ISSN (Online): 2455-3662
EPRA International Journal of Multidisciplinary Research (IJMR) - Peer Reviewed Journal
Volume: 10| Issue: 4| April 2024|| Journal DOI: 10.36713/epra2013 || SJIF Impact Factor 2024: 8.402 || ISI Value: 1.188

WOMEN'S EDUCATION AS A SOLUTION TO CHILD MORTALITY: UZBEKISTAN

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ABSTRACT

Development economics is one of the richest fields for research. Apart from macroeconomics, microeconomics, and finance, a sufficient number of experts dedicate their papers to examining and explaining different socioeconomic phenomena happening in people's lives. One of the most critical problems in modern society is child mortality. It has been prevalent at all stages of the world's history. On the other hand, in the 20th and 21st centuries of financial innovations and globalization, this problem should be less severe than it was formerly. The data from UNICEF shows that the child mortality problem remains as keen as it has always been. According to UNICEF's 2023 report on child mortality, around 5 million children and youths died due to unnatural reasons (UNICEF, 2018). The researchers argue that their deaths may have been averted in the case of proper care and living conditions. However, these factors do not rely entirely on children. The society and their families should guarantee their safety and well-being. Some experts assure that the possible key to solving child mortality is women's education. High-educated women are intelligent; they understand the importance of childcare. Educated women can also be income generators; families have enough money for food and health expenses (Doku et al., 2020). This paper conducts empirical research on the prevalence of child mortality in Uzbekistan. The main objective of this research is to examine the impact of women's education and other household parameters on child mortality in Uzbek families. The theoretical framework and ideas behind child mortality will be applied in practical econometric analysis by examining related literature. The data for this analysis has been downloaded from a respectful authority, the DHS program.

LITERATURE REVIEW

A sufficient number of development economists state that women's education can help improve child health and mortality issues. Pierce and Foster (2020) argue that schooling can improve children's welfare, increase survival chances, and solve gender discrimination and child mortality problems. The authors confirm that child mortality is highly prevalent in households with low-level educated mothers. The causes of death are mostly ignorance of essential health and safety, which are taught in primary schools. Thus, adequately educated mothers, with at least a primary level of education, are aware of child care. At the same time, child gender discrimination exists in families with uneducated mothers (Pierce & Foster, 2020). Poorly educated women mostly do household chores and sit with children while their husbands work. With several children and the only income earner, most households suffer from severe income constraints. The highest share of income is spent on food. Women's child preference is more for boys because sons will later grow up and earn money (Pierce & Foster, 2020). Thus, they spend more care and money on boys' health and education than girls. It can eventually solve the problem of child mortality since the majority of child and adolescent deaths originate from poor health and care, which are due to a lack of money. If these women had had a secondary education level, they could have been earning money with their husbands. Income constraints will loosen, and there will be enough money for all children, consequently reducing child mortality incidence as well as gender discrimination (Pierce & Foster, 2020). Keats (2018) states that women's education can indirectly impact child mortality through fertility preference. The researcher's statements correspond with the previous paper. Based on findings from Uganda households, the author proves that uneducated women prefer to have more children to have more income earners later. High fertility is considered one of the key triggers of child labor, mortality, and poverty (Keats, 2018).

Money earned by the father will need to be more to feed several children. Once a child gets old enough to do agriculture or other self-employment work, he starts skipping school and concentrates more on earning money. Without proper education, this child, later an adult, will find only low-wage jobs and raise his children similarly. High fertility causes intergenerational poverty. On the other hand, highly educated women have low fertility preferences. If they work and earn money themselves, they comprehend that money should be spent equally on each child. Educating women increases their chances of finding a job and reduces the financial burden on their families, which will eventually lead to lower child mortality and poverty (Keats, 2018).

However, several economists are not optimistic about the negative influence of women's education on child mortality. Kumar, Patel, and Chauhan (2020) do not find a significant effect of women's educational attainment on the health and safety of their children. In societies where severe gender discrimination and child mortality are prevalent, education opportunities cannot guarantee that women will work. Women with education may prevent child mortality, but only if education is higher. Primary and secondary education levels do not significantly affect a child's well-being and survival chances (Kumar et al., 2020). In the majority of developing

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countries, primary and secondary education is free. However, child mortality is still severe. With secondary education, women need help finding a well-paid job. Some work for low salaries and others are homemakers and sit with children. The authors also argue that higher education cannot effectively prevent child mortality. In Sub-Saharan and Asian countries, education for women is a good advantage from a marriage perspective (Kumar et al., 2020). Parents who can afford higher education do it to increase the marital value of their daughters. Once married, a sufficient number of women still do not work and remain at home. Kumar, Patel, and Chauhan (2020) conclude that higher education for women can fight child mortality if combined with other household and social factors. Ingutia, Rezitis, and Sumelius (2020) agree that education alone cannot effectively prevent child mortality.

Governmental authorities should encourage women to work even if they do not have proper education. The researchers are proponents of women's agriculture participation and land-owning. Ingutia, Rezitis, and Sumelius (2020) affirm that women's educational attainment positively influences child survival in the case of women's work. Theoretically, if the mother has an education and later works, it increases her family's and her children's welfare. However, some households do not permit their wives and daughters-in-law to work even if they have secondary or higher education (Ingutia et al., 2020). Thus, the child mortality problem remains the same.

On the other hand, well-educated women who own or rent land significantly reduce the likelihood of child mortality. In developing countries, people work in agriculture to grow food for their consumption. Educated women can utilize crops not only for consumption but also for sale. They earn money; thus, the household can spend not only on food but also on healthcare and education of children. It will consequently decrease child mortality. Furthermore, women's land ownership increases their bargaining power in the household. Their opinions and decisions have more value when deciding on budget allocation (Ingutia et al., 2020).

METHODOLOGY

The data for this research has been requested from the DHS program (DHS, no date). The DHS program conducts surveys to analyze different socioeconomic and health conditions of households in developing countries. In Uzbekistan, this survey has been performed in two waves: the standard DHS survey in 1996 and a specialized health survey in 2006. The data for this paper has been reduced from the initial Uzbekistan DHS 1996. The individual dataset HIR has been chosen among seven data sections as it has all the required variables. The questionnaires were filled out by female household members only and included information about their health and that of their children. The dataset has been further shortened by restricting the age of these women, only variables from households with female interviewees younger than 35. This measure should guarantee that a child of this woman has died underage since children older than 35 women may have been adults by the time of the interview. Since the main objective of this research is to analyze the influence of regressors on child mortality, their mothers should be younger than 35. The number of observations is 3,185. The OLS regression model will be applied to identify the impact of independent variables on child mortality.

Variable	Type	Definition
child alive	dummy	1 if the household has not lost at least one child; 0 if not
medu1	dummy	1 if the mother has primary education level
medu2	dummy	1 if the mother has secondary education level
medyears	numerical	Number of years mother has studied
lit	dummy	1 if mother can read; 0 if not
motherage	numerical	Mother's age
hhsize	numerical	Number of household members

The dependent variable, *childalive*, is a dummy variable. The DHS has provided women with specified questionnaires about their households, health, and children. These questionnaires ask if the household has ever lost at least one of their children. It takes 0 value if this household has lost one of their children prematurely, which is before the child turned 18, and 1 if it never did. The explanatory variables are household indicators mentioned in the literature review. The first dependent variable depicts the education level of the child's mother. The *medu1* and *medu2* variables are equal to one if the mother has primary and secondary education, respectively. While producing these variables from the initial survey, *motheredu3* for higher education was also generated. However, it still needs to meet the regression outcomes and be included. The *years* variable is numerical and describes how many years the mother has studied. Another independent dummy variable is *lit*. It takes the value of 1 if the mother can easily read and 0 if not. Motherage is numerical and demonstrates how old the mother is at the time of the interview. *Hhsize* is a numerical variable as well. It shows the number of members of the household.

$$y = \beta_0 + \beta_1 medu1 + \beta_2 medu2 + \beta_3 medyears + \beta_4 lit + \beta_5 motherage + \beta_6 hhsize + u_i$$

(Equation 1).

Equation 1 describes a theoretical framework behind the relationship between child mortality prevalence and regressors above. After the econometric analysis is conducted, this model will present definite relationship signs and beta coefficients. The set of different statistical tests and graphical adds are applied as a post-estimation check. These tests are the D'Agostino skewness and Jarque-Bera tests for normal distribution, the Breusch-Pagan test for heteroscedasticity, and the Variance inflation factor test for multicollinearity (see Appendices).

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RESULTS

Regression Results

The following section presents the findings about the relationship between child mortality prevalence and mother and household characteristics. The complete regression results are presented as a statistical table with coefficients and standard deviations for each variable (see Appendix 1 and 2). The regression algebraic equation is:

$$childalive = -1.220 + 0.220medu1 + 0.169medu2 + 0.011medyears + 0.016lit + 0.060motherage + 0.12hhsize + u_i$$

According to the literature review, almost all independent variables affect child mortality prevalence. Both *medu1* and *medu2* prove that a mother's educational attainment positively affects the health and well-being of their children. Children of mothers with complete primary and secondary education have a higher chance of reaching adulthood. However, *medu1* shows no significant influence on child mortality. It can be addressed to the education system in Uzbekistan.

In contrast to many developing countries where child mortality is prevalent, Uzbekistan requires every person to study at school. Regardless of gender and place of residence, primary education is compulsory in Uzbekistan. Thus, almost all women have primary education, and the impact is positive but insignificant. The significant positive impact of mother education exists if the mother has a secondary education, *medu2*. Households with mothers having secondary education have 16% less chance of losing their children.
In the same way, the higher the number of years mothers studied, the lower the child mortality prevalence. The regression findings state that each additional study year decreases child mortality by 1.1. The ability of the woman to read and write also negatively impacts child mortality. Women who can easily read and write reduce child mortality by 1.6%. A woman's age also has a significant effect on child mortality prevalence. With women becoming one year older, child mortality decreases by 6%.

On the other hand, household size contrasts with the literature review. The papers from the literature review section mostly agree that the bigger the household, the higher the chance of child mortality. However, the current regression shows that big households positively affect child well-being. With the number of household members increasing by 1, there is a 1% less chance of losing a child. The proven effect is positive and can be explained by exploring Uzbek families. A sufficient number of Uzbek families have lived together for several generations. Grandparents, parents, children, and grandchildren tend to live together. At the same time, working family members share living costs, and there are more people to look after children apart from their parents.

In contrast to African and some Asian countries, where child mortality is also prevalent, lots of families consist of parents and several of their children. If both parents work, the older children look after their younger siblings. In Uzbek families, it is a typical case when even if parents both work, grandparents live with them and take care of children. Objectively, grandparents are more experienced and reliable tenders than children themselves, even if they are older. This social tradition may explain why household size positively affects children living in Uzbekistan.

TESTS RESULTS

The data and variables should meet several requirements to ensure that regression analysis shows accurate and relevant results. The first condition that guarantees the OLS model's correctness is the normal distribution of data and residuals. Firstly, the graphs and charts are constructed to assess whether data is normally distributed visually. The Appendices 3 and 4 show the likeliness of current data to normal distribution. According to the graphs, the data does not perfectly fit the normal distribution trend (see Appendices 3 and 4). In Appendix 4, the blue line representing the current data does not perfectly follow the green line of normal distribution. Appendices 5 and 6 also demonstrate that data residuals do not accurately follow the expected trend. The D'Agostino skewness and kurtosis test is applied to check whether data is normally distributed. The test proves that data is normally distributed (see Appendix 7). Since probability chi2 is higher than 0.05, the null hypothesis of normality cannot be rejected. Thus, data is normally distributed. Jarque-Bera test for normality also states that data is normal in distribution (see Appendix 8).

Another critical indicator of accurate OLS estimation is heteroscedasticity. If heteroscedasticity is prevalent in OLS analysis, the regression model cannot correctly estimate the relationship of variables. Breusch-Pagan test checks for heteroscedasticity in error variances. The null hypothesis in this test is that errors vary constantly, homoscedastic. Since the p-value 0.6048 is higher than 0.05, homoscedasticity cannot be rejected (see Appendix 9). Multicollinearity is one of the significant problems in regression estimation. It occurs when explanatory variables affect the dependent variable and influence each other—multicollinearity mispresents regression results. Thus, coefficients may not state the relationship between variables correctly. STATA command _pwcorr states that there is a minor likelihood that variables are correlated with each other. Variance inflation factor test VIF confirms that explanatory variables are independent and uncorrelated (see Appendices 10 and 11). All STATA commands used in the analysis are included as a do-file in Appendix 12.

Policy Recommendation

The findings from the research are consistent with the literature. Women's education prevents child mortality. To fight child mortality, the government should give more power to women. First, the Ministry of Higher Education can propose education programs for women. It can be quotas and discount fees for higher education only for women, similar to military educational discounts for men who served in the army. Access to higher education is vital to solving the child mortality problem. With education, women can find well-paid jobs and earn money. With more funds, the share of

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medical healthcare and children's education will also increase. Proper healthcare can prevent child mortality. When earning money, women also have more rights and decision-making power in the household when allocating family budgets. Government authorities can meet with parents to explain the long-run importance and advantages of education for women and stimulate women's higher education enrollment. The government can also create specialized monitoring groups to evaluate Uzbek women's family conditions. If women have difficulties finding a job, these groups can assist them.

CONCLUSION

Child mortality is one of the most severe socioeconomic phenomena. UNICEF and other international organizations are constantly looking for solutions to this problem. The majority of child and youth deaths could have been avoided with appropriate health care. This paper proves that women's education is essential in fighting child mortality. Educated women increase the chance of survival for their children. When a woman generates income with her husband, she loosens the budget constraint of their family. The household spends enough money on consumption, healthcare, and children's education. Eventually, educating women decreases child gender discrimination and poverty as well. The government should focus on finding a way to empower and educate women. It is crucial to ease women's access to higher education by offering quotas and discounts for studying. At the same time, the government should assist women in finding a job if they have difficulties after graduation. In the early stage, Uzbek families should be encouraged to educate their daughters and granddaughters by explaining the long-term effect of education on their welfare.

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APPENDICES

Appendix 1. OLS regression model

```
. reg childalive medu1 medu2 lit motherage medyears hhsize
```

Source	SS	df	MS		
Model	395.309118	6	65.884853	Number of obs	= 3,185
Residual	387.028716	3,178	.121783737	F(6, 3178)	= 541.00
				Prob > F	= 0.0000
Total	782.337834	3,184	.245709119	R-squared	= 0.5053
				Adj R-squared	= 0.5044
				Root MSE	= .34898

childalive	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
medu1	.2195434	.1556025	1.41	0.158	-.0855482	.5246349
medu2	.1694913	.0366001	4.63	0.000	.0977291	.2412534
lit	.0161014	.0304623	0.53	0.597	-.0436265	.0758292
motherage	.0598163	.0010902	54.86	0.000	.0576787	.061954
medyears	.0107687	.0069465	1.55	0.121	-.0028513	.0243888
hhsize	.0121258	.0020553	5.90	0.000	.008096	.0161555
_cons	-1.21997	.1046638	-11.66	0.000	-1.425185	-1.014754

```
.
end of do-file
```

Appendix 2. OLS regression table

VARIABLES	(1) child alive
medu1	0.220
	(0.156)
medu2	0.169***
	(0.037)
lit	0.016
	(0.030)
motherage	0.060***
	(0.001)
medyears	0.011
	(0.007)
hhsize	0.012***
	(0.002)
Constant	-1.220***
	(0.105)
Observations	3,185
R-squared	0.505

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

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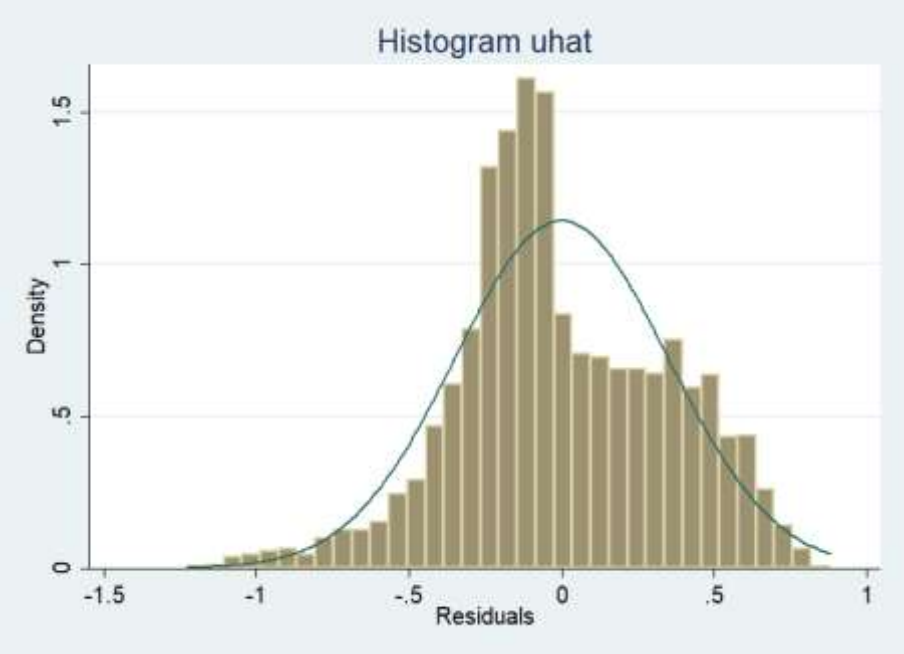
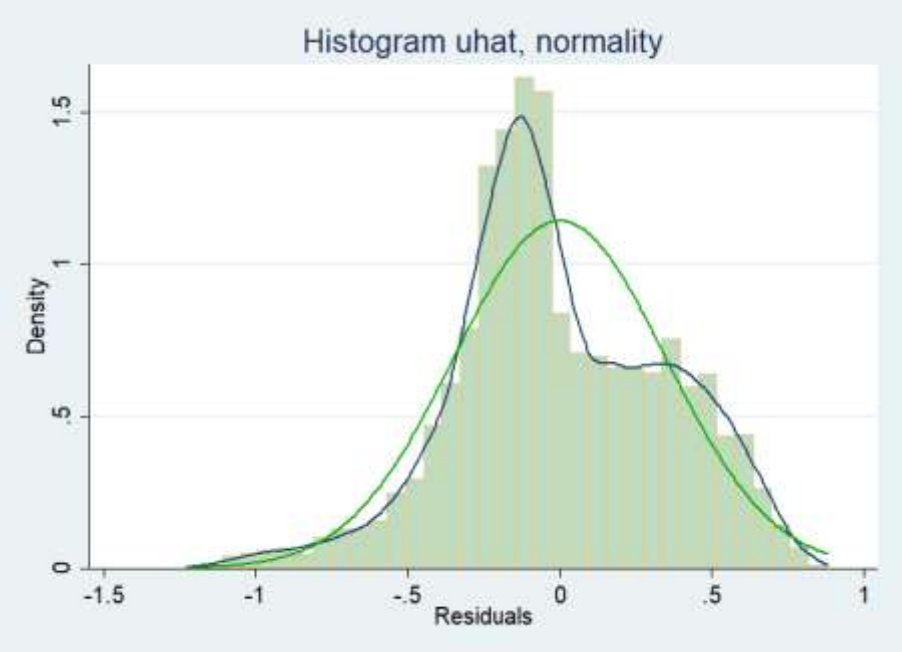
Appendix 3. Normal distribution



Appendix 4. Normal distribution, fitted



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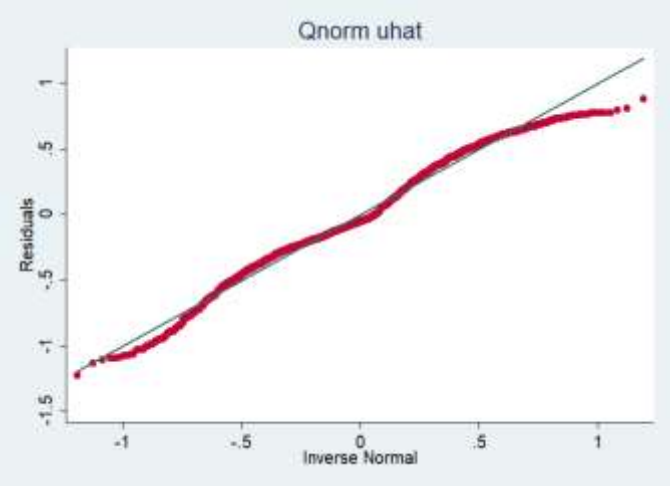
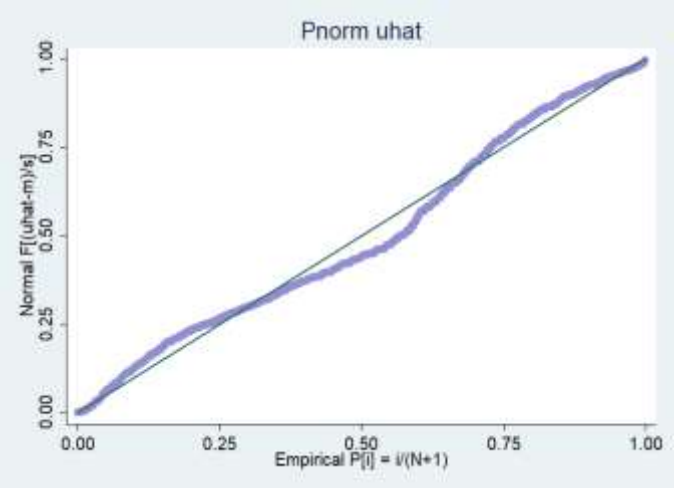
Appendix 5. Normal distribution. Qnorm



Appendix 6. Normal distribution. Pnorm



Appendix 7. Normal distribution test, D'Agostino skewness

```
. sktest uhat

                    Skewness/Kurtosis tests for Normality
                                                          ------- joint -------
    Variable |        Obs  Pr(Skewness)  Pr(Kurtosis) adj chi2(2)    Prob>chi2
-------------+---------------------------------------------------------------
        uhat |      3,185      0.2283        0.4342        2.06          0.3569

.
end of do-file
```

Appendix 8. Normal distribution test, Jarque-Bera

```
. jb uhat
Jarque-Bera normality test:  2.109 Chi(2)   .3483
Jarque-Bera test for Ho: normality:

.
end of do-file
```

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Appendix 9. Heteroscedasticity. Breusch-Pagan test

```
. estat hettest

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of childalive

         chi2(1)      =     0.27
         Prob > chi2  =   0.6048

.
end of do-file
```

Appendix 10. Multicollinearity

```
. pwcorr childalive medu1 medu2 lit motherage medyears hhsize
```

	childa~e	medu1	medu2	lit	mother~e	medyears	hhsize
childalive	1.0000						
medu1	-0.0266	1.0000					
medu2	-0.0314	-0.1303	1.0000				
lit	-0.0041	-0.0556	-0.0673	1.0000			
motherage	0.7021	-0.0361	-0.1573	-0.0033	1.0000		
medyears	0.1322	-0.2083	-0.7904	0.0944	0.2656	1.0000	
hhsize	-0.0168	0.0160	0.0790	-0.0458	-0.1339	-0.0937	1.0000

Appendix 11. Variance inflation factor

```
. vif

    Variable |       VIF       1/VIF
-------------+----------------------
    medyears |      3.84    0.260579
       medu2 |      3.56    0.280646
       medu1 |      1.39    0.720134
   motherage |      1.11    0.903920
      hhsize |      1.02    0.976373
         lit |      1.01    0.987250
-------------+----------------------
    Mean VIF |      1.99

.
```

Appendix 12. Do-file

```
*Generating variables
*generating dependent variable
gen childalive=.
tab b5_01, gen(ch1al)
tab b5_02, gen(ch2al)
tab b5_03, gen(ch3al)
tab b5_04, gen(ch4al)
tab b5_05, gen(ch5al)
```

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```
tab b5_06, gen(ch6al)
tab b5_07, gen(ch7al)
tab b5_08, gen(ch8al)
replace childalive=0
replace child alive =1 if ch1al2==1 |ch2al2==1 | ch3al2==1 | ch4al2==1 | ch5al2==1 | ch6al2==1 | ch7al2==1 |
ch8al1==1
tab child alive

*generating independent variables
tab v025, gen(region)
tab region1
tab v106, gen(medu)
tab v108, gen(lit)
rename lit1 lit
drop ch1al1 ch2al1 ch3al1 ch4al1 ch5al1 ch6al1 ch7al1 ch8al1
rename v133 medyears
rename v136 size
tab v151, gen(hheadage)
tab hheadage1
rename hheadage1 hheadgen1
rename v152 hheadage
rename v012 motherage
rename region1 region
rename hheadgen1 hhhgen

save cw0645.dta

*Regression
use cw0645.dta
drop if motherage > 35
reg child alive medu1 medu2 lit motherage medyears size
ssc install outreg2
outreg2 using regression_results, replace excel dec(3)

*Tests
predict that, resid
hist uhat, norm
hist uhat, density normal
qnorm that
pnorm that
sktest
that
jb that
estat hottest
pwcorr child alive medu1 medu2 lit motherage medyears size
vif
```