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and Their Children**

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Health Repercussions of Child Marriage on Middle-Eastern Mothers and Their Children

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Purpose: Although the MENA region hosts around 24 percentages of the global incidences of child marriage, empirical evidence examining the health and demographic outcome of child marriage for local women is rather rare or absent. The prevalence rate of this phenomenon may be subject to expansion due to the on-going conflicts and political fluxes across many countries in the region. This study investigates the impact of child marriage on the health outcome for mothers and their children in three developing MENA countries, Egypt, Sudan, and Palestine.

Method: This study uses the recent version of each country's UNICEF-MICS household survey to run a multivariate regression analysis across three clustering levels. Our model uses three children health outcomes: stunting, wasting and mortality rate and two women health outcomes: having children who later die and the recipient of antenatal care. These variables are selected based on their availability across countries. Our estimations are also adjusted for a set of socioeconomic and demographic indicators of interviewed women, such as maternal age, maternal literacy, child weight at birth, wealth index, parental polygyny, and living area, the extent of awareness and exposure to information via acquiring radio and television.

Results: More than half of the interviewed women across Egypt and Sudan have been married before reaching the age of 18 while nearly 46% of the Palestinian women have been married early. Our empirical results postulate that child marriage is generally associated with more vulnerable health outcomes across the three countries. Wherein, women who were married before reaching 18 in Egypt are more likely than women who

were elderly married to have stunted and wasted children. A similar finding regarding stunting rate is found in the case of Palestine. Also, child marriage is associated with higher under-five children mortality relative in the three countries. Regarding women health indicators, early married women are more likely to have children who later die than the other women group across all the countries. Finally, early married women are less likely to receive antenatal care in the three countries.

Keywords: child marriage; stunting; antenatal care; multilevel regression analysis

JEL: I15; J12

1. Introduction

Over the last three decades, the Middle East and North Africa (MENA) region have made a big progress in reducing child marriage from 34% to 18% (United Nations International Children's Emergency Fund [UNICEF], 2014). However, the political and economic turbulences spreading over many countries in the region have increased the economic and social hardships of millions of people and with poverty standing at the top reasons for children to get married hence this progress is seriously threatened (Nour, 2009). Due to the conflict cries in Syria, around 13.5 million Syrians need humanitarian assistance, wherein more than 6 million are reallocated within Syria, and around 5 million are refugees outside of Syria and hosted by developing countries neighboring Syria (OCHA [United Nations Office for the Coordination of Humanitarian Affairs], 2016). Accordingly, due to the several economic and social hardships faced by these families, child marriage is getting widely spreading among Syrian girls in refugee communities and even for those who were displaced internally within Syria. It is documented as well that

the terrorist group of Islamic State that occupy parts of Iraq and Syria have since 2014 have been using gender-based violence, including forced marriage, as a weapon of war (UNICEF, 2014).

Nearly 24 percent of the incidences of child marriage occurs in the MENA region. Some countries in the region report child marriage rates as high as 40 percent such as Yemen. Other countries such as Egypt provide a fertile environment for the widespread of these practices especially after the stance of political and social upheavals post the 2011 revolution (UNICEF, 2017). Nevertheless little or no empirical evidence exists on the MENA region or single countries inside the region. This study uses logistic multilevel regression to investigate the impact of child marriage on selected health indicators of young mothers and their newborn children in three developing MENA countries: Egypt, Sudan, and Palestine.

The Literature identifies three main drivers of child marriages: poverty, reinforcing social ties, and offering behavioral protection against rape and sexual activities (Nour, 2006; 2009). The vast

majority of the previous literature has mainly covered single or pool of countries from South Asia and Sub Saharan Africa. These parts of the world have the highest percentages of women who got married at age of 18 or less, nearly 88% of the global figures originate from these regions (UNICEF, 2018). For instance, Raj et al.'s (2009) study of 22807 Indian women found that nearly half of the women aged 20–24 years were married before 18 years. Another study by Nasrullah et al. (2013) concluded that more than half of their sample of Pakistani women is married before 18 years old. These early-married women are more likely to deliver at home and thus are subject to higher risks of maternal morbidity and mortality. Ohonsi and Attah, (2010) found that teenage mothers have a higher incidence of premature labor and low-birth-weight infants in Kano, Nigeria.

This phenomenon is not limited to developing countries, across the Pacific Ocean in Utah, the USA, a sample of 134,088 white teenage mothers who were married at the age of 13 to 17 years were investigated by Fraser et al. (1995). The authors found strong linkages between child marriages and delivering an infant who had low birth weight, as well as premature delivery. A meta-analysis by Santhya (2011) for a large number of studies found a conclusive evidence that early marriage carries adverse health repercussions of newborn children as well as their young mothers. Violence has been one of the main practices associated with child marriage (Nasrullahe et al., 2014). Other associations include reduced contraception early in the marriage, increased sterilization, and increased poor fertility

outcomes such as unwanted and terminated pregnancies, and repeat childbirths in less than 24 months (Raj et al., 2009; UNICEF, 2009; United Nations Population Fund [UNFPA], 2012).

2. Methods

2-1. Sample and procedure

We construct our cross-sectional dataset of each country based on the Multiple Indicator Cluster Survey (MICS) of UNICEF database¹. A nationally representative household-based sample was obtained by a three-stage, stratified, random sample design. The clustering levels were unique for each country based upon the original data collection procedure and its availability. For instance, the three stages in Egypt were individuals, regions, and governorates, for Sudan, they were individuals, states, and areas while for Palestine the data are clustered across individuals, governorates, and areas. The time span of each survey differs depending on the recent availability at UNICEF database, for Egypt, the 2014 version of the household survey was used in this study, while for Sudan and Palestine the 2010 versions of the surveys were used.

Our full sample includes women who were married at the age of 24 or less, wherein part of the sample is disentangled into women who were married before reaching 18 years old (control group representing child marriage) and women who were married between the age of 18 and 24 (reference group). Our analysis starts with providing

¹ The MICS surveys of the UNICEF are accessed from the following link: <http://mics.unicef.org/surveys>

descriptive statistics for both women groups and their children as shown in Tables 2&3. The sample size from each country is indicated at the second row in each of the descriptive statistics tables. We also report the probability of the Pearson chi-square test for the independence for each variable across the three countries. Wherein a significant probability at 10%, 5% or 1% levels implies that there is a statistically significant difference between the two groups regarding the reported variable.

2-2. Statistical analysis

$$health_{ijk} = \beta_0 + \beta_1 child\ marriage + \mu_i + \mu_{ij} + \varepsilon_{ijk}$$

The method of estimation is a logistic multilevel regression. The dependent variables in our model are proxies for infant and women health indicators. Those that are related to the infant health status are stunting (height for age), wasting (weight for age) and children mortality (children who died at the age of 5 or younger). While women health profiles are represented by the following variables: having children who later died and antenatal care. The nature of our comparability study constrains our selection of the variables. We select the variables based on their availability across the three countries' datasets.

The fixed part of the model consists of β_0 the intercept or the overall mean of the used health indicator and β_1 the coefficient of our variable of interest, child marriage (women married at the before reaching 18). The random part of the model is composed of μ_i level 2 random intercept

(between), μ_{ij} level 3 random intercept (within), and ε_{ijk} individual level specific error. Our model also incorporates a set of control variables to account for the socioeconomic vulnerabilities that affect the health of married women and their children. These are maternal age, maternal literacy, child weight at birth, husband polygyny, level of income, exposure to information via acquiring a radio and/or a television in the household and finally living area. Variables description is shown in Table 1.

Estimation results of the fixed and random parts of the model for infant and women health indicators are shown in Tables 4 and 5 respectively. We also report in the empirical results tables the measure of Intra-class Correlation Coefficient (ICC) at each of the clustering levels of each country. It reflects the degree of similarity of the reported health outcome at the same level compared to other levels. For instance, women living in the same region may be more similar to each other than women from other regions, as they share analogous economic, social, and other characteristics that may condition similar health status. The value of the ICC ranges from 0 (high difference) to 1 (high similarity). Median Odd Ratios (MOR) are also reported for each cluster level across countries, MORs reflect the degree of heterogeneity among the levels, A MOR value of 1 means there is no variation between clustering levels, in other words this clustering level does not play a significant role in defining the probability of occurrence of a specific health outcome (Hedin et al., 2006; Sanagou et al., 2012).

Table 1: Variables definition

Variable	Description
Child marriage	Categorized into (1) women married before reaching age 18 and (0) otherwise.
Stunting	Categorized into (1) children whose stunting z value is less than or equal - 2.5 and (0) otherwise.
Wasting	Categorized into (1) children whose wasting z value is less than or equal -2.5 and (0) otherwise.
Children mortality	Categorized into (1) children who died during their 5 years of age and (0) otherwise.
Having children who later died	Categorized into (1) women who have children who later died and (0) otherwise.
Contraception	Categorized into (1) women who are using contraceptive methods and (0) otherwise.
Antenatal care	Categorized into (1) women who have received antenatal care during their pregnancy and (0) otherwise.
Maternal age	Woman age (years).
Maternal literacy	Categorized into (1) women who have ever attended a school and (0) otherwise.
Child weight at birth	Categorized into (1) children whose weight at birth less than or equal 2500 gram (0) otherwise.
Wealth index quintiles	Categorized into quintiles based on ownership of consumer items and dwelling characteristics between 1 (poorest) and 5 (wealthiest).
Parental polygyny	Categorized into (1) husband who has more than one wife (0) otherwise.
Living area	Categorized into (1) urban and (0) rural.
Radio	Categorized into (1) having a radio in the household (0) otherwise.
Television	Categorized into (1) having a television in the household (0) otherwise.

3. Results

The reported prevalence of child marriage in Egypt, Sudan, and Palestine are respectively as follows,

63%, 60% and 47% of the total number of interviewed women. Table 2 describes the differences among the children health indicators of the two women groups. Variables such as wasting, stunting, and underweight prevalence as well the infant mortality rate are expressed in frequencies and percentages. Sudanese women who were married before reaching the age of 18 tend to give birth to children with higher health vulnerability compared to their counterparts in Egypt and Palestine. The percentages of stunted, wasted and underweighted Sudanese children are 24.88%, 18.74% and 8.56% of the total number of born children. These figures are relatively smaller for Egyptian children, while Palestinians children are performing the best in terms of their health status, wherein only 5.90%, 1.89% and 1.73% of the full sample of Palestinians children are stunted, wasted and underweighted respectively.

When comparing these numbers with the women group who were married between the ages of 18-24 across countries, we found that in the cases of Sudan and Palestine the differences regarding the 4 health indicators are not significant. However, in the case of Egypt, children of early married women experience higher health vulnerability compared to children of elderly married women. For instance, the number of stunted children is nearly double those who were born to elderly married women. 523 children of early married women have died between the ages of 0-5 compared to a total number of 202 dead children of the other women group.

Table 3 provides selected demographic and health information of the interviewed women about their education, residential area, living arrangements, income levels, husband polygyny, health profiles as well as pregnancy arrangements. The number of women who were married before the age of 18 equals 810 (62%) in Egypt, ranking it as the largest country in our sample regarding the prevalence of child marriage. Sudan comes in the second rank with a total number of 7407 (59%) and then followed by Palestine with a total number of 5776 (46%).

In terms of educational attainment, Palestinian women are performing better in terms of educational attainment, wherein only 9 % of the early married women in the sample are non-educated, relative to nearly 22% of Egyptian women and 57% of Sudanese women. Nearly 32% of Sudanese and Egyptian women who were married before 18 have had a child who later died, relative to 15% percentage of Palestinian women. The largest percentage of women who were early married have received antenatal care are located in Palestine, reaching a value of approximately 98%, compared to the values of 74% and 84% of women in Sudan and Egypt respectively. Also, the largest prevalence of husband Polygyny exists in Sudan, followed by Palestine then Egypt. The variables having children who later died, a number of women who gave birth, contraceptive usage, living area, and husband polygyny are noticeably different when comparing the reported statistics between early married and elderly married women groups across countries. For instance, the number of early

married women have had children who later died are 260, 2240, 842 in Egypt, Sudan and Palestine respectively, relative to 101, 1029, 723 elderly married women who similarly have given birth to children who later died.

Regarding the empirical evidence, according to Table 4, respondents with child marriage in Egypt are more likely than women who were elderly married to have children who are stunted (OR 1.416, 95% CI 1.159-1.731), wasted (OR 1.460, CI 1.023-2.084) and have high mortality rates (OR 5.732, 95% CI 0.175-0.419). As well, early-married women from Sudan and Palestine tend to have higher odd ratios of children mortality (OR 5.582, 95% CI 5.013-6.215; OR 2.239, 95% CI 1.99-2.51) relative to the other women group. Similarly, children who were born to early married Palestinian women are more likely to be stunted (OR 1.231, 95% CI 1.077-1.406) relative to other children. After adjustment for maternal age, maternal literacy, child weight at birth, wealth index, parental polygyny, and living area, child marriage is significantly associated with high stunting ratio for Palestinian children (OR 1.125, 95% CI 0.982-1.289). However, children from all countries tend to have higher mortality when their mothers are married before reaching the age of 18 with ratios of (OR 1.844, 95% CI 1.500-2.268; OR 2.447, 95% CI 2.156-2.778; OR 1.543, 95% CI 1.377-1.730) for Egypt, Sudan, and Palestine respectively. Table 5 reports the statistical results of the maternal health indicators. Child marriage levies negative health repercussions for Women in all countries, wherein early married women are more likely to have

children who later die than the other women group (OR 5.830, 95% CI 4.910-6.923; OR 5.679, CI 5.102-6.322; OR 2.259, 95% CI 2.011-2.537). This higher prevalence also holds in all countries after adjustment for maternal age, maternal literacy, child weight at birth, wealth index, parental polygyny, living area, and the exposure to information via possessing a radio and/or a television in the household. Finally, the child marriage is significantly associated with decreased likelihood of receiving any form of antenatal care in Egypt before and after adjustment for other control variables (OR 0.551, 95% CI 0.468-0.649; OR 0.640, 95% CI 0.524-0.781). For Sudan and Palestine, the results are similar to those of Egyptian early-married women after adjusting for the other control variables with ratios of (OR 0.867, 95% CI 0.782-0.961; OR 0.881, 95% CI 0.816-0.952).

Table 2: Demographic and health profile of children

Variable/Country	Egypt (2013/2014)					Sudan (2010)					Palestine (2010)				
	Women married at age <18 years old (n=810)		Women married between 18-24 years old (n=478)			Women married <18 years old (n=7407)		Women married between 18-24 years old (n=4992)			Women married <18 years old (n=5776)		Women married between 18-24 years old (n=6637)		
	Frequency	Percent	Frequency	Percent	P-value	Frequency	Percent	Frequency	Percent	P-value	Frequency	Percent	Frequency	Percent	P-value
Sex of child					0.46					0.85					0.68
Male	315	49.30	212	52.61		2565	50.32	1809	51.06		2966	51.35	3013	49.88	
Female	324	50.70	191	47.39		2532	49.68	1734	48.94		2810	48.65	3027	50.12	
Stunting prevalence * (Z score <= -2)	89	13.99	51	12.76	1.00	1102	24.88	736	23.97	0.40	256	5.90	265	5.49	0.71
Wasting prevalence (Z score <= -2)	18	2.84	9	2.26	<0.01	830	18.74	604	19.74	0.31	82	1.89	90	1.87	0.92
Underweight prevalence (Z score <= -2)	11	1.61	7	1.75	0.22	379	8.56	275	8.99	0.99	75	1.73	75	1.56	1.00
Age of died children (both gender)					0.96					1.00					1.00
0	197	37.89	86	42.57		1647	36.85	817	39.70		727	42.97	619	42.61	
1	250	48.08	96	47.53		2025	45.21	954	47.05		791	46.75	699	49.13	
2	54	10.39	15	7.43		597	13.33	218	10.60		134	7.92	104	7.16	
3	17	3.27	4	1.61		153	3.42	52	2.53		29	1.72	23	1.62	
>=4	5	0.97	1	0.49		42	0.94	17	0.82		11	0.66	8	0.57	

*According to the WHO Global Database, a Z-score of <-2 SD classifies low weight-for-age, low height-for-age and low weight-for-height.

Table 3: Demographic and health profile of Women

Variable /Country	Egypt (2013/2014)					Sudan (2010)					Palestine (2010)				
	Women married <18 years old (n=810)		Women married between 18-24 years old (n=478)			Women married < 18 years old (n=7407)		Women married between 18-24 years old (n=4992)			Women married <18 years old (n=5776)		Women married between 18-24 years old (n=6637)		
	Frequency	Percent	Frequency	Frequency	P-value	Frequency	Percent	Frequency	Percent	P-value	Frequency	Percent	Frequency	Percent	P-value
Education					0.32					<0.01					0.94
No Education	143	22.48	87	21.75		2907	57.03	2041	57.61		557	9.64	623	9.39	
Primary	144	22.64	85	21.25		1545	30.31	1011	28.54		3188	55.19	3714	55.96	
Secondary and higher	349	54.88	228	57		598	11.73	477	13.46		2029	35.13	2300	34.65	
Area										<0.01					<0.01
Urban						3333	45	2063	41.33		3514	60.84	4015	60.49	
Rural						4074	55	2929	58.67		1754	30.37	2113	31.84	
Television					0.27					0.28					0.75
Yes	765	94.80	456	95.40		1783	31.56	1286	32.96		4932	96.46	5601	96.42	
No	42	5.20	22	4.60		3866	68.42	2614	66.99		181	3.54	208	3.58	
Radio					0.32					0.99					0.85
Yes	144	17.84	97	20.29		3056	54.09	2098	53.77		3121	61.04	3480	59.91	
No	663	82.16	381	79.71		2591	45.86	1801	46.16		1992	38.96	2329	40.09	
Women who ever give birth					<0.01					<0.01					<0.01
Yes	772	95.31	455	95.19		6821	92.09	4409	88.32		5489	98.42	6192	97.88	
No	38	4.69	23	4.81		586	7.91	583	11.68		88	1.89	134	2.12	
Women who ever had children who later died					<0.01					<0.01					<0.01
Yes	260	32.10	101	21.13		2240	32.84	1029	23.34		842	15.10	723	11.43	
No	550	67.90	377	78.87		4581	67.16	3380	76.66		4735	84.90	5603	88.57	
Received Antenatal care					0.83					<0.01					0.11
Yes	241	84.27	204	87.18		2753	74.89	1859	78.04		2010	98.34	2532	98.87	
No	45	15.73	30	12.82		921	25.05	521	21.87		34	1.66	29	1.13	
Polygyny (Husband or partner has other wives)					<0.05					<0.01					<0.01
Yes	27	3.80	16	95.19		1422	20.81	770	16.67		236	4.26	241	3.79	
No	864	96.20	411	4.81		5398	78.99	3839	83.10		5275	95.29	6087	95.66	
Wealth index quintile										<0.1					0.46
Poorest						588	7.94	381	7.63		1220	23.05	1028	15.49	
Poor						1165	15.73	747	14.96		1223	23.11	1146	17.27	
Middle						1724	23.28	1087	21.77		1088	20.56	1381	20.81	
Rich						2048	27.65	1364	27.32		1001	18.92	1588	23.93	
Richest						1882	25.41	1413	28.31		690	13.04	1494	22.51	

Table 4: Multilevel regression analysis of child marriage impact on infant health indicators

	Egypt (2013/2014)		Sudan (2010)		Palestine (2010)	
	Three levels (individuals, regions and governorates)		Three levels (individuals, states and areas)		Three levels (Individuals, governorates and areas)	
	ORs (95% CI)	Adjusted ORs (95% CI) ^a	ORs (95% CI)	Adjusted ORs (95% CI)	ORs (95% CI)	Adjusted ORs (95% CI)
Stunting	1.416***	1.015	0.993	0.972	1.231***	1.125*
	(1.159-1.731)	(0.808-1.275)	(0.918-1.074)	(0.876-1.079)	(1.077-1.406)	(0.982-1.289)
Log likelihood	-3000	-2596	-8239	-4771	-3567	-3185
Chi2 (Prob.)	0.000	0.175	0.871	0.000	0.002	0.001
Observations	31685	5544	13587	7876	81510	11456
Random-effect parameters						
Level 2 ICC	0.975	0.000	0.000	0.017	0.969	0.050
MOR	1.100	1.000	1.000	1.258	2.700	1.495
Level 3 ICC	0.002	0.002	0.042	0.001	0.002	0.008
MOR	1.803	1.095	1.440	1.073	1.761	1.180
Wasting	1.460**	0.953	1.037	0.990	1.087	0.971
	(1.023-2.084)	(0.630-1.441)	(0.956-1.124)	(0.889-1.102)	(0.873-1.354)	(0.777-1.213)
Log likelihood	-116	-1034	-7769	-4548	-1637	-1474
Chi2 (Prob.)	0.037	0.973	0.374	0.000	0.418	0.924
Observations	31685	5544	13587	7876	81510	11456
Random-effect parameters						
Level 2 ICC	0.966	0.000	0.000	0.017	0.956	0.019
MOR	1.400	1.000	1.000	1.259	5.50	1.278
Level 3 ICC	0.002	0.000	0.042	0.000	0.005	0.025
MOR	1.548	1.000	1.442	1.000	1.870	1.324
Children mortality (both gender)	5.732***	1.844***	5.582***	2.447***	2.239***	1.543***
	(0.175-0.419)	(1.500-2.268)	(5.013-6.215)	(2.156-2.778)	(1.994-2.515)	(1.377-1.730)
Log likelihood	-2424	-1837	-5078	-3735	-4759	-4203
Chi2 (Prob.)	0.000	0.000	0.000	0.000	0.000	0.000
Observations	31685	5544	13587	7876	81510	11456
Random-effect parameters						
Level 2 ICC	0.974	0.000	0.000	0.000	0.972	0.001
MOR	0.004	1.000	1.000	1.043	3.100	1.074
Level 3 ICC	0.000	0.021	0.038	0.049	0.000	0.000
MOR	1.000	1.292	1.410	1.484	1.298	1.000

Method of estimation is multilevel logistic regression (*xtmelogit*). Significantly different from zero at *10%, **5%, and *** 1%.

ICC= intraclass correlation coefficient; MOR= Median odds ratio; OR=Odds ratio; CI=Confidence interval

^a Analysis adjusted across countries for maternal age, maternal literacy, child weight at birth, wealth index, parental polygyny, and living area.

Table 5: Multilevel regression analysis of child marriage impact on women health indicators.

	Egypt (2013/2014)		Sudan (2010)		Palestine (2010)	
	Three levels (individuals, regions and governorates)		Three levels (individuals, states and areas)		Three levels (Individuals, governorates and areas)	
	ORs (95% CI)	Adjusted ORs (95% CI) ^a	ORs (95% CI)	Adjusted ORs (95% CI)	ORs (95% CI)	Adjusted ORs (95% CI)
Having children who later died	5.830***	1.881***	5.679***	2.519***	2.259***	1.511***
	(4.910-6.923)	(1.531-2.313)	(5.102-6.322)	(2.218-2.860)	(2.011-2.537)	(1.384-1.738)
Log likelihood	-2426	-1874	-5096	-3722	-4772	-4214
Chi2 (Prob.)	0.000	0.000	0.000	0.000	0.000	0.000
Observations	31685	5544	13587	7876	81510	11456
Random-effect parameters						
Level 2 ICC	0.974	0.000	0.000	0.000	0.972	0.002
MOR	4.500	1.000	1.000	1.040	3.100	1.086
Level 3 ICC	0.000	0.022	0.041	0.054	0.000	0.000
MOR	1.000	1.297	1.430	1.515	1.298	1.000
Antenatal care	0.551***	0.640***	3.296***	0.867***	1.437***	0.881***
	(0.468-0.649)	(0.524-0.781)	(3.027-3.589)	(0.782-0.961)	(1.331-1.551)	(0.816-0.952)
Log likelihood	-5126	-3000	-6779	-4869	-9035	-7474
Chi2 (Prob.)	0.000	0.000	0.000	0.000	0.000	0.000
Observations	31685	5544	13587	7876	81510	11456
Random-effect parameters						
Level 2 ICC	0.981	0.000	0.000	0.000	0.946	0.010
MOR	1.000	1.000	1.000	1.000	2.550	1.199
Level 3 ICC	0.002	0.000	0.004	0.010	0.032	0.002
MOR	2.140	1.000	1.127	1.196	1.523	1.086

Method of estimation is multilevel logistic regression (*xtmelogit*). Significantly different from zero at *10%, **5%, and *** 1%.

ICC= intraclass correlation coefficient; MOR= Median odds ratio; OR=Odds ratio; CI=Confidence interval

^a Analysis adjusted across countries for maternal age, maternal literacy, child weight at birth, wealth index, parental polygyny, and living area, radio and television

4. Discussion

This study aims to shed light on the phenomenon of child marriage in the MENA region, the second most political and economically vulnerable region after SSA. Although the prevalence rate of child marriage is not similarly high as other regions such as South Asia and SSA. However, these practices exist on a large scale across many countries in the region. The recent political and social upsurges that have strongly hit the region have made the lives of millions of people harder and with poverty standing at the top reasons for children to get married thus the environment is now fertile than even to disseminate these practices.

Our analysis investigates the impact of child marriage on selected health indicators for women such as antenatal care, having children who later died, and contraception usage and for children such as stunting, wasting and children mortality before age 5. We also control for a set of economic, demographic and socioeconomic indicators to capture the underlying factors behind the occurrence of the child marriage. We select the most recent available MICS household survey for three countries from the region, Egypt, Sudan, and Palestine. These surveys are published and conducted by UNICEF and national governments to collect and analyze data for monitoring the situation of children and women across the world. We use the 2014 version of the Egyptian survey and the 2010 versions of Sudan and Palestine. We then disentangle the collected data into two women groups, women who were married before reaching

18 (control group), and women who were married between the ages of 18-24 (reference group). Our Multilevel regression analysis clusters the data within 3 levels. These levels are unique for each country based on the selection process.

More than half of the interviewed women across Egypt and Sudan have been married before reaching the age of 18 while nearly 46% of the Palestinian women have been married early. In general Palestinian women are performing better in terms of educational attainment and the recipient of antenatal care during pregnancy than their counterparts in Sudan and Egypt. With the lack of educational opportunities standing at one of the top drivers of child marriage (UNICEF; 2017), this explains the relatively low share of child marriage of Palestine in comparison with other countries. Also, Palestinian children who were born for early-married women are better in their health status and have lower rates of stunting, wasting and children mortality relative to their counterparts in Egypt and Sudan. Across countries, women who were married before the age of 18 have higher rates of husband polygyny, contraceptive usage, and tend to give birth to more children who later die relative to the women who were married between the ages of 18-24.

Our empirical results show that the phenomenon of child marriage is associated with more vulnerable health outcomes for both the mothers and their children across the three countries. Regarding children health indicators, respondents with child marriage in Egypt are more likely than women who were elderly married to have stunted and wasted

children. Similarly, children who were born by early married Palestinian women are more likely to be stunted relative to other women children. Also, early-married women from the three countries tend to have children with higher under-five children mortality relative to the other women group.

After adjusting the estimations using the set of socioeconomic and demographic characteristics of married women, the significant association between child marriage and under-five mortality rates hold across all the countries. While regarding the association between child marriages, stunting and wasting in the adjusted models, this relation becomes insignificant except for the stunting rate in the case of Palestine. Regarding women health indicators, early married women are more likely to have children who later die than the other women group across all the countries at both the basic and adjusted models. Finally, the child marriage is significantly associated with decreased likelihood of receiving any form of antenatal care in Egypt and after adjustment for other control variables, a similarly reduced likelihood is observed in Sudan and Palestine as well.

There are few limitations to this study, first, our analysis involves a cross-sectional analysis so we cannot assess causality based on our findings. Also, our analysis investigates women group who were married until the age 24, so we cannot generalize our results to the other women groups in any of the three countries. Although the time span of each country differs depending on the most recent available version in MICS database, however, the

temporal differences are not large. Nevertheless, our results regarding comparing the three countries should be treated with caution. Future research can expand this line of research in the MENA region, by mimicking similar studies in other parts of the world on the association between child marriage and other social and health indicators, such as husband violence, nature of assistance at delivery and place of delivery.

In conclusion, child marriage is generally associated with giving birth to children with higher under-five mortality rates across the three MENA countries. Also, women who get to marry before reaching the age of 18 are less likely to receive any form of antenatal care and more likely to give birth to children who later die. Governments and public communities should pay close attention to improving the widespread, availability and affordability of education for girls and women nationwide. Regardless of their residence area and level of income, subsidizing and income transfer programs should make sure that girls continue their education and do not leave schools due to income constraints, availability and or reachability of schools should be improved and families need to be constantly advised and guided via about the importance of education to their children. Within the MENA region that has the lowest global share of female literacy, Palestinian women are classified as the best educated (The Royal Academy of Science International Trust [RASIT], 2017. Our analysis suggests that the better educational attainment of Palestinian women explains the low prevalence of child marriage and for women and

children to have a relatively lower health deprivation relative to their counterparts in other countries. Better educated women are not only capable of better caring about their health and the health of their children but also they are better wives, citizens and a catalyst for the development of their countries. As narrated by Hafez Ibrahim the Nile poet in his poem about knowledge and morals (Ibrahim, 1937): ‘A mother is a school, whenever you equipped her well, you prepared a nation with a fine race’

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Conflict of interest:

The author reports no conflict of interest.

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