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MATERNAL EMPLOYMENT AND NUTRITIONAL STATUS OF CHILDREN IN SRI LANKA

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ABSTRACT

MATERNAL EMPLOYMENT AND NUTRITIONAL STATUS OF CHILDREN IN SRI LANKA

By

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The dominant mechanism through which maternal employment is thought to affect child development and survival is mother-worker roles incompatibility [Meyers and Indriso, 1986]. This implies that working mothers may not be able to provide adequate care for their children. Hence, their children may end up being malnourished.

However, as a greater proportion of the income earned by a woman is observed to be spent on food items, this tends to offsets the anticipated negative effect of a working mother's allocation of less time for child care.

In this dissertation the effect of maternal employment on the healthy growth of children is investigated by utilizing data from the Sri Lankan demographic and Health survey, 1987.

Results of this study found a positive relationship between maternal employment and the nutritional status of her children. The main effect, though, of maternal employment on the nutritional status of children is negative. However, due to the existence of an interaction between maternal employment and the use of improved toilet facility (a manifestation of hygienic life style), the impact of maternal employment on the

nutritional status of children becomes a positive.

Mother's literacy also shows a high positive impact on healthy growth of children, due to its modernizing and conscientious aspects. However, a relatively larger number of children in the household as well as a child not being breatfed are found to contribute negatively to the nutritional status of children.

The development policy suggestions tend to focus on creating jobs for married women, particularly in the formal sector of the Sri Lankan labor market. In addition, a concerted campaign to promote breastfeeding (particularly targeted at non-breastfeeding mothers), and development of a small family norm is strong recommended.

Dedicated to, my late mother who always wanted his son to achieve the highest of degrees in education, and my sister (Hamida B. Jahangir) who always stood by me as a father figure.

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CHAPTER 1

INTRODUCTION

Food deprivation and, consequently malnutrition, is an endemic problem of a majority of third world nations. Although there has been an enormous increase in food production in the last 50 years, particularly since the 1960s, however, a large amount of food supplies are still required in many areas of the world in order to meet the basic requirements for energy and protein.

A major, commonly accepted factor responsible for the existing world nutritional problem is the accompanying massive increase in the world's population in the last 50 years, which seems to have offset the expected positive effect of increased food production in many third world countries. According to Blaxter in 58 of the 124 nations surveyed, per capita food availability is still less than what was available ten years ago. In the African continent as a whole, the underlying demographic factor has been reported to have caused even a decline in the per-capita food supplies [Blaxter, Kenneth, 1986].

In many other developing countries, eventually the overall food supplies were adequate at the national level, inequitable distribution rendered adequate availability of per-capita food difficult for all [Goplan, C., 1986].

Consequently, most of the world's developing countries today face problems related to undernutrition.

In a broader context, nutritional deficiency has been observed to be related to morbidity, mortality, fertility, intellectual development and cognitive function, socio-economic competence, educational capability, physical performance, and economic productivity.

With specific reference to child growth and survival, nutritional deficiency renders infants more liable to infections because of their poor immunological capabilities. For example, such infectious diseases as diarrhoea and measles tend to be most prevalent in malnourished children. They further deteriorate a child's nutritional level by negatively affecting his/her digestion system, ultimately lowering the child's survival chances of a child, which is a common feature of a majority of the developing countries [Berg, 1981; Neumann et al., 1980; Sai, 1974]. In a study Reutlinger and Adelman (1980), they estimated that almost 24,000 Ghanian children annually were dying due to the malnutrition related disease 'kwashiorkor', while in Latin America in many instances the malnutrition-related deaths of children were, in many instances, almost 55 percent of the total number of child deaths.

Among other factors, the mother's physical, as well as

socio-economic, characteristics appeared to be some of the most significant determinants of child nutrition. For example, malnutrition among pregnant mothers has been reported to cause induced abortion, miscarriage, still births, congenital malformations and low-birth weight babies [Neumann, 1980, Sai, 1972]. Similarly, the mother's allocation of time for child care is considered to be the most important factor in healthy growth of a child during the first few years, particularly in infancy. The time allocation may be affected by the mother's participation in economic activities, which has been on the rise in both the formal and informal sectors of the labor market during the last 20 years [United Nations, 1989].

Succinctly, the dominant mechanism which makes up the negative effect of a woman's work status on child nutrition and survival operates through mother-worker roles incompatibility hypothesis [Meyers and Indriso, 1986]. The hypothesis states that mothers who opt to join the labor market are not able to provide adequate care for their children. Hence, their children remain malnourished and lack normal physical growth. Thus, the deficient physical growth of the children of working mothers reduces the chances of their survival as compared to those whose mothers are not actively involved in employment outside the home. This phenomenon

stems from the fact that the gender role distribution system of many developing societies places the responsibility of child rearing within the exclusive domain of women. Therefore, their employment is assumed to negatively affect their children due to the division of their time between home and child care and the job outside the home.

Contrary to the above perspective, a competing argument proclaims that a working mother's child may be at risk in terms of maternal care, since a greater proportion of the mother's income is being expended on food items and the provision of better quality care for her children. Therefore, it is preicted that the anticipated negative effect of the mother-worker role incompatibility on a child's health will dissipate. Nevertheless, there are many socioeconomic, demographic and health mechanisms through which a mother's work will affect her child's nutritional levels.

If the mother's work role assumes is so important and significant in the determination of a child's nutritional status and ultimately its survival, then there is no escaping its analytical importance. Therefore, this dissertation aims to contribute to the polemical debate on the impact of a mother's employment on the nutritional status of her children by analyzing data from the 1987 Sri Lanka Demographic and Health Survey.

A. A Review of Malnutrition in Sri Lanka.

Like other countries in the region, malnutrition is widespread in Sri Lanka. Table 1.1, provides a historical picture of malnutrition since 1970, when the first attempt was made to collect detailed information on malnutrition in the national Socio-economic Survey.

The estimation of malnutrition derived from the Socio-economic Survey (SES) was based on the dietary intakes of 10,000 households, representing the urban, rural and estate sectors. Retrospectively, information was gethered from each household on the food quantities consumed during the last week. These figures were then converted into their protein and energy equivalents. Then, per-capita daily intake was estimated in order to compare it with a recommended standard of 2,200 calories. It was consequently found that 43 percent of the nation's households, mainly from the lowest income group (less than Rs.200 per month) were undernourished [Government of Sri Lanka, 1972].

However, the first extensive anthropometric survey (Sri Lanka Nutritional Survey) was conducted during October 1975 to March 1976. This survey was comprised of 13,500 preschool children in the rural and estate sectors, representing all 15 health districts. Standard anthropometric indicators of height-for-age (HA), weight-for-height (WH) and weight-for-age

Table 1.1. Malnutrition in Sri Lanka 1970, 1971, 1980 and 1987

Year	Percentage of Malnourished Children Sampled					
	Height-for-Age		Weight-for-Height		Weight-for-Age	
	Normal	Malnourished	Normal	Malnourished	Normal	Malnourished
1970[1]	43 persent of households were found malnourished with 2,200 calories per capita as standard.					
1971[2]	70.0	30.0	92.8	7.2	59.8	40.2
1980[3]	78.0	22.0	84.9	15.1	61.5	38.5
1987[4]	72.5	27.5*	87.1	12.9	61.9	38.1

1. Socio-Economic Survey (1970).

2. Nutrition Status Survey (1976), Children below 90 percent of Height-for-Age, 80 percent of Weight-for-Height and below 75 percent of Weight-for-Age of the reference ppulation were considered to suffer from malnutrition.

3. Rural Nutrition Survey (1980), same criteria as used in Nutrition Survey (1976).

4. The Demographic Health Survey-1987, (final report). Children whose Height-for-Age were two or more standard deviations below the mean of reference population were considered to be malnourished.

(*) Our analysis based on DHS-1987, showed a little higher percentage of malnourished children (29.7), than what is reported in the final report. This discrepancy seems to have emerged due to 200 missing cases in our analysis.

WA) were compared against the American National Academy of Sciences standards to estimate the extent of malnutrition. According to the criteria used (see Table 1 for a description of the criteria), 34.7 percent, 6.6 percentand 42 percent of the preschool children in 1976 in Sri Lanka were suffering from malnutrition with regard to anthropometric measures of height-for-age, weight-for-height and weight-for-age, respectively [U.S. AID, 1976].

In June to July, 1980, another Nutritional Survey was conducted in two southern Districts of Sri lanka-Galle and Kalutara. This survey was aimed specifically at evaluating malnutrition rates among infants and preschool children in a diversified socioeconomic context in order to recommend relevant nutritional policy measures. A criterion similar to the 1976 Nutrition Status Survey was used to asses the extent of malnutrition in 1980. For this study, it was found that 22.0 percent, 15.1 percent and 38.5 percent of children suffered from malnutrition with refernce to height-for-age,weight-for-height and weight-for-age [Abeyratne and poleman, 1983].

Besides the Socio-Economic Survey of 1970, the Demographic and Health Survey (DHS) of 1987 was the other national survey which represented rural, urban and estate sectors for all districts in a sample selection, except for

two politically volatile north-eastern districts. In DHS-1987, all children found to be two or more standard deviations below the reference population were considered to be malnourished with respect to height-for-age, weight-for-height and weight-for-age. According to the aforementioned criteria 27.5 percent, 12.9 percent, and 38.1 percent, respectively of the surveyed children were malnourished.

It appears to be very hard to demonstrate a meaningful historical trend in malnutrition in Sri Lanka if one refers to the estimates provided in Table 1, because the underlying methodology varied in its application for estimating malnutrition and the differences found in the sampled populations.

For example, estimates of undernutrition pertaining to the 1970 Socioeconomic Survey were at the household level, while in the remaining three surveys they referred to a child's malnutrition. Similarly, they differed in regard to the methodology employed to measure the malnutrition. The Socioeconomic survey (1970) used a dietary intakes technique, while the three remaining surveys applied anthropometric measures. Moreover, while the Socioeconomic survey of 1970 and the Demographic and Health survey of 1987 included all sectors of the country, the Nutrition survey (1975-76) was based on only samples from the rural and estate sectors. On

the other hand, estimates of malnutrition from the Nutrition survey of 1980 were taken from only two Southern districts of Sri Lanka. Furthermore, standard or cutoff points used to estimate the extent of malnutrition varied from one anthropometric survey to another which tended to blur the overall nature of the problem. A lower or higher standard or cutoff point could make a substantial difference in estimating the extent of malnutrition. A lower cutoff point can underestimate the real situation regarding malnutrition by wrongly counting malnourished children as normal. On the other hand, a higher cutoff point might count many children as malnourished, when in fact they were normal.

However, the results provided in Table 1, revealed that the situation surrounding malnutrition in Sri Lanka remains alarming. It is an irony that the abovedescribed situation of malnutrition exists despite implementation of such welfare policies of the government, food subsidies.

The enactment of the social policies of free medical care and universal higher-level free education were reported as early as 1945. Similarly, a universal subsidy on food was introduced in 1942, which existed until 1979 with only occasional modifications in the criteria for eligibility. In 1966, the proportion of the rice sold under subsidy scheme was almost 50 percent of the total rice consumed, however, even

this figure was a decrease from the once high 70 percent plus. Rice made up 20 percent of the nations's total calorie intake in 1970. During the 1970s, this system of food subsidy comprised approximately between 15 to 24 percent of the total public expenditure [Haq, 1990]. In 1979, a modified system of food stamps was adopted, limited to the most deserving sections of society. It aimed to reduce the budgetary burden of the government. This dropped government expenditures on food subsidies from 15 percent in the mid-1970s to 3 percent in 1984, while there was a 100 percent increase in food subsdies amounts between 1979 and 1982, which almost halved the real value of the food stamps. Food subsdies seems to have adversely affected the situation of malnutrition. Although the national average daily consumption per-capita was virtually the same in 1981-82 as in 1979: just under 2300 calories. But the per-capita calorie consumption of the lowest decile fell from 1,335 calories to 1,181, and that of he second lowest decile from 1,663 calories to 1,558 [Haq, 1990].

In addition to drastic cuts in food subsidies programs in the 1970's, a study by Alailima (1984) indicated that as a whole the food subsidy program in Sri lanka benefitted the poor the least, particularly estate workers, for whom it was originally implemented. According to a study by the

International Labor Office, in 1978 approximately one-half of the total households fell below poverty line of Rs. 300 per month for a 5 person household [Cited in Richard and Wilber, 1980]. While a generally slow rate of economic growth and widespread unemployment could be the two most important causes of endemic poverty problems in Sri Lanka, inequality in income distribution tended to worsen these trends.

Sri Lanka's per capita gross domestic product (GDP) increased about 2.2 percent a year during the period of 1960 to 1970, and about 2.5 percent during 1970 to 1980, while by the end of 1987 was estimated to be a 3 percent, down from 4.3 percent in 1986 [Haq, 1990; Ross and Savada, 1990]. As for unemployment, the situation seems to have significantly worsened particularly since 1971 when the unemployment rate increased to around 30 percent, up from a little more than 12 percent in 1963 [Gutkind, 1988; ILO, 1986]. The increase in unemployment was mainly accounted for by the sharp demographic changes due to the increased volume of the total labor force from 2.6 million in 1946 to 5.91 million in 1980.

Similarly, rapid and radical changes in income distribution were also reported to have occurred in Sri Lanka. Income equalities, which seemed to have lessened in the early-1970s from mid-1960s, worsened again in the late 1970s and early-1980s. The estimates of the Gini coefficient were 0.45

in 1978 and 1982, which are comparable to those for the 1950s and early-1960s, except 0.35 for 1973 [Haq, 1990]. A lower estimate of the Gini coefficient describes a better distribution of the national income, the ideal figure approaching zero. Thus, the aforementioned unfavorable economic situation tended to cause widespread poverty in Sri Lanka. Although, due to a substantial increase in agriculture production, a 100 percent daily calorie supply was available from 1964 to 1966, the lingering problem of poverty rendered a substantial percent of Sri Lankan families unable to consume adequate quantities of food [Haq, 1990].

B). Female Labor Force Participation in Sri lanka: A Brief Review.

Historically, in Sri Lanka the family has been the center of all social activities. In a traditional set-up, economic activities took the form of family labor, and both sexes participated equally in the agricultural production. Women helped their men to weed, transplant, harvest and, to a limited extent, preparing the field and sow. In addition, they were responsible for preparing and taking food to workers in the fields, for boiling and drying the paddy and separating the rice from the husks by pounding, and for cultivating the home garden besides transporting crops [Jayaweera, 1979]. However, in some regions, such as Kandyan, they were not allowed to take part in the thrashing rice for fear that both

the rice and the thrashing floor could be polluted due to her being ritually inferior. Women's inferior status was religiously sanctioned and "associated with puberty, childbirth and the menses" [Nyrop et al., 1985].

The property-owning system in pre-colonial, traditional Sri Lankan society gave women a liberal access to land within a divergent marital system (polygamy-polyandry; matrilocal-patrilocal). Due to the pervasive property- owning system, the gender relationships, to a great extent, were based on equality. In the case of a matrilocal marriage, when the groom came to live with the bride's family, who owned a share in the property of her mother or father, the woman even had a superior status to that of the husband [Risseeuw, 1988]. However, in the colonial period, various legislative measures, first Portuguese, then Dutch and lastly, the most important, the Britisher promoted the European feudal family morality, inheritance and tradional land ownership system. These measures produced a negative impact on a woman's right to land or property, which generally rendered a woman position to be inferior to that of a male on the micro-level of the family and interpersonal relationships.

In the economic sphere the colonial policy of expanding plantations for cash crops, such as coffee, tea, rubber and coconut in the second half of the 19th century led to the

introduction of large-scale capitalist enterprises. This, along with a rapidly growing population created increased number of people who were landless. This depressing state in the peasant economy compelled poor women to migrate to urban centers for work. However, they could only find work as domestic servants in the homes of the upper and new middle-class, and in petty trade where, on the whole, women ended up in the least well-paid sectors [Risseeuw, 1988]. However, the accompanying rapidly expanding service sector created a relatively a high demand for female workers.

With educational institutions set up for women so they could acquire the necessary skills, by the start of the 20th century they started joining the labor market as clerks, telephone operators and sales girls, besides the usual female professions of educators and medical workers. Nevertheless, colonial administrative efforts to modernize the Sri lankan economy also opened some avenues for women to work in the industrial sector. Table 1.2 provide trends in the labor force by gender in various specific sectors of the economy for the last 30 years of 19th century. According to Table 1.2, the largest fluctuation was reported in the "domestic class". Women in the domestic category made up 65.0 percent of the total work force 1871, but decreased to 38.35 percent in 1884 and 39.37 percent and 1901. On the other hand, the proportion

Table 1.2: Participation Rates in the Labor Force, Per Distinguished Class of Labor and Sex in 1871, 1884 and 1901.

Class	Total Labor Force	% of Class to Total Lbor Force	% of Women in Class	% of Men in Class
(1871)				
Government/ Professio-nal	29,413	1.20	8.23	91.77
Domestic	1,589,008	66.20	65.00	35.00
Commercial	127,617	5.30	16.74	83.26
Agricultu-ral	568,698	23.70	6.51	93.49
Industrial	67,046	2.80	32.02	67.98
Non-Productive	19,384	0.80	22.95	77.05
(1884)				
Government/ Professio-nal	32,756	3.17	4.30	95.70
Domestic	47,529	4.61	38.25	61.65
Commercial	62,441	6.05	14.02	85.99
Agricultu-ral	664,095	62.71	14.02	85.99
Industrial	157,687	15.28	40.50	59.50
Non-Productive	87,501	8.48	23.96	76.04

continue ...

(Table 1.1. Continued ...)

Class	Total Labor Force	% of Class to Total Lbor Force	% of Women in Class	% of Men in Class
(1901)				
Government/ Professio- nal	53,246	3.29	7.00	93.01
Domestic	87,409	5.38	39.37	60.64
Commercial	82,515	5.07	12.58	87.42
Agricultu- ral	1,064,190	65.72	29.93	70.07
Industrial	275,730	16.94	38.54	61.47
Non- Productive	64,388	3.97	22.36	77.64

Source: [Risseeuw, 1988: 103, Table 6]

of women in the agricultural and industrial sectors was increasing. It is probably in these areas that their search for paid labor was chiefly directed. Generally, however, employment in the emerging industrial sector by all accounts, plans and policies developed by the colonial government spoke only of employment of males [Risseeuw, 1988]. Conceptual changes were made in the definition of employment which practically tended to undermine the economic contribution of women. As shown in Table 1.3, the use of the new concept of "gainfully employed," which defined a worker as one who pursued work for earned money or a money equivalent excluded a great number of unpaid family workers, usually females, from the general count of labor force in 1946.

After independence was gained in 1948, the continuing tradition of dominant populist and radical political activitis which had originated with the nineteenth-century Buddhist reform Movement, pressured the state to make such welfare reforms as the equal access of women to education and their integration in the mainstream economy [Caldwell, 1986; Jayaweera, 1979]. Later on, laws were passed regarding full employment and equal wages, besides other welfare and protective measures. Increases in the number of educated females had a great positive impact on urban economic activity rates in general, and especially in professional and white

Table 1.3: Percent of Labor Force (Gainfully Employed) and Specific Per Gender for 1901, 1911, 1921 and 1946.

Year	Total	Men	Women
1901	45.9	60.4	29.4
1911	43.0	59.2	24.8
1921	49.6	62.4	35.2
1946	38.9	57.2	18.1

Source: [Risseeuw, 1988: 96, able 5]

collar employment. As a whole, however, education has never been a deterrent factor to women's economic activities in Sri Lanka. On the contrary, women with no formal education stillmake up a substantial percentage of the total female labor force. The reason for this is that a large number of females in Sri Lanka are still employed on plantations and in peasant agricultural endeavors in which there is little demand for skills. As evident from Table 1.4, economically active women in agriculture and other related fields, as a percentage of the total number of economically active women, however, declined from 57.81 percent in 1963 to 35.86 in 1986. In other words, women's labor participation in other sectors of theeconomy, especially in the service sector, has been increasing overtime. [see Table 1.4]

An historical trend in women's economic activity rates as given in Tables 1.3 and 1.4, explained that female labor participation rates substantially decreased during the 1960s, but showed a steady increase afterwards, except in 1987. The DHS-1987 calculated only 18.0 percent of sampled women as working. [see Table 4.1.]

However, estimates derived from DHS-1987 were based on married women who were engaged in economic activity, while figures presented in Table 1.4, represent the percent of all working women aged 10 years and above. The DHS-1987 figure

could naturally be expected to be lower.

Generally, the lower economic activity rates during the 1960s were mainly due to drastically curtailed employment opportunities, a result of an overall sluggish trend in economic growth. The per-capita GDP rose only about 2.2 percent a year the years of 1969 and 1970, but then slightly increased to 2.5 percent from 1970 to 1980 [Haq, 1990]. Declining terms of trade and foreign exchange constraints and subsequently rapid world inflation limited the absorptive capacity of the economy [Jayaweera, 1979]. Although grave unemployment problem were confronted by job seekers in general, women were more adversely affected. According to Table 1.4, unemployment rates were less than 13 percent in 1963 and surged to more than 30 percent afterwards, except for in 1983 when they were 20.99 percent. The continued slow growth in the economy, male employment-oriented state policies coupled with a steadily growing population since the 1940s, are the major reasons given for the increased unemployment rates for women. However, comparatively much higher unemployment rates have occured since 1971, mainly due to a change in the definition of "unemployed." In 1971, all people of working age without employment were considered "unemployed" whether they were actively seeking employment or not ... the new criterion was the question if they would be "willing" to

work [Risseeuw, 1988]. The same criterion was used in the 1974 censuses and latter population counts, however, with some modification.

C). Undercounting Women at Work: Implications for definitions and Concepts.

As in other agriculturally based economies of different developing countries, women in Sri lanka also actively participate in the economic production process. However, they are "more likely to be self-employed than wage earners, to work seasonly rather than year-round, to be underemployed rather than formally employed, and to engage in a fluid or sporadic pattern of diverse and shifting activities" [Dixon, 1982]. They have been usually involved in the informal sector and domestic production, which may be used for household consumption as well as for sale or exchange. Moreover, they are also reported to carry out household tasks, such as processing food, carrying water, collecting fuel and providing child care, which are time and energy-consuming activities. If this unpaid household work was properly evaluated, it would significantly increase the amount of national production. For example, a study in rural Nepal showed that when a woman's marketable production was accounted for, women contributed about 22 percent of the total household income. But, when nonmarketable subsistence production was also considered women's contributions rose to 53 percent [Cited in Haq, 1990].

Despite its obvious productive and social worth, a great proportion of household work usually remains "invisible" in the labor statistics of national surveys and censuses. According to Safilios-Rothschild (1977; p.362), it mainly happen due to the fact that

> "[M]ost data ends to classify wome as working or non-working women, according to conventional, male-oriented and wage-oriented Western models and are often ... quite crude in that many working women in developing nations, especially in the rural and non-modern sectors, are not counted a such."

But, in many Asian countries, the under enumeration of economically active women, particularly those in the rural sector tends to occur due to socio-cultural norms. Enumerators are not allowed to have access to these women, while men tend to misreport their economic activities [FAO, 1987].

In Sri Lanka, both in pre and post-independence periods, concepts used to define labor and work were found to discriminate against women. Although census taking in Sri lanka started in 1827, it was not until 1871 that a column was provided in order to count female workers. However, in practice, this column was left empty and only "head of the house," assuming a male was interviewed for what kind of work was done, was counted. Other family members were entered in terms of their relationship to the head of the household. In

later censuses, concepts such as one household one job, women's domestic tasks as being unproductive, the male as the main bread earner while women were non-earner.

In 1921, the concept of gainful employment was introduced, which referred to an occupation" by which a person who pursued it, earned money or money equivalent [Risseeuw, 1988]. According to this definition, a housewife who did odd jobs and earned some money and contributed it to the support of the family was not included within the category of "the gainfully employed." Gainful occupation was further changed into "useful occupation" in 1946. However, as usual, unpaid household tasks were not categorized as useful or gainful occupations. Almost identical situations existed with regard to the counting of female workers in the post-independence period. According to Table 1.4, the female economic activity rate was only 19.1 percent in 1971. This low proportion of economically active women again was the result of computation based on the definition that working women were those engaged in "gainful" occupations measured in terms of activities which were not related to household tasks or which were home-based and part-time and not reported as employed. When household tasks were included as a component of the labor force in a Labor Force Survey in 1973, the female labor force participation rate in Sri lanka increased to 44.9 percent.

Table 1.4. Percent Distribution of Economically Active Female by Industry and Economic ActivityRates in Sri Lanka, 1963-1986.

	1963	1971	1981	1983	1985	1986
1.	57.81	42.63	35.86	43.67	35.46	35.86
2.	0.13	0.09	0.18	0.32	0.23	0.18
3.	8.84	8.45	7.41	11.23	7.68	7.41
4.	0.02	0.02	0.06	0.12	0.08	0.06
5.	0.19	0.10	0.38	0.50	0.39	0.38
6.	--	1.98	2.95	4.98	3.02	2.95
7.	0.34	0.29	0.64	0.51	0.68	0.64
8.	2.78	0.15	0.79	0.63	0.72	0.79
9.	17.75	11.21	15.15	14.35	15.86	3.17
10.	--	4.02	4.60	2.80	4.11	4.21
11.	12.14	31.06	31.98	20.99	31.77	31.98
12	14.10	19.10	17.60	21.20	23.10	23.10

Source: [Yearbooks of Labor Statistics, ILO.]

1. Agriculture, Hunting, Forestry and Fishing
2. Mining and Quarrying
3. Manufacturing
4. Electricity, Gas and Water
5. Constrcution
6. Wholesale/Retail Trade, Restaurants & Hotels
7. transport, Storage & Communication
8. Financing, Insurance, Real Estate & Bussiness Serv.
9. Community, Social & Personal Service
10. Not Adequately Defined
11. Unemployed
12. Activity Rate

Although in recent years, special efforts have been made to integrate women in the development process and improved their working conditions, women involved in the subsistence sector and those engaged in income generating home-based activities. are still regularly excluded from official statistics, or counted as unpaid family helpers [Jayawardena and Jayweera, 1985].

The concept employed to define "work" in the 1987 Sri Lanka Demographic and Health Survey also pointed to similar anomalies. Information on the work status of women was collected with reference to questions 715 and 716, which considered only those women who worked for "money" to be gainfully employed. Both questions are reproduced here:

Question 715

Are you now working to earn money, other than on a farm or in a business run by your family?

Question 716

Are you now working to earn money, on a farm or in a business run by your family?

D). **Litercay Rates in in Sri Lanka 1881-1921.**

Buddhism, the religion of a majority of Sri lanka's population, puts a special emphasis on enlightenment through education. However, like all other traditional societies characterized by gender-specific role distribution, education in the Buddhist religious schools (pirivenas) was

overwhelmingly restricted to males. Women were permitted, however, to join Buddhist temples as nuns and receive religious education. Generally, the role ascribed to women by the society expected them to be well-versed in home-centered specialties; consequently, they were prepared only to serve other members of the family. To a great extent, this situation prevailed during the colonial period, with the exception of the later British period when female literacy started showing remarkable improvements [Ross and Savada, 1990; Caldwell, 1986; Jayaweera, 1979].

Each colonial administration during their rule (Portuguese, Dutch and lastly British) established an educational system, however, to meet their limited political, religious and cultural needs. Educational institutions during the Portuguese rule only admitted male students, as did the 17th century male-focused system of compulsory education in the parish schools of the Dutch colonial administration. An exception was made for girls of Colombo City, but parents would usually would let their daughters to stay in these co-educational schools after the age of eighteen [Palm, 1946, cited in Jayaweera, 1979].

A viable formal system of female education can be credited to the British colonial administration, under whose tutelage the Christian missionaries opened schools separately

for girls and boys. However, the main beneficiaries of this formal schooling system were Eurasian girls and girls of affluent natives who were coopted in the colonial elite class. In the early British period, the sex-based educational curriculum was directed at imparting a type of education to girls that would train them for good marital life. Since 1870, however, a series of policy measures revolutionized the educational system in Sri lanka. It reduced the disparity between the boys' and girls' schools, and the government started expanding the number of state-run schools, along with private schools financed by the state. Consequently, as shown by table 1.5, the female literacy rate increased from 2.5 percent in 1881 to 21.2 percent in 1921, of which a large number of girls were university college students [Jayaweera, 1979; Ross and Savada, 1990].

Although, as described above, each colonial government started a formal schooling for its own vested interests in the second half of the 19th century the resurgence of Sinhalese cultural nationalism, known as Buddhist revival, certainly played an important role in augmenting the focus on literacy. The colonial administration was pressured to accept local participation in policy formulation in education and made it accessible to everyone. As a result of that, education extension was made an integral part of the social policy, and

Table 1.5. Literacy Rates in Sri Lanka, 1881-1921 (Selected Years).

Year	Males %	Females %
1881	24.6	2.5
1891	29.9	4.4
1901	34.7	6.9
1911	47.2	12.5
1921	56.3	21.1

Source: [Census of Ceylon 1881, 1891, 1911, 1921, Government Press, Colombo]

free education for everyone was introduced in 1945 [Caldwell, 1986; Jayaweera, 1979; Ross and Savada, 1990].

In the post-independence period the state has taken an ever larger role in making education one of its highest priorities. The most significant policy goal was to provide equal access to both boys and girls to all educational institutions. The result was near-parity in enrollment in the formal system of education by 1960s. The university enrollment, which was initially confined to boys was opened for girls too, in 1966. To achieve the elevated goal of universal education, the State's allocation for education has remained a little less than 4 percent of the GNP since 1960, of which about 94 percent was spent on primary education. It is one of the largest allocations for education in the region. Only a slight decrease in expenditures on education, as a percentage of the GNP, was noticed in 1986, which declined to 3.6 percent from 3.8 percent in 1960. [Haq, 1990] This emerges commendablely given the fact that the economic situation for many decades has not been favorable and the state has had to bear extra monetary burden to contain ongoing armed-insurgency in the North and North-East. Consequently, by 1977 there were, on the average, three schools per ten square miles and 35 schools per 10,000 of the school age population [Jayaweera, 1979].

A factor which greatly benefitted girls is that the education system in Sri Lanka is largely co-educational, and the availability of women teachers was just over half the total number of teachers by 1975 [Jayaweera, 1979]. Though imbalances in the men-to-women teacher ratio are sometimes reported for schools located in less-developed, rural areas, these never adversely affected significantly the enrollment of girls in schools. The co-educational system seems to efficiently take care of this problem. In many Asian societies, which emphasize a sex-based educational system, an insufficient availability of trained women teachers has proven to be a great barrier to girls' access to education. By 1960, 90 percent of the primary school-aged girls and 27 percent of the secondary school aged girls were enrolled in the educational system. These rates are much higher, though than a majority of the developing nations and even many European nations, such as Czechoslovakia, Romania, Hungary, or Spain. A 100 percent primary school enrollment, for both boys and girls, was achieved during 1986-88. The secondary school enrollment was 69 percent, which was higher the rate for boys which was 63 percent. As a whole, the female literacy rate has increased from 81 percent in 1970 to 91 percent in 1985 [Haq, 1990]. Our data from the Demographic and Health Survey 1987, however, reported a lower rate of 80 percent.

Nevertheless, the DHS rate was based on a relatively narrow-based population of married females.

CHAPTER 2

THEORETICAL FRAMEWORK AND HYPOTHESES

During the last decade, an enormous amount of interest has emerged in the study of a mother's employment and its positive and negative effects on the healthy growth and survival of children in the third world.

Specifically, a mother's employment outside the home is hypothesized to affect the nutritional status of children, and others, through two major effects, i.e., the positive effect of income earned by her employment, and the negative effect of child neglect which results from time spent outside the home. There is a host of intermediaries which may contribute positively or negatively towards the nutritional status of children, depending on their linkages with mother's employment.

I). Mother's Work and a Child's Nutritional Status: Positive Effects

Maternal employment increases the income available to the family, which in general positively contributes towards a child's nutrition, due to increases in household's total food expenditure [Kumar, 1977; Mgaza and Bantje, 1980; Popkin, 1980]. However, it would require a relatively stable price structure of food items, otherwise, the positive effect of increasing the household's income for food consumption would

be minimized or nullified [Sahn, 1988]. The previously-mentioned positive effect, however, has been shown to be more pronounced for lower income groups than middle or higher groups. The reason for this is that the income elasticity of food consumption, due to the use of effective food substitution measures, was indicated to be higher among poor than rich people [Sahn, 1988]. A variety of studies support the positive contribution of increases in income used towards child nutrition. However, the relationship was not always simple and positive. Occasionally, it appeared to be complex, and even inconsistent.

For example, a study comprised of low-income households in three rural villages in the Trivandrum district of Kerala-India (Kumar, 1977) found that the amount of household's total income was a poor and insignificant predictor of childr's nutritional status. In households where the mothers worked, the relationship between the aggregate household income and the childrens' nutritional status was not very strong. However, the net effect of a mother's income produced through work participation on the childrens' nutritional status showed there was a significant positive contribution. The same study by Kumar (1977) reported that an increase in maternal income, particularly due to wage earnings, acted as a more direct source of improvement in a child's nutrition than earnings

from any other source.

Similarly, a study by Tucker (1986) in the Chiriqui province of Panama showed that maternal income had a positive effect on a child's nutritional status. Tucker's study, when compared to the above-mentioned finding by Kumar, however, showed that maternal income had an equal, net, significant positive effect in improving a child's nutrition as that made from any other source.

Another study by Tripp (1981), conducted in rural Northern Ghana, also confirmed the significant positive effect of a mother's earning on her child's diet and nutrition. However, compared to earlier cited studies, Tripp's study indicated that earning made from trading, had more of a significant positive effect on a child's nutrition than earnings generated from farming. Tripp's findings appeared to be in close conformity with Ballweg's study (1972) of rural Haitian mothers.

A dominant feature of the above-cited studies, which tended to translate the positive contribution of a mother's earnings towards the children' nutritional needs, seemed to be conditioned by her access and control over her earnings. Combined with her 'altruistic' tendencies, a great proportion of a mother's earnings were spent and devoted in order to feed their family and for their children's welfare. In addition

to the above-cited studies, Mencher's study (1987) in the rural areas of three Indian states; Roldan's findings (1982) from a Mexican city; Acharya's and Lynn's (1981) rural Nepal's study; Conti's (1979) research in the Upper Volta, and Stavrakis's and Marshal's (1978) Belize village study described the mothers' altruistic tendencies in spending as being the most dominant common factor that positively contributed to child'S nutrition.

Another dominant aspect as reported by Tripp (1981) was that maternal earnings were more directly translated to the nutritional needs of her children than that of her counterpart (husband), even if she earned far less. Males preferred to keep a portion of their earnings for leisure spending, although it was desperately required for the family's (bare) survival. On the other hand, in many instances mothers were reported to have spent almost all of their earnings to buy food items and other household necessities. Moreover, maternal earnings also appeared to significantly contribute towards the nutritional status of the children, since they were now abled to exert a strong influence in decision-making regarding household resource allocation, especially household food expenditures [Acharya and Lynn, 1981].

In the above-mentioned studies by Conti (1979) and Stavrakis and Marshal (1978), it was also reported that when

a shift was made from traditional cultivation to cash cropping, there was a negative bearing on the nutritional status of the children. Although, the changes in the cropping pattern increased a family's average real income, it happened at the cost of woman's lesser involvement in the family's agricultural activities. In other words, their opportunities for access to independent earnings were curtailed. Moreover, cash cropping also helped to divert earnings into the control of males, since they dominated the mechanisms of economic transactions in the market place. They tended to spend a significant portion of their earnings on conspicuous consumption, rather than food for the family, which formulated a general adverse effect on the nutritional status of their children. Similar negative implications for the nutritional status of children, due to changes in cropping patterns have also been reported by Bukh (1979), Collier (1982), FAO (1979), and Tinker (1979).

Nevertheless, a majority of the above-cited studies pointed to the fact that the children of poor families tended to benefit far more better from their mother's earnings than children from middle-and higher-income families. The reasons for this was that the the income elasticity of food consumption, through the use of effective food substitution measures, was found to be higher among poor people than rich

ones and altruistic tendencies were more strongly exhibited among poor working mothers than among working middle or higher-income working women [Sahn, 1988].

Increases in a family's income, which may be partially due to a mother's employment outside the home, are also predicted to have a positive impact on the healthy growth of children due to the expected increases in the family's expenditures on medical care, improved housing conditions, and hygienic living style. Furthermore, more hygienic life-style, a more due to the increased access to a safe water supply and better sanitation, has been found to be fundamental for a child's healthy growth and survival. The negative impact of environmental contamination on a child's nutritional status has also been confirmed by other [McKeown et al., 1972; Mosley, 1979]. Hygienic living conditions show a positive result on a child's nutritional status by reducing the spread of various diseases. For example, diarrhea is known to hinder a child's absorption of nutrients, which hampers the child's growth in the long-term. This condition may be further aggravated by the lack of a clean environment around the house.

A study by Zaki [1989] in Pakistan showed that those households who had access to piped-in drinking water had only 11.5 percent severely malnourished children, compared with

26.1 percent in those households who consumed water from a stream and/or a pond. Therefore, improvement in housing conditions may control the environmental contamination and tend to exert a positive impact on the children's nutritional status by preventing them acquiring so many diseases.

B). **Mother's Work, Family Size and Child Nutrition**

Another dominant mechanism which contributes positively toward the nutritional status of children takes place due to mother-worker role incompatibility, which encourages smaller sized families [Kupinsky, 1977; Stycos and Weller, 1967; Blake, 1965]. The mother-worker role incompatibility nexus as put forward by Blake (1965), explains that

> [T]he employment of women is one of the more effective structural means by which non-familial roles begin to offer significant competition to familial ones as avenues for reward and satisfaction, thereby influencing fertility in general and family-size motivation in particular [Blake, 1965: 1195].

In particular, increased opportunity costs that child bearing may bring for an employed woman, and employment as an alternative source of satisfaction, would generally compete with childbearing. When a woman opts to be employed outside the home, and given that family planning services are easily accessible, she reportedly bears a small number of children. However, a majority of studies in this context reported that a negative relationship between a woman's work status and her fertility was highly expected 1) more in modernized countries

than in developing countries, urban areas than in rural areas, and in white-collar occupations more than agricultural occupations, and 2) if the woman was employed away from home rather than at home. [Lehrer and Norlove, 1986; Mueller, 1982; Safilios, 1977; Yousaf, 1982]. On the other hand,

> [W]ithin societies (mostly the developing), social classes (mostly the working classes), and context (the rural more often than the urban), in which the mother role is viewed as compatible with the work role and women's most important identity and fulfillment is considered to be motherhood, women's work may either be unrelated to fertility or positively related to it [Safilios, 1977: 361].

According to Safilios-Rothschild (1977), the anticipated negative relationship between women's employment and fertility may not appear in situations where a job is taken solely due to sheer economic necessity. Moreover, factors such as the extent of the womens' job commitment, her choice in work participation, and the nature of the family system may also act to weaken the incompatibility that exists between mother and worker roles. Therefore, the expected negative relationship between a woman's work participation and her fertility may not take place, or the direction may change completely. Various studies have pointed to this contrary to usual negative relationship between a woman's work participation and her fertility [Fapohunda, 1981 and United Nations, 1989].

In general, a family with a smaller number of children

may be able to allocate a greater share of their given resources for each child [Lazear and Michael, 1988]. This happens because a smaller family generally produces reduce competition among its members/ children for the food resources available to the family which, in turn, greatly enhances their chances for healthy growth [Martorell et al., 1982; Moock and Leslie, 1985].

Moreover, with a smaller number of children in the family, the parents will be able to allocate more time to each child, which is considered to be one of the most important determinants of a childr's healthy growth [Popkin, 1980]. By contrast, in a large family, competition for access to food resources will be more fierce (particularly in poor ones due to a scarcity of food resources), and infants and younger children are expected to suffer the most. In addition, compared to a smaller sized family, the chances of a child being neglected in a larger size family are expected to be higher, since the average amount of parental time for child care will be shorter. Its negative implication for nutrition and healthy growth of children is well documented.

II). MOTHER'S WORK AND A CHILD'S NUTRITIONAL STATUS: NEGATIVE ASPECTS:

A). Mother's Work and the Reduction in Time for Child Care and A Child's Nutritional Status.

The incompatibility between a mother's employment outside

the home and her allocation of time for child care results in a lack of attention and emotional support for her children. This is considered to have a negative impact on a child's healthy growth [Evenson et al., 1980; Nieves, 1981; Popkin, 1980].

In a society such as Sri Lanka, gender role specifications define women to be primarily the ones responsible for rearing their children, which in itself is a time-intensive activity. A mother's absence from home may cause an interruption in the provision of a regular supply of sufficient and appropriate meals. This would have a greater negative effect for children during infancy and during their early weaning period, when they need frequent and nutrient-rich meals in order to prevent undernutrition. According to Davanzo and Lee (1983), the greater the number of hours the mother works outside the home for pay, the smaller the total amount of time she has for household activities.

However, Soekirman's studies (1983, 1985) in Indonesia inferred that the negative effect on childrens' nutritional status of a mother's reduction of time for child care was only evident when she worked more than 45 hours a week. In addition, the provision of alternative child care provided to the child by another member of the family in the absence of mother, in many instances acted to deflate the negative

effect, as the incompatibility between the mother and worker roles was marginalized.

Other studies which analyzed the impact of a mother's time allocation for child care, controlling for such factors as 'the type of work', showed that children of part-time working mothers enjoyed better growth and health than who worked full-time [Adelman, 1983]. Adelman (1983), reported that among poor neighborhoods in Lima, Peru, a full-time working mother needed twice the earnings of a part-time working mother in order to produce a similar growth pattern to those of part-time working mothers for their children. Similarly, another controlling factor the informal versus formal sector employment displayed wide differences in its effect on a child' nutritional status. Maternal employment in the informal sector did not produce the anticipated incompatibility between mother and worker role, hence, the negative impact was nonexistent. Rather, the ultimate effect on a child's nutritional status was positive. Therefore, maternal employment in the formal sector confirmed the negative effect on a child's nutritional status and their healthy growth. The differentiated effect of a mother's work on her children's nutrition occurred due to the fact that mothers who worked in the informal sector as farm laborers, petty traders or domestic workers were often permitted to

bring their children with them to their place of employment. Although a change occured in the mother's time allocation between household and work, as mothers were allowed to bring their to their place of work, they were in a better position to take care of their children. In this situation, child neglect did not occur, and maternal earnings contributed positively toward their children's nutritional status.

B). Mother's Work, BreastFeeding and a Child's Nutritional Status:

Generally, a mother's work is theorized to produce a negative impact on breast feeding, however, empirical findings on breast feeding in relation to a mother's work status present inconsistent evidence. For example, studies by Knodel and Debavalya (1980) and Chen et al. (1978) found no significant differences in the extent or duration of breast feeding between employed and unemployed mothers.

Nevertheless, other studies, both in the context of developing and developed countries, showed that working mothers breast fed to a lesser extent and for shorter duration. They made a greater use of mixed feedings or bottle feedings than nonworking mothers [Vial et al., 1986; Soekirman, 1983]. In particular, mothers who were employed in the formal sector in higher prestige occupations generally breastfed for a shorter time period [Knodel and Debavalya, 1980].

Breastfeeding has a multiple role in determining a child's nutrition and health status. It increases the chances for a child's survival, not only by providing essential nutrients for growth, but also by supplying the immunizing elements of breast milk, which help protect infants against many infectious diseases. This benefit of breast feeding is especially important in an environment where substitute foods may ordinarily be contaminated. Breast feeding also tends to delay resumption of menstruation and thereby spaces the births apart, which produces a positive impact for both the mother's and child's health. Thus, breast feeding both directly (by breast milk intake) and indirectly (by child spacing) contributes positively to the children's health [Jelliffe and Jelliffe, 1978; Latham, 1982; Priyani, 1981; Wary, 1977]. Hence, if maternal employment outside the home constrains breast feeding of infants, it is expected to have a negative impact on the healthy growth of young children. Thus, a reduction in the duration and extent of breast feeding has been observed to negatively affect the nutritional status of children.

Consequently, different researchers have voiced negative implications for the existing health status and hence, survival of children due to the decreased extent and duration of breast feeding is commonly associated with maternal

employment. They have expressed alarm that child nutrition and survival will further decrease if the trend continues toward reducing the extent and duration of breast feeding and the replacement of human milk by infant formulas.

C). Mother's Literacy and a Child Nutritional Status

Literacy brings social modernization: a process that brings about innovative behavior, thus increasing an individual's ability to manipulate the social or physical environment for their own personal advantage. Literacy enables an individual to send and receive messages and information more efficiently through multiple channels of communication. Thus, by bringing about new knowledge of preventive and curative measures to mothers, it exerts an important direct positive effect on a child's nutritional status [Caldwell, 1979; Cochrane et al., 1982; Ware, 1984].

As the tendency increases for a literate mother to break with traditions increases, she also tends to become less 'fatalistic' about illnesses. This attitudinal change motivates her to adopt alternative methods of child care and therapeutics that are available in the modern world. Her increased knowledge also enables her to make better use of existing medical facilities. She is more able to manipulate the network of relationships and demand attention of her husband, relatives, in-laws and the medical staff for

provision of medical treatment for her children [Orubuloye and Caldwell, 1975].

Moreover, a literate mother is more opt to adopt an improved, hygienic lifestyle, which greatly hinders the spread and growth of various child diseases. The negative effect of unsafe sources of drinking water, such as ponds or streams on the growth of children is a well documented fact. A literate mother may boil water or at least try to use uncontaminated water for her family. Additionally, a literate mother tends to maximize the utility of the family's existing food stock through adoption of efficient feeding practices [Sloan, 1971].

Maternal literacy may also affect the nutritional status of the children in the family by producing the number of children through an interplay of various mechanisms of supply and demand. A woman's education may inversely influence the age at which she marries, due to several reasons. Education is said to be associated with an increase in a woman's domestic power, something that in turn increases her commitment and entry into the labor force, which can result in delaying the age at which she marries [Cochrane, 1979; Easterline, 1974; Schultz, 1973]. In addition, female education (particularly, higher educational levels) by reducing gender preferences and enhancing the value of children, within the spectrum of a westernized view of family

formation, ultimately may produce small family norms. Consequently, the demand as well as the supply of children will be limited [Caldwell, 1982; Easterline, 1974; Karsada, 1973;].

On the other hand, women's education may entail shorter breast feeding durations, coupled with early weanings specifically by shortening the period of post-partum amenorrhea, may positively contribute to the supply of children [Khan, 1985]. However, the previously mentioned positive relationship may be offset due to effective fertility regulation through the extended and efficient use of contraception. Therefore, the net effect of maternal literacy on fertility may ultimately be negative [Casterline, 1984; Cochrane, 1979; Costello, 1979]. Nevertheless, studies such as the one by Costello (1979), pointed out that the relationship between maternal education and fertility was curvilinear rather than negative, with high-schooled educated women having more children ever born per woman, when compared to those at other educational levels. The reason may be the positive earnings' effect at the higher educational levels. Similarly, Ware (1984), deviating from Caldwell's (1982) view, emphasized the quality of maternal education rather than quantity of education (mass education) as a fundamental requirement for the onset of a low fertility regime.

As explained earlier, a small family size is observed to exert a significant positive impact on the nutritional status of children and their healthy growth.

One of the dominant mechanisms to limit the number of children ever born is to efficiently space children. Child spacing, which defines the length of the interval between two consecutive births, influences the nutritional status of both children on either side of the interval. A longer birth interval positively affects the nutritional status of the formerly born child, as the duration of his or her breast feeding is extended. Similarly, the health of the next baby and his/her survival is enhanced, as the health of the mother is more likely to be less affected by births spaced further apart [Chen, 1974].

A consensus seems to have emerged among planners that investment in girls' education should be made an important aspect of policy for improving a child's physical growth and survival in developing nations [Mahler, 1986; UNICEF, 1985].

D). Hypotheses

This review of the literature and theoretical discussion has directed the development and the testing of following hypotheses:

Hypothesis 1

The likelihood that a child will grow up normally will be greater when the mother is working than when a

mother is not working.

Hypothesis 2

The likelihood that a child will grow up normally will be greater when the mother is literate than mother is illiterate.

Hypothesis 3

The likelihood for a child to grow normally will be greater when a child is being breast fed than when child is not being breast fed.

Hypothesis 4

The likelihood for a child to grow up normally will be greater when born in a smaller family than for those children who is born into a larger family.

Hypothesis 5

The likelihood that a child will grow up normally will be greater when the household has access to flush type of toilet facility than when a household does not have access to a flush toilet facility.

Each of the above given five hypotheses intend to test the bivariate relationship between independent variables of a particular predictor and the dependent variable i.e., the child's nutritional status. However, the theoretical discussion and literature review showed that the mother's work relates to child's nutritional status through other factors. Hence, to assess the real effect of a mother's work on her child nutrition, we need to control for the effects of confounding variables. Hence, by using a multi-variate regression analysis, the following main hypothesis is intended to be tested.

Hypothesis 6:

The positive effect of a mother's employment on her child's nutritional status will be sustained when mother's literacy, breast feeding, number of in the household, and accessibility to a flush toilet facility are controlled.

CHAPTER 3

DATA AND METHODOLOGY

I). The Data

The purpose of this research was to investigate the difference in the nutritional status of Sri Lankan children as a result of their mother's employment status. The data for this task was utilized from the Sri Lanka Demographic and Health Survey (DHS, Sri Lanka) of 1987, while the multivariate technique of logit regression was adopted to perform the statistical analysis. The Demographic and Health Survey in Sri lanka was carried out by the Institute for Resource Development, a subsidiary of Westinghouse Electric Corporation (now Macro System), U.S.A., as a part of a nine-year global project to assist developing countries in implementing 59 population and health surveys (IRD, 1988a). The DHS-Sri Lanka focussed primarily focussed on fertility, contraceptive use and child mortality, similar to the well- renowned World Fertility Survey (WFS) initiated in 1975. However, it also provided additional data on maternal and children's nutritional and health statuses.

In the urban areas a three-stage sample dsign was utilized, while in the rural areas a two-stage procedure was used. Before embarking on the actual process of sample selection, a comprehensive effort was made to update the lists

of housing units within each selected census block, which formed the sampling frame. Moreover, by the use of a uniform socioeconomic and ecological criteria, Sri Lanka was stratified into nine homogenous zones with each zone further stratified into strata for the purpose of selecting a representative sample.

Although the original survey plan included interviewing all the private households (institutional residents were excluded) in the nine designated sample zones, the field work could only be carried out in seven zones due to civil disturbances in zones eight and nine (the Northern and Eastern provinces). Each zone was allocated an equal number of the 900 completed interviews from ever-married women aged 15 through 49 who had slept in the household the previous night. However, an exception was made in the case of Zone 5, which was allocated a larger number of interviews (1,350) in order to over sample the estate plantation workers.

At the first stage of sampling, using probability proportional to size (PPS) criteria, a stratified sample of wards or estates was selected. Except for Zone 5, which had 54 primary sampling units (PSUs), each of the remaining six sample zones was allocated 36 PSUs. Within a given zone, a stratum was represented in direct proportion to its size in the total population of that zone. In the next stage, two

census blocks were selected from each PSU with PPS, without replacement. For the final stage, the housing units within each selected block was selected with inverse PPS, to achieve a self-weighing sample within each stratum. All the eligible women in those housing units were interviewed, along with collecting information on various indicators that would be descriptive of the health and anthropometric status of their children aged 3 though 36 months.

In the non-urban strata, generally falling in Zones 3 through 7, only two stages were involved in the sample selection; first, selection of the block and second, selection of the housing units.

A total of 8,119 households were identified in housing units in the designated seven sample zones. From these households, 6,170 eligible women were identified for the final interviewing; however, interviews could only be completed with 5,865 (95.1 percent) of the eligible women.

II). Data Collection and Quality of the Data

The Department of Census and Statistics (DCS), the Ministry of Plan Implementation, government of Sri Lanka, was made responsible to implement the survey in Sri Lanka, in close collaboration with the Institute of Resource Development (IRD). The DCS provided all of the necessary staff to organize and implement the survey administratively

and professionally. The IRD consultants helped them in sample selection, questionnaire design, anthropometric measurement, data processing and analysis.

Two questionnaires were administered for data collection: (1) the household questionnaire, and (2) the individual questionnaire. The household questionnaire listed all the household members, including visitors who had spent the previous night in the household. Information on age, sex and marital status was ascertained for each of the household members, which was later used to select the eligible respondents. An eligible respondent included any woman currently married, divorced, separated or widowed who was between the ages of 15 and 49, who had slept in the household the previous night.

The individual questionnaire was then administered to each eligible respondent to furnish such information as the mother's work, nutritional status of the children, and other socioeconomic and demographic characteristics of the respondent and her household.

As discussed earlier, the field staff was drawn from among the DCS employees, who had prior experience in survey research. In all 48 interviewers were chosen to undertake the interviewing task, including nine people to supervise the interviews. Interviewers attended a two-week special

orientation session. This helped them refresh the skills needed to conduct efficient interviews, and familiarized them with the questionnaire. Later on, they were tested through three practice interviews in the field.

In addition, 18 individuals were recruited to carry out anthropometric measurements. Since this was these individuals first attempt at anthropometric measurements, special care was taken to provide rigorous training under the close supervision of an IRD specialist. At the completion of their training, they were given a practical test in the field to ensure their perfection in recording various measurements.

Moreover, to ensure a better quality of data, a five-member team was entrusted with the task of coordinating the whole field work process. Their responsibility was to visit the interviewers in the field and review the completed questionnaires, at least twice during the field work. In addition to that, each questionnaire was also edited after the interview was complete. Furthermore, all questionnaires were again reviewed and edited in the head office of the survey in Colombo.

The survey was conducted between January 18th and March 31, 1987, with the exception of a few areas where data collection started later and was completed by May 1987. Data entry into microcomputers was simultaneously started, with a

lapse of just two weeks from the commencement of the field work. Any entry in the questionnaire found to be inconsistent with the standard response was communicated to the respective interviewer in the field and was corrected before entering it into the microcomputer. This procedure significantly reduced the number of errors and the spent time on data editing.

Usually we can expect three types of biases which can possibly undermine the quality of survey data. These are: coverage biases, respondents' biases and interviewers' biases [Shryock and Seigle, 1976].

III). Coverage Biases

Coverage biases would generally arise due to incomplete coverage of the population, which would tend to restrict the external validity of the study's results. As mentioned earlier, due to civil disturbances, field work could not be carried out in two of nine sample zones (Zones 8 and 9), which made up approximately 14 percent of the total 1986 estimated population of Sri Lanka.

Moreover, individual interviews were completed among 95.1 percent (5,865) of the total of 6,170 selected, eligible respondents. Surprisingly, the rate of completeness was relatively higher on plantation estates (99.6 percent) and in rural areas (95.2 percent), than in Colombo (89.9 percent), the metropolitan, highly-urbanized capital city of Sri Lanka.

The low completion rate for Colombo mainly occurred due to the absence of a larger number of selected respondents from home, and by a higher rate of refusals for interviews.

IV). Response Biases

Response biases may occur, for example, due to a recall lapse pertaining to a certain event. It may be the exact date of birth, the exact age or number of children ever born, etc. In the case of our analysis, the accuracy of reporting ages, particularly for children, was very important to arrive at reliable estimates of malnutrition for Sri Lanka. As the estimation of a child's nutritional status (his or her height or weight) is directly based on their age in months, an over-reporting or under-reporting will make a substantial difference in the determination of each child's nutritional status. A child over-reported with respect to age be wrongly classified as malnourished, when in fact he or she should have been classified as normal. Conversely, under-reporting may wrongly classify a child as normal with respect to his/her nutritional status.

In DHS Sri Lanka, special care was taken to seek the exact age of a child, and interviewers were instructed to ask for documentary proof of age. In the entire sample of children selected for anthropometric assessment, only two children lacked information on their month of birth. They were not

included in the analysis.

Age misreporting, in general, would entail an age distribution which would suffer from errors of heaping at certain preferred terminal digits, which occurs due to a tendency among respondents to round off age figures (Booth and Shah, 1984; Zaki and Zaki, 1984). In our situation, we normally would have expected age-heaping at 12, 18, 24, 30 and 36 months, but as presented in Table 3.1, the age distribution of children aged 3 through 36 months shows no discernible pattern of age heaping. This confirms that the age data are at least free from biases associated with heaping.

A second important factor affecting the validity of data pertaining to the nutritional status of children aged 3 through 36 months could be the accuracy of anthropometric measurements. The various steps undertaken at both the training level and the fieldwork level to ensure a better quality data have already been explained. In general, the measurement results were very encouraging. A test in the middle of the survey revealed that, on the average, height was underestimated by 2.7 millimeters, while those who overestimated did it by an average of 1.9 millimeters. These figures were far below the United Nations' suggested 'unsatisfactory' cut-off value of 5 millimeters. Results on weight measurements were accurate within 100 grams [IRD,1988].

Table 3.1. Distribution of Children Selected for Anthropometric Measurements by Age; DHS Sri Lanka, 1987.

Age in Months	Number	Percent	Age in Months	Number	Percent
03	81	3.7	20	78	3.5
04	65	3.0	21	68	3.1
05	71	3.2	22	55	2.5
06	59	2.7	23	60	2.7
07	64	2.9	24	66	3.0
08	75	3.4	25	72	3.3
09	40	1.8	26	69	3.1
10	62	2.8	27	76	3.4
11	71	3.2	28	60	2.7
12	69	3.1	29	61	2.8
13	59	2.7	30	48	2.2
14	76	3.4	31	51	2.3
15	66	3.0	32	61	2.8
16	78	3.5	33	65	3.0
17	60	2.7	34	82	3.7
18	50	2.3	35	60	2.7
19	69	3.1	36	56	2.5

Source: DHS Sri Lanka (1987)

Nevertheless, the present research is based on 2003 children, down from a total of 2203 children between theages of 3 and 36 months who had been identified for anthropometric measurements. Of the 200 children not included, 19 were due to grossly inaccurate measurements of their height or weight; another 97 were due to the unavailability or refusal of their mothers; and another 82 were excluded because they lacked height measurements and had only weight measurements [IRD, 1988].

V). Interviewer's biases

Interviewer's biases may result largely from insufficient training of the interviewers to handle the task of interviewing. The phrasing of the question or faulty probing may also add to these biases. Besides pretesting the questionnaire, special training sessions were arranged to ensure that interviewers were familiar with the questionnaire. Later on, each of them was also required to complete three practice interviews in the field and, based on the results of these practice interviews, further training was arranged. Interviewers with no past experience were teamed with experienced interviewers for a week to build up their confidence in the art of interviewing. Each of them completed two questionnaires, which were then compared with the questionnaires completed by experienced interviewers.

Counseling needed to remedy their inaccuracies followed.

VI). Measurement and Operationalization of Variables

The major variables in this study are: the mother's work, the mother's literacy, breast feeding, toilet facilities, number of children in the household (up to age 5), and the nutritional status of the children. The measurement and operational criteria are discussed below.

1). Mother's Work (V714)

In the present study, we sought to explain the extent of malnutrition among Sri Lankan children by their **mother's work status** (independent variable). the mother's work status was defined with reference to "whether the respondent is working currently." A 'no' or 'yes' response to the above question measured the mother's work status which was entertained as a dichotomy in the study. No information of other aspects of the mother's work, for example, whether she was working full-time or part-time, the industry sector in
which she was employed, and what kind of work (occupation) she did was furnished in DHS Sri Lanka (1987).

2). Mother's Literacy (V108)

The mother's literacy was measured by a question which categorized her reading ability as (1) **reads easily,** (2) reads **with difficulty,** and (3) **cannot read.** I merged the first two categories of reading ability and operationalized it as

'literate' and the third as 'illiterate'. To be certain about the merging of the first and second categories as a measure of a mother's literacy, we verified this answer with the responses to another question, which represented the mother's education (V106). In the later case, (V106), 'no education' represented 'illiterate', while women with primary, secondary or higher education levels were added together to represent 'literate' mothers. the frequency distributions for both variables (V108 and V106) produced identical results for 'illiterate' and 'literate' mothers. Thus, the merging of the two categories is accurate for our estimates of the mother's literacy.

3). **Breastfeeding (V404)**

Breast feeding was measured by the question: Whether the respondent is currently breastfeeding any child. A respondent who reported 'yes' was considered to be currently breastfeeding; if the respondent said 'no', was considered as currently not breastfeeding. Since the distribution of children ages 3 through 36 months showed that approximately 300 respondents had more than one child, the youngest child was considered to be currently being breastfed.

4). **Number of Children in the Household (upto 5 years old)**

We theorized that having a large number of children in a family would contribute negatively towards the average

nutritional status of the children. The children in each family between the ages of 3 and 60 months were included to measure this relationship. This variable was measured as a dichotomy, where respondents with one child between the ages of 3 through 36 months made up the first category, while everyone else made up the second category .

5). Toilet Facility (V116)

Information on the toilet facilities (intervening variable) available to a family were provided through five categories' response variable. We collapsed them into two distinct categories of 'flush' and 'non-flush', to be measured as a dichotomous variable in our study.

6). Children's Nutritional Status (HW5X)

Two standard indices of physical growth, i.e., height-for-age (HA) and weight-for-age (WA) were selected to describe the nutritional status of children aged 3 through 36 months (dependent variables). The way these indices are used to identify the nutritional status of a population is to compare the respondents height-and weight-for-age with that of a standard (reference) population, i.e., the standard established by such international health organizations as the National Center for Health Statistics (NCHS), the Child Disease Control Center (CDC), and the World Health Organization (WHO). Any child who was minus- two or more

standard deviations below the mean value of height-for-age of the reference population was considered to be malnourished (stunted), whereas if he or she was above the standard deviation of the reference population, they were considered to have normal growth. Similar criteria are used to assess the extent of malnutrition (wasting) with respect to the weight-for-age index.

In the present study, the dependent variable height-for-age (HW5X) was measured as a dichotomy, while 1 being normal, and 2 being malnourished.

CHAPTER 4

ANALYSIS OF DATA AND FINDINGS

I). Nutritional Status of Children Aged 3-36 months

In this study, the month-specific distribution of children aged 3-36 months indicated that 7.8 percent of them were 3 to 5 months old; 17.8 percent were 6 to 11 months of age; and more than two-thirds (74.3%) were at least one year old (Table 4.1).

A reduced height-for-age (HA), figure when compared comparison to a standard population, was the basis for assessing a child as being undernourished. Any child falling below two or more standard deviations below the mean height of the reference population was considered to be "stunted" or chronically undernourished. Accordingly, in Sri Lanka 29.7 percent of the children aged 3-36 months were chronically undernourished (Table 4.1), which is of central concern in this study.

Usually, a linear positive relationship exists between height and age; as a child's age increases, the percent of children who are shorter than their expected height increases. I found 7.6 percent of the undernourished children in the sample were in the age group 3-5 months. A sudden jump in the percentage of children short for their ages was notable from

Table 4.1: Selected Characteristics of Sample Based on the Sri Lanka Demographic and Health Survey, 1987.

Characteristics	Percent	Mean	S.D.
Malnourished Children (HA) 3-36 months	29.7	--	--
Children by Age-Group:		19.26	9.81
1. 03-05	7.8		
2. 06-11	17.8		
3. 12-23	37.2		
4. 24-36	37.1		
Mother's Work Status:		1.82	0.39
1. Working	18.0		
2. Not Working	82.0		
Mother's Literacy:		1.17	0.38
1. Literate	82.6		
2. Illiterate	17.4		
Children Being Breastfed:		1.31	0.46
1. Yes	67.7		
2. No	32.3		
Children in the Household (up to 5 years old):		1.65	0.67
1. One	45.9		
2. > One	54.1		
Type of Toilet Facility:		1.61	0.49
1. Flush	38.4		
2. Other	61.6		

Source: The DHS Sri Lanka (1987).
The total study sample size = 2003

Table 4.2:Percent Distribution of Children Aged 3-36 Months, by Standard Deviation Category of Height-for-Age Using the International NCHS/CDC/WHO Reference Population, According to background Characteristics, DHS-Sri Lanka 1987.

Background Characteristics	Standard Deviations from NCHS/CDC/WHO		
	-2.00 or less	-1.99 or more	Total (N)
Children's Age (moths):			
1. 03-05	7.6	92.4	100.0 (157)
2. 06-11	18.2	81.8	100.0 (357)
3. 12-23	32.8	67.2	100.0 (746)
4. 24-36	36.6	63.4	100.0 (743)
Region:			
1. Urban	20.2	79.8	100.0 (282)
2. Rural	31.2	68.8	100.0 (1721)
Gender:			
1. Male	28.7	71.3	100.0 (1060)
2. Female	30.8	69.2	100.0 (943)
Mother's Work:			
1. Working	47.9	52.1	100.0 (361)
2. No Work	25.6	74.4	100.0 (1642)
Mother's Literacy:			
1. Literate	24.9	75.1	100.0 (1652)
2. Illiterate	52.4	47.6	100.0 (349)
Breastfeeding:			
1. Yes	26.4	73.6	100.0 (1197)
2. No	32.2	67.8	100.0 (571)
Children in the Household:			
1. One	25.4	74.5	100.0 (920)
2. > One	33.2	66.8	100.0 (1083)
Toilet Facility:			
1. Flush	22.8	77.2	100.0 (749)
2. Other	34.0	66.0	100.0 (1234)
All Children	29.7	70.3	100.0 (2003)

Source: [DHS of Sri Lanka, 1987]

the age group 6-11 months (18.2%) to the age group for 12-23 months (32.8%). The percent of undernourished children for the age group 24-36 months was 36.6 percent (Table 4.2).

Of the sample children, 52.9 percent were males and 47.1 percent were females (Table 4.1). A slightly higher percent of the female children were found to be undernourished (30.8), compared to 28.7 percent of the male children (Table 4.2).

About 86.0 percent of the children in the study lived in rural areas and 14.0 percent in urban areas (Table 4.1). About 20.2 percent of the urban and 31.2 percent of the rural children were undernourished (Table 4.2); thus a relatively higher proportion of rural children was identified as suffering from malnutrition.

As indicated in Table 4.1, the possible reasons for the sudden jump in the percentage of children who were too shorter for their ages at 1 year old might be due to the lack of solid foof in the children's diet. Because mother's milk is high in required nutrients and is more easily digested than other foods that are unbalanced in nature and/or may have low nutrient density. It is generally recognized that infants who are breast fed tend to be better nourished than those who are not.

Table 4.3. Zero-order Correlation Among Various Variables, the Sri Lanka DHS, 1987.

Vari-ables	HW5X	V714	V108	V404	V208	V117
HW5X	--	-0.19[a]	0.23[a]	0.60[c]	0.01[a]	0.12[a]
V714	--	--	-0.28[a]	-0.53[b]	-0.11[a]	0.03[a]
V108	--	--	--	-0.28[a]	0.08[a]	0.16[a]
V404	--	--	--	--	-0.16[a]	-0.12[a]
V208	--	--	--	--	--	0.13[a]
V117	--	--	--	--	--	--

Source: [DHS Sri Lanka, 1987]

(a). Denotes significant at the 1% level.
(b). Denotes significant at the 5% level.
(c). Denotes significant at the 10% level

List of Variables:

HW5X; Nutrition Status of Children;
Normal = 1, Malnourished = 2.
V714; Mother's Current Work Status;
Working = 1, Not Working = 2.
V108; Mother's Literacy;
Literate = 1, Illiterate = 2.
V404; Breastfeeding;
Yes =1, No = 2.
V208; Children in the Household (up to 5 year age);
One = 1, else = 2.
V106; Toilet Facility;
Flush = 1, Other = 2.

II). Nutritional Status of Children by Mother's Work: Hypothesis 1.

Category of a mother's work status showed that 18.0 percent of mothers were reported to be working and 82.0 percent were not working at the time of the survey (Table 4.1). The percent of chronically undernourished children was higher among working mothers (47.9%) than that of non-working mothers (25.4%). The negative relationship between a mother's work status and a child's nutritional status was statistically significant (chi-square = 70.44; D.F. 1 (see Table 4.4). This led us to reject Proposition 1, which hypothesized that a mother's work contributed positively towards the healthy growth of her children.

III). Nutritional Status of Children by Mother's Literacy: Proposition 2.

A majority of mothers (82.6%) were found to be literate (who could read and/or write), while only 17.4 percent were illiterate (see Table 4.1). A Mother's literacy appeared to significantly contribute towards the healthy growth of the children. The children of literate mothers were far less chronically undernourished (24.9%) than those of illiterate mothers (52.4%) (see Table 4.3). A statistically significant positive relationship (X^2 = 104.82; D.F. = 1, $P < 0.01$) between a mother's literacy and her child's nutritional

Table 4.4. Percent Distribution of Normal/Undernourished Children (age 3-36 months) by Mother's Work Status in Sri Lanka, DHS 1987.

Children Nutritional Status	Mother's Work Status	
	Working	Not Working
Normal	52.1	74.4
Malnourished	47.9	25.6
Total (N)	100.0 (N=361)	100.0 (N=1642)

$X^2 = 70.44$; D.F. = 1; $P < 0.01$

Table 4.5: Percent Distribution of Normal/Malnourished Children (age 3-36 months) by Mother's Literacy in Sri Lanka, DHS 1979.

Children Nutritional Status	Mother's Literacy Status	
	Literate	Illiterate
Normal	52.1	74.4
Malnourished	47.9	25.6
Total (N)	100.0 (N=361)	100.0 (N=1642)

$X^2 = 70.44$; D.F. = 1; $P < 0.01$

IV). Nutritional Status of Children by Breastfeeding: Hypothesis 3.

As indicated in Table 4.1, slightly more than two-thirds of all mothers in the sample (67.7%) were reported to be breast feeding. Among all the children who were being breast fed, a relatively lower percent were chronically undernourished (35.9%) than those who were not (42.9%) (see Table 4.2). The chi-square test ($X^2 = 70.44$; D.F. = 1) indicated that the positive relationship was statistically significant at the 1.0 percent level (Table 4.6). Thus, The effect of breast feeding on the healthy growth of children was found to be positive. Therefore, we accepted Proposition 3.

V). Nutritional Status of Children by Number of Children in the Household (up to age 5 years old): Hypothesis 4.

Table 4.1 had indicated that 45.9 percent of the total households sampled had one child up to the age of 5 years, while the remainder of 54.1 percent reported more than one child 5-years of age. About 25.4 percent of the children in the households with only one child and 33.2 percent in the households with more than one child were chronically undernourished (see Table 4.2). A positive relationship was found between a child's nutritional health and the number of children in the household found (Proposition 4). A child

Table 4.6: Percent Distribution of Normal/Malnourished Children (age 3-36 months) by Youngest Child Being Breastfed in Sri Lanka, DHS 1 79.

Children Nutritional Status	Breastfeeding	
	Yes	No
Normal	73.6	67.8
Malnourished	26.4	32.2
Total (N)	100.0 (N=1197)	100.0 (N=571)

$X^2 = 6.47$; D.F. = 1; $P < 0.05$

Table 4.7: Percent Distribution of Normal/Undernourished Children (age 3-36 months) by Number of Children (up to 5 years)in the HH in Sri Lanka, DHS 1979.

Children Nutritional Status	% of Children in the Household (up to 5 Years old)	
	One	> One
Normal	74.6	66.8
Malnourished	25.4	33.2
Total (N)	100.0 (N=920)	100.0 (N=1083)

$X^2 = 14.53$; D.F. = 1; $P < 0.01$

without another sibling age 5 in the household appeared to be taller than his/her counterpart who lived in a household A chi-square value of 14.53, with 1.0 degree of freedom, made the relationship statistically significant at the 5 percent level, and confirmed proposition 3.

VI). Nutrition Staus of Children by Toilet Facility: Hypothesis 5.

A flush-type of toilet facility was only available to 38.4 percent of the households sampled, while a majority (61.6%) had access to another type of toilet facility, as was seen in Table 4.1. A positive impact on the physical growth of children was noted with respect to the availability of a flush type of toilet facility (see Table 4.8). The percent of undernourished children (38.4%) in the households with access to a flush type of toilet facility was (38.4%)far below than those who lacked access to a flush type of toilet facility (61.6%). This relationship was also statistically significant at 1.0 percentage level (X^2 = 28.48; D.F. = 1). Hence, Proposition 4 was also accepted to be true.

Thus, the relationship in each of the zero-order propositions tested positive as hypothesized, except for Proposition 1. However, a multi-variate analysis of the major hypothesis of this dissertation (Proposition 6) was performed with the use of logit regression technique.

Table 4.8: Percent Distribution of Normal/Malnourished Children (age 3-36 months) by Type of Toilet Facility Available to HH in Sri Lanka, DHS 1979.

Children's Nutritional Status	Type of Toilet Facility	
	Flush	Other
Normal	77.2	66.0
Malnourished	22.8	34.2
Total (N)	100.0 (N=769)	100.0 (N=1234)

$X^2 = 28.48$; D.F. = 1; $P < 0.01$

LOGIT REGRESSION MODEL:

The dependent variable, a child's nutritional status, explained whether a child between the ages of 3 and 36months was growing normally or not, as identified according to a standard height-for-age schedule. This nutritional status vaiable assumed the typical form of a binary or dichotomous variable. The binary nature of the dependent variable makes it least probable to fulfill the assumptions of Ordinary Least Square Regression procedures. This is true because on the one hand, the fundamental assumption of the normality of the error term with a mean value of zero and a variance that is constant across all the observations of the independent variable (homoscedasticity), is violated; on the other hand, given the binomial distribution of the dependent variable, its' mean will be conditioned to be greater than or equal to zero and less than or equal to one. "The value of mean approaches zero and 1 gradually" and "the change in the E(Y/x) per-unit change in X becomes progressively smaller as the mean gets closer to zero or 1." Its curve is S-shaped and "it resembles a plot of cumulative distribution of a random variable" [Hosmer and Lemeshow, 1989]. Hence, we used a logit transformation to this binomial distribution to achieve many desirable properties of a linear regression model.

The logit permits us to express the log of the ratio of probabilities (log odds) of experiencing an event (in our case, whether a child will grow normally or not, in terms of his or her height-for-age) as a linear function of a set of predictor variables, which can be estimated by maximum likelihood estimation (MLE) procedures. This can be expressed in the form of the following equation:

$$\ln\left(\frac{P}{1-P}\right) = L + B_i X_i$$

where,

ln(P/(1-P), is called the log-odds (logit) of a child growing up normally. P is the conditional probability of the occurrence of an event which, in our case, was the normal growth of a child between the ages of 3 and 36 months.

X_i are vectors of independent variables, and B are vectors of logit regression coefficients. The likelihood function of (L, B) is that pair of parameters which minimizes the difference between the observed and expected cell means and closely follow the chi-square distribution (Fienberg, 1985).

The logit-regression procedure as a subroutine of log-linear model is available in the Statistical Package for Social Sciences ($SPSS^X$).

I). Nutrition Status of Children by Mother's Work, Controlling for Other Factors: Hypothesis 6.

In Proposition 6, we analyzed the effect of a mother's work atatus on the physical growth of her children (HA) by controlling the effect of other factors, such as the mother's literacy, breast feeding, the number of children in the household up to age of 5 and the type of toilet facility in the house.

The selection procedure of the best-fitted, most parsimonious logit model to test proposition 6 is described below and the results are discussed in the following section.

SELECTION OF THE BEST-FITTED LOGIT REGRESSION MODEL:

Our large (saturated) model includes the dependent, independent and control variables in the study, plus all possible interaction terms. Ideally the likelihood ratio (G^2) of a saturated model is zero, with no degree of freedom, which tends to follow approximately a chi-square distribution. Nevertheless, we prefered to analyze the parameters of a reduced (unsaturated) model rather a large (saturated) model, given that it is also statistically insignificant with respect to its G^2 value at a conventional 5 percent level of significance. An insignificant G^2 of the reduced model at the respected degrees of freedom describes a better fit of the data.

We defined a reduced model by excluding an interaction term, or set of terms, from the large (saturated) model. As compared to the ideal situation of a saturated model, both G^2 and the number of degrees of freedom of a reduced model will be non-zero. This emerges as a result of the elimination of a term(s), which tends to produce discrepancies between the observed and expected cell means. The G^2 and the degrees of freedom of the large model and the reduced model are compared, and differences in the G^2 values of the two models are statistically tested with respect to the differences in their degrees of freedom. A statistical insignificant difference in G^2 of the reduced model, with regard to the difference in degrees of freedom of the saturated model and reduced model, would establish a best-fit for the reduced model without having made its observed and expected cell means discrepant over that of saturated model (Aldrich and Nelson, 1984). Therefore, the reduced model is considered equally valid in interpreting our data and the results.

Nevertheless, if the G^2 value of a reduced model at corresponding degrees of freedom would tend to be statistically significant at a conventional 5 percent level, it would be considered ill-fit to the data. Therefore, it is discarded from consideration. Similarly, when comparing the G^2 value of the reduced model with that of the saturated

model, if the difference is found to be statistically significant at a difference in their degrees of freedom, the reduced model is rejected as a best-fitted model. It is considered to have displayed discrepancy in its observed and expected cell means over that of the large model. In other words, it would signify the importance of the interaction term(s) whose exclusion had caused a statistically significant variation in the data. Hence, the excluded variables would need to be included in the final model in order to obtain a parsimonious analysis.

Using the afore-mentioned procedure, several models were tested, however, model 13 is being selected as the most parsimonious best fitted model to test Proposition 6. In line with the above-described procedure, we proceeded by eliminating each three-way term at a time. All of the tested models are described below.

Model 1

Model 1, is a full or saturated model comprised of all five two-way terms linking a dependent variable with the mother's work status, the predictor variable and each of four control variables, such as the mother's literacy, breast feeding, the number of children in the household up to age 5, and the availability of flush toilet facilities as control variables. In addition, Model 1 incorporated all the ten

Table 4.9: Goodness-of-Fit Statistics (G^2) for Various Log-Linear Models Applied to test Hypothesis 6.

Models	G^2	D.F	P Value
Model 1 [1][12][13][14] [15][16][123][124] [125][126][134][135] [136][145][146][156]	18.85	16	0.276
Model 2 [1][12][13][14] [15][16][124] [125][126][134][135] [136][145][146][156]	19.12	17	0.322
Model 3 [1][12][13][14] [15][16][123] [125][126][134][135] [136][145][146][156]	18.86	17	0.337
Model 4 [1][12][13][14] [15][16][123][124] [126][134][135] [136][145][146][156]	19.71	17	0.289
Model 5 [1][12][13][14] [15][16][123][124] [125][134][135] [136][145][146][156]	27.63	17	0.049
Model 6 [1][12][13][14] [15][16][123][124] [125][126][135] [136][145][146][156]	19.20	17	0.317
Model 7 [1][12][13][14] [15][16][123][124] [125][126][134] [136][145][146][156]	18.94	17	0.332

Continued ....

(Table 4.9. Continued ...)

Model 8			
[1][12][13][14] [15][16][123][124] [125][126][134][135] [145][146][156]	23.97	17	0.120
Model 9			
[1][12][13][14] [15][16][123][124] [125][126][134][135] [136][146][156]	18.90	17	0.334
Model 10			
[1][12][13][14] [15][16][123][124] [125][126][134][135] [136][145][156]	20.23	17	0.263
Model 11			
[1][12][13][14] [15][16][123][124] [125][126][134][135] [136][145][146]	19.21	17	0.317
Model 12			
[1][12][13][14] [15][16]	33.56	26	0.147
Model 13			
[1][12][13][14] [15][16][126] [136]	22.06	24	0.576

List of Variables:

[1]. Nutritional Status; Normal = 1, Malnourished = 2.
[2]. Mother's Literacy; Literate = 1, Illiterate = 2.
[3]. Mother's Work; Working = 1, Not Working = 2.
[4]. Breast feeding; yes =1, No = 2.
[5]. Children up to 5 year in the HH; 1 = 1, else = 2.
[6]. Toilet Facilities; Flush = 1, Other = 2.

Study sample size= 2001

Table 4.10:Comparison of Difference in Goodness-of-Fit Statistics (G^2) for Various Reduced Log-Linear Models with the Large (saturated) Model, Applied to Test Hypothesis 6.

Models	G_L^2	$D.F_L$	Critical Value at 5% level
Model 1 [1][12][13][14] [15][16][123][124] [125][126][134][135] [136][145][146][156]	18.85	16	26.30
Reduced Models:	$G_L^2 - G_R2$	$D.F_L - D.F_R$	Critical value
Model 2 [1][12][13][14] [15][16][124] [125][126][134][135] [136][145][146][156]	0.27	16	3.84
Model 3 [1][12][13][14] [15][16][123] [125][126][134][135] [136][145][146][156]	0.01	1	3.84
Model 4 [1][12][13][14] [15][16][123][124] [126][134][135] [136][145][146][156]	0.86	1	3.84
Model 5 [1][12][13][14] [15][16][123][124] [125][134][135] [136][145][146][156]	8.78	1	3.84*
Model 6 [1][12][13][14] [15][16][123][124] [125][126][135] [136][145][146][156]	0.35	1	3.84

Continue ...

(Table 4.10. Continued ...)

Model 7			
[1][12][13][14] [15][16][123][124] [125][126][134] [136][145][146][156]	0.09	1	3.84
Model 8			
[1][12][13][14] [15][16][123][124] [125][126][134][135] [145][146][156]	5.12	1	3.84*
Model 9			
[1][12][13][14] [15][16][123][124] [125][126][134][135] [136][146][156]	0.05	1	3.84
Model 10			
[1][12][13][14] [15][16][123][124] [125][126][134][135] [136][145][156]	1.38	1	3.84
Model 11			
[1][12][13][14] [15][16][123][124] [125][126][134][135] [136][145][146]	0.36	1	3.84
Model 12			
[1][12][13][14] [15][16]	14.71	10	18.31
Model 13			
[1][12][13][14] [15][16][126][136]	3.21	8	15.51

(*) Statistically significant difference at 5% level.

List of Variables:

[1]. Nutritional Status; Normal = 1, Malnourished = 2.
[2]. Mother's Literacy; Literate = 1, Illiterate = 2.
[3]. Mother's Work; Working = 1, Not Working = 2.
[4]. Breast feeding; yes =1, No = 2.
[5]. Children up to 5 year in the HH; 1 = 1, else = 2.
[6]. Toilet Facilities; Flush = 1, Other = 2.

possible three-way interaction terms linking the dependent variable with a pair of two other kinds of variables. The G^2 value and degrees of freedom of Model 1 were 18.85 and 16, respectively, which was statistically non-significant at $P > 0.05$ (see Table 4.9). Hence, this model showed a good fit of the data. In other words, it described statistically insignificant discrepancies between the observed and expected cell means. Model 1 formed the basis of comparison for the rest of our reduced models. Their comparison vis-a-vis Model 1 is provided in Table 4.10, and the procedure involved is illustrated below.

Model 2

Model 2 kept all two and three-way interaction terms, except the three-way interaction term [123]. The G^2 and the number of degrees of freedom for Model 2 were 19.12 and 17, respectively (Table 4.9), thus showing a good fit of the data. It produced a gain of 0.27 in G^2 above that for Model 1, with an increase of 1 degree of freedom (Table 4.10). The change in G^2 is far below the critical value of 3.84 at 1 degree of freedom. In other words, Model 2 followed a chi-square distribution that meant that the observed and expected cell means of Model 2 were not significantly different from the observed and expected cell means of model 1. Model 2 fulfilled both of our criteria for a best-fitted model; i.e.,

the G^2 value as well as the change in G^2 were statistically non-significant at corresponding degrees of freedom.

Model 3

In Model 3, we omitted the three-way term of variables [124] from Model 1 and showed a good fit of the data. The G^2 value for this model was 18.86, with 17 degrees of freedom (see Table 4.9). The change in the G^2 value over Model 1 was 0.01, with a change of 1 degree of freedom (see Table 4.10). Both the G^2 value of Model 3 and the change in the ^2G value over that of Model 1 were statistically insignificant. The extent of change in G^2 (0.01) in Model 3 meant that model 3 closely followed a chi-square distribution, or that the observed and expected cell means of this model were no different from that of Model 1. Therefore, we accepted Model 3 as best-fitted model.

Model 4

Model 4 omitted the three-way interaction term of variables [125] from Model 1. It had G^2 value of 19.71, with 17 degrees of freedom, which also showed a very good fit to the data (see Table 4.9). Compared with Model 1, it showed a gain of only 0.86 in its G^2 value at a gain of one degree of freedom, which fell far below the critical value of 3.84 at one degree of freedom (see Table 4.10). Hence, we also accepted it as a best-fitted model, descriptive of no

significant discrepancy in its observed and the expected cell means compared with that of Model 1.

Model 5

In Model 5, we excluded three-way interaction term [126] from Model 1. Its G^2 value of 27.63 at 17 degrees of freedom made it slightly higher than required to declare it statistically significant at a 5 percent level. The gain of 8.78 in the G^2 value of Model 5 over that of Model 1 at a difference of one degrees of freedom, was far above the critical value of 3.84. The statistically significant difference indicated a discrepancy in its observed and expected cell means over that of Model 1, which reflected the fact that ths model departed from the chi-square distribution. Hence, we reject Model 5 as a best-fitted model.

Model 6

In this model, we omitted three-way interaction term [134] from Model 1, which, as a whole, indicated a very good fit of the data and followed a chi-square distribution. The difference between the G^2 values of Model 6 and Model 1 was (19.20 - 18.85 = 0.35) at 1 degree of freedom (6 - 5 = 1). A gain of 0.35 in G^2 at a gain of 1 degree of freedom was far below the critical value of 3.84 (Table 4.10). Therefore, we accepted this model as a best-fitted modelas it fulfilled both stated criteria.

Model 7

In Model 7, we excluded three-way interaction term [135] from Model 1. It described a very good fit for the data and followed a chi-square distribution. Both the G^2 value of 18.94 at 17 degrees of freedom (Table 4.9), and the increase in G^2 value of 0.09 at a gain of one degree of over Model 1 (Table 4.10), were statistically insignificant. Hence, we also accepted Model 7 as a best-fitted model.

Model 8

In Model 8, we excluded the three-way interaction term [136] from Model 1. The G^2 value of 23.97 at 17 degrees of freedom was statistically insignificant at the 5 percent level; hence the model showed a good fit of the data. However, we saw that the gain of 5.12 (23.97 - 18.85) at a gain of 1 degree of freedom in Model 8, over that of Model 1 was statistically significant. The gain in G^2 was above the critical value of 3.84 (Table 4.10). In other words, its observed and expected cell means became discrepant compared with Model 1, and did not follow chi-square distribution. Therefore, we rejected Model 8 as a best-fitted model.

Model 9

Model 9 excluded the three-way interaction term [145] from Model 1 and showed a very good fit of the data. The G value of 18.90 at 17 degrees of freedom (Table 4.9), and a

gain of 0.05 value in G^2 at one degree of freedom over that of model 1 (Table 4.10), were sadistically insignificant. The change in G^2 was far below the critical value of 3.84 at 1 degree of freedom. Hence, Model 9 like model 1 tended to follow a chi-square distribution indicative of no discrepancy in the observed and expected cell means of Model 9 when compared with that of model 1. Therefore, we accepted Model 9 as a best fitted model, too.

Model 10

Model 10 kept all the terms from Model 1, exept for the three-way term of [146]. The G^2 value of 20.23 at 17 degrees of freedom was statistically insignificant (Table 4.9), descriptive of a very good fit of the data. The change in G^2 value over Model 1 was 1.38, with a change of one degree of freedom (Table 4.10), and was also statistically insignificant. Both criteria to accept a model as a best-fitted were fulfilled; hence, we accepted Model 10 as a best-fitted model. It followed a chi-square distribution and showed no discrepancy in its observed and expected cell means when compared with those of Model 1.

Model 11

Model 11 omitted a three-way term [156] from Model 1. Its estimated G^2 value of 19.21, with 17 degrees of freedom and was statistically insignificant (Table 4.9); hence, described

a very good fit of the data. Similarly, a gain of 0.36 in its G^2 value, at a gain of 1 degree of freedom, over that of Model 1 (Table 4.10) was also statistically insignificant. This indicated that Model 11 closely followed the chi-square distribution of Model 1, and displayed no significant discrepancy in its observed and expected cell means when compared with that of Model 1. Hence, we also accepted it as a best-fitted model.

Model 12

Model 12, comprised of five two-way interaction terms ([12][13][14][15][16]), and showed a very good fit of the data. Both the G^2 value of 33.56 at 26 degrees of freedom (Table 4.9), and a gain of 14.71 in G^2 value at a gain of 10 degrees of freedom, were statistically insignificant at 5 percent level (see Table 4.10). The data for Model 12, similar to Model 1 followed a chi-square distribution and displayed no significant discrepancy in its observed and expected cell. Hence, model 12 also qualified to be accepted as a best-fitted model.

Nevertheless, we observed that the exclusion of a three-way interaction term [126] from Model 5 and a three-way term [136] from Model 8 produced a statistically significant difference in the G^2 values of Model 5 and Model 8 over that of Model 1. Consequently, the two models were rejected as

best-fitted models. Nevertheless, we needed to reincorporate these terms in our final model to capture their effects, since these two interaction terms, among all possible three-way terms, were found to a make statistically significant contribution towards the determination of the physical growth of children. We thus proceeded with Model 13.

Model 13

Model 13, was comprised comprised of five two-way terms ([12][13][14][15][16]) as in Model 12, linking the dependent variable with the predictor variable- the mother's work status and each of the four control variables, such as the mother's literacy status, breastfeeding, the number of children in the household up to age 5, and the type of toilet facility in the house, plus the above-described two three-way interaction terms [126]and [136] linking the dependent variable with a pair of two other kinds of variables. The model indicated a very good fit of the data and followed the chi-square distribution of model 1. Both the G^2 value of 22.06 at 24 degrees of freedom (Table 4.9), and a gain in the G^2 value 3.21 (22.06 -18.85), with a gain of 5 degrees of freedom over Model 1 (Table 4.10) were statistically insignificant at 5 percent level. Hence, Model 13 was selected as the best-fitted, most parsimonious model, which became the basis to test Proposition 6.

LOGIT-REGRESSION PARAMETERS (Log Odds):

It is difficult to think of the magnitude of the effects in terms of log odds; therefore, it is preferable to translate the logit coefficients into the probabilities or likelihoods (Odd Ratios) of an occurrence of a particular event. In a model like ours, to calculate the odd ratios we multiply the log-odd by 2 and take its antilogarithm [Haberman, 1978]. It "is a measure of association, as it approximates how much more likely (or unlikely) it is for the outcome to be present among those" in the first category of independent variable rather than the second category. Statistically, it would require the odd ratio to be greater the first category of the dependent variable [Hosmer and Lemeshow, 1989]. The Z values determine the statistical significance of the results. [see Table 4.11]

Main Effects:

The average likelihood of Sri Lankan children to grow up normally was 1.35 to 1 (Z = 3.748). However, I found that mother's employment did not show a positive effect on the healthy growth of her children. As indicated in Table 4.11, the likelihood of a working mother's child to grow up normally was 0.73 to 1 (Z = 2.21).

The main effect of a mother's literacy (the ability to read and/or write) had a positive contribution towards the normal growth of her children. Compared with all other factor

Table 4.11.Logit regression of Nutritional Status of Children;(1=Normal; 2=malnourished) upon Mother's Work and Control Variables (model 13), Proposition 6.

Variables	Estimated Coefficient = (coeff. * 2)	Odd Ratios= ln(Coefficient)	Z value
Intercept	0.299	1.35	3.748*
MAIN EFFECTS:			
Mother's Work (1=Working; 2=Not Working)	-0.319	0.73	-4.601*
Mother's Literacy (1=Literate; 2=Illiterate	0.599	1.82	7.748*
Breast feeding (1=yes; No=2)	0.195	1.22	3.470*
Children up to 5 year in the HH (1=1; else=2)	0.169	1.18	3.179*
Toilet Facilities (1=Flush; 2=Other)	0.170	1.19	2.213*
INTERACTION EFFECT:			
Mother's Work By Toilet Facilities	0.156	1.17	2.246*
Mother's Literacy By Toilet Facilities	0.234	1.26	3.044*

Likelihood Ratio Chi-square = 31.45
D.F. = 25, P Value 0.175

* Statistically significant at 5% level.

than one. Conversely, an odd ratio less than one would represent a relative reduction in the likelihood of being in incorporated in our logit model, the effect of a mother's literacy was the strongest one. The likelihood of her children of literate mothers to grow up normally was 1.82 to 1.00 (Z = 7.480), which was far above the average likelihood (see Table 4.11). Children who were being breastfed at the time of the survey had higher odds (1.22 to 1.00) to grow up normally than those children who were not being breastfed (Z = 3.47). Similarly, higher odds (1.18 to 1.00) of growing up normally were also indicated for children in those households which had only one child up to the age of 5 years than those children in households, which had more than one children in this age group (Z = 2.716; see Table 4.11). Flush-type toilet facility available t the household also tended to contribute positively towards the normal growth of the children. The likelihood of children to grow up normally in households which had access to a flush-type of toilet facility was 1.19 to 1 (Z = 2.213). However, the type of toilet facility tended to affect the growth of children in combination with the mother's literacy and work status (interaction effects). The interpretation of these interactions is given below.

INTERACTON EFFECTS:

1). Mother's Work by Flush Toilet System by Nutritional Status of Children:

The likelihood (odds) of growing up normally for children whose mothers were working and whose household had access to a flush-type toilet system was 64.9%/35.1% = 1.85. The corresponding likelihood for children of non-working mothers was 80.2%/19.8% = 4.09 (Sub-table 1 of Table 4.12). However, we found the odds of growing up normally for children of working mothers whose household did not have access to a flush-type toilet system equaled 0.76 (43.2%/ 56.8%). But expectedly, children of non-working mothers whose household had no access to a flush-type toilet system which meant that a mother's employment by interacting positively with the flush-type toilet facility, tended to contribute positively towards the healthy growth of her children (see sub-table 2 of Table 4.12).

The fact that the first-order correlation coefficient for Sub-Table 1 became -0.144 (from -0.188, the zero-order correlation coefficient between a mother's employment and the normal growth of her children (see Table 4.2). It depicted an increased likelihood of the children of working mothers to grow normally when their households had access to a flush system toilet facility. The first-order correlation coefficient for Sub-Table 2 in Table 4.12, however, became

Table 4.12:Nutritional Status of Children by Mother's Work by Toilet facilities in Sri lanka, DHS 1987.

Children Nutritional Status	Toilet Facility/ Mother's Work Status			
	Flush		Other	
	Working	Not Working	Working	Not Working
Normal	64.9	80.2	43.2	70.8
Malnourished	35.1	19.8	56.8	29.2
Total	100.0 (N=148)	100.0 (N=621)	100.0 (N=213)	100.0 (N=1021)

	Sub-Table 1	Sub-Table 2
Chi-Square D.F.	15.97 1	59.95 1
Correlation	-0.144	-0.220

Source: [DHS Sri Lanka, 1987]

-0.220 descriptive of a further decrease in the likelihood of children to grow normally, when households of working mothers did not have access to a flush system of toilet facility.

Henceforth, the increased likelihood of children of working mothers to grow up normally may be interpreted as being the esult of to an expected positive effect of the mother's earnings. A mother's employment outside the home tends to substantially increase the financial status of her family, which, in turn, is expected to be spent more on improving the housing conditions. This tendency may well be translated in to equipping the house with a flush system type of toilet, consequently, increasing the likelihood of the children to normally in those households.

2). **Mother's Literacy by Flush Toilet System by Nutritional Status of Children.**

The likelihood (odds) of growing up normally for children of literate mothers, combined with famili's access to a flush system, was 81.2%/18.8% = 4.32; while the likelihood (odds) of children of illiterate mothers whose households had access to a flush-type system of toilet facility was 41.6%/58.4% = 0.71 (see Sub-Table 1 of Table 4.13). On the other hand, the likelihood of growing up normally for the children of literate mothers whose household had no access to a flush-type of toilet system was 70.8%/29.2 = 2.42. The corresponding likelihood of children of illiterate mothers to grow up

4.13:Nutritional Status of Children by Mother's Literacy by Toilet facilities in Sri lanka, DHS 1987.

Children Nutritional Status	Toilet Facility/ Mother's Literacy Status			
	Flush (Sub-Table 1)		Other (Sub-Table 2)	
	Literate	Illiterate	Literate	Illiterate
Normal	81.2	41.6	70.8	49.3
Malnourished	18.8	58.4	29.2	50.7
Total	100.0 (N=690)	100.0 (N=77)	100.0 (N=962)	100.0 (N=272)

	Sub-Table 1	Sub-Table 2
Chi-Square D.F.	61.69 1	43.81 1
Correlation	0.284	0.188

Source: [DHS Sri Lanka, 1987]

normally, however, was 49.3/50.7 = 0.97 (see Sub-Table 2 of Table 4.13).

The increased likelihood of growing up normally for the children of literate mothers whose households had access to flush-type toilet facility was reflected in an increase in the value of the first-order correlation coefficient (see Sub-Table 1 of Table 4.13). It increased form 0.229 to 0.284, in Table 4.2, which designates the zero-order relationship between a mother's literacy status and the physical growth of her children. By contrast, the first-order correlation coefficient value decreased to 0.188 for sub-table 2 in Table 4.13. It explained a decreased tendency for the children of literate mothers whosehouseholds had no access to a flush system of toilet facility to grow up normally. This may occur due to the tendency to increase parents' motivation to have a higher quality living conditions and healthier healthy children when the parents are better educated. In particular, when a mother's ability to read and write increases, she may be more inclined to understand and adopt new methods of child care, such as hygienic drinking water and better toilet facilities (Kasarda et al., 1986; Rosenweig and Schultz, 1983; Thomas et al., 1990).

CHAPTER 5

I). SUMMARY AND CONCLUSION.

During the last decade, an enormous amount of interest has emerged in the study of the healthy development and survival of children, and its relationship with maternal labor force participation, particularly in the Third World.

The **dominant mechanism** through which maternal employment is thought to affect child development and survival is mother-worker role incompatibility [Meyers and Indriso, 1986]. This implies that mothers who opt to join the labor market may not be able to provide adequate care for their children. Hence, their children may end up being malnourished. As a result of this neglect, these children's chances of survival are lower as compared to children whose mothers are not actively involved with work outside the home in the labor market. This phenomenon stems from the fact that gender role distribution in many developing countries including Pakistan, places the responsibility of child rearing within the exclusive domain of females.

Contrary to the above-described perspective, a **competing argument proclaims** that, although a child may be at risk in terms of maternal care, a greater proportion of the income earned by a woman is expected to be spent on food items.

Therefore, this offsets the anticipated negative effect of mother-worker role incompatibility on the health of their children.

The above-described possible effects of maternal employment on the healthy growth of children have fostered polemical viewpoints regarding maternal employment by researchers who study children's health and development or those who study women's economic roles. For example, medical and public health researchers (nutritionists in particular) generally view a woman's presence in the home to be fundamentally important to a child's health and development; an argument which undermines the economically productive aspects of a woman's life. Many social scientists in the arena of 'women in development', on the other hand, zealously advocate women's economic roles to such an extent that it seems to compete with child care responsibilities. Recently, however, a compromise between the two viewpoints has emerged in the context of Third World development policies, and intervention programs are being implemented that seriously account for both sides of these divergent issues at the planning and implementation levels [Meyers and Indriso, 1986; United Nations, 1984].

In this dissertation research, the prime objective was to investigate the effect of maternal employment outside the home

on the physical growth of the children, utilizing data from the Sri Lanka Demographic and Health Survey (1987). however, the positive or negative relationship between maternal employment and the healthy growth of their children is formulated by a host of intermediate socioeconomic and demographic factors.

For example, a mother's earnings through her participation in the job market supplements the family's income which in turn may increase the family's investment for improving their personal health and hygienic life style. A hygienic life style as reflected in an increased access to safe drinking water and sanitation, has been found to be fundamental for the healthy growth and survival of children, as it minimizes the danger of spreading various diseases [Mosley, 1979; McKeown et al., 1972].

A fewer number of children is also a positive factor for improving the nutritional status of children. It emerges due less competition among the children for a given level of the family's resources, consequently resulting in a greater share for each child. Moreover, this will also produce an increase in the amount of the parent's time allocated for child care. Its positive impact on child nutrition is well documented [Lazear and Michael, 1988; Popkin, 1980, 1975].

Maternal employment emerges as the significant

determining factor of a small family size, which takes place due to the mother-worker roles being incompatible. This happens because bearing a child may cost a mother her job, which is documented as an alternative source of satisfaction and thus competes with child bearing [Blake, 1965; Kupinsky, 1977; Stycos and Weller, 1967].

From an opposite angle, maternal employment is also hypothesized to negatively affect a child's nutritional status as it shortens the duration of breastfeeding and lessens its extant [Soekirman, 1985; Vial et al., 1986]. Breast feeding is a great source of the essential nutrients for children's growth, besides providing immunizing elements which help protect infants against many infectious diseases.

A longer duration and extent of breast feeding is generally recognized as an effective fertility-reducing measure which controls fertility by delaying resumption of menstruation and increases amount of spacing between children. An average longer child-spacing has been found to have a positive impact for health of both mother and children health.

Literacy manifests an innovative modernized behavior which would motivate a literate mother to adopt alternative methods of child care, and enables her to manipulate other existing social, physical and medical amenities for the benefit of her children. For these reasons, maternal literacy

is also recognized an important factor formulating a strong positive effect on the nutritional status of children [Caldwell, 1979; Cochrane et al., 1982; Orubuloye and Caldwell, 1975; Ware, 1984;].

Another mechanism through which maternal literacy would positively affect a child's nutritional status is the higher inclination of literate mothers than illiterate mothers, to adopt an improved hygienic life style. For example, the propensity to use uncontaminated water or/and a safe toilet system for the family is expected to be far greater for a literate than an illiterate mother. The positive effect of a hygienic life style on healthy growth of children is well recognized and is achieved by its ability to greatly hinder the spread and growth of childhood diseases [Mosley, 1979].

Moreover, literacy can also operate to produce a positive effect on a child's nutritional status through its fertility-suppressing role. Its anti-natal effects are realized through: a) through increasing the awareness and knowledge of modern family planning methods; b) an increase in the femal's age at marriage, which shortens the average reproductive period; and c) enhancing of her socio-economic status, which provides her with alternative satisfaction and competes with her desire for child bearing.

According to the Sri Lankan Demographic and Health Survey

(1987), about 30 percent of those children between ages 3-36 months were found to be "stunted" or chronically undernourished. It revealed that the situation regarding malnutrition remained alarming in Sri Lanka, and that the present level of malnourishment of children had not evidenced any remarkable improvement over the last decade. The irony is that the present level of malnutrition existed despite various governmental welfare policies, implemented during the last four decades, such as food subsidy, free medical care and universal, free higher level education.

As analyzed by various evaluative studies, the food subssidy programs fell far short of their targets [Richard and Gooneratne, 1980]. These studies indicated that food subsidy programs in Sri Lanka benefitted the designated poor sections of the population the least. Moreover, the generally slow rate of economic growth and the widespread unemployment rate, which adversely affected the prevailing poverty level in Sri Lanka through the deterioration of the distribution of the income, are other factors responsible for a high rate of malrnourished children [Gutkind, 1988; Haq, 1990; ILO, 1986; Ross and Savada, 1990].

Apart from its socioeconomic and demographic repercussions, the malnourishment of children plays an important role in the determination of child survival and

mortality levels. Hence, its analysis with respect to relevant socioeconomic and demographic factors becomes necessary from the practical point of view in recommending policy measures for the alleviating the malnutrition.

To begin with, the analysis of the nutritional status of children was planned to be carried out with reference to the following socioeconomic and demographic factors:

1) Mother's work status;
2) Mother's literacy;
3) Father's literacy;
4) Beastfeeding;
5) Children in the household up to age 5 years;

6) Child parity;
7) Drinking water facility; and
8) Toilet facility.

However, the final best-fit, most parsimonious model only involved five of the above factors. The factors of the father's literacy, child parity and drinking water facility were dropped, as their presence proved to ill defined the final model.

As for the final best-fit, most parsimonious model, mother's literacy was shown to have the most significant impact in determine the level of a child's nutritional status in Sri Lanka. Differentials in children's nutritional status by mother's literacy demonstrated that the healthy rate of growth among children of literate mothers was almost twice that of the children of illiterate mothers [see Table 4.11].

The expected positive impact of maternal literacy was in line with the results of many other studies in the context of both developed and developing nations.

Literacy manifests innovative modernized behavior, which motivates a literate mother to adopt alternative methods of child care, and enables her to manipulate other existing social, physical and medical amenities for the benefit of her children.

A literate mother is also expected to adopt a more hygienic life style, which greatly hinders the spread and growth of childhood diseases. For example, a literate mother's propensity to use uncontaminated water and/or
a hygienic toilet system for the family is expected to be far greater than that for an illiterate mother, and the positive effects effects of these practices on the healthy growth of children is well established.

Literacy is also recognized as an important suppressant of fertility. Some of its anti-natal effects are known to be realized through: a) increasing the awareness and knowledge of modern family planning methods; b) increasing age of a woman at the time of marriage, which shortens the average reproductive period; and c) enhancing her socioeconomic status, which provides her with alternative satisfaction and competes with the desire to bear children. In the present

analysis, I had initially intended to incorporate the factor of mother's literacy in a more elaborated form (i.e., the level of education). It was aimed at assessing how each level of maternal education (for example, the number of years of schooling), contributes to the nutritional status of her children. However, the inclusion of a literacy factor with more than two categories made it statistically impossible to select a best-fit, most parsimonious model to use.

Breastfeeding also showed an expected positive impact on the nutritional status of children; however, the nutritional advantage accruing to the children due to breastfeeding was only one-fifth greater than non-breastfed children. The positive contribution of breastfeeding towards a child's nutritional status is mainly because of being a great source of essential nutrients for a child's growth, besides providing immunizing elements which help protect an infant against many infectious diseases.

Moreover, the role of breastfeeding in delaying the resumption of menstruation, consequently increasing the space between children, is another important source of a child's as well as a mother's health. The positive effect of inceased spacing is reflected in smaller family sizes [Chandra, 1979; Jelliffe, 1978; Latham, 1982; Priyani, 1981; Wary, 1977].

The number of children in the household (up to age 5

years) was also used as one of the demographic linkages in the analysis of maternal work and a child's nutritional status. Results provided in Table 4.11 expectedly described a positive relationship between fewer children in a family and their average nutritional status. However, differentials on nutritional status across the categories of the number of children showed that if there was only one child in a family, it's probability to grow healthier was only 18 percent greater than a child who shared family's resources with other siblings aged five years old. I would expect the differentials to become greater when family income was controlled, particularly in the case of lower- income families. For the higher-income families, the differences may vanish altogether.

According to Lazear and Michael (1988), and Popkin (1980), the positive impact of fewer children on their nutritional status emerges due to the expected less competition among children; consequently resulting in a greater share of a given level of the family's resources being available for each child. Another corollary of this issue is that, given a decreased number of children in a family, the parents will be able to allocate more time to attend to their children's socio-economic needs. A study by Popkin (1980) found the factor of time allocation for child care to be one of the most important determinants of the healthy growth of

children. An improved life style of a household, for example- the result of an increased access to hygienic toilet facility and safe drinking water has been found to be one of the most significant determinants of a child's nutritional status. Results of this study also found a positive association between these factors. Children growing in a household with flush toilet system, compared to other toilet systems, had a better chance of growing up to be healthy. Mosley (1979) maintained that the occurrence of the positive impact of a hygienic life style on a child's nutritional status was due to the fact that it greatly hinders the spread and growth of childhood diseases. A sick child has definite disadvantages being growing normally.

A wide range of literature in developed and developing nations has empirically demonstrated that maternal employment outside the home did not show a definite effect (either by positively or negatively) in the determination of the health status of children. The theoretical explanation of an expected positive or negative effect of maternal employment on the healthy growth of children refers to two main mechanisms, the relative increase in the family's expenditure on food items and other areas of family welfare due to a relative increase in the family income (positive effect), while the mother-worker roles incompatibility may decline the total time

allocation for child care, yielding a negative effect. In this study, I argued that the expected negative impact due to decrease in the mother's allocation of time for child care would be offset by the family's enhanced earnings and other socio-demographic factors. In the end a positive effect of maternal employment on the healthy growth of children would prevail, as provided in the main hypothesis.

Results of this study pertaining to the main hypothesis confirmed the prevalence of a positive relationship between maternal employment and the nutritional status of her children [see Table 4.11]. The main effect, though, of maternal employment on the nutritional status of children was negative, which was in confirmation of the results of various other studies [Evenson et al., 1980; Nieves, 1981; Popkin 1980]. However, due to the existence of an interaction between maternal employment and the use of improved toilet facility, the final impact of maternal employment on the nutritional status of children turned out to be positive. It is assumed that when a mother joins the labor market, her earning are utilized to improve hygienic life style, besides enhancing the percapita food intake of the family. The availability of such safe toilet facility such as a flush system is demonstrated to have far reaching positive implications for the healthy growth of children, due to the role it plays in controlling the

spread of infectious childhood diseases.

The findings of this study confirm that a literate mother, breastfeeding the child at the time of survey, a fewer number of children in the household (up to age 5 years), and the availability of flush-system toilet facility, all contribute positively to the healthy growth of children, which suggests wide-ranging policy implications.

Most importantly, a developmental policy which focuses on creating jobs for married women would likely to be followed by an increase in the nutritional status of the children in Sri Lanka. However, it should be remembered that as maternal employment has a positive impact on the growth of Sri Lankan children, due to its favorable effect on an improved hygienic life style, which necessarily requires cash spending, maternal work must be cash remunerative. Therefore, employment policies should specifically focus on generating employment opportunities in the formal sector of the Sri Lankan labor market.

Among all the factors analyzed in this study, a mother's literacy appeared to be the most significant determinant of a child's nutritional status. Hence, a strong recommendation for policy measures enabling women to have inceased, liberal access to educational institutions is a logical outcome of this finding. Although since the 1980s Sri Lanka has achieved

100 percent enrollment at the primary level for both males and females, it still falls far short of achieving 100 percent for women in higher levels of education. Based on the results of this study, a substantial increase in the number of women enrolled in higher levels of education is expected to produce far more healthier children in Sri Lanka.

Other important policy implications pertain to two demographic factors: the number of children in the household (up to 5 years of age), and breastfeeding, which were also positively related to a child's nutritional status. According to the Sri Lanka Demographic and Health Survey (1987), the mean duration of breastfeeding was 22.7 months, which is a high figure (relative to many developing nations). Nevertheless, approximately one-third of the women sampled in this study were not breastfeeding. Therefore, a concerted campaign to promote breastfeeding, particularly targeted at non-breast feeding mothers, is strongly recommended. Apart from its direct positive impact on a child nutritional health, a successful campaign aimed at promoting a longer period of breastfeeding is also expected to yield extra positive effects through its fertility-suppressing mechanism.

However, any development plan which targets attainment of higher rates of female labor force participation, as well as an increased duration of breastfeeding, has to take into

account other important policy measures. It is well documented that female labor force participation (particularly in the formal sector) and breast feeding co-varies inversely. In simple words, due to a mother's participation in the job market, an incompatibility emerges between the mother and work roles, which tends to negatively affect the incidence of breastfeeding and its duration. Therefore, a program aimed at enhancing female labor force participation and breast feeding together, without accommodating other important policy measures discussed below, may negate these efforts at achieving healthy growth for children.

An important policy measure to take care of the anomalous situation resulting from mother-work roles incompatibility would be to allow mothers to bring breastfed infants to their place of work. A specific procedure would be to make it compulsory for every industry to provide child care facilities on the premises through a day-care center, where a mother could be permitted to breastfeed her child. Consequently, in addition to it's strong positive bearing on child nutrition, these child-care centers would be expected to enhance female retention rates in the job market.

II). RECOMMENDATION FOR FURTHER RESEARCH

This study has investigated the impact of maternal employment outside the home on the nutritional status of the

children in Sri Lanka. Suffice to say, to a great extent this study has successfully answered important questions pertaining to the socioeconomic and demographic linkages of maternal employment and the nutritional status of children. However, some questions remaine unanswered.

The Sri Lanka DHS (1987) included the variable on maternal work, but simply subdivided women into the categories of employed or unemployed. A simple subdivision of women into employed and unemployed, however, falls far short of serving the real purpose of investigating and comprehending the important aspects of work. A distinction between the formal and informal job sectors has to be maintained in this regard. In particular, care should be taken to not use too exclusive a concept of work, which defines employment as being for wages or in only formal
sector of the economy. Furthermore, women working in a diversified informal sector of the economy should not be grouped together.

In this study, children of working mothers were hypothesized to grow more normally than children of non-working mothers, and the positive effect of maternal employment on the nutritional status of children was assumed to function through expected a mother's earnings. However, to assess the real effect of a mother's work status (working or

non-working), it is deemed essential that all mothers in the sample should be desegregated by their family's economic status. It is quite likely that in some settings a non-working woman may belong to a more well-off family (due to her husband's earnings) than a working mother. Any future research should keep in mind this particular factor, without which the interpretation of the results pertaining to maternal work and the nutritional status of children may not be meaningful.

The two key links between maternal work and the nutritional status of children are usually hypothesized to be income and time effects, which tend to inversely relate with the healthy growth of children. Unfortunately, the Sri Lanka DHS (1987) did not include questions to furnish information so that it was impossible to measure the exact nature of the linkages between time and income in the study of the relationship between maternal employment and a child's nutritional status. Any future study must carefully examine these factors. An extension of the time effect in this kind of analysis should be focussed on assessing the effect of the availability and quality of substitute child care on the child's nutritional health.

One of the major sources of the positive impact of maternal employment on a child's nutritional health has been

demonstrated to be the mother's altruistic tendencies, as shown in the spending of her earnings on family's food items. However, in order to realize a mother's altruism it is necessary that a woman maintain independent control in the disbursing of their earnings. This directly relates to the issue of enhancing a woman's status, and should become an important aspect in future studies of maternal employment and a child's nutritional status. It will require gathering information on details regarding household expenditures from each parent's income, including how independent the mother was in spending her earnings.

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