Gender Difference in Child Mortality

by
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Section I: Introduction

Males may be biologically disadvantaged compared with females - starting at birth. Males have higher rates of infant mortality and higher death rates from congenital anomalies. Males may be subject to more disease linked to sex chromosomes than females and possibly are more susceptible to infections because of their less active immune system. There are biological mechanisms associated with women's reproductive capacity that may provide a protective advantage (U.s. National Center for Health Statistics,1983).

In Egypt the vital statistics indicate that the infant mortality rate (IMR) is higher for females than males except for the last two years 1985 and 1986 (Table 1.1). This differential is more pronounced in rural than urban areas. The child death rate for age 1 to 4 ($_4m_1$) calculated from vital statistics and censuses is higher for females than males (Table 1.2). The infant and child mortality rates derived from the Egyptian Fertility Survey (EFS), 1980 indicate the same trend, higher rates for females than males (Table 1.3).

Is higher death rate for females than males an indicator of son preference in Egypt ? If it is, what are the factors associated with higher child mortality for girls relative to boys? The purpose of this paper is to answer these two questions. Thus, the main objectives of this study are:

- To study whether higher mortality level for girls than boys is due to son preference in Egypt.
- To study factors affecting or associated with higher child mortality for girls relative to boys using multivariate analysis and a cross-sectional data of Egyptian Fertility Survey (EFS), 1980.

Table 1.1

Infant Mortality Rates by Sex for Egypt

Year	Males	Females
1975	87	92
1976	85	90
1977	82	89
1978	73	74
1979	75	78
1980	75	77
1981	70	71
1982	70	71
1983	64	65
1984	61	63
1985	50	49
1986	49	46

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Table 1.2

Child Death Rate ($_4m_1$) by Sex for Egypt

Year	Males	Females
1960	34.06	36.62
1976	16.91	20.55
1986	7.57	8.56

Table 1.3

Infant & Child Mortality in The Five Years Before The Survey EFS, 1980

	Males	Females
$_1q_0$	131	134
$_2q_0$	158	172
$_5q_0$	185	197

Previous Studies in Egypt

- Concerning son preference the report of EFS,1980 had stated that a preference for the next child to be a girl is found among women with boys only. Gadalla and others (1985) in studying how the number of living sons influences contraceptive use in Menoufia governorate, had stated:

  "Controlling for number of living children, women with more sons were more likely to be using contraception before the distribution program began. Among women not using contraception before the program, those with more sons were more likely to initiate contraceptive use and were more likely to continue use for a nine-month period following the distribution".

- Analysing the sex differentials in IMR, Rashad (1981) has mentioned in her study that:

  "Some researchers have attributed the sex difference in IMR to male supremacy in the Egyptian Culture which results in males enjoying better living conditions than females. Fergany (1976) have accepted that the previous justification may explain the sex differentials in adult mortality in some regions of Egypt; nevertheless he stated that:".... since children in rural areas are breast fed for no less than a year and are subject to about the same environmental hazards. Hence, there is not much room for sex-determinated differentiation in nutrition or health care ..... In other words, that culture determined sex differentials does not appear until different sex roles and life patterns evolve and become distinct."

- Analyzing the sex differences in quality of survival, Tekce (1989) has mentioned that female children after infancy begin to suffer weight deficits which are significantly more pronounced than those seen among male children and their relative disadvantage increases over time. One contributing factor may be the difference in treatment provided to male and female children during

illness. When the diarrheal episode is complicated and therefore likely to be seen as severe, then mothers seek professional help equally for boys and girls. The behavior is quite different, however, in the case of simple diarrheas when mothers are twice as likely to seek professional care for boys as compared to girls. In poorer households females are significantly worse off than males in terms of expected weights while the difference is smaller and insignificant in richer households. It becomes apparent that girls benefit from increases in household income substantially more than boys and the sex difference disappears at high incomes. Male preference is probably expressed through many aspects of child care, but the basic means is likely to be through intra-household allocation of food.

- Studying differential in child mortality Batani (1984) concludes that factors that affect susceptibility to disease and illness care (as health care by the family) were different for boys and girls. This raises the possibility of different social behaviour in caring for boys and girls, on different social roles of the children that might expose them differently in the environment.
- Makinson (1986) analyzed the nutritional status by sex and stated that the girls' nutritional status was significantly lower than that of boys at ages up to 30 months. She concluded that parental son preference and excess female child mortality were due to the belief of the Egyptian women that social status and marital security depend on the birth and survival of male children and that males should be given preferential treatment.

Data:

We are going to use two types of data sources. The first type of data is the Census data of 1976.

The second source of data is the EFS 1980, planned and executed by the Central Agency for Public Mobilization and Statistics (CAPMAS). The EFS was conducted as part of the World Fertility Survey (WFS), and with the collaboration of the World Bank. A nationally representative probability sample of 10596 dwellings was drawn from a master sample design which was developed at CAPMAS with the collaboration of WFS. The individual questionnaire was the main component of the survey. It was administered to Egyptian, ever-married women, under 50 years of age, usually resident in the sample households. A size of 8788 ever-married women had been successfully interviewed.

We are going to use the clean tape of the EFS, 1980 to analyze the retrospective data of births using SPSS.PC program and micro-computer.

Review of the Literature and Theoretical Framework:

- Concerning son preference indicated by higher mortality for girls relative to boys, the first objective of this study, Preston (1976) had stated that there are many biological differences between the sexes that should

influence their relative mortality. A male baby has, on average, a serious innate biological disadvantages in survival through the first year of life, a disadvantage that manifests itself in every major cause of death. As a child ages, this disadvantage either becomes quickly inoperative or is readily obscured by offsetting factors when health conditions are poor. From ages 1 through 30, females in the group of populations with lowest life expectancy have higher average death rates from all causes combined.

The increasing male disadvantage that emerges as mortality improves is accompanied by increasing disadvantages for most causes of death at most ages.

Waldron (1983) had mentioned also that infant mortality is generally lower for females than males, and this is probably due primarily to genetic factors. Despite these apparent inherent advantages for females, females have had higher infant mortality and/or higher infectious disease mortality in some societies in which environmental conditions, such as diet and health care, have been particularly unfavorable for females.

D'Souza and Chen (1980) in their study about sex differentials in mortality in rural Bangladesh mentioned that the study provides conclusive documentation of higher female than male mortality shortly after birth through the childbearing ages in a rural area in Bangladesh. The higher male mortality rates during the neonatal period are consistent with overwhelming evidence that male biological risk of death is higher than female. The differential is reversed during the postneonatal period in Bangladesh, with female mortality exceeding that of males by as much as 50 percent.

Son preference in parental care, and feeding patterns, intrafamily food distribution, and treatment of illness favoring male children are possible causes of such aberrant childhood mortality differences by sex in rural Bangladesh (D'Souza and Chen, 1980).

From the above discussion we can see that son preference measured by higher death rate for female than male children can be found in less developed countries. Thus, if higher death rate for girls than boys in Egypt is a consequence of son preference, we would find it more clear among low socioeconomic class than among the high class. This comparison of mortality level between girls and boys will be investigated in section II.
Concerning the causes of higher mortality rate for girls than boys, Preston (1976) had mentioned in his study that the factor most commonly mentioned as an influence on sex mortality differentials is the relative socio-economic status of women and girls. Discrimination against women and girls, insofar as it is systematically reduced by economic modernization, is also reflected by such variables. It is reasonable to expect that the comparative value of males to the household is greater

in an agricultural than in an urban setting, because of the typically larger contribution of sons to household production and to the support of aged parents. Williamson (in Preston, 1976) concludes after a review of the strength of relative preferences for sons around the world that urbanization is the strongest determinants of son preference.

Typically accompanying economic modernization, but logically separable from it, is a transformation in value and belief systems. Such beliefs should by themselves result in reduced discrimination against females. Apart from the process of economic modernization itself, the educational system is presumably the most effective agent of change in belief systems (Preston, 1976).

Rosenzweig and Schultz (1982) have mentioned in their study about child survival in Rural India that economic behavior may be linked to the greater mortality rates of girls relative to boys in countries such as India and Pakistan, contrary to the experience in most other places of the world, and to account for the large cross-sectional variations in sex differences in child survival rates. They explore in particular the hypothesis that such differences are related to the relative returns to survival, with households selectively allocating resources to children in response to variation in sex differences in their expected earnings opportunities as adults.

They assume that the future sex-specific earnings opportunities of children as adults affect positively their net pecuniary contributions, to the family, and that expectations of these opportunities are formed on the basis of contemporaneous sex-specific patterns of adult behavior. It is these expectations that thus inform the intrafamily allocation of resources.

For the application, Rosenzweig and Schultz (1982) select Households in which the mother was aged 20 to 55 and had borne at least one girl and one boy. The survival differential variable for each household was constructed from information on the number and sex of children ever born (CEP), and the number and sex of children surviving (CS). The endogenous variable is male-female child survival differential:

$$\frac{CS_m}{CEB_m} - \frac{CS_f}{CEB_f}$$

The results indicate that the employment rate coefficients are consistent with the hypothesis that intrafamily resource allocations reinforce market signals - a rise in the expected adult male employment rate exacerbates the survival differential in favor of boys, other things equal, while the female employment rate reduces the differential, as predicted by the model.

The results also indicate that holding constant the relative expected employment rates, Rosenzweig and Schultz (1982) find evidence that increases in wealth, in terms of land ownership or other productive capital and asset income, are associated with relatively greater survival prospects of female children. As a consequence of the apparent "superiority" of female survival, boys appear to have significantly higher survival rates relative to girls in landless than in landed households.

From the above discussion we can see that the socioeconomic level of the females as well as of the society is the main factor affecting discrimination against females. We are going to analyze these factors in section III.

Section II: Estimating Childhood Mortality Level by sex and Socioeconomic Class

To estimate childhood mortality level by child sex and socioeconomic class, indirect method is used. Trussell multipliers, of procedure first developed by Brass (U.N Manual X, 1983) have been applied to obtain probability of dying by child sex for each socioeconomic class. The education level of the mother is used to represent the socioeconomic class. Mother's education can reduce child mortality through many channels. It increases the status of women, and the higher the mother's status the lower her child mortality. Mother's education improves personal and Household hygiene, improves knowledge of disease processes, and increase utilization of modern health services. The effect of mother's education as a strong indicator of child mortality has been noted in many developing countries. In Egypt Ahmed (1989) had indicated that, mother's education is the most important social factor affecting childhood mortality, having a primary certificate (or higher) is associated with a proportionate reduction of 21 percent in the proportion dead among children. Caldwell (1983) indicates that in India, there is one powerful determinants of infant and child mortality and that is the education of the children's mother. The educated girls are more able to look after the health of their families. In Nigeria, mother's education appears by far to be the most important variable, Caldwell (1979) argues that maternal education is a factor in its own right, and not merely as a reflection of socio-economic status or general economic development. Preston (1985) indicates that mother's education is one of the strongest and most persistent correlates of child mortality in developing countries.

Using the 1976 Census data of ever married women and their number of CEB and CS by sex of child and education level of mother and applying Trussell multipliers of data classified by marriage duration and age of mother, the finding are as follows:

1-Using Data Classified by Marriage Duration:

Marriage duration had been tabulated in five-year duration groups till duration 19 years, after this age, it was tabulated

in ten-year duration. groups. Thus, we use the first four marriage durations only (0-4, 5-9, 10-14 & 15-19).

As a consistency check, the sex ratios of CEB were calculated, it indicates that the ratio is more reasonable for educated than illiterate mother. Thus, there is under enumeration for female births increases for illiterate mother. The number of dead children is probably more vulnerable to understatement than that of living children. Thus, the omission of dead female children is higher for illiterate than for educated mother. This means that there is a bias towards underestimating the probability of dying for female children of illiterate mother, should be considered in analyzing the findings. The sex ratio of CEB also indicates that the omission of dead female children for illiterate mother is increasing by marriage duration.

The average parity of ever married women by sex of child and education level of mother indicates that the average parity in general is higher for male than female children, reflect the high sex ratio indicated earlier. The average parity for illiterate mother is very close to mother who are able to read or has a primary certificate, and the lowest parity are for the university educated mother.

The proportion of children dead decreases (in general) by mother's education. There is difference in proportion of children dead between illiterate mother and mother who are able to read or has a primary certificate. Thus, a very low female education affect mortality more than fertility. For illiterate mother, the proportion of children dead is higher for males than females in the first two marriage durations, but higher for females in the last two durations. In spite of the high sex ratio of children ever born for higher durations which we mentioned earlier that may reveal under estimation of mortality for females, the proportions of children dead are higher for females than males.

For mother who are able to read or has primary certificate, the proportion dead of the female children is higher in the first marriage duration only. For the rest of education categories (intermediate or university certificate), proportion of dead males is higher than females.

Applying Trussell multipliers using South Model Life Table of Coal and Demeny (1966), we obtain the probabilities of dying from birth to age x "$q_{(x)}$" which illustrate the same trends of proportion of children dead.

Since mortality is very likely to have changed recently in Egypt, the estimation of the reference period is appropriate. Calculating the mortality level and reference date we find the mortality level of age 2 higher than that of age 3 because age 2 is mainly the first child of a young mother whose mortality level is generally high, so, we disregard the finding of this category. For other categories there are some fluctuations, as level of $q_{(3)} > q_{(5)}$ for university educated mother. This fluctuations may be due to small figures. But the result in general indicates lower mortality level for higher education

level and this is clear in $q_{(3)}$, $q_{(5)}$, $q_{(10)}$, and for both sexes. It also indicates higher mortality level for females than males for children whose mother in the first two education categories, but the reverse in the last two categories (except for $q_{(10)}$).

2- Using Data Classified by Age of Mother:

Sex ratio of children ever born by age and education level of mother indicates higher sex ratio for older and illiterate mothers, it reaches 118 male to 100 female children for illiterate aged 45-49 mothers. This indicates increasing the omission of dead female children for older uneducated mother. Thus, the estimates of probability of dying for female children for older illiterate mother would be biased down words.

There is a problem in using data classified by age of mother, that is no university educated women her age less than twenty years old i.e. there is no data to calculate the average parity (P_1). So we decided to use the average parity of the women who has intermediate certificate for the first estimate and to use $P_1=0$ for the second estimation, then probability of dying would be between these two estimation. The findings indicate that mortality level is differ slightly (.1) between these two estimates.

The result indicates more fluctuations in mortality level by age of child than that calculated using marriage duration. These fluctuations may be due to age misreporting. In general, it indicates lower mortality level for both sexes for higher mother's education. It also indicates higher mortality level for females than males in the first two education categories. For the later two education categories the females mortality level is lower than males for young children and higher for older children.

The Main Findings:

- The infant mortality rate $q_{(1)}$ for males is higher than females; consistent with the overwhelming evidence that males biological risk of death is higher than females. This value should be taken with caution because it is mainly related to the first birth of young women whose mortality level is generally high.
- From probability of dying till age a we calculate the sex ratio of mortality (Table 2.1). The sex ratio of mortality of the total social classes decreases by age. We should remember that each of these probability values is related to different time. For example, the sex ratio of infant mortality is 118 dead males to 100 dead females, this sex ratio related to the year 1976. The sex ratio of mortality till age five was 98 dead males to 100 dead females (if we use age of mother and 99 if we use marriage duration), this sex ratio is related to the year 1971. If the sex ratio of infant mortality of 1976 prevailed in 1971 (it was 118 in 1976), then we can conclude that the females mortality level for age 1-5 is higher than that for males. And similarly, we can conclude that females mortality level is higher than that for males from age 5 to 20 years old.

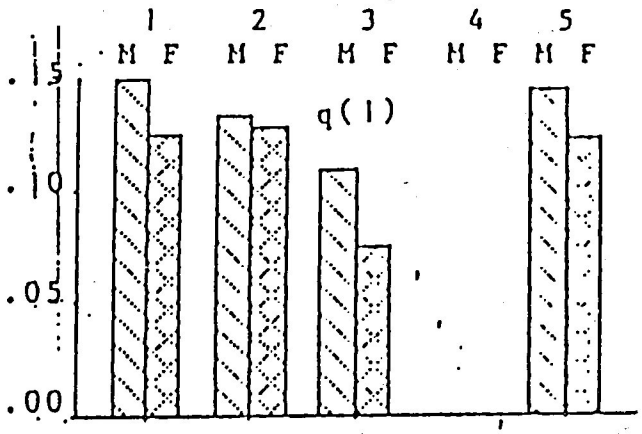
Table 2.1 indicates the sex ratio of child mortality by mother's education. In general, the sex ratio of mortality is increasing by mother's education. The illiterate mother has higher mortality level for female than male children in most age groups (0-5, 0-10, 0-15, 0-20). The mother who has intermediate or university certificate, her sons have higher mortality level than her daughters in all age groups (from birth to any age till 20). Thus, mother's education not only affects child mortality level, but also affects sex difference in child mortality. Figure 1 illustrates the decreasing level of child mortality by increasing mother's education and the sex differential in child mortality by mother's education. Batani (1984) studying differentials in child mortality till age 2 had reached to the same result, that is, more maternal education is associated with reduced sex differentials.

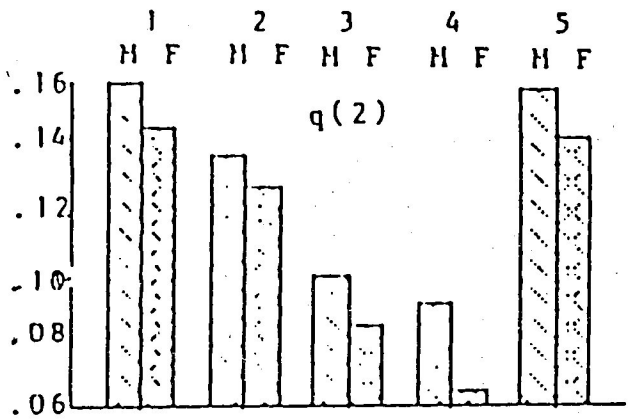
Conclusion:

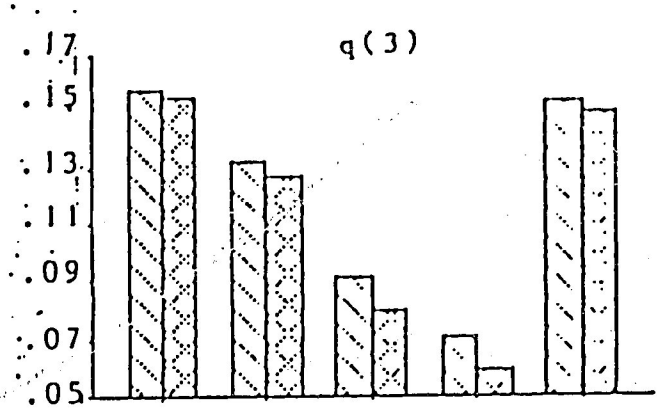
- Males have higher mortality level in infancy, but females have higher mortality from birth to age 5,10,15 &20. These findings have been obtained without correction for omitting dead females; if we correct for omitted dead females the mortality level for females would be higher.
- Sex difference in child mortality differ from social class to another. The higher the social class (indicated by mother's education) the higher the mortality level of boys relative to girls. A similar result had been mentioned by Carolyn Makinson (1986); that the university education of the mother was associated with a complete absence of excess female mortality. Nevertheless, their children exhibit the pattern of sex differentials customary in the developed world. Increasing the sex ratio of child mortality by mother's education provides support to the hypothesis that the sex difference in child mortality is due to son preference.

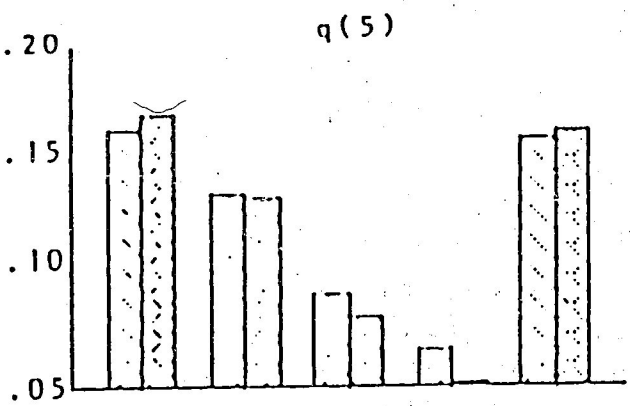
Figure (1) Probability of Dying

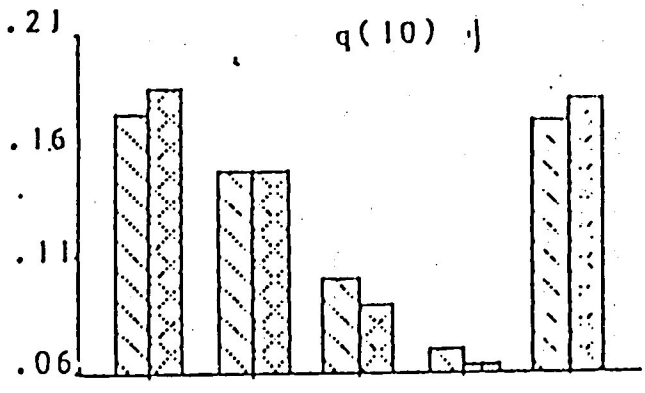
1 Illiterate
2 Read & Primary
3 Intermediate
4 University
5 Total

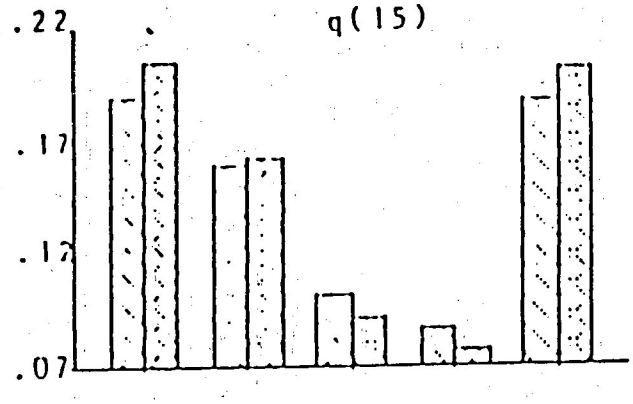












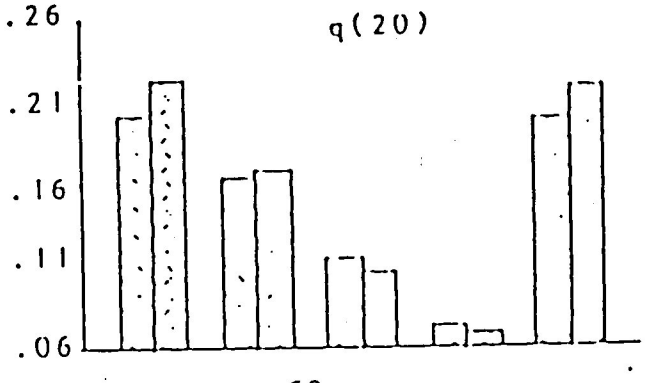


Table 2.1

Sex Ratio of Mortality

q(a)	Illiterate	Read & Primary	Intermediate	University	Total
		a. Using Age of Mother			
1	119	104	144*	--	118
2	109	107	118	141*	110
3	101	104	115	120	102
5	97	101	112	130	98
10	94	100	112	111	95
15	92	98	111	112	93
20	90	98	108	105	91
		b. Using marriage duration			
3	104	106	117	126	105
5	98	102	112	124	99
10	95	100	108	108	96

* high sex ratio due to few number of cases

Section III: Analysing Causes of Higher Mortality Level for Girls Than Boys:

The framework developed by Mosley and Chen (1983) for the study of social and biological determinants of child survival in developing countries is used. The framework aims at integrating child mortality research methods employed by both social and medical scientists. The framework is based on the premise that all social, economic, biologic, and ecologic determinants of child mortality must necessarily operate through a common set of mechanisms or intermediate variables to impact on mortality.

The key to conceptual model developed by Mosley and Chen (1983) is the identification of a set of intermediate variables which directly influence the risk of morbidity and mortality. All social and economic determinants must necessarily operate through these variables to affect child survival. The intermediate variables are grouped into five factors:

I. Maternal Factors (age, parity, birth interval)
II. Environmental Contamination Factors (air, food/water/fingers, skin/fomites/soil, vectors)
III. Nutrient Availability Factors (calories, protein, vitamins, minerals)
IV. Injury Factors (accident, intentional injury)
V. Personal Illness Control Factors (personal preventive measures, medical treatment)

Mosley and Chen (1983) examine also a range of independent variables in the context of the intermediate variable model to illustrate how these independent variables actually operate to influence the level of

child growth faltering and mortality. These are:

I. Individual level variables (father & mother productive capacity)
II. Household level variables (income/wealth, traditions/norms/attitudes)
III. Community level variables (ecological setting, political economy, health system).

Concerning the individual productivity for father Mosley and Chen (1983) mentioned that particularly in the urban sector, father's educational skills usually correlate strongly with income and/or occupation.Mother's education level can profoundly influence child survival directly through the intermediate variables by increasing her skills in a multiplicity of health care practices related to contraception, nutrition, hygiene, preventive care and disease treatment (Mosley and Chen, 1983).

Concerning income effects, Mosley and Chen (1983) stated that most critical is the stable availability of a basic minimum food supply. Food also requires sufficient variety to ensure all nutrients are available in adequate amounts. The sanitary quality of food is also an important factor in preventing disease transmission.

Concerning traditions, norms and attitudes Mosley and Chen (1983) indicate that the determinants grouped under this category are those factors that shape and modify the economic inputs and health related practices in the household according to the cultural traditions and norms of the society. Among important cultural determinants is value of children. It is also important to child survival. Recent studies in rural Bangladesh and Amman, Jordan have shown that higher female than male mortality could be directly related to differential feeding and medical care practices. Interestingly, the Bangladesh study showed little sex differential in infectious disease morbidity indicating that parents in that setting had little knowledge about or success with manipulating the "environmental exposure" intermediate variable to prevent child disease. Marriage expectations can be a major "economic return" factor conditioning child survival. For example in Kenya where girls are valued for the brideprice they bring, child survival is slightly better for females, while in South Asia where female dowry is the main concern, young girls are disadvantaged in terms of survival (Mosley and Chen, 1983).

Because of lack of most intermediate variables in the survey data and the difficulty in including the few available variables in the regression analysis, we are going to study maternal factors alone followed by analyzing cause of death and regression analysis.

A. Analysing Maternal Factors:

1. Duration of Breastfeeding:

Duration of Breastfeeding has been calculated for last closed birth interval by sex of child and social class of mother using EFS, 1980 data. Education level will be used to indicate the social class. We expect to find longer duration of breastfeeding for sons than daughters of uneducated mother.

The result indicates longer duration of breastfeeding for males than females for less than university educated mother by about one to two months. If mother has a university certificate, she breastfeed her daughter longer duration than her son by about one month. Thus, there is inequality in duration of breastfeeding the children by sex differ according to level of mother's education. Because the difference between the two sexes in duration of breastfeeding is only one month and the duration of breastfeeding is more than one year (for children of less than secondary educated mother), thus, we cannot expect sex difference in child mortality caused by this factor. If there is inequality in breastfeeding by sex of child, thus, inequality in distributing family food among children is expected also, but there is no data to measure it.

Makinson (1986) had reached to similar result, she concluded that breastfeeding was found to be shorter on average for girls than for boys, although the sex differential was not evident until 18 months duration and appeared to have no effect on sex differentials in nutritional status.

2. Birth Interval

Longer birth interval after a boy is expected because when mother gave birth to a girl she becomes upset and try to compensate by having another child as soon as possible hoping it will be a boy. Average birth interval by sex and birth order is calculated using EFS, 1980 data.

The result indicates that birth interval after having a son is longer than after a daughter by about one month. This longer birth interval indicates only son preference, because one month decrease in birth interval does not cause higher death rate for females.

As we have seen the effect of maternal factors (duration of breastfeeding and birth interval) on sex differential in child mortality is not clear. One month increase in duration of breastfeeding or birth interval after a son does not cause lower mortality level of male children. In order to know more about factors affecting higher mortality rate for girls than boys we are going to analyze cause of death by sex.

B. Cause of Death

Using the register events of deaths (in three years centered in 1986) and 1986 Census data, age specific death rates by sex and cause of death have been calculated for children less than 10 years old. The result indicates that female (less than 5 years old) death rates from digestive and respiration systems are higher than males. In spite of higher infant mortality rate "IMR" for males than females, the deaths from digestive and respiration systems are higher for females. The death rates (5-9) also indicates higher level for females than males from respiration system. Thus, there is opportunity for decreasing level of female mortality by equalizing treatment of respiration and digestive systems. Thus, we can conclude that treatment of illness favoring male children is possible cause of high female mortality.

C. Multivariate Analysis:

To analyze factors associated with higher mortality level for girls relative to boys, two procedures have been used to determine the dependent variable, i.e we have two regression equations. The dependent variable in the first equation is male - female child survival difference at the individual level as Rosenzweig and Schultz (1982) did in their analysis as mentioned earlier. The dependent variable in the second equation is male - female child observed to expected deaths at the individual level (Trussell and Preston, 1982). The main points which considered the basis of estimating the covariate of childhood mortality as Trussell and Preston (1982) had indicated are:

1- The probability that a child will die is a function, among other things, of how long he has been exposed to the risk of death.
2- Death rates at particular pairs of ages are highly correlated, that is a low - mortality environment tends to produce low mortality at all ages. It is reasonable to assume that the same situation prevails within subgroups of the same populations.

To estimate the covariate of childhood mortality, the child mortality levels have been estimated. Data on children ever born 'CEB' and children surviving 'CS' classified by marriage duration and Trussell multipliers of procedure first developed by Brass (U.N. Manual X, 1983) have been used to estimate child mortality levels by sex. Applying the expected proportion dead to number of CEB according to duration since first marriage, the ratio of observed to expected deaths is obtained for each sex, (1.10 for males and 1.05 for females).

Marriage duration for each women has been recorded as expected proportion dead. The dependent variable for each woman is formed as male - female observed to expected deaths of her CEB. Thus, we have applied Trussell and Preston's procedure (1982) to analyse factors associated with sex difference in child mortality instead of using it in analysing factors

associated with child mortality as mentioned in their study.

The clean tape of the EFS, 1980 data and SPSS.PC computer program have been used. The analysis is confined to ever married females who have ever born at least one boy and one girl. The regression has been weighted by number of CEB and OLS has been used. The result is presented in Table 3.1. The sign, magnitude of the coefficients and the significant of the effect is almost the same in the two equations. In analysing the effect of the independent variables we are going to mention to Rosenzweig and Schultz procedure because it is easier in explaining its meaning.

The following is a description of each of the independent variables:

1. Mother's Education:

It has been used as a dummy variable equal to one if any certificate obtained (primary or above), and equal to zero if no certificate obtained. To indicate the effect of education on sex differential in child mortality it is better to use higher education certificate than primary, but due to small number of ever married females who have higher certificate we use primary education.

Mother's education not only represent the productive capacity and skills of mother in health care but also represent her social class.

In spite of using the primary certificate to present the education effect, the analysis indicates that having a primary certificate decreases mortality level for girls relative to boys significantly.

2. Father's Education:

It has been used as a dummy variable equal to one if the father has university education, and equal to zero otherwise. Father's education not only represent the social class of father but also the level of the family income. Father's education decreases mortality level for girls relative to boys.

3. Mother's Working Status:

It has been used as two dummy variables. The first one is equal to one if the mother had experience in work but she is not working now, and equal to zero otherwise. Work experience represent the expected productive capacity of girls. The second dummy variable is equal to one if the mother was working at the time of the survey, and equal to zero otherwise. This variable will represent not only the expected productive capacity of girls but also the current productive capacity of mother.

Having work experience or being currently working for mother is associated with lower level of mortality for daughter than sons.

4. Religion:

Religion has been used as a dummy variable equal to one if the mother is Moslem and equal to zero if Christian. The analysis indicates that religion has no effect on level of child mortality, thus, the norms and traditions are the main cause of higher girls mortality level relative to boys.

5. Community Level of Education:

Community Level of Education has been measured by proportion of population having primary or above certificate in each governorate (urban-rural). Community level of education has been included in the analysis to represent the level of

development of the community which is assumed to affect the traditions and norms. The findings of the analysis do not agree with our hypothesis, they indicate that the higher the literacy level of the community the higher the mortality level of girls relative to boys, and this effect is significant. Thus, we can conclude that the mother benefit from the educated community the knowledge of treatment her preferred child (the boy). i.e the educated community affect the knowledge of disease treatment more than traditions and norms.

6. Accessibility of Pharmacy:

The Pharmacy plays an important role in illness treatment in Egypt because sometimes the pharmacist does the work of the physician by free, and all the medicine can be bought without prescription (except medicines which contain narcotics). So, including the accessibility of pharmacy in the regression analysis represents the availability of personal illness control factors on sex mortality difference.

Accessibility of pharmacy has been measured by proportion of pharmacies to population for each governorate. The analysis indicates that the higher the accessibility the higher the mortality level of girls relative to boys. Thus, male children benefit from medical service than females.

7. Regions:

Egypt can be divided into five main regions, these regions indicate the socioeconomic level of residence. These regions are:

1. Urban Governorates.
2. Urban Lower Egypt.
3. Urban Upper Egypt.
4. Rural Lower Egypt.
5. Rural Upper Egypt.

The first four regions have been treated each as a dummy variable, the fifth region (Rural Upper Egypt) is the reference category (It is considered the lowest socio-economic level).

Table 3.1 indicates that being in any region other than Rural Upper Egypt is associated with a significant reduction in mortality level of girls relative to boys differ from region to another. The regression coefficients indicate that the higher the socio economic level the lower the tie to traditions and norms and the lower the mortality level of girls relative to boys

Table 3.1

Lower Mortality Level for Girls
Relative to boys -EFS

Variables	Rosenzweig & Schultz	Trussell & Preston
Mother's Education	.0177**	.0346
Father's Education	.0268**	.1404**
Mother,s Work		
Work Experience	.0323***	.1545***
Working now	.0128***	.0656***
Religion	-.0090	-.0290
Literacy Level	-.0017***	-.0066**
Accessibility to Pharmacy	-.0040***	-.0196***
Regions		
Cairo & Alexandria	.1099***	.4304***
Urban Lower Egypt	.0662***	.2385***
Urban Upper Egypt	.0311*	.0853
Rural Lower Egypt	.0298***	.0909***

*** Significant at level .01
** Significant at level .05
* Significant at level .10

Conclusion

To analyse causes of higher mortality level for girls than boys, the framework developed by Mosley and Chen (1983) for the study of social and biological determinants of child survival in developing countries is used. The analysis indicates that:-

- There is inequality in duration of breastfeeding the children by sex differ according to level of mother's education. The university educated mother breastfeeds her daughter longer duration than her son by about one month, the opposite exist for less than university educated mother. Because the difference in duration of breastfeeding between the two sexes is only one month and the duration of breastfeeding is more than one year (for children of less than secondary educated mother), so sex difference in child mortality caused by this factor is not expected.
- The birth interval after having a son is longer than after having a daughter by about one month. This longer birth interval (one month) indicates son preference but it does not cause higher death rate for females.
- analyzing causes of death for children (less than 5 years old) indicates that deaths from digestive and respiration systems are higher for females than males. Thus, treatment of illness favoring male children is the possible cause of higher female mortality.
- The Multivariate analysis of the factors associated with higher mortality level for girls relative to boys indicates that:-
  * Mother's and father's education, which represent the social class, the skills of mother in health care and

the family income, decrease mortality level for girls relative to boys significantly.

* Having work-experience or being currently working for mother, which represent the experienced or the current productive capacity for mother, is associated with lower level of mortality for daughters than sons.
* The mother benefit from the literacy level of the community (increase her knowledge of disease treatment) and from accessibility of pharmacy (availability of medical service) to decrease mortality level of her preferred child (the boy) i.e high literacy level of the community and high accessibility of pharmacy are associated with lower mortality level of boys relative to girls.
* Traditions and norms indicated by region is associated with higher mortality level for girls relative to boys.

Section IV : Conclusion and Policy Implications:

Males may be biologically disadvantaged compared with females - starting at birth. In Egypt, males have higher mortality level in infancy, but females have higher mortality from birth to age 5, 10, 15 and 20. Sex differences in child mortality differ from social class to another. The higher the social class (indicated by mother's education) the higher the mortality level of boys relative to girls.

There is son preference in Egypt indicated by longer birth interval after a son and longer duration of breastfeeding for the son of less educated mother. Longer birth interval after a son is only one month and longer duration of breastfeeding is only for one month also after duration of breastfeeding for more than one year, so we do not expect sex differential in child mortality caused by these two maternal factors.

The main factor that cause sex difference in child mortality is the inequality in illness treatment favoring male children. The vital statistics indicate higher death rate for female than male children from digestive and respiration systems. This finding agrees with the result that Tekce (1989) has reached that, one contributing factor may be the difference in treatment provided to male and female children during illness, and agrees also with Batani (1983) findings which indicate that factors that affect susceptibility to disease and illness care (as health care by the family) were different for boys and girls. The multivariate analysis indicates that norms and traditions have much more effect on sex difference in child mortality than religion. The effect of norms and traditions can be reduced by education. Mother's work (or expected productive capacity of female children) has a powerful effect on reducing girl's mortality level relative to boys. The less educated mother benefits from the health service measured by accessibility of pharmacy and from knowledge of disease process from society to treat her preferred child (the son).

To decrease girls mortality level relative to boys, women's status should be raised through increasing education level and work opportunities. Increasing women's status will decrease norms and traditions which associated with son preference and higher mortality level for girls.

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