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Equality of Opportunity for Children in Egypt, 2000–2009

Achievements and Challenges

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Abstract

This paper provides relevant indicators and measurements useful for public policies seeking the expansion of equitable human development opportunities for Egyptian children and youth. To measure equitable access to opportunities, the authors use the Human Opportunity Index to examine the evolution of 16 basic opportunity indicators grouped in four sectors: education, basic housing services, early childhood development, and nutrition and hunger. The main findings show that during the last decade most opportunities for children and youth improved unambiguously,for the first two sectors, but were stagnant for nutrition and early childhood development opportunities. Although the urban-rural and interregional gaps were partially reduced, there are still substantial opportunity gaps between children in favorable and unfavorable circumstances. Parents' education, income per capita, urban-rural location, number of siblings, and regional location, are the five most important factors affecting equality of opportunity, although their impact varies across indicators.

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EQUALITY OF OPPORTUNITY FOR CHILDREN IN EGYPT, 2000-2009: ACHIEVEMENTS AND CHALLENGES

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Introduction

Children's access to human development opportunities today will determine to a large extent their country's future development path. Today, income poverty among Egyptian children, the single largest group of the Egyptian population (more than one-third), is higher than for the entire population, and has been increasing during the past decade. Moreover, there is evidence that children living in poverty are more likely to be deprived of the most basic opportunities for human development – namely, health, education, labor skills, basic shelter, and sanitation – and less likely to lead healthy, productive lives and escape poverty when they are adults. As Nobel laureate James Heckman (2008) shows, early childhood interventions that improve health and social, emotional, and cognitive abilities enhance a wide range of outcomes later in adulthood (e.g., school achievement, labor productivity, and health status) and, moreover, reduce crime and prevent teen pregnancy. There is evidence that these kinds of interventions at the start of the life-cycle have the highest rates of return (*vis-à-vis* all other social programs), because they reduce the costs of expensive measures to alleviate problems later in life.[2] Hassine (2009) shows that inequality of opportunity accounts for 30-40 percent of total inequality of earnings. Moreover, a recent study (Rocco et al., 2011) finds that malnutrition in Egypt is one of the main factors behind chronic diseases in adults, and that those diseases cause sizeable reductions in employment, imposing major efficiency losses on the economy. In summary, there are both equity and efficiency reasons that justify the concern about the availability and equity of human development for Egyptian children and youth. This paper measures them for the first time.

The main objective of this paper is to diagnose whether public policies are expanding and allocating opportunities equitably, and identify which demographic and regional circumstances should be considered to improve targeting mechanisms. This paper measures the extent to which circumstances beyond the individual's control feed into inequality of opportunities for the human development of children and youth. *Equality of opportunity* means that a person's chances to succeed in life (access to basic services, education, a quality job, and adequate consumption levels) should be unrelated to predetermined circumstances at birth such as gender, location of birth, and socioeconomic and demographic origin.[3] Comprehensive measurement of the levels and changes in inequality of opportunity in Egypt informs the policy debate in the search for a more equitable society. In addition, acting on reducing inequality of opportunity today might prove effective for reducing future inequality of outcomes in the medium and long term–such as income and employment status.

This paper aims to provide answers to the following questions: How unequal is the distribution of opportunities that are essential goods and services for the development of Egyptian children? To what extent has equality of opportunities advanced during the past decade? By how much have the urban-rural and inter-regional gaps in opportunities improved? Which sectors provide better access to opportunities for children in Egypt, and which sectors make it more challenging for children in adverse circumstances? Which demographic and location circumstances are most correlated with deprivation of basic development opportunities in Egypt?

To measure equitable access to opportunities, we use the Human Opportunity Index (HOI) to examine the evolution of 16 basic opportunity indicators grouped in four sectors: four HOIs linked to education, six to basic housing services, four to early childhood development, and three to nutrition and hunger. These 16 indicators cover human development milestones at the three stages

[2] See Carneiro and Heckman (2003), Schweinhart (2004), Federal Interagency Forum on Child and Family Statistics (2007), Heckman and Masterov (2007), WHO (2007), Heckman (2008), and Kilburn and Karoly (2008).
[3] See Roemer (1998), Barros et al (2008) and Molina et al (2010).

of the life-cycle between birth and 17 years of age: infancy, childhood, and adolescence. The selected indicators take into account two criteria: relevance to wellness and quality of life for children and youth and their responsiveness to public policies.

Section 1 of this paper summarizes the facts about the poverty, inequality, and deprivation of Egyptian children, and describes the most important programs for children's human development in the recent past. Section 2 explains the Human Opportunity Index methodology, the 16 opportunities to be assessed, and the set of individual circumstances selected given the data availability for Egypt. Section 3 presents the trends in the opportunities (national, urban-rural, and regional), and the main opportunity gaps across regions. Section 4 describes the main opportunity gaps across individual circumstances, identifies the most critical circumstances for the inequality of opportunities, and explores whether public expenditures across sectors (trends and targeting) are consistent with the time trends of opportunities and the evolution of regional opportunity gaps. Section 5 summarizes and concludes.

1. Background

1.1 Poverty, Inequality, and Deprivation

Although income poverty has remained widespread in Egypt during the past decade, inequality has remained relatively low. Poverty affects around 40 percent of the Egyptian population. According to the latest available data, the overall poverty rate was 41.2 percent in 2008/09 compared with 42.6 percent in 1999/2000.[4] Of all the poor, those in absolute poverty (living under the lower poverty line) increased from 16.7 percent in 2004/05 to 22 percent in 2008/09. However, Egypt's Gini coefficient for consumption expenditure shows persistent improvement in inequality between 1999/2000 and 2008/09 (down from 36 to around 31). Egypt is thus a moderate-inequality country.

Poor children in Egypt today could be tomorrow's poor parents. Unfortunately, absolute poverty rates for children are higher than those for the entire population, and children living in income poor households steadily increased from 21 percent of total children in 1999/2000 to 23.8 percent in 2008/09 (UNICEF, 2010b). There is evidence that poor households are faced with a vicious cycle of poverty and low levels of social mobility (World Bank, 2007). Both the lower education status of the head of household and the level of poverty limit schooling achievement, leading to an intergenerational vicious cycle of poverty and persistently low schooling. The data show that even if a non-poor head of household was illiterate, the household's members have a greater chance of being educated than if he or she was poor. In contrast, the proportion of those with secondary education in households with heads who have secondary education is lower among poor households than non-poor ones (21 versus 43 percent). For university education, the difference in proportions is even greater (24 versus 72 percent). Thus, income poverty inhibits significant social mobility in Egypt.

Many Egyptian children still face important human development challenges. Around 5 million children are deprived of appropriate housing conditions (including shelter, water and sanitation) and 1.6 million children under age 5 suffer health and food deprivation. This was one main finding of one of the few studies that looked at the deprivation of children in Egypt (UNICEF, 2010a). The study used a modified version of the Bristol definitions of severe deprivation to measure child poverty in seven areas.[5] The prevalence of deprivation of children in Egypt is higher when children live with an uneducated mother, are raised in a household headed by a single parent, or live in a household that has three or more children (UNICEF, 2010a). Finally, the study finds that children

[4] See World Bank (2007) and World Bank (2011).

[5] Although the Bristol definitions of deprivation regarding shelter, information, nutrition, and education were applicable to Egypt, the Bristol definitions of sanitation, water, and health were less applicable and were modified to reflect the conditions for children in Egypt.

living in income poor households are more likely to drop out of school or work, experiencing severe deprivation of education and/or income. Therefore, there is an increasing probability that today's children exposed to deprivation will pass it on to their children in the future. Failure to enhance opportunities for children today will require costly remedies tomorrow.[6]

Although health deprivation has remained almost unchanged, food and information deprivation have deteriorated. Children's risk of suffering health deprivation remained almost the same between 2000 (2.9 percent) and 2008 (2.4 percent), mainly because of the expansion of the national immunization program. Food deprivation deteriorated over time; the prevalence of severe food deprivation drastically increased from 6.3 percent in 2000 to 17 percent in 2008. In addition, the 2008 Egypt Demographic and Health Survey (EDHS) paper shows that 29 percent of children in Egypt age 0-4 years showed evidence of chronic malnutrition or stunting, and 7 percent were acutely malnourished. A comparison of the results with the 2005 EDHS suggests that children's nutritional status deteriorated during the period between the two surveys. For example, the stunting level increased by 26 percent.

1.2 *Major Public Policy Initiatives Linked to Human Development Opportunities*

Multiple public policy programs and policies to enhance the human development of children and youth in Egypt were undertaken during the past decade. Greater attention was given to less privileged segments of the population, including poor children. The initiatives focused on four sectors: social protection, health and nutrition, basic housing services, and education. Nevertheless, in most sectors, public expenditures for human development declined, with the exception of social protection, which expanded substantially. After 2006, the programs devoted nearly all the funds to finance fuel and food subsidies, which are costly and poorly targeted programs.[7]

In recent years, the country has reformed laws regulating responsibilities to care for and protect children. It has introduced several important new social programs to promote the physical, social, educational, and emotional well-being of children, and established the Ministry of State for Family and Population and the local Child Protection Committees to safeguard children's rights and welfare. Unfortunately, many reforms have not yielded the expected outcomes, either because they took the form of scattered pilot projects that have not been scaled up, they lack adequate resources, and/or they have not been appropriately and sustainably implemented.

Social Protection: Although the social safety net in Egypt uses considerable resources, public investments targeted to promote the human development of less advantaged children is limited. The country spends around 8 percent of GDP on subsidies and non-contributory social assistance. The great majority of these expenditures are used to finance energy subsidies (5 to 6 percent), bread subsidies (1.5 percent), and subsidies for basic staples under the ration cards (0.6 percent). There is strong evidence that food subsidies are poorly targeted, and a reform to narrow coverage and reduce subsidy leakage could save up to 73 percent of the cost (World Bank, 2010a).[8] The growth of fuel and food subsidies during the past decade was due to increased international commodity prices and expansion of coverage of food subsidies. The distribution of fuel subsidies is even more regressive: ECES (2010) newsletter figures show that in 2008/09 the richest urban quintile received nearly nine times the amount of subsidies given to the poorest urban quintile. In contrast, cash transfer programs to assist the poor, which if well designed could constitute an important tool to equalize opportunities and improve human capital outcomes for children, represent less than 0.2 percent of

[6] See Heckman (2000).

[7] Public investment spending on the main human development sectors (education and health) declined as a share of GDP (from 0.7 and 0.5 percent in 2000 to 0.3 and 0.2 percent in 2009, respectively). This decline more than offset the increase in private sector investment in these sectors, reducing total investment from 1.0 and 0.7 percent of GDP to 0.8 and 0.6 percent, for education and health, respectively, over the same period.

[8] See World Bank (2010).

GDP. Some are directed to families while others are targeted at children.[9] The coverage of the social solidarity pension, the main cash transfer program, has significantly widened in recent years, from 540,000 households in 2005 to 1.1 million in 2008 and 1.5 million in 2010.[10]

Education: The government issued the National Framework for Education Policies, which it expanded later into the "National Strategic Plan for Pre-University Education Reform in Egypt (2007/08 – 2011/12)." But it did not receive enough resources to be appropriately materialized. In 2008, the "National Authority for Quality Assurance" and the "Accreditation and a Professional Academy for Teachers" were established to improve the performance of schools and teachers. So far, only 1,055 schools of a total of 30,000 have been accredited. There were also some important pilot projects, like the Girls Education Initiative, which was launched in the early 2000s to increase girls' enrollment in primary education in targeted communities, and the Early Childhood Education Enhancement project, which improves readiness for school for 4 to 5-year-old children, particularly those at risk because of poverty and disabilities. Although they have been successful, both projects have been implemented only on a small scale, and need more resources to be scaled up at the national level.

Health and Nutrition: Since the 1990s, there has been a voluntary health insurance scheme for 0 to 5-year-old children for LE5/year, and universal health insurance for children enrolled in schools (the lowest health-risk group). Yet, 0 to 5-year-old children whose parents are not aware of the existence of the voluntary program (probably the poor, especially in remote areas) and dropouts (most likely poor children) are not covered by any health insurance. There are two major programs that address child health. First, the nation-wide Family Health Model (FHM) brings high quality, integrated primary healthcare services under the same roof for the entire family. It started in 2002/2003 and fleshed out in 2006. Second, the nation-wide Integrated Management of Childhood Illnesses promotes accurate identification of childhood illnesses and appropriate combined treatment. Yet, the introduction of fees for some health services under the FHM has resulted in significantly lower utilization rates, leading to the exclusion of some poor families that cannot afford the new fees. The government has indicated its commitment to gradually increase financing of the registration fees for the poor. There are also two important programs that relate to children's nutrition: the national breastfeeding program, which advocates for exclusive breastfeeding for the first six months and continued breastfeeding for up to two years; and the pilot program on prevention and control of micro-nutrient deficiency, which includes a concentrated vitamin A dose at vaccination time, provision of fortified biscuits and snacks for school children, and delivery of iron tablets to children and adolescents in government schools, in addition to a pilot project for iron fortification of local baladi bread that is now being expanded.

Support for the Poorest Villages: To foster social justice, in 2008/09 the government launched a geographically targeted national project for the poorest 1,000 villages. The project, which started with 151 villages, encompasses 11 main programs (i.e., development of formal education infrastructure, literacy classes, development of health and new housing units, provision of potable water and sanitation, electricity and roads, improvement of environmental conditions, as well as social protection schemes, including social fund loans).

[9] The transfers are made on a regular monthly basis, on a temporary basis, or as a one-time transfer.

[10] The minimum and maximum monthly values of the pension increased from LE70 to LE85 and from LE100 to LE120, respectively. In 2008, a monthly school allowance of LE20 was introduced for the children of these families, provided they go to school; the allowance was increased to LE40 in 2009.

2. The Human Opportunity Index

2.1 Definition, Properties, and Computation[11]

Definition of the HOI. Any measure of the rate of coverage of basic social services for human development that is responsive to opportunities must take into account at least two factors: (1) the global coverage or access rate, and (2) the differential between rates of coverage across the different circumstances that characterize population groups. The construction of a rate of coverage that is responsive to equality is equivalent to aggregating rates of coverage under different circumstances into a scalar measure that simultaneously achieves two properties: it increases with the global rate of coverage and it decreases with the differences in coverage between the different groups of circumstances.

The *HOI* is a measure of access to a specific human opportunity based on discounting the rate of global coverage, *C*, with penalization *P* linked to the inequality of coverage across all groups of circumstances:

$$HOI = C - P$$

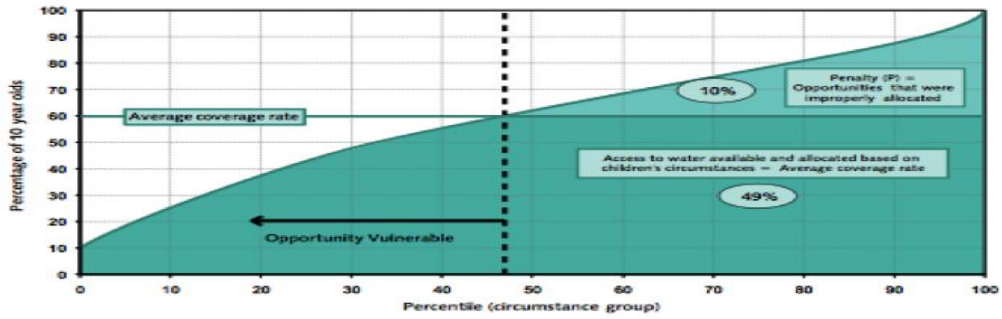
The penalization is equal to the product of the coverage and the inequality of opportunity, and is given by $P = (C * D)$, where *D* is the Dissimilarity Index, which measures the difference between the rates of coverage of an opportunity across different groups of circumstances. This index can be interpreted as the fraction of people to whom a service or good must be re-assigned as a percentage of the total number of people who have access to this good or service. Thus, 1-D would represent the percentage of opportunities available that are assigned according to the equality of opportunity principle:

$$HOI = C - P = C * (1-D) = C * (1-P/C)$$

The penalization is zero if all the rates of coverage across all the groups of circumstances are identical, and the penalization grows positively as the differences in coverage between groups of circumstances grow.

Graphic Explanation of the HOI. For a graphic explanation of the calculation and interpretation of the HOI, we use data on access to water for 10-year-old children in a fictional country. For example, consider the case of equality of opportunities where the rate of total coverage is 59 percent, with the same value for each group of circumstances. This situation of equality of opportunities is represented in Figure 1 by the horizontal line at the 59 percent coverage level. In this case, despite the fact that access does not depend on circumstances and the inequality penalty is zero, the HOI is equal to 59 points.

Figure1. Penalty for Inequality of opportunity in Fictitious Country



Source: Molina et al. (2010)

[11] This section follows the presentation of the methodology of the Human Opportunity Index made by Molinas et al. (2010).

Now consider a second case where 59 percent of children still have access to water and 41 percent do not, but the assignment of opportunities differs between the specific circumstances of the children. Thus, the sloped line in Figure 1 represents the situation of inequality of opportunities, and the "vulnerable groups" are those with rates of coverage *below* the line of equality of opportunities (or average coverage) and to the left of the vertical dotted line. In this case, *P*, the penalty for inequality of opportunity, is positive and is represented by the size of the shaded area over the line of the average rate of coverage and to the right of the vertical dotted line. In other words, the amount of access to water that was assigned unequally is equivalent to 10 percentage points. Therefore, in this case, the HOI is equal to 49 points: the average rate of coverage (59 percent) minus the penalty for the inequality of opportunities (10 percent).

Properties. The HOI has three important properties. First, it is defined as a rate of coverage that is responsive to inequality of opportunity. Thus, its value falls as the inequality of the allocation of a given number of opportunities grows. Second, this indicator is responsive to inequality and is Pareto consistent. If no one loses access and at least someone gains access, then the index will always increase, independently of whether this person belongs to a vulnerable group. Third, when the rate of coverage of all the groups of circumstances increases proportionally, the HOI will increase in the same proportion.[12]

Thus, the HOI will always improve when (1) inequality decreases and total coverage stays the same, or (2) total coverage increases while inequality stays the same. Lastly, given that the HOI is equal to the difference between the rate of coverage and the penalization, it will always be equal to or less than the total rate of coverage. We present the index on a scale of 0 to 100 points.

Computation. Computing the penalization for inequality of opportunities, P, requires the identification of all groups of circumstances with rates of coverage below the average. We refer to these groups as "vulnerable" to human opportunity. For each group vulnerable to opportunity, M_k is the number of people in group *k* with access to the basic good or service, while M^*_k is the number of people who should have access in order to make their rate of coverage equal to the average of the population. $M_k - M^*_k$ is thus the difference in opportunities or the opportunity gap within the vulnerable group *k*. The penalization is the sum of the differences in opportunities of all vulnerable groups (the total difference in opportunities) divided by the total population (N):

$$P = (1/N) \Sigma (M_k - M^*_k), \text{ for all } k = 1, \ldots, v$$

Intuitively, *P* can be interpreted as the percentage of people whose access would have to be re-assigned to people in groups with lower rates of coverage to reach equality of opportunities. If all groups have exactly the same rate of coverage, then the penalization is zero, and no re-assignment would be necessary. As long as the coverage approaches universality for all groups, the re-assignment required will be close to zero.

Decomposition of the Changes in the HOI: Distribution and Coverage Effects. Any improvement in the HOI can be decomposed in two additive steps. The first step would be through proportional increments in the rates of coverage of all the specific groups of circumstances. In this case, inequality of opportunities would remain unchanged and the HOI would increase exclusively due to changes in the average rate of coverage. We call this type of change the *scale or coverage effect.* The second step would be achieved through improvements in the rates of coverage of some groups, exactly compensated by a decrease in the rates of other groups, leaving the total rate of coverage unchanged. In this case, given that the total rate of coverage remains unaltered, the HOI would change only due to the reduction of the inequality of opportunities (and the penalty P). We call this type of change *the distribution effect*. All the changes in the HOI can be expressed as a

[12] It can be shown that in this case both the rate of coverage and the penalization increase by the same percentage, like the HOI.

combination of a scale and a distribution effect.

2.2 *HOI Indicators for Egypt*[13]

This paper measures the living conditions of infants, children, and youth, to provide a richer description than the one given by monetary measures of poverty alone. From this perspective, the HOI is an instrument that allows us to detect situations of inequality and/or exclusion between individuals in the first stages of the life-cycle, specifically associated with circumstances beyond the individual's control. At the same time, the measure of the HOI represents the first step for the recurrent measurement of the living conditions of Egyptian infants, children, and youth and for the evaluation of progress in access or equality of opportunities as a result of public policy programs at the national, regional, and municipal levels.

This study covers 16 opportunity indicators for children, which can be classified into four groups or sectors: education (three), basic housing services (six), early childhood healthcare (four), and nutrition (three) – see Table 1. These 16 indicators cover human development milestones at the three stages of the life cycle between birth and 17 years of age. All 16 opportunities take into account two criteria: relevance to wellness and quality of life for children and youth, and their responsiveness to public policies. These opportunity indicators are measured at the beginning and end of the decade, in 2000 and around 2009. All nine education and basic housing service opportunity indicators are obtained from the 2000 and 2009 Household Income, Expenditure and Consumption Surveys (HIECSs).[14] And all seven early childhood and nutrition opportunity indicators are estimated from the 2000 and 2008 EDHSs .

Education. While one of the three opportunities for education is associated with attendance, the other two are associated with quality or performance. The indicator for attendance is school attendance for children between 9 and 15 years of age. The performance indicators include finishing primary schooling on time, at age 13-15; and finishing secondary general or technical on time, at age 19-20.

Basic Housing Services. Six human opportunity indicators represent adequate access to basic household services for the dwelling: water, sanitation, lighting energy source, cooking energy source, non-overcrowding, and telephone. Criteria for adequate access are: for water, connection to public network; for sanitation, connection to public network; for lighting energy source, electricity; for cooking energy source, use of gas bottles, natural gas, or electricity; and for telephone, access to a fixed or mobile telephone. Access to these services is measured for children between the ages of 0 and 17. The sixth indicator is non-overcrowding and is measured as the opportunity to live in a home that is not overcrowded for children between the ages of 0 and 5.

Early Childhood Development. This group includes four opportunities that are associated with key factors of development and growth during early childhood (under age 5): access to assisted birth delivery (0-5), access to post-natal care (0-5), access to prenatal care (0-4), and access to immunization vaccines (0-4). Access to assisted birth delivery is defined as birth delivery assisted by a healthcare professional. Access to post-natal care 0-5 is defined as access to at least one prenatal checkup by a healthcare professional. Prenatal care for children under 5 is defined as access to at least one prenatal checkup by a healthcare professional. Finally, access to immunization and vaccines is defined as those children who have access to a vaccination card.

[13] This section draws on the definitions of indicators used by Velez et al. (2010) for the case of Colombia.
[14] For 2000, one of the education indicators (school attendance) was not available. Thus, the number of opportunity indicators for 2000 is 16.

Table 1. Human Development Opportunity Indicators for Egypt, 2000 and 2009

Category	*Label*	*Definition*
Education	Complete primary education on time **	Completion of below intermediate education on time (primary schooling)
	Complete secondary education on time **	Completion of intermediate education on time (general or technical secondary schooling).
	School attendance, 9-15 **	Attended school, 9–15
Basic housing services	Water **	Access to clean water without interruption,, 0–17
	Sanitation **	Access to adequate sanitation, 0–17
	Lighting energy source **	Access to adequate lighting energy source, 0–17
	Cooking energy source **	Access to adequate cooking energy source, 0–17
	Non-overcrowding, 0-5 **	Children under 5 in non-over-crowded homes
	Telephone	Access to a telephone, 0–17
Early childhood	Assisted birth delivery*	Access to institutionally assisted birth delivery, 0-4
	Post-natal care, 0-5*	Access to adequate post-natal care, 0-5
	Prenatal care, 0-4*	Access to prenatal care for children under age 4
	Immunization vaccines, 0-4*	Access to complete vaccinations, children under age 4
Nutrition and hunger	Non-wasting, 0-4 *	Adequate nutrition by weight-for-height measures for children under age 4
	Non-stunting, 2-17*	Adequate nutrition by height-for-age measures for children ages 2–17
	Non-underweight, 0-17*	Adequate nutrition by weight-for-age measures for children 0–17

* Available from the EDHS 2000 and 2008 surveys. ** Available from the CAPMAS HIECS 2000 and 2008.

Nutrition and Hunger. This group contains three opportunities based on nutrition: non-wasting for children age 0-4, non-stunting for children age 2-17, and non-underweight for children age 0-17. The nutritional indicators measure correct diet and growth. The first indicator, non-wasting or "weight-for-height," measures the nutrition of children age 0-4. The second, non-stunting, or "size-for-age" indicator captures *chronic deficits* in a child's nutrition and health; it is a *long-term* indicator. The third, non-underweight or "weight-for-age" indicator captures both short and long-term problems and reflects body mass in comparison to age. It is the most widely used indicator for the measurement of this kind of nutrition problem (WHO, 2007).

The specific measure for each child is compared with a distribution of the same variable for a "healthy" sample, following the WHO Child Growth Standards. For each individual indicator, z-scores are computed as the difference between the measure of the individual and the median of the reference population, divided by the standard deviation of the reference population. WHO classifications of malnutrition are applied: mild (z-score $\leq$ -1), moderate (z-score $\leq$ -2), and severe (z-score $\leq$ -3).[15] Access to the opportunity of nutrition is assigned to all children with *z-scores* greater than *-1*.

[15] More specifically, the routines ANTHRO and ZANTHRO are applied with statistical software. See O'Donnell, Doorslaer, Wagstaff and Lindelow (2008) and WHO (2007).

Aggregate HOIs. In addition to the sixteen HOIs for the same number of opportunities, this paper presents three aggregate HOIs, two for children between 0 and 4 years and one for children between 9 and 15 years. The first aggregate HOI for children in the 0-4 range, is built from all seven individual opportunities included in the early childhood development, and the nutrition and hunger groups, which are computed with the DHS surveys. The second aggregate HOI for children between 0 and 4 years, is built from six opportunities in the basic housing services group which are reported in the HIECS surveys. The aggregate HOI for children between 9 and 15 years, is based on five opportunities in the basic housing services group and one education apportunity (school attendance). We assume that a child achieves the aggregate opportunity if he has access *to at least four of them*.[16] [17] The labels for these four aggregate opportunities are respectively IOHa0-4-Nutrition & ECD, IOHa0-4-Housing Services y IOHa9-15-Housing Services.

2.3 Relevant Circumstances: Household Characteristics and Location

The choice of the circumstances vector is limited by the availability of information from different opportunity-measuring data sets – DHS and HIECS household surveys in this case. The circumstances vector includes variables specific to the child, the demographic composition of the household, income/wealth of the household, and variables for location. The following circumstances are included in the exercise:

- Gender of child
- Number of children under age 5 in the household
- Number of children between ages 6 and 17 in the household
- Number of people over age 70 or disabled in the household
- Presence of father and mother in the household
- Education of father and mother (education of the head and his spouse in the HIECS survey)
- Household income per capita (modified to wealth per capita quintile for the DHS survey)
- Location of residence (rural/urban)
- Region of residence (Upper Egypt, Lower Egypt, Metropolitan Egypt, or Frontier Governorates).

3. Evolution of Opportunities for Children in Egypt, 2000-2009: Time Trends and Regional Comparisons of the HOIs

Aggregate HOI Trends

Improvements in Opportunities for Children. As illustrated in Table 2,[18] the overall HOI for children between 9 and 15 years, *IOHa9-15-Housing Services* – the aggregate of all 5 human opportunities in housing and on education – increased from 35 points in 2000 to 72 points in 2009. This means an improvement of 37 points for the whole period, and a quite satisfactory annual rate of progress of 4.1 points per year. Similarly the aggregate HOI for housing for children between 0 and 4 years, *IOHa0-4-Housing Services*, experienced substantial progress from 49 to 83 points during the decade. In contrast, the other aggregate HOI for children in the range 0-4 years of age, *IOHa0-4-Nutrition & ECD*, performed very poorly and stayed at merely 14 points. In brief, the aggregate performance of access to opportunities of basic housing services is quite satisfactory for

[16] Figure A-1 in the appendix shows the number of opportunities (maximum 6 or 7) reached by children in the age groups 0-4 years of age and 9-15 years of age.

[17] An alternative way of building aggregate indices would be to average all 16 HOIs across the whole population. However these "mash-up" indices suffer serious limitation (Ravallion, 2010). A solution to this critique is to build a multidimensional opportunity index for a children cohort with an appropriate threshold (minimum number of opportunities)..

[18] School attendance was not available for 2000.

both cohorts, but access to nutrition and early childhood services for the youngest cohort is clearly unsatisfactory, because access has remained very low and very unequal during the whole decade.[19]

Table 2. Human Opportunity Index for Egypt, 2000 and 2009

Opportunity	*2000*	*Circa 2009*	*Annual rate of change*	*Decomposition **	
				Access	*Equality of opportunity*
Complete primary education on time	84	86	0.4%	51%	49%
Complete secondary education on time	62	63	0.3%	37%	63%
School attendance, 9-15	n.a.	89	---	---	---
Water	77	88	1.3%	67%	33%
Sanitation	26	30	0.5%	64%	36%
Lighting energy source	98	99	0.1%	---	---
Cooking energy source	73	98	2.8%	64%	36%
Non-overcrowding, 0-5	48	59	1.2%	62%	38%
Telephone	14	71	6.3%	78%	22%
Assisted birth delivery	64	84	2.5%	74%	26%
Post-natal care, 0-5	19	28	1.1%	91%	9%
Prenatal care, 0-4	58	78	2.6%	76%	24%
Immunization vaccines, 0-4	87	85	-0.2%	12%	88%
Non-wasting, 0-4	88	75	-1.6%	79%	21%
Non-stunting, 2-17	69	69	0.0%	---	---
Non-underweight, 0-17	80	85	0.6%	60%	40%
Aggregate HOIs					
IOHa9-15-Housing Services	35	72	4.1%	66%	34%
IOHa0-4-Housing Services	49	83	3.8%	64%	36%
IOHa0-4-Nutrition & ECD	14	14	0.0%	--	--

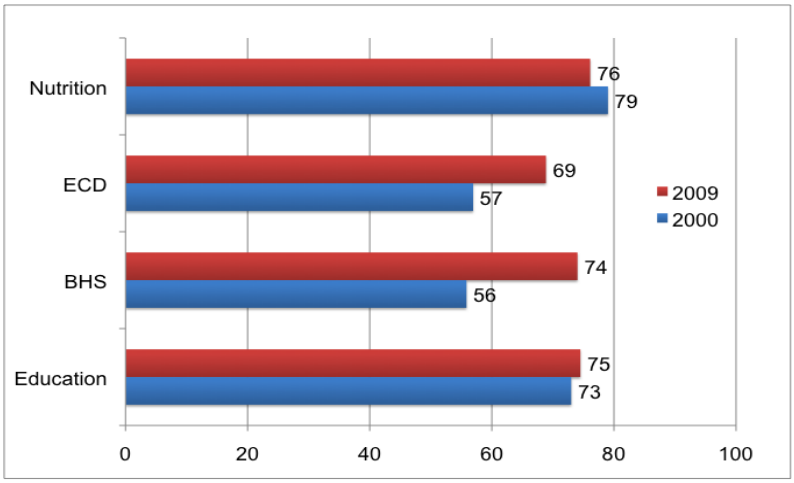
Note: (*) Decomposition is omitted for trivial cases in which the HOI change is negligible.
Source: HIECS 2000 and 2009 surveys, EDHS 2000 and 2008, And authors' calculations.

Uneven Improvement across Sectors. Figure 2 shows that improvements in the opportunity indices of basic housing services (BHS) and early childhood development (ECD) were impressive (18 and 12 points respectively). The rates of improvement of the opportunities in education and nutrition and hunger were modest or suffered a setback (5 points and -3 points, respectively). Table 2 (third column) shows the rates of annual progress for each opportunity separately. The telephone HOI recorded the largest annual rate of improvement at 6.3 points, followed by three opportunities: cooking energy, prenatal care, and assisted birth delivery (with similar annual rates, 2.8-2.5 points). Three opportunities – access to water, non-overcrowding, and post-natal care – showed rates of progress close to the average rate (between 1.1 and 1.3 points). These were followed by five opportunities with *modest* improvements at rates close to half the average rate, namely the two education opportunities for graduation on time, access to sanitation, and nutrition weight-for-age. By contrast, the HOI index for nutrition non-stunting did not show any progress, and two other

[19] In circa 2009 the percentage of children with access to four of six opportunities in ECD and nutrition was just 25% and inequality of access was the highest across all opportunities (see Table A.1).

indices for children between 0 and 4 years deteriorated, namely nutrition non-wasting (-1.6 points per year) and immunization vaccines (-0.2 points per year).[20]

Figure 2. Aggregate HOI by Sector in Egypt, 2000-2009



Source: HIECS 2000 and 2009 surveys, EDHS 2000 and 2008, and authors' calculations.

Progress Driven by Access Rather Than Equality of Opportunity. Table 2, in the last two columns, summarizes the decomposition of the total change in HOI improvements in access and equality of opportunities, and indicates that the improvement in Egypt's HOI for children is mainly due to the *scale effect* (increasing the *access* of all groups while maintaining the degree of equality of opportunities unchanged). For all 11 HOIs that improved more than 0.5% poins per year, at least 60 percent of the improvement is explained by the scale effect.[21] This is particularly pronounced for four indices: in fact the scale effect explains 91 percent for post-natal care index; 78 percent for the telephone index; 76 percent for the prenatal care index; 74 percent for the assisted birth delivery index. During the past decade, the least regressive scale effects were for nutrition non-underweight, with 60 percent, and the remaining basic housing services indices – between 62 percent for non-overcrowding and 67 percent for access to water. For the two cases in which opportunities deteriorated, there is a clear contrast between immunization vaccines, which concentrated the moderate setback among children in adverse circumstances (88 percent distribution effect) and nutrition non-wasting, which concentrated a small proportion of the setback among children in adverse circumstances (21 percent distribution effect). Finally, it should be noted that for the complete secondary education index, equality of opportunity explained 63% of its very modest improvement.[22]

Figure 3 illustrates explicitly how the changes in coverage and equality of distribution of coverage contribute to the improvements in the HOIs for some basic housing services. In 2000, the low (24

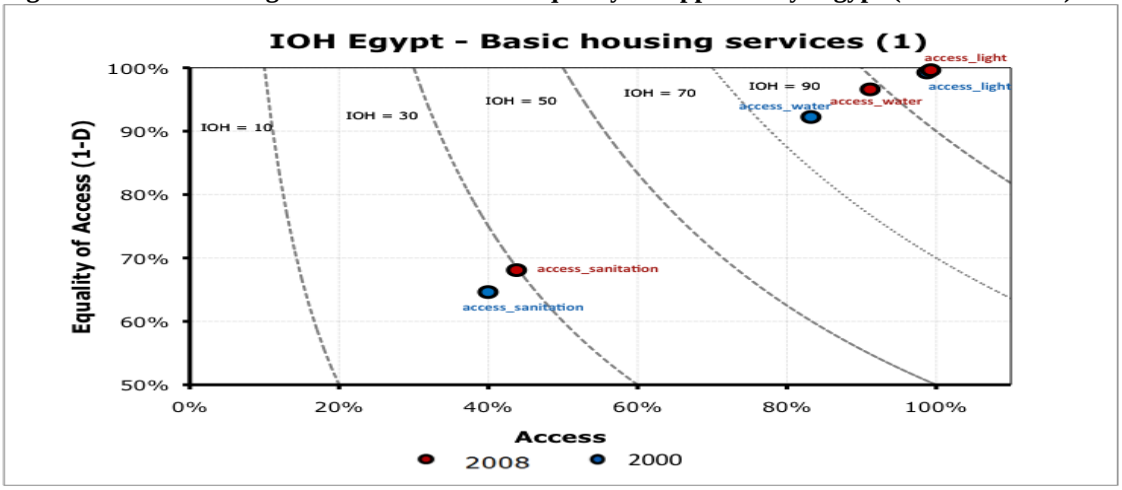
[20] Anthropometric measures for 2008 are based on a new reference population, the "WHO Child Growth Standards reference population," adopted in 2006. However, even when the old reference population was applied, the percentage of stunting of children increased in 2008 compared with the corresponding measures in 2000 and 2005, but with a smaller gap.

[21] For other 7 HOIs their rate of annual progress was too small, negative or zero. And for the school attendance opportunity, there was no HOI available for the year 2000.

[22] A more dissagregated alternative decomposition of the changes in HOIs between 2000 and circa 2009, presented in Table A-3, adds the "composition effect" to isolate any intertemporal changes in the circumstances of the population. This indicates an even weaker effect of equality of opportunity, reinforcing the proposition that the scale effects were the main drives of HOIs improvements for Egyptian children during the last decade.

percent) and unequal coverage (56 percent) of telephones rendered an HOI of 14 points. The considerable jump in coverage (to 78 percent) with simultaneous gains in equality of access (to 91 percent) rendered an HOI of 71 at the end of the decade. In a similar fashion but on a smaller scale, access to an adequate cooking energy source started from a relatively high HOI of 73 points (access 82 percent and equality of access 89 percent) and increased access by 17 percentage points and equality of access by 10 percentage points to become practically a universal opportunity. In the case of non-overcrowding, the initial HOI had a moderate value (48 points) and the increase in access by 8 percentage points and equality of access by 6 percentage points brought the HOI to 59 points in 2009.

Figure 3. Basic Housing Services: Access and Equality of Opportunity. Egypt (2000 and 2008)



Source: HIECS 2000 and 2009 surveys, EDHS 2000 and 2008, and authors' calculations

3.1 Urban-Rural Differences

Better Opportunities in Urban Areas. Tables 3 and 4 present the estimates of all HOIs for urban and rural areas, respectively. The fact that urban areas availed more services to children than rural areas in 2008/09 is registered by an urban-rural gaps of 17, 28 and 4 points in the three aggregate HOIs computed for children in the 9-15 cohort and 0-4 the cohort.[23] Several sizeable gaps are reported for all the HOI indices, except for immunization vaccines, lighting energy source, cooking energy source, all three nutrition opportunities, completion of primary education and school attnedance. On average, basic housing services and early childhood development are the sectors with the largest urban-rural gaps, driven by a 57-point gap in sanitation, and by a 20-point gap in access to a telephone, and to a lesser extent by a 14-point gap in ante-natal care and a 13-point gap in assisted birth delivery. For nearly all opportunities, rural areas offer more restricted access with more inequality of opportunity.

It is worth noting that comparisons with Latin American countries show the achievements of Egypt in access to opportunities in completion of primary education, water and electricity and the large challenges in sanitation and somewhat in school attendance (9-15). However, those challenges are less pronounced when comparisons are made with low-income Latin American countries (Bolivia, Honduras, Nicaragua, and Paraguay).[24]

[23] They are respectively: IOHa9-15-Housing Services, IOHa0-4-Housing Services, and IOHa0-4-Nutrition & ECD.
[24] Finding adequate comparator countries is somewhat challenging, because cross-country HOIs are available for only five basic opportunities and for 20 Latin American countries, which have a higher level of economic development than Egypt.

Table 3. Human Opportunity Index for Egypt, Urban 2000 and 2009					
Opportunity	***2000***	***Circa 2009***	***Annual rate of change***	***Decomposition***	
				Access	***Equality of opportunity***
Complete primary education on time	92	88	-0.6%	84%	16%
Complete secondary education on time	76	69	-0.7%	92%	8%
School attendance, 9-15	---	92	---	---	---
Water	97	96	0.0%	53%	47%
Sanitation	68	74	0.7%	95%	5%
Lighting energy source	100	100	0.0%	62%	38%
Cooking energy source	94	99	0.6%	60%	40%
Non-overcrowding, 0-5	58	64	0.7%	50%	50%
Telephone	38	84	5.1%	79%	21%
Assisted birth delivery	83	93	1.2%	64%	36%
Post-natal care, 0-5	23	33	1.2%	92%	8%
Prenatal care, 0-4	76	87	1.3%	76%	24%
Immunization vaccines, 0-4	84	85	0.1%	---	---
Non-wasting, 0-4	88	74	-1.7%	85%	15%
Non-stunting, 2-17	78	72	-0.8%	---	---
Non-underweight, 0-17	86	88	0.3%	57%	43%
Aggregate HOIs					
IOHa9-15-Housing Services	83	94	1.2%	60%	40%
IOHa0-4-Housing Services	77	92	1.7%	63%	37%
IOHa0-4-Nutrition & ECD	17	16	-0.1%	---	---
Source: HIECS 2000 and 2009 surveys, EDHS 2000 and 2008, and authors' calculations.					

Narrowing the Urban-Rural Opportunity Gap. Between 1999/2000 and 2008/09, the urban-rural opportunity gap contracted for basic housing services and education, but remained unchanged for nutrition opportunities. This was caused not only by much faster improvement in the average HOI in rural areas, but also by the fact that most rural HOIs improved at a faster pace while eleven urban HOIs had little progress or deteriorated.[25] Basically, the average rate of progress of rural HOIs more than doubled the urban annual rate (1.4 versus 0.5 points) and the aggregate rural HOIs for basic housing services for 9-15 and 0-4 year olds increased by 42 and 41 points, while the same urban HOIs increased by 11 and 15 points respectively. Although telephone access was by far the opportunity with the largest improvement in both urban and rural areas, the annual rates of improvement were faster in rural areas (6.3 versus 5.1). Similar comparisons, in terms of annual rates of improvement, apply to opportunities such as prenatal care, assisted birth delivery, cooking energy source, and overcrowding. Three opportunities that remained stagnant in urban areas showed moderate improvement in rural areas, namely, access to water and completion of primary and secondary education (respectively by 14, 7, and 7 points). In only three cases – completion of post-secondary education, sanitation, and immunization vaccines – urban improvement was marginally

[25] Only three of the urban HOI indicators – lighting energy source, water, and cooking energy source – approached universal coverage and had reached 100, 97, and 94 points, respectively by 2000. Three other stagnant urban HOIs were completion of primary education, sanitation and immunization-vaccines. A major cause of concern is the deterioration in the HOIs for nutrition non-wasting and non-stunting by 14 and 6 points, respectivel, and the HOIs for primary and secondary education by 4 and 7 points, respectively.

ahead of rural progress. For the remaining five opportunities, rates of improvement in rural areas were moderate or negative, but always superior to the urban rates.

Table 4. Human Opportunity Index for Egypt, Rural 2000 and 2009

Opportunity	*2000*	*Circa 2009*	*Annual rate of change*	*Decomposition*	
				Access	*Equality of opportunity*
Complete primary education on time	78	85	0.9%	77%	23%
Complete secondary education on time	53	60	0.9%	69%	31%
School attendance, 9-15	---	87	---	---	---
Water	70	85	1.6%	81%	19%
Sanitation	11	17	0.6%	78%	22%
Lighting energy source	97	98	0.1%	62%	38%
Cooking energy source	63	97	3.8%	61%	39%
Non-overcrowding, 0-5	43	55	1.3%	64%	36%
Telephone	8	64	6.3%	70%	31%
Assisted birth delivery	55	79	3.1%	82%	18%
Post-natal care, 0-5	16	24	1.0%	92%	8%
Prenatal care, 0-4	48	73	3.1%	82%	18%
Immunization vaccines, 0-4	89	85	-0.5%	42%	58%
Non-wasting, 0-4	87	75	-1.5%	75%	25%
Non-stunting, 2-17	65	67	0.3%	33%	67%
Non-underweight, 0-17	77	82	0.7%	67%	33%
Aggregate HOIs					
IOHa9-15-Housing Services	36	77	4.6	71%	29%
IOHa0-4-Housing Services	22	64	4.7	82%	18%
IOHa0-4-Nutrition & ECD	12	12	0.0	---	---

Source: HIECS 2000 and 2009 surveys, EDHS 2000 and 2008, and authors' calculations.

3.2 Regional Differences

Better Opportunities for Metropolitan Children Relative to Their Peers in Other Regions. Table 5 presents the HOIs across the four main regions in 2000 and 2009, and at the bottom of the table shows three aggregate HOIs (two for housing services 0-4 and 9-15 years of age, and a third one for nutrition plus early childhood development). The evidence indicates that in 2009 the three overall aggregate HOIs were highest in Metropolitan areas (95, 97 and 18 points, respectively) and lowest in Upper Egypt (64, 74 and 10 points, respectively), with Lower Egypt and Frontier Governorates in between. Moreover, the gaps between the best and worst region have been substantially reduced between 2000 and 2009, particularly in housing services, but much less in nutrition and early childhood development. However, based on the same aggregate HOIs, Lower Egypt offered in 2009 better opportunities than Frontier Governorates for children 0-4 years of age, but not for aggregate opportunities of housing services of children 9-15 years of age (79 points in Frontier Governorates compared to 75 in Upper Egypt). In contrast, a count of the number of opportunities for which each region offered the first best *or* second best opportunities (see Table A-4) shows the lead of the Metropolitan region with 14 HOIs (of 16 HOIs in total), followed by Lower Egypt with 11, Upper Egypt with four, and Frontier Governorates with only three. This would suggest considerable lack of opportunities in the Frontier Governorates, compared to Upper Egypt and Lower Egypt, contradicting the regional ranking based on aggregate HOIs. However, we should follow the interregional ranking based on the more rigorous aggregate HOIs that shows that Frontier Governorates offers better

opportunities than Upper Egypt and even closer to Lower Egypt in some cases.

Table 5. HOIs in Four Egyptian regions, 2000 and 2009

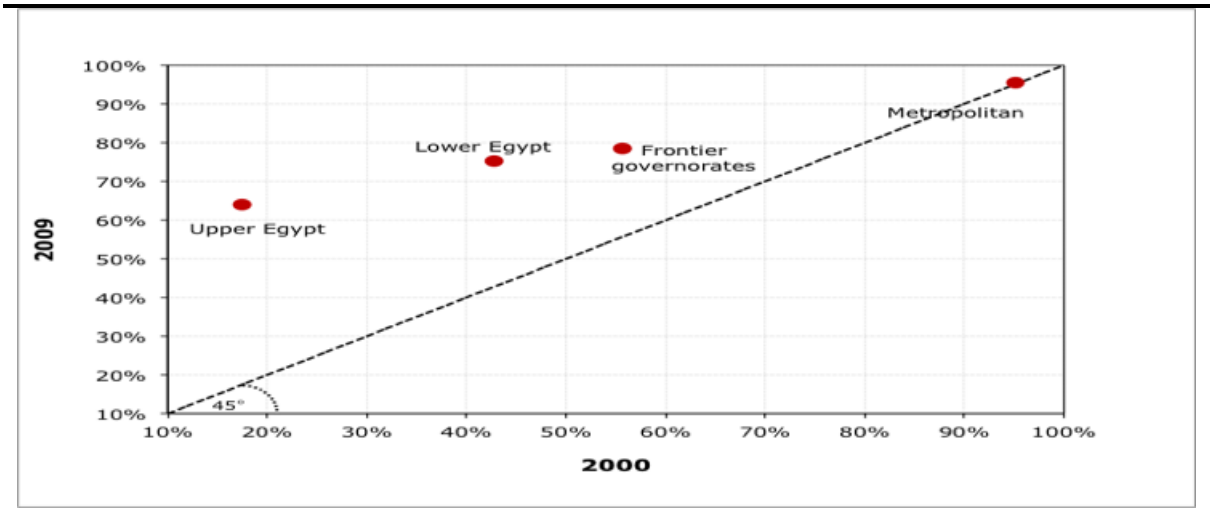
	2000					*2009*				
Opportunity	***Metropolitan***	***Lower Egypt***	***Upper Egypt***	***Frontier Governorates***	***Inter-regional opportunity gap (max) ****	***Metropolitan***	***Lower Egypt***	***Upper Egypt***	***Frontier Governorates***	***Inter-regional opportunity gap (max) ****
Complete primary education	93	87	76	92	*17*	85	89	82	87	*7*
Complete secondary education	76	64	53	69	*23*	67	67	58	67	*9*
School attendance, 9-15	---	---	---	---	*0*	90	92	86	82	*10*
Water	98	80	69	94	*29*	97	87	88	83	*14*
Sanitation	97	35	7	30	*90*	88	33	16	36	*72*
Lighting energy source	100	99	96	92	*8*	99	100	99	86	*14*
Cooking energy source	98	89	53	93	*45*	99	99	97	93	*7*
Non-overcrowding, 0-5	57	57	38	58	*20*	64	72	45	64	*27*
Telephone	44	12	9	41	*35*	88	73	63	88	*25*
Assisted birth delivery	87	66	53	52	*35*	93	88	75	63	*30*
Post-natal care, 0-5	25	17	18	10	*15*	40	24	30	11	*29*
Prenatal care, 0-4	79	57	51	36	*43*	90	77	74	64	*26*
Immunization vaccines, 0-4	81	89	86	73	*16*	85	85	81	80	*5*
Non-wasting, 0-4	85	89	86	76	*13*	67	79	72	71	*12*
Non-stunting, 2-17	78	70	64	51	*27*	74	64	74	53	*21*
Non-underweight, 0-17	86	81	76	68	*18*	89	87	80	72	*17*
Aggregate HOIs by group										
IOHa9-15-Housing Services	95	43	17	56	78	95	75	64	79	32
IOHa0-4-Housing Services	94	64	28	65	66	97	88	74	86	23
IOHa0-4-Nutrition & ECD	19	17	9	11	10	18	16	10	10	8

Notes: (*) The gap is computed as the difference between the maximum and the minimum HOI for each opportunity.
Source: HIECS 2000 and 2009 surveys, EDHS 2000 and 2008, and authors' calculations.

Improvements across Regions Benefit Upper Egypt in Housing Services, but Not in Nutrition. Figures 4 and 5 show aggregate HOIs for housing services (9-15) and nutrition & ECD (0-4), by region in 2000 and 2009. The fact that all points in Figure 4 are above the 45 degree line indicates that all four regions had better aggregate HOIs in 2009 than in 2000. Nevertheless, regions that made larger progress were those further from the 45-degree line, the Upper and Lower Egypt regions. Although for those two regions the aggregate HOIs advanced at a much faster pace (45 and 32 points, respectively), Frontier Governorates made moderate progress by 23 points, and the Metropolitan regions remained unchanged.[26] In contrast, the regional dynamic of aggregate opportunities in nutrition & ECD 0-4 (Figure 5) show the stagnation of opportunities for early childhood across all regions, except Upper Egypt that only "advanced" by one point. Thus, expanding opportunities for early childhood remain a crucial challenge across all Egyptian regions.

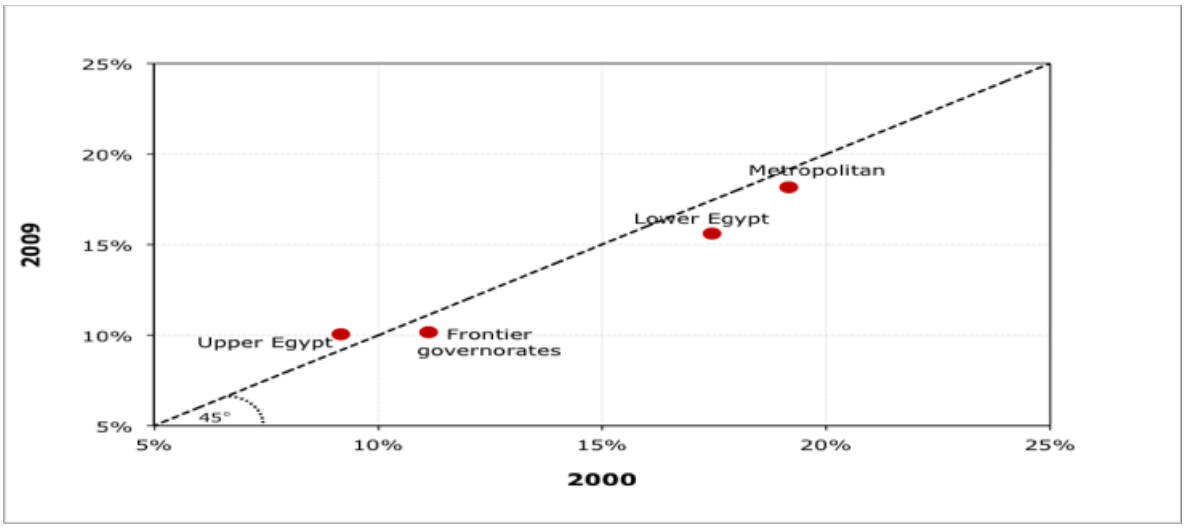
[26] The pattern of progress across regions was nearly identical for the aggregate HOI of Housing Services for children 0-4 years of age.

Figure 4. HOI by Region –Aggregate HOI 9-15-Housing Services. Egypt, 2000 and 2009



Source: HIECS 2000 and 2009 surveys, EDHS 2000 and 2008, and authors' calculations.

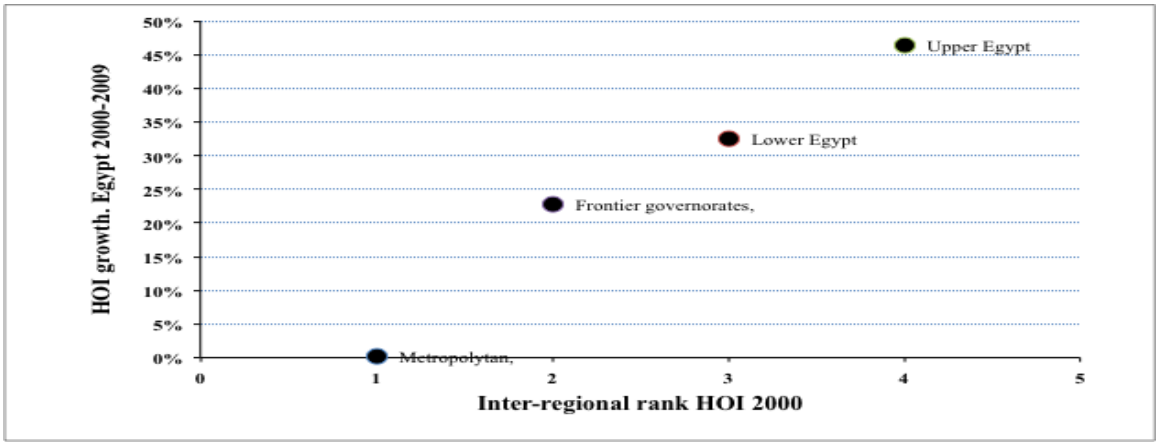
Figure 5. HOI by Region –Aggregate HOI 0-4-Nutrition & ECD. Egypt, 2000 and 2009



Source: HIECS 2000 and 2009 surveys, EDHS 2000 and 2008, and authors' calculations.

Aggregate Inter-regional Convergence Is Narrowing the Gap Relative to the Metropolitan Region. Figure 6 shows how the growth of opportunities in housing services (9-15 year old children) for each region was inversely related to the ranking of each region at the beginning of the period. The largest gain in the aggregate HOI (45 points) occurred in Upper Egypt, which ranked last in 2000, and was followed by the gain in the Lower Egypt region (32 points), the gain in the Frontier Governates region (23 points), and the gain in the Metropolitan region (1 points), which ranked first in 2000. As a result, the inter-regional gaps relative to the Metropolitan region became smaller (Figure 5). For example, the gap relative to Upper Egypt was reduced from 76 points in 2000 to 32 points in 2009. A similar pattern of inter-regional convergence is found for the aggregate HOI in housing services (0-4 year old children) and the aggregate HOI in nutrition and ECD (0-4 year old children).

Figure 6. Interregional Convergence? Inter-regional Rank vs. HOI Growth, Egypt, 2000 and 2009



Source: HIECS 2000 and 2009 surveys, EDHS 2000 and 2008, and authors' calculations

This interregional convergence is the result of significant changes favoring specific opportunities in the Lower and Upper Egypt regions vis-à-vis the Metropolitan region. Namely gains in education and basic housing services (BHS) opportunities in Lower Egypt, and very small gains in nutrition and hunger and basic housing services opportunities in Upper Egypt. In order to assess the evolution specific opportunities across regions, we examine the changes in inter-regional ranking over the period, that is, the number of sectors in which each region was in first or second place (using Table A-4 in the Appendix). In 2000, the Metropolitan region ranked first in 12 of the 16 HOIs, while the Lower Egypt region ranked first in only two HOIs – immunization and nutrition weight-for-height – and ranked second in the other six HOIs. However, by 2009, Lower Egypt increased its count of first places to eight HOIs of 16, plus three HOIs with second ranking, while the Metropolitan region was relatively stable in first place for 9 of the 16 HOIs, and in second place for five HOIs., The most important gains for Lower Egypt were in telephone, assisted birth delivery, ante natal care, adequate cooking energy source and non-overcrowding. Upper Egypt also advanced mostly in five opportunities: telephone, cooking energy source, assisted birth delivery, ante natal care, and no-overcrowding. By contrast, Frontier Governorates lost ground with only one first (assisted birth delivery) and one second ranking in 2009, after having one first and 5 seconds in 2000.

Although inter-regional convergence held for most opportunities, for four HOIs the inter-regional gap became larger. In fact, between 2000 and around 2009, the inter-regional gap increased by 14 points for post-natal care, by six points for non-overcrowding, and by six points for lighting energy source. Finally, the eight largest inter-regional opportunity gaps in 2009 fell predominantly in the basic housing services and early childhood development sectors. In BHS, these were sanitation (72 points), non-overcrowding (27 points), and telephone (25 points). In ECD, the three opportunities were assisted birth delivery (30 points), post-natal care (29 points), and prenatal care (26 points). In nutrition the largest gaps were in nutrition were non-stunting (21 points), and non-underweight (17 points).

4. The Main Circumstances behind Inequality of Opportunities for Children

This section examines two aspects of the role of demographic and location circumstances in the inequality of opportunities of Egyptian children. The first part examines the magnitude of the opportunity gaps between children in favorable and unfavorable circumstances, and how those gaps have evolved. The second part explores the most critical circumstances for the inequality of opportunities and whether some patterns of circumstances more unequalizing for opportunities in education, and whether they differ with the most unequalizing profiles of circumstances for

opportunities in basic housing services, early childhood development, or nutrition and hunger opportunities. Finally, the last part examines the extent to which the evolution of opportunity indices (national and regional) is consistent with the trends in public expenditure by sector and its distribution across regions.

4.1 Opportunity Gaps for Children in the Most Unfavorable Circumstances

The first step to assess the link between circumstances and the inequality of opportunities is to examine the access gaps between children in *favorable* circumstances (90th percentile of circumstances, P90 hereafter) and children in moderately *unfavorable* circumstances (percentile 30 of circumstances, P30 hereafter). We address three questions. How large are the opportunity gaps and how did they evolve during the decade? Which sectors present the largest opportunity gaps for children in the most unfavorable circumstances? Which sectors have managed to improve access to opportunities by reducing the opportunity gaps for children in unfavorable circumstances? The opportunity gaps for all 16 opportunities are summarized in Table 6 and Figure 7.

Table 6. Opportunity Gaps between Percentiles P90/P30, Egypt, 2009 and 2000

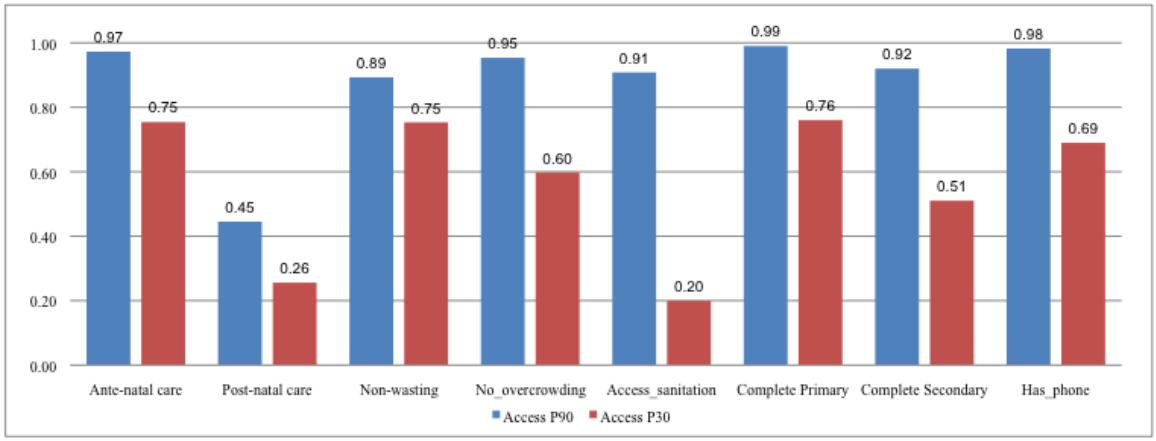
Opportunity	*Access probability*						
	2009			*2000*			*Change in gap*
	p90	*p30*	*gap*	*p90*	*p30*	*gap*	
Complete primary education on time	0.99	0.76	0.23	0.97	0.80	0.18	0.05
Complete secondary education on time	0.92	0.51	0.41	0.86	0.55	0.31	0.10
School attendance, 9-15	1.00	0.88	0.11	---	---	---	---
Water	0.99	0.87	0.12	1.00	0.77	0.23	-0.11
Sanitation	0.91	0.20	0.71	0.98	0.25	0.73	-0.02
Lighting energy source	1.00	0.99	0.01	1.00	0.99	0.01	0.00
Cooking energy source	1.00	0.99	0.01	1.00	0.85	0.15	-0.14
Non-overcrowding, 0-5	0.95	0.60	0.36	0.96	0.47	0.49	-0.13
Telephone	0.98	0.69	0.29	0.87	0.10	0.77	-0.48
Assisted birth delivery	0.98	0.84	0.14	0.97	0.61	0.36	-0.23
Post-natal care, 0-5	0.45	0.26	0.19	0.35	0.17	0.19	0.00
Prenatal care, 0-4	0.97	0.75	0.22	0.91	0.51	0.39	-0.17
Immunization vaccines, 0-4	0.98	0.84	0.14	0.94	0.87	0.07	0.06
Non-wasting, 0-4	0.89	0.75	0.14	0.93	0.87	0.06	0.08
Non-stunting, 2-17	0.81	0.68	0.13	0.88	0.70	0.18	-0.05
Non-underweight, 0-17	0.94	0.86	0.08	0.94	0.84	0.10	-0.02
Aggregate HOIs							
IOHa9-15-Housing Services	0.98	0.66	0.32	0.97	0.24	0.73	-0.41
IOHa0-4-Housing Services	0.99	0.81	0.18	0.99	0.4	0.59	-0.41
IOHa0-4-Nutrition & ECD	0.54	0.04	0.50	0.44	0.08	0.36	0.14

Source: HIECS 2000 and 2009 surveys, EDHS 2000 and 2008, and authors' calculations.

Substantial Opportunity Gaps between Children in Favorable and Unfavorable. Opportunity gaps between children in favorable and unfavorable circumstances in the year 2009 are considerable if we consider that the for largest opportunity gaps range between 29 and 71 percent. The opportunity gaps shown in Table 6 indicate that in 2009 the eight main obstacles faced by Egyptian children in unfavorable circumstances (P30) that were not obstacles for children in favorable circumstances (P90) are distributed accross all sectors: education, BHS, ECD and nutrition and hunger. The eight largest opportunity gaps in order of magnitude were: sanitation (71 percent), completion of secondary education (41 percent), non-overcrowding (36 percent), access to a telephone (29 percent), completion of primary education (23 percent), access to prenatal care (22 percent), and post-natal care (19 percent) and Non-wasting 0-4.

A decade earlier, children in unfavorable circumstances faced somewhat similar challenges. Comparison of the 2009 results with those of 2000 shows that the eight largest opportunity gaps corresponded to nearly the same set of opportunities one decade later. Five of the eight largest gaps corresponded to the same opportunities in 2000 and 2009. In fact, the eight largest opportunity gaps ranged from 77 percent to 19 percentage points, and complete primary and non-wasting entered this set of opportunities in 2009, as water and assisted birth delivery fell below the 8th place in 2009. Nevertheless, in 2000 the three largest opportunity gaps were concentrated in the BHS sector: telephone (77 percent), sanitation (73 percent), and non-overcrowding (49 percent).

Figure 7. Opportunity Gaps between Percentiles P90andP30, Egypt, 2009



Source: HIECS 2000 and 2009 surveys, EDHS 2000 and 2008, and authors' calculations.

Figure 7 explicitly illustrates the eight largest opportunity gaps, showing by how much the probabilities of access to opportunities for children in favorable circumstances exceeded those for children in the most unfavorable ones. The five largest opportunity gaps faced by the youngest children are in ante-natal care (22 percent), post-natal care (19 percent), non-wasting (14 percent), non-overcrowding (36 percent) and sanitation (71 percent), ollowed by substantial opportunity gaps during their childhood and adolescence in education opportunities (26 percent for primary education, 41 percent for completion of secondary education).[27] Evidently the doors to opportunities for basic human development close much faster for children in unfavorable circumstances.[28]

Children in extremely unfavorable circumstances must deal with similar challenges. The obstacles faced by Egyptian children in the worst circumstances (percentile 10, *P10* hereafter) are somewhat larger but in the same sectors as for children in *moderately adverse* circumstances (P30). The rankings (see Table A-6) are mostly consistent, except that priorities are a bit higher for basic housing services (sanitation and overcrowding rank first and second), while all education opportunities remain second.

Main Achievements for Children in Unfavorable Circumstances. The main achievements for children in unfavorable circumstances were reductions in six opportunity gaps by more than 10 percentage points (see Table 6). The reduction of the opportunity gap of immunization was due to the combined effect of improved access to P90 and moderate reduction in access for P30, while for

[27] Moreover those gaps became larger for completion of primary and secondary education between 2000 and 2009 (Table 6).

[28] This situation is confirmed by the large opportunity gaps in the year 2009 for the aggregate HOIs of infants (IOHa0-4-Housing Services, 18% and IOHa0-4-Nutrition & ECD, 50 percent) and children (IOHa9-15-Housing Services, 32 percent), shown in Table 6. Furthermore, during the last decade the opportunity gap for IOHa0-4-Nutrition & ECD increased by 14 percentage points

nutrition access deteriorated for both percentiles, although significantly for children in P30 circumstances, by 12 percentage points. A note of concern must be raised for four cases in which the opportunity gaps are larger in 2009 than in 2000: namely, complete primary and secondary education, non-stunting, and immunization vaccines.

In summary, the most important challenges facing Egyptian children in unfavorable circumstances are lack of access to four basic human opportunities with gaps exceeding 36 percent points: sanitation, completion of secondary education, non-overcrowding and access to telephone. Four other opportunities that represent a smaller but considerable challenge are completion of primary education, access to prenatal care and post-natal care, and non-wasting. These challenges remained basically the same during the decade.

4.2 Inequality of Opportunities by Circumstance

In order to identify the most influential circumstances on the inequality of opportunities, we compute the *matrix of inequality of opportunities by circumstances* (IOC). The matrix has 16 rows corresponding to the number of opportunities and eight columns corresponding to the number of circumstances – namely, gender, number of siblings, presence of parents, presence of elderly family members, parents' education, income per capita, urban-rural location, and regional location. The intuition is that each element of the IOC matrix, *IOC(i, j),* corresponding to the ith opportunity and the jth circumstance *j*, represents the inequality penalty *P* on the HOI(i) associated with the inequality of opportunity linked to the jth circumstance.[29] The larger is the penalty, the larger is the inequality of the *ith* opportunity associated with the *jth* circumstance. In order to isolate the effect of the variability of circumstance *j* on the inequality of access to opportunity *i*, the probability of access to opportunity *i* must be computed for each child using a *modified vector of circumstances* for each individual, which eliminates the variability of circumstances, *except for the variability of circumstance j*. This "equalized" vector of circumstances is identical for all individuals, *except* for circumstance *j*, which preserves the original value corresponding to each individual.[30] Once the probabilities of access to the *i-th* opportunity have been computed using the equalized vector of circumstances (except the *j-th*), the "equalized" dissimilarity index *D*(i,j)* is computed. Then each cell in the IOC matrix, IOC(i, j), is computed as the product of the "equalized" dissimilarity index *D*(i,j)* and the average access or coverage of opportunity *i* in the sample data.[31] Consequently, the element *IOC(i, j)* can be interpreted as the penalty *P* on the HOI(i) due to the inequality of opportunities associated with circumstance *j*. These computations represent the profile of inequality of opportunities by circumstance and are presented in Tables A-7-a and A-7-b in the Appendix. A summary of the main features of the profile of inequality of opportunities by circumstance is presented in Tables 7 and 8. Moreover, Table A-7-e in the Appendix presents the results of an alternative method to compute the *IOC matrix*, the *Shapley* decomposition of inequality of opportunities.[32] This methodology measures the change in inequality of opportunity by *adding* one circumstance and takes into account its correlation with all other circumstances.

Aggregate Analysis. The first notable feature of the IOC matrix is that the profile of the penalty of inequality of opportunities by circumstance showed an increasing trend in 60 percent of the cases. The figures in the top panel of Table 7 indicate that the mean, median, and all quartiles increased between 2000 and around 2009. Nevertheless, a more detailed analysis shows that the increasing trend in inequality of opportunity by circumstance applied

[29] The penalty concept was introduced in Section 3.

[30] All other circumstances in the "equalized" vector take their respective mean value for the reference population of that opportunity. Hence the probability of access *i* under the "equalized" vector indicates for one individual by how much that probability deviates from the average probability due to the specific value of circumstance *j* for that individual.

[31] Section 3 introduced the average coverage concept, which corresponds to variable *C(i).*

[32] Developed by Hoyos and Narayan (2011), following the application of the Shapley decomposition concept by Shrorrocks (1999)

to the majority of the cells in the matrix, but not all of them. In fact, 60 percent of the cells in the IOC matrix in 2009 exceeded their corresponding value in 2000, but 38 percent of the cells were *below* their value compared with 2000.[33] In summary, this is not an unambiguous pattern of increasing or decreasing inequality of opportunities by circumstance.[34] The five most influential circumstances for inequality of opportunity are parents' education, income per capita, urban-rural location, number of children in the household, and regional location. The second panel of Table 7 reports for each circumstance the mean of the inequality penalties across all opportunities, in other words, the mean of the column in the IOC matrix for the corresponding circumstance, in the initial and final periods.[35] Circumstances are listed in decreasing order of magnitude. The five most influential circumstances are at least twice as important as gender, presence of the elderly, and the presence of both parents in the household. Moreover, those circumstances correspond to the set of most influential circumstances in 2000, except that income per capita, which was the first most influential circumstance at the beginning of the decade, was replaced by parents' education at the end of the period.

Table 7. Analysis of the IOC Matrix: Inequality of Opportunity by Circumstance, 2000 and 2009

Distribution of {δs}	*2000*	***2009***
Mean	1.2	1.7
1st Quartile	0.1	0.2
Median	0.5	0.9
3rd Quartile	1.3	2.2
Circumstance	*Mean of {IOCs} by circumstance**	
Parents Eduaction	1.9	2.5
Income per capita	2.2	2.3
Urban-rural location	1.6	2.2
Number of children	1.9	2.1
Regional location	1.4	2.0
Circumstance	*Frequency of high value {IOCs} by circumstance* **	
Income per capita	7	8
Number of children	7	5
Regional location	4	6
Parents Eduaction	7	5
Gender	1	2
Presence of elderly	0	2
Presence of parents	0	2
Urban-rural location	5	2

(*) list only the five most unequalizing circumstances based on the mean of the column corresponding to each circumstance in the IOC matrix (see Tables A.7a and A.7b in the appendix). (**) reports the count of cells in the column corresponding to each circumstance of the IOC matrix with values in the top quartile of the distribution, that is the number of cells indicating inequality of opportunities by circumstance. Source: HIECS 2000 and 2009 and DHS 2000 and 2008. Author's calculations.

Comparing means indicates broad trends but carries the risk of missing significant effects of certain circumstances on specific opportunities or the spread of the influence of each circumstance across the set of opportunities. To detect those cases and complement the previous analysis, the third panel

[33] See Tables A.5-1-a, A.5-1-b, and A.5-1-c in the Appendix.

[34] This result differs partially from the findings of Hassine (2009), which find a trend of decreasing inequality of opportunities as a share of total inequality of earnings, when comparing cohorts 40-49, 30-39, and 20-29. See Hassine (2009), Table 4, Model 3. This paper uses different inequality measures (Dissimilarity Index versus Gini, Atkinson, or Theil) and a different metric (access to opportunities versus earnings).

[35] See Tables A.7-a and A.7-b in the Appendix.

of Table 7 indicates for each opportunity the number of times that the cells in its column in the IOC matrix score above the third quartile of the cells in the IOC matrix.[36] That is, the number of times that each circumstance was highly influential in the inequality of access to any opportunity. By this criterion, in 2009 there were *four* most influential circumstances on inequality of opportunity that scored in the top quartile at least four times (in the set of 16 opportunities), namely income per capita, number of children in the household, regional location, and urban-rural location. By the same criterion, in 2000 the set of circumstances with the most spread influence across opportunities was nearly identical, except that urban-rural location was a highly influential circumstance one decade earlier (with a count of 5 in 2000 *versus* a count of 2 in 2009) and regional location was somewhat less influential (with a count of 4 in 2000 *versus* a count of 6 in 2009).

These results are mostly consistent with the conclusion that identified the most influential circumstances under the largest mean value criterion; nevertheless, the latter criterion provides a more nuanced perspective of the profile of inequality of opportunity by circumstance. For instance, the urban-rural location circumstance concentrated its influence in just two opportunities in 2009 – completion of secondary education on time and sanitation. And three other circumstances concentrated their influence on the inequality of access for the same two opportunities in 2009, namely gender, presence of elderly, and presence of parents.

A more detailed picture of which opportunities are subject to the highest unequalizing effects of the most influential circumstances is shown in Table A.7-c. There are two rows without blanks corresponding to completion of secondary education on time and sanitation, which means that all circumstances are highly influential on those two opportunities. The influence of urban-rural and regional location on sanitation is particularly relevant.[37] Non-overcrowding is highly influenced by four circumstances: number of children, income per capita, parents' education, and regional location. Two other educational opportunities – completion of primary and secondary– are highly influenced by parents' education, number of children, income per capita and regional location. Completion of secondary education on tine is also very influenced by all other circumstances. There are four columns with fewer blanks, indicating that three circumstances – income per-capita, regional location, parents' education and number of children – are highly influential across numerous opportunities. Income per capita is highly influential for the two opportunities of completion of education grades on time, for three basic housing service opportunities (non-overcrowding, sanitation, and telephone) and three early childhood development opportunities (assisted birth delivery, post-natal care, and prenatal care). Regional location is highly influential for two educational opportunity (completion of secondary and primary education), two basic housing service opportunities (sanitation and non-overcrowding), and post-natal care and nutrition non-stunting. Parent's education is highly influential on all three educational opportunities, sanitation and non-evercrowding. Finally, number of children is highly influential on the two opportunities for completion of education on time, two basic housing opportunities (sanitation and non-overcrowding), and completed immunization vaccines. In summary, there is no single circumstance that is the most unequalizing across all opportunities. Nevertheless, this could possibly be the case within each sector, or if we compared the joint influence of demographic circumstances with the joint influence of all location circumstances.

For nearly all opportunities, demographic circumstances are more unequalizing than location circumstances. The last two columns of Table A.7-a summarize the unequalizing effects on each opportunity of all the demographic circumstances compared with the unequalizing effects of location circumstances. The results indicate unambiguously that for nearly all opportunities (15 of 16) demographic circumstances are the most unequalizing. Moreover, on average the inequality penalty of all demographic circumstances (jointly) on the HOIs is nearly three times the inequality

[36] See Tables A.7-a and A.7-b in the Appendix.
[37] These rank as the first and second largest HOI penalties among all cells in the IOC matrix.

penalty of all location circumstances (jointly) on the same HOIs, and in four cases this ratio is four-fold or larger. The only two exceptions to the joint dominance of demographic circumstances occur for sanitation and non-underweight. This is particularly important for sanitation, for which the ratio of the inequality penalty of location circumstances is 2.6 times the penalty associated with demographic circumstances. The fact that the *joint* unequalizing effect of demographic circumstances is significantly larger than the average of the unequalizing effects of demographic circumstances considered *one by one* suggests that there is some degree of (perverse) complementarity between unfavorable circumstances. That is to say, a household with two or three unfavorable circumstances would be subject to disproportionate penalties in its access to basic human development opportunities, well beyond the *linear* proxies given by the IOC matrix.[38]

The Importance of Specific Circumstances across Sectors. In order to understand whether certain circumstances are more unequalizing within some sector than in others, the same methodology used in the previous sub-section can be applied to analyze the IOC matrix *by sector*. Table 8 reports, for 2000 and around 2009, the average inequality penalties for the HOIs *within each sector*, and for each circumstance. Each row lists one of the four sectors and each column corresponds to one of the eight circumstances. In each row the cells corresponding to the three most unequalizing circumstances are highlighted, and additional cells are highlighted if they exceed the mean inequality penalty of the period.[39]

Table 8. Analysis of the IOC Matrix: Inequality of Opportunity by Circumstance -IOC- within Sectors, Egypt, 2009 *

Sector of opportunities \ circumstances	*Gender*	*Number of children*	*Presence of elderly*	*Presence of parents*	*Parents Education*	*Income per capita*	*Urban-rural location*	*Regional location*	*Mean*
	2009								
Education HOIs	***1.5***	***3.2***	***1.6***	***1.5***	***5.5***	***2.7***	***1.7***	***2.0***	***2.5***
Basic housing services HOIs	0.9	***2.1***	0.9	0.9	***2.1***	***2.7***	***4.6***	***2.7***	2.1
Early childhood development HOIs	0.3	***1.4***	0.2	0.0	0.8	***2.9***	0.3	***1.5***	0.9
Nutrition HOIs	0.7	***1.6***	0.1	0.1	0.9	***1.4***	0.6	***1.5***	0.9
	2000								
Education HOIs	0.5	***1.6***	0.1	0.0	***2.2***	0.5	0.7	0.5	0.8
Basic housing services HOIs	0.0	***2.6***	0.3	0.0	***2.6***	***2.5***	***3.3***	***2.3***	1.7
Early childhood development HOIs	0.3	***1.1***	0.1	0.4	***1.4***	***3.2***	0.9	***1.2***	1.1
Nutrition HOIs	0.5	***1.9***	0.3	0.2	***0.9***	***1.9***	0.1	0.6	0.8

Note: * Each cell reports the mean of {IOCs} by sector for each circumstance. See Tables A.7 a, b, c and d in the Appendix. *Source*: HIECS 2000 and 2009 surveys, EDHS 2000 and 2008, and authors' calculations.

Education. The first row in Table 8 shows the marginal effects of circumstances on education opportunities in 2009. The figures presented in the education row indicate that in this sector *all eight* circumstances are significantly unequalizing, with *parents' education* being the most important (nearly twice the inequality penalty of other circumstances), followed by *number of children* in the household and income per capita. These results suggest that, for education opportunities in 2009, all differences in circumstances matter for inequality of opportunities. It must be noted that this pattern differs from the situation in 2000, when only *two* circumstances were significantly influential – parents' education and number of children – and the inequality of

[38] The Shapley decomposition presented below captures the correlation across circumstances and the results indicate that the number of most influential circumstances is smaller.
[39] Reference values for the mean inequality penalty are 1.8 in 2009 and 1.2 in 2000.

opportunity in education was three times smaller.[40]

Basic housing services. The second row in Table 8 shows the marginal effects of circumstances on basic housing service opportunities in 2009. The results indicate that there are *five* significantly unequalizing circumstances. Urban-rural location circumstance presents the highest inequality penalty with 4.6 points (presumably due to economies of agglomeration), followed by income per capita and regional location with an inequality penalty of 2.7 points, and number of children and parents' education with a penalty of 2.1 points. Compared with the situation a decade ago, both the level of inequality of opportunity in basic housing service opportunities and the profile of inequality of opportunity by circumstances have remained basically unchanged.

Early childhood development and nutrition. The third and fourth rows in Table 8 show the marginal effects of circumstances on early childhood development and nutrition opportunities in 2009. The results indicate that these two sets of HOIs have similar profiles of inequality of opportunity by circumstance. They both have similar levels of average inequality of opportunity by circumstance (the average penalty is 0.9), which is fortunately much lower than the penalties for education and basic housing services, considering the fact that the former are fundamental and critical opportunities in the earliest stages of human development. The *three* most unequalizing circumstances are number of children, region, and income per capita. Although they are of similar importance in the case of nutrition and hunger opportunities, in the case of early childhood development opportunities income per capita is twice as important as the other two. Compared with the situation one decade earlier, the assessments of both sectors differ. For early childhood development opportunities, both the level and the profile of inequality penalties by circumstance were similar. But for nutrition and hunger opportunities, despite the similar level of the average inequality penalty, the regional location circumstance did not play a significant unequalizing role, as it did around 2009.

Shapley decomposition of inequality of opportunity: consistent results. The results of the Shapley decomposition of inequality of opportunity by circumstances presented in table A-7-e are quite consistent with the results of the basic methodology of "equalization" of circumstances –presented above-. From the perspective of aggregate analysis the five most influential circumstances on inequality of opportunity are exactly the same and nearly in the same order of importance: parents' education, income per capita, number of children in the household, urban-rural location, and regional location.[41] Nevertheless, the application of the Shapley decomposition to the analysis across sectors shows some interesting differences: for the education sector there are only three most influential circumstances, parents' education, income percapita and number of children, while the other five circumstances are nearly irrelevant. For the basic housing services sector, the set of five most influential circumstances remains unchanged. For the Early Childhood Development sector, two of the three circumstances remain most influential (income percapita and the number of children) and two other circumstances *become* most influential (parents'education and urban-rural location). Finally for the nutrition sector, two circumstances (urban-rural location and gender) are added to the set of most unequalizing circumstances (number of children, income percapita and regional location. Finally, the results of Shapley decomposition accross every opportunity indicate that there are *four* circumstances that have a more predominant influence, parents'

[40] The average of the inequality penalties across the whole education row in the IOC matrix was 2.9 in 2009 and 0.8 in 2000.

[41] Although the influence is more concentrated in the first four circumstances. This ranking results from the application of two criteria: comparing the average penalty for each circumstance across all 16 opportunities and comparing the number of highly influenced opportunities for each circumstance (see Table A-7-e).

education, income percapita, number of children and urban-rural location.[42]

Summing Up. The arguments presented here show that the largest challenges for Egyptian children in unfavorable circumstances are concentrated in improving access to *eight* opportunities. In addition, there is a clearly identified set of *five* most influential circumstances on aggregate inequality of opportunities. Nevertheless, the circumstances of children subject to deprivation in one sector might not be the same in another. For instance, although the profile of circumstances subject to deprivation of nutrition and ECD opportunities is characterized by three circumstances, the profile of deprivation of opportunities of education is more complex and involves five additional circumstances. And this profile differs from the profile of BHS opportunities, in which regional and location variables play a dominant role.

These differences in profiles of inequality of opportunity by circumstance across sectors provide obvious rationales for differential incentives and targeting across sectors. In other words, in order to reduce the eight largest opportunity gaps for Egyptian children, targeting and incentive measures to compensate for unfavorable circumstances should be revised with differentiated and sector-specific approaches. For example, a conditional cash transfer nutrition grant could be put in place that is proportional to the number of children and targeted to the poor by proxy mean test correlated with lower income and parents' education. This would apply to all ECD and nutrition opportunities and would be conditional on regular visits to monitor the children's development. In the case of BHS opportunities, the key seems to be regional targeting. Finally, it seems that conditional cash transfers would work for education opportunities because they compensate for some (not all) of the unfavorable circumstances, but would require complementary interventions to compensate for all the other unfavorable circumstances.

4.3 Targeting and Resource Allocation across Regions and Opportunities

To what extent do explicit or implicit targeting practices and rules for resource allocation across regions and sectors reinforce or counterbalance the adverse circumstances that prevent access to basic opportunities for Egyptian children? Are opportunity trends consistent with trends in resource allocation in education, health, water, and electricity, and by region? In relation to the first question, the available evidence indicates that there is room to improve the targeting of food and fuel subsidies to influence positively the HOIs of nutrition and cooking energy source.[43] For the second question, judging from the available evidence, the allocation of public expenditure across sectors and regions *alone* is not consistent with the trends in most HOIs, except in two sectors. There seem to be other powerful determinants that influence the efficacy of public expenditure and are crucial in explaining the evolution of opportunities.[44]

Given the sector priorities in the sixth five-year plan – water and sanitation, transportation, agriculture and irrigation, education, and health – public investment in those sectors would have been expected to rise. However, only the share of water in public investment increased significantly (from around 3 to 8 percent) over the decade, and to a much lesser extent the share of real estate and housing (from 0.2 to 0.5 percent). By contrast, the share of education and health services in total public investment declined from 10 and 4.5 percent, respectively, to around 3 percent in FY10, and the share of communication from around 5 to 2.5 percent. For those sectors and over the same period, the same trend applies to government investment items. At the same time, social protection expenditure increased from 1.6 percent in 2002 to 9 percent of GDP at the end of the decade, and

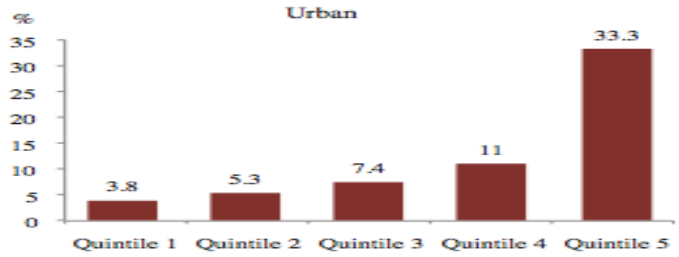
[42] While the Shapley decomposition method indicates that those two circumstances account for 19 of the 32 highly influence cells of the IOC matrix, the "equalization method" assings just 13 of the 32 highly influential cells to those two circumstances.

[43] Given the considerable magnitude of the resources devoted to services, there might be an opportunity to save public resources in these sectors. See World Bank (2010) for estimates of the savings under alternative scenarios for reform.

[44] Explaining the trends in opportunities would require complex sector-specific modeling with much richer information and data to explain the behavior of all agents involved.

most of those resources were devoted to fuel and food subsidies.[45] By 2009, total fuel subsidies reached 6 percent of GDP and food subsidies were 2 percent of GDP.[46]

Figure 8. Distribution of petroleum subsidies across urban income groups



Source: ECES (2010) *Policy Viewpoint* 25: 2-4

Targeting across Regions or Income Groups. Unfortunately, fuel and food subsidies are not only a substantial fiscal burden, but inequitably distributed as well. In fact, fuel subsidies vary significantly across energy products (from 20 to 93 percent) and are much lower for the fuels broadly demanded by low-income households. As a result, "the poorest twenty percent of urban population benefits from only 3.8 percent of total subsidies, while the richest [urban] twenty percent receives one-third of total subsidies" (see Figure 8).[47] Food subsidies are also poorly targeted, but less severely. Due to the wide coverage of ration cards (69 million beneficiaries), four in five households buy subsidized "baladi" bread and the three middle-income quintiles receive the highest shares of bread subsidies. Moreover, the wheat subsidy creates huge incentives for leakage into the black market because fully subsidized flour can be sold for ten times the price.[48] In summary, there is ample room to improve the current allocation of public social spending in the case of fuel and food subsidies to target better to the needy and prevent the irreversible consequences of nutritional deficiencies suffered by underprivileged children.

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Opportunity Trends, Resources, and Allocation Across Regions. Although the evidence is inconclusive, available figures suggest that investment is allocated with some degree of inequity across regions. In principle, the allocation of investment to different governorates is supposed to be determined according to a funding formula that includes various indicators: population size, poverty rate, and human development indicators.[49] Prior to 2008, the share in the total population was the main criterion for allocating public investment, with some privileges provided in some years to Upper Egyptian governorates. Nevertheless, in FY09 Metropolitan and Frontier Governorates received much more than the expected shares according to their shares in population or poverty (see Table 9).[50] Investment in education and health benefited the Metropolitan and Frontier Governorate regions, as it allocated much larger resources per-capita and per-poor. Other sources indicate that

[45] See Martinez-Vasquez and Timofeev (2011), p. 404.
[46] See Albers and Peters (2011), Box 3, p. 17. "Other" social protection expenses accounted for 1 percent of GDP in 2009.
[47] ECES (2010, p. 2–4).
[48] Ibidem, p. 7.
[49] This is in the context of the Decentralization Project supported by the Ministry of Local Development and funded by USAID; the formula can also be applied at the district level.
[50] This bias increased between FY03 and FY09.

for education and health, Lower and Upper Egypt spend less than the national average per capita, but Frontier Governorates spend at least twice the national average.[51] It is notable that although the Upper Egypt region had 50 percent of the population in FY09, it received only 18.2 percent of the health expenditure, 19.5 percent of water expenditure, and 29.4 percent of education expenditure. This was in contrast to its more proportionate share for the electricity sector (48.4 percent).

Table 9: Shares of Regions in Government Investment in Selected Sectors, 2009 (percent)

	Population	*Poverty*	*Total public investment*	*Total government investment*	*Electricity*	*Water*	*Educational Services*	*Health Services*	*Information*
Metropolitans	17	4.6	33.6	30	6.4	16.9	30.4	32.1	0.7
Lower Egypt	31.1	16.2	30.3	30.6	20	53.9	35.6	32.4	7.4
Upper Egypt	50.3	78.5	25.6	32	29.7	20.9	30.2	30.9	91.1
Border	1.5	0.7	10.4	7.4	43.9	8.4	3.9	4.6	0.7
Share in total public investment					10.1	12.9	6.7	2.7	0.5

Source: Poverty and population shares from the Household Income, Expenditure and Consumption Survey of 2008/09, and investment data from the MOED.

Furthermore, Table 10 shows that the allocation of teachers by region over the decade decreased the student-to-teacher ratio in the primary cycle in Metropolitan governorates and (more significantly) in Frontier governorates, while it increased the ratio in Upper Egypt and to a lesser extent in Lower Egypt. This was associated with an increase in class density across all regions, but more significantly in Lower Egypt.

Table 10. Inputs to the education sector by region, 2000 and 2008

	Pupils/teacher ratio						*Class Density*					
	Primary			*Preparatory*			*Primary*			*Preparatory*		
	2000	*2008*	*%Change*	*2000*	*2008*	*%Change*	*2000*	*2008*	*%Change*	*2000*	*2008*	*%Change*
Metropolitans	21.0	18.2	-13.3	18.0	7.4	-58.9	42.0	47.1	12.1	44.0	38.0	-13.6
Lower Egypt	21.0	21.2	1.0	23.0	15.6	-32.2	39.0	51.4	31.8	43.0	38.4	-10.7
Upper Egypt	26.0	28.0	7.7	26.0	17.8	-31.5	42.0	43.5	3.6	44.0	41.8	-5.0
Frontiers	12.0	6.7	-44.2	12.0	4.9	-59.2	25.0	26.0	4.0	29.0	25.3	-12.8
All Egypt	22.0	22.0	0.0	22.0	13.4	-39.1	40.0	42.5	6.3	43.0	39.3	-8.6

Source: World Bank (2010).

In summary, the trends in allocation of resources across sectors and regions are insufficient to provide a satisfactory explanation of the evolution of HOIs during the decade. This should not be surprising if we anticipate that, in addition to the obvious impact of resources available by sector and region, there must be significant variability in the efficacy of public expenditures (across sectors and regions) that influence access and inequality of access at the national and regional

[51] See Martinez-Vasquez and Timoneef (2011, p. 404).

levels.[52] For instance, the decreasing share of public investment in education is consistent with the modest progress of education HOIs during the decade. However, the distribution of resources across regions (Tables 9 and 10) favoring the Metropolitan and Frontier Governorate regions cannot explain the substantial progress of education HOIs in Upper and Lower Egypt. The early childhood development HOIs (except immunization vaccines) advanced substantially during the period, while the share of public expenditure in health showed a decreasing trend. Moreover, the distribution of health resources across regions (Table 9) favoring the Metropolitan and Frontier Governorates is contradictory to the substantial progress of ECD HOIs in Lower and Upper Egypt. Finally, some nutrition HOI indicators deteriorated or showed no progress, while food subsidies increased substantially during the period. Only in the case of the HOI for water and cooking energy source was substantial progress observed for this opportunity consistent with the increasing trend in fuel subsidies. Yet, access to water improved substantially in Upper Egypt, while the allocation of resources mostly favored Lower Egypt and Frontier Governorates.

5. Summary and Conclusions

This paper provides relevant indicators and measurements useful for public policies seeking the expansion of equitable human development opportunities for children and youth by answering five questions: How unequal is the distribution of opportunities for access to essential goods and services for the development of Egyptian children? To what extent has equality of opportunities advanced during the past decade? By how much have the urban-rural and inter-regional gaps in opportunities improved? Which sectors provide better access to opportunities for Egyptian children, and which sectors make it more challenging for children in adverse circumstances? Which demographic and location circumstances of children are most correlated with deprivation of basic development opportunities in Egypt?

There are eight main findings of this study:

- Most opportunities for children and youth improved unambiguously during the past decade. Improved opportunities advanced thanks to a combination of better access and more equality of opportunity, but access played the dominant role.
- Improvements in human opportunities for children were uneven across sectors. Although improvement in the opportunity indices of basic housing services and early childhood development were impressive, opportunities in education and nutrition and hunger had modest improvements or worsened.
- Despite the progress made, there are substantial opportunity gaps between children in favorable and unfavorable circumstances. The four largest opportunity gaps range from 23 to 71 percentage points. In order of importance, they are access to sanitation, completion of secondary education on time, non-overcrowded housing, and access to telephone.
- Although urban centers offer better opportunities for Egyptian children, the urban-rural gap was partially reduced during the decade. In 2009, there were significant urban-rural opportunity gaps for all HOI indices and they were particularly large for basic housing services and early childhood development HOIs (except immunization vaccines, lighting and cooking energy sources).
- In the Metropolitan region, children enjoy better opportunities than in other regions of the country; nevertheless, the inter-regional gap was narrowed during the decade. The Upper

[52] A more comprehensive analytical framework – different from the HOI methodology – including both supply and demand determinants of access to opportunities seems necessary to identify the key factors (beyond public expenditure) behind the observed trends in the HOI.

Egypt region experienced the largest gains and jumped one place in the inter-regional ranking, and Lower Egypt reached levels of opportunity in education and nutrition more comparable to the Metropolitan region.

- The five most unequalizing circumstances are parents' education, income per capita, urban-rural location, number of siblings, and regional location. These are at least twice as important as gender, presence of elderly family members, and presence of both parents in the household.
- The most unequalizing set of circumstances differs across sectors; therefore, policy makers should adjust targeting mechanisms accordingly.
- For nearly all opportunities (14 of 16), demographic circumstances considered jointly lead to greater inequality than location circumstances.

Four policy recommendations follow from these findings:

- The fact that the most unequal set of circumstances varies across sectors must be disseminated and discussed with government officials as a key reference to revise targeting designs *within each sector,* in order to remove the barriers to access for children in the most unfavorable circumstances and improve equality of opportunity. Special attention should be paid to children with more than two or three unfavorable circumstances because the cumulative effects multiply the barriers to access.
- An agenda for reforming expensive and inequitable subsidies for food and fuel is clearly justified in order to promote equality of opportunity among Egyptian children. The relatively poor performance of the HOI nutrition indicators (non-stunting, 2-17, and non-wasting, 0-4), and the poor targeting of food subsidies are good reasons to reform those programs.
- Moreover, the substantial resources that could be saved in the fuel and food subsidy programs might be devoted to conditional cash transfer nutrition programs, which would compensate for the most unfavorable circumstances (income per capita and number of siblings) that have been found to prevent access to nutrition opportunities.
- Finally, to increase awareness of inequality of opportunities among stakeholders and policy makers, the computation of opportunity indicators should be updated and disaggregated. HOIs available by sub-region and municipality -using census data– would provide relevant information to sub-national governments to implement more equitable policies for human development.

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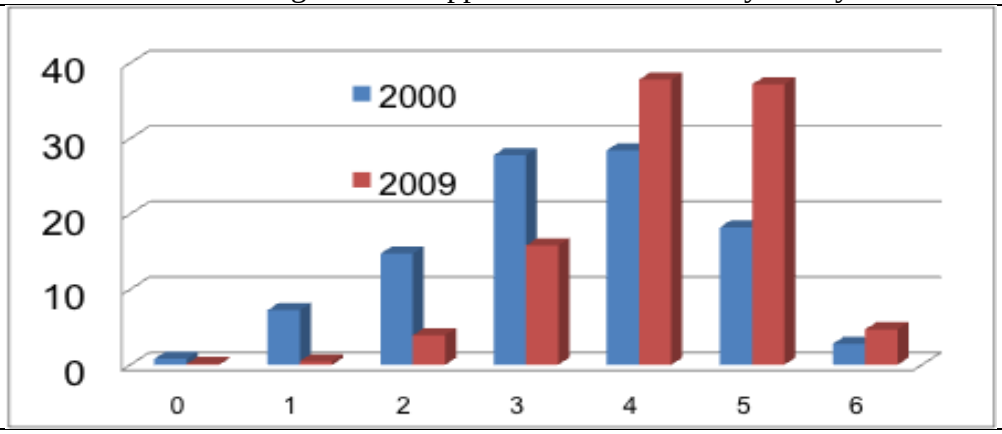
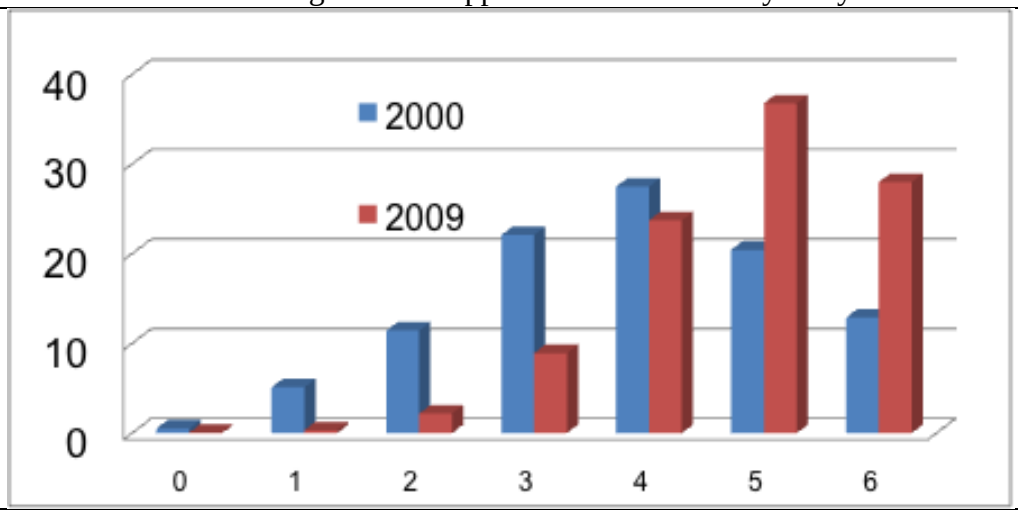
Statistical Appendix

Figure A.1:Aggregate HOIs: Histograms children and access to number of opportunities 2009

Number of Housing Services opportunities accessed by 9-15 year olds



Number of Housing Services opportunities accessed by 0-4 year olds



Number of Nutrition and ECD opportunities accessed by 0-4 year olds

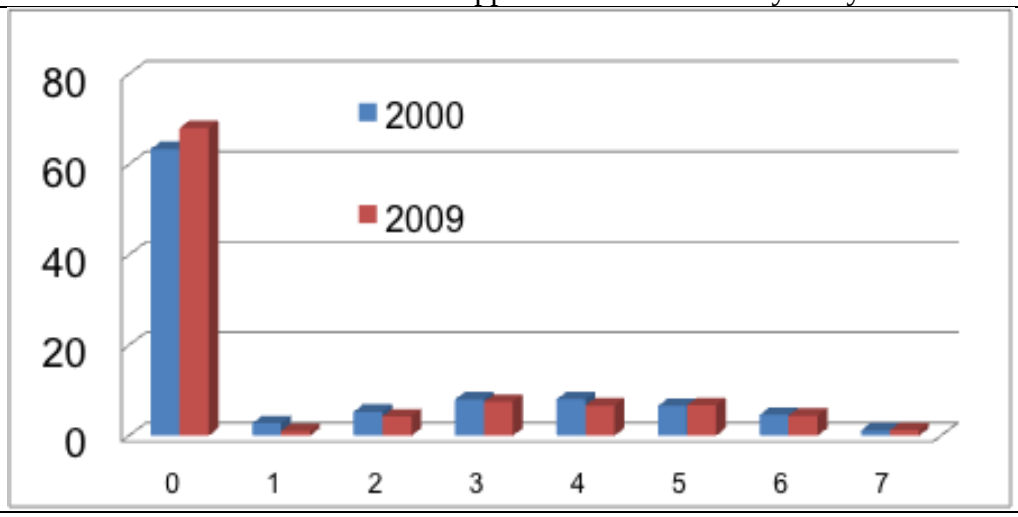


Table A.1: IOH Egypt circa 2009: Access, Equality of Access, and Opportunity Index				
Opportunity	Access	Equality (1-D)	HOI	Rank equality
Complete primary education on time	86	95	82	**13**
Complete secondary education on time	63	11	57	**6**
3School attendance, 9-15	92	97	89	**4**
Water	91	97	88	**4**
Sanitation	44	68	30	**1**
Lighting energy source	99	100	99	**2**
Cooking energy source	99	99	97	**14**
Non-overcrowding, 0-5	69	85	59	**14**
Telephone	78	91	71	**9**
Assisted birth delivery	89	95	84	**16**
Post-natal care, 0-5	32	88	28	**10**
Prenatal care, 0-4	83	94	78	**7**
Immunization vaccines, 0-4	89	96	85	**11**
Non-wasting, 0-4	79	95	75	**12**
Non-stunting, 2-17	72	96	69	**8**
Non-underweight, 0-17	87	97	85	**13**
Aggregate HOIs				
Aggregate 0-4 years HIECS	72	90	72	
Aggregate 9-15 years HIECS	83	94	83	
Aggregate 0-4 years DHS	14	56	14	

Source: HIECS 2000 and 2009 surveys, EDHS 2000 and 2008, and authors' calculations.

Table A.2: IOH Egypt 2000: Access, Equality of Access, and Opportunity Index				
Opportunity	Access	Equality (1-D)	HOI	Rank equality
Complete primary education on time	84	93	78	5
Complete secondary education on time	62	87	54	11
---School attendance, 9-15	---	---	---	7
Water	83	92	77	15
Sanitation	40	65	26	1
Lighting energy source	99	99	98	8
Cooking energy source	82	89	73	13
Non-overcrowding, 0-5	61	78	48	16
Telephone	24	56	14	9
Assisted birth delivery	73	88	64	12
Post-natal care, 0-5	22	85	19	10
Prenatal care, 0-4	66	87	58	3
Immunization vaccines, 0-4	89	98	87	2
Non-wasting, 0-4	89	99	88	6
Non-stunting, 2-17	74	93	69	4
Non-underweight, 0-17	85	95	80	5
Aggregate HOIs				
Aggregate 0-4 years HIECS	35	71	35	
Aggregate 9-15 years HIECS	49	77	49	
Aggregate 0-4 years DHS	14	66	14	
Source: HIECS 2000 and 2009 surveys, EDHS 2000 and 2008, and authors' calculations.				

Table A.3: Human Opportunity Index for Egypt, 2000 and 2009: Three way decomposition*						
Opportunity	*2000*	*Circa 2009*	*Annual rate of change*	*Decomposition ***		
				Composition	*Access*	*Equality of opportunity*
Complete primary education on time	78	82	0.4%	---	---	---
Complete secondary education on time	54	57	0.3%	---	---	---
School attendance, 9-15	n.a.	89	---	---	---	---
Water	77	88	1.3%	85%	5%	10%
Sanitation	26	30	0.5%	133%	-27%	-7%
Lighting energy source	98	99	0.1%	---	---	---
Cooking energy source	73	98	2.8%	72%	16%	12%
Non-overcrowding, 0-5	48	59	1.2%	178%	-66%	-13%
Telephone	14	71	6.3%	-439%	320%	220%
Assisted birth delivery	64	84	2.5%	32%	50%	18%
Post-natal care, 0-5	19	28	1.1%	14%	76%	10%
Prenatal care, 0-4	58	78	2.6%	23%	58%	19%
Immunization vaccines, 0-4	87	85	-0.2%	---	---	---
Non-wasting, 0-4	88	75	-1.6%	0%	79%	21%
Non-stunting, 2-17	69	69	0.0%	---	---	---
Non-underweight, 0-17	80	85	0.6%	---	---	---
Aggregate HOIs						
IOHa9-15-Housing Services	35	72	4.1%	66%	34%	66%
IOHa0-4-Housing Services	49	83	3.8%	64%	36%	64%
IOHa0-4-Nutrition & ECD	14	14	0.0%	---	---	---

Note: (*)The "composition effect" isolates any intertemporal changes in the circumstances of the population, which vary over time as young households enter the household pool and old households retire from it as they culminate their lifecycle, and also as the location (via migration) and the levels of income and wealth change for the whole population over time. The remaining improvement in HOIs, after discounting the "composition effect", is divided between the scale and equality of opportunity effects.

(**) Decomposition is omitted for trivial cases in which the HOI change is negligible.

Source: HIECS 2000 and 2009 surveys, EDHS 2000 and 2008, And authors' calculations.

Table A.4: Ranking of Egyptian Regions by HOIs, 2000 and 2009								
	2000				*2009*			
Opportunity	*Metropolitan*	*Lower Egypt*	*Upper Egypt*	*Frontier Governorates*	*Metropolitan*	*Lower Egypt*	*Upper Egypt*	*Frontier Governorates*
Complete primary education on time	1	3	4	2	3	1	4	2
Complete secondary education on time	1	3	4	2	2	1	4	3
School attendance, 9-15	---	---	---	---	2	1	3	4
Water	1	3	4	2	1	3	2	4
Sanitation	1	2	4	3	1	3	4	2
Lighting energy source	1	2	3	4	2	1	3	4
Cooking energy source	1	3	4	2	1	1	3	4
Non-overcrowding, 0-5	2	3	4	1	2	1	4	3
Telephone	1	3	4	2	2	3	4	1
Assisted birth delivery	1	2	3	4	1	2	3	4
Post-natal care, 0-5	1	3	2	4	1	3	2	4
Prenatal care, 0-4	1	2	3	4	1	2	3	4
Immunization vaccines, 0-4	3	1	2	4	1	1	3	4
Non-wasting, 0-4	3	1	2	4	4	1	2	3
Non-stunting, 2-17	1	2	3	4	1	3	1	4
Non-underweight, 0-17	1	2	3	4	1	2	3	4
Count of opportunities in 1st rank	12	2	0	1	9	8	1	1
Count of opportunities in 2nd rank	1	6	3	5	5	3	3	2
Source: HIECS 2000 and 2009 surveys, EDHS 2000 and 2008, and authors' calculations.								

Table A.5a: HOIs for Metropolitan Region: Rate of Progress and Decomposition between 2000 and 2009.

Opportunity	*HOI 2000*	*HOI Circa 2009*	*Annual Rate of change*	*Decomposition**	
				Access	*Equality of opportunity*
Complete primary education	90	80	-1.2	78%	22%
Complete secondary education	68	58	-1.0	88%	12%
School attendance 9-15	---	90	---	---	---
Water	98	97	-0.1	---	---
Sanitation	97	88	-1.0	77%	23%
Lighting energy source	100	99	-0.1	---	---
Cooking energy source	98	99	0.1	---	---
No-overcrowding 0-5	57	64	0.8	43%	57%
Telephone	44	88	4.9	55%	45%
Assisted Birth Delivery	87	93	0.8	70%	30%
Post-Natal care 0-5	25	40	1.9	68%	32%
Ante-natal Care 0-4	79	90	1.4	66%	34%
Immunization Vaccines 0-4	81	85	0.5	176%	-76%
Nutrition weight-for-height, 0-4	85	67	-2.3	85%	15%
Nutrition height-for-age 2-17	78	74	-0.5	143%	-43%
Nutrition weight-for-age 0-17	86	89	0.4	99%	1%

Note: (*)Decomposition is omitted for trivial cases in which the HOI change is negligible.
Source: HIECS 2000 and 2009 surveys, EDHS 2000 and 2008, And authors' calculations.

Table A.5b: HOIs for Lower Egypt Region: Rate of Progress and Decomposition between 2000 and 2009.

Opportunity	*HOI 2000*	*HOI Circa 2009*	*Annual Rate of change*	*Decomposition**	
				Access	*Equality of opportunity*
Complete primary education on time	83	86	0.4	70%	30%
Complete secondary education on time	58	61	0.3	86%	14%
School attendance 9-15	---	92	---	---	---
Water	80	87	0.8	67%	33%
Sanitation	35	33	-0.2	4%	96%
Lighting energy source	99	100	0.1	---	---
Cooking energy source	89	99	1.1	67%	33%
No-overcrowding 0-5	57	72	1.7	60%	40%
Telephone	12	73	6.8	69%	31%
Assisted Birth Delivery	66	88	2.8	75%	25%
Post-Natal care 0-5	17	24	0.9	87%	13%
Ante-natal Care 0-4	57	77	2.5	79%	21%
Immunization Vaccines 0-4	89	85	-0.5	34%	66%
Nutrition weight-for-height, 0-4	89	79	-1.3	65%	35%
Nutrition height-for-age 2-17	70	64	-0.8	106%	-6%
Nutrition weight-for-age 0-17	81	87	0.8	55%	45%

Note: (*)Decomposition is omitted for trivial cases in which the HOI change is negligible.
Source: HIECS 2000 and 2009 surveys, EDHS 2000 and 2008, And authors' calculations.

Table A.5c: HOIs for Upper Egypt Region: Rate of Progress and Decomposition between 2000 and 2009.

Opportunity	*HOI 2000*	*HOI Circa 2009*	*Annual Rate of change*	*Decomposition**	
				Access	*Equality of opportunity*
Complete primary education on time	69	78	1.0	67%	33%
Complete secondary education on time	43	51	0.8	58%	42%
School attendance 9-15	---	86	---	---	---
Water	69	88	2.1	72%	28%
Sanitation	7	16	1.0	62%	38%
Lighting energy source	96	99	0.3	46%	54%
Cooking energy source	53	97	4.9	68%	32%
No-overcrowding 0-5	38	45	0.8	66%	34%
Telephone	9	63	6.0	67%	33%
Assisted Birth Delivery	53	75	2.8	108%	-8%
Post-Natal care 0-5	18	30	1.5	85%	15%
Ante-natal Care 0-4	51	74	2.9	81%	19%
Immunization Vaccines 0-4	86	81	-0.6	63%	37%
Nutrition weight-for-height, 0-4	86	72	-1.8	90%	10%
Nutrition height-for-age 2-17	64	74	1.3	70%	30%
Nutrition weight-for-age 0-17	76	80	0.5	36%	64%

Note: (*)Decomposition is omitted for trivial cases in which the HOI change is negligible.
Source: HIECS 2000 and 2009 surveys, EDHS 2000 and 2008, And authors' calculations.

Table A.5d: HOIs for Frontier Governorates: Rate of Progress and Decomposition between 2000 and 2009.

Opportunity	*HOI 2000*	*HOI Circa 2009*	*Annual Rate of change*	*Decomposition**	
				Access	*Equality of opportunity*
Complete primary education on time	88	80	-0.9	64%	36%
Complete secondary education on time	61	57	-0.4	52%	48%
School attendance 9-15	---	82	---	---	---
Water	94	83	-1.2	53%	47%
Sanitation	30	36	0.7	6%	94%
Lighting energy source	92	86	-0.7	55%	45%
Cooking energy source	93	93	0.0	---	---
No-overcrowding 0-5	58	64	0.7	53%	47%
Telephone	41	88	5.2	67%	33%
Assisted Birth Delivery	52	63	1.4	135 %	-35%
Post-Natal care 0-5	10	11	0.1	---	---
Ante-natal Care 0-4	36	64	3.5	61%	39%
Immunization Vaccines 0-4	73	80	0.9	39%	61%
Nutrition weight-for-height, 0-4	76	71	-0.6	-7%	107%
Nutrition height-for-age 2-17	51	53	0.3	---	---
Nutrition weight-for-age 0-17	68	72	0.5	-40%	140%

Note: (*) Decomposition is omitted for trivial cases in which the HOI change is negligible.
Source: HIECS 2000 and 2009 surveys, EDHS 2000 and 2008, And authors' calculations.

Table A.6: Opportunity Gaps between Percentiles P90/P10, Egypt, 2009 and 2000								
Opportunity	Access probability						Change in gap
	2009			2000			
	p90	p10	gap	p90	p10	gap	
Complete primary education on time	0.99	0.75	0.24	0.97	0.65	0.32	-0.08
Complete secondary education on time	0.92	0.44	0.48	0.86	0.38	0.48	0.00
School attendance, 9-15	1.00	0.82	0.18	---	---	---	---
Water	0.99	0.81	0.18	1.00	0.64	0.35	-0.17
Sanitation	0.91	0.10	0.81	0.98	0.05	0.93	-0.12
Lighting energy source	1.00	0.98	0.02	1.00	0.97	0.03	*-0.02*
Cooking energy source	1.00	0.96	0.04	1.00	0.46	0.54	-0.50
Non-overcrowding, 0-5	0.95	0.29	0.66	0.96	0.15	0.81	-0.15
Telephone	0.98	0.53	0.45	0.87	0.05	0.83	-0.38
Assisted birth delivery	0.98	0.69	0.28	0.97	0.43	0.55	-0.26
Post-natal care, 0-5	0.45	0.21	0.24	0.35	0.12	0.23	*0.01*
Prenatal care, 0-4	0.97	0.66	0.31	0.91	0.39	0.51	-0.20
Immunization vaccines, 0-4	0.98	0.75	0.23	0.94	0.81	0.13	*0.10*
Non-wasting, 0-4	0.89	0.67	0.23	0.93	0.85	0.08	*0.15*
Non-stunting, 2-17	0.81	0.62	0.19	0.88	0.56	0.32	-0.12
Non-underweight, 0-17	0.94	0.79	0.15	0.94	0.68	0.26	-0.11
IOHa9-15-Housing Services	0.98	0.64	0.34	0.97	0.11	0.86	-0.52
IOHa0-4-Housing Services	0.99	0.64	0.35	0.99	0.16	0.83	-0.48
IOHa0-4-Nutrition & ECD	0.54	0.02	0.52	0.44	0.02	0.42	0.10
Source: HIECS 2000 and 2009 survey, EDHS 2000 and 2008, and authors' calculations.							

Table A.7a: IOC Matrix: Inequality of Opportunity by Circumstance, Egypt, 2009 *

Opportunities \ circumstances	*Gender*	*Number of children*	*Presence of elderly*	*Presence of parents*	*Parents Eduaction*	*Income per capita*	*Urban-rural location*	*Regional location*	*All Demographi*	*All Location*
Complete primary education on time	1.7	5.0	1.7	1.5	7.8	3.1	2.2	2.3	10.4	2.1
Complete secondary education on time	2.4	4.2	2.5	2.4	6.4	3.9	2.4	2.9	8.2	2.7
School attendance, 9-15	0.5	0.5	0.5	0.5	2.4	1.0	0.5	0.7	3.2	0.7
Water	0.4	0.4	0.5	0.4	1.1	1.3	1.5	0.7	2.1	1.5
Sanitation	2.6	4.7	2.7	2.6	6.4	5.4	23.4	11.4	9.7	25.3
Lighting energy source	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.2	0.1
Cooking energy source	0.0	0.0	0.0	0.0	0.1	0.2	0.1	0.1	0.4	0.1
Non-overcrowding, 0-5	1.5	6.4	1.5	1.5	2.8	5.6	1.4	2.9	10.5	3.0
Telephone	0.9	1.2	0.9	0.9	1.9	3.7	1.4	0.9	4.4	1.5
Assisted birth delivery	0.4	0.2	0.0	0.2	0.6	3.5	0.7	0.6	3.7	0.7
Post-natal care, 0-5	0.3	1.4	0.4	0.0	1.0	2.6	0.3	3.4	3.5	3.5
Prenatal care, 0-4	0.2	0.6	0.0	0.0	0.9	4.8	0.1	1.1	5.3	1.1
Immunization vaccines, 0-4	0.1	3.6	0.4	0.0	0.8	0.8	0.3	1.0	4.0	1.2
Non-wasting, 0-4	0.9	1.9	0.0	0.0	1.1	2.1	0.1	1.8	3.2	2.1
Non-stunting, 2-17	0.4	1.4	0.2	0.3	0.8	1.2	0.7	2.8	2.2	3.0
Non-underweight, 0-17	0.9	1.6	0.1	0.0	0.7	0.9	1.0	0.0	2.5	1.3

Note: * Each cell reports the mean of {IOCs} by sector for each circumstance.
Source: HIECS 2009, EDHS 2008, and authors' calculations.

Table A.7b: IOC Matrix: Inequality of Opportunity by Circumstance, Egypt, 2000 *

Opportunities \ circumstances	*Gender*	*Number of children*	*Presence of elderly*	*Presence of parents*	*Parents Eduaction*	*Income per capita*	*Urban-rural location*	*Regional location*
Complete primary education on time	0.6	1.6	0.1	0.0	2.2	0.9	1.0	0.7
Complete secondary education on time	0.3	0.8	0.1	0.0	1.2	0.3	0.4	0.3
School attendance, 9-15	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Water	0.0	0.1	0.0	0.0	1.3	0.7	2.1	0.6
Sanitation	0.1	1.8	0.2	0.0	1.5	1.1	10.7	9.8
Lighting energy source	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0
Cooking energy source	0.0	0.1	0.0	0.0	1.0	1.3	0.7	0.9
Non-overcrowding, 0-5	0.1	10.0	0.4	0.0	4.3	3.8	1.3	2.1
Telephone	0.0	3.4	0.9	0.0	7.6	7.8	5.0	0.5
Assisted birth delivery	0.3	1.2	0.3	0.5	1.7	4.4	1.4	1.4
Post-natal care, 0-5	0.4	0.6	0.1	0.0	1.2	2.7	0.5	1.1
Prenatal care, 0-4	0.5	1.2	0.1	0.9	2.0	5.3	1.5	1.4
Immunization vaccines, 0-4	0.1	1.5	0.0	0.3	0.7	0.4	0.4	0.9
Non-wasting, 0-4	0.2	0.1	0.3	0.0	0.6	1.1	0.0	0.4
Non-stunting, 2-17	1.2	2.9	0.3	0.5	1.0	2.0	0.1	0.9
Non-underweight, 0-17	0.3	2.7	0.2	0.0	1.2	2.5	0.2	0.5

Note: * Each cell reports the mean of {IOCs} by sector for each circumstance.
Source: HIECS 2000 survey, EDHS 2000, and authors' calculations.

Table A.7c: IOC Matrix: Highly Unequalizing Circumstances by Opportunity, Egypt, 2009 *								
Opportunities \ circumstances	*Gender*	*Number of children*	*Presence of elderly*	*Presence of parents*	*Parents Eduaction*	*Income per capita*	*Urban-rural location*	*Regional location*
Complete primary education on time	---	X	---	---	X	X	---	---
Complete secondary education on time	---	X	---	---	X	X	---	X
School attendance, 9-15	---	---	---	---	---	---	---	---
Water	---	---	---	---	---	---	---	---
Sanitation	X	X	X	X	X	X	X	X
Lighting energy source	---	---	---	---	---	---	---	---
Cooking energy source	---	---	---	---	---	---	---	---
Non-overcrowding, 0-5	---	X	---	---	X	X	---	X
Telephone	---	---	---	---	---	X	---	---
Assisted birth delivery	---	---	---	---	---	X	---	---
Post-natal care, 0-5	---	---	---	---	---	X	---	X
Prenatal care, 0-4	---	---	---	---	---	X	---	---
Immunization vaccines, 0-4	---	X	---	---	---	---	---	---
Non-wasting, 0-4	---	---	---	---	---	---	---	---
Non-stunting, 2-17	---	---	---	---	---	---	---	X
Non-underweight, 0-17	---	---	---	---	---	---	---	---

Note: * Cells with X indicate fourth quartile value of inequality of opportunity by circumstance in the IOC matrix 2009, Table A-7.a in the Appendix.
Source: HIECS 2009, EDHS 2008, and authors' calculations.

Table A.7d: IOC Matrix: Ranking of Highly Unequalizing Circumstances by Opportunity, Egypt, 2009 *

Opportunities \ circumstances	*Gender*	*Number of children*	*Presence of elderly*	*Presence of parents*	*Parents Eduaction*	*Income per capita*	*Urban-rural*	*Regional location*
Complete primary education on time	---	10	---	---	4	25	---	---
Complete secondary education on time	---	14	---	---	5	16	---	27
School attendance, 9-15	---	---	---	---	---	---	---	---
Water	---	---	---	---	---	---	---	---
Sanitation	33	12	31	32	7	9	1	2
Lighting energy source	---	---	---	---	---	---	---	---
Cooking energy source	---	---	---	---	---	---	---	---
Non-overcrowding, 0-5	---	6	---	---	30	8	---	28
Telephone	---	---	---	---	---	18	---	---
Assisted birth delivery	---	---	---	---	---	20	---	---
Post-natal care, 0-5	---	---	---	---	---	34	---	21
Prenatal care, 0-4	---	---	---	---	---	11	---	---
Immunization vaccines, 0-4	---	19	---	---	---	---	---	---
Non-wasting, 0-4	---	---	---	---	---	---	---	---
Non-stunting, 2-17	---	---	---	---	---	---	---	29
Non-underweight, 0-17	---	---	---	---	---	---	---	---

Note: Cells with numbers indicate fourth quartile value of inequality of opportunity by circumstance in the IOC matrix 2009, Table A-7.a in the Appendix.
Source: HIECS 2009, EDHS 2008, and authors' calculations.

Table A.7e: IOC Matrix by Shapley method: Inequality of Opportunity by Circumstance, Egypt, 2009 *

Opportunities \ Circumstances	*Gender*	*Number of children*	*Presence of elderly*	*Presence of parents*	*Parents Education*	*Income per capita*	*Urban-rural*	*Regional location*
Completion of Below Intermediate OT	0.0	0.3	0.0	0.0	2.5	0.8	0.1	0.1
Completion of Intermediate OT	0.1	1.1	0.0	0.0	3.6	1.4	0.4	0.2
School attendance 9-15	0.0	0.2	0.0	0.0	1.1	0.6	1.0	0.1
Water	0.0	0.2	0.0	0.0	1.1	0.6	1.0	0.1
Sanitation	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.1
Lighting energy source	0.0	0.0	0.0	0.0	0.2	0.3	0.1	0.2
Cooking energy source	0.0	4.2	0.1	0.0	2.4	3.0	0.3	0.6
No-overcrowding 0-5	0.0	0.3	0.0	0.0	2.8	2.5	1.1	0.5
Telephone	0.1	0.1	0.0	0.0	1.2	1.7	0.6	0.5
Assisted Birth Delivery	0.1	0.6	0.1	0.1	1.0	1.2	1.1	0.1
Post-Natal care 0-5	0.0	0.2	0.0	0.1	1.1	1.5	0.6	0.3
Ante-natal care 0-4	0.0	4.1	0.1	0.0	0.2	0.2	0.0	0.6
Immunization Vaccines 0-4	0.5	1.6	0.1	0.1	0.4	0.8	0.2	0.1
Nutrition weight-for-height, 0-4	0.1	0.9	0.1	0.4	0.5	0.4	0.9	0.3
Nutrition height-for-age 2-17	0.8	0.3	0.0	0.1	0.4	0.4	0.2	1.0
Nutrition weight-for-age 0-17	0.0	0.3	0.0	0.0	2.5	0.8	0.1	0.1
Average penalty by circumstance across all HOIs	0.1	0.9	0.1	0.0	1.3	1.0	0.8	0.5
Number of highly influenced opportunities by circumstance	0	6	0	0	10	9	5	2
Aggregate HOIs								
IOHa9-15-Housing Services	0.0	0.5	0.0	0.0	2.5	1.9	2.1	0.7
IOHa0-4-Housing Services	0.0	0.8	0.0	0.0	1.7	2.2	1.0	0.6
IOHa0-4-Nutrition & ECD	0.1	0.1	0.5	0.2	0.3	0.0	0.1	0.6

note: cells with numbers indicate fourth quartile value of inequality of opportunity by circumstance in the IOC matrix 2009, Table A-7.a in the appendix. Source: HIECS 2009 and DHS 2008. Author's calculations.

Table A.8: HOIs Confidence Interval 95% and Significant Differences over Time, Egypt, 2000 and 2009

Opportunity	2000			Circa 2009			Significant Difference
	LL	UL	sd	LL	UL	sd	
Complete primary education on time	83.0	84.2	0.48	85.1	86.4	0.52	*
Complete secondary education on time	61.3	63.3	0.35	62.4	64.4	0.30	*
School attendance, 9-15	---	---	---	88.5	89.4	0.23	n.a.
Water	76.3	77.1	0.19	87.8	88.4	0.14	*
Sanitation	25.5	26.1	0.15	29.6	30.2	0.16	*
Lighting energy source	97.7	98.0	0.07	98.8	99.0	0.05	*
Cooking energy source	72.5	73.2	0.18	97.9	98.1	0.07	*
Non-overcrowding, 0-5	47.3	48.5	0.31	58.1	59.4	0.32	*
Telephone	13.5	13.9	0.11	70.2	70.9	0.18	*
Assisted birth delivery	62.5	65.7	0.82	83.0	85.8	0.70	*
Post-natal care, 0-5	17.7	20.3	0.67	26.3	29.6	0.85	*
Prenatal care, 0-4	56.1	59.5	0.85	76.7	79.9	0.82	*
Immunization vaccines, 0-4	85.4	88.3	0.74	83.1	86.7	0.92	no
Non-wasting, 0-4	86.6	89.5	0.74	72.7	77.4	1.19	*
Non-stunting, 2-17	66.5	71.2	1.18	65.8	71.4	1.43	no
Non-underweight, 0-17	78.6	81.7	0.79	83.1	86.2	0.81	*

Note: LL, lower limit of confidence interval; UL, upper limit; sd, standard deviation; (*) significant difference at 95%.
Source: HIECS 2000 and 2009 surveys, EDHS 2000 and 2008, and authors' calculations.

Table A.9a: Demographic Weights Corresponding to Each HOI, 2000 and 2009				
Opportunities	*Age range*	*Original weights*	*Demographic weights*	
			2000	*2009*
Complete primary education on time	6-15	6.3%	5.7%	5.5%
Complete secondary education on time	16-22	6.3%	3.8%	4.0%
Complete post-secondary education on time	23-25	6.3%	1.3%	1.6%
School attendance, 9-15	0-17	6.3%	10.3%	10.2%
Water	0-17	6.3%	10.3%	10.2%
Sanitation	0-17	6.3%	10.3%	10.2%
Lighting energy source	0-17	6.3%	10.3%	10.2%
Cooking energy source	0-5	6.3%	3.5%	3.6%
Non-overcrowding, 0-5	0-17	6.3%	10.3%	10.2%
Telephone	0-4	6.3%	2.7%	2.8%
Assisted birth delivery	0-5	6.3%	3.5%	3.6%
Post-natal care, 0-5	0-4	6.3%	2.7%	2.8%
Prenatal care, 0-4	0-4	6.3%	2.7%	2.8%
Immunization vaccines, 0-4	0-4	6.3%	2.7%	2.8%
Non-wasting, 0-4	2-17	6.3%	9.5%	9.2%
Non-stunting, 2-17	0-17	6.3%	10.3%	10.2%
Sum (16 weights)		100%	100%	100%
IOHaEducation		24%	11%	11%
IOHaBasic housing services		35%	55%	55%
IOHaEarly childhood		24%	11%	12%
IOHaNutrition		18%	23%	22%
Source: HIECS 2009, EDHS 2008, and authors' calculations.				

Table A-9-b Robustness of aggregate and sector HOIs to demographic weights. Egypt and regions.

Aggregate Opportunity index	*2000*					*2009*				
	Egypt	*Metropolitan*	*Lower Egypt*	*Upper Egypt*	*Frontier Governorates*	*Egypt*	*Metropolitan*	*Lower Egypt*	*Upper Egypt*	*Frontier Governorates*
	Equal Weights									
IOHa16	57.0	73.2	60.0	49.6	57.0	67.2	76.9	68.8	62.8	61.9
IOHaEducation	37.4	52.1	39.8	29.4	46.5	42.5	52.1	44.7	37.0	42.6
IOHaBasic Housing services	55.8	82.3	61.9	45.3	67.9	74.0	89.2	77.2	68.0	74.7
IOHaEarly Childhood	56.9	68.0	57.3	52.0	42.8	68.9	77.0	68.5	65.0	54.5
IOHaNutrition	79.0	83.0	80.0	75.3	65.0	76.1	76.7	76.7	75.3	65.3
	Demographic Weights									
IOHa16	59.9	80.1	63.6	51.5	63.2	72.2	83.9	73.4	68.2	67.7
IOHaEducation	46.9	64.0	50.3	37.0	60.2	51.3	61.1	54.2	45.2	51.7
IOHaBasic Housing services	56.8	85.4	62.6	46.2	69.1	75.9	92.3	77.8	70.7	76.1
IOHaEarly Childhood	54.3	65.0	54.4	49.6	40.5	66.1	74.5	65.5	62.7	51.6
IOHaNutrition	76.3	82.5	77.3	72.1	61.8	76.8	80.0	76.4	76.5	64.0
	DIFFERENCE									
IOHa16	2.9	6.9	3.6	2	6.2	5.0	7.1	4.6	5.4	5.8
IOHaEducation	9.5	11.9	11	7.7	14	8.8	9.0	9.5	8.2	9.1
IOHaBasic Housing services	1.0	3.1	0.7	0.9	1.2	1.8	3.1	0.6	2.7	1.4
IOHaEarly Childhood	-2.6	-3.0	-2.9	-2	-2.3	-2.7	-2.5	-3.0	-2.3	-2.9
IOHaNutrition	-2.7	-0.5	-2.7	-3	-3.2	0.7	3.3	-0.3	1.2	-1.3
	IOH growth 2000-2009 (Equal Weights)									
IOHa16						10	4	9	13	5
IOHaEducation						5	0	5	8	-4
IOHaBasic Housing services						18	7	15	23	7
IOHaEarly Childhood						12	9	11	13	12
IOHaNutrition						-3	-6	-3	0	0
	IOH growth 2000-2009 Demographic Weights)									
IOHa16						12	4	10	17	5
IOHaEducation						4	-3	4	8	-9
IOHaBasic Housing services						19	7	15	24	7
IOHaEarly Childhood						12	10	11	13	11
IOHaNutrition						0	-3	-1	4	2

Table A.10a: Comparing Opportunities in Egypt with Latin American Countries: HOI Values, Circa 2000 and 2010

Country	*HOI (aggregate 5 opportunities)*		*Water HOI*		*Sanitation HOI*		*Electricity HOI*		*School attendance HOI*		*Complete Primary Education HOI*	
	Circa 1995	*Circa 2010*	*Circa 1995*	*Circa 2010*	*Circa 1995*	*Circa 2010*	*Circa 1995*	*Circa 2010*	*Circa 1995*	*Circa 2010*	*Circa 1995*	*Circa 2010*
Argentina	86	88	94	97	51	63	99	100	97	97	84	83
Bolivia	63	69	58	65	20	28	49	63	94	97	73	74
Brazil	57	76	56	82	53	78	80	96	87	97	15	35
Chile	83	92	83	94	66	86	92	99	97	98	74	82
Colombia	67	79	68	71	45	65	86	93	86	92	50	70
Costa Rica	77	88	92	95	69	92	91	99	84	96	57	66
Dominican Republic	64	73	61	69	36	48	82	95	97	96	38	53
Ecuador	60	76	23	66	40	49	81	91	79	86	65	79
Egypt	**70**	**78**	**77**	**88**	**26**	**30**	**98**	**99**	**---**	**89**	**78**	**82**
El Salvador	44	53	18	18	16	19	65	82	81	89	28	43
Guatemala	43	51	54	63	11	20	57	66	74	80	17	24
Honduras	42	48	13	18	31	25	47	51	73	82	33	45
Jamaica	79	81	28	23	99	98	74	84	94	95	90	93
Mexico	65	86	31	80	44	71	89	98	85	92	67	87
Nicaragua	35	46	11	14	4	35	46	51	76	85	23	34
Panama	66	69	77	80	28	30	54	58	89	91	68	71
Paraguay	61	71	42	63	36	46	83	94	91	92	45	56
Peru	55	69	37	42	30	54	47	63	92	95	52	74
Uruguay	89	90	84	89	96	96	97	98	96	95	76	78
Venezuela	82	87	87	87	77	82	98	98	92	95	62	73
Average LAC countries	64	73	53	64	45	57	75	83	88	92	53	64
Difference Egypt-LAC (%)	4	5	44	38	(42)	(48)	31	19	n.a.	(4)	25	18

Source: World Bank and Universidad de La Plata (CEDLAS), Socioeconomic Database for Latin America and the Caribbean, and authors' calculations.

Table A.10b: Comparing Opportunities for Egyptian Children with Latin American Countries: HOI Ranking and Annual Growth, Circa 2000 and 2010

Countries	*HOI (aggregate of 5 opportunities)*			*Water*			*Sanitation*			*Electricity*			*School attendance*			*Complete primary education*		
	Ranking Circa 1995	*Ranking Circa 2010*	*Annual rate of progress*	*Ranking Circa 1995*	*Ranking Circa 2010*	*Annual rate of progress*	*Ranking Circa 1995*	*Ranking Circa 2010*	*Annual rate of progress*	*Ranking Circa 1995*	*Ranking Circa 2010*	*Annual rate of progress*	*Ranking Circa 1995*	*Ranking Circa 2010*	*Annual rate of progress*	*Ranking Circa 1995*	*Ranking Circa 2010*	*Annual rate of progress*
Argentina	2	3	0.2%	1	1	0.3%	7	9	1.2%	1	1	0.1%	2	3	0.0%	2	3	-0.2%
Bolivia	12	14	0.7%	10	13	0.8%	17	17	0.9%	17	16	1.6%	6	4	0.3%	5	7	0.2%
Brazil	15	10	1.4%	11	7	2.0%	6	6	1.9%	12	8	1.2%	11	2	0.8%	20	18	1.5%
Chile	3	1	0.9%	5	3	1.1%	5	4	2.0%	5	2	0.7%	1	1	0.1%	4	4	0.8%
Colombia	7	8	1.1%	8	10	0.2%	8	8	1.8%	8	11	0.6%	12	12	0.6%	13	11	1.8%
Costa Rica	6	4	0.7%	2	2	0.2%	4	3	1.6%	6	4	0.5%	14	6	0.7%	10	12	0.6%
Dominican Republic	10	11	1.1%	9	11	1.0%	11	12	1.4%	10	9	1.6%	3	5	-0.1%	15	15	1.9%
Ecuador	14	9	1.4%	17	12	4.0%	10	11	0.8%	11	12	0.9%	16	17	0.6%	8	5	1.3%
Egypt	**7**	**9**	**0.9%**	**6**	**5**	**1.3%**	**16**	**16**	**0.5%**	**2**	**3**	**0.1%**	n.a.	**16**	n.a.	**3**	**5**	**0.4%**
El Salvador	17	17	1.0%	18	19	0.0%	18	20	0.2%	14	14	1.9%	15	15	0.9%	17	17	1.6%
Guatemala	18	18	1.4%	12	15	1.3%	19	19	1.5%	15	15	1.6%	18	20	1.1%	19	20	1.3%
Honduras	19	19	0.7%	19	18	0.7%	13	18	-0.8%	18	19	0.5%	19	19	1.1%	16	16	1.5%
Jamaica	5	7	0.1%	16	17	-0.4%	1	1	0.0%	13	13	0.8%	5	8	0.0%	1	1	0.2%
Mexico	9	6	1.7%	15	9	4.1%	9	7	2.2%	7	7	0.7%	13	11	0.6%	7	2	1.7%
Nicaragua	20	20	1.6%	20	20	0.4%	20	14	4.5%	20	20	0.7%	17	18	1.2%	18	19	1.5%
Panama	8	16	0.5%	7	8	0.6%	15	15	0.3%	16	18	0.8%	10	14	0.3%	6	10	0.5%
Paraguay	13	13	1.1%	13	14	2.3%	12	13	1.1%	9	10	1.2%	9	13	0.1%	14	14	1.2%
Peru	16	15	1.4%	14	16	0.5%	14	10	2.4%	19	17	1.7%	8	7	0.3%	11	8	2.2%
Uruguay	1	2	0.7%	4	4	2.1%	2	2	0.3%	4	6	0.4%	4	9	-0.4%	3	6	1.4%
Venezuela	4	5	0.5%	3	6	0.1%	3	5	0.5%	3	5	0.0%	7	10	0.3%	9	9	1.1%
Mean LAC countries			1.0%			1.1%			1.3%			0.9%			0.5%			1.2%
Median LAC countries			1.0%			0.7%			1.2%			0.8%			0.3%			1.3%

Source: World Bank and Universidad de La Plata (CEDLAS), Socioeconomic Database for Latin America and the Caribbean, and authors' calculations.