	0.47	0.58	3.98
	Human Opportunity	99.03	90.29	99.02	97.76	87.37
2. Lower Egypt Urban	Coverage (C)	98.29	95.39	95.76	99.20	92.30
	Dissemilarity (D)	1.07	2.02	3.68	0.22	3.53
	Human Opportunity	97.24	93.47	92.24	98.99	89.04
3.Lower Egypt Rural	Coverage (C)	85.49	94.30	98.50	99.00	79.16
	Dissemilarity (D)	4.94	1.62	1.21	0.22	6.76
	Human Opportunity	81.27	92.77	97.30	98.78	73.80
4 Upper Egypt Urban	Coverage (C)	99.47	94.71	98.87	99.40	92.66
	Dissemilarity (D)	0.27	2.75	0.98	0.19	3.57
	Human Opportunity	99.20	92.10	97.90	99.21	89.35
5. Upper Egypt Rural	Coverage (C)	89.20	81.74	94.47	97.44	69.37
	Dissemilarity (D)	3.60	4.98	3.75	0.49	10.50
	Human Opportunity	85.99	77.66	90.93	96.97	62.09
6. Frontier Governorates	Coverage (C)	70.37	86.07	79.06	97.10	64.27
	Dissemilarity (D)	22.79	8.98	18.11	1.49	28.14
	Human Opportunity	54.34	78.34	64.75	95.65	46.19
EGYPT TOTAL	Coverage (C)	97.46	93.74	97.57	98.61	89.85
	Dissemilarity (D)	0.99	2.99	1.17	0.32	4.35
	Human Opportunity	96.49	90.93	96.43	98.29	85.95
1. Urban Governorates	Coverage (C)	99.68	98.11		99.25	97.11
	Dissemilarity (D)	0.06	1.27		0.30	1.65
	Human Opportunity	99.61	96.86		98.95	95.51
2. Lower Egypt Urban	Coverage (C)	99.11	98.43		99.12	97.27
	Dissemilarity (D)	0.46	0.96		0.36	0.78
	Human Opportunity	98.66	97.49		98.76	96.52
3.Lower Egypt Rural	Coverage (C)	98.01	96.08		99.01	93.15
	Dissemilarity (D)	0.73	1.46		0.23	2.14
	Human Opportunity	97.30	94.68		98.78	91.16
4 Upper Egypt Urban	Coverage (C)	97.20	96.30		98.57	94.36
	Dissemilarity (D)	1.95	1.71		0.63	2.34
	Human Opportunity	95.31	94.65		97.94	92.16
5. Upper Egypt Rural	Coverage (C)	94.92	85.83		97.74	78.56
	Dissemilarity (D)	0.88	3.79		0.28	4.36
	Human Opportunity	94.08	82.58		97.47	75.14
6. Frontier Governorates	Coverage (C)	81.23	92.73		96.31	73.57
	Dissemilarity (D)	7.86	2.40		1.56	10.31
	Human Opportunity	74.85	90.51		94.81	65.98

Table 3.5A Human Opportunity Index, by region for Selected Educational Enrolment Variables

		Enrollment rate for ages 614 (inclusive)	Enrollment rate for ages 1517 (inclusive)	Probability of completing sixth grade ontime (among children ages <=13)	Probability of completing 9th grade (preparatory) ontime (among children ages <=16)
EGYPT TOTAL	Coverage (C)	89.86	68.78	68.68	57.34
	Dissemilarity (D)	4.92	11.74	12.21	17.27
	Human Opportunity Index (I	85.43	60.71	60.29	47.44
1. Urban Governorates	Coverage (C)	93.74	77.95	80.62	70.36
	Dissemilarity (D)	3.53	10.44	7.83	13.70
	Human Opportunity Index (I	90.43	69.81	74.31	60.73
2. Lower Egypt Urban	Coverage (C)	94.24	80.96	80.37	69.85
	Dissemilarity (D)	2.94	7.34	10.26	13.05
	Human Opportunity Index (I	91.47	75.02	72.12	60.73
3.Lower Egypt Rural	Coverage (C)	90.72	65.81	64.05	52.06
	Dissemilarity (D)	4.08	10.90	9.08	14.73
	Human Opportunity Index (I	87.02	58.64	58.23	44.39
4 Upper Egypt Urban	Coverage (C)	93.93	73.89	76.62	67.45
	Dissemilarity (D)	3.19	9.70	11.20	15.21
	Human Opportunity Index (I	90.93	66.72	68.04	57.19
5. Upper Egypt Rural	Coverage (C)	82.38	56.64	56.68	42.71
	Dissemilarity (D)	8.15	15.09	17.65	24.95
	Human Opportunity Index (I	75.66	48.09	46.67	32.05
6. Frontier Governorates	Coverage (C)	84.42	61.16	72.34	48.01
	Dissemilarity (D)	10.03	19.93	14.47	33.52
	Human Opportunity Index (I	75.95	48.97	61.87	31.92
EGYPT TOTAL	Coverage (C)	94.50	73.53	84.07	62.83
	Dissemilarity (D)	2.41	10.34	6.32	15.59
	Human Opportunity Index (I	92.22	65.92	78.76	53.04
1. Urban Governorates	Coverage (C)	95.90	80.35	89.84	70.39
	Dissemilarity (D)	1.89	10.32	5.07	14.37
	Human Opportunity Index (I	94.09	72.05	85.28	60.27
2. Lower Egypt Urban	Coverage (C)	97.87	82.76	92.73	78.55
	Dissemilarity (D)	1.02	7.59	3.89	8.88
	Human Opportunity Index (I	96.87	76.48	89.12	71.57
3.Lower Egypt Rural	Coverage (C)	95.64	73.17	83.80	66.71
	Dissemilarity (D)	1.75	9.56	5.22	13.11
	Human Opportunity Index (I	93.97	66.17	79.43	57.97
4 Upper Egypt Urban	Coverage (C)	96.19	82.10	92.25	69.15
	Dissemilarity (D)	2.08	9.10	5.05	20.55
	Human Opportunity Index (I	94.19	74.63	87.59	54.94
5. Upper Egypt Rural	Coverage (C)	90.52	63.28	74.48	46.64
	Dissemilarity (D)	3.24	9.55	6.87	15.29
	Human Opportunity Index (I	87.58	57.23	69.36	39.51
6. Frontier Governorates	Coverage (C)	90.73	68.49	86.85	71.76
	Dissemilarity (D)	5.46	12.23	7.04	16.11
	Human Opportunity Index (I	85.77	60.12	80.73	60.20

Table 3.6A Shapley Decomposition of the Dissimilarity Index by Circumstance Groups (2000 and 2008)

		Health Utilization						Nutrition						Housing and access to basic services					Education enrolment			
		During pregnancy, blood sample was taken from mother	Birth assisted by trained health staff (doctor/midwife/nurse)	Birth given at public or private health facility	Baby postnatal check within 2 months of birth	Child received all immunization (ages in months 1224)	Composite variable for having adequate access to health services (birth by skilled staff, in health facility, with postnatal checkup)	Not stunted	No wasted	Not underweight	Child lives in hh with adequately iodized salt (>.15 ppm iodine)	The mother received iron tablets during pregnancy	Composite variable for having adequate nutrition (not stunted, not underweight & lives in hh with	HH has access to improved drinking water	HH has nonshared toilet	HH has electricity	Child is reported to have an identity card	Composite variable for having access to basic infrastructure (registered child in hh with improved water	Enrollment rate for ages 614 (inclusive)	Enrollment rate for ages 1517 (inclusive)	Probability of completing sixth grade ontime (among children ages <=13)	Probability of completing 9th grade (preparatory) ontime (among children ages <=16)
2000	Region	12.9	15.9	19.3	5.7	9.0	8.9	38.6	7.1	35.1	7.7	7.4	11.5	10.2	13.5	12.3	11.3	11.1	6.6	6.8	6.7	6.9
	Mother's Educational Attainment	26.3	24.1	20.7	28.6	18.3	25.8	11.6	1.8	12.2	23.0	30.7	21.3	15.7	19.9	14.1	15.5	17.4	21.2	21.0	23.0	23.4
	Father's Educational Attainment	15.2	15.5	14.3	21.2	12.3	18.0	8.8	6.6	9.4	18.2	21.3	16.3	12.2	14.3	10.6	14.5	13.6	27.8	27.6	25.5	25.3
	Number of children at home	14.0	12.6	13.5	13.3	13.8	13.1	5.1	11.6	9.6	3.9	7.8	4.4	3.8	6.5	6.0	8.5	4.9	12.4	8.8	8.9	8.5
	Asset quintiles	27.9	30.1	29.7	27.6	20.0	31.2	22.5	14.2	23.9	38.8	29.0	38.6	55.0	34.4	50.4	36.8	46.5	23.6	26.6	28.2	30.0
	Consumption	2.7	1.8	2.3	2.6	21.4	2.6	9.3	0.5	3.9	8.1	2.7	7.2	2.5	11.0	6.3	8.5	6.3	2.7	4.7	7.1	5.5
	Gender of child	1.1	0.1	0.2	1.0	5.1	0.3	4.1	58.2	5.8	0.3	1.2	0.7	0.6	0.2	0.3	5.0	0.3	5.6	4.5	0.6	0.4
		100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
2008	Region	11.7	20.6	21.8	5.0	42.5	11.6	19.7	9.5	18.2	18.1	8.1	7.9	50.9	22.5	8.3	31.9	27.5	7.7	6.2	7.7	7.0
	Mother's Educational Attainment	21.1	21.4	20.2	23.8	5.3	21.1	1.6	5.9	21.1	16.5	18.8	15.6	11.3	14.7	15.0	18.7	14.9	24.2	31.2	28.8	27.9
	Father's Educational Attainment	11.9	11.9	10.0	19.4	6.7	13.9	9.9	1.0	8.6	11.2	18.2	11.1	3.4	9.1	8.6	13.8	8.9	27.0	25.3	25.5	25.7
	Number of children at home	30.7	9.9	10.8	10.9	5.8	10.6	7.8	14.3	5.5	4.7	15.5	3.4	1.2	1.7	8.1	1.6	2.2	10.0	5.4	7.6	5.3
	Asset quintiles	23.5	32.4	33.6	31.1	27.4	36.1	1.3	10.9	18.2	45.2	33.0	51.6	25.5	45.1	38.1	19.3	38.6	23.4	21.9	20.4	20.9
	Consumption	1.1	2.6	2.9	3.2	3.6	3.7	1.1	20.4	4.0	4.0	5.7	4.0	6.8	6.2	21.6	6.2	7.6	6.2	8.7	6.3	7.5
	Gender of child	0.0	1.3	0.8	6.7	8.8	3.0	58.5	38.0	24.3	0.1	0.6	6.5	0.9	0.8	0.3	8.5	0.3	1.5	1.3	3.7	5.6
		100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

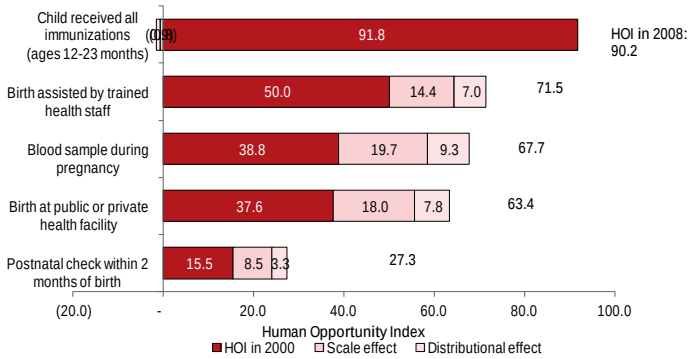
Table 3.7A Percentage of variance in anthropometric measures explained by circumstances (DHS 2008)

		Height-for-age	Weight-for-age	Weight for Height
		Variance of z-scores	**Variance of z-scores**	**Variance of z-scores**
Total variance		3.3883	2.3455	1.6935
Percentage of variance explained by circumstances	**Parametric estimates (all)**	1.6%	2.6%	2.4%
	Urban birth	0.0%	0.0%	0.0%
	Region of birth	1.2%	1.1%	0.6%
	Mother's education	0.0%	0.1%	0.0%
	Father's education	0.1%	0.1%	0.1%
	Number of Siblings	0.2%	0.0%	0.0%
	Asset Quintiles	0.1%	0.4%	0.2%
	Gender of child	0.3%	0.3%	0.8%

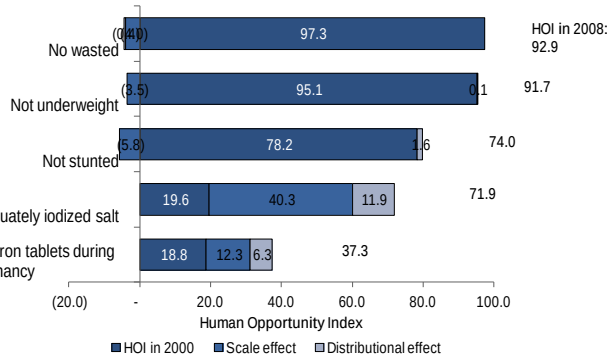
Source: Egypt DHS 2008; Sample: Children in DHS 2008 sample ages 0-4

Figure 3.1A1 Decomposition of Changes in the Human development Index in Egypt by the Scale and Distribution Effect

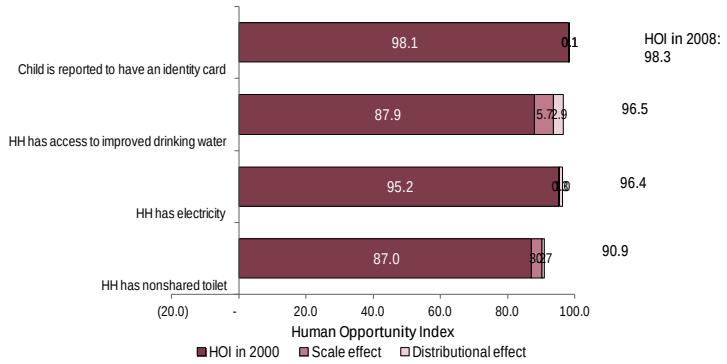
Health Utilization variables



Nutrition variables



Housing and Access to Basic Services



Educational Enrolment Variables

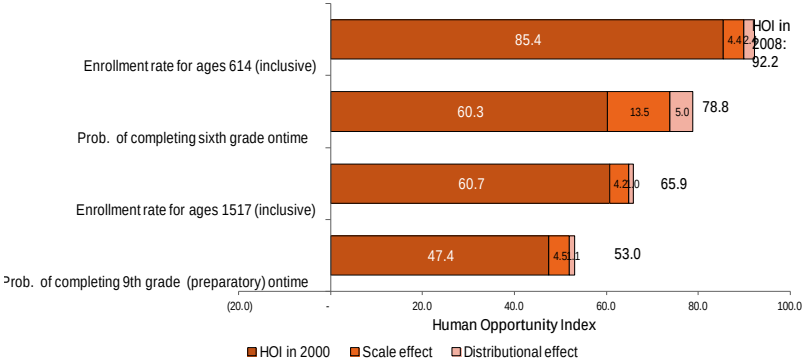
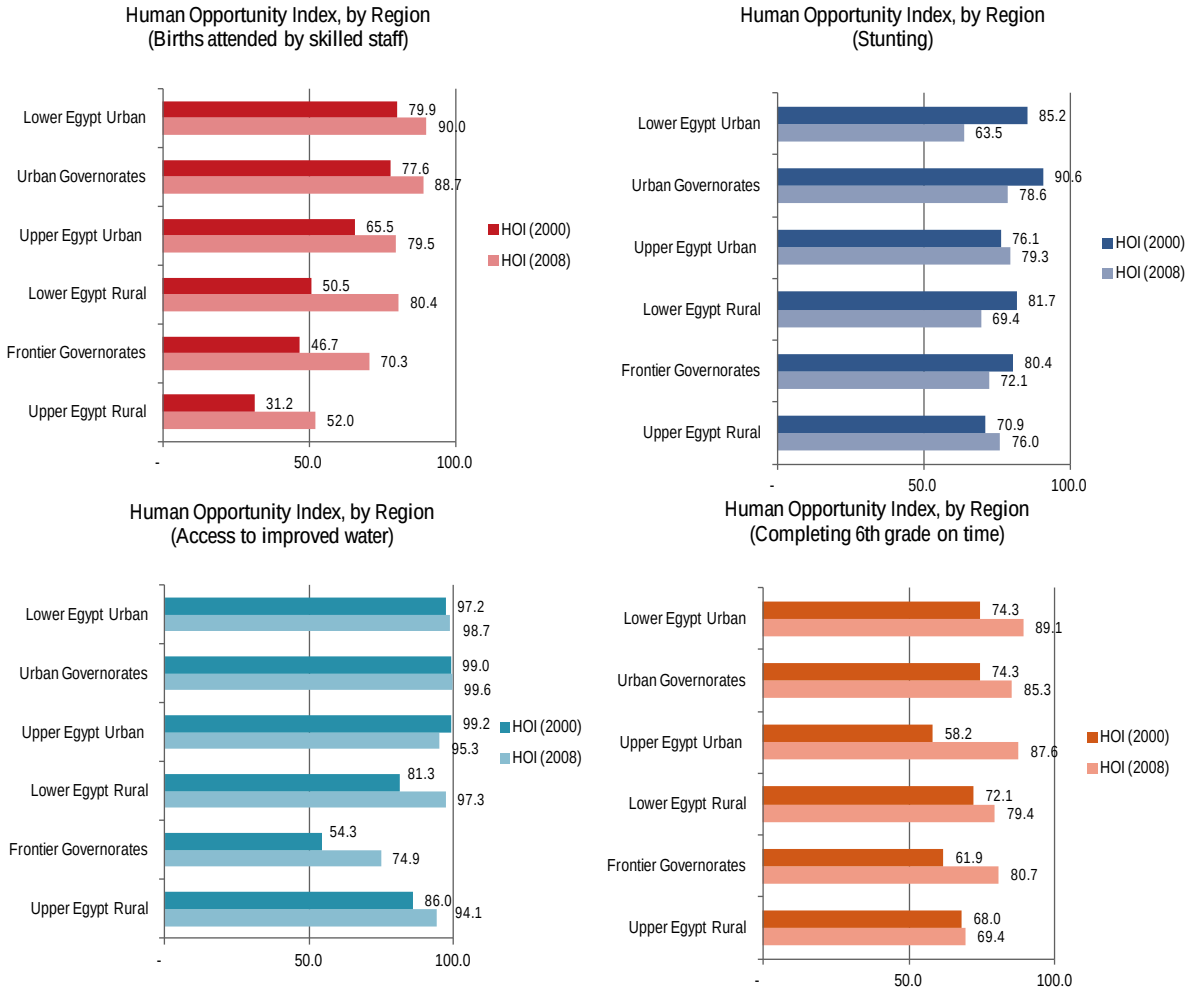


Figure 3.2A Human Opportunity Index by Region on Selected Outcome



Variables

Figure 3.3A Shapley Decomposition of the Dissimilarity Index by Circumstance Groups (2008)