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Maternal Employment and Children's Development Outcomes:

Understanding the Influence of Employment Types

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Shireen AlAzzawi and Vladimir Hlasny

Abstract

High inequality of opportunities for early childhood development is a major social challenge in the Arab region. This study evaluates the role of mothers' employment status on children's developmental outcomes, as measured by a large set of indicators across all sixteen low- and middle-income Arab countries and years 2002–2015. First, we confirm that Arab children in general receive inadequate access to qualified prenatal and delivery care, many fail to be vaccinated or receive an inadequate supply of iodine. Disproportionately many children thus become stunted and underweight, or die before their first birthday. Significant deficiencies exist also in children's opportunities for cognitive development: enrolment in nurseries and pre-school programs, cognitive stimulation at home. Meanwhile, violent disciplining and exploitation of children for housework are widespread. Second, our health-survey data confirm that young Arab mothers tend to hold lower-level, precarious work even relative to the notoriously poor out-of-survey benchmarks for all women. Mothers' employment affects children's outcomes systematically and significantly, with more-formal positions in the labor market being responsible for generally better nutritional outcomes for children. This is the case for children's risk of stunting and wasting, and across most occupation types also for being underweight. This differs substantially across countries and years, and across children's specific circumstances, suggesting that children's vulnerabilities are interrelated and exacerbate each other.

Keywords: early childhood development; inequality of opportunity; maternal employment; MENA.
JEL Classification: I14, I24, J13, J4, N35.

I. Motivation

Recent studies in developing countries around the world have found a negative association between women's labor force participation and health outcomes of children (Rashad and Sharaf 2019 for Egypt; Brauner-Otto et al. 2019 for Nepal, Jakaria *et.al.* 2022 for Bangladesh). This finding is surprising given the well-established income effect and household bargaining power literature (Duflo 2003) concluding that when the mother's income rises we should expect an increase in spending on children in the form of more and better quality nutrition, more frequent health checkups, and better childcare in other respects such as cognitive stimulation and school attendance.

Alternative arguments suggest that increased stress and the higher time burden on working mothers may worsen impacts on children (Morrill 2011). The result is especially puzzling for the Middle East and North Africa region (MENA) where female labor force participation rates are low compared to other world regions. Considering that female educational attainment has increased dramatically in the past decade, and that women self-selecting for formal employment come from the ranks of those with the greatest set of human capital, we might expect a positive association between women's participation and their children's development outcomes.

In many countries in the region, the relatively small share of women who do work, work for government, or formal public or private enterprises (Assaad et. al. 2022). MENA labor markets have suffered from a state of duality where highly coveted "good" public sector jobs were provided as part of the social contract of the 1950s and 1960s to a select group of workers, while "bad" private and informal sector jobs absorbed the remainder of the labor force. As this social contract eventually broke in the 1980s and 1990s in most MENA countries, the good jobs became more difficult to find and many married women in particular opted to exit the labor market altogether rather than end up in bad jobs, especially after giving birth (Assaad et. al. 2022). At the same time, MENA countries suffer from high levels of child health problems and low educational attainment especially in terms of quality relative to the countries' income levels (UNICEF 2014). Inequality of opportunities (IOp) for early childhood development (ECD) outcomes has been identified as an enduring problem particularly in relation to parents' economic status.

Most existing studies investigating the relationship between maternal employment and child health outcomes, are correlational (Brauner-Otto et al. 2019; Nankinga et al. 2019; Ukwuani and Suchindran 2003). They do not account for the potential endogeneities in maternal employment decision relative to their children's existing heath challenges. These endogeneities may arise due

to omitted variable bias: the mothers' decision of getting employed and children's health may all be due to poor economic conditions such as low household wealth or a high number of dependent members in the household. They could also be due to reverse causality: the poor health of children may worsen the household's financial position, creating an incentive for the mother to join the labor force. We use instrumental variable estimation to disentangle these factors. Our study is therefore among a small number of studies across countries worldwide – Jakaria *et.al.* (2022) in Bangladesh, Pieters and Rawlings (2020) in China, Rashad and Sharaf (2019) in Egypt, Reynolds et al. (2017) in Chile, Afridi et al. (2016) in India, and Dervisevic et. al. (2021) in Indonesia – that produce causal estimates.

This study contributes to the literature on the role of maternal employment on children's ECD opportunities and outcomes in several ways. We investigate whether the negative association between maternal employment and children's health is confirmed for all sixteen low- and middle-income Arab countries using multiple surveys from the last 20 years, and an identification strategy that allows us to establish a causal link; whether this result extends to educational outcomes; how the relationship changed over time; and critically, how the type of maternal economic activity interacts with children's other circumstances in affecting the children's ECD outcomes. The impacts are hypothesized to be mediated by children's participation in activities advancing socio-cognitive skills, access to medical care and resources such as water and clean energy, and exposure to gender-based and child violence and forced domestic work. This topic is particularly relevant in the wake of the COVID-19 pandemic that has disrupted women's economic participation, domestic distribution of work, as well as children's socio-cognitive outcomes. Implications for future years when the structure of the labor markets transitions to a more digitized and greener form are drawn.

The rest of the study is organized as follows. Section II reviews relevant literature. Section III introduces the key concepts, methods and demographic and health surveys used in this study. Section IV then presents the prevalence of children's access to various health, nutrition and cognitive-development opportunities across Arab countries, as well as between children of formally-employed versus economically inactive mothers in each country. An index of *dissimilarity* in the prevalence of various ECD opportunities between more versus less privileged children is computed, and the contribution of various parental characteristics including mother's employment status is estimated. Section V then presents our main results, formally identifying the effect of mothers' employment status on their children's outcomes. Section VI concludes

with a discussion of policy responses critical to the reduction of malnutrition and to evening out of opportunities across socioeconomic groups.

II. Literature review

Becker (1965) highlights a trade-off where mothers' work impacts both childcare time and household income. Increased income from employed mothers enables better investment in child health and nutrition, allowing access to improved healthcare and nutritious diets (Gennetian et al., 2010; Glick, 2002; Morrill, 2011; Qian, 2008; Smith et al., 2003). However, the impact of this investment may rely on how much influence mothers have in allocating household resources (Hossain et al., 2007; Lépine & Strobl, 2013; Quisumbing, 2003; Shroff et al., 2011; Smith et al., 2003). Conversely, working mothers may have reduced time to care for their children, affecting tasks like breastfeeding, meal preparation, and accessing healthcare services (Cawely & Liu, 2012; Desai et al., 1989; Glick & Sahn, 1998; Smith et al., 2003). While some substitutes exist, like prepared food and hired help, they might be less effective and costly for working women (Glick & Sahn, 1998). Alternate caregivers, such as grandparents or neighbors, might fill this gap, but these arrangements aren't always available or offer the same quality of care (Glick & Sahn, 1998). Moreover, not all parental time is created equal. Hsin and Felfe (2014), using US longitudinal data, find that not all parental time benefits children, with maternal work affecting non-beneficial, unstructured time rather than beneficial time spent with children, on average. The overall impact of maternal employment on child health is thus an empirical question that may rely on several confounding factors such as existence of quality child care alternatives and women’s bargaining power within the household, which not only vary across countries even within the MENA region, but also within them, depending on socioeconomic status and region of residence.

There are substantial spatial inequalities in education and health within Arab countries, and their effects on inequality in economic outcomes within the broader contect of the IOp in the Arab World (Bibi and Nabli 2009). Belhaj-Hassine (2012), using the 2006 wave of the Egyptian panel survey, confirmed the existence of dissimilarity in earnings across households with different educational achievement and occupation of parents, region of birth and gender. Salehi-Isfahani et al. (2014) confirmed the existence of high inequality of opportunity in terms of education, particularly due to regional differences. Boutayeb and Helmert (2011) identified persisting and even increasing inequality of human development opportunities across regions and across the urban-rural dimension. A number of studies observed that food insecurity and child

malnourishment have been falling for decades before ticking up in the early 2000s (Tabutin and Schoumaker 2005; Breisinger et al. 2012; Kuhn 2012). Perception on the ground in most Arab countries is that children do not have adequate opportunities to learn and grow. Fewer than two-thirds of survey respondents think that most children have adequate opportunities.

Numerous studies, primarily focusing on developed nations, have investigated how maternal employment influences ECD outcomes. These investigations span various facets of child development, encompassing cognitive growth measured by standardized or school test performance (Baum 2003; Bernal 2008; Bernal and Keane 2010, 2011; Del Boca et al. 2014; Gregg et al. 2005; Verropoulou and Joshi 2009; Waldfogel et al. 2002; Ruhm 2008), educational attainment (Ermisch and Francesconi 2013), secondary school attendance (Schildberg-Hoerisch 2011), or university graduation (Mosca et al. 2017). Some inquiries delved into health metrics using parental reports on child health (Gennetian et al. 2010; Page et al. 2019), overweight tendencies (Anderson et al. 2003), and occurrences of adverse events like accidents or asthma episodes (Morrill 2011).

A number of studies that have investigated this relationship were correlational in nature. These studies have mixed results. Some found a negative association (Rabiee and Geissler (1992) for Iran, Abbi et al. (1991) for India), others found a positive association (Ukwuani and Suchindran(2003) for Nigeria). Some studies have also delved deeper and investigated the role of job type. Brauner-Otto et al. (2019) investigated the relationship between female labor force participation (FLFP) and child health, exploring both the type (wage, salary, or own business) and timing of work across the child's first five years in Nepal. They found that FLFP is associated with worse child health outcomes, and that this is largely due to the lower quality and lower-paying type of work women do. These studies ignored the potential endogeneity.

Among the small number of studies worldwide that have accounted for endogeneity, the results were mixed. Rashad and Sharaf (2019) for Egypt, and Jakaria *et.al.* (2022) for Bangladesh found a negative causal impact of maternal employment on child health outcomes, using an IV approach. Reynolds et. al. (2017) find that maternal employment does not affect cognitive, language, and socio-economic development of their children. Afridi et. al. (2016), using child level panel data, find that a mother's participation in the labor force increases her children's time spent in school and leads to better grade progression, and argue that is largely due to greater household decision-making power of working mothers. Dervisevic et. al. (2021) found that maternal employment has a positive and significant effect on children's health and education in Indonesia, and that this is largely irrespective of household income. They argue that

maternal work in Indonesia affects children through channels other than income, such as broader social networks or maternal empowerment. These studies have not examined the role of employment type which, considering the forms of labor-market engagement of women in the Arab region, is an important gap in the literature.

III. Concepts, methods and data

Concepts

This study aims to link children's opportunities for healthy physical development to their mothers' employment type, across the bulk of Arab countries and across the years. To set the stage, the study reviews a broad range of indicators of young children's physical development under four categories: mothers' and children's access to prenatal healthcare; young children's health outcomes; children's nutrition outcomes; and early childhood care and education (ECCE). These indicators are selected in agreement with the principles of human opportunities that essential health care, sufficient nutrition, and engagement in socio-emotive and cognitive activities are basic human rights that should be available to all children without exception.

Prenatal health indicators include mothers' prenatal care and child delivery by a trained attendant, and adequate health-center visits during pregnancy. Only health checkups performed by doctors, trained nurses or qualified midwives are viewed as adequate. Four or more visits to a qualified physician or health care center during pregnancy is taken as an adequate rate of prenatal visits. This is evaluated among women who gave birth in the past two years, ensuring accurate recollection.

Postnatal health indicators include full immunization by age one, and neonatal (within the first month of life) and infant (within the first year) mortality. Full immunization entails vaccination for all six preventable child diseases, namely tuberculosis, diphtheria, whooping cough, tetanus, polio and measles. These are covered by vaccinations for Bacillus Calmette-Guérin (BCG), three subsequent vaccinations for diphtheria, pertussis and tetanus (DPT), three subsequent vaccinations for polio, and vaccination for measles. These vaccinations must be undertaken in the first year of children's life. To ensure accurate recollection by mothers, this variable is evaluated only among children between the ages of 12 and 24 months.

Nutrition indicators include children's access to iodized salt at home, and children's anthropometric measurements. Iodine is a fundamental element, adequate doses of which are important for the development and functioning of children's nervous system. Children's

anthropometric status including stunting, underweight and wastage are important outcomes of inadequate food supply in early childhood. These are commonly used indicators of children's nutrition and balanced diet, and are available – and validated as reliable – in the majority of health surveys. Children's height for age, weight for age, and weight for height can be analyzed across cohorts of children and across different ages to gauge the acuteness and longer-term stability of children's access to nutrition.

We use four anthropometric indicators to measure malnutrition health outcomes for children: stunting, wasting, underweight, and overweight. Stunting, or low height for age; is caused by long-term insufficient nutrient intake and frequent infections. Stunting generally occurs before age two, and effects are largely irreversible. These include delayed motor development, impaired cognitive function and poor school performance. Nearly one third of children under five in the developing world are stunted (UNICEF 2019). Wasting, or low weight for height, is a strong predictor of mortality among children under five. It is usually the result of acute significant food shortage and/or disease. There are 24 developing countries with wasting rates of 10 per cent or more, indicating a serious problem urgently requiring a response (UNICEF 2019).

Weight-for-age indicators are used to gauge underweight and overweight. Underweight, or low weight for age, raises the mortality risk of children who are even mildly underweight, and severely underweight children are at even greater risk (WHO 2010). Overweight, or high weight for age, is associated with a higher probability of obesity in adulthood, which can lead to a variety of disabilities and diseases, such as diabetes, cardiovascular diseases, musculoskeletal disorders and certain cancers (WHO 2010). Overweight is an increasingly important issue all over the world: 20 developing countries have rates above 5 per cent. Childhood undernutrition and overweight co-exist in many countries, leading to a double burden of malnutrition. The corresponding *anthropometric* ratios – in *z*-scores or standard deviations relative to the median in the World Health Organization (WHO) reference healthy population, are used to determine malnutrition levels. Iodization of household salt of fifteen parts per million or more (15+ ppm) is taken as adequate in households with children aged four years or less.

ECCE indicators encompass children's attendance of pre-school educational programs at the age of 3–4 years old and separately at the age of 5–6 (El-Kogali and Krafft 2015). Interactive and play activities at home that help children's cognitive growth and learning are also considered, namely the engagement of parents or other household members in reading books, singing or telling stories to children, playing indoors or outside, looking at picture books and naming objects, or spending time with children in other ways. Engagement in four or more of these

activities over the past three days is taken as adequate for 3–4 year-old children. Finally, violent disciplining at home; and forced engagement in domestic chores or other work. Violent disciplining entails ever abusing a 2–5 year old child verbally or physically, causing emotional or physical harm.[1] Finally, child labor is taken here to entail work for a family member or someone outside the home regardless whether for pay or not, fetching of wood or water, or other business and domestic household chores within the past week (regardless of the number of hours involved). To ensure comparability across children, this variable is evaluated only among those exactly five years old.

Measurement of IOp and the role of mothers' employment status

Upon identifying and harmonizing ECD indicators across all survey waves, we assess the indicators' levels and distributions across national populations. To measure IOp for ECD, a *dissimilarity index* for binary-outcome variables is used (Barros et al. 2008, 2009), defined as follows:

$$D = \frac{1}{2\bar{p}} \sum_{i=1}^{K} w_i |p_i - \bar{p}|$$

Here p_i is the prevalence of the particular indicator of ECD in a population group possessing a particular set of circumstances (aka, circumstance group) i, K is the number of such groups, $\bar{p}$ is the prevalence in the overall population, and w_i is a population sampling weight of each group i. D ranges from 0 (perfect between-group equality) to 1 (perfect inequality), and can be interpreted as the fraction of the overall access to ECD opportunities that would have to be reallocated to obtain equality of opportunities.

To delineate the various circumstance groups, we use mother's and father's employment status and education, household wealth, residence in urban/rural and economically privileged/ disadvantaged regions (typically governorates identified as high/low-income), sex of the household head, and sex of the child. All explanatory variables are transformed into sets of mutually-exclusive binary variables. These variables, in their binary form, are used to distinguish children and households living in clearly different circumstances.

[1] An affirmative response to any of the following statements is taken as evidence of violent disciplining: shaking a child; shouting, yelling or screaming at a child; spanking, hitting or slapping a child on bottom with bare hand; hitting a child on the bottom or elsewhere with a belt, brush, stick, or another instrument; calling a child dumb, lazy or another name; hitting or slapping a child on the face, head or ears; hitting or slapping a child on the hand, arm or leg; beating a child up as hard as one could.

Next we estimate the socio-economic determinants of children's ECD opportunities – particularly the role of mothers' employment status. This is done by the means of probit regressions of the various ECD outcomes on mothers' employment status and other circumstances as listed above (Roemer 1998). Probit models account for population sampling weights, and coefficient standard errors are corrected for heteroskedasticity and autocorrelation within sampling clusters of households.

To understand the marginal association of each household characteristic with children's access to ECD, Shorrocks-Shapley decomposition is used and Shapley values are estimated. The individual marginal impact of a characteristic *j* is estimated as the average of all changes that occur to *D* when *j* is added to all possible subsets of circumstances that exclude from consideration characteristic *j* (subset *S* of *K* household characteristics, each subset drawn, *s*, numbering n_s characteristics) among the set of all *K* existing circumstances (Shorrocks 1982, 2013):

$$D_j = \sum_{s \in S} \frac{n_s!\,(K - n_s - 1)!}{K!} [D(s, j) - D(s)]$$

Here *D(s)* is the dissimilarity index without the consideration of the characteristic *j*, and *D(s,j)* is the index with *j* considered in the delineation of circumstance groups. The summation is over all *s* possible subsets of characteristics. Normalized Shapley values in percentage form are reported, computed as: $M_j = D_j/D$, interpreted as the fraction of all inequality explainable by observable household characteristics that is due to the characteristic *j*.

Identifying the impact of mothers' employment status

To test the relationship between mothers' employment type and children's ECD outcomes formally and causally, a careful estimation strategy that takes into consideration potential endogeneity is employed. In particular, women may work more or less because of child malnutrition or low education, and therefore reverse causality is a potential problem. Additionally, the same independent variables that may affect child malnutrition, such as household wealth or the partner's earning capacity, may also affect women's employment. Finally, omitted variables including individuals' predispositions may lead to spurious estimates on the employment–ECD relationship.

We therefore use an instrumental variables (IV) approach taking the regional average employment rates for females in each employment category as an instrument for an individual female's employment. The individual level data are thus combined with district level data on

sector of employment, industry and job type from Labor Force Surveys as a measure of labor market conditions at the region of residence level. We use a standard two-stage least-squares (2SLS) model as follows:

$$Y_{ijr} = \beta_1 + \beta_2 Emp_{jr} + \beta_3 X_{ijr} + \varepsilon_{ijr} \quad (1)$$

$$Emp_{jr} = \alpha_1 + \alpha_2 k_{1r} + \alpha_3 k_{2jr} + \varphi_{jr} \quad (2)$$

where Y_{ij} is the ECD outcome variable of child *i's* health/education born to mother *j* in region *r*, Emp_j is a variable that represents either female employment status or type of employment (sector/permanent or temporary/occupation, etc.), X_{ij} is a vector of observable characteristics of the child, mother and their household, including child's age, gender, father's employment status, mother's and father's education, number of children, marital status, region of residence, and year. In equation (2), k_1 is the set of exogenous IVs including the average prevalence of employment/job type of women, mean wage, and mean employer characteristics by region, k_2 is a vector of control variables associated with female employment, and φ is an error term. k_1 must be strongly associated with mothers' employment/job type, and must be excluded from the structural equation (1), for this equation to be well identified. Regressions are estimated on pooled countries as well as by country (results available on request).

Data

We use data from sets of up-to-date health surveys for all sixteen low- and middle-income Arab countries and years 2002–2015. All together this encompasses 34 surveys. (Refer to Table A1 in the appendix.) We examine the role of the type of jobs (agricultural/non-agricultural), type of earnings (cash/in-kind/not paid), type of employer (family member/non-family member/self-employed), and continuity of employment (all-year/seasonal/occasional) available to women in explaining ECD outcomes for children and how this role has changed over time, how it varies by other household and macro indicators within and between countries in the region. Children's educational outcomes are measured by child school enrollment, as well as grade repetition and dropout. Children's health outcomes are assessed by child malnutrition indicators – being stunted, wasted, underweight and overweight – based on children's anthropometric scores (height-for-age, weight-for-height, and weight-for-age Z-scores) and WHO standards for each child's height, age, and gender.

IV. Descriptive statistics of ECD outcomes and mothers' role

Distribution of the various indicators of children's ECD across the sixteen countries, and their association with parents' economic status is presented next. The presentation is broken down into three subsections: The first subsection briefly reviews children's typical access to ECD opportunities across Arab countries and years, and inequality in within-country access to ECD opportunities across socioeconomic groups. The next subsection reports on the decomposition of inequality according to the contributions by households' various socio-economic characteristics, with an emphasis on maternal employment status. The distribution of maternal employment status is also presented.

The level and inequality of ECD opportunities

Table 1 shows the mean rate of access to the various ECD opportunities across 34 surveys from sixteen Arab countries. Multiple waves for the majority of countries (i.e., Algeria, Djibouti, Egypt, Iraq, Jordan, Mauritania, Morocco, Palestine, Sudan, Syria, Tunisia and Yemen) facilitate intertemporal comparisons, as well as mitigate the problem of missing values of some indicators in each wave.

Table 1 shows that across Arab countries, access to ECD opportunities is generally poor, with an average of only 61 percent of women benefiting from adequate prenatal doctor visits, 48 percent of children being fully vaccinated, and 54 percent of children having access to iodized salt. Children's health outcomes correspond to these inadequate opportunities: 3.7 percent die before their first birthday, 21 percent are stunted, and 12 percent are significantly underweight. Only 51 percent of children engage in adequate developmental activities at home, and only 31 percent of 3–4 year-olds and 21 percent of 5–6 year-olds attend formal preschool programs. This may reflect public under-spending on pre-primary education, which increases the burden on families with children, and affects disproportionally harshly children from poor socio-economic backgrounds. Finally, 90 percent of children are subject to violent disciplining, and 30 percent are asked to perform work within or outside of home, discouraging them from attending formal education.

ECD opportunities vary vastly across Arab countries. Access to prenatal and delivery care varies from being available to circa one half of all women in Morocco, Sudan, Tunisia and Yemen to a near universal coverage in Jordan and Palestine. Vaccination coverage varies from one tenth of all children in Somalia to nine tenths in Algeria, Jordan and Palestine. Mortality

within the first year of life varies from 2 percent in Jordan and Palestine to over 8 percent in Somalia. Prevalence of stunting varies from less than 8 percent in Jordan, Palestine and Tunisia to over 30 percent in Djibouti, Somalia and Yemen. Salt iodization reaches less than two percent of children in Somalia to over 90 percent in Comoros.

Only 27 percent of children in Djibouti engage in cognitive developmental activities, compared to 79 percent in Palestine. Attendance of formal pre-school programs ranges from 2 to 59 percent among 3–4 year-olds and from 4 to 94 percent among 5–6 year-olds across countries, the lowest attendance rates occurring in Djibouti, Iraq, Mauritania and Somalia, and the highest in Morocco and Palestine. Finally, the prevalence rates of violent disciplining and child labor are high across all included countries, with Djibouti, Iraq and Syria on the lower end, and Egypt, Morocco, Palestine and Tunisia on the higher end.

Table 2 supplements table 1 by evaluating *dissimilarities* within countries, that is, the disparity in opportunities for ECD that should be bridged to achieve equal opportunities across demographic groups in each country. For most ECD indicators, between 5 and 30 percent of relevant ECD opportunities should be redistributed across socio-economic groups if inter-group equality of opportunities were the policy aim. Current distribution within Arab countries thus appears to be quite unequal. The fraction to be redistributed is lowest for violent disciplining, followed by parental development activities and prenatal care. The fraction to be redistributed is greatest for preschool programs followed by neonatal and infant mortality, which vary systematically and significantly across socio-economic classes. Algeria, Egypt, Jordan, Palestine and Syria have the lowest degrees of dissimilarity across most ECD indicators that could be redistributed; Mauritania, Morocco, Tunisia and Yemen have a median degree; and Somalia and Sudan have the highest degree.

The role of mother's employment status in IOp for ECD

Table 3 reports the fractions of the dissimilarity in ECD opportunities across national populations that can be attributed to mothers' employment status. (Similar tables with the contributions of household wealth, father's employment, both parents' education, rural vs. urban residence, and region are available on request.) Mother's employment status is shown to account for 15–25 percent across most countries and ECD indicators, which is a significant share trailing only household wealth in driving the inequality in children's access to ECD opportunities.

Mother's employment status affects ECD opportunities most significantly in Palestine, where it drives particularly the disparity in child mortality and stunting, while it is far less influential in

Somalia, Djibouti, Iraq, Mauritania and Morocco. Mother's employment status seems to explain well the disparities in prenatal and delivery care, child mortality, stunting and preschool attendance during 3–4 years of age, but not access to iodized salt and the subjection to violent disciplining and child labor.

Over time the role of mothers' employment status fluctuates, but does not grow or decline in importance. The trends differ across different ECD indicators. Whether the contribution of mothers' employment status can be viewed as direct and causal is also unclear, since most evaluated characteristics are significantly correlated with one another and many other relevant variables were omitted as unavailable. These issues have likely confounded the estimation of individual contributions. In light of this, the following section reports on a formal undertaking of linking children's developmental outcomes causally to their mothers' employment status.

V. Main results

Our formal estimates for the role of mothers' employment are presented in this section. First we report the results of baseline OLS regressions, showing the specific associations of mothers' employment outcomes and occupations and children's nutrition outcomes, while controlling for children's other socioeconomic circumstances. Next, we present the results of instrumental variables regressions identifying the causal impacts of women's employment and occupation. The sample for the regressions is made up of pooled survey rounds for three middle-income Arab countries in similar (and thus comparable) socio-economic circumstances: Egypt (1988, 1992, 1995, 2000, 2005, 2008, 2014), Jordan (1990, 1997, 2002, 2007, 2009, 2012) and Morocco (1987, 1992, 2003).[2] This yields a large sample of nearly 90,000 observations, in which we can assess differences across household types, across regions and countries, and over time. Figure 1 illustrates the distribution of children's anthropometric outcomes across the included survey rounds, showing substantial differences across both space and time.

OLS regression results

Tables 4 and 5 present pooled OLS regressions of the association between maternal employment and children's anthropometric outcomes across the three countries. Table 4 presents

[2] The current draft of the paper does not use all up-to-date health surveys, some of which have only recently become available to the public. The regression analysis has been performed only on a subset of countries and indicators (i.e., anthropometrics), for testing purposes. A revised version of the paper with an updated and consistent set of surveys and indicators will be available over the next month.

the estimated effects of broad maternal employment status. The results reveal that there is no statistically significant effect on stunting, however maternal employment is significantly associated with higher weight for height – hence, reducing wasting – and with higher weight for age – hence reducing the incidence of underweight among children.

Examining the role of specific occupation types in Table 5, we see clearer distinctions. The prevalence of stunting, wasting and underweight is significantly lower among professionally employed mothers. Agricultural occupations, however, are associated with a lower stunting z-score (higher prevalence of stunting), while there is no significant association in the case of clerical occupations. For wasting, having a working mother is associated with a higher z-score of weight for height and hence lower prevalence of wasting, and this is regardless of the exact occupation of the mother. Weight for age, measuring overweight or underweight, is only significantly positively associated with a professional maternal occupation, while it is not significant for agricultural and clerical occupations.

2SLS regression results

Tables 6 and 7 present the results of our 2SLS estimation with instrumental variables. Regressing the various anthropometric z-scores on maternal employment (without differentiating occupation types) implies an overall positive effect on all malnutrition indicators. Mothers employment causes less prevalence of stunting, wasting and underweight; however, it may increase the risk of being overweight. In Table 7 we differentiate mothers' occupation. As with the OLS regressions, these results confirm that having a mother in a professional occupation results in lower prevalence of stunting, wasting and underweight. However, having a mother in an agricultural or clerical occupation results in a higher prevalence of stunting, and a lower prevalence of wasting. The results for underweight are mixed: mothers' occupation in agriculture is causally linked to lower prevalence of underweight, but clerical occupations are responsible for a higher prevalence of underweight.

The results suggest that the positive effect of women's employment and better-quality occupation is especially important for the development of daughters (relative to sons), but the effects differ by children's age and living conditions in a complex way, and should be studied more carefully. The 'employment' effects are also exacerbated in the presence of indoor pollution and poor access to utilities including water/sanitation and clean energy, once again calling for more careful analysis in follow-up work.

Unpacking the effects of country and year fixed effects, we re-estimate the regressions by country, with year indicators included among regressors (available on request). These country-level regressions show that the effects of women's employment and occupation are not uniform across countries. Over time, the effects have strengthened, potentially reflecting the diminution of public-sector opportunities and generally deteriorating conditions in Arab labor markets for married and child-bearing women over the past decade.

VI. Policy implications

Low typical levels of opportunities for ECD and high inequality in them across socioeconomic groups are major social challenges in the Arab region, as stressed in the extant IOp literature. This study focused on assessing the contribution of mothers' labor market status and employment type to explaining the ECD gaps. Children's developmental outcomes were measured by several indicators.

The study points to several important findings. First, we confirm that Arab children in general receive inadequate access to qualified prenatal and delivery care, many fail to be vaccinated or receive an inadequate supply of iodine. Disproportionately many children thus become stunted and underweight, or die before their first birthday. Significant deficiencies exist in children's cognitive development: enrolment in nurseries and pre-school programs, cognitive stimulation at home, violent disciplining and exploitation of children for housework. Second, our data confirm that the surveyed young mothers tend to hold lower-level, precarious work relative to observed out-of-survey benchmarks for all women. Third, mothers' employment affects children's outcomes systematically and significantly, with more-formal positions in the labor market being responsible for generally better nutritional outcomes for children. This is the case for children's risk of stunting and wasting, and across most occupation types also for being underweight, but the effects on the risk of being overweight are mixed.

These results thus suggest that the type of jobs available to women is an important determinant of health outcomes for children. This study therefore sheds light on an important topic that has clear policy implications, not least considering the protracted labor-market recovery from the pandemic, and deteriorating water and energy security in the region.

It should be noted that our study is not conclusive about all types of labor market engagement of women. The role of self employment versus wage employment, and fulltime work versus seasonal or occasional work should be examined in follow-up studies.

Social norms in the region consider mothers as those mainly in charge of the well-being of the family, children, and household responsibilities. According to the United Nations, "based on data between 2000 and 2016 from about 90 countries, women spend roughly three times as many hours in unpaid domestic and care work as men"[3]. In addition to these responsibilities, women take paid jobs that are as challenging as those taken by their counterpart males and work for similar numbers of hours. Identifying whether female employment has a negative impact on health outcomes for children, and in particular whether specific types of jobs are especially detrimental can help policy makers devise a well targeted set of policies to support working mothers and their children in the most problematic sectors/jobs to maximize the wellbeing of societies. Such interventions can be in the form of more "family conscious" laws and regulations that stipulate, for example, for allowing breastfeeding or pumping breastmilk at work, making special accommodations for such purposes available by law. Policy makers can also provide cash support for child care costs or getting employers to provide on-site daycare centers for children, enhancing the quality and quantity of existing daycare centers and providing additional educational support for children of working mothers in these priority sectors.

Creating less vulnerable and more rewarding "good" job opportunities for women will also go a long way toward ensuring better outcomes for children over the long run. Providing this support for women is pivotal for managing pervasive problems of harmful living conditions among children in Arab developing countries, which are posed to further grow amid deteriorating water and energy security. Supporting women will promote achieving the Sustainable Development Goals (SDGs) that call for gender equality, good health and well-being, quality education, and promoting productive labor and supporting decent work for all.

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Table 1. ECD indicators' levels across Arab countries (Children or women with access to ECD, %)

	Prenatal care	Prenatal visits: 4+	Skilled delivery	Full immun.	Neonatal mortality	Infant mort.	Stunted	Under-weight	Wasted	Iodized salt	4+ dvlp. activities	ECCE 3-4yrs	ECCE 5-6yrs	Violent discipl.	Child labor
Algeria '02	79.2	52.5	94.4	91.8	0.7	1.0	23.2	11.1	10.6	.	.	.	.	.	.
Algeria '06	89.4	55.8	95.2	89.2	.	.	12.4	4.1	3.9	58.4	61.7	8.9	23.9	86.2	22.2
Comoros '12	92.4	57.4	83.8	63.7	2.1	3.3	29.6	15.6	11.1	91.0	.	.	.	.	25.0
Djibouti '06	92.3	.	92.9	45.7	.	.	32.6	30.3	30.1	.	26.5	14.1	6.4	69.6	18.6
Djibouti '12	87.9	26.6	87.4	20.6	.	.	33.5	29.9	22.3	.	36.6	.	.	36.2	.
Egypt '05	69.8	59.2	74.6	81.7	1.9	3.1	17.6	6.1	3.8	72.6	.	31.6	10.7	97.0	24.3
Egypt '08	73.6	.	79.0	91.7	1.6	2.4	28.9	6.0	7.3	76.7	.	40.2	.	.	.
Egypt '14	90.2	82.7	91.6	34.2	1.4	2.3	17.6	6.8	7.6	88.3	.	58.6	.	94.9	45.5
Egypt '15	.	.	.	.	.	.	13.5	1.8	1.5	.	.	50.6	.	.	.
Iraq '06	78.9	67.8	59.8	50.6	2.2	3.3	23.8	8.2	6.0	24.9	44.4	2.5	4.1	86.2	13.4
Iraq '11	77.7	50.8	90.8	64.3	2.0	3.1	21.7	6.9	6.4	24.4	53.5	3.8	7.0	77.2	10.1
Jordan '07	98.8	94.2	99.0	86.7	1.5	2.1	14.4	5.3	7.2	.	.	.	.	.	.
Jordan '09	.	.	.	.	1.4	2.1	8.0	1.8	1.5	.	.	.	.	.	.
Jordan '12	99.1	94.5	99.6	93.0	1.5	1.8	7.6	.	.	.	81.6	21.7	.	91.3	.
Lebanon '04	.	.	.	.	.	.	18.1	5.2	6.6	89.9	.	92.9	.	.	.
Libya '07	93.8	75.5	98.7	85.8	1.1	2.7	21.0	5.6	7.0	52.5	.	5.3	.	.	7.1
Mauritania '07	73.9	.	57.9	36.5	.	.	26.9	30.4	13.3	1.6	36.1	7.2	.	.	.
Mauritania '11	33.7	17.4	29.0	31.9	.	.	25.3	28.3	13.2	7.9	.	.	.	.	.
Morocco '04	67.9	30.6	62.9	89.6	2.5	3.8	23.1	9.9	11.6	.	.	.	.	.	.
Morocco '06	.	.	.	.	.	.	.	.	.	19.6	58.0	40.2	42.4	95.8	19.4
Morocco '11	77.6	41.8	23.3	51.9	.	.	.	.	.	.	34.8	.	.	.	.
Palestine '04	98.4	86.4	91.6	94.5	2.3	4.0	11.0	6.1	3.4	68.2	.	.	71.1	.	.
Palestine '06	98.5	90.4	97.7	85.9	.	.	11.9	2.3	2.0	87.7	68.3	34.1	.	95.4	15.3
Palestine '10	98.6	94.2	68.2	92.7	1.3	2.0	10.9	3.7	3.3	79.5	66.6	17.7	94.3	92.3	31.4
Palestine '14	99.4	96.0	99.6	87.3	1.0	1.7	7.4	1.4	1.2	73.8	79.0	26.9	90.0	94.1	.
Somalia '06	--	--	--	9.7	3.8	8.4	38.1	36.3	11.8	1.5	65.0	2.3	13.6	.	52.1
Sudan '06	60.0	38.9	62.1	27.9	.	.	.	.	.	11.4	.	.	.	.	.
Sudan '10	64.7	59.3	25.7	44.2	2.9	5.0	34.2	29.4	15.2	10.2	.	20.4	30.6	.	.
Syria '06	83.3	.	91.4	34.9	.	.	25.1	11.0	10.4	.	59.8	7.4	44.1	85.7	12.3
Syria '09	87.8	69.2	96.3	33.3	.	.	25.8	11.2	11.8	30.4	55.0	17.2	32.9	58.1	3.3
Tunisia '06	53.0	65.2	--	85.5	.	.	6.4	3.4	2.8	.	53.8	27.3	--	98.5	.
Tunisia '11	98.1	85.5	98.6	89.6	1.2	1.7	10.1	2.3	2.8	.	71.1	44.5	--	94.9	24.0
Yemen '03	44.4	31.6	28.8	37.20	2.2	4.6	.	.	.	.	.	.	.	.	.
Yemen '06	47.0	.	35.7	40.7	4.0	7.1	53.1	45.6	12.4	.	25.5	2.7	.	93.2	15.8
Yemen '13	61.0	25.3	43.6	43.5	2.5	4.0	46.3	38.9	16.4	49.0	.	.	.	80.0	.

Notes: "." Unavailable due to missing data. "—" non-representative due to estimation issues such as small sample sizes.
Access to prenatal and delivery care is evaluated among women who gave birth in the past 2 years; the rest of indicators are evaluated among children.

Table 2. Inequality in ECD opportunities: Opportunities to be redistributed (*Dissimilarity index*, initial–final wave %)

	Prenatal care	Prenatal visits: 4+	Skilled delivery	Full immun.	Neonatal mortality	Infant mort.	Iodized salt	Stunted	Under-weight	Wasted	4+ dvlp. Activities	ECCE 3-4yrs	ECCE 5-6yrs	Violent discipl.	Child labor
Algeria '02–'06	7.7–4.6	. –14.0	2.4–2.6	2.2–2.8	13.9–.	14.7–.	. –13.2	9.9–14.8	.–20.9	.–15.3	.–7.2	.–33.4	.–30.1	.–2.9	.–6.5
Comoros '12	2.3	11.6	6.8	14.0	37.4	30.6	1.9	15.0	19.3	13.2	.	.	.	.	14.6
Djibouti '06–'12	2.5–6.4	.	3.0–9.6	8.2–22.2	.	.	.	12.7–9.6	12.1–.	8.5–.	15.7–13.9	35.1–34.6	38.2–.	7.1–11.6	23.3–23.2
Egypt '05–'08–'14–'15	12.1–9.0–3.3–.	16.6–12.1–5.4–.	10.9–9.0–3.4–.	2.6–1.7–7.2–.	18.1–24.9–21.2–.	20.3–20.3–17.9–.	10.7–8.1–4.1–.	12.2–9.0–11.5–2.6	15.2–12.1–14.2–0.6	17.1–12.4–8.4–0.6	.	25.7–21.8–15.2–.	34.3–.–.–.	0.7–.–1.0–.	12.1–.–10.8–.
Iraq '06–'11	6.4–20.9	11.9–10.1	7.4–2.9	13.4–8.6	11.0–9.7	8.2–6.1	21.9–20.3	9.1–7.1	6.8–8.5	7.6–7.0	10.5–12.6	41.2–43.5	42.2–44.9	4.9–2.6	12.9–17.0
Jordan '07–'09–'12	0.6–.–0.5	1.5–.–1.8	0.4–.–0.2	3.9–.–2.3	33.6–37.8–19.7	27.8–28.4–20.3	.	18.9–19.6–24.1	26.3–30.4–27.8	18.8–34.3–24.2	. –.–3.4	. –.–24.4	. –.–	. –.–3.5	. –.–
Lebanon '04	.	.	.	.	.	.	2.8	22.2	21.8	23.7	.	3.5	.	.	.
Libya '07	2.0	5.1	0.8	3.0	28.6	23.2	16.1	5.1	11.1	9.0	.	28.4	.	.	25.8
Mauritania '07–'11	9.5–16.2	.–22.2	25.6–22.3	12.3–17.2	.	.	29.6–25.1	11.3–14.3	16.6–17.4	16.3–18.2	12.0–.	35.5–.	.–.	.–.	.–.
Morocco '04–'06–'11	14.3–.–11.4	.–.–25.7	19.6–.–22.6	3.6–.–7.4	19.5–.–.	19.8–.–.	.–32.2–.	16.1–.–.	.	. –32.2–.	.–15.0–22.2	. –36.7–.	.–32.6–.	.–1.9–.	. –24.6–.
Palestine '04–'06–'10–'14	0.5–0.5–0.3–0.2	4.3–2.3–1.4–0.8	3.1–0.8–4.3–0.2	1.4–2.6–2.2–3.3	12.4–.–11.2–39.0	13.4–.–11.4–33.8	8.5–1.0–7.1–5.0	9.3–13.4–9.8–11.3	11.7–11.4–9.9–19.9	18.2–14.4–10.8–23.2	.–4.7–6.2–4.0	. –12.2–15.2–14.8	5.7–.–1.5–2.7	.–0.9–1.3–1.4	. –15.7–16.4–.
Somalia '06	.	.	.	45.2	12.2	5.9	29.4	16.5	16.6	16.7	3.9	46.4	59.1	.	9.6
Sudan '06–'10	20.4–18.7	24.4–17.3	16.1–41.6	33.8–15.8	.–89.3	.–86.2	58.1–54.2	.–14.9	.–14.7	.–9.9	.–.	.–.	.–.	.–.	.–.
Syria '06–'09	6.8–5.1	.–8.1	4.3–2.2	7.6–8.6	.	.	.–32.2	12.5–13.0	15.0–13.4	15.2–11.9	10.3–14.0	37.7–41.1	17.2–10.6	2.1–16.4	12.0–31.5
Tunisia '06–'11	18.7–0.8	10.2–3.5	.	4.8–4.4	.–40.0	.–33.4	.	26.0–19.8	38.5–28.0	29.0–22.9	17.8–11.8	34.3–25.5	.–.	0.9–.	.–21.7
Yemen '03–'06–'13	17.4–16.8–14.5	25.3–.–32.0	20.6–.–22.9	26.1–20.6–14.4	16.4–.–19.3	12.5–15.5–16.2	.–.–17.4	4.9–.–12.3	.–.–13.7	.–.–12.2	.–19.3–.	.	.	.–.–4.3	.–25.1–.

Legend: Only surveys with anthropometric indicators are retained. Light green background indicates improvement of values over time; darker red color indicates worsening. When information from three waves shows a non-monotonic trend, comparison of the first wave and the third wave is used. Reported numbers are the percentages of the levels of access to ECD opportunities that should be redistributed to achieve equality of access across evaluated socio-economic groups. "." Unavailable due to missing data in all waves.
Access to prenatal and delivery care is evaluated among women who gave birth in the past 2 years; the rest of indicators are evaluated among children.

Table 3. Contribution of Mother's Employment Status to Inequality in ECD Opportunities (%)

	Prenatal care	Prenatal visits: 4+	Skilled delivery	Full immun.	Neonatal mortality	Infant mort.	Stunted	Under-weight	Wasted	Iodized salt	4+ dvlp. activities	ECCE 3-4yrs	ECCE 5-6yrs	Violent discipl.	Child labor
Algeria '02	36.96	36.55	29.89	41.70	34.00	17.42	38.42	29.88	59.96	.	.	.	.	.	.
Algeria '06	32.26	35.80	23.59	32.55	.	.	24.93	17.81	4.92	25.80	19.58	26.06	28.26	2.64	15.87
Comoros '12	32.81	24.79	23.99	12.75	18.72	21.90	19.99	29.70	31.72	--	.	.	.	.	--
Djibouti '06	6.67	.	3.79	19.32	.	.	10.51	5.06	2.35	.	12.73	21.31	24.98	33.18	6.07
Djibouti '12	5.43	13.19	4.48	2.12	.	.	1.75	2.24	1.12	.	5.11	.	.	0.91	.
Egypt '05	32.58	27.54	36.14	22.56	24.89	37.66	10.24	13.23	24.19	7.93	.	4.82	5.13	9.71	8.78
Egypt '08	28.46	.	23.61	11.47	.	.	4.46	.	.	14.55	.	25.96	.	.	.
Egypt '14	31.91	31.50	36.50	11.61	28.94	29.20	16.87	18.02	5.94	6.48	.	12.92	.	7.52	16.38
Egypt '15	.	.	.	.	.	.	31.60	21.59	18.12	.	.	37.40	.	.	.
Iraq '06	6.00	6.94	7.96	23.13	13.54	37.18	20.93	38.42	26.40	9.45	20.15	21.95	15.43	11.82	3.36
Iraq '11	23.64	.	18.10	17.01	11.81	28.75	10.83	.	.	9.66	24.18	21.09	.	8.88	15.49
Jordan '07	31.14	30.01	45.19	13.64	24.30	27.78	14.31	16.54	11.07	.	.	.	.	.	.
Jordan '09	.	.	.	.	39.27	34.49	28.81	49.03	26.12	.	.	.	.	.	.
Jordan '12	15.53	.	.	.	.	20.30	.	.	.	.	.	.	.	.	.
Lebanon '04	.	.	.	.	.	.	24.88	37.68	19.42	45.19	.	35.20	.	.	.
Libya '07	.	40.73	17.71	34.02	13.35	20.62	9.71	15.76	5.15	4.76	.	16.06	.	.	9.97
Mauritania '07	8.72	.	9.33	14.98	.	.	12.62	12.68	11.51	18.38	12.74	25.45	.	.	.
Mauritania '11	37.29	33.82	39.25	5.70	.	.	9.05	10.89	6.65	5.56	.	.	.	.	.
Morocco '04	20.55	22.96	18.12	12.59	14.56	18.79	10.86	7.98	3.08	.	.	.	.	.	.
Morocco '06	.	.	.	.	.	.	.	.	.	4.61	9.18	8.09	9.00	6.79	16.28
Morocco '11	19.82	18.72	7.95	10.48	.	.	.	.	.	.	19.83	.	.	.	.
Palestine '04	14.82	6.49	6.48	43.42	26.91	43.60	30.31	17.69	13.17	1.86	.	.	23.11	.	.
Palestine '06	23.85	13.77	5.21	3.79	.	.	11.16	11.73	7.18	5.14	27.10	41.75	.	16.24	8.80
Palestine '10	23.87	29.82	10.76	1.96	3.09	8.19	19.46	7.57	9.40	2.58	14.33	26.95	9.37	6.87	6.22
Palestine '14	4.26	15.04	5.14	3.65	81.23	88.20	42.72	44.87	2.47	5.84	13.81	26.33	24.39	3.62	.
Somalia '06	--	--	--	2.71	18.57	26.51	7.47	7.82	2.57	12.54	3.72	7.80	12.89	.	17.76
Sudan '06	13.85	22.96	29.61	13.43	.	.	.	.	.	3.51	.	.	.	.	.
Sudan '10	14.22	16.43	6.70	22.39	88.01	88.32	25.88	17.77	10.91	0.73	.	29.68	5.75	.	.
Syria '06	29.51	.	21.10	32.37	.	.	23.59	19.80	12.02	.	22.55	29.49	26.69	14.98	15.21
Syria '09	.	.	.	23.37	.	.	18.30	22.19	7.82	12.70	16.53	35.49	13.86	2.30	3.02
Tunisia '06	19.88	24.69	--	5.85	.	.	18.09	18.06	11.62	.	17.12	20.86	--	12.07	.
Tunisia '11	.	.	--	20.07	6.62	7.03	10.33	.	.	.	19.26	8.75	--	.	12.70
Yemen '03	21.33	18.27	15.39	13.87	17.05	10.37	.	.	.	.	.	.	.	.	.
Yemen '13	19.60	18.93	22.43	10.88	19.39	13.71	16.75	14.94	5.08	10.96	.	.	.	13.25	.

Notes: Access to prenatal and delivery care is evaluated among women who gave birth in the past 2 years; the rest of indicators are evaluated among children.
Reported numbers are the Shapley decomposition values in percentage form – percentages of the differences in access to ECD opportunities across socio-economic groups that can be attributed to mother's employment, rather than to household wealth, father's employment, both parents' education, urban/rural residence, and residence in privileged/disadvantaged regions. Sex of children and of household heads is also used in all models except those of prenatal/delivery care and child mortality. "." Indicates unavailable due to missing data. "--" indicates unavailable due to estimation issues such as small sample sizes, missing variables, or perfect collinearity or perfect prediction of outcomes among selected explanatory variables.

Table 4. Baseline OLS regressions of children's anthropometric indicators on maternal employment

VARIABLES	(1) Stunting (height for age) z-score	(2) Wasting (weight for height) z-score	(3) Weight for age z-score
Mother currently working (Yes=1, No=0)	0.013	0.060***	0.050***
	(0.017)	(0.014)	(0.011)
Gender of child (Female=1, Male=0)	0.117***	0.023**	0.080***
	(0.011)	(0.010)	(0.008)
Number of Children in household	-0.039***	-0.028***	-0.042***
	(0.005)	(0.004)	(0.004)
Region (Rural=1, Urban=0)	-0.123***	0.052***	-0.037***
	(0.014)	(0.012)	(0.010)
Age of Mother	-0.004***	-0.004***	-0.005***
	(0.001)	(0.001)	(0.001)
Mother's education (Secondary or higher=1, Primary or lower=0)	0.105***	0.002	0.062***
	(0.016)	(0.014)	(0.011)
Marital Status (Married=1, Not Married=0)	0.056	-0.034	0.005
	(0.050)	(0.043)	(0.035)
Father's Occupation (Professional=1, Other=0)	0.070***	-0.001	0.036***
	(0.016)	(0.014)	(0.011)
Father's education (Secondary or higher=1, Primary or lower=0)	0.066***	0.022*	0.056***
	(0.015)	(0.013)	(0.011)
Female headed household	0.009	-0.034	-0.022
	(0.028)	(0.024)	(0.019)
Wealth Quintile 1	-0.348***	-0.108***	-0.269***
	(0.024)	(0.021)	(0.017)
Wealth Quintile 2	-0.225***	-0.063***	-0.164***
	(0.024)	(0.020)	(0.016)
Wealth Quintile 3	-0.131***	-0.034*	-0.090***
	(0.022)	(0.019)	(0.015)
Wealth Quintile 4	-0.081***	-0.013	-0.054***
	(0.021)	(0.018)	(0.015)
Country and year fixed effects	yes	yes	yes
Observations	89,574	89,574	89,574
R-squared	0.048	0.022	0.031

Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Table 5. Baseline OLS regressions of children's anthropometric indicators on maternal employment by occupation

VARIABLES	(1) Stunting (height for age) z-score	(2) Wasting (weight for height) z-score	(3) Weight for age z-score
Mother in a professional occupation	0.106***	0.067***	0.109***
	(0.024)	(0.021)	(0.017)
Mother in an agricultural occupation	-0.123***	0.074***	-0.015
	(0.031)	(0.027)	(0.022)
Mother in a clerical occupation	-0.009	0.055*	0.028
	(0.036)	(0.031)	(0.025)
Gender of child (Female=1, Male=0)	0.117***	0.023**	0.080***
	(0.011)	(0.010)	(0.008)
Number of Children in household	-0.039***	-0.028***	-0.042***
	(0.005)	(0.004)	(0.004)
Region (Rural=1, Urban=0)	-0.120***	0.051***	-0.036***
	(0.014)	(0.012)	(0.010)
Age of Mother	-0.004***	-0.004***	-0.005***
	(0.001)	(0.001)	(0.001)
Mother's education (Secondary or higher=1, Primary or lower=0)	0.095***	0.000	0.056***
	(0.017)	(0.014)	(0.011)
Marital Status (Married=1, Not Married=0)	0.055	-0.036	0.003
	(0.050)	(0.043)	(0.034)
Father's Occupation (Professional=1, Other=0)	0.058***	-0.002	0.028**
	(0.016)	(0.014)	(0.011)
Father's education (Secondary or higher=1, Primary or lower=0)	0.061***	0.022	0.054***
	(0.015)	(0.013)	(0.011)
Female headed household	0.010	-0.034	-0.022
	(0.028)	(0.024)	(0.019)
Wealth Quintile 1	-0.338***	-0.109***	-0.264***
	(0.024)	(0.021)	(0.017)
Wealth Quintile 2	-0.218***	-0.063***	-0.160***
	(0.024)	(0.020)	(0.016)
Wealth Quintile 3	-0.128***	-0.033*	-0.088***
	(0.022)	(0.019)	(0.015)
Wealth Quintile 4	-0.081***	-0.013	-0.053***
	(0.021)	(0.018)	(0.015)
Country and year fixed effects	Yes	Yes	Yes
Observations	89,574	89,574	89,574
R-squared	0.048	0.022	0.031

Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Table 6. 2SLS regressions of children's anthropometric indicators on maternal employment

VARIABLES	(1) Stunting (height for age) z-score	(2) Wasting (weight for height) z-score	(3) Weight for age z-score	(4) Stunting (height for age) z-score	(5) Wasting (weight for height) z-score	(6) Weight for age z-score
Mother currently working (Yes=1, No=0)	-0.385***	1.153***	0.622***	0.125	0.941***	0.754***
	(0.0764)	(0.0681)	(0.0531)	(0.0814)	(0.0720)	(0.0574)
Gender of child (Female=1, Male=0)	0.118***	0.0234**	0.0809***	0.117***	0.0231**	0.0804***
	(0.0115)	(0.0103)	(0.00801)	(0.0114)	(0.0101)	(0.00803)
Number of Children in household	-0.0530***	-0.0166***	-0.0410***	-0.0366***	-0.0200***	-0.0348***
	(0.00511)	(0.00455)	(0.00355)	(0.00513)	(0.00454)	(0.00362)
Mother's education (Secondary or higher=1, Primary or lower=0)	0.319***	-0.151***	0.0705***	0.112***	-0.0573***	0.0230*
	(0.0158)	(0.0140)	(0.0110)	(0.0173)	(0.0153)	(0.0122)
Marital Status (Married=1, Not Married=0)	0.0228	0.0614	0.0569	0.0706	0.0463	0.0721**
	(0.0510)	(0.0455)	(0.0355)	(0.0505)	(0.0447)	(0.0356)
Region (Rural=1, Urban=0)	-0.193***	0.0856***	-0.0546***	-0.124***	0.0179	-0.0623***
	(0.0135)	(0.0121)	(0.00941)	(0.0146)	(0.0129)	(0.0103)
Father's education (Secondary or higher=1, Primary or lower=0)	0.154***	-0.0156	0.0779***	0.0805***	0.00710	0.0536***
	(0.0149)	(0.0133)	(0.0104)	(0.0152)	(0.0134)	(0.0107)
Female headed household	-0.0166	-0.0182	-0.0251	0.0105	-0.0355	-0.0221
	(0.0281)	(0.0250)	(0.0195)	(0.0278)	(0.0246)	(0.0196)
Wealth Quintile 1	-0.138***	-0.139***	-0.173***	-0.345***	-4.89e-06	-0.188***
	(0.0206)	(0.0184)	(0.0144)	(0.0257)	(0.0227)	(0.0181)
Wealth Quintile 2	-0.0447**	-0.0671***	-0.0652***	-0.219***	0.0566**	-0.0733***
	(0.0209)	(0.0186)	(0.0145)	(0.0253)	(0.0224)	(0.0179)
Wealth Quintile 3	0.00288	-0.00642	0.00436	-0.124***	0.0814***	-0.00234
	(0.0204)	(0.0182)	(0.0142)	(0.0240)	(0.0213)	(0.0170)
Wealth Quintile 4	0.00755	0.0118	0.0127	-0.0778***	0.0595***	0.00172
	(0.0194)	(0.0173)	(0.0135)	(0.0219)	(0.0194)	(0.0155)
Country and year fixed effects	no	no	no	yes	yes	yes
Observations	89,574	89,574	89,574	89,574	89,574	89,574

Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

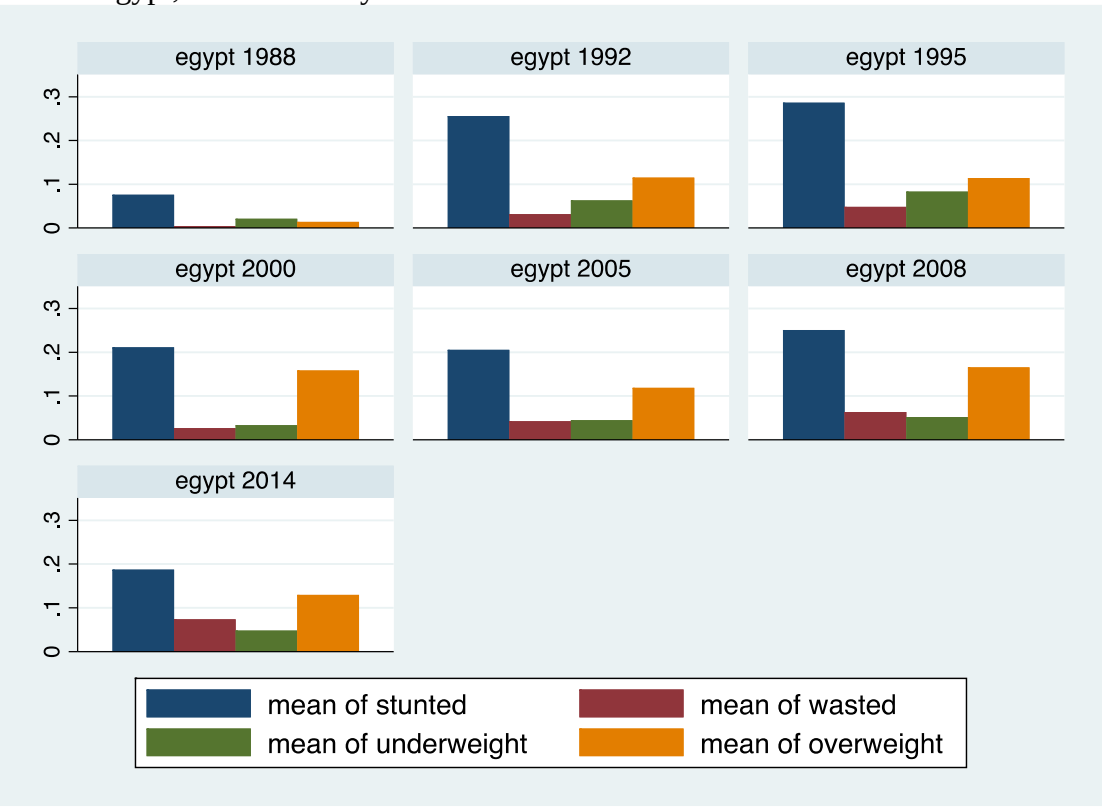
Table 7. 2SLS regressions of children's anthropometric indicators on maternal employment

VARIABLES	(1) Stunting (height for age) z-score	(2) Wasting (weight for height) z-score	(3) Weight for age z-score
Mother in a professional occupation	0.667***	0.349***	0.612***
	(0.133)	(0.110)	(0.0842)
Mother in an agricultural occupation	-1.163***	1.791***	0.655***
	(0.151)	(0.125)	(0.0955)
Mother in a clerical occupation	-4.946***	2.642***	-0.870***
	(0.339)	(0.281)	(0.215)
Gender of child (Female=1, Male=0)	0.116***	0.0262**	0.0821***
	(0.0127)	(0.0105)	(0.00805)
Number of Children in household	-0.0638***	-0.0180***	-0.0482***
	(0.00579)	(0.00479)	(0.00367)
Mother's education (Secondary or higher=1, Primary or lower=0)	0.303***	-0.111***	0.0926***
	(0.0218)	(0.0181)	(0.0138)
Marital Status (Married=1, Not Married=0)	-0.0346	0.0348	0.00487
	(0.0561)	(0.0464)	(0.0355)
Region (Rural=1, Urban=0)	-0.149***	0.0428***	-0.0611***
	(0.0159)	(0.0132)	(0.0101)
Father's Occupation (Professional=1, Other=0)	0.101***	0.0232	0.0771***
	(0.0176)	(0.0146)	(0.0111)
Female headed household	0.0202	-0.0300	-0.0130
	(0.0310)	(0.0257)	(0.0197)
Wealth Quintile 1	-0.196***	-0.152***	-0.217***
	(0.0258)	(0.0214)	(0.0164)
Wealth Quintile 2	-0.110***	-0.0610***	-0.0989***
	(0.0250)	(0.0207)	(0.0158)
Wealth Quintile 3	-0.0674***	0.0167	-0.0197
	(0.0238)	(0.0197)	(0.0151)
Wealth Quintile 4	-0.0644***	0.0468**	-0.00291
	(0.0220)	(0.0182)	(0.0139)
Observations	89,574	89,574	89,574

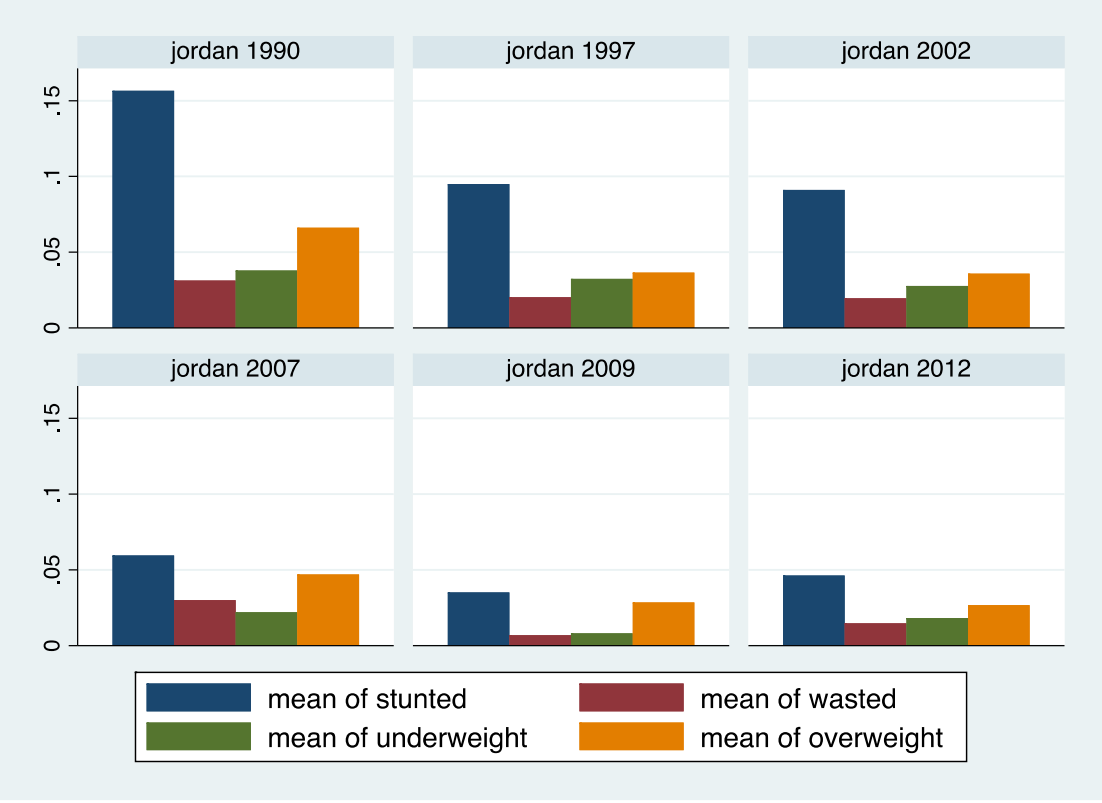
Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Figure 1. Average rates of malnutrition outcomes

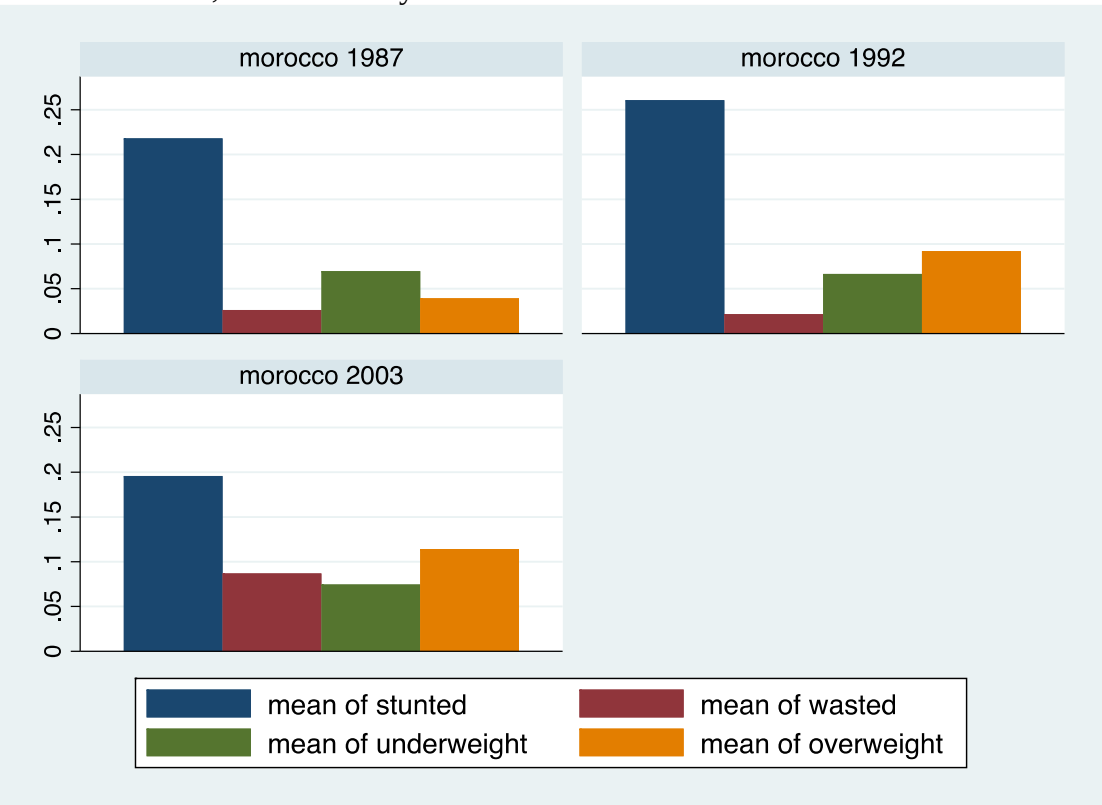
a. Egypt, various survey rounds



b. Jordan, various survey rounds



c. Morocco, various survey rounds



Notes: Stunting: If the child's height for age Z-scores of <-2 SD of the median WHO reference values. Wasting: if the child weight for height Z-score is <-2 SD from the median WHO reference values.
Underweight: if the child's weight for age Z-score is <-2 SD from the median WHO reference values. Overweight: if the child's weight for age Z-score is >2 SD from the median WHO reference values.

Appendix

Table A1. Sample sizes used in various survey modules

	Survey instrument	Households (complete interviews)	Ever-married women 15–49 in women's module (complete int.)	Children younger than 5 covered by responding women (complete int.)	Live births covered by responding women
Algeria '02	PAPFAM/FHS	19,233	7,399	3,383	3,433
Algeria '06	MICS	29,008	43,641	14,593	--
Comoros '12	DHS	4,482	3,094	3,022	2,016
Djibouti '06	MICS	4,888	6,019	2,245	--
Djibouti '12	PAPFAM/FHS	5,771	3,304	4,162	2,973
Egypt '05	DHS	15,842	13,851	13,621	13,851
Egypt '08	DHS	14,733	12,008	10,540	8,367
Egypt '14	DHS	28,175	59,266	56,568	15,848
Egypt '15	Special DHS	7,516	--	10,878	--
Iraq '06	MICS	16,699	27,186	16,469	17,363
Iraq '11	MICS	35,701	55,194	33,908	13,994
Jordan '07	DHS	14,564	11,622	10,876	10,426
Jordan '09	DHS	13,577	10,109	9,407	7,759
Jordan '12	DHS	15,190	10,304	6,350	8,462
Lebanon '04	PAPFAM/FHS	5,532	3,499	1,292	3,365
Libya '07	PAPFAM	11,709	11,920	12,550	--
Mauritania '07	MICS	10,361	12,549	8,672	--
Mauritania '11	MICS	10,320	13,657	9,543	30,335
Morocco '04	DHS	11,513	4,754	5,916	6,180
Morocco '06	MICS/PAPFAM	7,931	6,608	3,721	--
Morocco '11	PAPFAM	15,343	11,069	6,117	--
Palestine '04	DHS	5,799	4,972	4,833	4,974
Palestine '06	PAPFAM	11,509	9,785	10,107	--
Palestine '10	MICS	13,330	11,384	10,070	11,298
Palestine '14	MICS	10,182	13,367	7,816	7,948
Somalia '06	MICS/PAPFAM	5,969	8,438	8,812	6,348
Sudan '06	MICS/PAPFAM	1,000	6,563	8,175	--
Sudan '10	MICS	14,778	18,614	13,282	38,041
Syria '06	MICS	19,019	25,026	11,017	--
Syria '09	PAPFAM	27,385	18,340	17,744	16,566
Tunisia '06	MICS	8,681	6,152	3,050	--
Tunisia '11	MICS	9,171	10,215	2,899	2,977
Yemen '03	PAPFAM/FHS	12,665	11,292	2,011	7,173
Yemen '06	MICS	3,979	3,912	3,918	17,213
Yemen '13	DHS	17,351	16,093	15,367	16,072

Notes: Sample sizes are only partially standardized due to differences in format, variable coverage and missing observations in individual surveys. Sample sizes used in regression models may be lower than these numbers due to missing data for dependent or explanatory variables, or perfect prediction of outcomes among some explanatory variables for some observations. "--" indicates missing data for a particular survey module.

Results based on these data are comparable across socio-economic groups in a country and are representative of the underlying population. This is achieved by a nationally-representative stratified sampling design, the usage of sampling weights, and partial harmonization across DHS, MICS and PAPFAM/FHS surveys. However, not all results are exactly comparable across countries, because of various data issues. Country-selection issues may also be responsible for differences between DHS, MICS and PAPFAM survey data. Because DHS is funded by United States Agency for International Development, surveyed countries tend to be US allies in a lower or transitional state of development (Kuhn 2012:677). The following paragraphs list notable problems limiting our ability to compare quantitative results across countries. The issues fall into the following three categories: 1) differences in sample sizes; 2) differences in sources of variables; and 3) differences in variable definitions across countries.

Sample sizes: Sample sizes affect the representativeness of sample summary statistics for the underlying population, robustness of regression estimates, and sizes of standard errors. As Table A2 shows, sample sizes vary greatly across surveys.

Sources of variables: The following examples illustrate why dependent and explanatory variables are not always exactly comparable across surveys.

Household surveys are split into registers of all household members, household-heads', women's, and children's modules, and birth recode registers. These various parts allow alternative ways for computing variables of interest. Household members' age and education, for instance, are available in raw form as well as imputed. Children aged 5 years and a few days may be included in the children's module along with 59-months old children.

Variable definitions: Information on education and preschool programs differs across countries due to differences in countries' institutions. Various non-standard types of school, levels of schooling and grades exist. As a result, educational achievement is difficult to harmonize across the entire Arab region. Similar issues, to a small degree, arise with immunization, child labor, and violent disciplining in selected countries.

Reference for the Included Surveys

Algeria '02: National Office of Statistics (Algeria), Ministry of Health, Population and Hospital Reform (Algeria), League of Arab States. Algeria Family Health Survey 2002-2003.

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Mauritania '11: National Statistical Office of Mauritania (2014) Mauritanie: Suivi de la situation des femmes et des enfants Enquête par Grappes à Indicateurs Multiples 2011 - Rapport Final. https://mics-surveys-prod.s3.amazonaws.com/MICS4/West%20and%20Central%20Africa/Mauritania/2011/Final/Mauritania%202011%20MICS_French.pdf.
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