Jordanian Household Socioeconomic Conditions and Child Health

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ABSTRACT

This paper examines the effect of Jordanian household circumstances on child health. The main objective is to figure out the extent to which household circumstances matter for child survival and health of surviving children. Repeated cross sectional micro-data from the Demographic and Health Surveys (DHS) for Jordan spanning the period 1997–2009 is used. Logit models and standard linear regression models are employed in the analysis. Main findings may be summarized as follows. Household conditions appear to matter for child survival odds and health of surviving children. Boys' survival odds ratio is about quarter to one-third less than girls. However, surviving boys are on average taller than girls. Chances of surviving increases with child birth order, whereas birth order is negatively associated with height of survivors. Education of the mother enhances the chances of child surviving by 60-120%, and increases the child height. Given age, effects of mother education is more significant for boys compared to girls. Physician care during conception is positively associated with the health of survivors. Ownership of refrigerator is positively associated with child height. Finally, children in urban areas show better health compared to their counterparts in rural areas.

Keywords: Child survival; Child height; Household circumstances; Mother education; prenatal care; DHS data; Jordan.

INTRODUCTION

While economic growth allows better nutrition and medical care, health plays an important role for economic growth and development. For example, the poor long-term growth in many developing economies may be explained by high rates of disease prevalence and mortality according to Arora (2001). Moreover, health gains in more developed countries during the 20th century - mainly the substantial decline in mortality - were attributed to social welfare expansion and living standards improvements (Haas, 2006). These findings among others highlight the importance of health and the environment where an individual is born and live. Health in childhood is particular because it is an important channel through which Socio-economic status transmitted across generations (Case et al., 2002; Haas, 2006; Currie, 2009).

Childhood health can affect adulthood outcomes, in addition to health and cognitive abilities at old ages (Case and Paxon, 2009). Household conditions impact child health through its effects on investments on children. For example, parents' education stimulates or limits child growth through nutrition choices (eg. breastfeeding) and reaction toward health threats and risks. In addition, parents' education enhances the perception regarding prevention, cure, immunization, and medicine that represent investments in child health. Household conditions can be divided into two main categories; in-door circumstances and out-door circumstances. The two categories include social,

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demographic, economic, and health conditions within which the household resides. In-door conditions include factors that interact inside the house such as parents' education and occupation, ownership of durable goods, household size, and a like. On the other hand, neighborhood and the city where the household lives represent out-door conditions.

Health can be seen as an outcome of the interaction process between heredity and environment. Genetics is not sufficient to explain individual's health without considering the surrounding conditions. For example, Deaton (2007) shows that disease environment may have selection effect in developing countries. Under high disease and low-nutrition environment, more children do not survive and the more healthy children succeed to survive. Surviving children, on the other hand, may experience reduction in potential health outcomes (scarring effect). When infant and child mortality are very high, selection effect dominates according to Deaton. Neighborhood and the city represent factors that impact child health either directly or indirectly. Crowed, contamination, and disease transmission are examples of the out-door factors that affect health negatively. On the other side, flow of useful information through social networks in the neighborhood may help treating or avoiding health problems represent the positive effect of the out-door factors. Although important, adequate data on out-door factors is not available, and consequently, out-door conditions are excluded in the current study. Focus will mainly be upon in-door household conditions and child health during early childhood, that is 0 – 59 months.

Following Tanner (1990), health can be expressed as a production function of genetic factors and environmental factors. Foetus interacts with the uterine environment that is affected by nutrition and medical care among other factors. Later the child interacts with the complex and changing adult-created environment. The main objective of this paper is to figure out the extent to which household circumstances matter for child survival and health of surviving children. Explicitly, the paper seeks to answer two main questions:

- Do household conditions affect survival of children?
- Do household conditions affect the health of surviving children?

In order to address these issues, repeated cross sectional micro-data from the Demographic and Health Surveys (DHS) for Jordan spanning the period 1992–2009 is used. Four micro-data sets are used, namely 1997, 2002, 2007 and 2009. Because key variables are missing, 1990 DHS data set is excluded. Particular attention is paid to mother characteristics and choices because children tend to spend more time under mothers care. These characteristics and choices include age at child delivery, number of births, health status proxied by body-mass index, education, and doctor pre-natal care. Child characteristics such as gender, age in months, and birth order are considered. Household ownership of refrigerator is also included due to its relative importance to preserve food and medicines healthy for use. Dummy variables for place of residence (rural vs. urban), governorate, and child year of birth are introduced in the analysis in order to control for unobservable factors.

The remainder of this paper is organized as follows. Section 2 reviews the relevant literature. Section 3 justifies the focus on Jordan. Section 4 discusses the data. Section 5 describes the statistical methods. Empirical results are discussed in section 6, Finally, Section 7 concludes.

2. Literature Review

Effects of household conditions on health among other outcomes have been widely investigated in the literature. Socioeconomic status and early childhood health received particular interest because it affects adulthood outcomes and later aging health and cognitive

abilities. Currie and Stabile (2003) show that health of low socioeconomic status (SES) children worsens with age because they are subject to more shocks. They argue that policies that focus only on reducing gaps in access to palliative care, such as expansions of public health insurance, are unlikely to fully close the SES related gap in health. Rather, it is important to understand and address the reasons for a higher arrival rate of health shocks among low-SES children. Haas (2006) investigates whether childhood health acts as a mechanism through which socioeconomic status is transferred across generations through tracking siblings and accounting for unobserved heterogeneity at family level. Results demonstrate that disadvantaged social background is associated with poor childhood health. Subsequently, poor health in childhood has significant, direct, and large adverse effects on educational attainment and wealth accumulation. In addition, childhood health appears to have indirect effects on occupational standing, earnings, and wealth via educational attainment and adult health status.

Casterline et al. (1989) examines the relationship between household income and child survival in Egypt. They argue that income has little effect on infant mortality but is inversely related to mortality in early childhood. The mechanisms underlying the income effects are not evident from their analysis. In addition, maternal demographic characteristics do not explain the net impact of income on child mortality, and maternal schooling has relatively weak effect on child survival.

Duncan et al. (1998) examine why parental socioeconomic status correlates strongly with various measures of child and adult achievement. They argue that family economic conditions in early childhood have the greatest impact on achievement, especially among children in families with low incomes. According to Case et al. (2002) children from lower-income households with chronic conditions have worse health than do those from higher-income households. Adverse health effects of lower income accumulate over children's lives, and part of the intergenerational transmission of socioeconomic status may work through the impact of parents' income on children's health.

Browning and Cagney (2003) show that neighborhood affluence is a more powerful predictor of health status than poverty, above and beyond individual demographic background, socioeconomic status, health behaviors, and insurance coverage. Their findings emphasize association of neighborhood affluence and residential stability with health and indicate that when the prevalence of affluence is low, residential stability is negatively associated with health. Dehejia and Lleras-Muney (2004) demonstrate that babies conceived in times of high unemployment have a reduced incidence of low and very low birth weight, fewer congenital malformations, and lower post neonatal mortality. These health improvements are attributable both to selection (changes in the type of mothers who conceive during recessions) and to improvements in health behavior during recessions.

Hayward and Gorman (2004) show that men's mortality is associated with childhood conditions including socioeconomic status, family living arrangements, mother's work status, rural residence, and parents' nativity. They find that socioeconomic achievement processes in adulthood and lifestyle factors mediated these associations. Education, family income, household wealth and occupation mediate the influence of socioeconomic status in childhood. Robert (1998) examines whether the socioeconomic (SES) characteristics of communities are associated with the health of community residents. Results indicate that a person's health is associated with SES characteristics of the community over and above one's own income, education, and assets. However, individual-level and family-level SES indicators are stronger predictors of health than community-level SES indicators.

Fuchs et al. (2010) addresses mother's education as a

fundamental determinant of child mortality in developing countries. The main proposition is to distinguish between the role of education and that of material resources in influencing child survival. Results show that in the vast majority of developing countries, mother's education matters more for infant survival than household wealth. Their findings suggest a reorientation of global health policies toward female education as a primary policy option for improving child health. Slater (2015) argues that children who are healthy early in life (from conception to age five) not only grow up to be healthier adults, they are also better educated, earn more, and contribute more to the economy. The United States lags behind other advanced countries in early childhood health, threatening both the health of future generations and the nation's long-term economic viability.

In general, children tend to spend more time home under household care, mainly the parents. Since they are more sensitive to the circumstances within which they are born and live, and since childhood may have life-long effects, availability of decent environment and adequate medical services may be crucial for individual, family and society investments on children.

3. Why Jordan

During the last three decades, the region of Arab countries witnessed many conflicts that cause migration from the hot areas toward more safe and stable areas. For different considerations, and despite its limited resources, Jordan was and still is one of the favorable destinations for migrants. Successive increases in the number of inhabitants have led to dramatic and tangible changes in social and economic conditions of Jordanian household. For example, Jordan experienced an unprecedented inflation in the new millennium, which in turn reduces household well-being and aggravates the economic challenges that Jordanian household faces. Table 1 shows the income distribution profile of Jordan for the years 1992, 1997, 2003, 2006, and 2010. The table shows a huge income distribution gap between rich and poor. Although the gap between the richest 20% and the poorest 20% of the population has been reduced between the year 1992 (the gap = 50 – 6 = 44%) and the year 2010 (the gap = 43.6 – 7.7 = 35:9%), income distribution inequality remains high and the profile did not change sufficiently.

Table 1
Income Distribution Profile in Jordan (1992-2010)

	Income share in year (%)				
Strip	**1992**	**1997**	**2003**	**2006**	**2010**
Richest 20%	50.0	44.4	46.1	45.5	43.6
Second 20%	9.7	11.4	10.7	11.1	11.6
Third 20%	14.0	15.5	15.1	15.2	15.7
Fourth 20%	20.4	21.1	21.4	21.0	21.5
Poorest 20%	6.0	7.6	6.7	7.3	7.7
Richest 10%	35.0	29.8	30.8	30.8	28.7
Poorest 10%	2.5	3.3	2.9	3.2	3.4

Source: World Bank

World Bank (WB) statistics reveal that national poverty head-count ratio at national poverty line amounts 14.2% in 2002. According to the same poverty measure, 18.7% of rural population and 12.9% of the urban population are classified to be poor. In the year 2010, the poverty head-count ratio amounts 14.4% of

Jordanian population (World Development Indicators, WB). Since Jordan suffers health insurance drawbacks, and has huge income disparities, the effect of household conditions may be more manifest. Given the existing political and economic challenges, the limited resources, and the increasing pressure on its infrastructure, Jordan represents an interesting case for this investigation.

4. Data

Demographic and Health Surveys (DHS) program has collected, analyzed, and disseminated representative data on population, health, HIV, and nutrition in more than 90 countries. The project is mainly funded by U.S. Agency for International Development (USAID). DHS measures intended to help policymakers to assess and improve strategies for population programmes and health services. Each DHS survey is executed in four phases. The first phase designs the sample and develops the survey questionnaires. Field staff is trained and eligible households and individual respondents are identified and interviewed in a second phase. Third phase involves data processing, including quality control procedures of the data. The final phase analyzes the data and preparing final reports.

Jordan is divided into 12 governorates that are located in three administrative regions, North, Central and South: North region consists of Irbid, Jarash, Ajloun, and Mafraq; Central region includes Amman, Madaba, Balqa, and Zarqa; and South region consists of Karak, Tafiela, Maan, and Aqaba. Jordan Demographic and Health Survey sample (JDHS sample, thereafter) is a stratified sample selected in two stages based on Population and Housing Census frame provided by the Department of Statistics (DoS). In the first stage, urban and rural areas are separated in each governorate. Rural areas in each governorate form a single stratum. Urban areas of each governorate form a single stratum if the governorate has no cities having a population of 100,000 or more. Three governorates represent an exception to this case; Amman, Zarqa, and Irbid as they represent 38%, 15% and 18% of the Jordanian population, respectively. In this case, urban areas are further stratified. Stratum division continues until it reaches a convenient area units called blocks as primary sampling units (PSUs). In a second stage, a fixed number of households are selected as final sampling units in each PSU, resulting in a sample size of about 15,000 household. All ever married women aged 15 – 49 who slept in the household on the night before the interviews were eligible for interview.

Last, population and Housing Census frame excludes the population living in remote areas (most of whom are nomads), as well as those living in collective housing units such as hotels, hospitals, work camps, prisons, and the like. In order to meet the precision request for different governorates weights are applied.

4.1. Indicators of child health

Survival is a core interest of health care. Thus this paper examines whether household conditions impact the opportunity of child survival. The first health indicator is whether the child is alive at the survey time or not. Child survival takes a value of 1 if the child is alive at the survey interview and 0 otherwise. Height is an anthropometric measure that reflects effects of living standards on health. For example, unhealthy environment, maternal behavior, and inadequate medical care impact fetal development and child growth (Hayward and Gorman 2004; Haas 2007; Case and Paxon 2009). Height given age and sex indicates the long run health status and thus is the second indicator of child health.

Figure 1 shows the fraction of child survival by child year of birth spanning the period 1986–2010. In general, the graph shows increasing trend from about 96 % to almost 99% between 1986 and 2010. Improvements in child survival fraction suggest kind of progress in health care and welfare conditions over the considered time

period. Figure 2 shows child height by age and doctor prenatal care. The average height at child birth equals 51.5 cm in both cases. However, the graph shows that children whose mothers received doctor prenatal care tend to be taller than their counterparts whose mothers did not receive doctor care during conception. This height trend suggests an impact of prenatal care on child health after birth without ignoring the effect of surrounding environment.

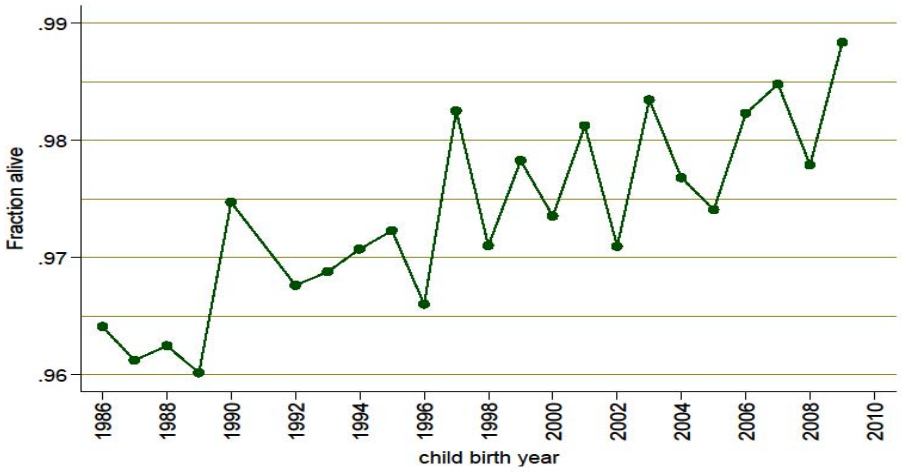

Figure 1: Child Survival Fraction by Child Year of Birth (1986-2009)
Source: Demographic and Health Surveys (DHS)

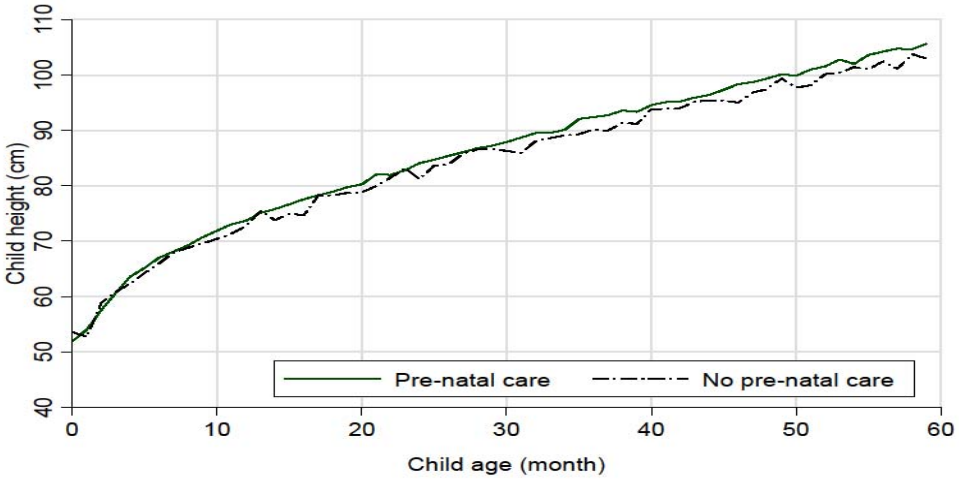

Figure 2: Child Height vs. Child Age and Doctor Prenatal Care
Source: Demographic and Health Surveys (DHS)

Table 2
Summary Statistics of Key Variables

Variable	obs	mean	sd	min	max
Child height (cm)	19315	86.3	14.3	40	120
Child is male	31949	0.510	0.5	0	1
Mother height (cm)	21349	158.0	5.99	101.1	199.9
Number of births	31949	3.9	2.2	1	14
Mother age at birth (yr)	31949	28.4	5.9	15	49
Doctor prenatal care	16537	0.934	0.25	0	1
Household members	31949	6.4	2.5	3	15
Refrigerator ownership	31037	0.947	0.22	0	1
Urban resident	31949	0.818	0.39	0	1

source: Demographic and Health Surveys (DHS).

4.2. Indicators of household circumstances

Household circumstances can be seen through different dimensions such as residence conditions, parents' choices and investments, neighborhood and the city, and the like. As mentioned earlier, this paper focuses on household in-door conditions. Given child sex and age, attention is paid for mother's characteristics and choices (investments). These include age at child birth, body mass index, total number of children ever born, and education. Figure 3 compares education of mothers in urban and rural areas in Jordan. While 5.2% of urban mothers are not educated, 15.5% of rural mothers are not. The percentage of primary education is 9.7% among urban mothers but 13.6% in rural areas. About 50.3% of rural mothers obtain secondary education while this percentage rises to 57.9% in urban areas. Higher education attainment is about 20.6% in rural areas, whereas, 27.2% of mothers who live in urban areas attain higher education. Figure 3 shows that urban mothers are more likely to receive better education than rural counterparts which in turn will be reflected on their children outcomes. Mother occupation would be important variable for child health to be addressed in this study. However, due to missing values and because the data lack consistent information regarding mother occupation across the repeated cross section survey waves, mother occupation is excluded.

Table 2 shows summary statistics for the main variables in this investigation. For the entire sample, the mean child height is 86.3 cm. around 51% of the sample are males. Average mother height is 158 cm with 28.4 year mean age at child birth. The average number of births is 3.9 per woman and 93.4% of mothers receive doctor prenatal care during conception. The average household size is 6.4 with 94.7% of households own refrigerator, whereas 81.8% of children are urban residents. High rates of prenatal care and refrigerator ownership, in addition to missing values of the former variable in 2007 and 2009 survey waves should be underlined. Nevertheless, it remains useful to use the available information to give a glimpse of these two vital effects for health.

5. The statistical approach

In order to link household conditions to the child health outcomes (survival and height), logit models and linear regression models are employed. Child survival is a binary variable that takes a value of 1 if the child is alive at the survey time and zero otherwise. Therefore, Logit model is used for child survival odds. Linear regression model is used for the height of surviving child. Household circumstances are proxied by household size, place of residence (urban - rural) and refrigerator ownership. In addition, mother education,

body mass index, total number of births, and prenatal care can be viewed as household investments or choices that affect child health directly or indirectly. Child characteristics are introduced through gender, age in months, and birth order. Governorate and child year of birth are also introduced in the analysis to control for non-observable factors**.**

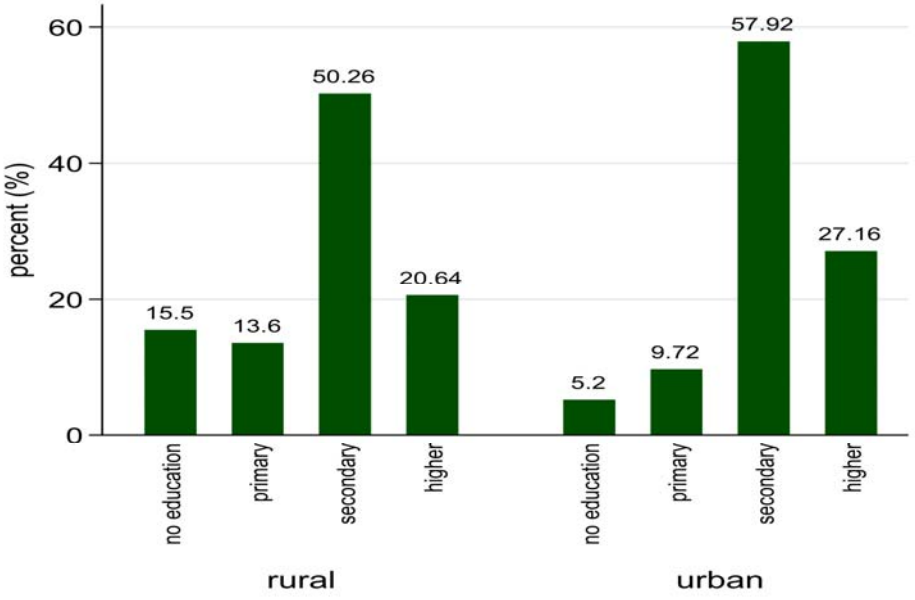

Figure 3: Mother Education in Urban and Rural Areas
Source: Demographic and Health Surveys (DHS)

5.1. The logit model

Child survival log odds ratio is regressed on two groups of variables; the first includes child specific continuous regressors, and the second contains the child-specific dummy variables. The model can be written as:

$$\log\frac{\pi_i}{1-\pi_i} = \alpha + \beta' X_i + \gamma' D_i \quad \text{..... (1)}$$

where π_i is the probability that child (i) is alive at the survey time, X_i is a vector represents continuous regressors (child age in months, mother age at child birth, mother BMI, household size, . . .) and D_i is a vector consists of a set of dummies for gender, mother education, child birth year, place of residence, prenatal care, etc. β is the effect on the log odds of unit change in X covariate, whereas is the effect of positive outcome of the dummy indicator (i.e. $D=1$) with respect to negative outcome ($D=0$) on the log survival odds. However, the survival odds rather than the log of survival odds are reported in order to facilitate the interpretation of the regression parameters in terms of relative changes in survival odds[1]. For example, let D is a dummy for child sex that takes value of 1 if the child is male and 0 if female. Then the reported parameter of child sex is the increase/decrease in the survival odds of a boy compared to survival odds of a girl everything else being equal. Relative odds ratio greater than 1 is

1 Relative odds ratio (ROR) is the odds ratio of positive outcome divided by the odds ratio of the negative outcome,

$$ROR = \frac{\frac{\pi_i}{1-\pi_i}(D=1)}{\frac{\pi_i}{1-\pi_i}(D=0)}$$

interpreted as the survival odds ratio of positive outcome being higher than the survival odds ratio of the negative outcome by the fraction or the number above 1, while relative odds ratio less than 1 is interpreted as the survival odds ratio of the positive outcome being less than the survival odds ratio of the negative outcome by 1 minus the fraction (note that the relative odds ratio cannot be negative). The first case is considered as enhancement in survival probability, but the second means an increase in the risk of death.

5.2. The linear regression model

Effects of household conditions on child mean height as a proxy for child health are assessed according to:

$$H_{it} = \alpha + \beta' X_{it} + \gamma' D_{it} + u_{it} \quad \text{..... (2)}$$

Where, H_{it} is the mean height of child i born in year t; X_{it}; and D_{it} are the same as before, and u_{it} is a regression error. The reduced form of the regression can be written as:

$$H = X\beta + U \quad \text{.....(3)}$$

$$E[u \mid X] = 0 \quad \text{..... (3.1)}$$

$$E[uu' \mid X] = \Sigma_u \quad \text{..... (3.2)}$$

where, Σ_u is a positive-definite matrix. This is a generalization of the $i.i.d.$ error model in which $\Sigma_u = \sigma^2 I_N$. Under the assumptions of random missing values, zero conditional mean of the error term, and heteroscedasticity, the regression results are discussed in the next section.

6. Results

Table 3 shows the logit model results of child survival relative odds ratio. In column 1, child and mother characteristics are introduced, whereas in column 2 household characteristics are added to the regression. In order to control for unobservable factors in terms of time and place, dummies for child year of birth and governorate of residence are included in the two specifications (i.e. column 1 and column 2). Some of the regressors are re-centered and thus the constant term represents the survival odds of a first birth order girl who aged 24 months, living in rural household of 6 members and illiterate mother aged 25 years at delivery with height of 155 cm.

Results show that boys survival odds ratio is about 24.1% (roughly quarter) less compared to girls survival odds ratio before introducing household characteristics at 95% confidence level. This gap increases to about the third after introducing household indicators and significant at 99% significance level. While primary education of the mother is not significantly different from no education (the reference category), mother's secondary education increases the survival odds ratio of the child by 61% whereas higher education attainment rises the survival odds by 83%. These differences in survival odds are significant at 95% level. Introducing the household indicators into the regression reinforces survival odds differences of secondary and higher education in terms of magnitude and significance level. For both, secondary and higher education, Survival odds ratio is about 120% greater compared to no education at 99% significance level.

Since most of births occur during the youth era of mother's life, 20s and early 30s, mother age at child birth does not show significant effect on survival odds ratio. Mother's body mass index (BMI) is significant at 95% level before introducing household variables. Survival odds ratio decreases by about 4% as the mother body mass index increases by one unit. However, introducing the household variables to the regression does not change the direction of BMI effect, but it is no more statistically significant. Child birth order and total number of births (total children ever born for the mother) show opposing significant effects. While birth order increases the survival odds ratio of the child, total number of births reduces the ratio. As child birth order

increases, survival odds ratio increases by about 120%. On the other hand, as total number of births increases the survival odds decreases by about 60%. The net effect of birth order and total number of births may depend on the value of these variables, mother experiences treating risks, and the role of household members.

Place of residence appears insignificant for survival odds neither before nor after introducing household indicators. Number of household members impacts child survival odds significantly. Survival odds ratio increases by about 95% with the number of household members. Coherent household relations and cooperation among household members can be shown as an insurance against risks and emergencies may explain the strong effect of household members. Against expectations, ownership of refrigerator and doctor prenatal care show no significant effect on child survival odds. However, next table shows that they are strongly significant for height of surviving children.

Homser – Lemeshow goodness of fit test is conducted. With a chi-square value of 12.26 and p-value of 0.1401, we fail to reject (or simply accept) the null hypothesis that the model fits. Variance Inflation Factor (VIF), that measures how much the standard error inflation could be caused by collinearity, is conducted to check for potential collinearity between number of household members and number of total children ever born as shown in Table 7. The corresponding VIF is simply 1 divided by tolerance, where tolerance for a variable is 1 minus the R^2 that results from the regression of other variables on that variable. When variables are uncorrelated, both the tolerance and VIF are 1. If a variable is related to another variable(s), the tolerance goes to 0 and the variance inflation gets very large. As a rule of thumb, a tolerance of 0.1 or less (equivalently VIF of 10 or greater) is a cause for concern. Here, the VIF between household members and total children ever born is 1.99 that causes no concern regarding collinearity[2].

Table 4 shows results of child height linear regression. Child age is introduced as cubic polynomial, while mother age at child birth is included as quadratic polynomial to control for non linearity. As mentioned previously, column 1 includes child and mother variables, while in column 2 household indicators are added. Dummies for governorate of residence and child year of birth are introduced to control for unobservable factors in both specifications. Boys are taller than girls by about 1.2 cm, as column 1 shows. Although increases child survival odds, birth order is negatively associated with the height of surviving child. As birth order of the child increases the child height decreases by about 0.18 cm. Education of the mother is significantly associated with child height. Primary education of the mother increases the child height by 0.64 cm, while secondary education increases the height by 1.2 cm. This increase in height rises to 1.9 cm when the mother is higher educated. The effect on child height of the mother education is strongly significant at 99% level. Introducing household indicators, mitigates effects of mother education in magnitude compared to no education category, however, effects remain significant at 99% level. Mother age at delivery has significant impact of 0.04 cm. Although modest in magnitude, mother's body mass index is strongly significant. Child height increases by 0.05 cm as the mother body mass index increases one unit that is significant at 99% level.

Household characteristics affect the two indicators of child health in opposing directions. Indicators that significantly matters for child survival, does not affect the height of survivors and vice versa. For example, household size is strongly significant for child survival

2 When collinearity occurs, or when one independent variable is a linear combination of others, it is stata drops the variable that is a linear combination of the others and stata issues a note, informing us that the variable has been dropped from the model due to collinearity.

odds ratio but has no significant effect on child height. On the other hand, refrigerator ownership and prenatal care impact child height significantly but not child survival odds. More specific, number of household members has no significant effect on height of survivors but increases survival odds by 95%. Ownership of refrigerator increases child height by 0.85 cm and doctor prenatal care increases the height by about 0.57 cm whereas both of them show no significant impact on survival odds. Finally, survival odds shows not significant differences by place of residence, however, urban child tend to be 0.8 to 0.9 cm taller than rural counterpart.

Child height regression is conducted separately for boys and girls as shown table 5 and 6 respectively. The negative effect of birth order is more manifest for girls than boys. On the other hand, mother education seems to be more significant for boys than girls. In terms of magnitude and significance level, mother education impact boy's height more than girls. For example, primary education is not significant for girls, while significantly increases boys height by little more than 0.8 cm at 95% level. Secondary education significantly increases the height of girls; however, it is about 35% higher for boys. While higher education increases girls height by 1.5 cm, it increases height of boys by 2.25 cm. Effects of household members is small in magnitude, negative in sign, and not significant for boys. However, it is positive and significantly associated with height of girls at 90% level. Refrigerator ownership and prenatal doctor care are positively associated with boys' height (0.62 cm at 95% and 0.58 cm at 90% respectively). Ownership of refrigerator increases height of girl by 1.06 cm at 99%, while prenatal care increases the height of girls by about 0.56 cm at 95% level.

7. Conclusions

This paper examines the effects of household circumstances on child health in Jordan. Child health is indicated by child survival odds and mean height of surviving children. Findings may be summarized as follows. While boys survival odds ratio is about quarter to one-third less than girls, boys are on average about 1.2 cm taller than girls. Child birth order enhances the chances of surviving, however, negatively associated with height of survivors. Mother's body mass index is positively associated with both survival odds and child height. Education of mothers enhances the chances of child survival by 60-120%, while increases child height by 0.6-1.3 cm as compared to no education mothers. Given age, effects of mother education is more significant for boys compared to girls.

Mother age at child birth is positively associated with child height. Doctor prenatal care during conception does not show significant effect on child survival odds, however, positively associated with height of survivors. Child survival odds increases with household size, nevertheless, household size appears not to matter for height of surviving children. Ownership of refrigerator shows no significant association with survival odds, but increases the child height by about 0.85 cm. These findings may help households to target investments that reduce risks of child mortality and improve health of surviving children. On the other hand, it may also help decision makers to target policies that bridge health disparities between children at the hope of better future outcomes.

Table 3
Child Relative Survival Odds Ratio: [Pr(live)= Pr(die)]

Specification (1):		***Specification (2):***	
Number of obs = 21336		Number of obs = 12598	
Wald chi2(29) = 296.36		Wald chi2(32) = 237.50	
Prob > chi2 = 0.0000		Prob > chi2 = 0.0000	
Pseudo R2 = 0.0639		Pseudo R2 = 0.1226	
Homser-Lemeshow Test :			
number of groups = 10		number of groups = 10	
Hosmer-Lemeshow chi2(8) = 10.74		Hosmer-Lemeshow chi2(8) = 12.26	
Prob > chi2 = 0.2396		Prob > chi2 = 0.1401	

	Variable	(1)	(2)
Child	sex of child (male)	0.759**	0.667***
	child birth order number	2.197***	2.536***
	mother education (primary)	1.098	1.154
	mother education (secondary)	1.610**	2.193***
	mother education (higher)	1.830**	2.199**
Mother	total children ever born	0.403***	0.224***
	mother age at child birth (yr)	1.028	0.998
	mother age square	1.000	1.000
	mother body mass index (kg/m2)	0.957***	0.983
	place of residence (urban)	0.975	1.014
Household	number of household members		1.948***
	household owns refrigerator		0.863
	prenatal care: doctor		0.968
Governorate		Yes	Yes
Child birth year		Yes	Yes
cons.		3.944***	3.500**

*** variable is significant at 99% level. (** at 95% level) and (* at 90% level).

Table 4
Child Height Regression (cm)

Specification (1):		***Specification (2):***	
Number of obs =	19262	Number of obs =	11265
F(31, 19230) =	3065.18	F(32, 11232) =	2322.84
Prob > F =	0.0000	Prob > F =	0.0000
R-squared =	0.8705	R-squared =	0.8713
Root MSE =	5.1583	Root MSE =	5.1726

	Variable	(1)	(2)
Child	child age in months	0.723***	0.643***
	child age square	-0.014***	-0.014***
	child age cube	0.000***	0.000***
	sex of child (male)	1.172***	1.267***
	child birth order number	-0.178***	-0.162***
Mother	mother education (primary)	0.638***	0.584**
	mother education (secondary)	1.193***	0.859***
	mother education (higher)	1.877***	1.300***
	mother age at child birth (yr)	0.030*	0.039**
	mother age square	0.001	0.001
	mother body mass index (kg=m2)	0.048***	0.049***
Household	place of residence (urban)	0.922***	0.780***
	number of household members		0.013
	household owns refrigerator		0.846***
	prenatal care: doctor		0.569***
Governorate		Yes	Yes
Child birth year		Yes	Yes
cons.		81.725***	80.621***

Table 5

Child Height Regression, cm (Boys, or Males)

Variable		(1)	(2)
Child	child age in months	0.731***	0.682***
	child age square	-0.014***	-0.013***
	child age cube	0.000***	0.000***
	child birth order number	-0.164***	-0.119**
Mother	mother education (primary)	0.878**	0.844**
	mother education (secondary)	1.459***	1.004***
	mother education (higher)	2.254***	1.793***
	mother age at child birth (yr)	0.019	0.027
	mother age square	0.001	0.002
	mother body mass index (kg=m2)	0.046***	0.037**
Household	place of residence (urban)	0.946***	0.809***
	number of household members		-0.047
	household owns refrigerator		0.618**
	prenatal care: doctor		0.582*
Governorate		Yes	Yes
Child birth year		Yes	Yes
cons.		82.890***	82.036***
N		9795	5802
R2		0.875	0.875
RMSE		5.041	5.068
F		1807.750	1345.100

Table 6

Child Height Regression, cm (Girls, or Females)

Variable		(1)	(2)
Child	child age in months	0.717***	0.609***
	child age square	-0.014***	-0.014***
	child age cube	0.000***	0.000***
	child birth order number	-0.194***	-0.208***
Mother	mother education (primary)	0.398	0.336
	mother education (secondary)	0.941***	0.650**
	mother education (higher)	1.500***	0.726*
	mother age at child birth (yr)	0.043*	0.049*
	mother age square	0.001	0.000
	mother body mass index (kg=m2)	0.051***	0.062***
Household	place of residence (urban)	0.896***	0.751***
	number of household members		0.074*
	household owns refrigerator		1.056***
	prenatal care: doctor		0.555**
Governorate		Yes	Yes
Child birth year		Yes	Yes
cons.		81.666***	80.492***
N		9467	5463
R2		0.875	0.874
RMSE		5.107	5.151
F		1782.536	1359.747

Table 7
Collinearity Diagnostics

Variable	VIF	SQRT VIF	Tolerance	R-Squared
number of household members	1.99	1.41	0.5019	0.4981
total children ever born	1.99	1.41	0.5019	0.4981

REFERENCES

Arora, S. (2001). Health, Human Productivity, and Long-Term Economic Growth. ***The Journal of Economic History***, 61 (3): 699-749.

Browning, C. and Cagney, K. (2002). Neighborhood Structural Disadvantage, Collective Efficacy, and Self-Rated Physical Health in an Urban Setting. ***Journal of Health and Social Behavior***, 43: 383-399.

Case, A., Lubotsky, D., and Paxon, C. (2002). Economic status and health in childhood: The origins of the gradient. ***American Economic Review***, 92: 1308-1334.

Case, A. and Paxon, C. (2009). Health and wealth, early life health, and cognitive function in old age. ***American Economic Review Papers & Proceedings***, 99: 104–109.

Casterline, J., Cooksey, E., and Ismail, A. (1989). Household Income and Child Survival in Egypt. ***Demography***, 26 (1): 15-35.

Currie, J. (2009). Healthy, wealthy, and wise: Socioeconomic status, poor health in childhood, and human capital development. ***Journal of Economic Literature***, 47: 87-122.

Currie, J. and Stabile, M. (2003). "Socioeconomic status and child health: Why is the relationship stronger for older children? ***American Economic Review***, 93: 1813–1823.

Dehejia, R. and Lleras-Muney, A. (2004). Booms, Busts, and Babies' Health. ***The Quarterly Journal of Economics***, 119: 1091-1130.

Deaton, A. (2007). Height, health, and development. ***Proceedings of the National Academy of Sciences***, 104: 13232–13237.

Duncan, G., Yeung, W., Brooks-Gunn, J. and Smith, J. (1998). How Much Does Childhood Poverty Affect the Life Chances of Children? ***American Sociological Review***, 63: 406-423.

Fuchs, R., Pamuk, E. and Lutz, W. (2010). Education or wealth: which matters more for reducing child mortality in developing countries? ***Vienna Yearbook of Population Research,*** 8: 175-199.

Haas, S. (2006). Health selection and the process of social stratification: The effect of childhood health on socioeconomic attainment. ***Journal of Health and Social Behavior***, 47: 339-354.

Haas, S. (2007). The long-term effects of poor childhood health: An assessment and application of retrospective reports. ***Demography***, 44: 113-135.

Hayward, M. and Gorman, B. (2004). The long arm of childhood: The influence of early-life social conditions on men's mortality. ***Demography***, 41: 87-107.

Robert, S. (1998). Community-Level Socioeconomic Status Effects on Adult Health. ***Journal of Health and Social Behavior***, 39: 18-37.

Slater, M. (2015). Promoting Health in Early Childhood, **Policies to Promote Child Health**, **Princeton University**,*25(1): 35-64*

Tanner, J. (1990). ***Fetus into Man: Physical Growth from Conception to Maturity*** (revised edition). Harvard University Press: Cambridge, MA.

ظروف الأسرة الأردنية وأثرها على صحة الأطفال

محمود علي هيلات [1]

ملخص

تهدف هذه الورقة إلى دراسة أثر الظروف الاجتماعية والاقتصادية للأسرة الأردنية وخاصة مستوى تعليم الأم، عدد حالات الإنجاب، عمر الأم عند ولادة الطفل، وتوفر الرعاية الطبية أثناء الحمل على صحة الأطفال. بالإضافة إلى بعض الخصائص الديموغرافية للأسرة مثل مكان السكن، عدد أفراد الأسرة، وملكيتها براد كهربائي التي يمكن النظر إليها كإضافة على مدخلات الرعاية الصحية. تم تحليل بيانات مقطعية للأردن من مسوحات الصحة والديموغرافيا للفترة 1997–2009 ويمكن تلخيص أبرز النتائج فيما يلي. تؤثر ظروف الأسرة الأردنية في فرص الحياة بالنسبة للأطفال وصحة الأحياء منهم. تنخفض فرص البقاء على قيد الحياة للأطفال الذكور بحوالي الربع إلى الثلث عنها للإناث بينما وجد أن الذكور الأحياء يزيد معدل الطول بينهم عن الإناث. تزداد فرص الحياة بزيادة ترتيب ولادة الطفل بينما يرتبط هذا الترتيب عكسيا مع طول الطفل. يعزز تعليم الأم فرص الحياة بالنسبة للطفل بنسبة تتراوح بين 60% إلى 120% كما يؤثر إيجابا (زيادة) على طول الطفل، ويظهر هذا الأثر بشكل أكبر على الذكور من الإناث. تشير النتائج أن الرعاية الطبية أثناء فترة الحمل وامتلاك الأسرة للبراد لها أثر إيجابي على صحة الأطفال حيث تزيد من معدل طول الطفل. أخيراً، يتمتع الأطفال في المناطق الحضرية بصحة أفضل من نظرائهم في الأرياف.

الكلمات الدالة: ظروف الأسرة، صحة الطفل، تعليم الأم، الرعاية الصحية، مسح الصحة والديموغرافية، الأردن.

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