
Reaping the benefits of Girl's Secondary Education in Bangladesh – Impact on Fertility and Malnutrition

Syed Rashed El Zayed (Research Associate),
Yaniv Stopnitzky (JPA) and Qaiser Khan (Lead
HD Specialist)
SASHD, World Bank

Data used and organization of study

- Study based on household data from 2004 DHS survey which was conducted in four phases over a period of 18–20 months. The results were checked also using data from the 2000 survey.
- 2004 survey had a sample of 10,500 households.
- The econometric analysis looked at the determinants of malnutrition and fertility in the household – focusing on the effect of girls education controlling for other factors.
- Stunting was used as the measure of malnutrition for this study as this is a better measure of long terms malnutrition.
- Fertility was studied as most of the demographic literature shows a strong direct link between fertility and maternal mortality which is a difficult MDG indicator to achieve in South Asia.
- The study look first at fertility, then at malnutrition.
- Next it will look at econometrics for both
- Finally we look at the impact of female secondary education on TFR and stunting by the MDG target date of 2015

In 1994 Bangladesh started a program of incentives to increase girls secondary enrolments

- This included incentives for schools and students – schools got bonuses to attract girl students and girl students got stipends.
- To eliminate the supply constraint i.e. school places, the government also fully financed for private and NGO sector schools
- Enrolments soared and the gender balance is now in favor of girls
- Despite the persistence of quality problems, this paper finds that the investment is already starting to pay off in terms of difficult MDG targets such as malnutrition and maternal mortality
- The 20-24 year olds in the next table were the first beneficiaries of the above policies.

Impact of Program on Education Attainment by age of mothers (from DHS 2004)

Age	None	Primary	Secondary	Higher	Total
10 to 14	14.6	40.1	45.3	0.0	100.0
15 to 19	15.4	31.3	48.6	4.6	100.0
20 to 24	27.8	30.5	32.1	9.6	100.0
25 to 34	43.9	29.0	19.7	7.4	100.0
35 to 49	54.7	27.6	14.1	3.6	100.0
All	38.6	29.6	25.8	6.0	100.0

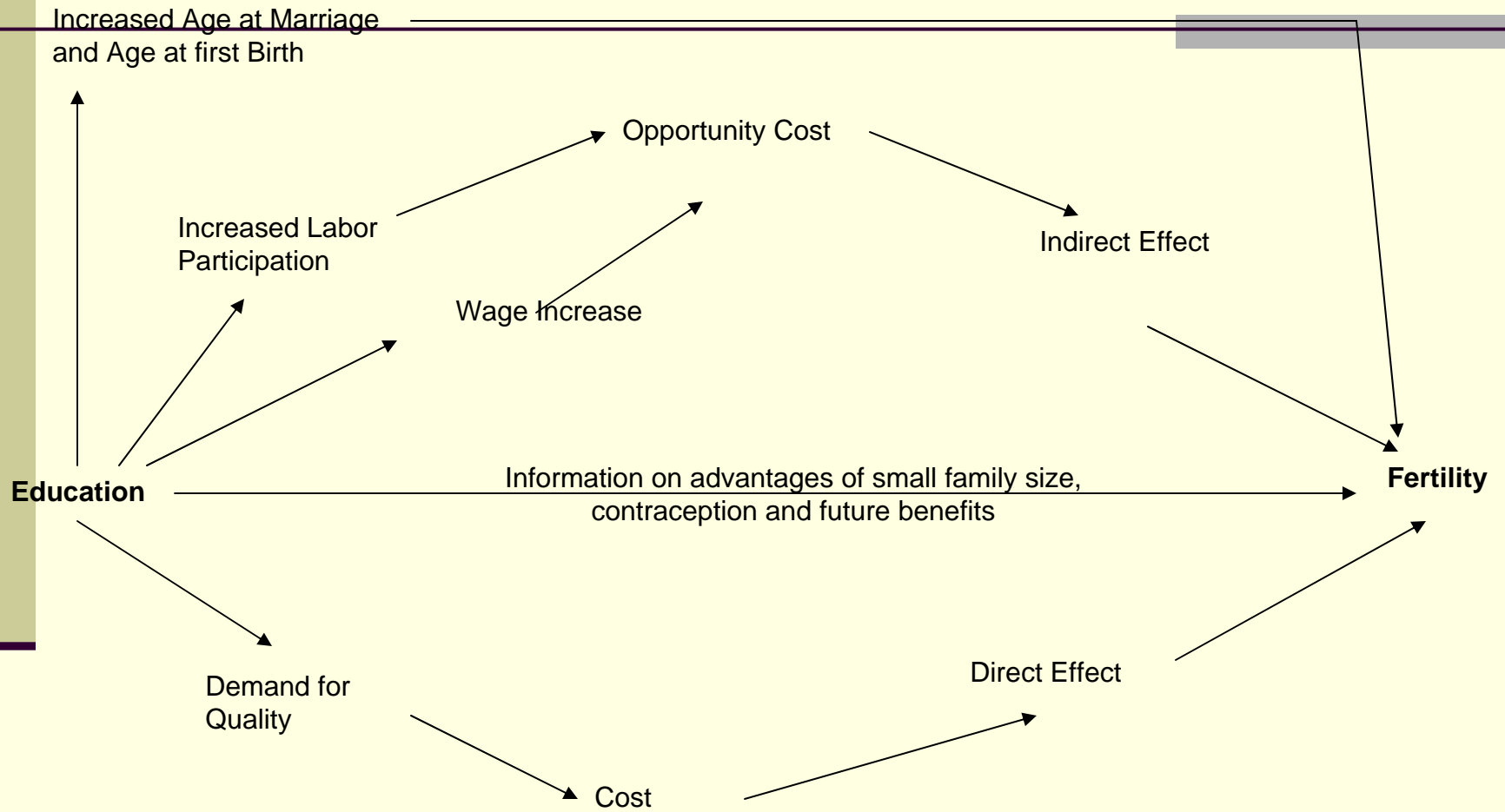
Fertility and Education

- This section looks at the issues underlying the relationship between fertility and education.
- It also explores population and group means from the DHS survey

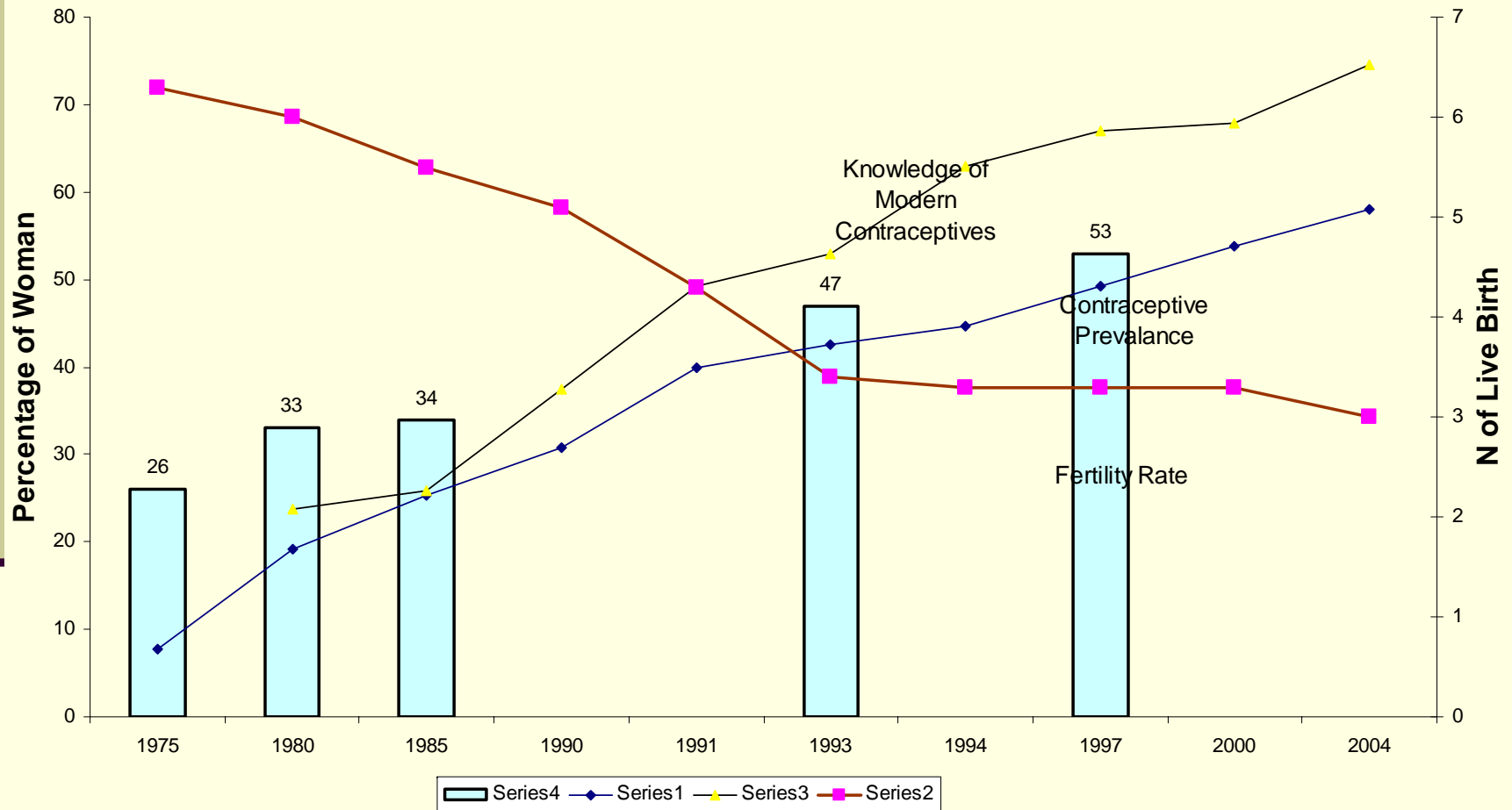
The literature on fertility

- Early research attributes fertility decline to the rise in contraceptive use and efficacy of FP programs. (e.g. Bongaarts and Potter, 1983)
- Recent research shows that changes in socio-economic status alter the cost/benefit ratio faced by households, and leads parents to have less children (e.g. Bongaarts, 2005, Olfa and Lahga (undated)).
- In Becker and Lewis (1973) an economic theory of family views children as a durable commodity and predicts that increased socio economic status of the mother increases the opportunity cost of raising a child (Olfa and Lahga, (undated)).

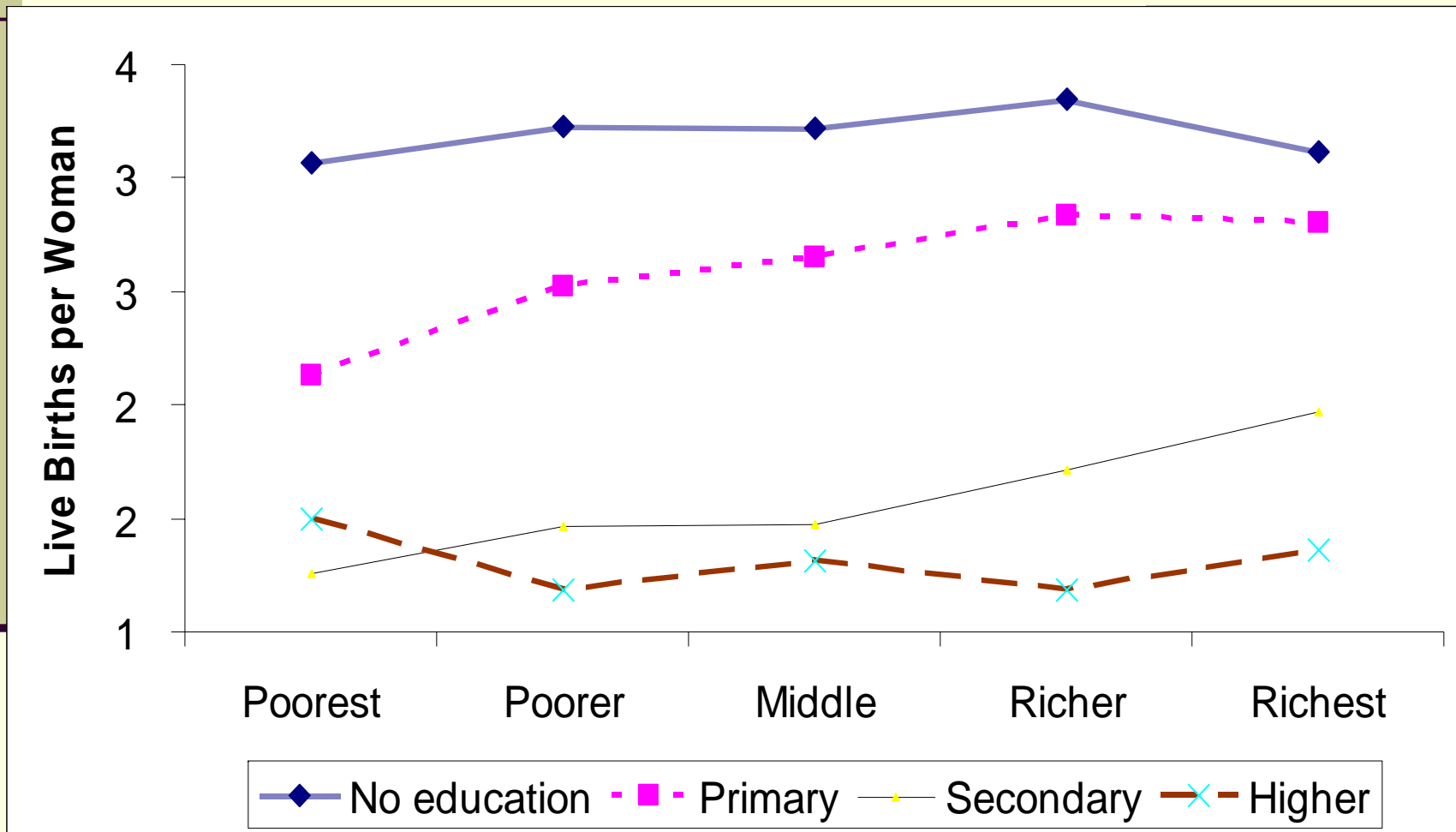
How Education Affects Fertility: An Economic Model



Contraceptive Prevalence, Knowledge of Modern Contraceptive and Fertility Rate from DHS surveys

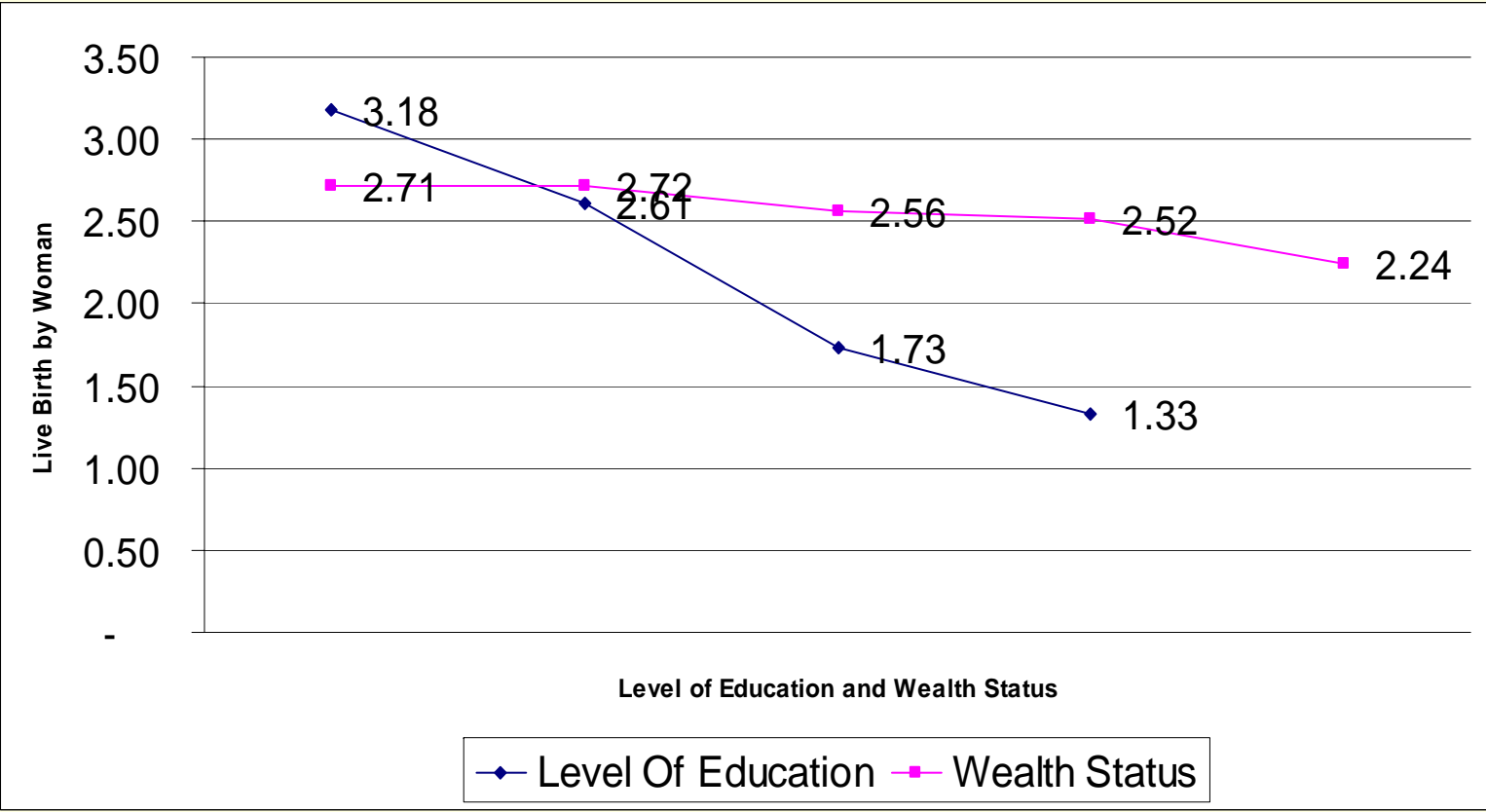


Fertility Rate by Level of Wealth and Education



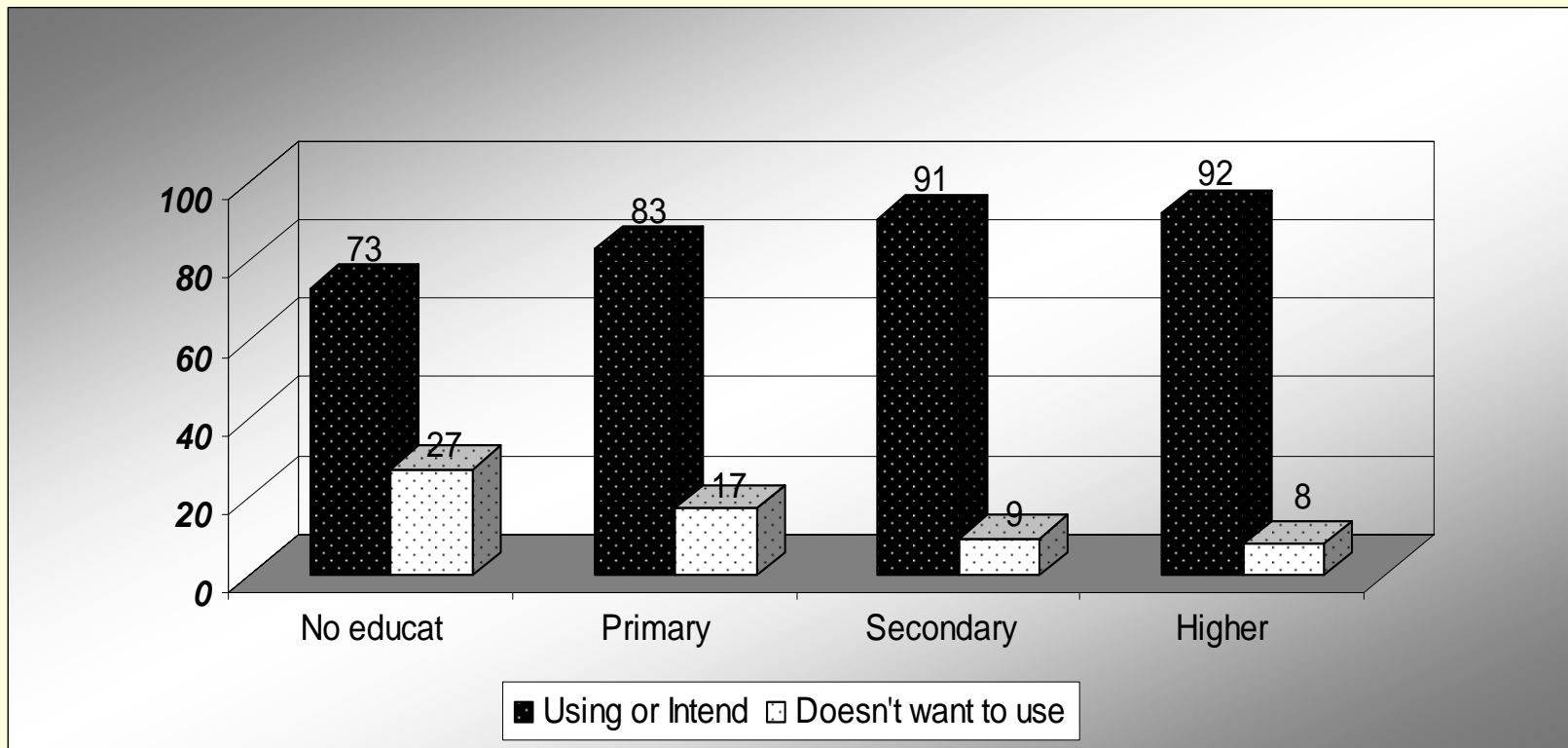
Source: Author's Calculation using DHS 2004

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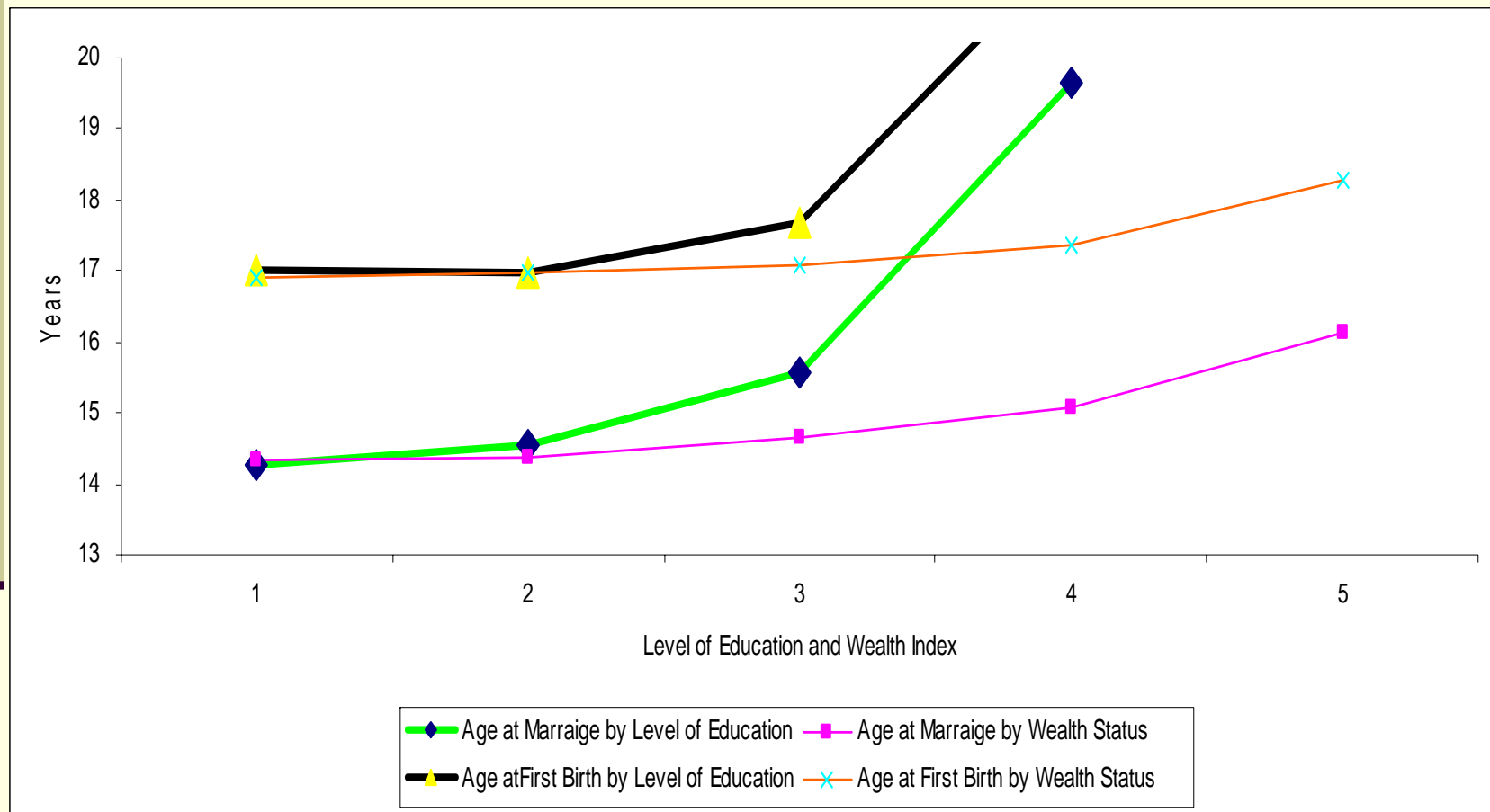
Source: Author's Calculation using DHS 2004

Intention to Contraceptive Use by Level of Education



Source: Author's Calculation using DHS 2004

Age At First Marriage and Age at First Birth By Wealth Index and Education

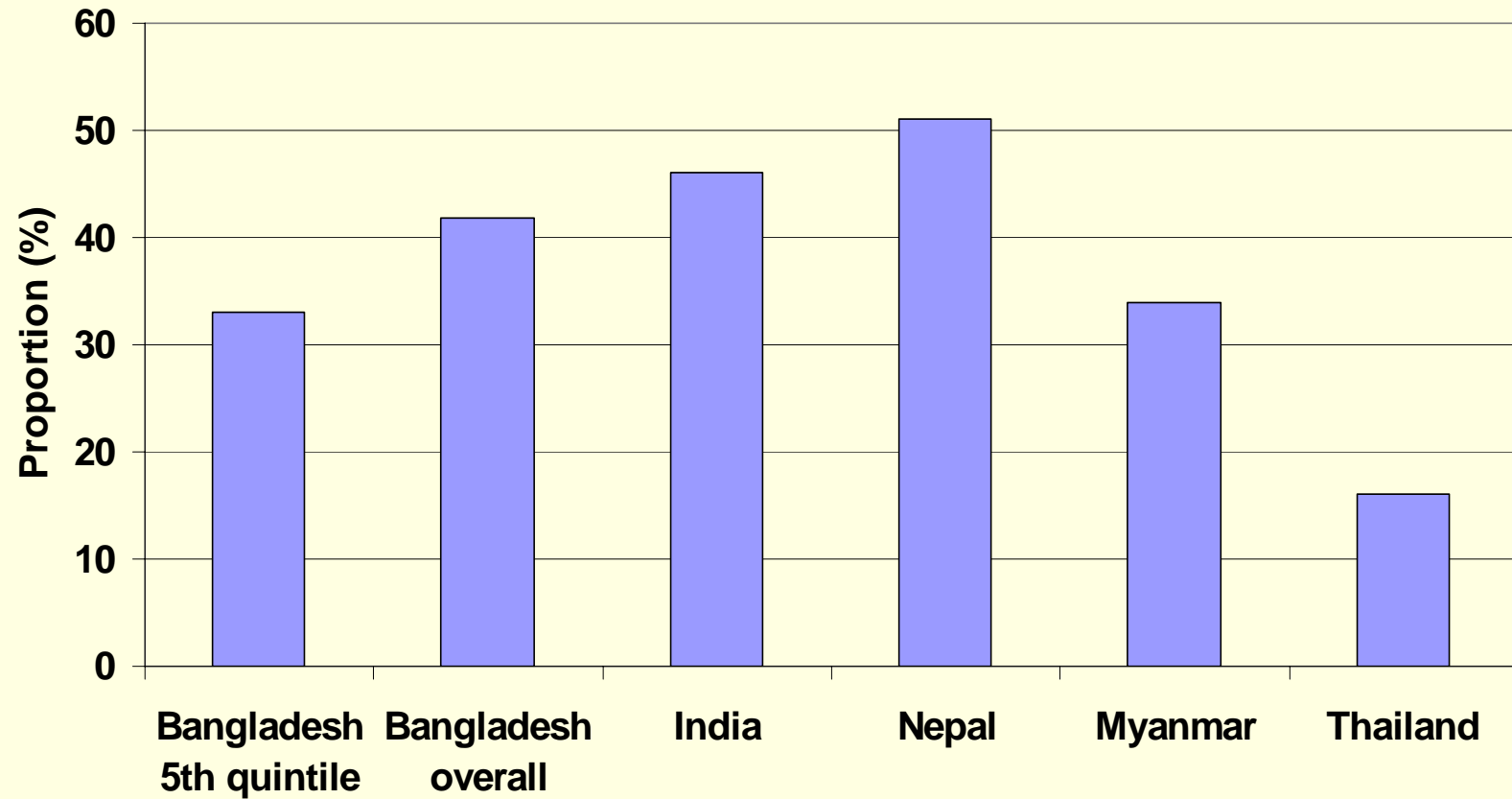


Source: Author's Calculation using DHS 2004

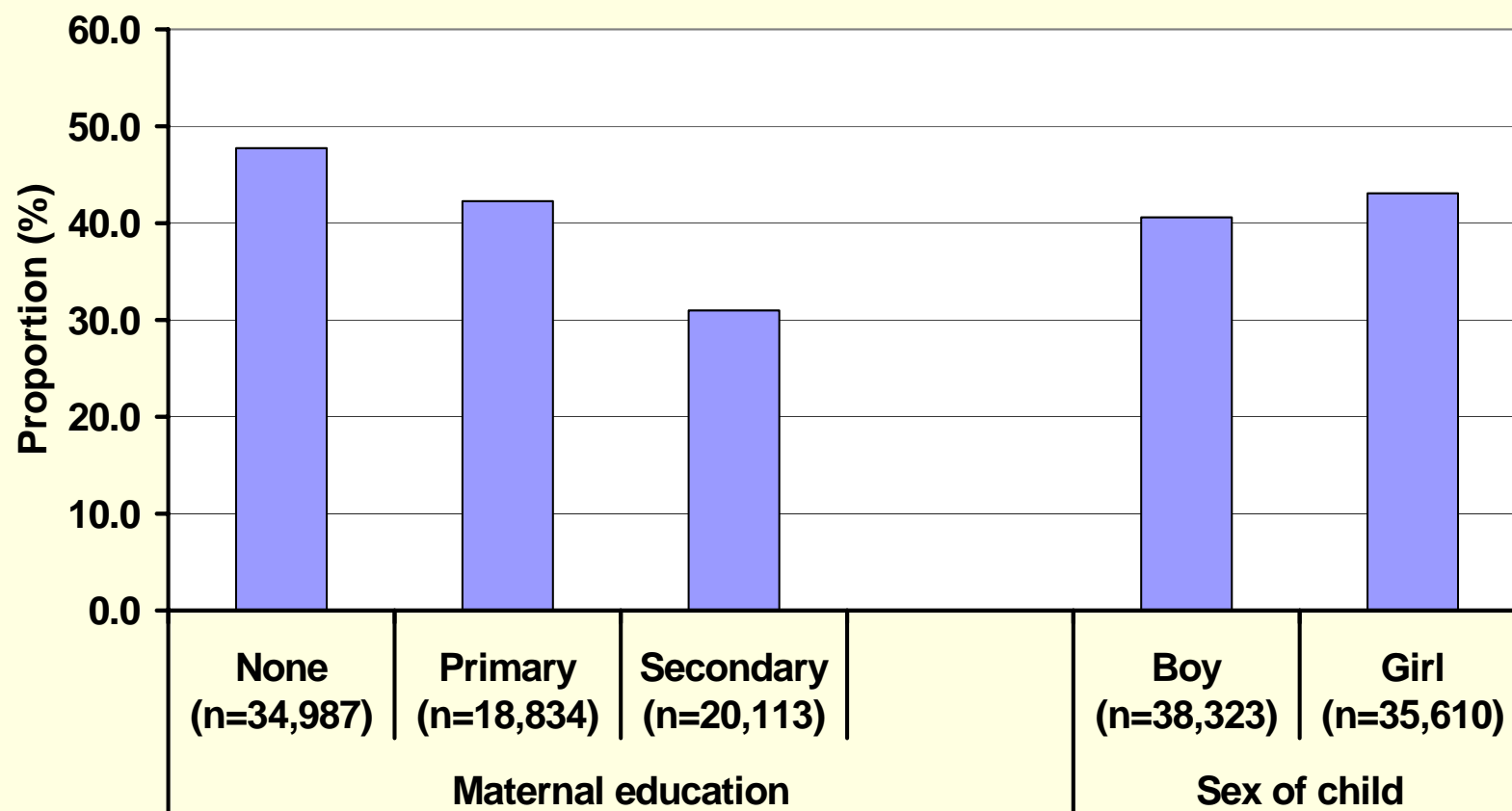
Malnutrition, Wealth and Education

- Before we move to the regression analysis – a look at the broader issues in Malnutrition including analysis of group means from the 2004 DHS

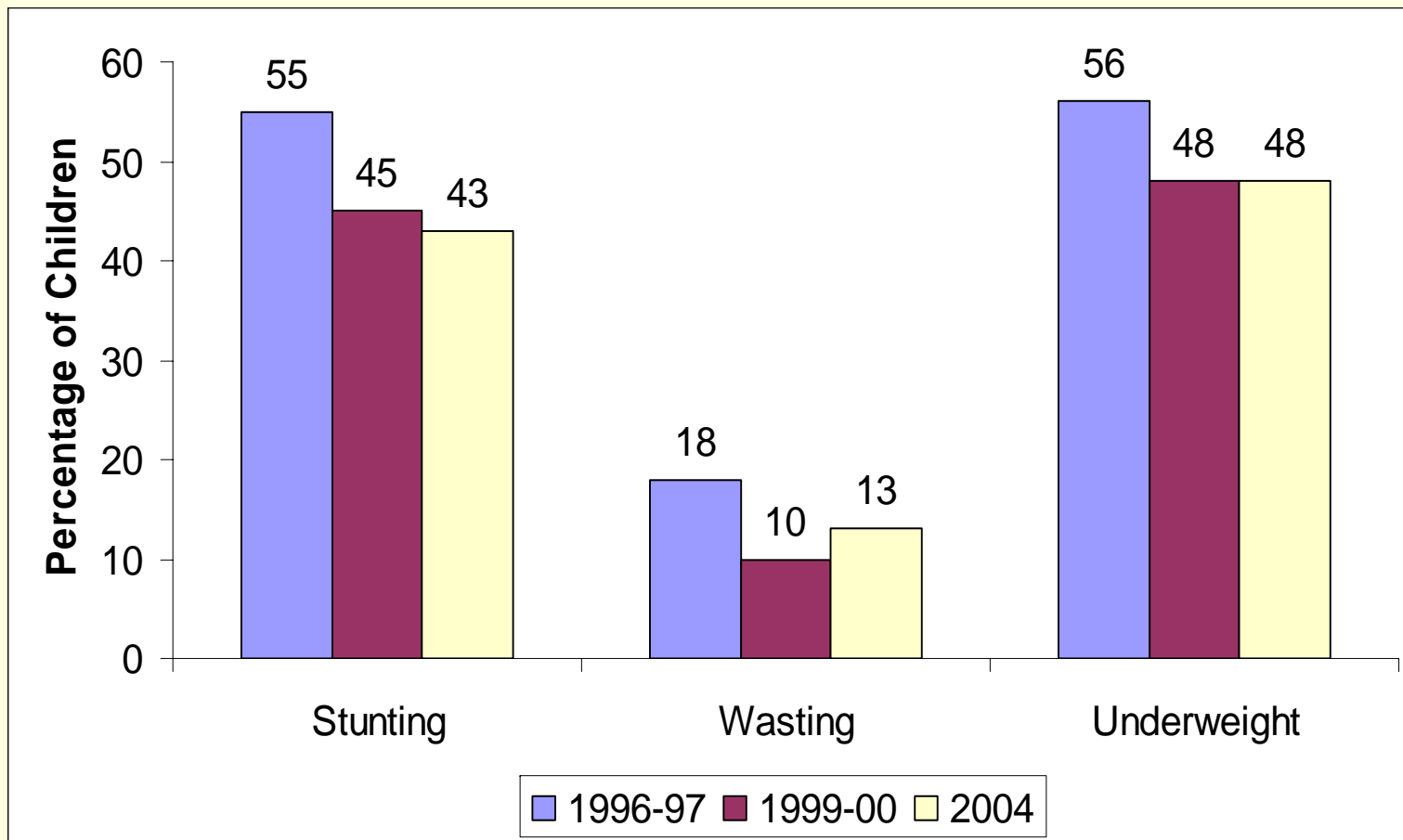
Magnitude of Malnutrition in South Asia



Data from Nutritional Surveillance Project by Helen Keller International (NNP funded)

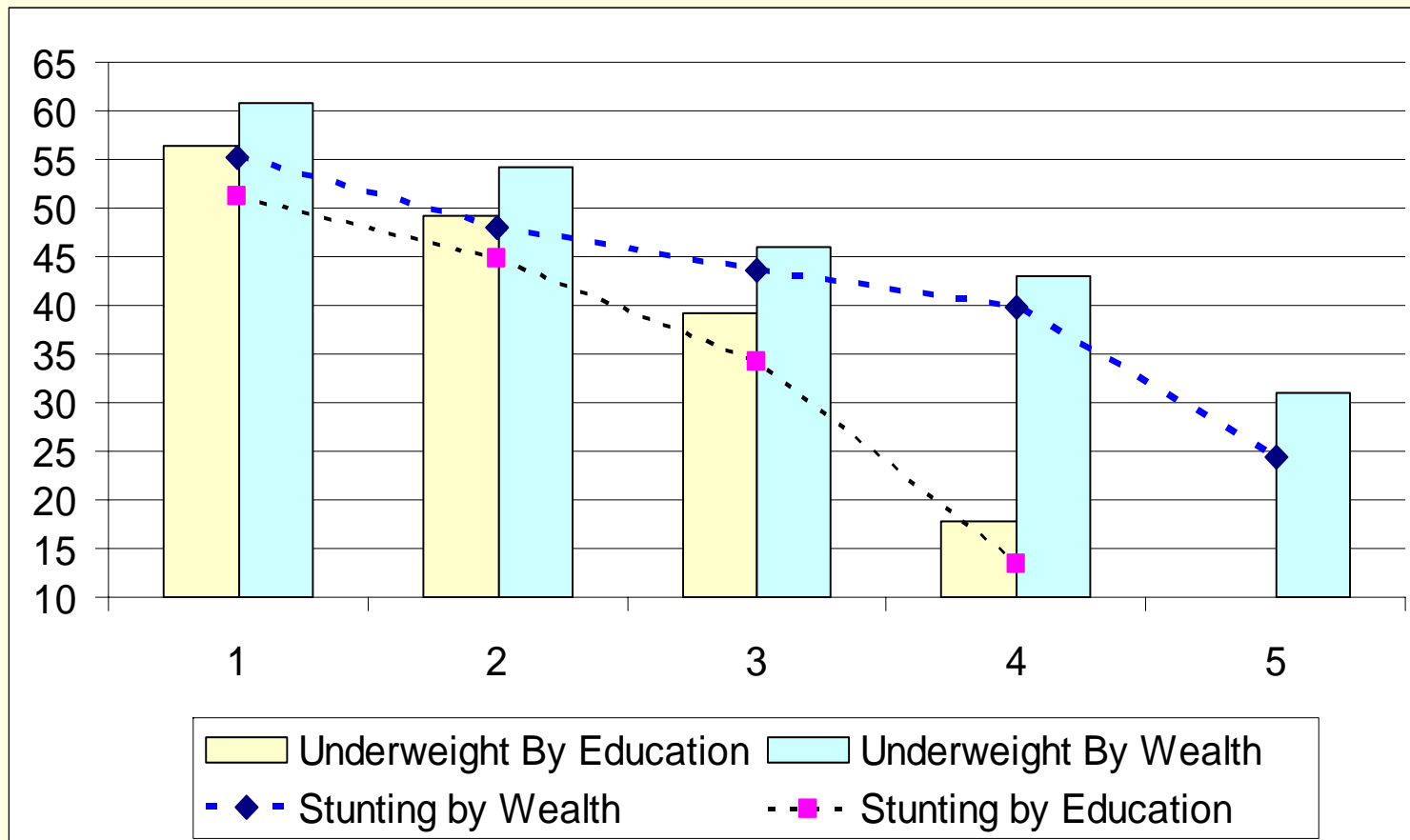


Trends in Nutritional Status of Children Under Five



Source: DHS 2004

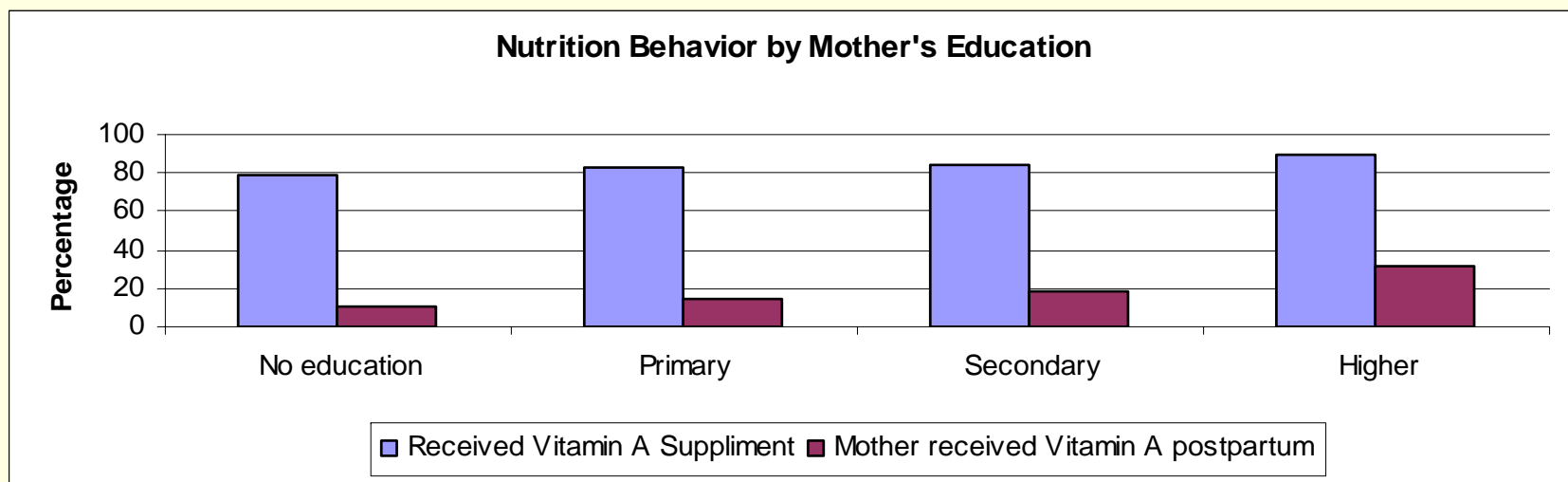
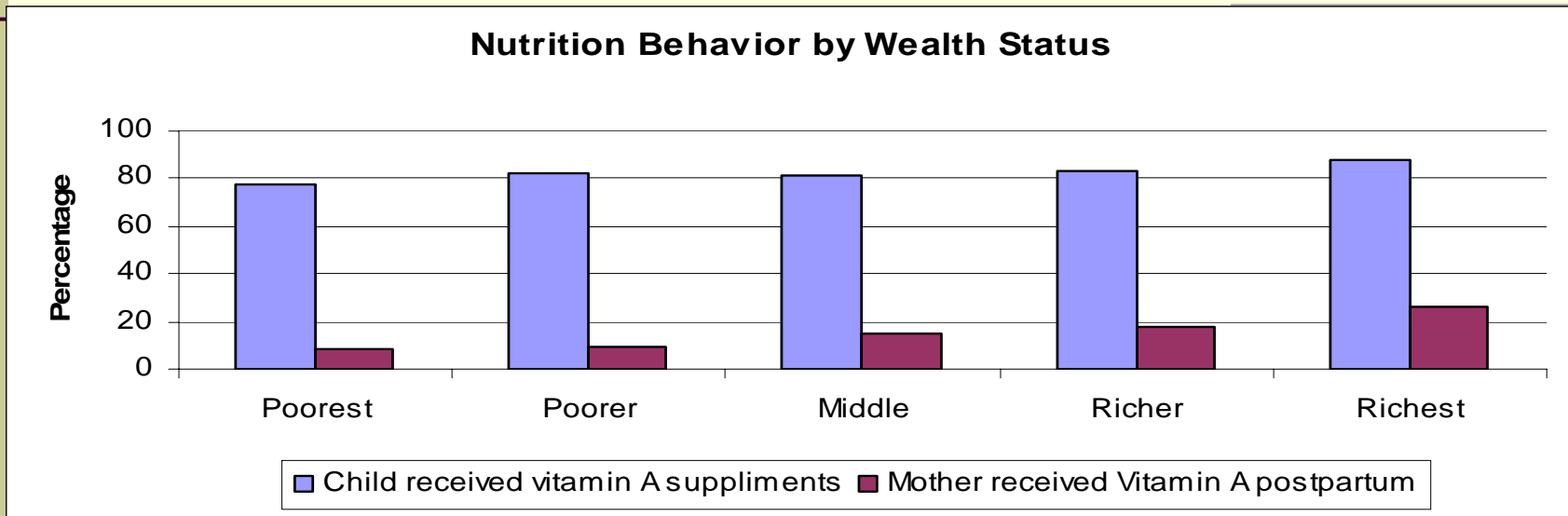
Percentage of stunting and under weight children by level of mother's education and wealth status of the family



Source: Author's Calculation using DHS 2004

Nutritional Behavior by Wealth Status and Education level of the Mother

Source: Author's Calculation using DHS 2004



Econometric Analysis

- The next part deals with limited dependent variable econometrics to explore the impact of specific variables such as education and wealth on fertility and malnutrition.
- The regressions used a Poisson distribution for fertility and a Probit distribution for malnutrition.

Econometrics: Fertility

- A Poisson regression model was used to test the effect of education on fertility
 - Interactions between wealth status and woman's education capture joint effects along with individual effects
 - Poverty dummy (belongs to bottom 40% or not)*Primary dummy
 - Poverty dummy (belongs to bottom 40% or not)*Secondary dummy
 - Other variables are:
 - Primary (Dummy - whether primary graduate or not)
 - Secondary (Dummy - whether secondary graduate or not)
 - Poverty dummy (whether household is in bottom 40% or not)
 - Woman's work status (Dummy)
 - Age at marriage (Dummy – married after 16 or not)
 - Age at first birth
 - Husband's preference (Dummy – husband wants more children or not)
 - Visit by family planning workers (Dummy) Interaction between woman's education and family planning workers
 - Dependent variable is “Number of Living Children”.

Econometrics: Fertility (Poisson)

Regression Results

Dependent Variable: N of Live Births	Coefficient	Significance Level
Interaction Between Primary Education and Level of Wealth (Primary Dummy*Poverty Dummy)	Negative	95%
Interaction Between Secondary Education and Level of Wealth (Secondary Dummy*Poverty Dummy)	Zero	
Primary (Dummy)	Negative	95%
Secondary (Dummy)	Negative	95%
Interaction Between Primary Education and FP Visit (Primary Dummy*FP Visit Dummy)	Zero	
Interaction Between Secondary Education and FP Visit (Secondary Dummy*FP Visit Dummy)	Zero	
FP Visit (Dummy - whether visited Ever by a FP Worker)	Zero	
Poverty (Dummy - whether Hh is in the lowest 40%)	Negative	90%
Married after 16 (Dummy)	Negative	90%
Age at First Birth	Negative	95%
Husband's Fertility Preference (Dummy)	Positive	95%
Work Status of the Woman (Dummy)	Negative	95%
Access to Tv (Dummy)	Negative	95%

Econometrics: Fertility

■ Interpretation of the Results

- Coefficients for all of the explanatory variables show expected sign but interaction term between poverty dummy and secondary education, visit by family planning workers (Dummy) and interaction between woman's education and family planning worker's visit are insignificant.
- Individual effect of poverty dummy is negative and significant at 10 percent level
- Individual effect of both primary dummy and secondary dummy are negative and significant. In fact coefficient of secondary dummy is the single largest among all of the coefficients (-.33; husband's preference is the second: .16).
- Marriage dummy (married after 16 or not), access to TV, husband's preference, age at first birth and woman's work status all affects fertility negatively which supports the hypothesis that socio-economic changes affect significantly the fertility rate.
- Insignificant interaction term between secondary dummy and poverty dummy and significant individual secondary dummy suggests that: if a woman has at least secondary education she will have less children, irrespective of her wealth status
- Significant and negative interaction term between primary and poverty dummy suggests that: if a person is poor, primary education will decrease her number of children

Econometrics: Fertility

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Econometrics: Malnutrition (Probit)

Regression Results (Only the important Variables)

Dependent Variable: Stunt Dummy (Whether the child is stunting or not)	Coefficient	Significance Level
Age of the Child	Positive	95%
Interaction Between Primary Education and Level of Wealth (Primary Dummy*Poverty Dummy)	Statistically Zero	
Interaction Between Secondary Education and Level of Wealth (Secondary Dummy*Poverty Dummy)	Statistically Zero	
Primary (Dummy)	Negative	90%
Secondary (Dummy)	Negative	95%
Poverty Dummy1 (whether Hh is in the lowest 20%)	Positive	95%
Poverty Dummy2 (whether Hh is in the lowest 40%)	Statistically Zero	
Poverty Dummy3 (whether Hh is in the lowest 60%)	Statistically Zero	
Poverty Dummy4 (whether Hh is in richest quintile)	Negative	95%

Econometrics: Malnutrition (Cont.)

■ Interpretation of The Results (Probit distribution)

■ When we control for individual effects of education (primary and secondary dummy) and wealth status, all interaction terms (primary*bottom and secondary*bottom) disappear (i.e., statistically zero). Woman's work status and father's education dummy also have no significant effect on nutritional status of a child.

■ Education Variables:

- Coefficients for both primary (10% level) and secondary dummy are negative (i.e., a secondary educated (or primary) mother has a smaller probability of having a malnourished child). Secondary dummy has the largest effect.

■ Wealth Variables:

- Coefficient of Poverty dummy1 is significant and has a positive sign. Coefficient of rich dummy is negative as expected. Interpretation is if a child belongs to a poor Hh he is more likely to be malnourished.
- Interestingly, third and fourth poverty dummy appear to be statistically zero. This could be because only in extreme cases (poorest or richest) wealth status has a significant effect upon the child's nutrition status. In other cases, wealth status does not matter.

■ Other significant variables are

- Child age (negative): malnutrition is more prominent for older children.
- Mother's BMI (Positive): Mother's nutritional status also effects child nutritional status
- N of child (Positive): the more siblings, the higher the possibility of being malnourished
- Mother's age (Negative): younger mothers tend to have more malnourished children

However, encouraging girls secondary education does not mean stopping other programs

- The linkage between mother's education and malnutrition and fertility is one that presupposes that existing programs and services in health, population and nutrition are maintained. Secondary education appears to have an interaction effect with health care provision that makes health care more efficient and effective, beyond the program and wealth effects.

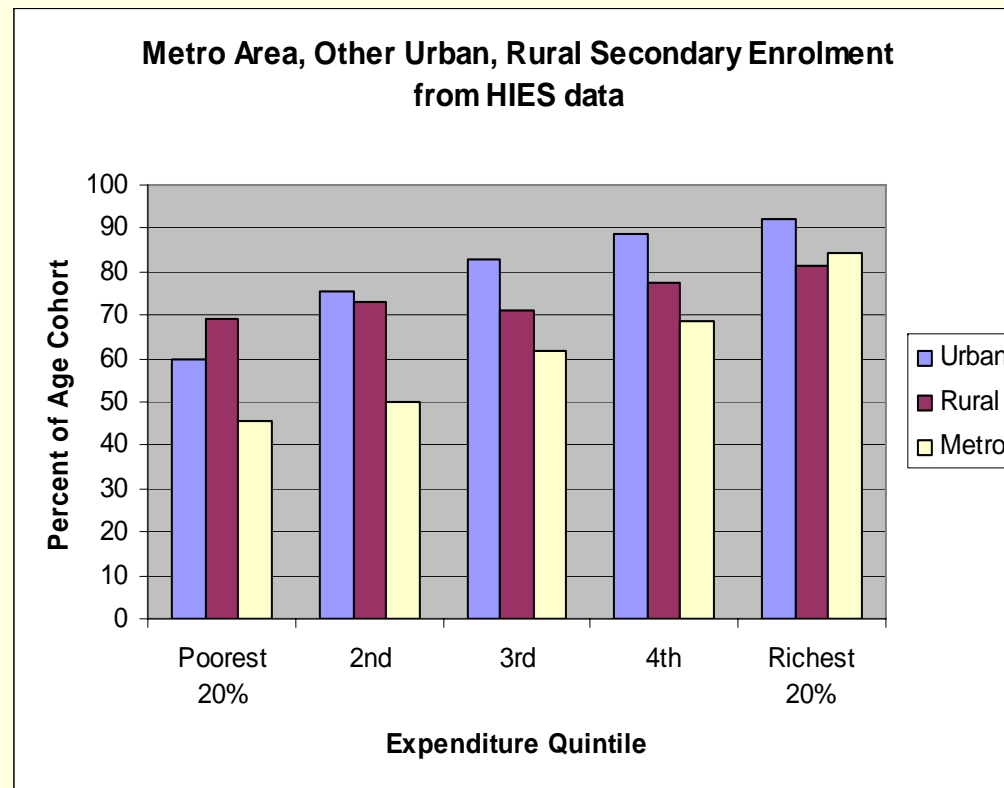
Simulation – Impact of Secondary Education on MDG Outcomes

- A simulation of the impact of secondary education on TFR and Stunting was carried out for 2015 – the MDG target year
- These simulations show the potential impact of various scenarios but should not be taken as predictions.
- Even though the indicator under maternal health is Maternal Mortality (MMR)- Fertility has a strong positive relationship with MMR.
- In 1990 malnutrition was close to 65.8% (UN MDG database) - thus the MDG target for 2015 is 33%.

Simulation of potential impact of education on TFR and Stunting

Scenario	Expected Fertility Rate	Expected percentage of stunted children
No change in education status	2.9	47%
All mothers have primary, no change in secondary or higher	2.5	31%
All mothers have at least secondary education	2.0	17%
Most likely scenario in 2015 i.e. 61% have at least secondary, 30% percent at least primary	2.4	33% MDG target met

Bangladesh could attain difficult MDG outcomes by 2015 but for the emerging problem of school access for the poor in metropolitan areas which are growing fast – higher out-of-pocket and opportunity costs keep the metro poor out of school



The way forward

- The policy of providing incentives to get girls into secondary schools – a cornerstone of Government policies since the return of democracy in the early 1990s appears to have been spot on.
- The country may be able to attain difficult MDG outcomes such as maternal mortality and malnutrition as a result of this.
- But, special attention needs to be given to the urban areas because urban share of population is expected to rise to 30% by 2015 and Dhaka is likely to be the second largest urban agglomeration in the world by 2020.
- Special programs are needed to address the incentives of the metropolitan poor – otherwise the gains made in rural areas and small towns will be brought down.
- Apart from special programs, the whole metro governance structure needs revisiting to assure that the poor are served.