CHILDHOOD MORTALITY AND DEVELOPMENT IN IRAN

An Empirical Analysis of Fars Province, 1986-91

By

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ABSTRACT

The primary purpose of this dissertation is to assess the extent to which household characteristics and behaviours exert their effects both directly and indirectly on childhood mortality through the more proximate factors that can be measured within the context of society. A child mortality model, primarily based on Mosley and Chen's framework, is developed by linking individual and societal factors. Then the model is tested with empirical data from the Fars Province of Iran. The survey data were collected in 1991-92 in five counties of Fars. It consisted of 10665 interviews and covered 67 villages 14 towns and one city. Three sampling techniques were employed: l) proportional stratified sampling; 2) cluster sampling; and 3) simple random sampling.

Three levels of analysis were carried out in this thesis: individual, societal and contextual. Bivariate and multivariate logistic regression analysis were done for subsets of variables based on the child mortality model that were identified to be good predictors of child mortality and which were also identified theoretically as proximate and intervening variables.

The individual level analysis reveals that place of residence, education of the mother, and occupation of the father from the socio-economic factors; and age of first marriage of mothers, pregnancy order, and pregnancy age from demographic factors; and visiting doctors during pregnancy, type of delivery, pregnancy duration, birth weight, and vaccination from the health status factors; and housing quality are the important determinants of child mortality in Fars.

At the societal level, rural setting, the literacy rate of the villages and assets indexed by sheep per capita are the important determinants of child mortality. Also child mortality rate differentials were found to be compatible with that of additive developmental index of regions (counties).

Contextual analysis shows that birth weight, pregnancy duration, pregnancy order, and house facilities are, in Iran, significant predictors of child mortality. Among all the variables, these variables appear to be the most proximate variables and the other variables, including socio-economic and demographic variables, significant intervening variables.

The results of this dissertation support the claim that child mortality can be a sensitive indicator of human development and quality of life both at the individual and societal levels. Most significantly it appears to be prerequisite to fertility decline. The most important finding from these analyses is that child mortality is influenced both by the individual's characteristics as well as by community characteristics. In better words, social organisation as proposed in the child mortality model matters.

RESUME

L'objet principal de cette dissertation est de définir l'influence des caractéristiques et du comportement d'un ménage sur la mortalité infantile par l 'intermédiare de facteurs directs qui peuvent être mesurés dans le contexte d'une société. Le modèle de mortalité infantile, fondé sur la théorie de Mosley et Chen, est d'abord developpé reliant l'individu et les facteurs sociaux, puis, le modèle est testé avec les données empiriques de la province de Fars en Iran. Les données du sondage ont été rassemblées en 1991-92 dans 5 comtés de la province de Fars en Iran. Ce sondage comprend 10 665 entrevues et couvre 67 villages, 14 villes moyennes et une grande ville. Trois techniques d'échantillonnage ont été employées: 1) la stratification proportionnelle; 2) l'échantillonage par groupe; 3) l'échantillonage aléatoire.

Cette thèse est analysée à trois niveaux: au niveau de l'individu, de la société et du contexte. Fondée sur le modèle de mortalité infantile mentionné ci-haut, des analyses de régression logistique à variables doubles et multiples sont faites pour chaque sous-ensemble de variables identifiées comme de bons indicateurs de mortalité infantile et aussi identifiés théoriquement comme variables directes et intermédiaires significatives.

L'analyse au niveau de l'individu révèle le lieu de résidence, l'éducation de la mère et la profession du père d'après les facteurs socio-économiques. Elles indiquent aussi l'âge du premier mariage de la mère, l'ordre de ses grossesses et l'âge pendant les grossesses selon les facteurs démographiques. En outre, les visites du médecin pendant la grossesse, le type d'accouchement, la durée de la grossesse, le poids à la naissance, la façon de nourrir et la vaccination sont des élements tirés des carnets de santé; tous ces élements ainsi que la qualité du foyer familial sont des éléments importants permettant de déterminer la mortalité infantile à Fars.

Au niveau de la société, dans un environnement rural, le taux d'alphabétisation des villages et la richesse, d'après le nombre de moutons par habitant, sont des déterminants importants de la mortalité infantile. De plus, les taux différentiels de mortalité infantile sont compatibles avec ceux de l' index du développement en flèche des régions (comtés).

L'analyse du contexte montre que le poids à la naissance, la durée de la grossesse, l'ordre des grossesses et les conditions de vie sont des éléments de prédictions significatifs de la mortalité infantile en Iran. Parmi toutes ces variables, celles-ci semblent être celles qui ont l'influence la plus directe sur la mortalité infantile alors que les autres variables, y compris celles d'ordre socioéconomique et démographique, sont intermédiaires.

Le résultat de cette dissertation soutient que la mortalité infantile peut être un indicateur sensible du développement humain et de sa qualité de vie tant au niveau de l'individu qu'au niveau de la société, et c'est un prérequis pour le déclin de la fertilité. La trouvaille la plus importante de ces analyses est que la mortalité infantile est influencée autant par les caractéristiques de l'individu que par celles de la communauté, c'est-à-dire par l'organisation sociale telle que proposée par le modèle de mortalité infantile mentionné plus haut.

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LIST OF ABBREVIATIONS

CM: Child Mortality
CMR: Child Mortality Rate
EIU: Economic Intelligence Union
GDP: Gross Domestic Product
GNP: Gross National Product
I/CM: Infant and Child Mortality
IFS: Iran Fertility Survey
PQLI: Physical Quality of Life Index
SCI: Statistical Centre of Iran
S.E..S: Socio-economic Status
SPSS: Statistical Package of Social Science
U-5 MR: Under 5 Year Mortality Rate
UNICEF: United Nations Institute for Culture and Education
WHO: World Fertility Survey

CHAPTER ONE
INTRODUCTION

Despite a general decline in childhood mortality in the world during the current century, there is still enormous variation among regions and countries, associated with social and economic conditions. There are large differences in child survival between developed countries and developing countries and also among developing countries. It is important to identify the underlying factors determining children survival in order to promote the implementation of effective policies to reduce childhood mortality.

Although there has been progress in conceptualising the study of child mortality in last decade, the available evidence is not sufficient to support the new argument. The present study is an effort to respond to fill this gap -- it is an empirical research focusing on childhood mortality in the Fars province of Iran.

Iran, as a developing country, has undergone serious political and socio-economic changes during recent decades. These changes had extensively affected population dynamics, particularly infant and child mortality. Considering that Iran is a highly diverse country from every point of view, by any standard, the study of child mortality should uncover socio-economic determinants and differentials between groups. Furthermore, a proposed child mortality model, including the societal context, is examined. The model examines child mortality in different socio-economic and geographical groups at the individual, household and societal levels.

This chapter provides the general concepts and theories pertaining to study of child mortality. It contains six sections: 1) child mortality and development; 2) trends and patterns of child mortality; 3) the economic development/modernisation transition theories; 4) demographic transition theory; 5) epidemiological transition theory; and 6) the one transition approach.

1.1. Child Mortality and Development

Child mortality is widely recognised to be a sensitive indicator of a population's health and ultimately of its social, economic and environmental conditions. It determines the quality of the lives of children, which in turn provides a good sign of a community's prospects for the future. Child survival is an integral part of development and cannot be separated from it: successful childhood health programs improve the survival rate not as an isolated phenomenon but as part of the overall improvement in the quality of life (Kent, 1990). This includes comprehensive and multidimensional improvements to the whole social system that controls the beliefs and behaviours of individuals in a society.

This vision of development is radically different from the set of ideas that flourished after World War II, which focused on economic growth based on rapid industrialisation. Industrialisation was understood less as a means for improving the quality of life of poor people than as a means to achieve higher Gross National Product (GNP). GNP was used to measure levels of industrialisation, not levels of human welfare (Kent, 1991).

In the 1970s, the dominant post-war vision of development was attacked by various commentators and scholars. This critique was based not on the failure of industrialisation to achieve the original objective of overall national economic growth, but on its failure in alleviating poverty. Industrialisation is clearly only a part of a unified, self-reliant development strategy (Streeten, 1976). The response was the alleviation of poverty through programs attempting to address concerns of both growth and equity. The growth-with-equity theory and the issue of distribution of wealth took many forms: meeting basic needs (Adelman and Morris, 1973; Streeten, 1976), redirecting investments (Chenery, 1974), strengthening agriculture (Mellor, 1976), increasing local self-reliance (Goulet, 1978), and establishing a "New International Economic Order" (Streeten, 1976; Mahbub ul Hag, 1976). Even though the means proposed for achieving new perspectives on development varied, all versions considered both the production of goods and their distribution.

This new perspective required that new indicators of development be formulated and linked with the well-being of individuals. The most prominent of these indicators was the Physical Quality of Life Index (PQLI), a composite measure based on life expectancy, infant mortality, and literacy (Morris, 1979; Rohde, 1983). Using this concept of development, a central focus became the community's well-being and in particular the welfare of children as potential elements for future development. If child survival is recognised as a major problem by the community, then the reduction of childhood mortality should be a major objective of its development programs and projects.

1.2. Trends and Patterns of Child Mortality

There has been some progress in reducing infant and child mortality in all countries in the world since 1950, although the degree of improvement has varied considerably. Due to the varied rates of improvement in childhood survival, the relative differences between the more- and the less-developed regions have widened. While all developed countries have achieved impressive and consistent declines in their infant and child mortality rates since the early 1950s, the trends and pattern of childhood mortality in developing countries are much more varied. Further, while among the developed countries there has been a convergence in the levels of infant and child mortality, among the developing countries the differences have widened since 1950.

Table 1.1 illustrates these differences, and shows some of the major trends in children's mortality. In 1980 the world infant mortality rate (deaths before infants reached their first birthday) was 82 per 1000 live births, and the child mortality rate (deaths to children under five years of age) during the five years, 1976-80, was 125 per 1000 live births. Figures were lower in developed countries, higher in developing countries. All of these rates were expected to generally decline over time, though the number of children's deaths in Africa is forecasted to increase by the year 2000. Africa now accounts for less than 30 percent of all children's deaths, but it is expected to account for more than 40 percent by the end of the century.

Estimates of past and future infant mortality rates for the world, developed and developing regions, and for Iran are shown in Table 1.2. Infant mortality rates have been

Table 1.1: Infant and Child Mortality Estimates and Projections

	1950			1980			2000		
	IMR	U5MR	U5D	IMR	U5MR	U5D	IMR	U5MR	U5D
<u>World</u>	163	251	24.8	82	125	15.4	53	78	10.9
Developed countries	64	84	1.6	18	22	0.4	11	12	0.2
Developing countries	188	295	23.2	92	142	15.0	59	87	10.7
<u>Regions</u>									
Africa	197	332	3.8	119	193	4.3	79	122	4.4
West Asia	218	334	0.7	90	131	0.5	45	58	0.3
South Asia	187	320	9.9	110	173	7.9	70	102	4.7
East Asia	199	273	7.3	37	55	1.2	22	27	0.6
Central and South America	132	201	1.5	67	94	1.1	42	58	0.7

Source: United Nations Children's Fund, Executive Board, 1987 Session, Medium-term plan for the Period 1986-1990, E/ICEF/1987/3, p.5.
IMR = infant mortality rate
U5MR = under-five years mortality rate
U5D = number of infants' and children's deaths (in millions).

Table 1.2: Estimates and Projections of Infant Mortality rates

Region	1950 to 1955	1975 to 1980	1980 to 1985	1995 to 2000	2020 to 2025
	period				
Developed regions	56	19	16	11	7
-North America	29	14	11	7	6
-Europe	62	19	15	10	7
-Oceania	67	36	31	18	9
-USSR	73	28	25	17	9
Developing Regions	180	96	88	62	33
-Africa	191	124	112	83	45
-South Asia	180	115	103	72	34
-East Asia	182	39	36	22	11
-Latin America	125	70	62	44	27
Iran	284	176	168	118	48
World	156	85	78	56	30

Source: United Nations, World Population Prospects, Infant Mortality: World Estimates and Projections, 1950-2025, Population Bulletin of the United Nations, No. 14, p.31-51 dropping steadily in the world, declining from an average of 156 in 1950-55 to an average of 85 in 1975-80. Further, the child mortality rate fell almost by half between 1950 and 1980, declining more slowly since 1980.

Estimates of infant mortality in the past and projections for the future for Iran are dramatically above average levels for both the world and developing countries, being 284 in 1950s but expected to decline to 48 by the 2020s (see Table 1.2). The table illustrates that the differences between the developed and developing regions in general, and within the developing regions in particular, are very large. The discrepancies are better revealed when we compare the rates for each region with the world average child mortality rate. Further, the case of Iran is more dramatic, especially in light of economic changes in the country. Infant mortality rates dropped quickly in East Asian regions, apparently due to their rapid economic growth during the same period. Nevertheless, Iran, with low and sluggish rates of economic growth, has reduced childhood mortality considerably.

Enormous advances have been made in the child survival since the turn of the century, but the rate of progress is slowing down on the whole. It is becoming increasingly clear that the effectiveness of technical remedies varies by the social, economic, and demographic contexts in which they are embedded. As we see from the above statistics, there are differences in infant mortality between developed and developing countries on the one hand, and within developed and developing countries on the other. The decrease of infant mortality in developed countries was accompanied by industrialisation and took about a century and a half to accomplish. In other words, the changes in mortality pattern in the more developed countries were based upon changes in social, economical, and political institutions formed there. In contrast, infant mortality reduction in developing countries is occurring through the importation of progressive medical technologies and vaccinations, which leads to rapid reductions. After a period, the rate of progress is slowing down, because from this stage on, further reductions in mortality require progress in the general standard of living which is itself rooted in socio-economic and demographic development. The concepts of `demographic transition' (Thompson, 1929; Notstein, 1944; Blacker, 1952), `epidemiological transition' (Omran, 1971), and `modernisation transition' (Zelinsky, 1971; Rostow, 1966) are applied to the developed countries in the last century. There have been attempts to make compatible the developing countries diverse patterns to the events that occurred in the developed countries that gave rise to these concepts. The remaining sections of this chapter discuss the controversy surrounding these theories and child mortality.

1.3. The Economic Development/Modernisation Transition

The understanding of development varies among schools of thought. The diagnosis of the problems and the specification of social and economic changes depend upon underlying theories. The theories of socio-economic development will be highlighted here under two dominant paradigms: the orthodox and the political economy approaches.

1.3.1. The Orthodox Paradigm

Development thinking in the United States has long been dominated by the orthodox paradigm. Although it has certainly undergone an evolution and has several variants, its basic outlines encompass a majority of American writers on economic development.

One long-standing view in social science is that economic development leads to overall modernisation and progress. The idea of modernisation emerged as the model to which development efforts should be oriented, a model that in 1950s and 1960s dominated conceptualisations of the development process. Development is seen as an evolutionary process: nations grow healthier and mature as they modernise.

One of the best known theories of modernisation is attributed to Walter Rostow. Rostow's Stages of Economic Growth (1966), set out to identify five stages of social and economic development: the traditional society, the phase which sets up the preconditions for take-off, the take-off, the drive to maturity, and the age of high mass consumption.

Rostow assumed that the take-off stage is crucial for the transformation of traditional into modern societies, and begins a sustained, accelerated process of growth. Rostow discussed various cases of take-off, pointing out that, as a rule, it is also the stage of the industrial revolution. The situation for take-off becomes ripe when science develops and a "leading sector" of production (food, wool, cotton, rubber, oil) emerges in the economy. Fulfilment of other preconditions is essential for take-off to occur. Resistance to change has to be removed, a class of entrepreneurs has to emerge, and agricultural productivity has to increase. Further, the society has to acquire an attitude that the regular flow of high-rate innovations is normal. There must be an increase in the ratio of savings and investments of the national income, from between five to over ten per cent. Thus it is said that economic development begins with a sharp rise in real per capita output and continues where sustained growth is maintained. The basic goal of development has been traditionally defined as the attainment of a "high mass consumption" society, to use Rostow's term. It is understandable, therefore, that orthodox development economists have usually measured the level of economic development by the level of per capita GNP or GDP (Gross Domestic Product).

Changes in a society associated with modernisation help citizens to benefit from economic development via a "trickle down" effect. According to this view, economic development improves standards of living and consequently leads to mortality reduction. Economic growth and industrialisation allow challenges to the traditional fatalistic acceptance of high infant and child mortality. Societies begin to fight aggressively disease and death. With the rise of modern society and the widespread acceptance of literacy there are calls for changes in population dynamics. Health care improves, mortality decreases and life expectancy increases. Population explodes, urban areas grow and emigration is encouraged to relieve crowding and job creation problems.

Much of the orthodox paradigm literature assumes that a major cause of mortality reduction, past and present, is modernisation in general or economic development in particular. This approach to explaining mortality reduction emphasises factors endogenous to a society. However, for a more complete understanding of the process, one must also recognise mortality-reducing factors which are exogenous to a society, especially public health technologies. Other perspectives discussed below include such exogenous factors and their introduction into societies, suggesting different explanations for mortality reduction in the modern world.

1.3.2. The Political Economy Paradigm

Political economists are more concerned with the nature of the process by which economic growth is achieved. They criticise the traditional laissez-faire and planned economy strategies in which the poor majorities were being excluded from whatever benefits were reaped through economic growth. Furthermore, the orthodox perspective is criticised as ethnocentric, derived from Western views and ideas about what constitutes development. The orthodox perspective views people's values as means, and argues that people must adopt Western values if they are to consolidate economic growth. The enormous diversity and richness of cultural traditions in Asia, Africa, and Latin America are neglected. For political economists, conversely, one goal is to enhance people's core values. In this view, development becomes the means, not the end; development or growth is desirable only if it is consistent with people's values. Development is defined as "liberation from oppressive and exploitative relationships" both at intra- and international levels (Goulet, 1978).

Three major schools of thought have emerged within the political economic paradigm: Marxist, world system, and dependency theories.

Marxists argue that the internal class structure is the key to understand the control of the economic surplus. Economic surplus is viewed as a residual factor which remains after necessary consumption has been subtracted from total output. Three variables operates in a mechanism to reproduce the economic surplus: capital, productive forces, and productive relations. Marxists argue that control of this economic surplus by a specified social class determines the nature of development process. In so far as the proletariat or working class is seen as being able to reproduce steady high fertility is seen as accompanying high mortality, especially among children. The degree of foreign control of the surplus will also shape the strategy of development in world system and dependency theories.

World system theorists focus on the effects of an almost universal set of values and beliefs about economic, social, and political processes that exists within nations. It is suggested that by comparing new problems with old experiences and by looking from similarities and differences we can develop a theory of international behaviour. They suggest that international behaviour depends on a desirable structures and consensus that human groups achieved through historical events. This consensus diffuses widely throughout the world, described by increasing cultural similarities. The consensus, or universal culture, has been enforced by capitalism and colonialism[1].

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[1]In Adam Smith's opinion (1776), private profit and public welfare would become reconciled through impersonal forces of market competition. Laissez-faire policies and political liberalism produced a capitalist civilisation. Economic success produced political power,

Individual states enjoy the benefits of the responsibility of international community in providing their nation's welfare programs as humanitarian aid. Colonial powers introduced education and health programs into their colonies. Availability of health care within nation-states would be directly related to degree of world system involvement on the basis of political (or geopolitical) economic importance of the states. Those who have debated whether mortality reduction results from economic development or from public health interventions often overlook the possibility that both may be influenced by the degree of incorporation into the world system. According to this argument, international health aid reduces mortality. Preston (1980) argued that the contributions of the more developed countries' to mortality reduction in less developed countries have included development of low cost health measures exploitable on a large scale program, the major cost of which is often absorbed by the recipient country. From this, it can be postulated that world system involvement leads to mortality reduction.

Dependency theory emphasises the role of the economic dependence in shaping the internal economic, social, and political structures and in shaping the external relations of underdeveloped countries. Dependency means that many of the most important decisions about development strategies--decisions about prices, investment patterns, government macroeconomics policies, etc.--are made by individuals, firms, and institutions external to the country. The appropriate strategy of development from this

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which in turn produced policies congenial to the capitalist process, and in turn was a major factor in a period of unprecedented economic expansion. This process was accompanied with the colonisation of African and Asian countries, differentiation in colonial and colonised division of labour and their economic development.

perspective emphasises self-reliant development which encompasses fulfilling people's basic human needs (food, shelter, health, education) and providing institutional structures that enables people to exert control over the conditions in which they lead their lives. This broad-based development strategy is expected to have relationship with the reduction of childhood mortality. Dependency theory suggests that one reason that the recent mortality reduction processes in more developed countries and less developed countries have differed is that dependence made it difficult for less developed countries to develop enough to achieve the type of extensive redistribution of resources necessary to effect additional mortality declines. Where efforts to provide mass education, health care and food have occurred (in Sri Lanka, Costa Rica, Cuba, and even China), greater mortality reduction has been achieved than in other nations at similar levels of per capita income (Preston 1976, Caldwell 1986).

1.4. Demographic Transition Theory

Frank Notestein (1945), following Warren Thompson (1929) and through observing past birth and death rates, constructed the "demographic transition" which relates birth and death rates over certain periods of time. The construction of the model involved some inductive analysis, but requires testing against the most recent birth and death rate data. The model was generally accepted as a framework for analysis and, according to Blacker (1952), consists of five phases.

Phase 1, the "high stationary" stage, occurs when both birth and death rates are high and uncontrolled. Very few parts of the world are still in this phase, since medical aid has been successful in most places in bringing death rates under some degree of control.

Phase 2, "primary population growth", is marked by a reduction of the death rate as people live longer and a higher proportion of infant and children living until reproductive age. However, birth rates usually remain high according to the social system and the result is an ever-widening gap between the two rates. Declines in fertility usually lag behind those for mortality and a population explosion begins, intensifying as the gap between births and deaths widens. The intensity of this population explosion heightened by the fact that death control does more than just permit children to reach childbearing age; it also permits them to survive through their fertile years.

Phase 3, the "late expanding stage", starts as soon as birth control becomes common enough to allow for a significant decline in the birth rate, while death rates usually remain fairly low. During Phase 3 the population explosion continues, but slows as the gap between the birth rate and the death rate diminishes. However, a slower rate of natural increase does not necessarily reduce population pressure since the population base, which exploded through Phase 2, is now much larger. This is the case in most developing countries, including Iran.

In Phase 4, "low stationary", both birth and death rates tend to be fairly low and steady. The death rate may actually rise slightly, as older people form a larger part of the population, and there may even be "baby booms" in certain periods. Although the details of the situation vary from country to country, the general trend is low birth and death rates and slow population increases.

In Phase 5, "declining stage", death rates will climb above birth rates because of the continued ageing of the population. Population growth slows, approaches zero, and then becomes negative. Germany, Sweden, Italy and Netherlands, showing declining populations, are perhaps already beginning to move into Phase 5, and many other countries are approaching it.

According to the demographic transition model, the movement from one phase to another requires the development of socio-economic and environmental factors in society. The patterns of population growth of societies reflect degrees of transition from earlier to later phases. However, actual world demographic trends and vital rate patterns show a considerable discrepancy with the general demographic transition model (Helleiner, 1977).

A comparison between currently developing countries and Western Europe prior to industrialisation shows not only the higher population density of the former but, in some cases, faster mortality reduction than Western Europe of the 19th century. Health measures, the improvement of clinical treatment methods, and the use of these ready-made programs and methods allowed underdeveloped countries to reduce their mortality in reliable order.

Yang and Pendelton (1981) studied the relationship between socio-economic development and mortality reduction in developing countries and found that a "network of socio-economic variables" has more impact on the mortality levels of those societies that are in the later demographic transition phases. United Nations (1989) also estimated the phases of demographic transition that each country of the world posited from 1950 to 2025 (Table 1.3). Iran is undergoing a shift from stage I to stage II at the present time.

In short, demographic transition theory provides a useful description on a macro-scale of what may have happened in some Western countries. However, it fails to account for variations in the transition, especially the quite different types of transition that are now occurring in developing countries. The theory lacks depth in that it does not illuminate the determinants of transition, especially the forces of mortality and of age-sex and urban-rural differentials in risks of morbidity and mortality (Omran, 1974). Although the occurrence of socio-economic changes in the demographic transition process are generally accepted, several questions remained unanswered by existing research: Are determinants of mortality reduction the same in all phases of the transition, or do they change as societies develop? Are health and medical technologies more important for earlier versus later phases of the development of modern developing countries? Are they related to socio-economic factors in specific phase of demographic transition?

Potential answers to these questions can be suggested by reviewing population theories regarding the effects of development on mortality, discussed earlier in subsequent sections of this chapter.

1.5. The Epidemiological Transition

Epidemiological transition theory is a another description of historical mortality change. The transition involved a shift in the leading cause of death from pandemics to

Table 1.3: The estimation of phases of demographic transition of some selected Muslem countries and Iran, 1950-2025.

Country	1950-55		1980-85		2000-2005		2020-2025	
Iran	2	1	3	2	4	3	4	4
Iraq	1	1	2	1	3	3	4	4
Jordan	1	1	3	1	4	2	4	3
Syria	2	1	3	1	4	3	4	4
Turkey	2	1	3	3	4	4	4	4
Indonesia	1	2	2	3	4	4	4	4

Source: United Nations, World Population at the Turn of the Century, 1989, No. 111.

degenerative and man-made disease. The theory focuses on interactions between these patterns and their socio-economic and demographic determinants and consequences. Epidemiological transition distinguishes three phases or eras. The first is the era of pestilence and famine, when the major cause of deaths are infectious diseases such as typhoid, tuberculosis, cholera, diphtheria, and plague. These diseases began to retreat in Europe in eighteenth century and in LDCs in the twentieth century, notably after World War II. At this stage mortality is high and life expectancy is low. In the second phase, infectious diseases are controlled and their decline accelerated by importation of medical technology and implementation of public health measures. The epidemics becomes less frequent or disappear and mortality declines substantially. In the third phase, degenerative diseases such as cancer, heart disease, and stroke become major cause of illness and death. Mortality declines and stabilises and life expectancy becomes high.

Three different models attempt to account for this epidemiological transition, which attempt to account for differences: the 'classical model' is applied in Western societies; the 'accelerated model' occurred in Japan; and the 'delayed model' is applied to modern developing countries.

Omran, in his epidemiological transition theory, also elaborates the complex relationship between the demographic and socio-economic factors and emphasises childhood mortality decline as the linking process of mortality and fertility decline (Omran, 1971).

1.6. The One Transition Approach

It would seem, then, that there are three possible - and complementary rather than competing - interpretations for relationship between social and population changes. It is widely accepted that the transitions of both fertility and mortality from high to low levels are determined by "development" or "modernisation", but there are few reliable indicators of this underlying process and there are differences in how they are conceptualised or explained. It is not that the demographic transition has modernisation as a cause; rather, changes in demographic dynamics are part and parcel of a transformation less comprehensive than modernisation that refers to technical, economic, and ecological changes which have ramifications throughout the whole social and cultural fabric.

Unfortunately, the role of demographic transition in general and mortality transition in particular were ignored in all the grand theories of social change to a great deal. As Caldwell (1982: 31) argued, "earlier examinations of major theories of social change and 'modernisation' sought neither to explain demographic movements nor to assign them any major role in causing social change," adding that, "at most they accepted that the theories of social change and modernisation largely explained further demographic change, and that the desire for, and attainment of, a small family was a necessary characteristic of 'modern man'." Although in 1970s, some put population growth as a condition of social mobilisation and, in later stages, as a barrier to modernisation, they did not go beyond that as reflected in the writings of Eisenstadi (1966), and Crook (1978). Only in the 1980s did high mortality come to be considered as a major characteristic of underdevelopment, and proceeded the demand for the greater social and economic egalitarianism policy for suffering groups of society (Caldwell, 1982).

Social change and modernisation undoubtedly played an important role in mortality decline, but so did the decline in mortality have a significant impact on social change. Therefore, demographic change and modernisation represent a single transition that needs to be studied simultaneously and not just in parallel. There is a complex interrelation between socio-economic changes and human behaviour and much remains to be explained.

Variations in mortality reflect variations in the real welfare of groups. Mortality varies over time, both intra- and internationally. These variations result from inequalities in the distribution of economic resources and opportunities. The factors most often mentioned in the literature as influencing the process of mortality reduction are economic development, public health measures and medical technology, and the distribution of resources. The relative importance of these factors differs from region to region and from one time to another. The explanation most often given for the shifts and variations is a "threshold" and "diminishing returns" effects. At each threshold, the relative importance of factors affecting mortality are assumed to have changed. Countries reach thresholds at different times because of their varied socio-economic histories. The more developed countries experienced simultaneous economic and technological advances. Distribution of economic resources and the life styles chosen by individuals had the greatest impact on aggregate mortality levels, particularly on childhood mortality.

Less developed countries experienced introduction of public health measures from outside, without the socio-economic modernisation experience by more developed countries. Inexpensive health technology reduced rapidly mortality, especially infant mortality. Recently, some countries have become saturated with inexpensive medical technology, so that further economic development and redistribution of resources are required before additional mortality declines will be seen.

At present, most social scientists view the infant mortality rate as an excellent summary indicator of the socio-economic development of a country. Children are the most vulnerable group of population are affected by socio-economic changes. Children are the most valuable assets of a nation. Their welfare strengthens a nation's potential for social and economic development, and the aims of a welfare state must include at least the right of every baby to be given an equal chance to live, to be educated, and to be enabled to develop its skills commensurate with its ability, to attain adulthood and the right to work, to have a minimum standard of life, and thus to contribute to the personal and social progress of the community.

1.7. Plan of Present Dissertation

The present study is based on the general approach of "only one transition". The child mortality model, based on Mosley and Chen conceptual framework (1984), which will be discussed in the Chapter Two, is developed in order to link theory and concepts. The concepts are operationalised in Chapter Three, data collection, method of measurement and statistical analysis are also described there. Chapter Four introduces the profile of the study area. Chapter Five is devoted to levels and trends of child mortality of as founding in the sample. Chapter Six to Ten each presents analyses of a subset of variables of the child mortality model. Chapter Eleven focuses on the test of the overall child mortality model based on the results of earlier chapters and also provides a contextual analysis. Finally, Chapter Twelve provides a summary and conclusions based on the findings of the survey, an outline of the dissertation's contribution to knowledge and implication for interpretating childhood mortality declines, and presents suggestion for the future research.

CHAPTER TWO

REVIEW OF LITERATURE

There are several steps in the research process, of which theory-building, conceptualisation, and operationalisation are the most important ones. The first was discussed in the previous chapter; the second is our concern in this chapter. Conceptualisation can be defined as the assessment of theoretical relationships between abstract concepts (Wunsch and Duchene, 1985). This chapter provides the literature review and conceptual framework that guide the present analysis and facilitate the interpretation of the empirical results.

2.1. REVIEW OF LITERATURE

The review of literature to support the conceptual framework and methods, is divided into three sections. In the first, I review studies suggesting that initial child mortality declines after World War II are due to the introduction of medical technology, largely dissociated from socio-economic development (Fiedler, 1991; Fabrega, 1972; McDermott, 1966). In the second section, I review studies indicating that economic and social improvements were largely responsible for child mortality decline (Sivamurthy, 1981; Preston, 1980; Gwatkin, 1980; United Nations, 1980). In the third section, I will review those studies which support the Mosley & Chen conceptual framework for the study of child survival that incorporates both biomedical and socio-economic correlates of morbidity and mortality (Mosley & Chen, 1984).

2.1.1 Biomedical perspective

In support of the biomedical perspective, (Gbesemete, 1993) has considered the relevance of historic (19th and early 20th century) public health problems and solutions in Great Britain to present-day Africa. Historical Great Britain suffered widespread infectious and parasitic diseases and high child mortality rates. Improvement was achieved through public education on hygiene and nutrition. Likewise, Gbesemete argues that in Africa today, more emphasis is needed on preventive than curative medicine, massive clean-up of rural and urban environments, health education, incorporation of indigenous medical practitioners into the national health care system, grass-roots participation in community health planning, and improvement of food production, all of which would improve public health in Africa.

In another study (Azevedo et al, 1991), the relationship between biomedical assumptions, programs, traditional cultural tenets, and their impact on child mortality in Cameroon was examined. A majority of respondents believed sorcery, witchcraft, and ancestral curses to be the major cause of infant mortality. Belief in natural causation of death and disease was nearly non-existent. Accordingly, visits to health care centres are relatively few, and infant mortality rates are high. Preventive health care and biomedical training and education were suggested. For some decades now, biomedical scientists have been aware of the limitations of the curative approach to health care in traditional societies (McDermott, 1966; Rowland and Mccollum, 1977), and anthropologists have described how belief systems influence choices concerning use of health care (Fabrega, 1972). Omondi-odhiambo, Van-Ginneken, and Voorhoeve (1990) in a rural area of Kenya observed that the infectious diseases and diseases of the respiratory system followed by congenital anomalies and perinatal conditions were the leading causes of death among children under 5 years. The ways that health beliefs and attitudes affect responces to fatal diseases in Ondo State of Nigeria were also investigated (Adetunji, 1991). That study concluded that, despite the negative health implications of some of practices, they could be adapted to promote self-reliance in medical care.

In a study of child survival in Indonesia, Lienbach (1988) explained the provincial childhood mortality rate variations in part by female education levels, access to health facilities, and the impress of health aid and system programs, especially family planning. In addition, mortality rates and the usage of modern health care continued to reflect historical and cultural imprints. He suggested a program strategy for improvements in infant and child mortality focuses on four basic elements: growth monitoring, oral rehydration therapy, breast-feeding, and immunisation.

A criticism can be made on the current evaluation of primary health care programs in that they place too much emphasis on mortality, morbidity, or nutrition indicators as measures of health impact. Alternatively, Van-Norren and his associates (1989) offer an action-oriented framework to explain child survival. The key to this is the identification of intermediate variables that affect the health status of children and that can be influenced by primary health care intervention; curative variables that affect it indirectly through one or more of four biological risk factors of the child: (1) physical constitution at birth, (2) susceptibility to infectious agents, (3) exposure to infectious agents, and (4) nutritional intake. It is recommended that evaluations of preventive health care programs should focus on these intermediate variables and their impact.

An assessment of child survival activities including: immunizations, management of diarrhea, and acute lower respiratory infections in Philippines was surveyed (Peters and Becker, 1991). Wide variation was found in quality of services as: shortage of vaccines, variation in treatment of diarrhea, and inadequate of advice to mothers. A need for further training and provider education was suggested.

Preventive health care services such as vaccination are important and necessary factors for improving child mortality in a developing country, but they are not sufficient. Aghajanian (1990), in his study based on the survey data of Shiraz city of Iran, suggested that the strategy in a country like Iran will have to include not only the expansion of such preventive child care services, but also the promotion of knowledge and attitudes towards effective use of such services.

2.1.2 Demographic and socio-economic perspectives

Before reviewing the studies of the determinants of childhood mortality it is necessary to mention two points. First, there is very little specific theory on the socio-economic determinants of childhood mortality as opposed to biological theories about causes of death. Second, in developing countries the data on childhood mortality are not known to be particularly accurate. With few exceptions, most of child mortality studies are based on retrospective information from birth histories and on mothers' recollections of past events and behaviours (Lantz, Partin and Palloni, 1992). There is always a risk of recalling the exact events of the past as well as illiteracy problem. Unfortunately, there is no reliable vital registration data in rural areas and small towns of Iran and it comes into this category (Aghajanian, 1993).

Infant mortality has long been used as a marker of the socio-economic development of a nation. Within Asia and Pacific regions in the late 1980s, infant mortality as low as 10/1000 has been observed in Australia, New Zealand, Japan, Singapore and Hong Kong, whereas rates of over 100/1000 have been reported in Afghanistan, Bangladesh, Nepal, Pakistan, Laos and Kampuchea (ESCAP, 1988). These figures indicate a negative relationship between infant mortality and socio-economic development. In addition, infant mortality differs by socio-economic status of parents within countries (Caldwell, 1979; Arriaga, 1980, 1981, Hashmi, 1980; Rutstein, 1983; Hobcraft, McDonald & Rutstein, 1984) and by demographic factors [such as?] (McDonald & Rutstein, 1985). The relative importance of socio-economic and demographic factors on infant mortality, however, varies with the level of socio-economic development of the nation. In a traditional society, demographic factors affect infant mortality more than do socio-economic factors, whereas in the later stages the effect of demographic factors becomes very small (Nepal FP/MCH Project, 1987; Gubhaju, 1984, 1986; Sim 1988; Gubhaju, Kim, Abul Kashem, 1991).

Demographers have noted the effects of maternal age, family size, birth order or rank, and birth spacing on infant and child mortality. The relationship between breastfeeding, health conditions of a child, and survival during the first two or three years of life are complex and have frequently been studied (Lantz, Partin & Palloni, 1992; Brittain, 1992; Tu, 1990; Abdel-Aziz, 1989; Mengistu, 1989). Pebley, Hermalin, and Knodel (1991) found a strong association between previous birth interval length and infant mortality, especially when the previous child survived. The results of their study suggest that the association is not only a function of differences in breast-feeding behaviour or socio-economic status. Other factors, such as maternal depletion or sibling competition, also contribute. Further, Ahmad et al (1991), in their study of Liberia, conclude that breast-feeding is the single most important influence on child survival. This effect persists with or without controls for other variables.

Some demographers have examined sex differentials in childhood mortality (Harpending & Pennington, 1991; Basu, 1989). Demographic data suggest that the infant and child mortality rates for males are historically greater than for females among the Hereto cattle and goat pastoralists in north-western Botswana (Harpending & Pennington, 1991). On the other hand, a study in Bangladesh concluded that child mortality among famine-borne infants is 82% higher for girls than for boys (Razzaque, Alam, Wai, Foster, 1990). Ghosh (1991) shows the same sex discrimination in child mortality in India. He reported a declining female/male child population ratio (dropping from 972 per thousand in 1901 to 935 per thousand in 1981), poorer nutritional status among female children in New Delhi in 1986, and higher infant and childhood mortality rates for females throughout India during 1970-1982.

In his study of Nepal, Pant (1991) showed significant effects of education of any household members in lowering infant and child mortality. Lower infant and child mortality was observed in households where either both parents or the mother and one other family member were educated. Other household characteristics associated with lower infant and child mortality in households were access to a toilet, electricity, and piped water. This suggests that both education and resources are complementary, and access to both improves child survival (Pant, 1991). In Ghana, the relationship between child mortality and six socio-economic factors--the mother's type of residence, education, occupation, work status, and the current husband's education and occupation--are examined. Tawiah (1989) argues that mother's and father's education had the largest effect on child mortality, followed by husband's occupation and mother's occupation, respectively . Using data from a longitudinal study of 8,556 pregnant women in Queensland, Australia, Bor et al. (1993) found children of the most socio-economically disadvantaged mothers consistently manifested the worst health, which the authors concluded was due to the lower rate of health service utilisation, greater chronic health problems, and poorer dental health of these mothers.

The importance of socio-economic factors on child mortality is further shown in a study of Bangladesh which revealed that malnourished children had a risk of death nine times that of their counterparts with better nutritional status. Mother's education and economic condition of household also showed a negative relationship with the risk of death, but the effect of mother's education was modified by economic conditions and the sex of the children (Bhuiya, Wojtyniak, Karim, 1989). Other studies in developing countries demonstrate the importance of socio-economic factors in child mortality (Victoria et al., 1992; Oni, 1988).

Using the Iran Fertility Survey of 1976-77, Aghajanian (1994) examined the levels, trends and differentials of infant mortality and concluded that there are consistent regional and rural-urban socio-economic and demographic differences in infant mortality rate. The process of modernisation of the Iranian economy and the urbanisation of its population have not been accompanied by a more equal distribution of development, especially of health services.

2.1.3 Multidisciplinary perspective

Mosley & Chen (1984) presented a multidisciplinary conceptual framework for the study of child survival that incorporates both biomedical and socio-economic correlates of morbidity and mortality. Behm (1991) has argued that Mosley and Chen framework considers socio-economic determinants acting at both individual and societal levels. Furthermore, at the individual level, they distinguish the proximate determinants from intervening variables, through which the socio-economic determinants affect the child's health status and disease process.

Cleland and Van-Ginneken (1988) tried to link socio-economic determinants to preventive and curative factors, assessing various intervening variables operating in developing countries. The relationship between a mother's education and the health and survival of her children was examined via survey data gathered over a twenty year period. Reproductive health patterns and more equitable treatment of children were two minor intervening factors in this relationship, but education-associated economic advantages accounted for some 55% of the variance.

Use of preventive and curative health services is another major factor, especially in countries whose health services tend to accentuate educational disparities because of differential access. Aksit and Bahattin (1989) in their attempt to review and integrate international and Turkish research on infant and child mortality came to the same conclusion. Their findings suggested that both maternal and paternal education might link socio-economic, psycho-cultural, and biomedical variables with each other at community, household, and individual levels.

Ahmad and his associates (1991) studied child mortality in Liberia; they looked at the effects of maternal socio-demographic characteristics and the quality of the environment on child survival through two intervening variables -- breast-feeding and parental care. Their findings support the previous studies and also reveal complex relationships of the role of education, maternal age and the breast-feeding in enhancing child survival. The study of the influence of individual and environmental factors on infant and child mortality in rural Sierra Leone (Bailey, 1989) indicates that higher birth orders, male births, and low family income are positively associated with mortality, while duration of breast-feeding, maternal education, and community size have negative effects. Piped water and dispensary/health care services also have a negative, though non-significant, effect. In a study of Bangladesh (Metlab), Muhuri and Preston (1991) investigated the effect of sex composition of older siblings on child mortality. They were also interested in whether sex differentials in childhood mortality vary with socio-economic circumstances and whether they were reduced by maternal and child health programs undertaken in the treatment area. Their findings showed that the presence of an older sister is a grave risk factor for female children, suggesting that higher female child mortality is not primarily a consequence of a general practice of treating all females differently than males, but rather a pattern of conscious, selective discrimination against individual children. The result also demonstrated a similar, though more muted, pattern of mortality among males.

Finally, Edmonston's (1983) exploratory survey of infant and child mortality at community and household level indicates that infant mortality is higher in rural than in urban areas. This result is significantly related to socio-economic conditions, mother's educational level, urban access, and presence of health clinics with Maternal-Child Health (MCH) programs. Edmonston recommended several strategies to reduce childhood mortality: improvement of socio-economic conditions, particularly for the women; provision of clinics with MCH programs; the building of surfaced roads; and the provision of schools (Edmonston, 1983).

Ahmad et al (1991) argues that the variability in findings from different studies may be due to social heterogeneity or to the adaptation of different study designs and methodologies. For example, some studies have relied solely on single equation regression models to test Mosley-Chen conceptual framework. Although a decomposition of the multiple coefficient of determination, (R2), does allow for separation of direct and indirect "effects", as well as for the estimation of relationships among the variables, it does not permit the inspection of the complete causal structure (Ahmad, Eberstein, and Sly, 1991). At best, the relative importance of individual variables can be estimated using standardised results. Others suggest that a multi-equation approach (e.g. Casterline, Cooksey & Ismail, 1989) enables us to estimate the contributions of single variables to a number of endogenous variables (Ahmad et al, 1991).

2.2. CONCEPTUAL FRAMEWORK

The research on children's mortality has been undertaken by two kinds of community-level research initiatives. The first is research that has been conducted by biomedical scientists concerned with finding remedies within existing social systems. Second, there is research done by social scientists concerned with the social factors that constrain families in the use of health services and new medical technology. Apart from their value in shedding some light on the determinants of child mortality, both research campaigns have important implications for health policy orientation (Ruzicka, 1989). In roughly the last decade, the concentration of attention and resources exclusively on medical technologies in child mortality has been increasingly questioned, due to the fact that it ignores the social constraints on the demand for, and effective use of, health services. Similarly, the social science strategy has been criticised for ignoring the effect of health and preventive medicine on child mortality. The resources available in a child's family are not limited to economic, environmental and social amenities to which it can gain access; equally important are the social resources (Mosley, 1983; Misra, 1983; UN

Population Division, 1983; Chen, 1984).

Biomedical research focuses on disease agents and on host-agent interactions, with applied research being primarily designed to lead to effective therapies and vaccines and calls for intervention programs to control infectious and parasitic diseases. Social science research ranges from micro to macro level, and focuses on the beliefs and behaviours of individuals. At the micro level, this type of research is based on the household survey research. At the macro level, it analyses aggregate data from regions or from whole nations, or cross-nationally where such data is available. Demographers have developed a variety of sophisticated analytical techniques to estimate trends and differentials in mortality from census and survey records, even where data are quite limited (Mosley, 1984).

The present research consolidates these two perspectives by building a model that considers the socio-economic, health care and preventive medical aspects at the same time. Furthermore, it considers contextual factors (characteristics population aggregates) which influence the childhood survival through social and biological conditions operating in the home. It offers interpretations of the association found in the micro-analysis of family demands taking these contextual variables into account. By applying this model, the effect of factors separately and their variability in widespread communities or regions with different characteristics can be discerned.

Three propositions (WHO and UNICEF 1978) formed the basis of much of the health and development planning of the 1950s and 1960s, a period when economic growth was relatively rapid and when important advances took place in health:

(1) that child health and survival were closely related to household income, especially family poverty;

(2) that improvements in health for a country depended on increases in health services and thus on expenditure for that sector; and

(3) that improvements in health for a country depended on increases in income per capita in that country, which in turn would lead to both increases in family incomes and increases in government expenditure.

Grant and Jolly (1987) refer to these propositions as the 'old economics' of child health and survival, and suggest a fourth condition, 'income distribution', as insurance that some `trickle down' takes place. They argue that increases in per capita income have to be accompanied by favourable income distributions for some benefits to accrue to the groups in need, especially to children and other vulnerable groups.

The above propositions treat economic growth as a precondition for improvements in health. Unfortunately they obscure many possibilities for improved child health and survival in the short- and medium-term which do not depend on increases in income. Evidence from developing countries demonstrates that, in some countries, progress has been made in child survival in spite of relative low per capita income. Sri Lanka, for example, with a per capita GNP of US $330 in 1984, had an IMR of only 38 deaths per 100 and under-5 mortality rate (U-5MR) was 50. Another example is China which, in 1984, had a GNP of US $300, an IMR of 36/1000, and an U-5MR of 50. Both of these countries have infant and child mortality rates well under half of Turkey's rates which had a GNP in 1984 of US $1240, or most of OPEC members with even high GNP per capita. These evidences suggest the shift in development thinking was toward the human objectives of development as proposed at the Alma Ata Conference of the world health professionals sponsored by the WHO and UNICEF. For policy-making, it will require a clear focus on human progress as a direct objective, not as a by-product of economic growth (UNICEF, 1986).

Grant and Jolly (1987) proposes four principles for 'new economics' of child health and survival. First foremost is that the use of medical knowledge and the efficiency of health services depends on social organisation. There is a lag between these two factors in developing countries.

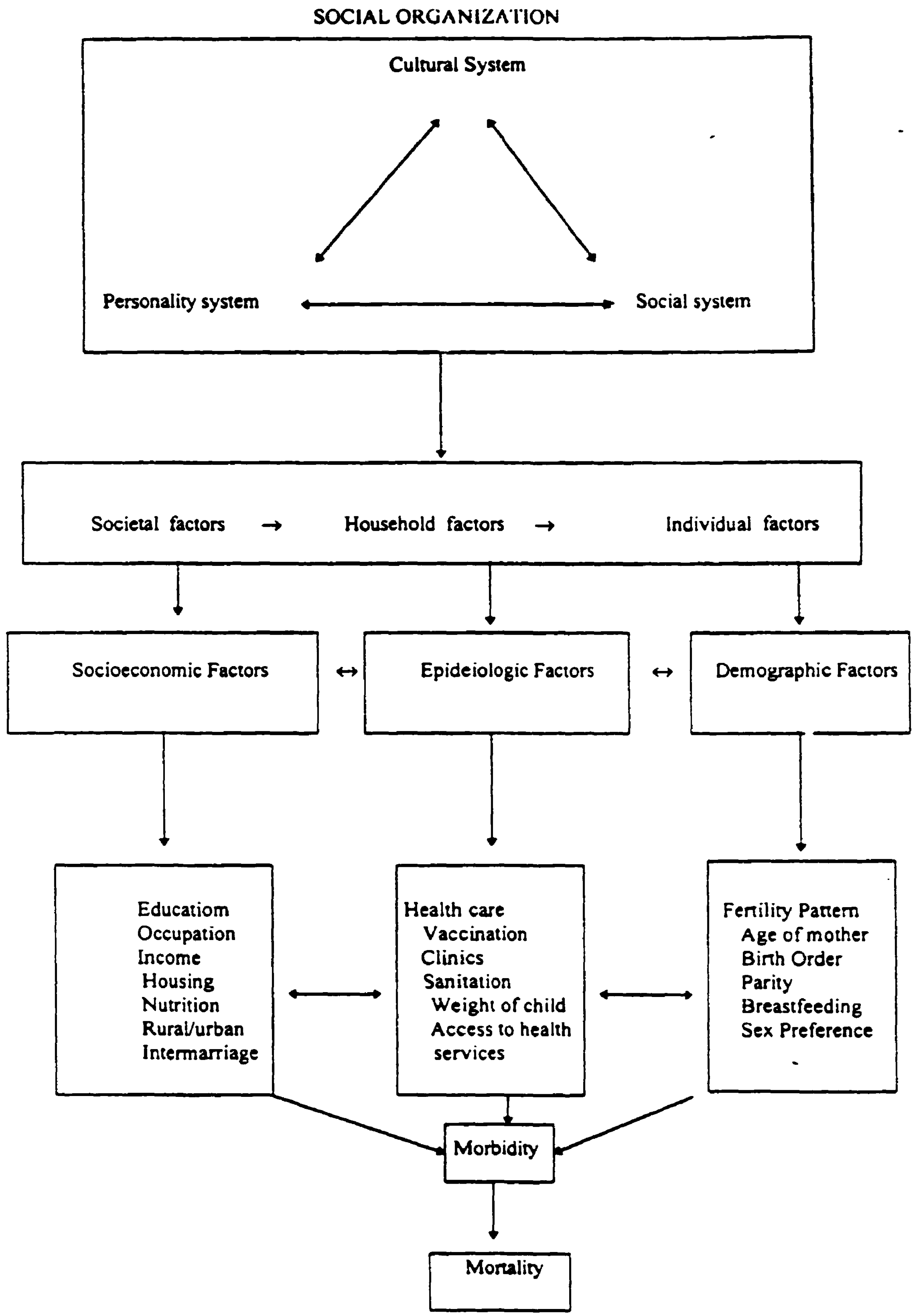
2.2.1 Multidisciplinary Approach and Child Mortality Model

Moseley and Chen (1984), using a multidisciplinary approach, developed a conceptual framework for the analysis of childhood mortality. They consider the socio-economic determinants acting at both individual and societal levels. Furthermore, at the individual level, they distinguish the proximate determinants from intervening variables, through which the socio-economic determinants affect the child's health status and disease process (Behm, 1991). The conceptual framework used in the present work also takes into account processes that operate at individual and family, and societal levels (see Figure 2.1).

2.2.1.1 Individual and Family level

Socio-economic variables that affect the proximate determinants include household income and occupation. These determine the family's material living

FIGURE 2.1: The child mortality model



conditions, which includes quality of housing (e.g., water supply, lavatory facilities, the availability of electricity, home sanitation and personal hygiene), and access to health care services all of which are important in child survival. The parent's education is an important variable, as it plays role in both the parent's capacity to efficiently manage activities which, directly or indirectly, affect the child's health, and in the time available for them to engage in these activities. It provides knowledge to access to the resources (social and health resources) and the attitiudes towards utilization of the resources.

Intervening variables can be grouped into four categories: (a) demographic and maternal factors in reproduction process, such as age, age of marriage, fertility and spacing of births; (b) epidemiological factors, which encourage the spread of infectious agents and the incidence of infectious diseases; (c) nutritional deficiency, due to inadequate supply of nutrients for the child and mother during the pregnancy and breast-feeding; and (d) practices in the care of healthy and sick children, including both traditional practices and modern medicine (Behm, 1991).

2.2.1.2 Societal Level

Family strategies for childhood survival are limited by factors rooted in the structure of the society to which the family belongs. Behm (1991) pointed out Moseley and Chen famework distinguishs four systems: ecological, political, economic and health-care. Ecological factors include geographical and climatic factors, where human life depends more heavily upon nature, and which affect physical access to public services. Political economic factors include the organisation of production and the policies affecting the distribution of goods and services among the population. The physical infrastructure influences the distribution and relative cost of health services. Finally, political institutions such as local and community organisations play important roles.

There is always interaction between the individual, household, and societal levels. Individual factors include biomedical aspects of both the mother's and child's conditions, specifically their disease and nutritional status. Household factors include household income or assets, parent's education, access to health services, water supply and sanitation, and family patterns. Social factors include those factors that are much more under the influence of government or environment than the individual or household. Thus the potential causes of childhood mortality can be understood in terms of the interaction between the socio-economic factors operating at the individual and household levels, while socio-economic factors might be understood in terms of the interaction between the household and the societal levels. Access to services, such as health care and water supplies, can be assessed from the point of view both the household and society, though the provision of such services is a societal issue, dependent on things like national budgets and priorities. At the household, level we are concerned with the consequences of malnutrition, poverty, and inadequate health care services; at the societal level we are interested in their sources.

The childhood mortality model presented here is based on aforementioned criteria. The model takes into account the sequence by which the various determinants operate both at the micro level of the family and at the contextual level. Analysis of interactions between factors at the micro level can contribute to a fuller interpretation of the associations of the independent variables with child mortality.

The lack of theory pertaining to determinants of child mortality is reflected in the lack of agreement on what variables should be included in the analysis. More efforts are required to provide both the reliable data and constructing the sound theory based on an understandable model. An understanding of the determinants of infant and child mortality is of critical importance for the further reduction of infant and child mortality. There is always problem of the need for more information, especially in a multilevel study of child mortality, such as this one. In current conditions in developing countries, where the problem of infant mortality requires immediate action, research must make use of all available sources of information, of a multidisciplinary approach and of a suitable analytical framework.

2.3. SUMMARY

The theories of socio-economic development discussed in the introductory chapter led to studies of child mortality from three perspectives: 1) biomedical, 2) socio-economic and demographic, and 3) multidisciplinary. The literature and the conceptual frameworks of these perspectives were reviewed in the present chapter where efforts were been made to construct a child mortality model based on the multidisciplinary perspective (Mosley and Chen framework). The proposed child mortality model is designed to encompass both the micro level, individual/household characteristics, and at the contextual level, the interaction of individual and societal factors. This child mortality model will serve as a guide for the current study in the following chapters.

Operationalisation of the model will discuss in the next chapter.

CHAPTER THREE

METHODOLOGY AND DATA COLLECTION

In countries where a vital registration system as a basis for child mortality estimates is of uncertain or unacceptable quality, information from some type of household survey is required to validate, calibrate or substitute for a vital registration estimates (United Nations, 1992: 11). Different types of surveys have been used for this purpose. In this study a retrospective survey was adopted. The survey method requires careful instrument design, sample design, and training and adequate supervision in order to be successful; attention also needs to be given to data-editing and imputation procedures.

3.1. PURPOSE AND OBJECTIVES

The principal objective of this dissertation is to assess the extent to which household characteristics and behaviour exert their effects indirectly on childhood mortality through more proximate factors that can be measured. A second purpose is to determine whether and to what extent the effectiveness of technical remedies and preventive medicine is affected by the social, economic, and demographic contexts in which they are embedded. Finally, a third goal, is to propose measures to prevent infant mortality, to reduce morbidity, and to identify areas for further investigation.

3.2. HYPOTHESES

Having reviewed the literature and conceptual frameworks in childhood mortality and based on the child mortality model presented in previous chapter, the following hypotheses, from which adequate data for analysis are available, represent the core ideas of the present research:

Childhood mortality is associated with poor socio-economic status because:

H1: Poor educational achievement by the parents increases infant and childhood mortality.

H2: Parents with low income are expected to experience higher infant and child mortality among their offspring.

H3: Low occupational status of parents is expected to increase the incidence of infant and child mortality

H4: Those who reside in rural area are expected to have higher infant and child mortality.

H5: High pregnancy order increases the risk of infant and childhood mortality.

H6: Low parity pregnancies have increased chances of infant and child mortality.

H7: If a mother is below 18 and above 35 at time of delivery, this increases the risk of infant and child mortality.

H8: Malnutrition of mothers leads to low birth weight infants which increases infant and child mortality.

H9: Bottle feeding increases childhood mortality.

H10: Limited duration of breast feeding increases childhood mortality.

H11: Lack of access to the health care services (availability of vaccination for children and clinic, midwife, and physician for mothers) increase the risk of infant and child mortality.

H12: Sex preferences for males increases the risk of female infant and child mortality.

H13: Poor housing increases the risk of infant and child mortality.

3.3 RESEARCH SITES

The choice of sites for the study of child mortality differentials depends on the existence of reasonably good demographic data for the area. As an official researcher of Population Centre of Shiraz University[1], I was able to obtain financial and personnel contributions from this centre in order to conduct the present project on child mortality in the Fars province of Iran. Being aware of the relatively high quality of the data collected in the project that I designed and having considerable enthusiasm for the findings and completion of their project, I decided to choose it for this dissertation.

Another reason for choosing Iran as the research site was an interesting official report of a 1992 child mortality rate of 43/1000 (Population Reference Bureau, 1992) which is far from the UN Secretary's projected estimates 168/1000 for 1980-85 and 118/1000 for 1995-2000, and other survey-based estimates of 105/1000 for 1973-74 and a more valid survey 112.4/1000 for 1973-76 (Iran Statistical Centre, 1980). These discrepancies between projected and reported child mortality seem anomalous, especially considering the reported increases in the total fertility rate (from 6.3 to 7.0 in the previous decade) and the effects of the Iraq-Iran war (1980-1988) on socio-economic and health care situations in Iran.

Fars province is one of the largest provinces in southern Iran. It is divided into 15

[1] The Population Centre was established in 1973 in collaboration with the United Nations, Population Division, to support the Iranian family planning program which was started in 1967. The main objective of this centre is to design and conduct population studies of Iranian society.

divisions (See map in Appendix A). These divisions, or 'Shahrestan' (comparable to a county), differ in environment and ways of life. Some have tribal backgrounds, some speak Farsi with different accents or speak separate languages , some live in metropolitan centres (like Shiraz, the capital city of the province) and some in villages without any roads, piped water or electricity.

Five Shahrestans were selected as the study group on the basis of their demographic, topographic, and climatologic differences. From a demographic point of view, these five Shahrestans cover two-thirds of the total population of the Fars province and this provides a good estimate of the standard of living there. From a topographic point of view, they radiate different geographic directions relative to the centre of province, so that they cover north, south, east, west, and centre of the Fars province, and, they have different climate. Three points should be stressed here. First, the selection of these five Shahrestans should provide unbiased estimates for child mortality in Fars province because they are dispersed over the whole area. If shahrestans other than these five had been selected, they would have been close to the capital city of Shiraz which has large hospitals and medical centres. The relative distance from the capital city plays an important role in development of the regions and in access to the health care services which are important determinants of childhood mortality.

Second, at the other extreme, the sample design covers the Shahrestan of Shiraz in order to prevent biases in the sample which would have occurred if only shahrestans far from where the majority of people live had been included. Consequently, both demographic and topographic considerations were taken into account. Furthermore, four of five shahrestans are adjacent to other provinces, and they could have similar situations in their neighbours.

Thirdly, because of diversity in location and the distance between them, these Shahrestans are heterogeneous in their social and cultural aspects. The different climates and environments requires different ways of living and imply different standards of living. Natural endowments play an important role in population distribution and socio-economic and cultural differentiation especially in developing countries. There are unsettled populations in all of these shahrestans. The majority of settled populations come from tribal backgrounds, so their culture is different from urban, or even rural, ones. For example, Laar, which is the southern Shahrestan of Fars, speak Arabic and most of them are engaged in trade rather than in agriculture. Because their land is not fertile they earn their living from trading with the Amir kingdom in the Persian Gulf. Or, Mamasani has a special accent which is related to the specific tribe and earn their living from as pastoralists as well as from agriculture. The population of other shahrstans also includes tribal backgrounds. These differences are important in the study of childhood mortality.

3.4 UNIT OF STUDY

The main thrust of the present study in to identify several cultural, ecological, socio-economic, demographic, nutritional and health factors that could explain differentials in infant mortality in these five subprovinces of Iran. All ever married women under 50 years of age who experienced a pregnancy during the five years prior to the survey are considered as the target population and the primary unit of analysis.

3.5 SAMPLE DESIGN

The survey research used in this dissertation employed three sampling techniques:

1) proportional stratified sampling;
2) cluster sampling;
3) simple random sampling.

In the first instance, a proportional stratified sampling technique was used in the study for both urban and rural areas with the shahrestans defining the strata. This technique was deemed appropriate because stratified sampling eliminates between-stratum variation and leaves only within-stratum variation. The sample within each stratum (if randomly drawn) can be considered an independent sample of the population of that stratum. Stratified sampling offers the possibility that a very heterogeneous population (which would require a large sample size without stratification in order to be representative) can be stratified into a number of relatively homogeneous strata. The reason for stratifying rather than taking a random sample is to reduce the number of cases required in other to achieve a given degree of accuracy and statistical findings.

I selected the strata or Shahrestans according to the above mentioned priorities. Then an equal sampling fraction was determined for each stratum proportionate to the percentage of children below five years of age in the population as reported in latest census. According to the 1986 Census of Iran, 62 percent of the under five year old population reside in urban areas and 38 percent in rural areas. Therefore, 32 clusters were determined for urban areas and 21 clusters for rural areas proportionately; each cluster includes at least 200 [2] women under 50 years old who had pregnancies during the last five years. The clusters were selected with simple random sampling.

The sample size covers 67 villages for rural areas and 15 towns or cities for urban areas. The 1986 Census and its supplementary publications by Statistical Centre of Iran (SCI) were used as the frame of reference in selecting the sample regions. It should be noted that the sample was not a representative sample of the five subprovinces (the selected shahrestans) but was so at the province level. In fact, the objective was not to derive a single estimate for the sample site, but rather to gather evidence on current levels within various socio-economic groups. The sample was, therefore, stratified to ensure that we would have information on sufficient numbers of women from various socio-economic groups. A similar sampling technique was adopted by Oni (1988) in his study the of socio-economic differentials of childhood mortality in a Nigerian city.

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[2] The sample size of clusters are calculated by the formula:

$$n = \frac{\dfrac{t^2pq}{d^2}}{1 + 1/N\,(t^2pq/d2 - 1)} = \frac{\dfrac{4*(0.08*0.92)}{0.0025}}{1 + 1/N\dfrac{4*(0.08*0.92)}{0.0025} - 1}$$

$$n = 105.31$$

where p represent the infant mortality rate per 1000 and q = 1-p t=2 d=0.05 (d=t*). Considering that probability of existence of women 15-49 is 1/2 in the adult female population, therefore the result of this formula should be doubled in order to get the optimum sample size for each cluster. Thus, it was decided to have clusters of more than 200 eligible women.

3.6 SAMPLE SIZE

The survey sample consisted of 10665 respondents. The estimation and calculation of sample size according to the sample design are as follows:

N of clusters multiplied by the cluster size is equal to the total of anticipated sample size:

$$53 * 200 = 10600$$

The anticipated estimated sample size was 10600 which is close to the actual sample size 10665 as shown in Table 3.1.

Considering that some respondents (10665) had more than one pregnancy during the five years prior to the survey, the sample size includes 26265 cases (live births during the 5 years), and each constituted a supplementary unit of analysis for this study. Table 3.2. shows the name of selected Shahrestans, the number of clusters, and the sample size.

3.7 A GOODNESS-OF-FIT TEST

Goodness of fit tests are used to evaluate whether a sample statistic represents a good fit to a hypothesised population parameter. A Chi-square test can be used to estimate the goodness of fit for nominal scale data with more than two categories. The null hypothesis states that no actual differences exist between the observed and expected frequencies. The values of Chi-square for both rural and urban sampling distribution are calculated in Tables 3.3 (rural) and 3.4 (urban).

The tabled Chi-square value for testing H0 for the urban sample (9.49) is greater than the calculated Chi-square (4.79); one cannot reject the null hypothesis that the difference between the observed sample and the expected values is simply due to

Table 3.1: Estimated Sample Size

Shahrestan	Rural Sampling: Village	Clust-ers	Sample Size	Urban Sampling: Town	Clust-ers	Sample Size
1. Abadeh	160	3	600	4	4	800
2. Shiraz	347	8	1600	5	22	4400
3. Laar	139	4	800	4	4	800
4. Mamassani	621	4	800	1	1	200
5. Neiriz	92	2	400	1	1	200
Total	1359	21	4200	15	32	6400

Source: calculated from 1986 Census data, Statistical Centre of Iran.
Rural cluster = village
Urban cluster = Census tract

Table 3.2: Selected Regions and the Sample Size

Shahrestan	Urban Pop-U5	Clust-er	Sample size	Rural Pop-U5	Clust-er	Sample Size	Total
1.Abadeh	11805	4	800	14278	3	612	
2.Shiraz	157991	22	4455	47193	8	1549	
3.Laar	14636	4	844	20709	4	771	
4.Mamassani	5311	1	207	25526	4	824	
5.Neiriz	5089	1	217	10664	2	386	
Total	194832	32	6525	118370	21	4142	10665

source: The survey data

Table 3.3: Sample Size and the Chi-square Statistic for Urban Area

Shahrestan	O	E	O - E	(O - E)2	(O - E)2/E
1. Neiriz	217	200	17	289	1.44
2. Abadeh	800	800	00	000	0.00
3. Shiraz	4455	4400	55	3025	0.68
4. Laar	844	800	44	1936	2.42
5. Mamassani	207	200	07	49	0.24
Total	6525	6400	---	---	X2 =4.79

Source: calculated from the survey data

df = 5 - 1 = 4

Table 3.4: Sample Size and Chi-square Statistic for Rural Area

Shahrestan	O	E	O - E	(O - E)2	(O - E)2/E
1. Neiriz	387	400	- 14	196	0.49
2. Abadeh	612	600	12	144	0.24
3. Shiraz	1549	1600	- 51	2601	1.62
4. Larr	771	800	- 29	841	1.05
5. Mamassani	842	800	58	3364	4.20
Total	4142	4200	- 24	---	X2 = 7.60

Source: calculated from the survey data

df = 5 - 1 = 4

sampling variation. The Chi-square for rural sampling (7.60) is less than the table value (9.49); therefore, similarly one cannot reject null hypothesis; and the difference between the observed sample values and expected values is simply due to sampling variation. In other words, both the rural and urban regions can be considered as representative at the provincial level.

3.8 THE QUESTIONNAIRE

The data were collected by using a questionnaire which gathered information on four sets of variables -- infant and child mortality, socio-economic status, demographic characteristics, and health care and vaccination practice. The interview schedule consisted of 135 questions of which the questions about pattern of fertility and child mortality were constructed in tabular form in order to shorten the questionnaire format (see the questionnaire in Appendix B.1).

To place questions in logical order, the questionnaire started by asking for general information about age, birth-place, and marriage status of the respondents. These were followed by questions pertaining to socii-economic status, which gathered information on education, occupation, place of residence, and birth-place of the child's mother and father. Education was measured from 1 indicating illiterate to 7 indicating the highest degree (doctorate). Occupations were listed and coded according to the categories used for the latest Iranian census (see the lists of occupations in Appendix B.2 and B.3) . Place of residence was measured as rural or urban, and also distinguished by the name of regions, villages, towns, and city. This facilitated merging the aggregated data with the survey data. The birth-place of respondents gave us the information about rural and urban background of household. Given that, in Iran, rural-urban migration has being intensified at an increasing rate, and the fact that immigrants try to keep their way of life for a while in new social settings until they assimilated, it was assumed that there is a difference between those having rural backgrounds compared to those with urban ones. Two different lists of asset items, one for rural and one for urban setting, indicating the level of income and financial situation for households were elaborated. This measurement was used to examine the relationship between child mortality and level of income at the household level.

Housing conditions were measured according to the above-mentioned hypotheses. Poor housing is characterised here by:

- poor condition of housing (i.e. tent, slum, other),
- poor construction material (i.e. not concrete or steel),
- poor space (number of rooms per family),
- poor sanitation facilities (water, bathroom, WC heater, kitchen, electricity, gas, cooler).

The questions measured the quality of housing in terms of building materials (good as concrete and steel materials and bad as mud brick and wood), types of housing (regular and irregular as tents and slums), space (number of room per house and per family) and household facilities and sanitation (as piped water, electricity, heating, bathroom, WC ECT.).

Demographic indicators were measured by questions pertaining to age, age of first marriage, age at the time of each birth, birth order, and breast-feeding practice. Age was measured by single years as an interval scale, and birth order as an ordinal scale. Breast-feeding duration was measured by month, and also coded as a dichotomous variable, as either breast-fed or bottle-fed.

Questions about fertility history, child mortality, and pegNancy wastage were constructed in box format (#21, see AppendixB.1). This used less space on the questionnaire than the repetition of questions for each interview and eliminated confusion over which response referred to which answer.

Child mortality questions were arranged into two separate box- formats. The first box-format (#20: infant mortality events during last year before survey from July 1990 to July 1991) included questions about the sex, age, and cause of death. The second (#22) gathered information about pregnancies and the outcomes during the five preceding years. Three types of data were collected here:

> 1) pregnancy outcome (pregnancy wastage, live birth led to death, live birth led to living children);
>
> 2) maternal and delivery information (pregnancy duration, delivery place, delivery assistants);
>
> 3) live birth (birth-weight, breast-feeding, age, and sex). The information of this box format (22) guided the interviewer to the next separate box format (#23) developed for childhood mortality occurrences during five years prior to the survey(1986-1991). It included questions about age at the time of death, sex, cause of death, and vaccination.

The assessment of reliability and validity of questionnaire was done by conducting a pilot study with a small sample. Corrections were made to the questionnaire prior to the principle data collection. Indicators based on individual items or combination of items were developed in order to test the hypotheses. These indicators provide the necessary information to improve current explanations of the determinants of child mortality, including how and why .

3.9. THE FIELDWORK

The fieldwork was carried out by a team co-ordinated at the Population Centre at Shiraz University. One chief supervisor and five group supervisors were appointed. The research officer and the Population Centre staff co-ordinated the fieldwork in my absence. The chief supervisor was responsible for the co-ordination of all groups, preparing the cars, drivers, necessary ID, contact with the local authorities, distribution of questionnaire, preparation of the maps (roads and regions) and for the interviewer's training and support.

There were five field research groups-- one for each Shahrestan. Supervisors were responsible for organising and co-ordinating the data gathering by the groups in their specified Shahrestans. They distributed the questionnaires to the interviewers, specified the clusters for each of them, and checked completed questionnaires at the end. Interviewers were selected from female university students due to the fact that the study required face to face contact with women, which in Iran implies cultural and religion considerations[3]. Both the interviewers and supervisors participated in a training seminars held by Population Centre researchers and staff.

3.10. DATA PROCESSING

Completed questionnaires were sent to the Population Centre at Shiraz University. Data were edited and coded by a group of 20 students in accordance with instructions set out in coding manuals (separate manuals were developed for rural and urban questionnaire). The coded sheets were keypunched onto computer tape, prepared at Shiraz University by VM/SP with XEDIT editor, loaded by a tape dump command, and sent to McGill University, Montreal. The staff of the Faculty of Arts Computer Laboratory there helped the present researcher to process and convert the files to format that compatible with the McGill University mainframe and local network computer facilities.

[3] One of the important point in collecting data is to consider the cultural and religious limitations in order to get accurate answers. In Moslem society, there is a sanction that a woman make a face to face contact with a man in the absence of her husband. Moreover, there should be a procedure that both the respondent and the interviewer feel comfortable during interviewing specially when the questions are about fertility and family planning.

3.11. DATA ANALYSIS

As will be seen below, for the data analysis both descriptive and inferential statistics were used. Descriptive statistics employed in this dissertation include univariate analysis, tabulation and cross tabulation (bivariate presentation). Two-variable tables are most popular and three variables are about the maximum presented in a single table. The popularity of two-variable tables stems not only from their simplicity but also from the fact that most hypotheses contain two variables, making a bivariate table sufficient to test a hypothesis, and specifying a zero-order relationship.

Inferential statistics consists of explanation and prediction, and generally are more complicated than description. They require more computation as well as more interpretation. Explanatory statistical analysis employed here consisted of the analysis of a relationship between two or more variables. The first task was to use probability to see whether one can say with confidence that a relationship even exists between two selected variables. This was accomplished through the computation of a statistical test of significance, from tables the Chi-square test. Tests were run with SPSS software to determine if a relationship existed, then correlation or regression techniques were utilised to assess the strength and the causal of relationship between variables. By strength of relationship I mean how much one variable affects another even in the presence of covariats; in the case at hand, for example, I was interested in how much a given socio-economic variable affected a childhood mortality measure. Moreover, if we either suspect or have shown that a relatively strong relationship exists between variables, we can use a statistical technique that enables us to predict the score of one variable from the knowledge of the other variable. The most popular statistical method for prediction is regression analysis. Regression analysis also forms the basis for the most so-called causal models, which attempt to show causal relationships rather than mere correlation among variables.

Considering that dependent variable in our study (child mortality) is dichotomous variable (i.e. 1=alive and 0=dead), the standard ordinary least square (OLS) regression model would be misleading. The most appropriate statistical technique in this case was judged to be logistic regression. This survey is retrospective, starting with the existence of childhood mortality and working backward in time to discover differences between those cases who have experienced child mortality and those who have not. Thus the totals for the natural response variable--the presence or absence of dead children--are fixed rather than the totals for one or more of the explanatory variables.

Logit models for categorical responses are analogous to regression models for continuous response variate. A basic problem with the use of logistic regression models is the difficulty in determining whether the models provide an adequate fit in to data. As in standard regression analysis, we can assess the need for sets of variables by means of a likelihood-ratio test, based on a pair of nested models with and without the variables in question. Computer programs typically include as part of their printout estimated coefficients, estimated standard errors of the coefficients, Z-values, and the likelihood-ratio test comparing the fitted model to the one in which the coefficients of all the explanatory variables are zero. Thus, when it is convenient to do so, categorising some continuous variables from a logistic regression model may allow construction of a corresponding logit model whose fit can be assessed (Norusis/SPSS Inc, 1991: 45-69).

Logistic regression technique was used to predict the binary dependent variable that is, child mortality. In logistic regression, as in other multivariate statistical techniques, the researcher wants to identify subsets of independent variables that are good predictors of the dependent variable. The contribution of individual variables in logistic regression is difficult to determine. The contribution of each variable depends on the other variables in the model. This is a problem particularly when independent variables are highly correlated. It is, therefore, advisable to examine several possible models and choose among them on the basis of interpretability, parsimony, and ease of variable acquisition (Norusis, 1991: 45-69). This task was done by using stepwise logistic regression method.

3.12 SUMMARY

The theoretical and conceptual framework were discussed in first two chapters. The assessment of theoretical relationships between abstract concepts was followed in this chapter. The operationalisation of such relationships, presented in child mortality model, required a method which consisted of the process of building hypotheses, sampling design, building questionnaire to create indicators and their measurements, data collection, and determining statistical techniques for data analysis. These process were done, and validity and reliability of the questionnaire were assessed. Based on child mortality model thirteen (13) hypotheses were built and a research design constructed by employing three sampling techniques. The sample size was determined (10665); and a test of goodness-of-fit was run indicating that the sample is representative at the provincial level. According to the model, the construction of questionnaire was done and the indicators and their measurement were described. The appropriate statistical method fitted to data was introduced. The subsequent analysis of these indicators through statistical models is subject to empirical verification which will be discussed in the next chapters.

CHAPTER FOUR

PROFILE OF THE STUDY AREA

In the previous chapters I have described the tools of investigation, selection of study area, sample design, and techniques of data analysis. Here I provide a brief description of geographical and socio-economic and cultural background of Iran and each of the five selected subprovinces as an aid to the interpretation of data analysis in chapters that follow. Since one of the objectives of the present study is to explore differentials in infant mortality with respect to environmental and societal variables, it is necessary to describe the physical and socio-economic characteristics of the study area. Three sources were used for information on physical characteristics and the modernisation transition of Iran: *The Economist Intelligence Unit, 1992-1993*, and *The New Grolier Multimedia Encyclopaedia, 1993*, and *Iran: The Country Study, 1989*.

4.1 Physical characteristic

The surface area of Iran is approximately 1,648,000 Km2, supporting at the start of the 1990s some 59.59 million people, with a population density 36 per km2 (The Economist Intelligence Unit, 1992-1993). The country is divided into twenty-five provinces (*ostan*), each under a governor general (*ostandar*), and these provinces are further subdivided into counties (*shahrestans*), each under a governor (*farmandar*). Most administrative officials are appointed by, and answerable to, the central Ministry of Interior.

Iran is a highly diverse country from every point of view, not the least in terms of topography and climate. It includes high mountain ranges along the northern and western borders, vast deserts on the heartland, tropical lowlands along the Caspian littoral, and hot dry plains near the Persian Gulf. The land is mostly arid or semiarid and subtropical along Caspian coasts. Therefore, long hot dry summers throughout most of the country, with oppressively high humidity along the Gulf and Caspian coasts. Winter temperatures are low in the Northeast mountains but moderate elsewhere. The Caspian coast lands and the slopes of the Alburz mountains in the north receive an average annual rainfall of 1000-1200 mm. Natural pasture and forest exist over wide areas of this region. Iran's heartland is in the central plateau between the Alburz mountains in the north and the western Zagros mountains of and lowland drainage areas adjacent to the eastern Afghan and Pakistan frontiers. Much of the central plateau consists of salt and sand desert, including both the Dasht-e Kavir and Dasht-e Lut systems.

Relative to other Middle Eastern countries, Iran has a good climate. More than one third of the land surface receives rainfall of more than 250 mm on average each year, while extensive run-off from the mountain rim of the central plateau, which receives heavy snowfalls, provides water for crop irrigation. The fertile land crescent in the northwest and west, which includes Luristan, Kurdistan and Azerbaiijan provinces, receives good and relatively reliable rainfall and, despite marked seasonal extremes of temperature, supports a prosperous herding and dry land arable economy. The Caspian coast lands, the Mesopotamian plain and the valleys of the interior all have cultivable soil but this is more fragile than in other areas. Moreover, land and water resources are not used to their fullest; only a fraction of total available (9.1%, of which 8.6% arable land and 0.4% permanent crops) is tapped for agriculture, allowing for large-scale reclamation at the extensive margin, and cultivation on existing agricultural land could be intensified through more widespread and effective use of water resources.

Socially, the country is just as diverse. A substantial portion of the population is of Turkish (25%), Kurds (9%), Gilaki and Mazandrani (8%), Lur (2%), Baloch (1%), and Arabic (1%). The underlying fabric of Iran is a cultural, an observance of long-established customs of literature, art, oral tradition and social manners. This cultural structure arises from the most diverse of linguistic and ethnic backgrounds within the area of influence of the old Persian empire and especially inside the boundaries of the modern Iranian nation state.

Farsi (Persian), is the official language, and the mother tongue of over half the population (58%). Tehran, Isfahan, Fars, Kerman, Khorasan and Yazd are some of the provinces inhabited by Persians. There are a number of other national and ethnic groups living in vast parts of Iran. The historical background of these groups has not been given much attention by anthropologists for a number of reasons, including their mixing with Iranian culture, political considerations, and a lack of anthropologists in the country. Twenty six per cent of remainder speak in Turkish dialect, nine per cent in Kurdish, two percent in Luri, one per cent in Arabic and Baloch and three per cent in other languages. Shia Islam is the official religion with 95 per cent of Iranians as adherents; the remainder comprises 4 percent Sunni Muslims and small numbers of Christians, Jews, Zoroastrians, and Bahais.

4.1.1 Fars Province

Fars province, a southern province of Iran, had a population of 3,543,828 (6.5 percentage of Iran population) according to Iran Statistical Centre publication (1991) and is divided into 15 counties (*shahrestan*). It is a semiarid and mountainous land with long summers (see the map of Fars in Appendix A2). The southern part, Shahrestan-e Laar, has a hot and dry climate. The western and northern parts of the province, including Shahrestan-e Mamasani and Abadeh, are mountainous and have a moderate climate, providing good herding and agricultural land. The eastern part, including Shahrestan-e Neiriz, is close to the desert but has a moderate climate. The middle part of the province, including Shahrestan-e Shiraz is a mountainous area with a moderate climate and short winters. Shiraz, the capital of the province, is a metropolitan city, and is located in this subprovince. The minimum and maximum temperature of the city of Shiraz were -5 and 40 centigrade in the year of the survey (1991). The city ranks fourth in population, is semi-industrial and well-developed in terms of higher education, the level of professionals, and hospital facilities.

One of the peculiarities of Fars is the considerable proportion of nomadic groups and the influence of their cultural background on the socio-economic and demographic situation of the province (Table 4.1). The nomadic tribes of Iran have been the most difficult population group to enumerate, not only because of their life-style but also because many of them live in the more remot parts of the country. Increasingly, many tribal groups have permanent or semi-permanent residence, but for an ever-decreasing number the pattern of their seasonal migration makes this impossible. The tribal system,

Table 4.1: Nomadic Tribes Population of Iran

Source	Year	Population	%
Cruzon	1892	2,000,000	22.0
UK Foreign Office	1910	2,650,000	24.0
Lambton	1932	1,000,000	7.7
Census, unsettled population	1956	240,000	1.2
Census, unsettled population	1966	240,000	0.9
Echo of Iran	1966	3,000,000	11.0
Census, unsettled population	1976	N.A	
Census, unsettled population	1986	251,098	0.5
Census, unsettled population, Fars	1986	64,922	2.0

N.A: not available

Unsettled population: According to definition used in census of Iran by Iran Statistical Center the population who did not live in "inhabited village or town" are labelled unsettled population. The nomadic population is in this category.

as it has evolved and in those areas where it is still operating today (particularly in the central and southern Zagros), is clearly a response to lack of adequate and regular water supplies for crops and livestock. Movement is seasonal and is geared to migration between winter and summer quarters. Nomadic tribes of the southern Zagros, for example, move to the warm plains of Persian gulf in autumn to sow grain. In the spring they return to the highest mountain pastures where grass is available for their livestock but leave some members of the tribe to gather the harvest.

Population figures of this tribal population have been no more than rough estimates with large discrepancies. Although the figures may not be correct, there can be no doubt that a reduction did occur as a result of Reza Shah's (ruled 1925-1941) and his son, Mohammed Reza Shah's (ruled 1941-1979) policy to settle the tribes. They considered the tribes a potential threat to the monarchy and its security, and an obstacle to their policy of modernisation. During their reign, they attempted to organise the tribes to prevent seasonal migration. Many were settled, and many were killed, as they stood against the central government, especially Qashghae tribe in the Fars province.

The major nomadic tribe in Fars province is Qashghae which had a population over one hundred thousand in 1966 (Paydarfar, 1977). But as a result of their settlement, they distributed in villages and towns in nearby or migrated to the city of Shiraz. The nomads are concentrated in some of the counties, including two from the research site for the present study, Mamassani and Abadeh.

4.2. Modernisation of Iran

Iran evolved from the great Persian civilisation, where long history, included the foundation of a world empire. Iran created many sophisticated socio-economic and political institutions, many of which continue to influence the present Islamic regime. Despite turmoil surrounding the establishment of the revolutionary government, one can argue that Iran's development has shown continuity. Three major historical factors which have affected Iranian society have been a tradition of monarchical government (represented in the twentieth century by Mohammed Reza Shah Pahlavy), the important political role of the Shia Islamic clergy (seen most recently in Ayatollah Sayyid Ruhollah Musavi Khomeini's leadership in the Islamic Revolution), and, at least since the late nineteenth century, pressures for Westernisation or modernisation (Iran: the Country Study, 1989). Much of Iranian culture results a mixture or interaction of these three elements.

Contrasting the traditional elements of Iranian history, there has been a pressure toward "Westernisation" that began in the late 19th century. Such pressure initially came from Britain, which sought to intensify its commercial relations with Iran by promoting modernisation of Iran's infrastructure and liberalisation of its trade. However, British pressure had little effect until the emergence of domestic reaction to the growing corruption of the Qajar monarchy, which led to the Constitutional Revolution in 1905-1906. This revolution resulted in an elected parliament, a cabinet approved by the parliament, and a constitution guaranteeing some personal freedoms of citizens. In spite of tremendous economic development and Western styled legal and educational reforms, the Reza Shah Pahlavy's monarchy (ruled 1925-1941), undermined constitutional laws. The push for Westernisation continued with Mohammed Reza Shah (ruled 1941-1979) who also largely ignored the traditional culture and the religious values of Iranian society and the role of Shia religious leaders (*Iran: the Country Study*, 1989).

Mohammed Reza Shah promoted Iran's economic development by implementing a series of seven-and five-year economic development plans, first being launched in 1949. These programs stressed the creation of necessary infrastructure and establishment of capital-intensive industry, initially making use of Iran's enormous oil revenues, but ultimately seeking to diversification of the country's economy through expansion of heavy industry (*The Economist Intelligence Unit, 1992-1993*). In the 1960s, the Shah also paid attended to land reform, but the redistribution of land to peasants was slow, and often individual farmers were allocated inadequate amounts of land for economically viable agricultural production. further, due to the Shah's huge foreign arms purchases and his attempts at unrealistically rapid industrial development and modernisation, Iran experienced high inflation. The small merchant class, who were members of the bazaar, gained proportionately less than the Shah's Westernising elite from modernisation. This lack of benefit from reforms was also true of the inhabitants of most small villages, who remained without electricity, running water, or paved roads. The failure of the bazaar class to achieve significant benefits from the economic development programs was one influential factor contributing to the fall of the shah in 1978. Other factors that are usually cited are Western influences and secularisation, ignorance of religious leaders, and repression of potential dissidents and of the Tudeh party (Ashraf, 1988).

In the revolutionary regime, the officially renamed Islamic Republic of Iran, became a theocratic state in which Islamic doctrine is the foundation for governing the people in accordance with the theory of velayat-e faqih (the policy guide and ultimate decision-maker as the pious jurist or faqih). The new Constitution provided for political institutions to implement legislative aspects of government as elected legislative assembly (Majlis), a Council of Guardiance to ensure the conformity of the Majlis' laws with Islam, and an elected president as the head of state (Iran: the Country Study, 1989).

In addition to religious factor, Iran's economic situation has also influenced its foreign policy. Initially, and for ideological reasons, the revolutionary government had made a radical shift in foreign policy from the pro-Western stance of the Shah to nation of Islam. Both capitalism and socialism were condemned as materialistic systems that sought to dominate the Third World (The Economist Intelligence Unit, 1992-93).

The first decade or course of the revolutionary regime had passed through the construction of political structure, the 1980-89 Iraq-Iran war, and governmental centralisation. In the early years of revolution, there seemed a good chance that a coherent Islamic economy would emerge. Both Islamic and socialist thinking on economic policies were developed which emphasised the need to become independent from foreign countries, to reject modernisation merely imitating Western ways, and to restructure asset ownership. However, the economy entered a recessionary period largely due to the anti-materialistic view of the authorities and the Iraq-Iran war. During 1980-88, when the authorities were preoccupied with the war effort, financial and real resource allocations were influenced strongly by military; in most respects, the country had a full-scale war economy which worsened the "losses" from the Revolution. The combined effects of the Revolution and the Iran-Iraq war have inhabited even medium-term systematic management of the Iranian economy (The Economist Intelligence Unit, 1992-93).

The first official post-revolutionary five year development plan began (1989-1993) to reconstruct the economy. Its allocations aimed at a rapid rate of change, a target of 8 percent for annual real GDP growth. The government increased its spending on agriculture and water projects and stressed education, health, and social measures, all designed to show the Islamic government concern for the lower classes. A second development plan for the period (1994-1998) was prepared and approved by the parliament, but is likely to confront political and financial obstacles, especially the large foreign debt (The Economist Intelligence Unit, 1994).

The relationship between the modernisation process outlined above and household size was examined in Iran by using data from the 1956 and 1966 censuses (Paydarfar, 1968). A modernisation scale was constructed as a composite index of three indicators: urbanisation, industrialisation, and general education. The two variables (modernisation and household size) were inversely related, though the coefficients were not statistically significant. The reasons suggested for this unexpected result were the fact that modernisation transition and demographic transition were both still at their initial stages (Paydarfar, 1968).

A recent study of modernisation, the status of women, the and fertility decline in Iran during the 1966-76 period suggested that the minimal effect of modernisation and socio-economic development on fertility in Iran is due to the modernisation process being biased by class and gender. Aghajanian (1991) examined the impact of development on the status of women across the districts (Shahrestans) in Iran. The findings suggest that great inequality exists between men and women in all districts, but this varies with the level of development: gender inequality in education and health status decreases as development increases.

The findings of these studies indicate that despite the rise in GNP due to oil revenues (the shock in oil prices in 1973) the socio-economic condition of the Iranian population did not developed evenly. There has been no comprehensive examination of modernisation and development in Iran, with the exception of few studies done on population issues. Nevertheless, some modernisation indicators can be estimated by comparing the information of four successive censuses of Iran, 1956, 1966, 1976, 1986.

4.2.1. Population Growth Trends

The first national census of Iran was held November 1956 and thereafter it has been held every ten years. Prior to 1956, the only official population records that existed were figures for an urban headcount and the statistic of the Civil Registration Office which started operations in 1928 (Bharier, 1972).

Table 4.2 shows the estimates of annual population growth rates in the 20th century. The estimates suggest that in the first quarter of the century, Iran was in the first phase of the demographic transition model, with high fertility and mortality rates leading to low population growth. With the improvement of health, political centralisation and

Table 4.2: The Trend of Population and Growth Rate of Iran, 1900-1991

year	Population	Growth Rate
1900*	9,860,000	--
1926*	11,860,000	0.8
1934*	13,320,000	1.5
1940*	14,550,000	1.5
1956**	20,380,000	2.2
1966**	27,070,000	2.9
1976**	33,708,744	2.7
1986**	49,857,384	3.7
1991***	59,590,000	3.2
1995***	---	2.7

Source*: Bharier, J; 1972, backward estimation.
Source**: Iran Statistical Center, Census of 1956, 1966, 1976,1986.
Source***: The Economist International Unit, 1994.
Source****: The Official report

economic development mortality declined and, as a result, there was a higher population growth rate. At this stage, Iran entered into the second phase of demographic transition (see also Table 1.3). It was after the World War II that the mortality rate declined dramatically. With the expansion of international relations, nation states became interested in world cooperation on health issues. The establishment of the World Health Organisation was one result of this cooperation, which launched programs in preventive medicine, particularly to eradicate malaria, small pox, and many other infectious diseases. During the 1941-56 period, the rate of population growth was about 2.2 percent which was due to a drop in the mortality rate. This trend continued for decade 1955-66, but the population growth decreased in 1966-76, due to socio-economic development which involved checks on fertility behaviour in the form of family planning program.

In his analysis of this period, Aghajanian (1991) suggests two formal policies supporting the decline in the crude birth rate: (1) improvements in the social, legal, and economic status of women (including increased participation in the social and economic world outside the household); and (2) a commitment to population policy, particularly, fertility control, beginning in 1967. However, even with Iran's declining growth rate, in 1976 it was among the highest in the world. Moreover, the decline did not last long. Following the Islamic Revolution of 1978, the population of Iran increased to about 50 million in 1986, with an average annual growth rate of 3.8 percent, one of the world's highest (Iran Statistical Centre, 1987). Excluding the 1.8 million Afghani refugees, the average annual population growth rate still would be 3.4 percent, a dramatic increase from the 1966-76 period's 2.7 percent. Aghajanian (1991) has argued that two factors can account for this increase: (1) a decline in crude death rate and (2) an increase in crude birth rate. Specially, he argues that the population growth rate can be attributed to a decrease age of marriage for urban women, increases exposure to current fertility, and higher age-specific fertility rates for older women. According to Aghajanian, among social and political factors contributing to increased fertility, "redefinition of the roles of women in the context of Islamic society" after the establishment of Islamic Republic and the attempt to remove the "contamination from previous regime policies of Westernisation" can be accounted for this reverse trend. This redefinition has meant decreased female labour force participation, lower age of marriage, population policy and discontinuation of family planning, rationing system from the onset of war operated as an incentive for having more children.

Since 1986, the government of Islamic Republic of Iran has apparently recognised the pressure that a high rate of population growth places on available resources and has returned to population policies introduced in the pre-Revolutionary period. The government has taken a step in providing family planning services and training, and has paid more attention to the status of women. However, Hoodfar (1994: 11-17) has found a "contradiction between the recent population policy and gender roles in Iran". She argues that the Islamic Republic of Iran has, on the one hand, placed a major emphasis on education for women, as literacy and schooling rates are improving, and this has enhanced social and economic security of all citizens. It has placed great importance on the social and economic integration of women and on the improvement of woman's status, both in the family and society generally. On the other hand, "the gender roles and

Table 4.3: The Population and Growth Rate of Iran and Fars Province, 1966-86

	Popul-ation 1966	APGR 1956-66	Popula-tion 1976	APGR 1966-76	Population 1986	APGR 1976-86
Iran	27070000	2.9	33708744	2.7	4985384	3.7
Fars	1437065	3.9	1938824	3.0	3128847	4.8
Abadeh	97979	2.1	120428	2.1	176025	3.8
Shiraz	423104	4.3	631373	4.0	1288524	5.7
Laar	138191	4.2	125398	2.3	202436	4.5
Mamasani	87414	4.4	120243	3.2	158785	2.8
Neiriz	40604	4.3	49570	2.0	86082	4.6

Source: Census of Iran, 1956, 1966, 1976, 1986

APGR: Annual Population Growth Rate

female domesticity that government advocated as the cornerstone of its envisaged Muslim society are not easily reconciled with the improvement of woman's position and socio-economic integration" (Hoodfar, 1994: 11-17).

Table 4.3 presents separate population growth rate trends for the Fars province and the research sites, the five selected counties, for the 1956-66, 1966-76, and 1976-86 periods. Fars, in general, experienced a higher annual population growth rate during the last three decades (3.9, 3.0, and 4.8) with the most rapid growth occurring in the last decade. The research site had diverse population growth patterns. The rate for Shiraz in 1956-66 did not differ very much from other counties, except for Abadeh which had lower rate. But, during the following decades it displayed a more rapid population growth rate than the other counties (4.3, 4.0, and 5.7 respectively). In contrast to Shiraz, Mamasani's growth rate declined (from 4.4 to 3.2, declining again to 2.8). Laar and Neiriz show a similar trend in their population growth rate and a "U" pattern over the three periods. The annual population growth rate of Abadeh did not change during the first two decades (2.1) but increased rapidly to 3.8 during the last decade.

4.2.2 Urbanisation

Urbanisation is one result of modernisation: people seek a better life in the cities and towns than they expect to find in the countryside. The process of urbanisation is tied to both an increase in population and a revolution in agricultural productivity that accompanies industrialisation. The level of urbanisation (or percent urban) has been associated with numerous positive social outcomes such as technological innovation, economic progress, and higher standards of living (Teune 1988, Bradshow & Faster

1989) but has also been linked to social and environmental problems and to perceived mismatches between population distribution and economic development (Dogan & Kasarda 1988, Timberlake 1985). Urbanisation is also said to have made various functions of the traditional family insignificant and even dysfunctional (Wirth, 1938:21); modern women are more likely to be employed, marriage tends to be postponed, there is a growing desire to control births, and a shift from extended to the nuclear family patterns.

Urbanisation has been accelerating in Iran over the past decades (Table 4.4). In the 1950s, towns and cities accommodated some 31 percent of the population; by 1991, according to the Statistical Centre of Iran, 57 percent of Iranians were urban residents. In general, the rural population has grown more slowly, while the towns have experienced a rapid increase of more than 4 percent a year through a high rate of internal growth and expansion and through the entry of rural migrants on a large scale. Population expansion has been greatest in Tehran, as the growth of primate city. Perhaps the greatest causes of the population geography of the country have been increased government investment in health and welfare services, educational facilities, infra structural planning, and industrial and agricultural development policies. There is a marked contrast between rural and urban populations in terms of income, job opportunities, degree of literacy and standards of living.

4.2.2.2 Fars Province

Fars province demonstrates a diverse pattern in its urbanisation transition,

Table 4.4: Percent of Urban/Rural Residents of Population of Iran, 1901-1991.

year	% Urban	% Rural
1901*	21	79
1934*	21	79
1940*	22	78
1956**	31	69
1966**	39	61
1976**	47	53
1986**	54	46
1986**	57	43

Source*: Julian Bharier 1977; Backward estimation
Source**: Statistical Center of Iran, Census of 1956, 1966, 1976, 1986.

Table 4.5: Percent of Urban /Rural Residents of Fars and the Research Site, 1966-86.

	1966		1976		1986	
Area	Urban	Rural	Urban	Rural	Urban	Rural
Iran	39.0	61.0	47.0	53.0	54.0	46.0
Fars	40.0	60.0	44.7	65.3	52.5	48.0
Abadeh	29.5	70.5	33.1	66.9	45.5	54.5
Shiraz	68.3	30.7	71.0	29.0	80.1	19.9
Laar	27.1	72.9	31.0	69.0	33.1	66.9
Mamasani	6.0	94.0	9.1	90.9	16.0	84.0
Neiriz	39.7	60.3	38.0	62.0	36.2	63.8

Source: Statistical Centre of Iran, Census 1966, 1976, 1986.

particularly in the research sites (Table 4.5). The most urbanised county is Shiraz, with 80.1 per cent urban, based on the latest census (1986), because the provincial capital, Shiraz City, is located in this county. The least urbanised county is Mamasani with only 16 per cent urban. The trends and pattern of urbanisation among the counties differ. The most rapid changes have been in Mamasani whose rates increased 270 per cent between 1966 (6.0) and 1986 (16.0). The urbanisation rate of Neiriz decreased over the same time from 39.7 to 36.2 per cent. Laar had a moderate rate throughout the periods. Shiraz and Abadeh had a moderate rate during 1966-76 but a fast rate during 1976-86. The rapid urbanisation growth rate of Shiraz and Mamasani, to some extent, can be accounted for the invasion of Iraq troops to the adjacent province of Fars, 'Khozestan'.

4.2.3 Labour Force Characteristics

There have been marked changes in the composition of employment in different industries in the intercensus period, 1956-1976 (Table 4.6). Worth noting is the decrease of total percentage of employment in agriculture as this has important implications for rural-urban migration. The proportion of employment in agriculture has decreased from 46.2 in 1966 to 37.1 in 1976 and to 29 percent in 1986. Although manufacturing in the whole of the country has increased by 4.7 percent during 1956-66 period, there has only been a small increase in manufacturing as a percentage of total urban employment. In fact, manufacturing employment has decreased from 18.5 percent in 1966 to 13.2 in 1986 which is an indication of the decreasing level of industrialisation in this period.

In tertiary activities there has been little change in the percentages of employment

Table 4.6: Percentage employed population of Iran 10 years of age and over by major industry groups, 1956-1986.

Year	Agriculture, Animal Husbandry, Forestry, Fishing	Mining quarry	Manufacturing	Electricity, Gas, Water	Construction	Commerce, Transportation, Services	Not classified
IRAN							
1956	56.3	0.4	13.8	0.2	5.7	23.6	---
1966	46.2	0.4	18.5	0.8	7.4	26.7	---
1976	37.1	1.0	17.2	0.6	12.3	28.3	3.5
1986	29.0	0.3	13.2	0.8	11.0	42.5	3.6

Source: Statistical Centre of Iran, Census 1966, 1976, 1986

Table 4.7: Percentage employed population of the sample sites 10 years of age and over by major industry groups, 1956-1986.

	1966			1976			1986		
Counties	**Agriculture**	**Manufacture**	**Services others**	**Agriculture**	**Manufacture**	**Services others**	**Agriculture**	**Manufacture**	**Services others**
Abadeh	43.6	32.8	23.6	40.7	38.9	20.3	33.8	25.5	40.6
Shiraz	35.7	17.8	46.5	17.4	30.1	52.3	13.1	23.9	62.7
Laar	28.8	7.4	63.8	27.1	39.8	33.1	14.7	35.7	49.6
Mamasani	76.6	5.1	18.3	74.3	13.4	12.3	58.2	7.3	34.5
Neiriz	57.6	14.2	28.2	49.8	30.9	19.3	44.6	22.6	32.8

Source: Statistical Centre of Iran, Census 1966, 1976, 1986.

in the different service industries during the intercensal period, but during 1976-86, a tremendous increase occurred in commerce and services employment. There appears to have been a significant mobility of labour from agriculture to the construction sector during 1966-76 and also from agriculture to commerce and the services sector during the period 1976-86. But the proportion of the labour force in the manufacturing sector has actually declined during recent decades. The reduction of labour force in agricultural sector and its shift to the construction and commerce sectors can be accounted for in two ways: one, a population explosion, combined with Iran's limited land and water resources; and two, industrialisation was not good or expansive enough to absorb surplus labour.

4.2.3.2 Labour Force in Fars Province

The labour force patterns in selected counties of Fars province follows the general pattern Iran to some extent. Table 4.7 presents the percentage of employed labour force in three major industry sectors. All the selected counties have undergone reductions in their share of labour force in agricultural sector. The reduction was more severe in the case of Shiraz and Laar shahrestan during the last three decades. The manpower distribution of selected counties in 1966-76 indicates that Mamasani had a highest agricultural labour force rate while Laar had the lowest rate. The manufacturing sector showed an increase in its share of labour force from 1966 to 1976. Abadeh ranked first while Mamasani had the lowest rate in manufacturing. A reverse trend occurred in 1976-86. The service and other sectors had a negative growth rate in 1966-76, except in Shiraz. The reverse trend happened in later decade, 1976-86. All the counties had uneven growth in service and other sectors; Abadeh, Mamasani and Neiriz had comparatively higher growth rates (Table 4.7).

2.2.4 Literacy Rates

The lot of unskilled and semiskilled workers in Iran has been improving steadily as a result of rapid growth in the literacy rate in recent decades. Table 4.8 presents the literacy rate of the population 7 years of age and older. This literacy rate nearly doubled between the 1956 and 1966 censuses, the increases in literacy were greater for females than for males. While this trend continued in later decades, the literacy rate of female population is still much below that of the male population, illustrated the relative social status of women in Iran. Considering the population growth rate in 1986, the Islamic republic of Iran has to allocate a large proportion of its budget to the educational system. Fortunately, the budget devoted to education increased every year in proportion to population increases and particular attention was paid to higher education. Fars province literacy status (65.7%) is higher than the national average (61.8); and, as is the case for Iran as a whole, there are remarkable differences between the male (74.6) and female rates (56.3).

4.2.5 National Economy

Iran has undergone rapid and fundamental changes in its economic structure during the last three decades. In the years 1964-73 the changes were the result of positive policies but thereafter were the outcome of external, unregulated and potentially

Table 4.8: Literacy rate of population 7 years and over by sex, Iran/Fars, 1956-86

Sex	1956	1966	1976	1986	Fars/1986
Male	22.4	40.1	58.6	71.0	56.3
Female	8.0	17.9	35.1	52.0	74.6
Total	15.4	29.4	46.9	61.8	65.7

Source: Iran Statistical Centre, 1956, 1966, 1976, 1986.

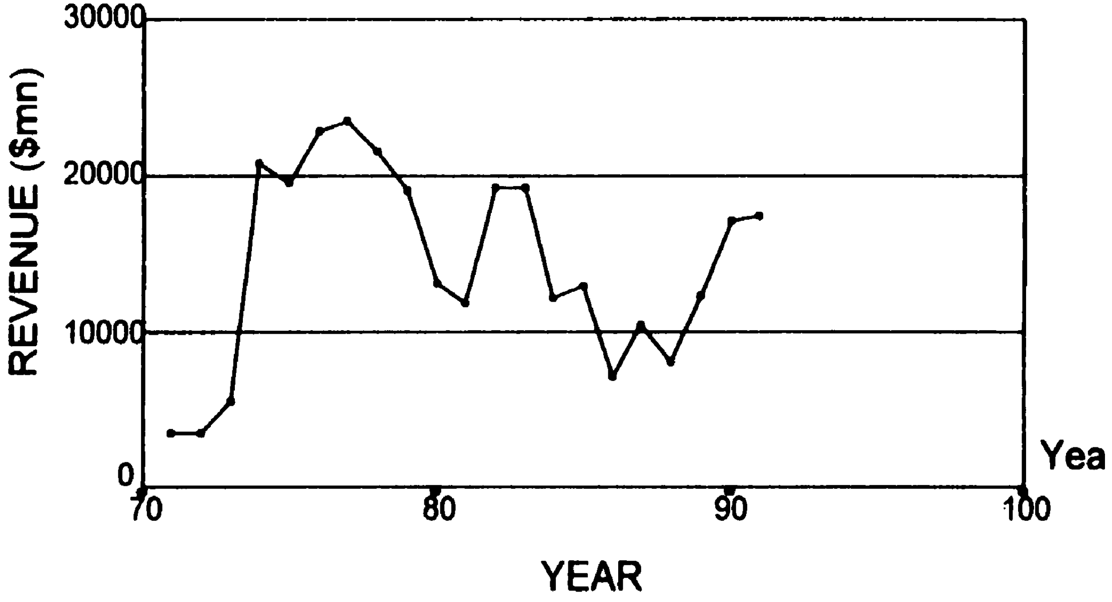
damaging pressures. The fifth five-year plan of the shah, prepared for the 1973-78 period, was designed to reinforce all major industrial projects and infrastructure investments begun under the previous plans. But, there were constant shifts in government policy as a reaction to the boom years based on oil revenues of the mid-1970s and to sharp falls in it later on. The post-revolutionary five year plan (1989/90-1993/94) was prepared to reconstruct the economy, emphasising agriculture and water projects, education, health, and social measures, but it confronted the constraints of a formal planning framework of Iranian regime and financial obstacles in the current conjuncture.

The role of oil has remained critical in Iran's economic structure, peaking at some 50 per cent of GDP at the time of the first shock in 1973/74. Oil and services combined contributed approximately 70-75 per cent of GDP in the second half of the 1970s. Therefore, Iran was more of an oil economy at the end of the Shah's reign than it had been at the beginning, and the revolutionary period has exhibited exactly the same tendency. Figure 4.1 displays the trend of the oil export revenues during 1971 to 1991. Overt state policies have aimed at reducing the importance of oil in the domestic economy, but the reality nonetheless has been a continuing oil dependence.

4.3. Socio-economic and Demographic Characteristics of the Sample

A brief review of the social and economic characteristics of also provides a useful context for interpreting the results and data analysis of the next chapter. Table 4.9 presents data on socio-economic characteristics of the sample, by rural and urban, and by

Figure 4.1: Oil export revenues



Source: OPEC, Annual Statistical Bulletin, in EIU subprovince.

Virtually all of ever-married women in the sample were married at the time of the survey (98.9 per cent being currently married). The proportion of currently married is slightly lower for urban versus rural woman. Instances of widowhood, divorce and separation also appeared to be very small for the population surveyed. A large proportion of woman (44.8 per cent), were married to relatives (i.e., endogamy). This rate is larger for rural versus urban areas, and the results also show regional diversity with the urban area, Laar (47.9 per cent), and the rural area, Neiriz (70.1 per cent) having the highest rates of endogamy.

Mother's illiteracy rate for the sample (ages 14-49) is 40.7 percent which is comparable to the 43.62 rate for population 7 years and above of Fars province. The three percent lower rate can be accounted for by the age-range differences and the prevalence of illiteracy for woman 50 years and above. There is a large difference between rural and urban areas and among the counties, in terms of mother's illiteracy rate. In urban settings, Shiraz (23.1) and Mamasani (23.3) have the lowest illiteracy rate; in rural settings, Shiraz (72.6) and Neiriz county (71.6) have the highest rates. Father's overall illiteracy rate is 24.8, comparable to 25.38 for the Fars province, and clearly much lower than the mother's. Further, father's illiteracy rate follows the same pattern as mothers in terms of regional differences.

"Working mothers" includes a wide range of occupations, mostly from agricultural, livestock labourer, or traditional handicraft labourer in rural settings to highly professional occupations in urban areas. Women are working in the farms along

Table 4.9: selected social and economic characteristics of the sample (percentage)

Variables	Abadeh		Shiraz		Laar		Mamasani		Neiriz		Total
	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural	
Married	99.3	99.5	98.7	99.0	98.6	98.9	98.9	99.1	98.8	99.5	98.9
Divorced	----	00.1	00.3	00.2	00.3	00.3	00.6	00.1	00.6	----	00.2
Widow	00.5	----	00.6	00.7	00.7	00.7	00.6	00.7	00.3	00.3	00.6
Separated	----	00.4	00.1	----	----	00.3	----	----	----	00.3	00.1
Endogamy	41.5	43.6	37.0	45.5	47.9	62.8	41.3	58.1	38.1	70.1	44.8
Illiteracy, mothers	27.0	46.5	23.1	72.6	38.9	54.3	23.3	43.9	25.2	71.6	40.7
Illiteracy, fathers	29.9	27.5	15.9	43.0	21.1	27.4	14.4	24.8	24.3	44.5	24.8
Working mothers	21.6	26.3	9.1	32.0	3.2	1.6	7.2	5.3	7.2	21.9	13.5
Good housing	67.9	33.4	91.3	34.5	35.0	26.5	45.4	34.7	59.2	23.4	53.9
Access to electricity	98.6	61.4	99.0	71.4	99.6	81.1	99.4	77.5	99.7	46.2	86.8
Access to piped water	98.3	93.0	98.7	88.3	99.2	81.o	99.2	78.4	99.1	86.3	92.9
Having bathroom	70.9	52.8	83.3	48.4	92.0	89.5	83.1	40.6	64.0	30.8	70.2
Abnormal delivery	7.8	6.3	13.1	7.3	8.5	8.0	6.6	6.8	3.9	1.9	9.3
Delivery place	93.3	68.3	91.5	53.3	77.1	52.0	93.1	75.1	78.7	14.7	74.4
Delivery aids	94.8	81.5	93.7	55.5	80.4	54.5	92.0	84.0	87.1	61.4	79.9
Normal Birth weight	76.5	66.0	79.5	66.6	60.5	50.4	76.7	73.9	71.2	35.4	69.6
Breastfed	54.2	60.9	48.1	60.9	44.6	41.3	55.0	65.7	53.9	73.2	49.4

Source: the survey data

with men of the households. Therefore, rural working mother rate is larger than the urban one. Being a working mother in urban setting can be considered a higher status compared to being a non-working mother. In urban setting Abadeh with a marked difference had the highest rate (21.6); and Shiraz occupied the second position. The lowest rate attributed to Laar county. In the rural setting, Shiraz and Abadeh had the first (32.0) and second (26.3) rank in terms of working mother.

"Housing status" is categorised into good and bad, according to building materials: dwelling units made of reinforced concrete, steel beam skeleton or break and iron were considered good, while those using other materials were considered bad. A slight majority (53.9 percent) of the housing was good, but there are differences between rural and urban settings and among the counties. Shiraz county (Shahrestan) has the highest rate of good housing condition compared to other counties. The rural area of Neiriz and the urban area of Laar had bad housing conditions.

Access to electricity and piped water are two important indicators of development that can be considered basic needs of a household. Results show that 86.8 and 92.9 percent of sample population had access to electricity and piped water respectively. The most disadvantaged region in terms of electricity access was the rural area of Neiriz (46.2) and in terms of piped water the rural area of Mamasani (78.4). But the sample population as a whole is better off than the country generally in these regards. (According to the 1986 census, 83.7 percent of Iranians used electricity and 73.7 percent used piped water.)

The availability of bathrooms can be considered as a household sanitation indicator. Of the sample population, 70.2 percent have bathrooms in their houses. The most disadvantage region is Neiriz both in rural (30.8 of the sample with bathrooms available) and urban areas (64 percent of sample population), and the most advantaged region is the urban area of Laar (92%).

The characteristics of maternal care of the sample give us a general view of access and utilisation of health system. Among the sample population, 74.4 percent of births were delivered at hospitals. There are a large differences in such hospital use between rural and urban and among the counties. The lowest rate occurs in the rural Neiriz (14.7 percent) and the highest in the urban areas of Abadeh (93.3) and Mamasani (93.1). Delivery aid is important in child mortality study. In the sample, 79.9 percent of deliveries had trained aides. The rural areas of Shiraz and Laar are considered as disadvantaged in this respect, while Abadeh and Mamasani can be considered as advantageous areas. This may influence precarious measures for abnormal delivery, as 9.3 percent of deliveries were reported as abnormal. Shiraz had the highest rate of abnormal, probably because complicated delivery cases were transferred to the city of Shiraz, which has best equipped hospital in Fars province.

A birth weight of 2500 grams is considered the threshold for "normal" birth weight. Among our sample, 96.6 percent of babies were "normal" at the time of delivery. The rural area of Neiriz had the lowest rate (1.9 percent abnormal) and the urban area of Shiraz had the highest rate (13.1). The breast-feeding status is also an important variable in this study, 49.4 percent of all the babies which borne alive were solely breast-fed. The lowest rate attributed to the rural area of Laar and the highest rate to the urban area of

Neiriz.

4.4 SUMMARY

In this chapter I have given a profile of the study area in three sectors: Physical characteristics, modernisation of Iran and the research site, and the socio-economic and demographic characteristics of the sample. Both the physical and socio-economic characteristic of Iran and the sample are heterogeneous. The modernisation process has also been characterised by fluctuations, following shaky patterns in the political economy of a dependent third world country. Since the population dynamics cannot be separated from the overall development process, the study of child mortality as a sensitive indicator of development will uncover some facts in this regard. The next chapter will discuss one of these dimensions, the level and pattern of child mortality.

CHAPTER FIVE

Infant and Child Mortality Levels, Patterns and Differentials

large numbers of deaths under five years age are not characteristic of most industrially developed areas, but for technically developing countries deaths within the age group of 0-4 years contribute heavily to the crude death rates. The high rate of foetal, infant and child mortality affects parents' attitudes toward a controlled family size. It is therefore important to arrive at accurate estimates of infant and child mortality along with some realistic assessment of the wastage of pregnancies by abortions, miscarriages and stillbirths. This information is of great relevance to national planners and administrators who are responsible for improving the quality of life and health programs of the people in different areas. The present chapter is an attempt to provide such information. It includes six sections: (1) definitions, (2) childhood mortality rates, (3) indirect estimation of childhood mortality rate based on the survey data, (4) pregnancy wastage, (5) survival rate analysis, (6) ever-wasted pregnancy.

5.1. Definitions and Calculations

The United Nations and the World Health Organization (WHO) have proposed the following definition of death: "Death is the permanent disappearance of all evidence of life at any time after birth has taken place--post-natal cessation of vital functions without capability of resuscitation" (WHO, 1950). The definition of a death can be understood only in relation to the definition of a live birth and excludes death prior to birth which is referred to foetal death (Shryock, Siegel and associates, 1976).

"Wastage" includes foetal deaths, infant deaths, and child deaths. It is an economic concept which indicates not only the loss of human life before or after birth, but also considers the loss of bringing up children who die before reaching adulthood. It has been estimated that expenditures incurred on children who never reach adulthood or the reproductive age in population with higher mortality would be almost 1.8 times that of a population with lower mortality rates (Saxena, 1971). Of course, the emotional costs of such deaths for the mental health of the mother and for the morale of the society are very great. Both, however, are overlooked by the simple wastage concept. More precise definitions are needed to prevent ambiguities.

5.1.1. Foetal Death

Foetal death refers to the expulsion of a premature foetus; it includes miscarriages, stillbirths; and induced abortions. Miscarriage refers to spontaneous termination of foetal life occurring early in pregnancy. Stillbirths refers to late foetal deaths, occurring between the 20th and the 28th week of pregnancy. Induced abortion is an purposely caused expulsion from the uterus of the product of conception in the early weeks of gestation period.

From technical viewpoint, abortion and miscarriage can hardly be distinguished. The recommendation of the United Nations and the WHO is to group all of these events together under the heading "foetal death" and to classify them as early, intermediate, and late according to the months of gestation (United Nations, 1992). This suggestion was implemented in the present survey and is reported in this dissertation.

5.1.2 Infant Mortality Rates (IMR)

The infant mortality rate (IMR), or the number of deaths per thousand live births during the first year of child's life in a given year, can be further divided into three categories, according to the survival period of the child after alive birth:

The Perinatal Mortality Rate indicates the number of deaths in the first seven days of life (early neonatal death) plus the number of late foetal deaths divided by the total number of births (live births plus stillbirths):

Perinatal mortality rate= (early neonatal + late foetal death)/(live birth + stillbirth)*1000

The Neonatal Mortality Rate indicates the number of deaths occurring within 28 days of live birth, per thousand in a given year. Neonatal mortality rates, unlike perinatal mortality rates, exclude the number of stillbirths (foetal deaths within 28 and 36 weeks of gestation period).

Neonatal mortality rate=(deaths within 28 days from births)/(live birth)*1000

The Post-neonatal Mortality Rate indicate the number of infant deaths from 28 days to under one year per thousands live births among infants having survived the neonatal period.

Post-neonatal Mortality Rate= (deaths between 1-12 months of life)/(live birth)*1000

The formula for the post-neonatal mortality rate does not express a true probability, because not all of the infant deaths in a given year occurred to infants born within the same year; some occurred to births of previous year and some deaths will occur in the following year. This problem is minimized here for two reasons: first, the unit of analysis is pregnant women in last five years and the infant mortality rates are based on the outcome of the pregnancies and the age of deceased children; second, because of fluctuations in the number of births between- and within-years, the study focuses on the under-5-years-old child mortality rate (U-5MR) which avoids distorted rate indicators.

This study presents infant and child mortality rates and foetal death rates during the last five years pregnancy experience of ever-married women up to the time of interview. The data enable a comparative study of infant and child mortality in rural and urban populations in different parts of the Fars province of Iran. They also enable the identification of socio-economic and demographic factors typically associated with high or low death rates among children in different age group. An attempt has been made here to interpret the results in the light of the data collection methodology used. The relationships between childhood mortality variables are studied against a set of independent variables in each chapter.

5.1.3 Child Mortality Rate (CMR)

There is no conventional method for the calculation of the child mortality rate, although it is usually defined as the total number of child deaths between the ages of 1-4 years, divided by the total live births in the same period multiply by 1000 (per thousand live births).

5.2. Childhood Mortality Rates

5.2.1. Direct Estimation

From the pregnancy histories collected in five counties of Fars province of Iran in 1991, a separate record was made for each live birth, matching it with information about the household and community. This "child file" consists of information on live births for 80 different communities (65 villages, 14 towns, and one city) which are grouped into five counties. An infant mortality rate could not be calculated for all communities because for many sample clusters (about 200 households), rural villages and towns, the proportion of child deaths is relatively low. Since the sample design was adopted to investigate the determinants of childhood mortality in Fars province, rather than the level and rates of child mortality at the sub-provincial level, an overall CMR was calculated and that rate is considered here. Thus, the infant and child mortality rates are based on the county-level (subprovinces or shahrestans), but community-level variables are taken into account, especially the characteristics of the rural and the urban sectors

Estimates of child mortality are presented in Table 5.1 express cumulative

Table 5.1: Cumulative Infant and Childhood Mortality Rates of the Sample, 1986-91.

	Urban			Rural			Total
Time period	Birth	Death	rate	Birth	Death	rate	rate
Late fetal (A)	9936[a]	129	13.0	7571[a]	121	16	14.3
Early neonatal (B)	9252[b]	70	7.5	7035[b]	63	9	8.2
Perinatal (A+B)	9936	199	20.0	7571	184	24.3	21.9
Neonatal (C)	9252	78	8.5	7035	80	11.4	9.7
Post neonatal (D)	9252	65	7.0	7035	104	14.8	10.4
Infant (C+D)	9252	143	15.5	7035	184	26.2	20.0
Child (1 To <5)	9252	21	2.3	7035	31	4.4	3.2
Conventional infant mortality	1490[c]	49	32.9	1196	86	71.9	50.3
Average Infant Mortality Rate for the same Shahrestan (Census, 1986)							57.1
Infant mortality Rate (Official announcement, 1992)							43.0

a: Total birth
b: Live birth
c: Survey data

perinatal, neonatal, post-neonatal, infant and child mortality rates between birth and the date of survey (0-4) of a five-year history of pregnancy.

Several differentials in Table 5.1 are worthy of note. First, overall results indicate marked rural-urban differences and, as can be seen by comparing the neonatal and post neonatal rates, these differences increase as the age of children increases. The rural-urban childhood mortality differential, particularly late post-neonatal mortality, is important in terms of the effect of socio-economic structure on the survival of children. Secondly, the conventional infant mortality appears to have decreased from the official rate of 57.9 to 50.3 for the same regions in a five year period. Thirdly, the perinatal rates are very high in both rural and urban areas, with a slight difference to the benefit of the latter. The estimates of geographical regions and differential will be discussed by a comparative table (Table 5.4) in next section.

5.2.2. Indirect Estimation

A complete maternity history collects not only the numbers of children ever born to a women, but also includes the information about all the pregnancies terminated by feotal wastage. Thus, such "mortality history" provides the information needed for application of indirect estimation procedures. These indirect estimates can be compared with direct measures. Because the numbers of births and deaths are identical for both methods, differences in the resulting estimates arise from different locations (explicit in the case of direct estimates, implicit in the case of indirect estimates) of events in the past.

Mislocation of births in the past and heaping of age at death on preferred digits, which are characteristic of data collected from developing countries, may however, substantially affect direct estimates particularly of the infant mortality rate. Of course changing fertility behaviour and its short-term fluctuations may affect indirect estimates (United Nations, 1991). Fortunately, data used here allow us to make a comparison between the two estimates.

Brass (1964) used models of fertility and mortality to establish the relationship between the proportion dead of children ever-born to women in a specified age group and the probability of dying by an exact age of childhood through the use of simple indicators of the age pattern of fertility, under the assumption of unchanging fertility and mortality. Brass' method provides an inexpensive and opportunistic approach to updating estimates of child mortality levels and trends.

The Brass method of indirect estimation is based on three assumptions:

a) Child mortality rates have been changing at a fixed rate for a considerable period in the past. This is one of the shortcomings of indirect estimation of child mortality -- it does not capture the full magnitude or exact timing of short-term fluctuations in child mortality, but it is able, other things being equal, to capture longer term trends (United Nations, 1992).

b) All children, regardless of the mother's age, are exposed to the same, homogenous mortality risks (United Nations, 1992). This assumption can be incorrect in at least one important respect, because mortality risk is not the same for groups belonging to different socio-economic statuses. Teenage motherhood, for example, is a risk factor that varies systematically with socio-economic status. Therefore, the indirect estimate of child mortality derived from women aged 15-19 should be treated cautiously on the grounds that it is frequently seriously bias, as well as unreliable, because of the relatively small numbers of events (United Nations, 1992).

c) Fertility has been constant for all age groups. The fertility changes in the past, particularly with regard to duration of marriage, can result in biased estimates of child mortality.

There are several versions of the Brass method, which differ in terms of the type of model used to simulate the quantities of interest. The two versions will use here are those proposed by Trussel (1975) and by Palloni and Heligman (1986). They differ mainly in that the former uses the Coale-Demeny (1966) regional model life tables to simulate mortality, while the latter uses the United Nations model life tables for developing countries.

The Trussell version is based on the Coal-Demeny regional model life tables, which have four variants: North, South, East and West. The Palloni-Heligman version based on the United Nations model life tables for developing countries, whose five variants are Latin American, Chilean, South Asia, Far Eastern and General.

The above-mentioned methods employed in this section of analysis are the refined Brass method discussed in detail in the United Nations Manual (1991). A microcomputer program for child mortality estimation, `QFIVE-UNITED NATIONS' (1990), was used for rural, urban and total areas of Fars province separately. The required raw data extracted from the survey data consist of the number of women by age group, the number of children dead as reported by women in age group, and the number of surviving children as reported by women in age group.

The estimates of the probabilities of dying by age x, q(x), yielded by different versions of the Brass method using all available mortality models are presented in Table 5.2 for rural, urban and total area respectively. Three sets of estimates, q(x), accompanied by the corresponding time reference are: q(1), that is, the probability of dying between birth and exact age 1, known as infant mortality; 4q1, the probability of dying between exact ages 1 and 5, known as child mortality; and q(5), the probability of dying between birth and exact age 5. also known as under-five mortality.

As the estimates obtained from 15-19 age group are not very reliable (given the problems with Brass' second assumption), the estimates obtained from the group aged 20-24 and 25-29 years old are usually taken to be closest to reality. It should be noted that, assuming there is declining mortality, children born to older women have experienced a higher mortality rate than children born to the younger women. The decline in the child mortality levels between the estimates corresponding to the younger and older women indicates that children born to older women were experiencing higher mortality levels. It is unlikely that this pattern is due to reporting errors such as recall lapse by the older women. If the estimates of q(1) are disregarded because they are associated with relatively low levels of probability of dying in model life tables, it can be seen that the estimates of the levels decline steadily, except in a few cases, with an increasing age of mother suggesting that child mortality has been declining.

As the output shows, it makes little difference whether estimates are derived using

Table 5.2: Indirect Estimates of Infant, Child and Under-Five Mortality in Fars Province of Iran, 1991. (per 1000 live bith)

Model	Age Group of women	Reference date	Both Sectoes q1	4q1	q5	Rural Sector q1	4q1	q5	Urban Sector q1	4q1	q5
Trussell (East)											
	15-19	1988.1	00	00	00	9	1	10	00	00	00
	20-24	1986.4	27	3	30	36	5	41	21	2	23
	25-29	1985.2	37	6	42	46	8	53	29	4	33
	30-34	1984.4	46	8	54	56	11	66	39	6	45
	35-39	1983.8	50	9	59	60	13	72	41	7	47
	40-44	1982.7	65	15	80	81	23	102	50	9	58
	45+	1980.1	63	15	76	72	18	89	53	10	62
Palloni-Heligman (Chilean)											
	15-19	1989.4	00	00	00	00	00	00	00	00	00
	20-24	1986.8	00	00	00	40	5	45	00	00	00
	25-29	1985.4	38	5	43	48	7	55	00	00	00
	30-34	1985.1	47	7	54	57	10	66	39	5	44
	35-39	1985.4	50	8	57	60	11	70	40	5	46
	40-44	1984.9	67	13	79	84	19	101	50	8	57
	45+	1981.6	66	13	78	76	15	90	55	9	64

Note: q value of 00 denotes value from table with life expectancy greater than 75.
Source: Calculated by the survey data, extracted from the computer output of QFIVE microcomputer program of United Nations.

the Trussell or the Palloni-Heligman version of the brass method. But it is better to consider how the mortality patterns in childhood of different populations vary and how the patterns of certain populations are close to a given mortality model. The choice of the `East' and `Chilean' model of life tables is based on known parameters of fertility and mortality schedules from the survey data, mostly of child mortality rates depicted in Table 5.1.

Table 5.1 reveals that mortality risks between age 1 and 5 are very low, compared with those below age 1. This pattern is similar to that of Chilean and East pattern, where the risks of dying between ages 1 and 5 are low with respect to those of dying in infancy, whereas, for example, model North is appropriate when the former are high compared to the latter; model West, falling in between those two, is a good compromise on an average model (United Nations, A/107, 1990). Thus, it is appropriate to focus on these two models for making comparison with the direct estimate.

Table 5.3 demonstrates a remarkable rural-urban differences, the same pattern seen using the direct method. Aghajanian (1994) in his attempts to study infant mortality trends and differentials in Iran has reviewed previous studies and has come to the same conclusion about these differentials. The estimates of direct and indirect method for urban area are quite close, but are not for rural areas, affecting the total result. In general, although the reference time of the direct method are more recent, the rural estimates are higher than those of the indirect methods. If some children that have died are reported as being alive or if dead children are omitted to a greater extent than living children, the mortality estimates obtained will be too low. The 1-4 mortality rates (4q1) seems to be

Table 5.3: Comparison between direct and indirect child mortality estimation method

Method	Urban			Rural			Total		
	q1	4q1	q5	q1	4q1	q5	q1	4q1	q5
Direct estimates* (1989-90)	30	2**	32	66	4**	70	46	3**	49
Indirect estimates (Trussell) (1985.2)	29	4	33	46	8	53	37	6	42
(Palloni-Heligman (1985.4)	--	--	--	48	7	55	38	5	43

* Direct estimates (conventional infant mortality rates) are based on last year infant deaths which are different from cummulative infant mortality rates based on the last four years infant deaths prior to the surey.

** 4q1 of direct estimates based on cummulative Childhood mortality rates during 5 years prior to the survey

Source: calculated by survey data, based on Table 5.1 and Table 5.2

underestimated, due to the same reasoning as the lapse of memory is the main common error in q(5) estimations.

There are some substantial regional differences in child mortality, as well as a discrepancy between the direct and indirect estimates (Table 5.4). According to direct estimates, child mortality appears to be worse in Neiriz (31.0) than in other counties, but it has the low rate in indirect estimates (35.0). Abadeh has the lowest child mortality levels out of the five counties in direct and second in indirect estimates. The Shiraz region ranks second in direct estimates and fourth in indirect estimates. The levels of childhood mortality (q1, 4q1 and q5) of some regions is unexpected. The official report of infant estimate (43) falls between the conventional infant mortality rate (50.0) and the indirect estimate (37.0).

According to Table 5.1, the infant mortality was 61.6 for Fars province and 57.9 for the five selected counties in the mid 1980s, when Iran was involved in war with Iraq. Considering the fact that for the time of survey the war was over and the distribution of resources (like health services, food, housing, and so on) was again focused on civilians, the fast decline of child mortality--from 46/1000 in 1991 (survey-based estimate) to 43/1000 in 1992 (official figures)--is not surprising. To some extent the unexpected differences and variations between the counties can be explained by variations in the sampling design (which is not representative at the county level), variations in rural and urban proportion, and the insufficient number of interviews in samples in some rural or urban areas (see also Table 3.2). It is important to point out that the estimates may have been affected by omission errors which characterise retrospective data collected in the

Table 5.4: Levels and geographical differences of child mortality estimates

Region	Direct Estimates q1	4q1	q5	Rank	Indirect estimates q1	4q1	q5	rank
Abadeh	12.0	3.0	15.0	1	30	9	38	2
Shiraz	19.0	2.8	21.8	2	38	6	44	4
Laar	21.7	4.3	26.0	4	41	7	48	5
Mamasani	20.0	2.3	22.3	3	28	4	32	1
Neiriz	26.0	4.8	30.8	5	31	4	35	3
Total	19.2	3.1	22.4		37	6	42	

Source: Calculated by the survey data

developing countries (Brass et al; 1968). Since infant mortality for young mothers (15-19 yrs.) is particularly liable to error, due to the small number of children born, and as this age group has an above-average infant mortality risk, the rate is presented as zero (000) in the indirect estimates.

One possible interpretation of the rural-urban and regional differentials might be that, as social and economic developments proceed, certain groups and regions receive the benefits of improved education, housing, sanitation and public health before other groups or areas. According to this view, differentials could be expected to widen before eventually narrowing as a result of more widespread diffusion of the benefits of the above-mentioned parameters. While this is quite plausible, it must be noted that the differentials themselves may changed for the reasons quite independent of such a process. For example, selective rural-urban migration may attract more educated individuals with lower child mortality rates to larger urban areas like Shiraz and thus increase the gap between child mortality rates in rural and urban regions.

In following chapters, the residential and geographical differentials will be analyzed with regard to socio-economic, demographic, and environmental variables. Before doing this it is better to see the child mortality by survival function and other related rates, in order to portray the pattern and trend of pregnancy wastage in general and child mortality in particular.

5.3. Pregnancy Wastage

According to Valaoras (1954), "Each human generation is known to be heavily depleted almost at its inception, during the relatively short period of the nine months of gestation and the first year after birth. The loss of life occurring during this period far exceeds the mortality of any other segment of human life of equal duration." The situation was, and for the most part remains, much worse in the developing countries. Our data for infant mortality confirms this claim, as about 90 percent of infant mortality in both rural and urban areas occurred in the first six months of births (see Table 5.1).

Evidence from national and international experience of family planning programmes clearly indicates that one of the major bottlenecks discouraging the general acceptance of family planning is the high incidence of infant and child mortality, leading to parents' fears and uncertainties about the survival to adulthood of their existing children (Kaur, 1978).

In Iran, although accurate data on pregnancy and child wastage are still lacking, it has been estimated that loss of human life in terms of total wastage of pregnancies and infant and child mortality is probably among the highest in the world. This tremendous waste of human resources in terms of the mother's health and of social, economic and emotional energy, caused by the loss of life prior to and within one year of birth is considered to be a problem prevalent in developing countries in general and Iran in particular.

The ratio of the number of spontaneous abortions to the total number of pregnancies during five years prior to the survey is very high regarding the fast decline in

TABLE 5.5: Miscarriage per 1000 pregnancies by regions and counties

	Urban			Rural			All sector		
Counties	Pregn	Misc	Ratio	Pregn	Misc	Ratio	Pregn	Misc	Ratio
Abadeh	1177	69	58.6	941	57	60.5	2118	126	59.5
Shiraz	6599	435	65.9	2840	205	72.2	9439	640	67.8
Laar	1466	130	88.6	1572	152	96.7	3038	282	92.8
Mamasani	361	27	74.8	1432	68	47.5	1793	95	53.0
Neiriz	333	23	69.0	782	53	67.8	1115	76	68.2
Total	9934	684	68.8	7571	535	70.6	17505	1219	69.6
Tehran (hospital survey, 1978)*									66.2

Source: Calculated from the survey data; * IFRP
Misc = miscarriage

infant mortality rate in the last decade (Table 5.5). The data of the IFRP's (International Fertility Research Program) Maternity Care Monitoring study between July 1977 and July 1978, a study that yielded standardized data on family planning, breast-feeding patterns and management of labour and delivery from over 30 countries in the developed and developing world (including Iran), showed that among 15403 women who had deliveries in one of Tehran's hospitals (The Queen Farah Maternity Hospital) previous pregnancy outcomes consisted of 13208 live births, 1175 deceased, 158 stillbirth, and 862 spontaneous abortions. The ratio of the number of abortions to the number of pregnancies is equal to 66.2 per thousand (the mean of the last pregnancy interval was 20 months) which is close to the 69.6 figure for 1986-1991 of the survey data. It may not appear appropriate to compare the two settings, since one is the metropolitan capital of Iran and the other the rural and urban areas of Fars, a southern province of Iran. But data in the present survey demonstrated that, in spite of remarkable childhood mortality differentials between the rural and urban areas, their difference in foetal death ratio is negligible, so making comparison between Tehran city and Fars province seems reasonable.

Between-group variations show that Laar has the highest foetal death ratio among the counties, contrary to the fast decline in its infant mortality rate. However, foetal death is hard to pin down. Sometimes the products of conception were not recognized as such when they were passed and, in other instances, an unduly copious flow at the regular menstrual period might have been considered a miscarriage when in fact it was not. It is probable, however, that the frequency of foetal death s occurring in this population was much greater than the actual number stated (Mashayekhi, Mead, Hayes, 1977). As induced abortion is illegal in Iran and violation of this law carries a severe punishment, the rate of spontaneous abortion seems to be a very artificially high. In cases where there are no official registration or statistics on abortion, individual surveys may provide data. However, where abortion is illegal providers may not be willing to give the information in order to protect the women's confidentiality and to avoid prosecution. Moreover, non-medical providers may be difficult to identify, and self-induced abortions are also missed.

5.4 Survival Rates Analysis

Analyzing survival data by event-history methods opens new avenues for the study of social transition that are not possible using traditional continency table approaches. Life table analysis is the most common method for survival analyzes. The life table, also referred to as the mortality table, is a statistical device used to present the mortality experience of a population aggregate in a form that permits the analysis of survival data. Survival data may include survival time, response to a given treatment, or patient characteristics related to response and survival.

Surveys can be used to collect data about time successive actor either prospectively or retrospectively. In a prospective (longitudinal or panel) study, an aggregate of individuals or units is followed up in order to obtain the needed information over time. In the retrospective approach, the subjects selected for the study are asked to report their past experiences. Irrespective of whether data are derived from prospective or retrospective studies, life table construction requires information on the following dates:

1. Date of study entry (date of randomization)

2. Failure date (date of experiencing the event of interest)

3. Date of exit from the study (date of censoring)

4. Stopping date (cutoff date) - for example, the last follow-up date in clinical studies, interview date in surveys, or the end of observation period in observational studies (Namboodiri and Suchindran, 1986).

The life table method was used to develop estimates and plots of survivor, density and transition functions. The total cases (live births) were entered into the model beginning when the mother was at least 15 years and their survival or death was gradually examined over five year or sixty month periods, with the number entered decreasing as the survival time increases. The life tables are constructed for both the rural and urban areas.

The first column of Table 5.6 shows the time interval in years starting from respondents' aged 15-49 for the previous five years. The second column represents the number entered at the beginning of survival, is total number of cases = 17258 pregnancies. This column covers all births, which means that all dead infants were alive at the starting time and as the time progressed infants died at uneven rates. The structure and pattern of births and deaths are distributed in age intervals (ages 15 through 49) as depicted in column 3 through five. In fact, these columns represent the transition from birth to death. Column 3 depicts the number of births drawn from the total pregnancy pool and the fifth column shows the number of terminal events, here the number of infant deaths in unit of interval. For example, in interval starting 15 (column 1) 17258 cases

Table 56: Survival data of child mortality by age of mother at pregnancy

Intrvl Start Time	Number Entrng this Intrvl	Number Wdrawn During Intrvl	Number Exposd to Risk	Number of Termnl Events	Propn Termi-nating	Propn Sur-viving	Cumul Propn Surv at End	Proba-bility Densty	Hazard Rate
15.0	17258.0	234.0	17141.0	4.0	.0002	.9998	.9989	.0002	.0002
16.0	17020.0	421.0	16809.5	8.0	.0005	.9995	.9984	.0005	.0005
17.0	16591.0	641.0	16270.5	11.0	.0007	.9993	.9978	.0007	.0007
18.0	15939.0	701.0	15588.5	22.0	.0014	.9986	.9963	.0014	.0014
19.0	15216.0	886.0	14773.0	16.0	.0011	.9989	.9953	.0011	.0011
20.0	14314.0	922.0	13853.0	22.0	.0016	.9984	.9937	.0016	.0016
21.0	13370.0	945.0	12897.5	25.0	.0019	.9981	.9918	.0019	.0019
22.0	12400.0	959.0	11920.5	27.0	.0023	.9977	.9895	.0022	.0023
23.0	11414.0	936.0	10946.0	18.0	.0016	.9984	.9879	.0016	.0016
24.0	10460.0	894.0	10013.0	26.0	.0026	.9974	.9853	.0026	.0026
25.0	9540.0	974.0	9053.0	17.0	.0019	.9981	.9835	.0019	.0019
26.0	8549.0	885.0	8106.5	15.0	.0019	.9981	.9817	.0018	.0019
27.0	7649.0	830.0	7234.0	13.0	.0018	.9982	.9799	.0018	.0018
28.0	6806.0	735.0	6438.5	24.0	.0037	.9963	.9762	.0037	.0037
29.0	6047.0	714.0	5690.0	14.0	.0025	.9975	.9738	.0024	.0025
30.0	5319.0	709.0	4964.5	16.0	.0032	.9968	.9707	.0031	.0032
31.0	4594.0	635.0	4276.5	11.0	.0026	.9974	.9682	.0025	.0026
32.0	3948.0	635.0	3630.5	9.0	.0025	.9975	.9658	.0024	.0025
33.0	3304.0	524.0	3042.0	11.0	.0036	.9964	.9623	.0035	.0036
34.0	2769.0	535.0	2501.5	8.0	.0032	.9968	.9592	.0031	.0032
35.0	2226.0	508.0	1972.0	10.0	.0051	.9949	.9544	.0049	.0051
36.0	1708.0	393.0	1511.5	11.0	.0073	.9927	.9474	.0069	.0073
37.0	1304.0	300.0	1154.0	9.0	.0078	.9922	.9400	.0074	.0078
38.0	995.0	282.0	854.0	5.0	.0059	.9941	.9345	.0055	.0059
39.0	708.0	181.0	617.5	3.0	.0049	.9951	.9300	.0045	.0049
40.0	524.0	156.0	446.0	3.0	.0067	.9933	.9237	.0063	.0067
41.0	365.0	108.0	311.0	.0	.0000	1.0000	.9237	.0000	.0000
42.0	257.0	73.0	220.5	2.0	.0091	.9909	.9154	.0084	.0091
43.0	182.0	65.0	149.5	.0	.0000	1.0000	.9154	.0000	.0000
44.0	117.0	39.0	97.5	1.0	.0103	.9897	.9060	.0094	.0103
45.0	77.0	33.0	60.5	1.0	.0165	.9835	.8910	.0150	.0167
46.0	43.0	21.0	32.5	.0	.0000	1.0000	.8910	.0000	.0000
47.0	22.0	9.0	17.5	.0	.0000	1.0000	.8910	.0000	.0000
48.0	13.0	5.0	10.5	.0	.0000	1.0000	.8910	.0000	.0000
49.0+	8.0	7.0	4.5	1.0	.2222	.7778	.6930	**	**

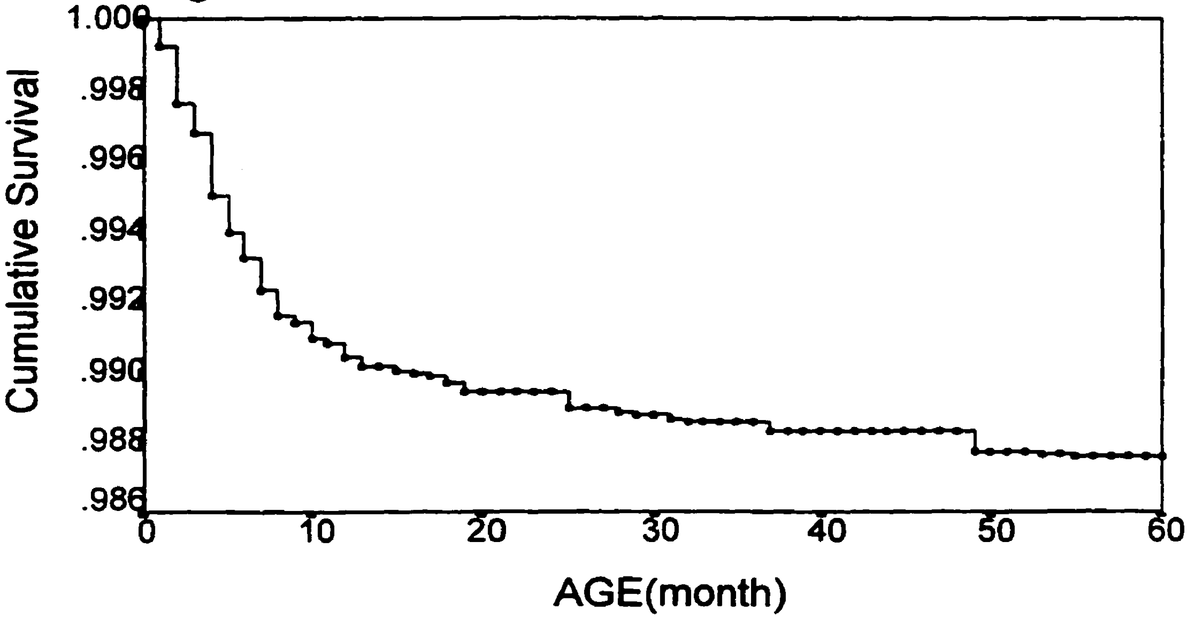
** These calculations for the last interval are meaningless.
Source: Calculated by the survey data

(pregnants) were entered into model (column 2), and 234 cases were drawn for the specific interval (column 3), then the population at risk decreased to 17141 (column 4), and 4 cases out of these 234 died (column 5).

Columns 6 to 8 present the proportion value of terminating and surviving events, death and survivals. Column nine indicates the estimate of the probability of death occurring in an interval for a case that has made it to the beginning of the interval. It is computed as the number of deaths divided by the number exposed to risk of dying. Column 10, the proportion surviving is 1 minus the proportion of deaths (column 9). Column 12, the probability density, is an estimate of probability per unit time of experiencing death in the interval. Hazard rate, column 13, is an estimate of the probability per unit time that a case that has survived to the beginning of an interval will experience death in that interval. The values of probability function and hazard rate are very close to each other. The survival analysis of rural and urban areas calculated similarly is in Appendix C1.

Further, survival analysis was run in order to depict the probability of surviving for the age of children by month starting from first month during the five years survey (60 months in column 1). More than 90 percent of mortality occurred within the first 7 months (column 5). Both the direct and indirect estimates support Chilean pattern of child mortality in Fars. The cumulative survival function, plotted on Figure 5.1, also displays the pattern. The plot shows that the survival function has steps. That is, it is only at each of the observed event times (deaths) that the estimate of the survival function changes. It is constant for all times between two adjacent events. The steps are very steep in the first

Figure. 5.1 Survival of Children born alive



Source: the survey data

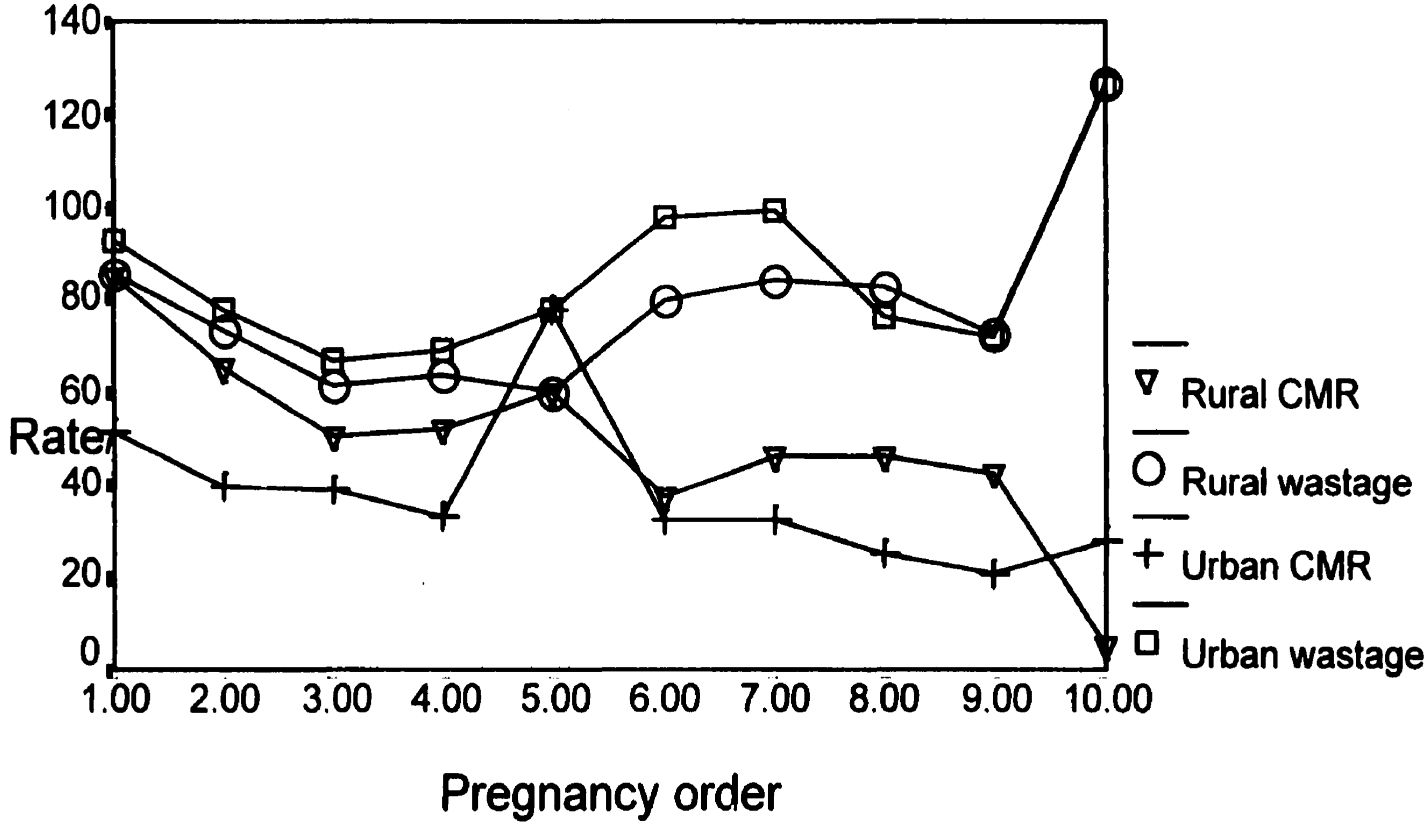
year (first 12 months). In conclusion, child mortality occurs predominently in the first 12 months of age (for the details see the Appendix C2).

5.5 Ever-Wasted Pregnancy

In this section, I look at the event-history aggregate data of live births, abortions, and child deaths that occurred to the women in the sample during of their reproductive ages up to the time of interview. The rate of the foetal death s plus deceased children to pregnancies are calculated separately for rural and urban areas and plotted in Figure 5.2. The rural wastage tends to be lower than that for urban areas but they follow the same J-shaped pattern. The reasons for the wastage of children in the first order of pregnancy can most likely be explained by the low age of marriage and resulting low pregnancy age and, secondly, by the low standard of living in (in absolute and relative terms) especially in rural areas which affects the nutrition and the health conditions of the mother, foetus, and baby. There are greater variations between the rural and urban areas with regard to deceased children versus foetal wastage. The incidence of deceased children, unlike foetal death , is low for higher order pregnancies. This impact is due to the lower frequency of pregnancy events as women approach the end of their reproductive periods when, in contrast, the wastage increases. The high risk of feotal wastage in pregnancies beyond the 10th order can be attributed to biological factors and greater pregnancy complications.

It is more convenient to represent these differentials at the county level. Table 5.7 shows the percentage of sum of abortions and deceased children for rural and urban areas

Figure 5.2: Pregnancy Wastage



Source: The survey data

by county, from which the following conclusion can be drawn:

5.5.1 Deceased Children

a) the risk of death children in rural areas (24.7) is almost twice that in the urban ones (13.6).

b) The rural areas of Shiraz county have the highest rate of deceased children; but its urban areas have the lowest rate.

c) The rural areas of Abadeh and Mamasani have the lowest rate of deceased children among the rural areas.

5.5.2 Feotal Wastage Rates

a) Rural-urban wastage differentials are not as great as deceased those for children (27.3 for urban and 30.2 for rural, with similar values for each county, excepting Mamasani).

b) Rural wastage for Shiraz and Laar are high; and in the urban areas Laar and Mamasani have the highest rates.

c) The data and the results of ever-foetal wastage agree to the results of child mortality rates that are analysed above.

5.6 Summary

The analyses here indicate that there has been a remarkable decrease in childhood mortality in past decade. However, marked rural-urban differences also exist, with infants born in urban areas having more than twice the chance of survival as compared with rural-born infants. On the other hand, the data show dramatic infant mortality differences among the five geographical regions (counties). The pattern of child mortality appears to

Table 5.7: Ever-wasted Pregnancy of women, Fars, 1991.

County	Urban		Rural	
	Miscarriage%	Deceased%	Miscarriage%	Deceased%
Abadeh	23.7	18.0	23.9	18.6
Shiraz	27.0	11.6	33.1	29.7
Laar	32.8	18.9	37.2	26.3
Mamasani	31.5	14.1	22.9	18.0
Neiriz	26.1	13.5	27.2	22.7
Average	27.3	13.6	30.2	24.7

Source: calculated from the survey data

be similar to the "Chilean model" in which infant mortality (0-1 year) is more prominent than mortality for the 1-4 year age group. There is little difference between the foetal death rates of rural and urban areas.

The following chapters will examine the socioeconomic and demographic factors explaining these differences.

CHAPTER SIX

INFANT AND CHILD MORTALITY AND SOCIO-ECONOMIC DIFFERENTIALS

The socio-economic conditions of people in a community have a strong impact on its mortality level. These factors affect childhood mortality through nutrition, sanitation and supply of pure water. Socio-economic conditions create differentials in access of these basic items. One factor that is consistently observed by researchers (Aghajanian, 1994; Gubhaju, 1991) and by experts of international organizations (Irfan, 1986; Ahmad 1986; Kwon, 1986; Zheng, 1986; Utomo and Iskandar, 1986; Porapekkhan, 1986; United Nations, 1992, 1991, 1987, 1985) is that the high mortality of developing countries is associated with, among other things, poverty, illiteracy, malnutrition, inadequate quality of housing, a lack of personal and environmental hygiene and low level of immunity. Obviously, there is a feedback mechanism at work here, whereby socio-economic development affects mortality levels and, in turn, mortality levels affect the socio-economic and demographic structures of a country.

This chapter will evaluate various socio-economic differentials in childhood mortality in the Islamic Republic of Iran, especially in the area of the study. Four types of variables have been chosen as socio-economic indicators: educational attainment, occupation or employment status, household assets and the respective residential backgrounds of mother and father. To determine the relative importance of the types of variable groupings, and to evaluate their relative significance in explaining the childhood mortality differences of children at ages 0-4, two types of analyses are presented. First, bivariate analyses provide cross-tabulations of neonatal and postnatal mortality differences with regard to the socio-economic indicators, with the 1991 survey results being compared to those from a 1976 survey of Iran (Tables 6.1 to 6.4). Second, multivariate, logistic regression analyses are shown in an attempt to predict the occurrence of child mortality (i.e.,to estimate the probability that child mortality occurs), as well as to identify the variables that are most useful in making such a prediction.

6.1. Bivariate Analyses

6.1.1. Urban versus Rural Residence

There are differences between urban and rural areas in economic development, culture, education, and medical and health care. Urban areas[1] are generally more developed than rural areas in these aspects, which are associated with lower mortality. The residential background of the parents consists of three variables: father's place of birth, mother's place of birth and her current residence, where residence is categorized as either urban or rural.

Table 6.1 presents the infant (0-1) and child mortality (0-4) rates by selected

[1] Urban areas are defined in Iran, and for the present study as well, as places with 5,000 inhabitants or more.

socio-economic variables for the survey data. For all three indicators of residential background, an urban background is found to be associated with lower mortality in both infants and children aged 0-4. Comparing father's to mother's birthplace, one finds that the former is a slightly better predictor than the latter in urban settings and much a more significant one in rural: 100 (urban) and 117 (rural) for father's birthplace, 93.5 (urban) and 138.8 (rural) for mother's birthplace. Comparing these IMRs with those from the five years prior to IFS survey, two conclusions can be drawn. First, mortality rates decreased dramatically during this period; secondly, the ratio between rural and urban IMRs, though still large, has been steadily narrowing (from 1.57 to 1.34).

Infant and childhood mortality, for both urban and rural areas defined by the type of current residence, are higher than those for the equivalent areas defined by the type of place of birth. This observation indicates that the mortality of children born to parents who have migrated from rural to urban areas is placed in between that of children born to rural non-migrants and that of children born to urban non-migrant.

6.1.2. Education

Social scientists very often use the level of education as an index for socio-economic status (Kitagawa and Hauser, 1973; and Bucharest Conference 1974). This general observation is supported in the current analysis of Iranian counties where education is the most influential factor in predicting people's social and demographic behaviour. Children born to parents with a higher levels of education are exposed to much less risk of dying than

Table 6.1: Mortality Rates by Some Socio-economic Characteristics of the Survey Data (1991) with Comparison to the IFS of Iran (1978)

Characteristics	Mortality Rates 5 years prior to the Survey				IFS*
	N (16031)	IMR (0-1)	CMR (0-4)	P Value Sig level	IMR
Place of residence:				0.000	
Urban	9094	88.5	121.7		91.1
Rural	6937	118.5	175.4		143.4
Mother's birthplace:				0.116	
Urban	12531	65.0	93.5		85.8
Rural	3500	83.5	138.8		134.2
Father's birthplace:				0.370	
Urban	13204	70.0	100.0		--
Rural	2827	66.5	117.0		--
Mother's Education:				0.007	
No education	6660	115.5	240.0		133.1
Some primary	3525	92.0	133.0		73.1
Complete primary	2697	78.0	100.6		72.8
Some secondary	1537	54.0	69.8		38.8
High School or More	1842	38.5	51.1		14.8
Father's education:				0.003	
No education	4088	116.0	185.5		136.1
Some primary	3453	92.0	150.5		123.2
Complete primary	3344	92.5	114.6		89.5
Some secondary	1981	82.5	118.8		86.8
High School or More	3343	89.0	114.3		26.1
Mother's work status:				0.007	
Homemaker	15530	92.0	137.8		140.9
Working	601	63.5	--		114.2
Father's work status:				0.004	N.A.
Professional	245	84.0	--		--
Commercial	1823	65.0	103.0		--
Clerical	3935	66.0	116.5		--
Semi-professional	173	38.0	158.0		--
Services	3111	74.0	108.0		--
Retail traders	416	110.0	149.5		--
Laborers	7072	111.5	168.4		--
Unemployed	679	102.0	182.6		--

IMR : Infant Mortality Rate; CMR: Child Mortality Rate
Source: calculated from the survey data
*Source: Aghajanian, A. (1994) "Infant Mortality Trends and Differentials in Iran," Fayetteville State University.

those where parents had a lower level of education. This is true for both infants and children aged 1-4. The reasons for this marked difference is straightforward: more highly educated parents provide their children with better care, health and nutrition and such parents have fewer children on the average, with wider birth intervals. The relationship between the educational level of parents and childhood mortality is thought to be strongly influenced by fertility behaviour which will be discussed and analysed in the next chapter.

Several studies have observed that the mother's education is a more influential factor for CMRs than father' education (Kwoon TH, 1982, 1986; Aghajanian, 1994). A similar result emerges when comparing father's and mother's education by CMRs from the IFS survey data, as Table 6.1 shows. The pattern of childhood mortality coincides with that of fertility differences which is considered an important intermediate variable in differentiating infant mortality. Mother's education may indicate a household's social status or it may act independently, as Caldwell (1983) suggests. The mechanism through which the mother's education affects child survival is the greater role educated mothers play in family decision-making in allocating resources, i.e. the distribution of food among its members and access to resources to modern medicine (Caldwell, et al, 1983). Women's status and their power in decision-making in child spacing and family planning is also important. This mechanism could be very important in the context of Iranian socio-cultural system where the authority of women is very limited (Aghajanian, 1994). The result of present study is consistent with the other studies. When comparing my CM variations in terms of Fathers' and mothers' education the latter presents explains the variation better than the first group. It also seems that CM differentials between the levels of education has narrowed, which can be explained by the other socio economic, demographic and societal factors.

All these factors --education, occupation, income, place of residence, and demographic factors-- seem to have operated simultaneously in Iran. For example, educated mothers exhibit higher labour force participation than uneducated ones. This possible linkage between mother education, her participation in the labour force, and the infant mortality experiences of her merits further investigation. The relationship between infant mortality and education and occupation of the father follows the same pattern. In the following sections, we consider the influence of household assets and occupation on infant mortality.

6.1.3. Occupation

In general, occupation has a considerable influence on the variation in mortality levels. For child mortality in particular, the influence appears to be rather strong. In the current data, a marked difference was observed in the child mortality in terms of mother's work status. The bivariate analysis shown in Table 6.1 suggests lower infant and child mortality for babies born to working mothers. The relationship between child mortality and mother's work status is complex. On the one hand, working mothers have higher education and knowledge of appropriate care for both healthy and sick children and they usually know how to access resources. Such women also have relatively more power in decision-making, especially in family planning, and contribute to the family income, which all affect child mortality. On the other hand, leaving the children to uneducated relatives or baby-sitters may increase child mortality. According to the survey, data 13.5 percent of the cases are working mothers. The child mortality rates for working mother appears to be much lower than for homemakers. These results are comparable to those of the IFS study.

There are, however, some differences in child mortality in terms of father's occupation. Children with fathers in professional and commercial positions have the lowest risks of mortality. The highest risk is found among children whose fathers are labourers (farm or nonfarm) or who are unemployed. Table 6.1 shows that CMRs (0-4) for commercial and clerical fathers are 103.0 and 116.5/1000 respectively and for retail traders, labourer, and unemployed are 149.5, 168.4, and 182.6/1000 respectively. The rate for professionals was not calculated because there were too few observations.

In the agricultural sector there are differences in child mortality between household heads who own their lands compared to landless farmers. The separation of farmers who work their own land from waged agricultural workers is complicated by the frequent presence of an intermediate group: semi-proletarianised farmers (Behm, 1991) This issue has been developed in the analysis of family assets (land, garden, cattle and sheep) in the following section of this chapter.

In the non-agricultural sector it is difficult to define some 'retail traders', where children are at the greater risk of infant and child mortality. In the present study, retail traders had very high levels of IM and CM.

6.1.4. Family Assets

The financial situation of the family is assumed to be inversely related to child mortality. Family (or household) incomes are usually used as the indicator of financial situation in studies of child mortality. When the family has a good income, then its members will enjoy better nutrition, housing and access to the health resources and, as a result, they should experience lower infant and child mortality. However, it is not always an easy matter to obtain such data. In societies where the rates of illiteracy are high, and where the cultural characteristics are such that the people cannot trust the interviewer on financial matters and mistake them for governmental officials evaluating the interviewees' for tax collection, it is better to inquire about assets rather than direct questions about their monthly or annually income. This procedure was employed in this survey in order to determine their level of standard of living in terms of economic indicators. Two different indicators were used for rural and urban areas, because their settings are different. Generally speaking, those households owning for listed asset items are to be considered as having higher income and, therefore, it is expected they will have lower child mortality rates. I constructed a simple asset index by adding the number of items (assets) in a household. Each item is coded 1 if the household owns it, 0 if it does not, with the index ranging from 0 to 10. The count of the items (1) for each individual constitutes the index of its household asset. If a family, for example, owns all of the items in urban setting the index is 10, if they posses more the index's, then, correlated the asset index and child mortality to assess possible associations between CM and family assets.

Table 6.2 and 6.3 show both the frequency distribution of household assets and the results of the correlation analysis. There is a negative correlation between child mortality and family assets but it is not strong enough (-0.014 and -0.037, for urban and rural setting respectively) to reach statistical significance.

The level of income in rural areas mostly depends on landholding and the size of animal holdings, and Table 6.4 presents frequency distributions for these indicators. The data suggest that wealth is unevenly distributed in rural settings and that the majority of population are landless or own no animals. However, these indicators are not mutually exclusive, since there are families who own both land and animals. Therefore, a solid conclusion cannot be drawn unless a multiple analysis is run to detect the best predictors among these items, as is done later in this chapter.

6.1.5. Regional Differences

Regional variations in mortality exist in almost every country of the world (Ruzicka, 1982; Ahmad, 1986) and occur primarily because of the differential access that individuals have to amenities available for prevention and treatment, and because of household socio-economic differences. The former will be discussed in chapter 7, the latter is discussed here.

In Fars province, a marked regional difference exists in mortality rates in terms of the level of socio-economic development of its divisions. Since place of residence, parent's education, and occupation are considered the most influential socio-economic variables and social class background indicators of CM differentials, regional variations

Table 6.2: Frequency Distribution of Household Asset in Urban Areas

Assets items N=9252	Percent	
Stove	82.0	
Car	24.5	
Freezer	15.6	
Colour T.V.	26.4	
B & W T.V.	63.1	
Dish washer	8.0	
Refrigerator	89.9	
Vacuum cleaner	22.4	
Washing machine	37.6	
Stove with oven	15.9	
Spearman correlation		
Asset index (count=1)	-0.014	P=0.010

Source: calculated from the survey data

Table 6.3: Frequency Distribution of Household Asset in Rural Areas

Assets items N=7035	Percent	
Stove	91.4	
Iron	18.6	
Radio	57.7	
Fan	56.3	
T.V.	51.2	
Motorcycle	29.4	
Bicycle	11.5	
Cassette player	37.6	
Refrigerator	62.8	
Sewing machine	63.8	
Spearman correlation		
Asset index (count=1)	-0.037	p=0.010

Source: calculated from the survey data

Table 6.4: Frequency Distribution of Household Property in Rural Areas

Asset	N=6992	Percent
Land		
landless	4224	60.4
< 1 hectare	433	6.2
> 1 hectare	2335	33.4
Garden		
no garden	6067	86.8
< 1 hectare	451	6.4
> 1 hectare	474	6.8
Sheep		
no sheep	5235	75.0
< 100	1687	24.0
> 100	70	1.0
Cow		
no	5564	79.5
yes	1428	20.5

Source: calculated from the survey data

in such differentials can be considered with regard to parents' education and occupation.

A. Place of Residence

Both direct and indirect estimates of child mortality (Chapter 5) show remarkable CM differences in terms of rural-urban place of residence. Since amenities are distributed by the population size, one can argue that the population size of the place of residence may play an important role in development and consequently on child mortality of the area. But this is not the case for present study in urban setting. Rather, the distance of a town from the capital city of Shiraz and being located in the main road, Tehran-Esfahan-Shiraz which connects the north and south of the country, determine the high levels of CM (Neiriz, Norabad) and the low levels of CM in the urban setting. It may be that proximity to the main road provides a better socio-economic and health status indicator for inhabitants of these towns. Table 6.5 shows the variation of child mortality in terms of the population size of urban areas.

B. Education

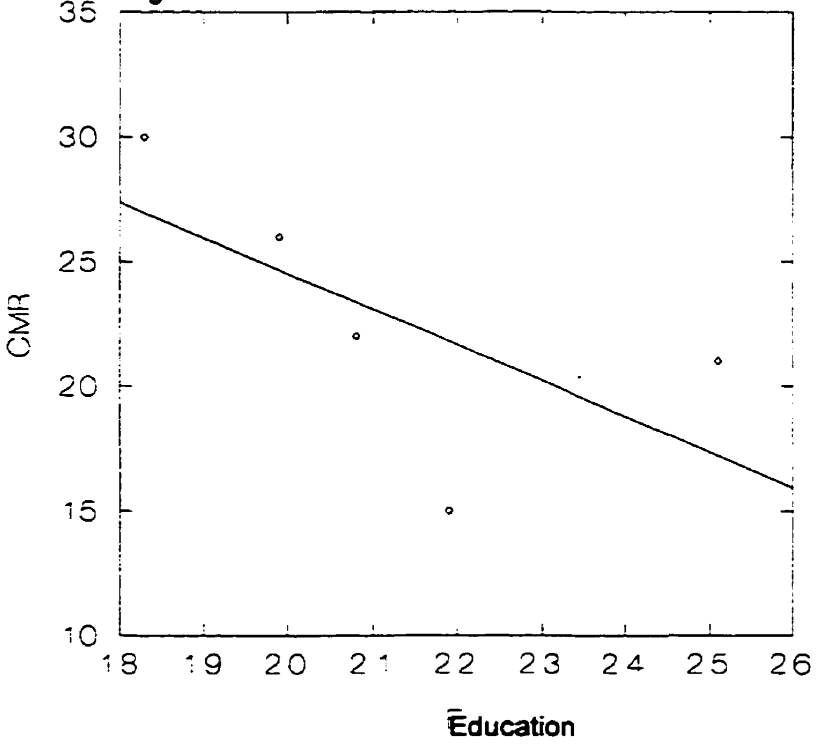
According to the Iran Statistical Centre data 33 percent of 15-49 age group of Fars population were illiterate in the year of the survey data were collected. These survey data indicate a similar educational level (Mean=33%) as 40.8 and 25.1 illiteracy rate for women and men respectively at the same age group. The similar illiteracy rates of Fars population and that of the survey may suggest the representativeness of the sample. The mean educational and mortality levels of the five regions of the research site were

Table 6.5: Cumulative Child Mortality Rate by population size of the Urban areas

Urban Name	population	Number of Cases	CCMR
Shiraz	1,024,142	5290	15.0
Kherameh	17,781	341	15.5
Kavar	13,048	345	15.1
Sarvestan	12,745	338	22.0
Zarghan	15,451	274	15.7
Abadeh	44,967	302	17.7
Saghad	9,364	274	19.5
Sorian	8,818	294	7.1
Dehbeed	9,222	303	10.5
Laar	42,226	310	17.5
Evaz	13,438	366	26.6
Gerash	19,989	359	18.6
khonj	12,365	432	25.5
Norabad(Mamasani)	33,913	366	35.4
Neiriz	34,114	333	38.7
Spearson correlation coefficient	-0.144	P=0.6	

Source: calculated fron the survey data

Figure 6.1: CMR and Education



compared and are illustrated in Graph 6.1. Regions with higher educational level (compared to the mean of the regions), do not have lower CM level. The standard regression coefficient (-0.65) is not significant at the 0.05. Multivariate analysis is required to examine the net effect of the two variables.

C. <u>Occupation</u>

Parent's occupation is used as an indicator of socio-economic status. The bivariate relation between child mortality and parent's occupation, by geographical division, is given in Table 6.6. The results indicate that regions having more skilled father' occupation or working mothers, like Abadeh, Shiraz, and Mamassani, have lower CM, a relationship which is clear if unskilled father's occupation is taken into consideration. The distribution of regional child mortality differences in terms of mother's working status does not support the idea that regions have higher proportion of working mothers have lower child mortality. It should be mentioned that the proportion of working women is very low, below 10 percent in urban areas and there is no independent working status in rural areas. So it is not a good indicator to apply for regional differences analysis.

6.2. MULTIVARIATE ANALYSIS

It is well established that socio-economic variables are interrelated. For example, one's occupation is closely related to one's educational level. In order to investigate the effect of occupation on child mortality it is necessary to control for the level of education.

Table 6.6: Cumulative Child Mortality Rate by Working Status for Men and Women by Geographical Regions

Occupation Divisions	N=17507	CCMR*	Women			Men		
			Homemaker	Working	labourer	Skilled	Unskilled	Labourer
Abadeh	2062	15.0	96.3	3.3	0.4	52.0	24.6	23.4
Shiraz	9439	21.8	89.8	6.1	4.1	45.8	30.9	23.2
Laar	3048	26.0	97.3	2.5	0.1	56.3	22.3	21.4
Mamassani	1793	22.3	94.6	5.2	0.2	55.8	29.8	14.4
Neiriz	1115	30.8	95.9	3.8	0.8	27.8	44.7	27.5

Source: Calculated by the survey data
* CCMR: Cumulative Child Mortality Rate

Table 6.7: Logistic Regression Coefficient for Regression of Child Mortality on Socio-economic Variable

Independent Variables	N=16031	Model I B(S.E)	Model II B(S.E)	Model III B(S.E)
Residence (urban)	9094	-0.28*** (0.05)	-0.23*** (0.05)	-0.21*** (0.05)
Mother's Education				
No Schooling	4060		0.16 (0.10)	0.05 (0.11)
Primary	6767		-0.08 (0.10)	-0.14 (0.10)
Secondary	4785		-0.39** (0.12)	-0.34** (0.12)
Higher Education	419		---	---
Father's Occupation				
Skilled	7654			-0.21* (0.08)
Unskilled	4731			-0.05 (0.05)
Constant		-3.74***	-3.66***	-3.59***
-2 Log Likelihood		3507.53***	3492.38***	3485.14***
Model Chi-Square		31.50**	16.04	8.77
Residual Chi-Square		27.70***	42.9***	50.12***

* Significant at 0.05 level
** Significant at 0.01 level
*** Significant at 0.0001 level

Source: calculated from the survey data

Father's occupational status, as mother's, is linked to other socio-economic characteristics and can be regarded as social class indicator. Behm (1991) argues that when the father has a less skilled occupation and lower social status, it is more probable that socio-economic conditions adverse to the child's survival exist in the family: low income; low maternal educational level; poor housing; and other conditions that are not usually measured, such as the persistence of beliefs inconsistent with healthy child-care practice and limited access to and use of health services. This is evident from above mentioned bivariate analyses. The reduction of this association, when family socio-economic characteristics are controlled, indicates that they represent some of the intervening mechanisms through which the father's occupation affects the child's health. Indeed, this is revealed by multivariate analyses.

Logistic regression models are estimated for the independent variables defined above for children born during 5 years prior to the survey. Table 6.7 presents logistic estimates of the effect of a set of socio-economic characteristics on the children born during these 5 years. Forward stepwise variable selection was used.[2] Model (1) shows that residence (rural versus urban) has the largest score statistic, so it is entered into the model. Child mortality decreases by a factor of 0.28 (B=0.28) for urban residents when compared to those of rural areas. In another words, rural areas versus has negative effect on the probability of child mortality. In the second step, mother's education variable has

[2] In forward stepwise regression, at each step, the variable with the smallest significance level for the score statistic (by default 0.05) is entered into the model and deleted if it is not less than that level.

the largest score statistic and meets entry criteria, so it is entered next. The model chi-square increased from 27.7 to 42.9, indicating that there has been a significant change in the model. Also, the regression coefficient for place of resident diminishes from -0.28 in model 1 to -0.23 in Model (2), indicating the pure effect of place of resident when controlling mother's level of education. Mother's education has four categories from no education to university level. The first category, mothers with no education, displays a higher child mortality (B=0.16)[3] as compared to the average effect of all categories. CM decreases by a factor 0.08 when mother's education level shifts from `no education` to elementary school and also decreases by a factor of 0.39 when it shifts from elementary to high school. In the third step, father's occupation is introduced into the model. Model chi-square decreases dramatically, indicating that there is a big change in the model. Father's occupations were recoded in three category: skilled, unskilled and labourer. The skilled fathers has lower CM compared to the average effect of all categories (B= -0.21). CM increases by a factor 0.05 when father's occupation shifts from skilled to unskilled. Other variables -- father's education and work status of mothers, are deleted due to their insignificance for the score (Wald) statistic. The best model predicting childhood mortality is Model (3) which includes residence, mother's education and father's occupation.

Logistic regression was used for all the asset variables simultaneously. Since the

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3 The "deviation" coding scheme was adopted here. The logistic regression coefficient in deviation scheme tells us how much better or worse each category is compared to the average effect of all categories. The value of the last category is not displayed , but it is the negative sum of the other categories (SPSS Inc, 1991).

asset index is different for rural and urban areas, two separate programs were run for rural and urban settings. The results are shown in Table 6.8 and 6.9 respectively. In rural settings, three specific assets show significant effects on child mortality: sheep, land, and motorcycles. This explains that the financial situation in rural setting depends on the ownership of land and cattle. Motorcycles are popular and efficient transportation device in rural areas and they can have a major role both in enhancing the economic situation and in facilitating to access to resources in rural areas. The other items are probably not that important in rural life. In urban settings, none of the items of asset index have significant relationships with child mortality. The only explanation can be made is that either having these items do not have effect on child mortality or the list of items is not a good index of financial situation of family.

6.3. SUMMARY

Among the three types of socio-economic variables (education, occupation and residence), the rural-urban residence, mother's education and occupation proved to be the most important explanation of mortality differences for children aged 0-4, when controlling for other socio-economic variables. It was also observed that father's education and mother's working status has insignificant relationship with child mortality differences. Family assets in the urban setting did not play a major role in child mortality differentials, but having land and sheep which are considered the main source of income had a significant relationship with child mortality, as did motorcycles. In general, if we

Table 6.8: Logistic Regression Coefficient for Child Mortality on Family Asset Variables in Rural Sample Setting, Fars, Iran, 1991

	---------------------Variables in the Equation------------------				
Variable	B	Wald	df	Sig	Exp(B)
Gas Stove(1)	-0.11	0.38	1	0.53	0.89
Radio(1)	0.05	0.12	1	0.72	1.05
Cassette Player(1)	-0.02	0.02	1	0.89	0.97
Iron(1)	-0.20	0.69	1	0.41	1.22
Sewing machine(1)	0.03	0.07	1	0.79	1.03
Refrigerator(1)	-0.16	0.80	1	0.37	1.17
Fan(1)	-0.04	0.05	1	0.81	0.96
Television(1)	0.04	0.05	1	0.81	1.04
Bicycle(1)	-0.01	0.00	1	0.94	0.98
Motorcycle(1)	-0.35	5.48	1	0.02	0.70
Van(1)	-0.17	0.77	1	0.38	0.84
Land(1)	0.27	4.43	1	0.03	1.31
Garden(1)	-0.15	0.82	1	0.36	0.85
Cow(1)	-0.09	0.39	1	0.53	0.91
Sheep(1)	-0.37	6.00	1	0.01	0.68
Constant	-3.60	97.84			

Source: calculated by the survey data

Table 6.9: Logistic Regression Coefficient for Child Mortality on Family Asset Variables in Urban Sample Setting, Fars, Iran, 1991

----------------------Variables in the Equation--------------------

Variable	B	Wald	df	Sig	Exp(B)
Car(1)	-0.09	0.88	1	0.34	0.90
Black & White TV(1)	-0.02	0.06	1	0.80	0.97
Colour TV(1)	0.24	2.26	1	0.13	1.27
Dishwashing Machine	-0.44	2.05	1	0.15	0.64
Washing Machine(1)	0.08	0.64	1	0.42	1.08
Vacuum cleaner(1)	-0.07	0.26	1	0.60	0.92
Freezer(1)	0.04	0.06	1	0.79	1.04
Refrigerator(1)	0.11	0.77	1	0.37	1.12
Gas stove, small(1)	-0.21	1.11	1	0.29	0.80
Gas stove, big(1)	-0.24	1.73	1	0.18	0.78
Constant	-3.60	131.60			

Source: calculated by the survey data

reconsider the mechanism by which these factors operate in the context of development of residential areas, it may be revealed that structural or environmental factors have more effect on child mortality than socioeconomic ones. What remains to be examined, however, are other demographic and-bio-physical factors. These are the subjects of the following chapters.

CHAPTER SEVEN

CHILD MORTALITY DIFFERENTIALS AND DEMOGRAPHIC FACTORS

7.1. The Effect of Infant and Child Mortality Upon Fertility Behaviour

The possible effects of I/CM on attitudes and fertility behaviour can be subdivided into two components: (1) the effects at the community level, and (2) the effects of individual experiences of child loss (Heer and Hsin-Ying Wu, 1975). Differences in the community level of infant and child mortality can plausibly affect the behaviour and attitudes of married couples who do not lose a child, as well as those who do. In communities with high level of I/CM, couples try to have additional children as insurance against the possibility that one or more of them may die in future, in order to preserve the desired number of children. Individuals suffering from child loss compensate for this loss by having additional children.

The current study is designed so as to be able to test the effects of infant and child mortality on fertility behaviour both at the community and the individual levels. At the community level, the ever-pregnancy history of the respondents and the outcomes (living children, dead, and pregnancy wastage) are examined. At the individual level, the relationship between some individual bio-demographic and social factors are studied.

7.2. The Community Level of Child Survival and Fertility

In his study of 24 Asian countries (accounting for 3.1 billion or 56 per cent of the world's population), Freedman (1995) suggests that three explanatory variables caused recent fertility declines there (39 percent since the mid 1960s): mortality decline, broad social and economic development, and family planning programs. He argued that mortality declines everywhere precedes fertility declines. Improved survival rates for children meant that when women were in the their 30s they increasingly had alive the number of children they wanted. Formerly, much larger numbers of births had been required to achieve desired family size. Lower mortality also resulted in the higher rates of population growth, which made policy makers concerned about reducing fertility and consequently interested in family planning programs.

Table 7.1 displays fertility behaviour and its wastage for both rural and urban areas of the Fars, based on the survey data. The average age of first marriage for rural areas (15.96) is lower than that for urban areas (17.00). Thus, rural women enter into their active reproductive periods sooner than urban ones. From 4142 rural respondents there were 41399 ever-pregnant cases (average of 10.0 per respondent) of which 6.0 percent resulted in death and 7.4 percent in wastage. Similarly, for the 6523 urban respondents there were 42571 ever-pregnant cases (average of 6.5 per respondent) of which 4.4 percent resulted to the death and 8.1 percent resulted in wastage. Considering the mean ages of respondents in rural (28.93) and urban (28.70) areas, the observed fertility rates (pregnancy frequency) seem to be very high. CM is higher in rural versus urban areas, whereas the reverse pattern is true for wastage.

Table 7.1 gives a clear picture of fertility behaviour and its relationship with the mortality and wastage rates. According to the hypothesis, the greater the risk of child

Table 7.1: The cumulative pregnancy, survived, dead, and wastage ratio of the women interviewed, Fars , Iran, 1987-91.

Region	N	pregnancy*	Survived**	dead**	wastage**
Rural	4142	41399 (10)	35856 (86.6)	2491 (6.0)	3052 (7.4)
Urban	6523	42571 (6.5)	37243 (87.5)	1877 (4.4)	3451 (8.1)
Total	10665	83970 (7.9)	73099 (87)	4368 (5.2)	6503 (7.7)

Source: Calculated by the survey data; ratio in ( )
* Ratio = total pregnancies/total women interviewed
** Ratio = Survived, dead, or wastage/total pregnancies

death or pregnancy wastage, the greater will be the fertility rate to insure the ideal size of the family. By comparing average pregnancies and the ratio of CM in rural (10 and 6 percent respectively) to urban settings (6.5 and 4.4 percent), for our survey sample, our analysis consistent with this hypothesis. Of course, to avoid misinterpretation, this relationship should be considered in light of the value of children in the household economy. Since the cost child rearing is lower in rural than in urban areas, and since children can be used as a cost-free labour force in farm and grazing land, rural parents intend to have more children than urban ones. It is worth noting that this interpretation is not contrary to the theory of "demographic change and response" presented by Kinsley Davis (1963) which focuses on the calculation of individual choice. Rather, these results are in the same direction. Individual behaviour, in part, is determined by interactions with others in the community. These interactions can, under certain conditions, produce an all-around psychosocial development and perception and thus influence behaviour.

7.3. The Individual Level of Child Survival and Fertility

In fact, the community level of infant and child mortality have influence upon fertility through affecting the individual couple's perception of the chances of child survival in the community. Five bio-demographic factors are found to be important predictors of child survival (Chidambaram, McDonald, Brucher, 1987): sex of the child, age of the mother at time of child's birth, birth order, multiplicity of the birth, and length of the previous birth interval.

In a study of child survivorship and pregnancy spacing in Iran, the effects of previous pregnancy outcomes, breast-feeding and contraceptive use on birth spacing were examined in Tehran (Janowitz and Nichols, 1980). Outcomes of previous pregnancies, particularly the most recent, significantly affected the length of the pregnancy interval and breast-feeding, and improved survivorship, increasing the length of pregnancy intervals most when it resulted in greater use of contraception and when breast-feeding was commonly practised for extended period.

In this study, the effect of four variables on childhood mortality are examined: sex of infant, age of mother at the time of birth (pregnancy age), birth (pregnancy) order, and breast-feeding.

7.3.1. Sex Differential

Sex of the child is commonly used as a demographic variable in infant mortality differentials in developing and underdeveloped societies. Death rates during the first year of life tend to be higher for males than for females, and the differences can be expected to appear right from birth (Chidambaran, Mcdonald, Brucher, 1987, P: 875). This was confirmed by the WFS survey that 27 out of 29 countries revealed the excess of male infant mortality to the female with the exception of Jordan and Syria (Rustein, 1983). The sex ratio of mortality is more balanced after infancy except for three countries: Egypt, Pakistan, and Bangladesh (Hobcraft, McDonald and Rustein 1985). Sex differentials of childhood mortality in Bangladesh follows a special pattern which does not conform to the pattern in most societies where male mortality predominates during both the neonatal and post-neonatal periods (Chen, 1981).

Greater female infant mortality has been observed through various studies of Iran. During 1974-75, the Iran Statistical Centre survey shows a 110/1000 female IMR as compared to a 101/1000 male IMR (Iran Statistical Centre, 1977), though the reverse pattern was observed in Fars province in the past decade. According to IFS data, the 1971-1975 IMR for Iranian females is 121, and for males 117 (Aghajanian, 1994). Disaggregating 1986 Iranian Census results for the Fars province (61.6 overall IMR) shows 68.7 for males and 54.2 for female. Further, rate differences widen if calculated by rural and urban residences (SIDC 1990). One possible explanation for the reversal in the past decade is the change in pattern of child mortality. As mentioned in chapter 5, more than 90 percent of child mortality of survey data occurred within the first 8 months, and also 48 percent of rural and 52 percent of urban CCM occurred within the first month of birth. Since biological factors benefit female babies during this period of infancy, the sex-specific results of CCM are under the influence of early neonatal mortality rate. To test this explanation, the sex-specific CMRs are useful.

Table 7.2 presents a clear picture of sex differential of CCM in Fars. Although sex differentials in overall CMRs do not appear striking, a breakdown of CM into *neonatal* and *post-neonatal* components presents a very different picture. Neonatal rates for males (25.7) are significantly higher than those for females (10.7), which agrees with findings from research from other developing countries. Conversely, female post-neonatal rates (23.0) are significantly higher than male rates (19.9), a tendency which is further accentuated for infants aged 1-4.

There is a marked sex difference in neonatal infant mortality in both rural and

Table 7.2: Sex Differential of Child Mortality of Fars province of Iran (percentage)

Sex Death	N	Rural Female	 Male	Urban Female	 Male	Total Female	 Male
1-10 day	133	8.8	22.0	13.0	30.4	10.7	25.7
11-29 day	25	4.9	3.0	1.9	2.5	3.6	3.0
1-12 month	165	28.3	19.5	16.1	20.5	23.0	19.9
12-60 month	48	7.8	5.4	8.7	4.3	8.2	4.9
Total*	371	49.8	50.0	41.7	60.7	45.4	53.5

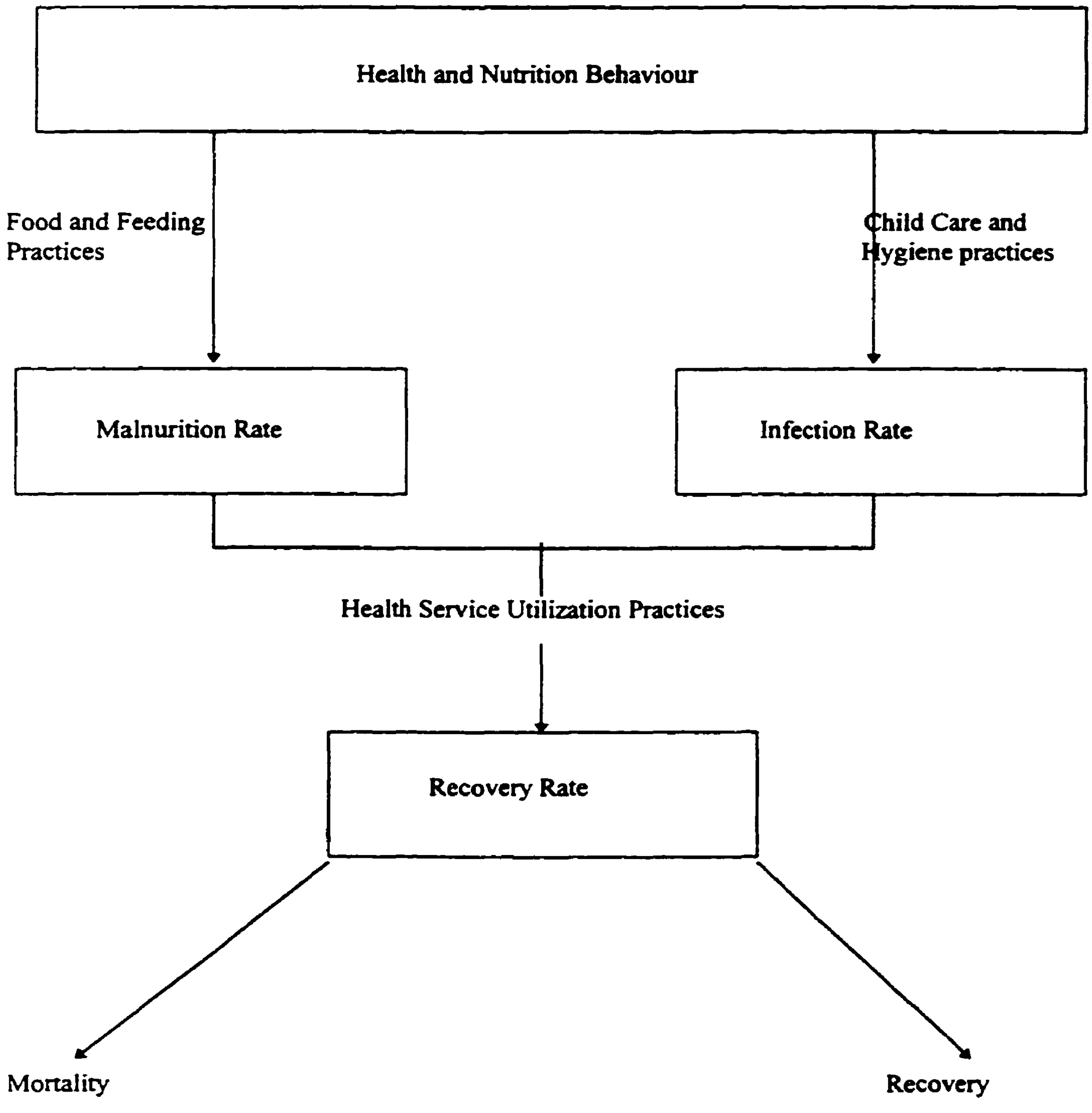
* The no-answer cases are extracted from the calculation.
-The difference between the total and the addition is related to the rounding errors.

urban areas. These findings are similar to those in the study of childhood mortality in rural Bangladesh (Chen, 1981) and supports those for Egypt, Pakistan and Bangladesh (Hobcraft, McDonald and Rustein, 1985), and probably reflects a "selective neglect" of female children, regardless of the sex composition in a family (Ahmad, 1986). The survey data demonstrate two different trends in infant mortality rate in terms of sex differences for rural and urban settings. The 1-12 month IMRs in rural areas are higher for females (28.3) than males (19.5), whereas the reverse trend observes in urban areas (16.1 female, and 20.5 male).

As is typical in traditional societies like Iran, there is a marked sex preference favouring male children, which is manifested in preferential access to food and health care for them (Chen, 1981; Aghajanian, 1993). This attitude is more prevalent in rural/agricultural sectors and among less-educated people, being rooted in the economic value of children in a traditional society or as a means of household or family security in dealing with threats of invasion or trespassing in conflicts in tribal society

Chen (1981) has examined the behavioural variables accounting for sex differentials of childhood mortality and a framework conceptualizing the mechanisms by which sex-biased health and nutritional behaviour might produce sex-differences in CM (Figure 7.1). In fact, Chen's framework can be considered as a part of "Life Affecting Variables" model suggested by Mahadevan (Mahadevan, 1990). Both Chen and Mahadevan conceptual framework are summarized in the social organization which determines the cultural, political and economical social systems (see also: Child Mortality Model, Figure 2.1). In traditional societies, the value of children is determined by their

Figure 7.1: Chen's Framework of Health and Nutritional Determinants of Child Mortality



participation in household economies and social security. In the previous four decades, the structure of the Iranian population has changed. According to the 1956 census, 68.6% of the population was rural of which a marked proportion were nomads. A smaller part of the society lived in cities and most of urban centres consisted of residential areas with more than 5000 population which were not modernized. Patriotic and extended families favoured male children in order to increase their labour force for farming and grazing and also to further the social security both inside and outside of household. Since there was no formal or public social security, parents depended economically on sons for in their old ages.

7.3.2. Age of Mother at Time of Birth

In developing countries, neo-natal and infant mortality are known to vary according to the mother's age at the time of birth, regardless of the overall level of risk in the community. The relation tends to be J- or U-shaped, with high mortality for children of teenage mothers, relatively low mortality for those children of mothers in their twenties, and steep rises in mortality with increasing maternal age (Nortman 1974). WAS results showed that infant mortality rates varies with maternal age according to a J- or U-shaped curve. Without exception, morality of children born to teenage mothers were higher than that for children born to mothers aged 20-29. Further, in the majority of the 29 countries surveyed, discrepancies were found to continue into subsequent years of life (Rutstein 1983). Table 7.4 shows that the IFS data follows the same pattern. The MR is 162/1000 live births in the case of teenage mothers, with the rate decreasing as the age of

Table 7.3: Childhood mortality by mother's age at birth for South Korea 1956-1970 birth cohort (per hundred)

Mother's age at birth	Child 0-4	Infant (0)	Childhood 1-4
24 or less	8.45	5.32	3.31
25 - 29	7.53	4.98	2.69
30 or more	7.37	5.78	1.69

Source: Kwon Tai-Hwan, (1986). Mortality and Health Issues: The trends and patterns of Mortality and Health in the Republic of Korea, Asian Population Studies Series, NO. 76, pp, 19.

Table 7.4: The relationship between the selected bio-demographic variables with childhood mortality and pregnancy wastage

Variables	N (17509)	1986-91 Survived (%)	died (%)	wastage (%)	1974/75 IMR* /1000
Age of Mother					
20>	3194	86.94	2.40	10.6	162.6
20 - 29	8995	91.82	2.20	5.95	101.1
30 - 39	7495	91.60	1.94	6.30	113.7
40 - 49	524	90.60	1.53	7.82	174.8
Chi-sq	(0.34)				
Birth Order					
1	10700	93.43	1.76	4.80	137.1
2	5164	88.20	2.60	9.20	125.6
3	1380	84.04	3.00	13.00	111.7
4	288	76.75	4.38	18.85	114.6
5	31	61.30	9.67	29.03	117.9
6	5	60.00	---	40.00	-----
Chi-sq	(0.00)				
Breastfeeding					
1> Month	99	83.84	16.16	---	-----
2 - 3 Months	1574	98.03	1.97	---	-----
4 - 6 Months	1279	98.04	1.96	---	-----
7 - 12 Months	1408	99.00	1.00	---	-----
13+ Months	12384	89.00	10.98	---	-----
Chi-sq	(0.00)				

Source: Calculated from the survey data
* Infant Mortality Rate calculated on the basis IFS data (1971-75) by Aghajanian, A. 1994. Infant Mortality Trends and Differentials in Iran, Fayetteville State University, Fayetteville

mother increases (e.g., 101/1000 for 25-29 age group). After age 39, the rate increases significantly (Aghajanian, 1994).

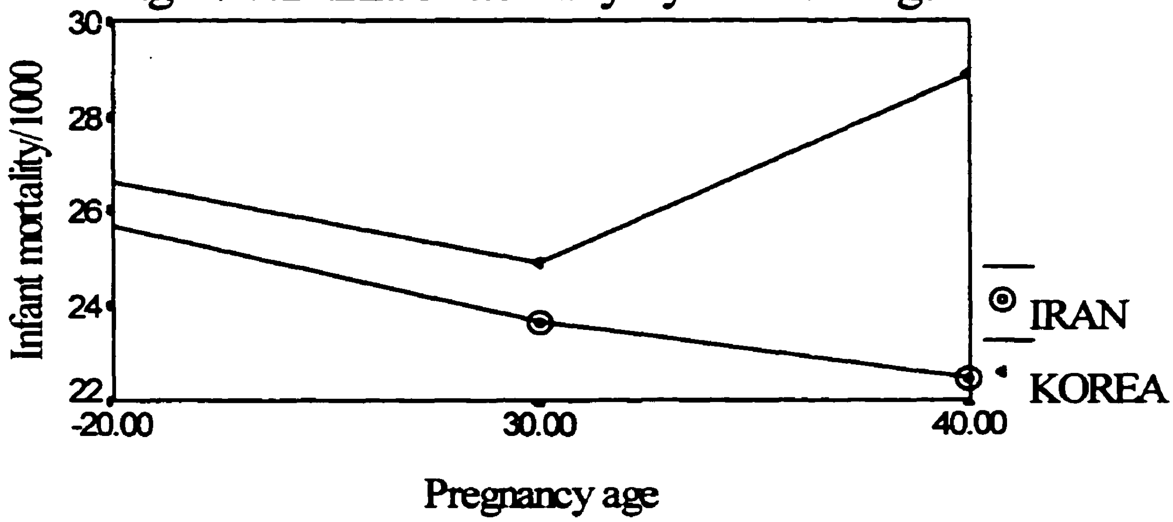
Thus, the IFS data confirms the U-shape mortality rates for the age of the mothers at the time of births which has been observed elsewhere. However, the current survey does not confirm the U-shape relation between CMRs for the age of mothers at the time of births (Figure 7.2). It seems that, with the drop of CM in the last decade and the drop of FRs in recent years, the U-shape pattern of the relation between CMR and age of the mother at time of birth has changed and that the pattern is gradually converging with that found in newly industrialized countries like South Korea during 1956-70 (see Figure 7.2).

The data support other findings from developing countries that CM is high for teen-age mothers and decreases at later ages. But the relationship between wastage during pregnancy and age of the mother follows the U-shape pattern. In order to portray this relationship, rates are presented separately. Table 7.4 compares survived with deceased children and with pregnancy wastage. Table 7.5 shows age of mother at the time of birth by neonatal and post-neonatal rates for both rural and urban areas.

7.3.3. Birth Order

Birth order has been found to be related to infant and child mortality rates. In most WAS surveys, for example, birth order proved to be an important correlate of infant mortality. In high-mortality countries, such as Nepal and Kenya, first-born children were at greater risk of dying during infancy than were their younger siblings, and there was a tendency for risks to increase again at birth orders seven and higher (Chidambaram,

Figure 7.2: Infant mortality by mother's age



Infant mortality rate for Iran is cummulative rate

Infant mortality rate for Korea is 50% of the actual rate

Source: Korea, Kwon Tai-Hwan; Iran, the survey data

McDonald and Brucher, 1987:868-879). This U-shaped pattern was not observed in all 29 countries examined (Rustein, 1983). In countries where overall child mortality levels were lower, such as the Philippines and Jamaica, first-born children appeared to be most likely to survive and, thereafter, risks of death increased progressively with birth order (Chidambaram; Mcdonald; Brucher, 1987). The IFS data supports the U-shape relationship between the birth order and child mortality for Iran in period 1971-75 (Aghajanian, 1994).

Not surprisingly, the present survey data reflects the pattern of low child mortality level countries, such as the Phillippines and Jamaica. Table 7.4 and 7.6 show child mortality rate (0-60 months) increases with increase of birth order, but it is U-shape for the deceased children 13-60 months of age. Such patterns are to be expected because the childhood mortality rate reduced dramatically during the two past decades (from 115 in 1976-77 to 34 in 1993, see Aghajanian, 1994; Ministry of Health, 1993). The mechanism operating here is the distribution of resources in the household. Other things constant, with the increase of birth order the physical and psychological situation of mother, economical and health care resources decrease, thereby increasing risks to the health of both mother and infants. Therefore, it is likely that the increase of birth order affects the weight of a given baby at time of birth as well as the weight of the infants and children thereafter because of limited resources and resulting malnutrition. The physical and psychological situation of mother can be affected for the same reasons and, in turn, produces higher risk for both mother and child through nutritional deficiency and physical weaknesses, causing infections and mortality.

Table 7.5: The age of mothers at the time of birth and infant and child mortality of Fars province of Iran 1986-91

	Total					Urban					Rural				
	Month					Month					Month				
	0-1	1-12	13-60	0-60	N 17507	0-1	1-12	13-60	0-60	N 9936	0-1	1-12	13-60	0-60	N 7571
20>	10.3	9.4	2.8	22.5	1048	11.7	3.3	1.1	16.1	565	8.6	17.1	5.0	34.3	483
20-29	9.6	9.1	3.0	21.7	8695	8.3	6.7	2.5	18.0	5007	11.3	12.4	3.7	28.2	3688
30-39	7.7	8.7	2.3	18.7	6362	5.2	6.4	1.9	14.6	3601	10.8	11.7	2.8	25.4	2761
40+	3.8	9.5	1.9	15.2	1402	--	3.7	3.7	7.5	763	7.8	15.6	--	23.3	639
Chi-Square		0.24					0.24					0.16			

Source: Calculated by the survey data

Table 7.6: Birth order and infant and child mortality of Fars province of Iran 1986-91

	Total					Urban					Rural				
	Month					Month					Month				
Birth order	0-1	1-12	13-60	0-60	N 17509	0-1	1-12	13-60	0-60	N 9936	0-1	1-12	13-60	0-60	N 7571
1	7.0	7.1	2.9	17.0	10701	6.6	4.6	2.4	13.6	6544	7.7	11.0	3.6	22.4	4155
2	11.4	11.6	2.3	25.4	5164	10.8	9.0	1.1	20.9	2673	12.0	14.4	3.6	30.1	2491
3	12.3	13.8	2.2	28.3	1380	9.9	4.9	1.6	16.5	607	14.2	20.7	2.6	37.5	773
4	21.9	13.1	8.8	43.9	228	--	19.8	9.9	29.7	101	39.4	7.9	7.9	55.1	127
5	64.5	32.6	--	96.8	36	--	--	--	--	1	100	50.0	--	150.0	25
Chi-Square		.00004				.00004					.00004				

Source: Calculated by the survey data

Table 7.7: Breast-feeding and infant and child mortality of Fars province of Iran 1986-91

	Total					Urban					Rural				
	Month					Month					Month				
	0-1	1-12	13-60	0-60	N 17242	0-1	1-12	13-60	0-60	N 9832	0-1	1-12	13-60	0-60	N 7410
Breast feeding															
1>month	151	10.1	---	161	99	101.7	--	--	10.2	59	225	25.0	--	250.0	40
1-3 ==	---	17.8	19.4	19.7	1574	--	11.5	--	11.5	1042	---	30.0	5.6	35.6	532
4-6 ==	1.6	16.4	1.6	19.5	1279	1.2	8.6	2.4	12.2	817	2.2	30.0	---	32.5	462
7-12 ==	5.2	6.3	3.1	10.0	1908	--	5.2	2.6	7.9	1143	1.3	7.8	3.9	14.4	756
13 + ==	6.7	2.7	1.7	11.1	12382	7.0	2.4	1.8	11.2	6771	6.2	3.2	1.6	11.2	5611
Chi-Square		0.0000				0.0000					0.0000				

Source: Calculated by the survey data

Moreover, there are rural-urban differences with regard to the level and pattern of this relationship, which can be explained by the different levels and patterns of fertility, age of marriage, and the age of mothers in rural versus urban areas. Birth order and mother's age are not independent demographic variables, since women of higher age groups can be expected to have higher number of births. But one cannot be a proxy for other. The variation of age at marriage and pregnancy age make these two variables different in their significance.

7.3.4. Breast-Feeding

An impressive body of evidence in developing countries, mostly WAS data, suggests that breast-feeding has non-trivial and beneficial effects on survival in infancy and early childhood. Further, the relationship between mortality risks for children for subsequent births after a short intervals (less than 18 months) have been supported by diverse data sources, and in disparate social contexts (Ahmad; Eberstein; sly, 1991; Lantz; Partin; Palloni, 1992; Janowitz and Nichols, 1980).

The relationship between the breastfeeding and childhood mortality is based on the notion that the shorter the lactation period, the higher the risk of child death. The relationship is complex and difficult to assess from the normally available data. Lantz and his associates attributed the difficulty and the sources of bias to the three mechanisms:

> (1) Children who experience health complications immediately after birth may never begin breastfeeding at all. This leads to over-estimations of the beneficial effects of breastfeeding on childhood mortality. To overcome this bias it is necessary to control for the health status of the child at birth and shortly afterwards.

(2) children who are ill may cease to breast-feed either as a result of their own weakness or by the mother's choice. Using death of a child also over-estimates the relationship. One possible solution would be access to information about the survival status and illnesses of the children, but this is rarely available.

(3) Breastfeeding behaviour is chosen by the mother in accordance with her social position, her individual characteristics, and her motivations. Some of these may affect child care practices with a net effect on child health and mortality. As in modern society, the choice of short duration of breastfeeding accompanied with food supplements may reduce this relationship (Lantz; Partin; Palloni, 1992: 122).

The study of child survival and pregnancy spacing in Iran also lends support to these mechanisms. Findings suggest that women who breast-fed for extended periods had longer pregnancy intervals than women who either did not breast-feed or did so for a short time. Further, among both the users and non-users of contraception, the length of the pregnancy interval increases with the duration of breastfeeding, with the effect being larger among non-users. These findings also support the argument that either the baby or the mother interferes with breastfeeding (Janowitz and Nichols, 1980: 39).

Our analysis shows that the death rate for babies who had not been breast-fed or breast-fed less than one month is much larger for the child mortality rate of 0-60 months (Table 7.7). But the child mortality rate (0-60 months) is under the influence of the deaths of infants in their first months of their birth, which seems to be unrelated to the duration of breastfeeding. It is better to look at the breakdown of the age of childhood mortality in terms of breastfeeding, as is shown in Tables 7.4 and 7.7. The breakdown of the age of deceased children into shorter intervals, weakens the relationship. It is difficult to infer the relationship from the data as there are fluctuations in childhood mortality in terms of the duration of breastfeeding. To deal with this problem, it is advisable to study the cause of death, the nutritional and the health status of the children with regard to breastfeeding, which is discussed further in the next chapter.

7.4 Regional Differences

Table 7.8, 7.9, and 7.10 show regional differences in terms of some bio-demographic variables. Each sub-province demonstrates a different pattern of pregnancy age of the mother and childhood mortality. Teenage mothers in Shiraz and Neiriz have experienced low CMRs compared to those in other sub-provinces. CMRs in Mamassani and Laar show something of the U-shape pattern characteristics for developing societies, and the patterns of Shiraz and Abadeh is rather close to those of newly industrialized societies (Table 7.8).

The relation between childhood mortality rate and the birth order in terms of regional differences follows the same pattern, moving from low levels for first order births to high levels for later order births (Table 7.9). The rates for the fourth and fifth order births in Shiraz and Laar are higher than those for other regions. Two explanations for this finding can be advanced. First, fertility rates for mothers over 40 years of age are higher in these two sub-provinces as a result of generally higher fertility rates. According to the census in 1987, the general fertility rates (GFR) were 309.8 for Shiraz and 300.3 for Laar, as compared to overall provincial rates of 283.4 (Iran Statistical Centre, 1987). For Shiraz it can be also explained by postponed the age of marriage. Second, it may be that differential treatment can be attributed to the different sample sizes in the regions.

Table 7.8: The childhood mortality differentials by pregnancy age in Fars province of Iran, 1991.

Variables	N (17507)	Abadeh (2109)	Shiraz (9287)	Laar (2989)	Mamasan (1775)	Neiriz (1089)
20 >	3195	20.4	19.5	32.9	33.2	19.2
20-29	8995	13.1	22.3	21.3	20.4	37.4
30-39	4795	14.5	17.9	32.4	16.3	23.4
40 +	524	---	16.2	25.2	20.4	---

Chi-sq: Not significant at 0.05 level

Table 7.9: The childhood mortality differentials by birth order in Fars province of Iran, 1991.

Variables	N (17508)	Abadeh (2122)	Shiraz (9439)	Laar (3038)	Mamasan (1793)	Neiriz (1115)
Birth Order						
1	10700)	11.3	15.9	21.6	19.2	24.8
2	5164	20.9	26.9	23.2	25.6	26.4
3	1380	18.0	42.7	29.3	20.1	53.1
4	228	---	64.5	37.0	---	55.5
5	36	---	133.3	90.9	---	---

Chi-sq: Not significant at 0.05 level

Table 7.10: The childhood mortality differentials by breast-feeding duration in Fars province of Iran, 1991.

Variables	N (17242)	Abadeh (2109)	Shiraz (9287)	Laar (2982)	Mamasan (1775)	Neiriz (1089)
Breast-feed (in month)						
1 >	97	142.0	92.6	230.0	400.0	---
2-3	1574	40.0	11.3	18.7	57.0	57.5
4-6	1279	57.7	11.3	7.2	42.3	50.1
7-12	1908	4.1	6.6	16.2	24.2	21.8
13 +	12382	6.1	13.0	13.7	8.2	10.0

Chi-Squar Significant at 0.01 and 0.05 level

Source: Calculated by the survey data

Shiraz has a very large population which makes occurrences of CM more probable there than in the other sub-provinces. This proportional sampling technique explains the reason why there are not enough infant and child deaths (occurrences for analysis) in Abadeh, Mamassani and Neiriz.

The relationship between breast-feeding and childhood mortality seems to be higher mortality rate in the early infancy and decreases as the duration of breast-feeding is longer (Table 7.10). Shiraz has lower rate than the other regions. Perhaps the level of development, health-care practices and access to the supplementary food in a big city can be accounted for this difference. But the overall patterns for the regions are the same.

7.5. Multivariate Analyses

Bivariate analyses in the previous section suggests that pregnancy order, breast-feeding and sex of the child are significantly related to child mortality and that pregnancy age and order are related to pregnancy outcome, in expected the direction. In this section the net effect of each demographic variable on CM will be examined, significant and strong variables will be distinguished, and the best model for representing the data will be reported. The dependent variable is the probability of fetal and child mortality before age 5 (pregnancy outcome: 0 = prenatal and postnatal mortality, and 1 = living children).

Logistic regressions are performed on the pregnancy age, pregnancy order, and marital age variables. Given the dependent variable includes both pre- and postnatal mortality, the sex and breast-feeding variables are omitted (since pre-natal mortality cannot be related to the sex of the child or the breast-feeding practice which follows pregnancy). Forward stepwise variable selection (p = 0.05) was conducted. Table 7.11. represents logistic estimates of the effect of demographic variables on the outcome of pregnancy and child survival. Model (1) shows that the pregnancy order has the largest coefficient and is entered into the model first on the basis of its score statistic. By increasing the value of survival of fetus or child from 0 to 1, with values of other independent variables hold constant, odds decrease by 0.517. In other words, it has negative effect on probability of child mortality. In the second step, pregnancy age has the largest score statistic and meets entry criteria, Model (2). The reduction of the residual chi-square from 524.5 to 228.9 indicates a significant change in the model. Also, the regression coefficient for pregnancy order reduced from -0.517 to -0.530 in Model (2), indicating how much these two variables correlate when controlling for other independent variables. The net effect of pregnancy age on fetal and child mortality is .05. The coefficient of logistic regression for pregnancy age 0.045 indicates that child mortality increases by a factor 0.045 when the odds change from 0 to 1. It means that child mortality increases slightly with the increase in pregnancy age. In the next step, the age of first marriage is entered into the Model (3) the same criteria as in Model (2). The coefficients in the Model (2) decrease and the net effect of all independent variables are determined (Table 7.11). The reduction in the residual chi-square from 228.9 to 83.0 indicates the positive effect of age of first marriage on fetal and child mortality by 0.016 when the odds change from 0 to 1, and the regression coefficients for other variables change accordingly. It is clear that, in each of the three models, part of the effect of individual variables has been transmitted through the other variables entered into the

Table 7.11: Logistic Regression Estimates for Regression of prenatal and postnatal mortality on selected demographic variables

Independent Variables (N=17505)	Model 1 B (S.E.)	Model 2 B (S.E.)	Model 3 B (S.E.)
Pregnancy order	-0.517 (0.031)	-0.530 (0.031)	-0.526 (0.031)
Pregnancy age		0.045 (0.003)	0.045 (0.003)
Age of first marriage			0.016 (0.002)
Constant	3.135 (0.060)	2.025 (0.107)	0.504 (0.207)
- 2 Log Likelihood	10441.5	10295.3	10270.6
Goodness of fit	17441.5	17867.8	17965.7
Model Chi-square	255.0*	399.0*	459.4*
Residual Chi-square	524.5*	228.9*	83.0*

Source: Calculated from the survey data

B: Regression Coefficient
(S.E.): Standars Error
* Significant at 0.0001 level

model. The best model predicting fetal and child mortality is Model (3), which includes the pregnancy order, pregnancy age, and the age of the first marriage.

7.6. Summary

In this chapter, the effect of demographic variables on child mortality was analysed through bivariate and multivariate analysis. Bivariate analysis showed that pregnancy order, sex of the child, and breastfeeding status are significantly related to child mortality. Pregnancy age and pregnancy order are also related to the pregnancy outcome in expected direction.

Multivariate analysis suggested that, among the three types of demographic variables - age of mother at first marriage, and birth order - pregnancy order is the most significant predictor of pre- and postnatal mortality. The other two variables - pregnancy age and the age of the first marriage - have a slight effect on such mortality. If we reconsider the mechanism by which these variables operate, pregnancy order appears to play a role as a proximate variable, i.e., the point of intersection of the effects of other intervening and structural variables, of which pregnancy age and age of first marriage are two. Thus, it is important to investigate the relation between environmental and structural variables and child mortality. These are the subjects of the next chapter.

CHAPTER EIGHT
HEALTH STATUS AND CHELD SURVIVAL

The quality of health exerts an influence on mortality in general, on childhood mortality in particular, and on the reproductive behaviour of individual couples. It has been argued that the most important element in reducing mortality is access to health care. The poor, especially the rural poor, have less access to health services and are more susceptible to disease than their better-off, urban counterparts. Lasting improvements in the mortality rates of developing countries demand a structure for the prevention and cure of disease that will reach every sector of society. This is particularly so for rural areas, where the vast majority of people live. The establishment of an effective health service is part of the nation-building process and of a country's capacity for economic development.

Mothers' and children's access to modern health care services has been shown to be important in reducing overall mortality. Yet, these findings have been challenged by those who argue that too much emphasis is placed on short-term, vertically-organised public health interventions and modern medical institutions, at the expense of social and economic development. It is not a single episode of disease that kills, but the fact that children are weakened by chronic malnutrition and must continually battle disease. Curing an episode and returning the child to the same environment is not likely to have much lasting impact (Kent, 1991).

The present chapter examines the debate surrounding these two kinds of arguments. Cleland and his associates (1987) examined the impact of proximity of health facilities and services in six developing countries (Bangladesh, Cameroon, Ecuador, Egypt, Peru and Philippines) and found that more dense networks of health facilities have a beneficial effect on infant and child mortality. There is evidence that village-based primary health care systems can have a significant effect, but in some cases there is only a very weak association between the provision of health care services and reductions in children's mortality. The major problem in drawing conclusions from such studies is making the distinction between access to, versus the extent and frequency of utilisation of these facilities. If service utilisation is related to the socio-economic characteristics of individuals or households, then the impact of service availability may be eliminated by introducing socio-economic controls. Consequently, these findings may merely indicate of the differentials in the utilisation of the services.

In order to explain these differentials, two different types of analyses must be performed: (1) using the survey data at the individual level; (2) combining the survey data with that of aggregate data and analysing it at the community level. The data collected in Fars province allow for such a distinction to be made. In this chapter, the analysis pertaining to the maternal and health status of children at the individual level is the particular concern.

The survey data allow the examination of the impact of health service utilisation for both pre- and post-neonatal mortality. Pre- and post-neonatal mortality are thought to be related to variables such as: pregnancy duration, frequency of doctor visits during pregnancy, place and type of delivery, presence of trained medical members at delivery, birth weight, method of child feeding and duration of breast-feeding, vaccination, and cause of death.

8.1. BIVARIATE ANALYSIS

Both bivariate and multivariate analyses are presented here. The bivariate analysis uses two different dependent variables in separate runs. First, the relationship between the pregnancy outcome (live children, child mortality, and prenatal mortality or pregnancy wastage) and maternal health status are analysed and results are presented. Second, the relationship between childhood mortality (neonatal and post neonatal mortality) and selected child health status is assessed.

8.1.1. Pregnancy Duration

The analysis shows that pregnancy duration is inversely related to prenatal mortality for the sample under consideration; that is, the shorter the pregnancy duration, the higher the prenatal mortality. Foetal wastage can be divided into two groups: wastage within the first 24 weeks and wastage between the 25 and 36 weeks. Given birth prior to full term, the survival chances of the baby is very limited. This is one of the main reason for the high rate of early neonatal mortality (mortality within the first 10 days of birth), as the survey data shows that 31 (rural) and 48 percent (urban) of childhood mortality (q5) occurred in this group.

The operative mechanism here is complex and sometimes has biological causes. But maternal health care is most likely positively related to pregnancy duration, and consequently negatively with foetal wastage and early neonatal mortality. Table 8.1 presents the results of bivariate analysis of pregnancy duration on pregnancy outcome (0=mortality; 1=live birth) by providing cross-tabulations and relative risk estimates. The analysis shows that, up to 24 weeks of pregnancy, the outcome is always absolute foetal

Table 8.1: The crosstabulation of pregnancy outcome by selected variables of health services for 1987-91, Fars province of Iran (percent)

Variables	N 16289	Live Birth: Living (at time of Interview)	Live Birth: Child Dead (at time of Interview)
Pregnancy duration	15819		
25-36 week	5741	97.5	2.5
37 +	10078	98.1	1.9
Relative risk estimate		0.8	1.1
Type of Delivery	16289		
Normal	15076	97.0	3.0
Abnormal	1213	60.4	39.6
Relative risk estimate		0.4	8.6
Place of Delivery	16289		
Hospital	12309	88.5	11.5
Home	3980	94.4	5.6
Relative risk estimate		0.8	1.7
Assistance of Delivery	16289		
Educated or Trained	3052	94.5	5.5
Uneducated	13237	86.2	13.8
Relative risk estimate		0.8	2.1
Visiting Doctor	16235		
Yes	14379	95.7	4.3
No	1856	76.1	23.9
Relative risk estimate		0.6	4.2

Source: Calculated from the survey data
Relative Risk Estimate: (dead/living)

Table 8.2: The crosstabulation of pregnancy outcome by selected variables of health services for 1987-91, Fars province of Iran (percent)

Variables	N	Pregnancy Live birth	Wastage
Pregnancy duration	17508		
25-36 week	7438	97.2	2.8
37 +	10070	99.8	0.3
Relative risk estimate		0.1	1.5
Type of Delivery	17508		
Normal	15539	95.0	5.0
Abnormal	1969	58.6	41.4
Relative risk estimate		0.5	7.0
Place of Delivery	17508		
Hospital	13030	92.6	7.4
Home	4478	86.0	14.0
Relative risk estimate		0.8	1.6
Assistance of Delivery	17508		
Educated or Trained	13987	92.8	7.2
Uneducated	3521	83.4	16.6
Relative risk estimate		0.8	2.0
Visiting Doctor	17427		
Yes	15008	93.7	6.3
No	2419	74.2	25.8
Relative risk estimate		0.7	3.5

Source: Calculated from the survey data
Relative Risk Estimate: (miscarriage/live birth)

wastage; for longer duration, the chances of survival increase directly with duration of pregnancy. Survival rates also show rural-urban differences areas, as the wastage above 25 weeks duration of pregnancy is lower for urban than for rural areas. As with early neonatal mortality, post-neonatal mortality increases as the pregnancy duration decreases. Table 8.1 presents the cross-tabulation and relative risk estimate of pregnancy duration and pregnancy outcome (0=mortality, 1=live birth). The relative risk estimates compare the risk of child survival between the two categories of pregnancy duration ('25-36 week' and '37+'). The relative risk for child mortality is 1.088 compared to 0.846 for live births. The relative risk of prenatal mortality is 1.48 versus 0.16 for live births. Thus, these data led to support to the hypothesis that pregnancy duration has an effect on child mortality.

8.1.2. Type of Delivery

Depending on the physical and medical condition of the mother and foetus, delivery may be normal or abnormal. An "abnormal delivery" requires special medical techniques or devices, which expose both mother and child to risks of injury and infection or other health problems, and consequently a later stage risks to I/CM. The survey data collected for this dissertation allow further examination of the risk of death with regard to the type of delivery. Table 8.1 and 8.2 show that the risk of pre- and post-neonatal mortality is higher for abnormal (8.55) than normal (0.41) deliveries, and that the risk is higher for prenatal mortality (7.05) than for post neonatal mortality (0.52).

8.1.3. The Place of Delivery

The place of delivery may be at home or hospital, depending on availability of, or access to, clinics or hospitals. Access to health services is one of the most important issues being discussed in studies of childhood mortality in developing countries. It is expected that the availability of health services and the utilisation of health facilities decrease childhood mortality. Here, we are concerned with the effect of health facility utilisation on pre- and post-neonatal mortality. Giving birth at home increases the risk of both maternal and child death as compared to hospital delivery. The relatively unhealthy conditions of home delivery, in combination with the presence of an untrained midwife, provide an environment that facilitates infections and injuries for both mother and baby. It is, therefore, expected that the pre- and post-neonatal mortality will be more prevalent for those who give birth at home. Table 8.1 and 8.2 present data relevant to the question of home versus hospital delivery. Those who have delivery in home tend to have greater risk of dying relative to those who have delivery in hospital (1.68 versus 0.78). The same interpretation is true for the risk of wastage (Table 8.2). It can be concluded that a relationship between the place of delivery and perinatal and post neonatal mortality exists favouring hospital delivery.

8.1.4. Assistance in Delivery

The relationship between the assistance of delivery and prenatal (stillbirth) and early neonatal mortality is examined. It is expected that there will be increased risk for stillbirth and neonatal deaths in live born children due to lack of supervision during the perinatal period. Table 8.1 shows that CM for those who had educated or trained midwives (5.5 per cent) is lower than for those who did not have trained assistance (13.8).

This difference can be explained through the relative risk estimates. The attendance of educated midwives tend to associate with lower risk of child mortality (0.76 versus 2.08, Table 8.1)). The same explanation is true in terms of pregnancy wastage (0.77 versus 1.98, Table 8.2).

8.1.5. Frequency Doctor Visits During Pregnancy

Health check-ups for pregnant women and health and weight checks for the foetus are important factors in pregnancy outcomes. It is expected that regular checks would decrease the risk for prenatal and neonatal mortality, and survey data allow the examination of this hypothesis. Table 8.1. shows that pregnant women who did not visit the doctor during their pregnancy had 23.9 percent CM (q5), with a relative risk estimate of 4.17, and those who did visit the doctor had 4.3 percent CM, with a relative risk element of 0.59. The same pattern can be observed for pregnancy wastage, which was 25.8 percent CM (relative risk estimate = 3.518) for women who did not visit doctor during pregnancy, and 6.3 percent CM (relative risk estimate = 0.678) for those who did. The findings presented in Tables 8.1 and 8.2 suggest a sizeable, a positive impact of doctor visits during pregnancy for both CM and pregnancy wastage.

8.1.6. Birth-weight

Birth-weight is not only a reliable index of intrauterine growth but also a determinant of the probability that an infant will survive and experience normal development. Low birth weight has been found to be a major factor in high infant mortality in developing countries (Ebomoyi, Adetoro; Wickremasinghe, 1991). The present research likewise found that lower birth-weight increases the risk for childhood mortality, as is clearly shown in Table 8.3. Differences in IM (0-1) are very great, as MRs in the first months are three times greater for low birth-weight infants versus normal weight infants; for 1-12 month infants, it is twice as large. In the postnatal mortality (1-4 years of age) the difference is not large enough.

Low birth weight is best understood as intervening variable rather than a causal factor. It is a sensitive indicator of malnutrition and disease in the mother, and a good predictor of increase mortality risk for the child. In developing countries, the major determinants of intrauterine retardation are poor gestation nutrition, low pre-pregnancy weight, short maternal stature, and malaria (Kramer, 1987). The health status of a pregnant woman, and thus of her foetus, is indicated by her weight gain during pregnancy. A low weight gain, due to inadequate nutrition combined with hard physical work, is likely to be associated with low birth-weight of the child. Most low birth-weight results from intrauterine growth retardation, but some results from prematurity of birth.

8.1.7. Immunization

Chen (1981) has argued that the major forms of illness among children in developing countries are protein and calorie malnutrition and the common childhood infections which are both separate and mutually reinforcing determinants of child's health status (see also Figure 7.1). Given that some infectious diseases can be prevented through an immunisation strategy, the vaccination program and its coverage could be one of the factors affecting the childhood mortality.

Table 8.3: Infant and Childhood Mortality by selected health status variables for the survey data 1987-91, Fars province of Iran

Variables	Infant Age (month)		Child Age (month)	
	(0 - 1)	(1 - 12)	(13 - 60)	(0 - 60)
Birthweight				
2500<	15.0	10.0	2.5	28.6
2500>	5.2	5.7	2.3	13.3
Chi-Sq Test= Significant at .0001 level				
Vaccination				
Yes	---	22.2	6.5	40.5
No	---	42.0	17.8	59.5
Chi-Sq Test= Significant at .0001 level				
Feeding				
Breast-fed	---	70.0	30.0	48.5
bottle-fed or mixture	---	78.0	22.0	51.5
Chi-Sq Test= Not Significant				

Source: Calculated from the survey data

Aghajanian (1990) has argued that the utilisation of health care in general and immunisation services in particular are based on the concept of motivation, perception, learning and attitude. In his study of Shiraz city of Iran, he found out that one-third of children either did not have vaccination at all or if they did, it was later than the age at which they should have.

The survey data shows that 59.5 percent of dead children had not been vaccinated at all. Unfortunately, the vaccination survey question was asked only when the child had died, so we cannot directly compare vaccination practices in these cases with those for children had survived, but we can infer from differences in the ratios of CM were higher where vaccination was not present than when it occurred.

8.1.8. Child Feeding Practices

The relationship between breast-feeding duration and CM was analysed in chapter 7. Here, we are comparing bottle- and breast-feeding in their relationships on childhood mortality through infectious diseases. It is expected that bottle-feeding in condition of poor sanitation increases child morbidity. A study done in Liberia demonstrated a clear effect of breast-feeding on child survival net of all other variables (Ahmad, Eberstein and Sly 1991).

Table 8.3 also presents, among other things, the relationship between the status of breast-feeding and childhood mortality. For purposes of the present analysis, it is necessary to remove from consideration here the children who experienced health complications immediately after birth and died in the first month of their life (in order to control for bias that mentioned in previous chapter, see 7.2.4). There are differences in CM for children who were breast-fed (48.5 percent) versus bottle-fed children or those fed by both means (combined 51.5 percent), but the difference is not statistically significant. It is very interesting to look into age group of child mortality. The child mortality for 1-12 month and that for 13-60 have different directions of relationship with breast-feeding and bottle-feeding. It seems that the risk of dying for children under 1 year of age is greater with bottle-feeding; but the reverse is true for 1-4 year old children (30% for breast-fed, 22% for bottle-fed). Children after one year gradually change their status from breast-feeding to bottle-feeding. Although controls for nutritional states were not available for this analysis, data suggest that breast-feeding provides a sterile, cheap, affordable and effective means of reducing the death toll from infant mortality in developing countries. Artificially fed children are at greater risk of mortality compared to those who are breast-fed at least for the first year of life.

8.1.9. Causes of Death

Information about cause of death is an indispensable item in any mortality analysis, providing valuable insight into the network of interactions between viable human and behavioural factors that may result in one or more morbid conditions that lead ultimately to the death of the host (Porapakkham, 1986). Table 8.4 presents the ranked frequency distribution of the causes of death for infant and child mortality from the sample of Iranian women used in this dissertation. The causes are named according to International Classification of Diseases and then classified into 7 broader categories to

Table 8.4: Leading causes of death among infant and child mortality of Fars province of Iran, 1987-91

Major disease category	Infant Mortality (0-1) Percent	Rank	Childd Mortality Percent	Rank
Certain conditions originating in the perinatal period (maternal disease and birth injury)	30	1	--	--
Congenital Anomalities	22	2	21	2
Diarrhoeal diseases	14	3	17	3
Respiratory diseases	12	4	5	5
Accidents	4	5	23	1
Viral diseases	3	6	10	4
All other diseases	14	--	23	--

Source: calculated by the survey data

prevent diagnostic error and also to facilitate the interpretation provided below.

8.1.9.1. Infants Under One Year:

Conditions for Perinatal Deaths

Birth outcomes can be strongly affected by disease and malnutrition of pregnant mothers. Several different kinds of diseases can lead either to foetal death or to disease or defects in the infant which ultimately result in death. Maternal diseases are causal factors mainly in neonatal deaths. The majority of infant deaths are caused by certain conditions in the perinatal period related to maternal and delivery status, and have been a major killer of early neonatal babies. The survey data show that 30 percent of all infant deaths are attributed to this category which occurs in the first month of birth and is ranked in the first position.

Congenital Anomalies

Congenital anomalies category (including prematurity) with 22 percent of infant deaths and 21 percent of child deaths is ranked on the second position. To prevent the death of infants due to this cause, detailed analysis should be performed to classify death into preventable and unpreventable conditions. Preventive measures could then be carried out accordingly. One of the reason for congenital diseases may be the prevalence of intermarriage behaviour of parents. Indeed, the survey data for Fars province of Iran show that 40 percent of urban marriages and 55 percent of rural marriages occurred between relatives.

Diarrhoeal diseases

Diarrhoea is an important cause of children's mortality in developing countries of the ranking first. It includes a broad variety of specific types of illnesses caused by several different kinds of bacteria, viral, and parasitic pathogens in the intestine. It is not single, isolated bouts of disease, but the effect of repeated episodes on poorly nourished children, which weakens them so badly that eventually one episode becomes their last. Most children's death from diarrhoea are due to dehydration.

Pneumonia and Respiratory Infection

According to the ninth revision of the International Classification of Diseases, deaths from tuberculosis, diphtheria, pertussis, measles, otitis media, upper respiratory tract diseases, other respiratory tract diseases, acute bronchitis and bronchi litis, pneumonia, influenza, and pleurisy are related to Acute Respiratory Infection (ARI). Of these, measles, diphtheria, pertussis, and tuberculosis are vaccine-preventable. Of the many different diseases included in ARI, acute lower respiratory tract infections -- primarily pneumonia and bronchiotis-- are the major types of ARI responsible for childhood mortality (AHRTAG, 1983). Accidents and viral diseases are ranked 6 and 8 respectively and are considered as the major diseases of infant mortality. The other minor diseases are classified in last group.

8.1.9.2. Children 1-4 Years:

The ranks of causes of death are changed for this group. Post neonatal deaths are associated more with diseases and malnutrition of the children themselves. Accidents ranks first as a cause of mortality. Congenital anomalies including genetic diseases are ranked, like infants, as second major cause of death. It seems that, unlike 1-12 children, viral diseases are more prevalent than respiratory diseases for this group of children.

8.2. MULTIVARIATE ANALYSIS

8.2.1. Maternal Health Status and Outcome of Pregnancy

The bivariate analysis presented above suggests that the duration of pregnancy, place of delivery, type of delivery, assistance of delivery, and the frequency of visit doctor are significantly related to the outcome of pregnancy and to the probability of child survival. Considering that almost 90 percent of child mortality from the present sample occurred in the first year of birth and that 50 percent of that mortality originated in the perinatal condition, the importance of these variables for infant mortality in Iran must be recognised.

In this section the net effect of each of these variables on child mortality is examined and the "best model" to represent these data is introduced. The dependent variable is the probability child mortality before age 5 (0=child mortality, and 1=living children). Logistic regression coefficients are estimated for pregnancy duration, type of delivery, place of delivery, assistance of delivery, feeding, birth-weight, and visit the doctor. Forward stepwise variable selection is utilised to chose variables. At each step, the variable with the smallest p-value for the score statistic is entered into the model, but if it is not less than 0.05 it is omitted. Table 8.5 shows logistic estimates of the effects of the selected health status variables on the child survival.

Table 8.5: Logistic regression of child survival on selected maternal health status variables

Independent Variables	N 14093	Model 1 (S.E)	Model 2 (S.E)	Model 3 (S.E)
Birth-weight				
1:> 2500 Gm	2398	-0.86 (.16)	-0.83 (.16)	-0.78 (.17)
2:< 2500 Gm (Rf)	11695	---	---	---
Visit Doctor				
1: No	3448		-0.57 (.16)	-0.59 (.16)
2: Yes (Rf)	10645		---	---
Pregnancy duration				
1: Incomplete	251			-0.82 (.37)
2: Complete (Rf)	13836			---
Constant		4.65	4.82	4.84
-2 Log likelihood		1754.48	1742.67	1738.81
Model chi-square		23.48	35.28	39.15
Improvement		23.48	11.80	3.86
Residual chi-square		51.44	21.93	3.79

S.E= Standard error of estimation
(Rf)= Reference category, the regression coefficient for Rf is zero.
Source: calculated from the survey data

Table 8.6: Regression of child mortality on utilising vaccination, Fars, 1986-91

Variable	B	SE B	P-Value
Vaccine	1.4	0.69	0.04
Constant	7.3	3.7	0.05
R^2	0.03	F=4.0	0.4

Source: calculated from the survey data

Model (1) in column 1 indicates that the birth-weight has the largest coefficient correlation. Birth-weight is a dichotomy variable where (1) representing the babies born with less than 2500 grams and (2) representing babies born with more than 2500 grams weight. By changing the value of birth-weight from 1 to 2, and the values of the other independent variables remain the same, the child mortality decreases by factor 0.86.

In the second step, the variable 'visit the doctor' has the largest score statistic and meets entry criteria, so it is entered next. It is also a dummy variable where (0) equals no visiting doctor during pregnancy and (1) equals visiting doctor. The residual chi-square reduced from 51.44 to 21.93 indicating that there has been a significant change in the model. The regression coefficient increases of birth-weight decreases from -0.86 to -0.83. This indicates that how much these two variables are correlated when controlling the other independent variables. It is important to see the changes occurred to the entries at the bottom of the table. The constant changes slightly, from 4.65 in model one to 4.82 in Model 2. The model chi-square tests the null hypothesis that the coefficients for all of the terms in the current model, except the constant, are 0 (this is comparable to the overall F test for regression). The model chi-square increases as the coefficient regression increases in Model (2) and Model (3). The 'improvement' is the change in -2LL between successive steps of building a model. It tests the null hypothesis that the coefficients for the variables added at the last step are 0 (the improvement chi-square test is comparable to the F-change test in multiple regression). The 'improvement' decreases with introducing each variable into the new model.

Next, the variable 'pregnancy duration' is entered into the regression to form

Model (3). Considering that pregnancy duration is a dichotomy variable where (1) equals the completed pregnancy and (2) equals incomplete pregnancy duration, the interpretation of the coefficient is straightforward. It tells us child mortality decreases with complete pregnancy duration. The coefficients in Model (2) change and the net effect of other independent variables are determined as presented in the Table 8.4. The net effect of this variable is B=-.82. It means that when the value of pregnancy duration changes from 1 to 2 (1=incomplete and 2=complete pregnancy), and the values of the other independent variables remain the same, the log odds of the child survival being dead decreases by 0.82. The negative sign means that there is a inverse relationship between the odds of child survival and pregnancy duration (change from 2 to 1 in pregnancy duration tends to increase the probability of shift in child survival from 1 to 0 or from live to dead). The -2LL decreases to 1738.81, the improvement from 11.80 to 3. 86 and the residual chi-square from 21.93 to 9.79 due to the effect that the variable 'pregnancy duration' exerted on the other independent variables in Model (3).

In short, among the selected variables of maternal health status 'duration of pregnancy' provides the most important explanation of child survival. The `visit of doctor' and `birth-weight' have also some effect on child survival. But the 'assistance of delivery', feeding, and 'place of delivery' which were deleted from variable selection of the models do not have statistically significant effects on child survival.

8.2.2. Child Health Status and Child Mortality

The bivariate analysis suggests that 'birth-weight', 'vaccination', and 'type of feeding' significantly related to child mortality in expected direction (see Table 8.2). In this section, the net effect of vaccination is examined. Since this variable (vaccination question) pertaining just to those children who have died, separate analysis is adopted. Regression program is run and the result is shown in Table 8.6. One may conclude from the result that vaccination has a significant effect on child mortality.

8.3. SUMMARY

In bivariate analysis the relationship between the pregnancy outcome (living, dead, and prenatal mortality or pregnancy wastage) and maternal health status and the relationship between childhood mortality (neonatal and post neonatal mortality) and selected child health status were studied. This analysis suggested that pregnancy duration, type of delivery, place of delivery, assistant of delivery, and frequency of visiting doctors related to the outcome of pregnancy. Furthermore, birth weight, vaccination, and type of feeding significantly related to child mortality in expected direction.

In multivariate analysis pregnancy duration provided the most important explanation of child survival. The `visit of doctor' and `birth-weight' had some effects on child survival, but assistance of delivery, feeding, and place of delivery did not have significant relationships with pregnancy outcome. The other variable (vaccination) had also significant relationships with child mortality. Considering the mechanisms of these variables, short pregnancy duration is the product of nutrition deficiency, and also the psychological and physical situation of the mother. This should be understood in the context of the society the way she lives, works and behaves.

CHAPTER NINE
HOUSING QUALITY AND CHILD MORTALITY

As noted in Chapter 2, a number of studies have found significant and strong connections between housing quality and CM. In this chapter, I examine both the independent effect and direction of the relationship between household quality and CM, and the net effect of housing quality, controlling for other variables. The first section reports the results of independent bivariate regressions of CMR on: general quality of housing, quality of building materials, numbers of rooms per dwelling unit, and household facilities. In the second section, these variables are incorporated into a multivariate analysis which also controls for other socio-economic variables, in order to assess the net effect of housing on CM and to test an "integrated model".

There is evidence that the physical household environment significantly affects CMRs. In particular, poor water supply and lavatory facilities lead to contamination and thus influence the incidence of various infectious diseases, especially diarrhoea. For example, a United Nations study of six developing countries (1985) found that old housing, deficient sanitary conditions, and lack of electricity constitute risk factors for child survival. However, as the multivariate analysis in the present chapter shows, this association weakens when controlling for several household socio-economic characteristics.

Another study of Amman, Jordan, Tekce and Shorter (1984) has found a net negative effect of deficient housing on the mortality of children under three years of age, controlling for other household socio-economic characteristics. The result showed that quality of housing appeared to be associated with the nutritional status of the child. (It will be recalled that according to the Chen framework there is a relationship between malnutrition and repeated infections and consequently to child mortality.). Johnson's and Nelson's (1984) study of the rural Philippines found that, other things equal, children from better quality housing were more likely to live to age 5 than were children from worse quality housing.

9.1. BIVARIATE ANALYSIS

9.1.1. General Quality of Housing

At the most general level, housing was categorized as either regular or irregular (See section 3.8). Almost all (98.5%) dwellings were regular, with only a small proportion (1.5%) being irregular. A large CMR discrepancy exists when comparing regular (22.6) with irregular (55.5) housing types. Table 9.1 and 9.2 present some general characteristics of housing conditions in Iran and Fars.

9.1.2. Building Materials

"Regular housing" is, of course, a very broad category, and to further specify the housing-CMR connection, building materials of households were also considered in the analysis. Building materials were classified into nine categories in the questionnaire (Appendix B). Since CM events for each category are not large enough to permit

Table 9.1: Percent distribution of using household facilities in regular houses of Iran, 1987.

Facilities	Total	Urban	Rural
Electricity	83.7	97.4	65.1
Piped water	73.7	90.3	51.5
Bathroom	43.6	63.2	17.2
Gas	63.4	84.4	42.4

Source: census of Iran, 1987.

Table 9.2: Percentage distribution of some indicators of house facilities, Fars, Iran, 1987-91

Variables	N=17509	Percentage
Electricity	15199	96.9
Piped water	16268	92.9
Bathroom	1977	11.3
kitchen	12096	69.1
Gas	3932	22.5
Telephone	2515	14.4
Cooler	6991	39.9
Heating system	152	0.9

Source: Calculated by the survey data

statistical analysis, the building material variables were re-coded in three categories: good, moderate, and bad. As suggested by Figure 9.1., quality of building materials is inversely related to CMR. In other words, the higher the quality of housing, the lower the CM.

9.1.3. Household Population Density

Bivariate analyses also show that CMR varies (1) directly with the number of families per dwelling unit (see Figure 9.2), (2) inversely with number of rooms per house (Figure 9.3), and (3) indirectly with the number of rooms occupied by each family (Figure 9.4).

The CMR relationships with numbers of families/dwelling and the number of rooms per house variables might be explained in one of two ways. On the one hand, they may reflect the direct effect of dwelling unit population density on the health of residents as densely populated dwellings are expected to be more susceptible to disease than are less crowded ones. On the other hand, they may indicate the indirect effects of the household socioeconomic status. Since, the higher the income of the family, the larger the house and the more rooms in it.

9.1.4. Household Facilities

As noted in Chapter 2, household facilities includes the variables which are the indicators of both health and household S.E.S. For example, presence or absence of electricity and/or piped water determine the level of development of a village or region.

Figure 9.1 Child Mortality and Building Material

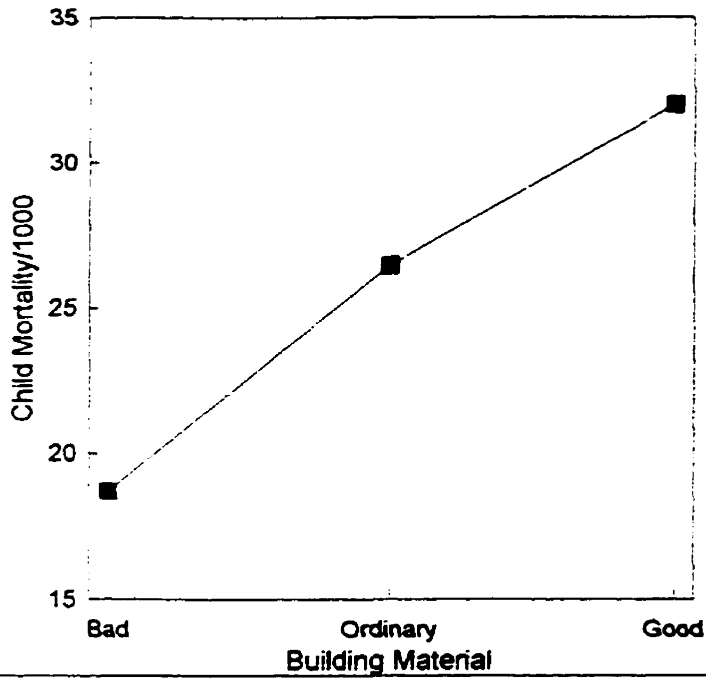


Figure 9.2 Child Mortality and Number of Family

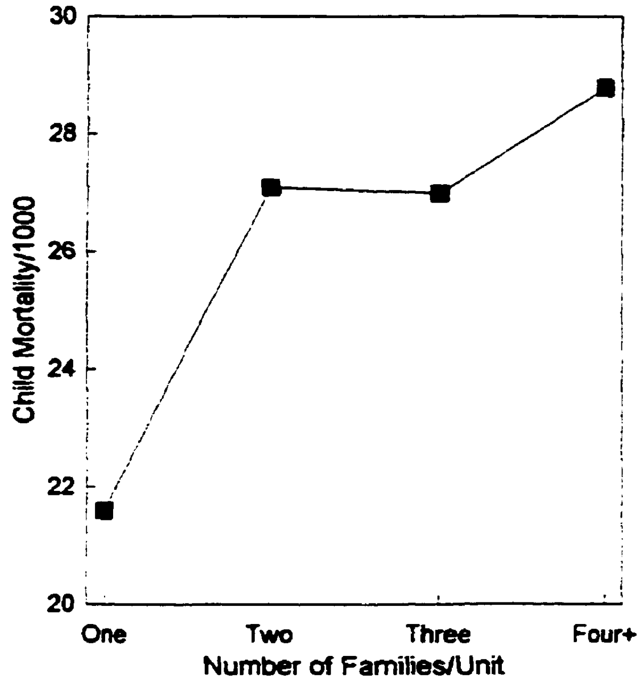


Figure 9.3 Child Mortality and Family Physical Space

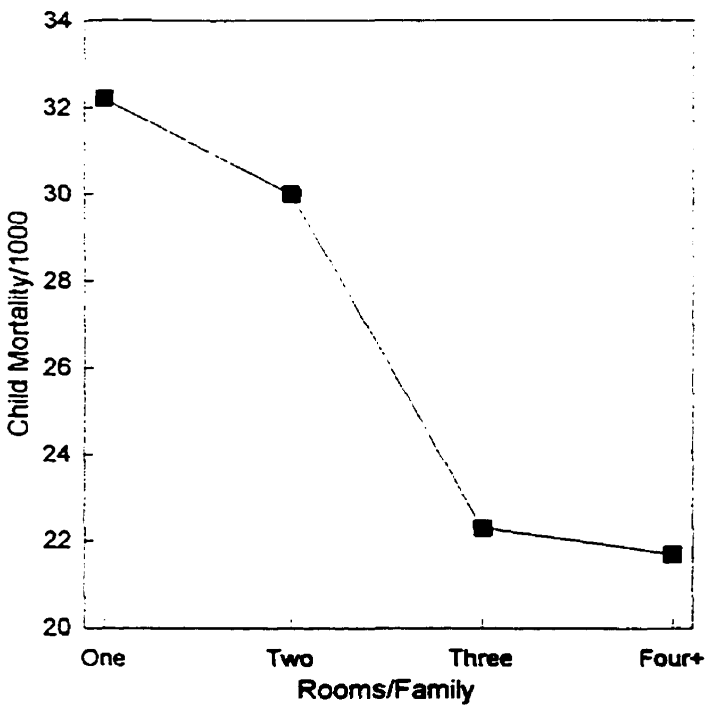
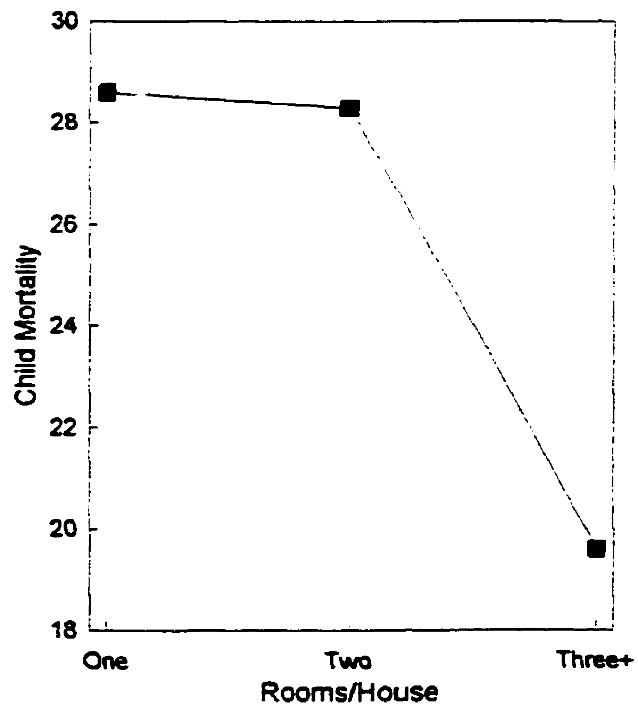


Figure 9.4 Child Mortality and House Space



Households that have such facilities are expected to have lower CMRs than households that do not have them. Electricity is not only used for the light, but rather it carries with itself a new lifestyle where electronic communications technology can open the door of an enclaved region to the outside world. The availability of piped water has a remarkable effect on child mortality clearly making it as a necessity of personal hygiene. The infant and child mortality rates in Nepal were significantly lower among children from households that had access to piped drinking water and electricity, compared with those from households that had not (Pant, 1991).

The presence of other facilities -- including bathroom or kitchen facilities, gas, telephone, or air-conditioning -- could be important in CM either as direct effects on sanitation or indirect effects operating through socio-economic indicators. Since these variables are not mutually exclusive, I decided to compute an additive index out of all of these variables and then test the association between their index and child mortality.

Table 9.3 shows the results for household facilities and CM, employing the household facility index (HFI) discussed in above, and a comparison of mortality/survival outcomes for individual index scores. The Zero-order correlation coefficient suggests there is no general relationship between household facilities and child mortality (r = 0.052, p-value=0.03) which is unexpected. However, a comparison of birth outcomes according to HFI score suggests the matter is not this simple. A direct and positive effect of household facilities on child survival is indicated for sub-populations having an HFI scores of 0 (CM = 2.6%, child survival = 1.1%), and scores of 1 (4.2 % versus 2.3%), while a reverse trend is suggested for HFI scores 2 to 5 where proportion of CM is less

Table 9.3: Index of Household Facilities by Child Mortalty

Index Score	F%	Live Birth	
		Living Children(%)	Child Mortality(%)
0	0.9	2.6	1.1
1	1.9	4.2	2.3
2	6.6	11.1	6.4
3	18.1	16.4	14.5
4	27.2	16.9	13.4
5	22.2	23.7	21.4
6	16.7	10.8	18.1
7	6.1	10.3	16.4
8	0.3	3.2	6.1
Total	100	100	100

Source: calculated from the survey data
F = frequency

than survival. From scores 6 to 9, proportion of CM again exceeds that of child survival.

One reason for this apparent curvilinear relationship may be that these facilities items are not mutually exclusive. Some items, such as piped water, may be considered necessities, while others, like telephones, may be luxuries. Further, some may be considered as societal factors beyond the individual choice or control (e.g., gas, telephone, electricity, and piped water). A more solid statistical technique, multivariate analysis, is required to explain the net effect of each of these variable on child mortality. Moreover, it is required to take the societal factors into account which will discuss in next chapter.

9.2. MULTIVARIATE ANALYSIS

Two separate stepwise logistic regression programs were run for the housing quality and house facility variables.

9.2.1. Housing Quality

Again, the quality of housing includes type of housing, building material, number of rooms per house, number of families per dwelling unit, and physical space for each of family. Table 9.4 presents regression coefficients for each of variable in the regression equation. All variables were considered as categorical and indicator variables. By using the indicator coding scheme, the coefficient for each category (as a new variable) represents the effect of each category compared to a reference category, the high-level category. The coefficient for the reference category is 0.

Following multiple regression, a forward stepwise regression was run in order to identify subset of independent variables that were good predictors of the dependent variable. Simply, this technique identify the "best housing quality model" for predicting CM. Two variables, the number of rooms and the number of families per dwelling, had low significance levels for their score statistic (Wald statistic), and thus were removed from the equation. The remaining variables were selected and organised into three models. The net effect of each variable is shown in Table 9.4. The type of house variable (regular house = good, irregular house = bad) was found to be the most powerful predictor in the regression equation (-0.7). This means that the change in log odds from irregular to regular housing resulted in a decrease of CM by a factor of 0.7. The effect of building materials (-0.28 and 0.07) and space (0.16, 0.17) are not considerable compared to that of type of housing, as there was little change in model chi-square and the log likelihood chi-square from one model to the other.

9.2.2. The Household Facilities

Forward stepwise logistic regression was run to identify the good predictors of child mortality, using the housing facility variables shown in Table 9.5. Four variables - kitchen, cooler, gas, and piped water - were selected and entered into the equation, the remainder being removed due to their low Wald statistic. The selection of variables was organised into four models by entering each variable occasionally. Model (1) indicates that having a kitchen tended to lessen CM by a factor of -.26 (B=-.26). Model (2) adds

Table 9.4: Logistic Regression of Child Mortality on Housing Quality

Variable	N 15876	Model I (S.E)	Model II (S.E)	Model III (S.E)
Building Material				
===============(1)	8673	-.31** (.071)	-.29** (.07)	-.28** (.07)
===============(2)	4715	.07 (.07)	.08** (.07)	.07* (.07)
===============(3:RF)	2488	---	---	---
Type of house (1)	15658		-.77** (.30)	-.70* (.30)
============= (2:RF)	218		---	---
space				
==============(1)	2292			.16 (.10)
==============(2)	3977			.16 (.08)
==============(3)	3775			-.17 (.10)
==============(4:RF)	5832			---
Constant		-3.65** (.05)	-2.90** (.30)	-2.95** (.30)
-2 log likelihood chi-sq		3486.87**	3481.64**	3473.02**
Model chi-sq		18.66**	23.89**	32.51*
Goodness of fit		15875.98**	15905.22**	15898.42**

Source: calculated from the survey data

Table 9.5: Logistic Regression of Child Mortality on Housing Facilities

Variable	N=16240	Model I	Model II	Model III	Model IV
Kitchen (1)	11240	-.26	-.18	-.15	-.12
	5000	(.05)	(.05)	(.05)	(.05)
Cooler (1)	6461		-.20	-.20	-.15
	9779		(.06)	(.06)	(.06)
Piped water (1)	15127			-.25	-.23
	1113			(.08)	(.08)
Gas (1)	3649				-.18
	12591				(.08)
constant		-3.67	-3.75	-3.56	3.70
		(.05)	(.06)	(.08)	(.10)
2 LL chi-square		3575.68	3564.99	3556.66	3552.15
Model chi-square		23.32*	34.68*	43.78*	47.53*
Goodness of fit		16287.98	16269.03	16263.28	16292.11

*Significant at both 0.05 and 0.01 level
Source: calculated by the survey data

another variable, cooler, to the first model, and indicates additional decreases in CM. By entering a new variable into the model the net effect of each variable in the equation is determined. For example, when the `cooler` variable is introduced, the regression coefficient for the kitchen reduced from -0.26 (in Model 1) to -0.18 (in Model 2). The same interpretation is true for Models 3 and 4, with additional variables entered into the model at each step. Among the four models, Model 4 emerges as the best model, and thus identifies the best predictor variables for CM. Model 4 shows that piped water has the highest regression coefficient. The two variables in this model, `presence of kitchen' and `cooler`, can be considered as the socio-economic indicators, while gas is a societal factor. Since 83.7 percent of Iranian population have electricity, it apparently does not affect the overall CM, although a consumption index would probably turn up different result.

9.3 SUMMARY

In this chapter, the relationship between the quality of housing and child mortality was studied through bivariate and multivariate analysis techniques. The quality of housing was assessed by indicators such as: type of housing, building materials, number of rooms per house, number of families per dwelling unit, number of rooms per family, and household facilities (electricity, water, bathroom, etc.). Bivariate analyses found a direct relationship between CM and family members per dwelling unit and indirect relationships with other housing variables. The multivariate analysis suggested the significant predictors of housing quality are: building materials, type of house, and space (number of room per family). From the analysis of household facilities and CM three variables appeared to be good predictors: presence of kitchen, cooler, and piped water. In general, the analysis lends support to the hypothesis that poor housing quality can increase the risk of child survival and supports the findings of other studies mentioned at the beginning of the chapter.

Thus, quality of housing appears to be an important indicator of socio-economic status as well as having some direct effect on childhood mortality. However, the effect of many housing quality indicators depends upon societal and contextual factors, such as development policies regarding household utilities. Such factors are introduced, incorporated into the analysis, and discussed in the following chapter.

CHAPTER TEN
SOCIETAL FACTORS AND CHILDHOOD MORTALITY

Child survival strategies are limited by factors rooted in the structure of the society to which the family belongs. The model developed and used in the present work distinguishes between ecological, political-economic, and health-care system variables as subsets, each accounting for a different portion of the variation observed in CM. In earlier chapters, the association between socio-economic and demographic factors and childhood survival at the household level was anlyzed. In this chapter, I explain how societal factors influence child mortality and survival. Adequate interpretation of associations found in the micro-analysis of the family demands that societal variables be taken into account.

Part of a society's structural character is qualitative and cannot be the object of statistical analysis. However, some structural characteristics can be measured and so used. For example, some development variables at the level of villages which I was able to extract from the latest census data (1986) and combined with the CMR of the same villages allows for contextual as well as individual level variables to be measured in terms of their relationship to childhood mortality. At the community level, a development index was created for each of the 65 villages in rural regions. This index is unavailable for urban areas, so those respondents are excluded from the analysis presented in this chapter. The index includes set of variables in three categories: health services, infrastructure, and socio-economic status.

10.1. Bivariate Analysis

Each of health, infrastructure, and socio-economic status are coded dichotomously where 1=present and 0=absent (see Table 10.1). An index was calculated using the count formula for the presence of each of the variables, and a frequency distribution of the index score by regions was generated (Table 10.2). The correlation coefficient provides the strength of association between the index score and CMR.

10.1.1. Health Status

The extent of health care coverage is considered an important factor determining CM in rural areas. Health services in rural areas of Fars include primary care at two levels: clinics and health posts. The health posts deliver services to mothers and children - such as health checks for pregnant women, health and weight checks for the children - as well as regular immunisation services provided by the village health worker. Health posts are connected to the clinics which have rotating doctor and nurse staff, provide training for village health workers, and provide primary health care and treatment of patients. Table 10.1 presents the distribution of health posts, clinics, doctors, and health workers among the villages in the five subprovinces.

Taking into account the individual-level CMR for each region, one can determine how the inequality in the distribution of health services affects variations in CM among the regions. For example, there are more health services available in shahrestan-e Abadeh, with lowest CMR (15.7), than shahrestan-e Shiraz, with the highest CMR (41.0) or Laar (31.0).

Table 10.1: Distribution of community development status of villages

Subprovince Variables	Abadeh	Shiraz	Laar	Mamasani	Neiriz
I/CMR	15.7	41.0	31.0	19.8	27.4
<u>Health Status</u>					
Clinic					
exist	2(20)	4(15.4)	2(20)	2(14.3)	2(40)
nonexist	8(80)	22(84.6)	8(80)	12(85.7)	3(60)
Health post					
exist	3(30)	4(15.4)	2(20)	7(50)	1(20)
nonexist	7(70)	22(84.6)	8(80)	7(50)	4(80)
Doctor					
exist	1(10)	1(3.8)	1(10)	--	2(40)
nonexist	9(90)	25(96.2)	9(90)	14(100)	2(60)
Health worker					
exist	3(30)	--	2(20)	2(8.3)	2(40)
nonexist	7(70)	26(100)	8(80)	12(91.7)	3(60)
<u>Infrastructure Status</u>					
Electricity					
exist	5(50)	12(46)	5(50)	7(50)	2(40)
nonexist	5(50)	14(54)	5(50)	7(50)	3(60)
Piped water					
exist	8(80)	15(57.7)	7(70)	9(64.3)	3(60)
nonexist	2(20)	11(42.3)	3(30)	5(35.7)	2(40)
Transportation					
exist	7(70)	14(54)	4(40)	7(50)	5(100)
nonexist	3(30)	12(46)	6(60)	7(50)	--
Telephone					
exist	3(30)	--	2(20)	--	--
nonexist	7(70)	26(100)	8(80)	14(100)	5(100)
Post box					
exist	2(20)	2(7.7)	2(20)	2(14.3)	3(60)
nonexist	8(80)	24(92.3)	8(80)	12(85.7)	2(40)

Table 10.1: continued

Subprovince Variables	Abadeh	Shiraz	Laar	Mamasani	Neiriz
Child Mortality Rate	15.7	41.0	31.0	19.8	27.4
Socio-economic Status					
Literacy ratio					
above M	7(70)	6(23)	5(50)	12(85.7)	1(20)
below M	3(30)	20(77)	5(50)	2(14.3)	4(80)
Elementary School					
exist	9(90)	24(92.3)	9(90)	13(93)	4(80)
nonexist	1(10)	2(7.7)	1(10)	1(7)	1(20)
Secondary School					
exist	4(40)	5(19.2)	5(50)	8(57)	4(80)
nonexist	6(60)	21(80.8)	5(50)	6(43)	1(20)
Adult Education					
exist	5(50)	7(27)	2(20)	5(36)	3(60)
nonexist	5(50)	19(73)	8(80)	9(64)	2(40)
Sheep per capita					
above M	5(50)	8(31)	2(20)	2(8.3)	2(40)
below M	5(50)	18(69)	8(80)	12(91.7)	3(60)
Cow per capita					
above M	2(20)	10(38.5)	1(10)	4(28.5)	--
below M	8(80)	16(61.5)	9(90)	10(71.5)	5(100)

Source (1): Child mortality rate calculated by the survey data
Source (2): Data for the characteristics of the villages extracted from census of Iran, 1986.

10.1.2. Infrastructure Status

Table 10.1 also illustrates the infrastructure status of the rural setting in Fars with regard to CM. The infrastructure variables include electricity, piped water, and communication which play an important role in socio-economic development of the regions. The infrastructure variables are unevenly distributed among the regions of study. The regions that have the better infrastructure also have lower child mortality. For example, 42.3 % of Shiraz villages, as compared to 20 % of Abadeh villages, have no piped water. The other indicators of infrastructure show approximately the same pattern of differentiation.

10.1.3. Socioeconomic Status

The socio-economic status of rural setting includes three variables: literacy rate, existence of schools at different levels, and animal husbandry per capita. Land ownership[1] and gardening are excluded from the index, because all villages are involved to some extent in farming and data are not available to calculate the population density per hectare farming land as an economic indicator at the societal level.

Table 10.1 presents the socio-economic development index of rural setting, and shows that villages with higher socio-economic status levels have lower CM. The villages of Abadeh, Mamasani and Neiriz have a higher proportion of schools compared to Shiraz and Laar. There is a great variation in terms of two economic indicators, sheep and cows per capita, among the regions.

[1] The ownership of land and garden at the household level were analysed in chapter six

10.1.4. Development Index of the Regions

The developmental index demonstrates the level of socio-economic development for each community (county) and its position relative to the others with regard to the level of mortality. Table 10.2. presents the additive development index based on the information presented in Table 10.1. Each of the three variable subsets in Table 10.2 -- health status, infrastructure status, and socio-economic status -- contains several dichotomous variables (presence and absence coded 1 or 0 respectively). The additive development index was created by counting of presence for each variable in a subset and ultimately in a total developmental index. The index ranges from 0 to 10 indicating the existence of the development indicators in Table 10.1. For example, the score of 0 means that the region does not have any of development indicators. Likewise the score 5 means that five of indicators exist in that region. Individual-level CM was then correlated with the development index to test the hypothesis that developmental index values should be inversely related with CMRs.

Table 10.2 also presents the values of health status index. The results show the unevenness of development between regions developed, as the range between extreme cases shows. Whereas slightly more than half (51.1%) of Abadeh villages have all of the development indicators, this is true of hardly any of the villages (0.1%) in the shahrestan-e Shiraz. Such variation ultimately represents differential access to health care services and other amenities that could affect CM. The correlation coefficient (-0.108) suggests that there is a weak and negative relationship between development and childhood mortality. Abadeh has the lowest CMR and highest development index is at one extreme,

Table 10.2: Scores and percentage of societal development by the regions

Index Score	Abadeh	Shiraz	Laar	Mamasani	Neiriz
0	---	3.7	0.4	0.1	---
1	0.2	1.0	3.1	---	---
2	5.6	12.0	4.0	---	---
3	8.7	7.2	14.2	12.1	26.6
4	---	31.1	12.9	16.3	---
5	15.0	15.6	7.5	10.6	0.1
6	---	14.2	0.2	5.6	---
7	1.6	12.0	15.3	33.5	46.7
8	---	3.2	---	21.7	17.1
9	17.8	---	14.4	---	9.5
10	51.1	0.1	28.0	---	---

Souce: calculated from the survey data

and Shiraz with the highest mortality rate and lowest development index is at the other. One may justify that the unevenly distribution of development in regions (at the societal level) means some groups can have access to amenities, while some do not. This does, however, affect child mortality at the individual level.

10.2. Multivariate Analyses

Stepwise multiple regression was run in order to improve our explanation of the complex relationship between CM and societal indicators by controlling the confounding factors, and to arrive at the best societal-factor or societal-level model for predicting CMR. The dependent variable is the CMR of each village (at the societal level), and the independent variables are the health status, infrastructure, and socio-economic variables discussed earlier. Table 10.3 presents the result of the stepwise regression procedures, which yielded twelve models. Each model indicating a new variable introduced into the previous model. This means that out of 15 variables 12 of them are statistically significant predictors of CMR at the village level. The best model is the last model which includes the selected 12 variables. Table 10.3 presents the 'best model' of the result of analysis. The presence of amenities such as: health post, clinic, electrical power, transportation, post box, secondary school, high literacy rate, and high number of sheep and cows per capita have inverse effects on CMR. The presence of some variables such as doctor, elementary and adult school have strong effect on CMR in unexpected direction. The unexpected negative effect of these variables on CMR may, however, be due to insufficient CM events and ultimately zero CMR for small villages. Therefore, the

Table 10.3: Regression of Child Mortality Rate of Villages on Societal Factors, Fars, Iran, 1986-91

Variables	B	SE B	Beta	Tolerance	Sig T
Health-post	-3.45	0.60	-0.06	0.78	0.0000
Clinic	-4.38	0.68	-0.08	0.57	0.0000
Doctor	8.84	0.86	0.11	0.77	0.0000
Electricity	-2.17	0.53	-0.04	0.81	0.0001
Transportation	-5.80	0.57	-0.10	0.82	0.0000
Post Box	-2.11	0.63	-0.03	0.82	0.0010
Literacy Rate	-1.23	0.03	-0.40	0.65	0.0000
Elementary school	17.94	0.92	0.21	0.77	0.0000
Secondary school	-4.22	0.60	-0.08	0.62	0.0000
Adult school	8.83	0.65	0.17	0.54	0.0000
Sheep per capita	-1.60	0.06	-0.28	0.75	0.0000
Cow per capita	-0.08	0.00	-0.12	0.90	0.0000
Constant	84.91	1.86			0.0000

Source: Calculated from the survey data

effect of the presence some of amenities on CMR in these (small) villages might be spurious.

To solve this problem, the analysis is repeated with a change in dependent variable from societal (village) to individual. This time stepwise regression analysis was run to detect the effect of the same societal factors (independent variables) on CM at the individual level (dependent variable). Model (1) in Table 10.4 consists solely of the village literacy rate, and shows that this is negatively related to CMR. Its regression coefficient (B = -1.17) represents for each unit increase in the literacy ratio of villages, holding other variables constant, CMR decreases by a factor of 1.17 and the model explains 14 percent of variation in the CMR variable.

Model (2) includes both literacy ratio and the sheep per capita in each village. With introduction of sheep per capita to Model (1), some the literacy ratio coefficient was reduced from -1.17 to -1.5059. This means that for each unit increase in village sheep per capita, the CMR decreases by 2.07, holding other variables constant. R square explains 23 percent of variation in child mortality by the combination of the independent variables. The remaining societal indicators were eliminated from the model, due to failure to meet entry requirements (pin = .050 limits). The value of tolerance in the equation is very high, suggesting that multicollinearity was not a problem.

10.3. SUMMARY

This chapter has reported analyses aimed at determining the possible effects of societal factors on child mortality. Societal factors were divided into three subsets: health

Table 10.4: Regression of child mortality rate on societal factors, Fars, Iran, 1986-91

Independent Variable	Model I (S.E)	Model II (S.E)
Literacy ratio	-1.17 (.36)	-1.50 (.36)
Sheep per capita		-2.07 (.78)
Constant (Intercept)	80.80	102.88
R square	.14	.23

Source: calculated from the survey data

status, infrastructure status, and socio-economic status. Bivariate analysis demonstrated that high values of developmental index of the community were associated with low CMRs.

Two separate multivariate analyses (stepwise regressions) were run for both CMR at the village level and at the individual level. The analysis of societal factors on CMR at village level indicated that 12 out of the 15 variables were good predictors, whereas the analysis of societal factors on CM at the individual level revealed that only 2 out of 15 variables, literacy rate and sheep per capita of the community, had relatively significant effects on CMR when controlling for the other variables. This analysis appears to indicate that societal factors are more important than the individual factors in determining I/CM in Fars, Iran. However, the analysis must take into account the possibility of interaction between the individual and societal factors. This leads to the need to perform a contextual analysis which is the subject of the following chapter.

CHAPTER ELEVEN
TEST OF THE INTEGRATED CHILDHOOD MORTALITY MODEL

This chapter presents the overall test of the CM model developed in chapter two, subsets of which have been tested by the analyses of chapters six to ten. The relationship between childhood mortality and the intervening variables were examined through both bivariate and multivariate analysis. Variables which have been determined in stepwise multiple regression to have important effects on CM were chosen, with the remainder of variables removed from the model, via logistic regression analyses. The variables which were selected are shown in Table 11.1.

11.1 MULTIVARIATE ANALYSIS

In this chapter, all variables that were selected on the basis of the statistical procedures employed in each of the previous chapters are analysed together using the same criteria to determine the most important variables affecting child mortality. Forward stepwise logistic regression is employed to identify which independent variables are good predictors of CM.

Table 11.2 presents the results of this stepwise procedure in both rural and urban areas. Five variables are selected and organised in five models. Model (I) shows that birth-weight has the largest score statistic, so it is entered into the model. There is an inverse relationship between birth-weight and CM. I/CM for the babies born with the weight more than 2500 grams decreases by a factor 1.29 when the birth weight compared

Table 11.1: Variables selected through the earlier analysis

Subset/Variables	Chapter
Socioeconomic Factors Subset	6
Place of Residence	
Education of Mother	
Occupation of Father	
Demographic Factors Subset	7
Age of First Marriage of Mother	
Pregnancy Order	
Pregnancy Age	
Maternal and Child Health Status Subset	8
Frequency of visiting Doctors during pregnancy	
Pregnancy duration	
Birth-weight	
Housing Condition Factors Subset	9
Type of Housing	
Housing Material	
Physical Space (number of room)	
Piped Water	
Housing Facilities	
-Kitchen	
-Cooler	
Societal Factors Subset	10
Literacy Rate of the Community (village)	
Sheep per capita of the Community (village)	

Source: extracted from chapters 6,7,8,9,10.

Table 11.2: Variables in Logistic Regression Equation, Study of I/CM, Fars, 1986-91

Independent Variables	N=16287	Model I (S.E)	Model II (S.E)	Model III (S.E)	Model IV (S.E)	Model V (S.E)
Birth-weight (> 2500 gr)	12185	-1.29 (0.14)	-1.37 (0.14)	-1.36 (0.14)	-1.34 (15)	-1.33 (0.14)
Birth-weight (not know)	1577	0.85 (0.14)	0.78 (0.14)	0.75 (0.14)	0.73 (0.14)	0.72 (0.14)
Birth-weight (< 2500 gr) RF	2525	0.00	0.00	0.00	0.00	0.00
Pregnancy duration (completed)	15427		-1.20 (0.15)	-1.18 (0.15)	-1.18 (0.15)	-1.12 (0.150)
Pregnancy duration (incompleted) RF	860		0.00	0.00	0.00	0.00
Pregnacy Order 1	10184			0.95 (0.30)	0.94 (0.30)	0.91 (0.30)
Pregnacy Order 2	4692			0.61 (0.31)	0.63 (0.31)	0.59 (0.31)
Pregnacy Order 3	1201			0.56 (0.33)	0.57 (0.33)	0.54 (0.34)
Pregnacy Order 4 RF	210			0.00	0.00	0.00
Housing Facility (without cooler)	6461				0.35 (0.12)	0.34 (0.12)
Housing Facility (with cooler) RF	9826				0.00	0.00
Number of Rooms/family	16287					-0.01 (0.00)
Constant		3.51	3.69	2.91	2.80	2.88
-2 Log likelihold Ratio		3305.03	3255.84	3239.93	3230.87	3226.91
Goodness of Fit		16286.37	16586.20	16788.84	16713.48	16757.45
Chi-square Residual		117.81	49.46	16.42	22.42	16.42
Model Chi-square		294.60	343.79	359.70	368.76	372.72

Source: calculated from the survey data

Rf = Reference Category

to those babies with less than 2500 grams weight, the reference category. In the second step, pregnancy duration entered was entered into the model, yielding a regression coefficient of -1.20 and a significant change in the residual chi-square reduced (R^2) from 117.81 in Model I to 49.46 in Model II. In other words, the shorter the pregnancy duration, the higher the probability of CM as compared to the reference group, incomplete pregnancy. In the next step, pregnancy order of the woman meets entry criteria, so it is entered. The coefficients in Model (II) decreased, and net effect of all the new variables are determined as presented in the Table 11.2. There is an indirect relationship between pregnancy order and I/CM. The women with lower pregnancy order tend to have slightly higher I/CM, when compared to the last category, high order pregnancy. The residual chi-square also decreased from 49.46 to 16.42. The first order pregnancy, where the age of first marriage is low, is expose to the higher risk of I/CM for two reasons: first, biophysical factor which tends to increase the risk of delivery and its consequences like injuries and infection for both mother and child; second, the first order of pregnancy and having the baby is a new phenomenon for a teenage mother and lack of experience tends to increase the risk for peri- and post neonatal mortality.

The Next, housing facility (cooler) entered into the model, Model IV. The coefficient of other variables changed slightly. Those who have cooler in their house tend to have lower I/CM. Quality of housing, number of rooms per family, entered into the model, Model V. The number of rooms has an inverse relationship with I/CM. By increasing the number of rooms of a family, I/CM decreases by a factor 0.01.

In short, the best model, Model V, includes birth-weight of the baby, pregnancy duration, pregnancy order, and housing quality and facility. According to the model developed in earlier chapters of this dissertation, these variables are identified as the proximate variables, which directly affect CM. The variable selection at previous stages, presented in Table 11.1, can be regarded as significant intervening variables selected from subsets of socioeconomic and demographic variables.

11.2. CONTEXTUAL ANALYSIS

Models which consider only individual-level variables may be inadequate especially when it is crucial to explicitly consider the effect of context. The latter can be mediated through a group mean variable. The possibility that these effects involve a cross-level interaction or operate in non-linear ways must also be considered. Boyd and Iversen (1979) argued that beyond the explicit aim to explain aggregate relationship, the specification of multilevel relationships serves as a diagnostic aid for the detection incorrectly specified models of individual behaviour.

Multilevel analysis technique enables the sociologist to analyse individual and group behaviour simultaneously. Contextual analysis is a practical statistical tool to be used to predict individual and group interaction. A key question of social science inquiry is that to extent are human beings affected by the characteristics of the groups to which they belong, and to what extent are they affected by their individual characteristics.

A multiple regression contextual model contains continuous individual, group, and interaction variables. This model is:

$$Y_{ic} = b_0 + b_1X_{ic} + b_2X_c + b_3X_{ic} + e_{ic}$$

where Y_{ic} and X_{ic} represent continuous individual-level scores for the ith individual in the cth community, and X_c represents community-level characteristics. The possibility of an interaction between the individual characteristic and community one is addressed with the product variable $X_{ic}X_c$. The partial coefficients b_1, b_2, and b_3 measure the individual, group, and interaction effects associated with these variable.

This basic model has been adjusted to our survey data. The survey merged file (see chapter 10) consists of both the individual-level (X) and community level data, therefor, it is not necessary to create the group data (X). The interaction term was introduced by multiplying community data by corresponding individual data. The interaction terms are as follows:

Int-1 = mother's education by existence of school

Int-2 = mother's education by visit a doctor

Int-3 = pregnancy age by age at first marriage

Int-4 = frequency of doctor visits by presence of doctor

Int-5 = pregnancy duration (in weeks) by existence of medical aids

Int-6 = pregnancy age by age at first marriage by pregnancy order

These variables were entered into the multiple regression contextual model. The contextual analysis was run for rural areas, including 65 villages[1] which differ according

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[1] Urban sectors were automatically excluded as missing cases because the community data

to availability of some or all of development institutions and in their potential effects on child mortality.

Forward stepwise logistic regression was run and at each step the variables were examined and met the selection-and-removal criteria. Based on these criteria, four Models (each step resulting in one model) presented the predictors of CM. The best model is the last model presented in Table 11.3, includes the four most important variables: birth weight, pregnancy order, pregnancy duration, and housing facility.

Given that almost the same variables, except rooms per family, are selected for the contextual analysis, we can conclude that the contextual analysis explains the variation in CM comparable to the non-contextual model. The three out of four selected variables are proximate variables: birth-weight, Pregnancy duration, and pregnancy order. Housing facilities also shows significant relationships with CM. Table 11.3 shows the regression coefficients of the four model. The regression coefficients of the selected variables are close to the noncontextual model presented in Table 11.2 and their direction did not changed.

11.3. SUMMARY

Several key findings emerged from the test of the integrated model reported in this chapter. First, among the variables determined by earlier analyses (Chapters 6-10) to be important predictors of CM, the subset of variables related to maternal and child health

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is only available for rural areas, besides it is supposed that all such development institutions (like school and health centre) exist in urban setting.

Table 11.3: Variables in Logistic Regression Equation, Study of I/CM, Fars, 1986-91

Independent Variables	N=7029	Model I (S.E)	Model II (S.E)	Model III (S.E)	Model IV (S.E)
Birth-weight (> 2500 gr.)	4640	-1.09 (0.20)	-1.19 (0.19)	-1.18 (0.19)	-1.15 (0.19)
Birth-weight (not know)	1033	0.65 (0.20)	0.60 (0.19)	0.56 (0.19)	0.75 (0.19)
Birth-weight (< 2500 gr.) Rf	1356		---	---	---
Pregnancy duration (complete)	6693		-1.13 (0.22)	-1.11 (0.23)	-1.06 (0.19)
Pregnancy duration (incomplete) Rf	346				---
Pregnancy order 1	3959			1.20 (0.35)	1.21 (0.35)
Pregnancy order 2	2281			0.92 (0.36)	0.93 (0.36)
Pregnancy order 3	673			0.76 (0.39)	0.76 (0.39)
Pregnancy order 4 Rf	116				---
Housing facility (without cooler)	1659				0.48 (0.36)
Housing facility (with cooler)	5370				---
Constant		3.41	5.56	2.55	2.43
-2 Log Likelihood Ratio		1794.02	1774.04	1761.50	17775.66
Goodness of Fit		7028.98	7111.12	7274.01	7336.70
Chi-square Residual		114.97	134.95	147.50	154.33

Source: calculated from survey data

Rf: Reference group

services were found to be most important variables. With reference to the integrated model, these variables, birth-weight, pregnancy duration and pregnancy order, should be viewed as proximate variables in the community context. Secondly, in the above analysis, housing quality emerged the most important indicator of socioeconomic status of both households and communities. Thirdly, variables deleted in first and second analysis could be considered even if they are not directly related to CM; rather they might indirectly affect child mortality through other factors.

CHAPTER TWELVE
CONCLUSION

12.1 Restatement of the Problem

There is abundant evidence in the existing research on development and health that economic growth helps to improve child survival rates. However, the evidence of recent decades show that the prospects for rapid economic growth rates are not promising for most developing countries. Moreover, the connection between child survival and economic growth is neither inclusive nor comprehensive. Economic growth *per se* does not explain enough of the variation in CM and, thus, cannot eliminate CM on its own; indeed, it is insufficient as the sole guiding basis for national development. The persistence of the CM problem in developed countries, although it may not reach the levels found in developing countries, itself indicates there is a need to fundamentally rethink the meaning of "national development." The approach advocated here, is to view the challenge of child survival as an integral part of development - in other words, as a component of overall improvement in the quality of life. Kent (1990) agrees that the prerequisites of a good quality of life are the individual's and community's consciousness of capacities in relation to the surrounding world. Economic growth is useful, but as a means towards, not as the end objective of, development.

Comparing the experiences of developed countries over the past three centuries with those of developing countries in the post-WWII period reveal that development is an indigenous process, rather than being something to be imported from abroad. Kent's

(1990) argument that individual and community consciousness are prerequisites for development supports this point. One way to encompass this argument is to review the demographic transition of developed and developing countries.

The demographic transition as a basic, descriptive phenomenon occurs at different rates in different ways at different times for different reasons. During the histories of various presently "developed" countries, one major demographic change was the decline in death rates, particularly in those countries undergoing industrialisation. This resulted in relatively rapid population growth rates in Western countries. A second major change was the decline in the birth rates of these countries following industrialisation, which decreased their demographic growth rates below world averages. However, the transition in the developing countries is different from that of the developed countries especially when considering economic "outputs". During the industrial revolution in currently developed countries, rapid population growth was associated with increasing wealth. Instead, the recent rapid population growth of today's developing countries is associated with poverty. The economic-growth-driven demographic transition in the wake of the Western industrial revolution may have been a unique historical event. In developing countries, mortality levels fell rapidly when medical and public-health services were introduced; use of antibiotics and vaccinations reduced the number of deaths from infectious diseases; and use of insecticides helped to control malaria. These changes did not result from socioeconomic development within the various developing countries, but were imported through technical or foreign aid.

A number of demographers hold the view that socioeconomic development, with its fundamental changes in the status of women and in the economic value of children, is the only possible basis for the transition from high to low fertility levels (Davis, 1967, 1973; Ryder, 1976). The prevailing explanations for changes in population growth rates, which centre on economic growth and health care services, miss the structural characteristics of demographic transition. Lappe and Schurman (1988) have shown how important it is to understand the role of social power:

> the powerlessness of the poor often leaves them little option but large families. Indeed, high birth rates among the poor can best be understood.... as a defensive response against structures of power that fail to provide, or actively block, source of security beyond the family.

In a society without adequate arable land or secure land tenure, and with no old-age support from outside the family, many poor people understandably view children as perhaps the only source of power open to them. For those in extreme poverty, children can be critical to one's very survival (Lappe and Schurman, 1988: 20-21). Under such conditions of apparent scarcity, which limit the access of individuals to the commons, both birth rates and child mortality rates will remain high.

The problem is mediated by a social structure that governs the way in which a nation's resource are allocated. The critical issue is not the population size itself, nor population size in relation to overall resources. It is the nature of the social arrangements that mediate access to resources. Arrangements that are open to full and equal participation by all affected groups are likely to lead to more even distribution of the benefits from the resources, and thus to adequacy for all. This study has shown that where the amenities are very unevenly distributed as in the five regions of Fars province of Iran, this leads to significant variations in child mortality level. Furthermore, the arrangement to access to these amenities and resources and also the extent of utilisation by different socio-economic groups in rural and urban population explains a considerable proportion of the variations in childhood mortality.

The study of child mortality and development calls for a framework that takes into account both individual- and community-level factors to explain these variations. The present empirical study represents a response tc that demand.

12.2. Outline of Significant Findings of the Present Study

According to the conceptual framework, provided initially by Mosely and Chen (1984) but elaborated by me, a comprehensive child mortality model was constructed. Such a model make the conceptualisation of CM more feasible and suggests that the study of child survival must proceed minimally at two levels: at the individuals (or household) and at the societal level. The operationalisation of the concepts was done through (1) examination of theory and hypotheses derived from a review of theoretical approach and empirical research, and (2) developing questionnaire items followed by a face to face interview (10665 cases) consists of 135 questions at the household level, and combined with the aggregated data from the latest census (1986) at the societal level (villages), thus allowing for a contextual analysis. The socio-economic, demographic, maternal and child health services, housing quality, and societal variables - as subsets of social system - were introduced into the model, and appropriate hypotheses developed for each. These hypotheses were tested through bivariate and multivariate analysis at both individual and contextual levels. The most important variables which had significant relationship with the child mortality were defined. The significant findings at different levels are summarised in Table 12.1.

In the stepwise regression procedure employed here, the estimated effect of the variables decline when others variable are subsequently introduced into the regression equation. This decline can be interpreted as the effect of the first variable operating indirectly through the second. The set of variables is an analytical category which forms part of the conceptual model. Thus, the socio-economic status affects child mortality through place of residence (rural and urban), mother's education, and father's occupation variables. The same is true with other sets of variables such as: demographic status, maternal and child health status, and housing conditions.

Further, multivariate regression analyses were run for the selected variables in order to chose the most important ones. The three most important variables were : pregnancy duration, visiting doctors and birth-weight which were among the maternal and child health care status subset. By this way, the variables can be distinguished into two groups according to their effects. Those selected at first stage as intervening variable and those selected at final stage as the proximate variables. Therefore, pregnancy duration, visiting doctors, and birth-weight as the proximate variables and the above mentioned list of significant variables as intervening variables. One may conclude that the major effect of intervening variables including, socio-economic, housing, and demographic variables, on child mortality operates through its association with the

Table 12.1: Outline of significant findings of child mortality

1. At the individual level

- Socio-economic Factors Subset
  - Place of Residence
  - Education of Mother
  - Occupation of Father

- Demographic Factors Subset
  - Age of First Marriage of Mother
  - Pregnancy Order
  - Pregnancy Age

- Maternal and Child Health Status Subset
  - Frequency of visiting doctors during pregnancy
  - Pregnancy order
  - Pregnancy duration
  - Birth-weight
  - Vaccination

- Housing Condition Factors Subset
  - Type of Housing
  - Housing Material
  - Physical Space (number of room)
  - Piped Water
  - Housing Facilities
    - -Kitchen
    - -Cooler

2. At the societal level

- Literacy rate
- Sheep per capita

3. At the contextual level

- Birth-weight
- Pregnancy duration
- Pregnancy order
- house facility (cooler)

4. Proximate variables

- Birth-weight
- Pregnancy order
- Pregnancy duration

Source: extracted from chapter 6 through 11

selected maternal and child health variables. The list of proximate variables is incomplete until contextual factors are added to the list.

In the contextual analysis equation CM was presented as a function of both individual and regional indicators. Individual factors, plus their interaction with corresponding regional factors, were entered into the equation. Four variables were found to have relationship with child mortality. The proximate variables are: birth weight, type of delivery, vaccination, visiting a doctor during pregnancy, and the feeding status of the child.

Furthermore the contextual analysis revealed that societal factors are interrelated with the individual characteristics and are better predictors of CMRs of villages (clusters) than the individual CM (see Table 12.1).

12.3. The Contributions of the Present Research

12.3.1. Child Mortality Model and Conceptual Framework

Any study obviously requires a conceptual framework to guide the analysis. Unlike the field of fertility, conceptual schemes for the study of child mortality are rare. The epidemiologists' models contributed narrow empirically mostly focusing on environmental factors and cause of death. This has, however, severe limitations for adaptation in the larger field of population and development studies. The 1980s multidisciplinary orientations models emphasised variables like environment, nutrition, health and morbidity (Mosley, 1983; Ruzicka, 1983; Farah, 1981). None of these models take the societal and contextual factors into the consideration. The "life affecting variable model" of Mahadevan (1990) also focused on different parameters that may affect health and life in different ways. But the framework of analysis may not have much value for effective application in empirical research due to the fact that it employs parameters which cannot be operationalised in most data sets.

The conceptual framework used in the present study was developed through a proposed child mortality model based on the social system. A principle objective of the current research was to see how social context affects infant and childhood mortality. Child mortality is caused by processes that may operate at two levels, individual and household level and societal level. The difference between the two levels shed light on the questions <u>what</u> and <u>why</u>. The first question applied at the individual level and the latter question at the contextual level. Underlying causes reflect an equal distribution of socio-economic institutions, availability of health services and infrastructure within geographic areas or even within household which depend on the socio-economic structure of society. The social or socio-economic factors are distinguished here into two groups: societal and household. The first is associated with distribution and access to resources and the latter is associated with capability of utilisation of resources.

Development in the study area (the Fars province of Iran) has been highly uneven. Some sectors, regions and classes have benefited considerably more than the others. The manifestation of uneven development is a crisis of poverty among the rural class which manifests itself in terms of a high level of child mortality. There are some explanations for rural areas in crisis. The major problem in rural areas arise from cyclical instability of food supplies. Traditional agriculture in Iran is highly dependent on yearly average rainfall fluctuations and natural disasters like drought and floods. The consequences are both economic in terms of agricultural output and health care in terms of food and nutrition intake. The second explanation is that population growth rate and high population density constitute major obstacles to the reduction of poverty in the countryside. Griffin and Ghose (1979) suggested two different hypotheses to define the mechanisms involved. The first is that high population densities are associated with low rates of growth of agricultural output and hence with low rates of growth of income in rural areas. The second hypothesis focuses on the inverse association between the rate of growth of population and the rate of growth agricultural production.

Inter-region differential child mortality is another outcome of the uneven distribution of resource allocation and growth performance. The inequality in distribution of health services and public amenities in the study areas does explain some of the variation in childhood mortality experiences. Even within geographically homogenous regions, however, intra-regional inequalities have tended to increase in Iran. The institutions, policies and technologies had a noticeable bias in the distribution of income. For example, notwithstanding two incomplete land reforms, one in 1963 and the other after the revolution 1978-79, the proportion of the rural population that is without land is actually rising. Small farmers and tenants, or the children of such people, are being transformed into a landless labour force.

At the individual level, ability to utilise resources depends on the socio-economic conditions of households. The finding of present research supports the arguments of

Mosley, Bobadilla, and Jamison (1993) that providing 'information', 'knowledge', and 'skills', ideally reinforced with social support, is critical to the promotion of child health and disease prevention. In traditional settings, employment of health workers to provide information, in addition to primary health services, plays an important role in childhood mortality reduction.

12.3.2. Methodological Contributions

The assessment of theoretical relationships between abstract concepts was followed by the operationalisation of such relationships through indicators. The methodology was designed as a multilevel study. At the individual, the method was designed by the endogenous and exogenous variables or intervening and proximate variables that should be distinguished by the inferential statistic based on the Mosley and Chen framework. At the societal level, the socio-economic institutions and indicators of the communities were studied. At the further step, the individual and the societal indicators were merged in order to run the contextual analysis. This three level analysis in the empirically study of child mortality is unprecedented and may have contribution to the study of child mortality.

12.3.3. Empirical Research

The main contribution of empirical research reported in this dissertation is the exploration of differentials and associations in child mortality, rather than to the determination of levels and trends. It is important to explore the mechanism through which the socio-economic and demographic factors operate and to identify the interrelationship between these factors. This can be achieved only by means of empirical research.

This study make a very valuable contribution in this regard by identifying social groups where children are exposed to greatest mortality risks. It is also an attempt to distinguish between the proximate and intervening variables that have effect on childhood mortality. This empirical study, based on a large sample and conducted in a heterogenous research site, also provides information that is fundamental to targeting policy, such as: the magnitude of CM differentials, the numbers of children exposed annually to mortality risks, and the geographic, social, economic or other characteristics that can help identify children and families most at risk.

12.4. The Implications

This current study represents contribution to the study of child mortality. A second objective of this study of the determinants of child mortality is to contribute to our understanding of those measures that bring about a sharp drop in excess I/CM in the developing countries. There is no doubt that better knowledge of the conditions determining higher child mortality and of the mechanisms through which we can act, provide the basis for more rational and effective policies to improve child survival.

The policy implications of the present analyses are to identify risk factors. The factors listed in Table 12.1 may be considered as the most important factors affecting child mortality in the developing countries, particularly in the region of this study. With respect to education and health services, the differentials emphasise the necessity to implement policies to provide more equal access to those benefits.

In addition, knowledge of living conditions contributes to the identification of major risk groups, which should receive priority attention, like the high risk of childhood mortality in the families living in poor housing conditions.

12.5. The Limitations

Considering that the study of child mortality is multidisciplinary, the present study tried to cover as many variables as possible. A frequent problem in the study of the determinants of child mortality is the exclusion of factors for which no information is available. The exclusion of such variables can alter estimates of the effects of the variables included in the analysis, depending upon the degree of correlation with omitted variables. But because of the technical and financial limitations in collecting these data, some things could not be done. The technical problems were more important than the financial ones; since the time of respondents who spend on answering the questions, the quality and accuracy of answers if the questionnaire was long and somewhat boring, the level of literacy of respondents and their information concerning these things should be considered. Two pieces of information were omitted (or altered): One was related to the information about the dates of birth of children. Date of birth is required to calculate the birth spacing which is one of the important demographic factor in the study of child mortality. Lack of this information caused to ignore this variable in present study. Furthermore, date of birth is also required to do survival analysis with entering the date of birth instead of the age of the children by month. The other missing information is related to contraceptive use by the respondents. This information allows us to examine the effect of family planning on child mortality through birth spacing.

A second limitation in the study of childhood mortality in developing countries is the quality of data. Because of the high rate of illiteracy and lack of trust to those who collecting data--the respondents do not trust the interviewer because of their bad image of government inspectors for taxation and military services--the quality of data might not be high enough. In addition, the problem of memory in retrospective data in child mortality is crucial. Although I was aware of these limitations before conducting the research, on unprecedented phenomenon, the war time rationing system, which continued during the data collection, might have caused me to underestimate child mortality in the research site. The rationing system distributed the necessities according to the family size. Therefore, many people, especially poor people, did not register or report the death of their children in order to enjoy the benefit of a large family size. The indirect estimation technique based on the maternal history of the same women was applied to determine the under-reporting of death or child mortality rates.

The third limitation is related to societal and contextual analysis in urban setting. Lack of information about societal and group factors in urban setting led to omit this part of contextual analysis. Besides, part of the information is qualitative and cannot be object of the statistical analysis.

A fourth limitation of the study lies in the statistical method. Each of quantitative methods has advantages and disadvantages of its own. The most popular and appropriate statistical method used in child mortality study is logistic model. Since out study requires multilevel analysis, the statistical technique and the computer software has not developed well to meet the need of such an analysis of social research.

The fifth limitation is the distance between the fieldwork and the study centre. Sometimes it was required to access to the questionnaire, or other source information like census data which was not feasible to do it. The solution was to use some secondary references or communicate to population centre at Shiraz University and ask for some piece of information which was time consuming.

12.6. Suggestions for the Future Research

It is suggested that the future research should make use of all available data sources of information, of a multidisciplinary approach and of a suitable analytical framework. In addition to demographic techniques, use of epidemiological methods, such as case-control studies, which permit estimate of the risk associated with bio-demographic factors in comparing those who die with those who survive. For example, the effect of breast-feeding and vaccination of the child are among of those variables that should be studied by case-control method. Because the mechanism through which these factors operates is complex and is different for each case by case. Breast-feeding, its duration, interruption and amount, and its combination with other supplementary nutritious food varies by case.

The need to combine quantitative analysis with qualitative information, like cultural characteristic, is also very important. To do so, many ethnographic studies combine data from census taking in a village with qualitative data on the cultural significance of death and dying, providing the opportunity to describe mortality risks of children in their cultural context.

The difference in child mortality among geographical regions is very important factor for regional planning and requires both micro and macro-level analysis. There is physical, economic, social and cultural heterogeneity; regions can differ in their prevailing type of production and also in their policies for distribution of economic and social benefits. Moreover ethnic groups may predominate in one region more than another, adding further differential factors. There can also be wide differences in the degree of urbanisation; the region that has the capital or main towns is often the most developed. Although lack of sufficient data on ethnicity in developing countries is a barrier for investigation, but the importance of the issue deserve more attention and study.

There is no doubt that better knowledge of determinants of childhood mortality and the mechanism through which they act provide the basis for effective child survival strategies. Other similar studies make a very valuable contribution to improve our knowledge and to identify the social groups in which children are exposed to the greatest mortality risk.

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APPENDIX A

MAPS

A1: Iran

A2: Fars Province

A3 : Abadeh (shahrestan)

A4: Shiraz (shahrestan)

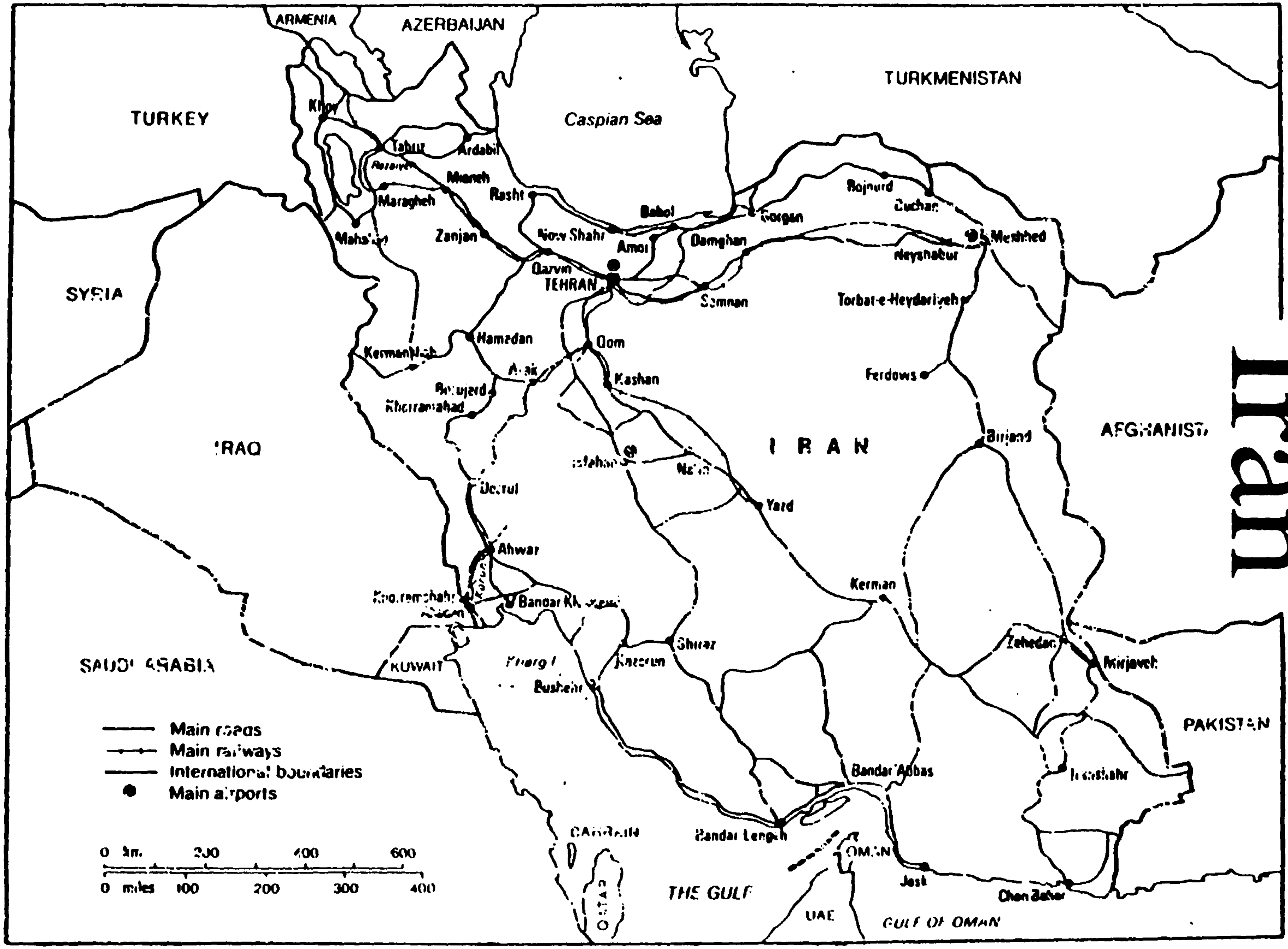
A5: Laar (shahrestan)

A6: Mamasani (shahrestan)

A7: Neiriz (shahrestan)

source: census of Iran, 1976

Iran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IRAN
AFGHANIST
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SAUDI ARABIA
KUWAIT
THE GULF
UAE
OMAN
GULF OF OMAN
Khoy
Tabriz
Ardabil
Mianeh
Rasht
Maragheh
Zanjan
Babol
Gorgan
Bojnurd
Quchan
Mashhed
Neyshabur
Now Shahr
Amol
Damghan
Qazvin
TEHRAN
Semnan
Torbat-e-Heydariyeh
Hamadan
Qom
Kashan
Ferdows
Birjand
Yazd
Kerman
Ahwaz
Shiraz
Kazerun
Bushehr
Zahedan
Mirjaveh
Bandar Abbas
Bandar Lengeh
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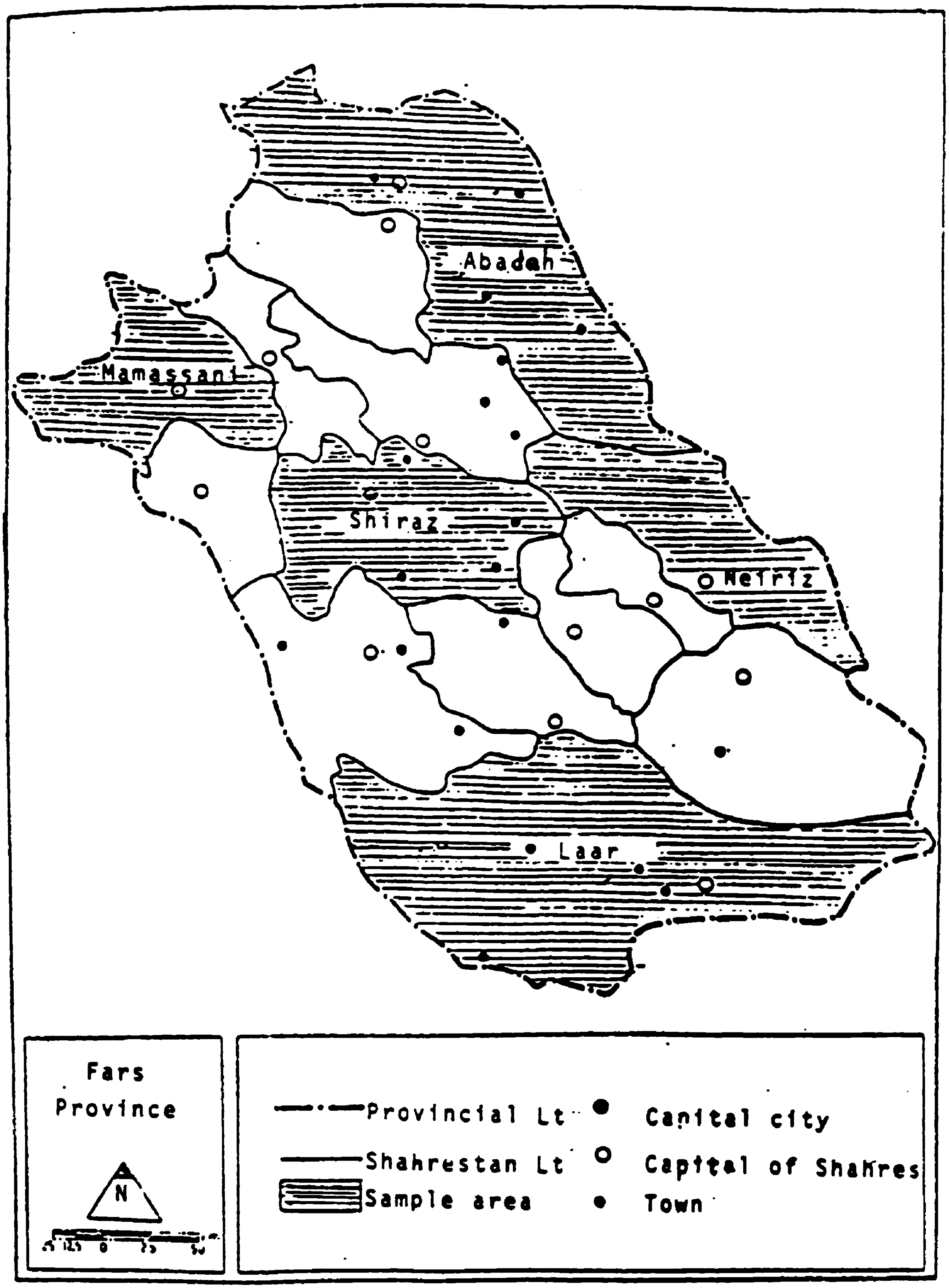
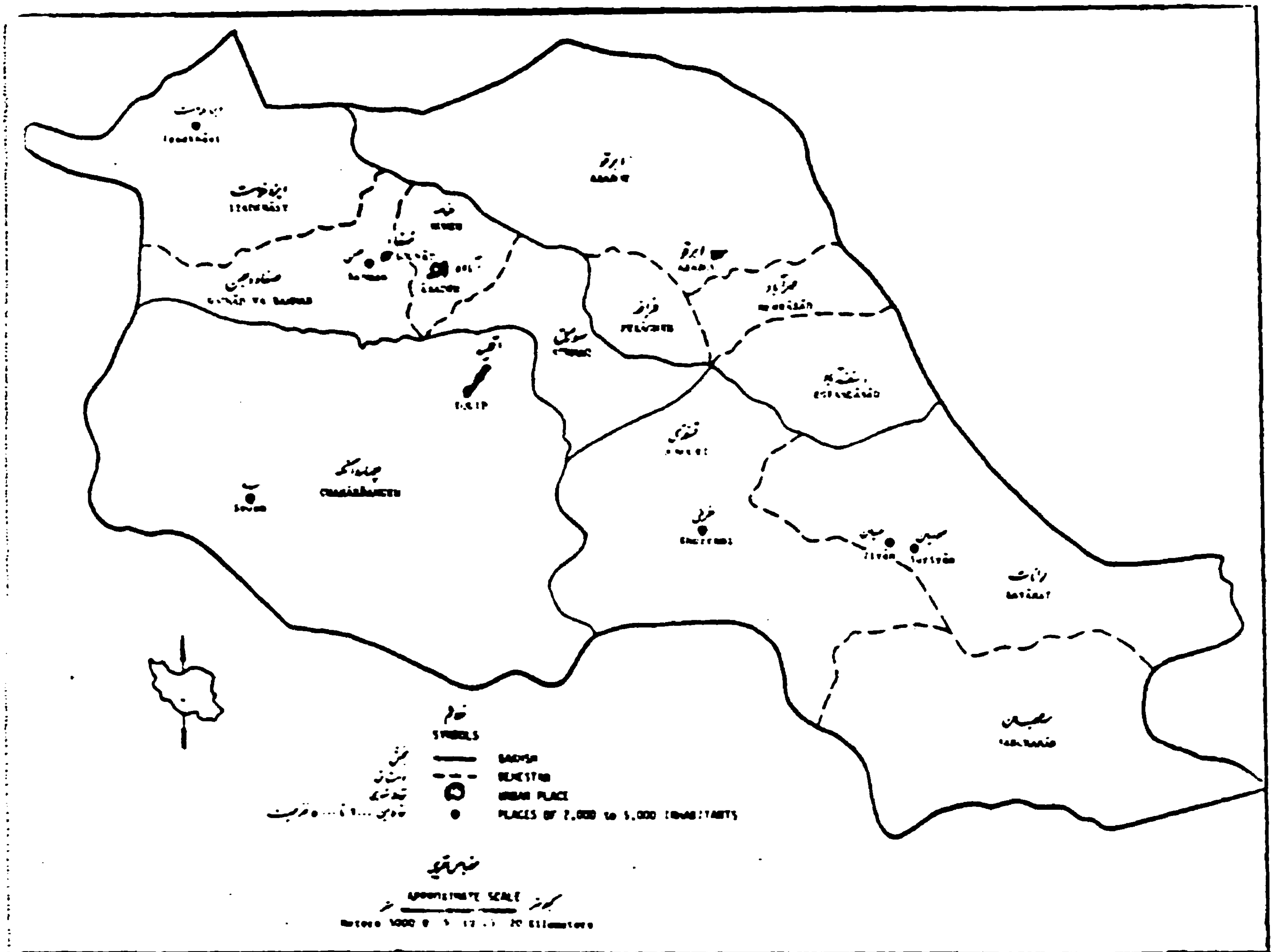
Iran

A2: Fars Province



نقشه شهرستان آباده - بخشها و دهستانها ، نقاط شهری و نقاطی که از ۲۰۰۰ تا ۵۰۰۰ نفر جمعیت دارند

ABADEH SHAHRESTAN - DEHESTANS, URBAN PLACES, AND PLACES OF 2,000 to 5,000 INHABITANTS



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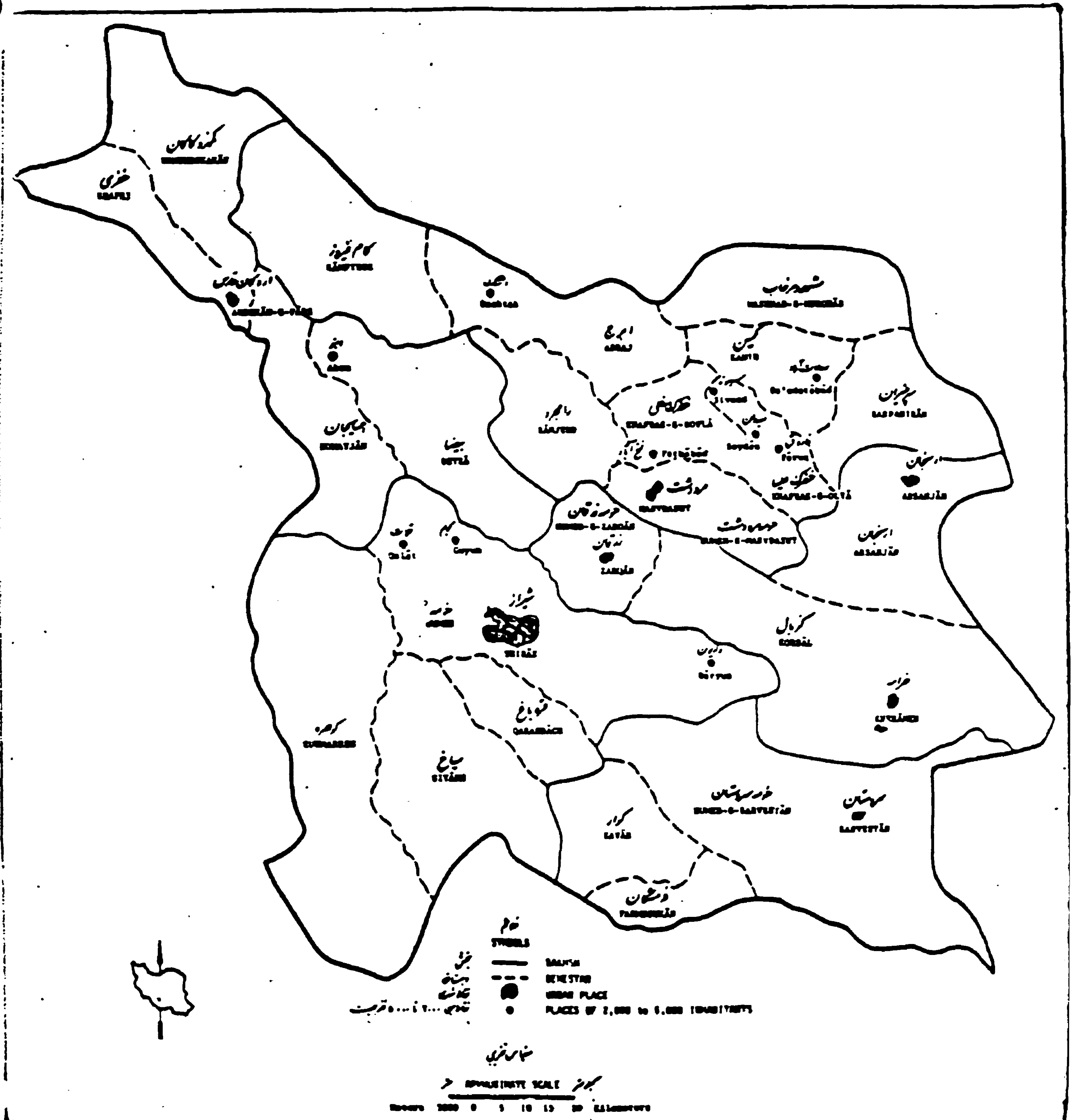
نقشه شهرستان شیراز بتفکیک دهستانها ، نقاط شهری و نقاطی که از ۲۰۰۰ تا ۵۰۰۰ نفر جمعیت دارند

SHIRAZ SHAHRESTAN - DEHESTANS, URBAN PLACES, AND PLACES OF 2,000 to 5,000 INHABITANTS

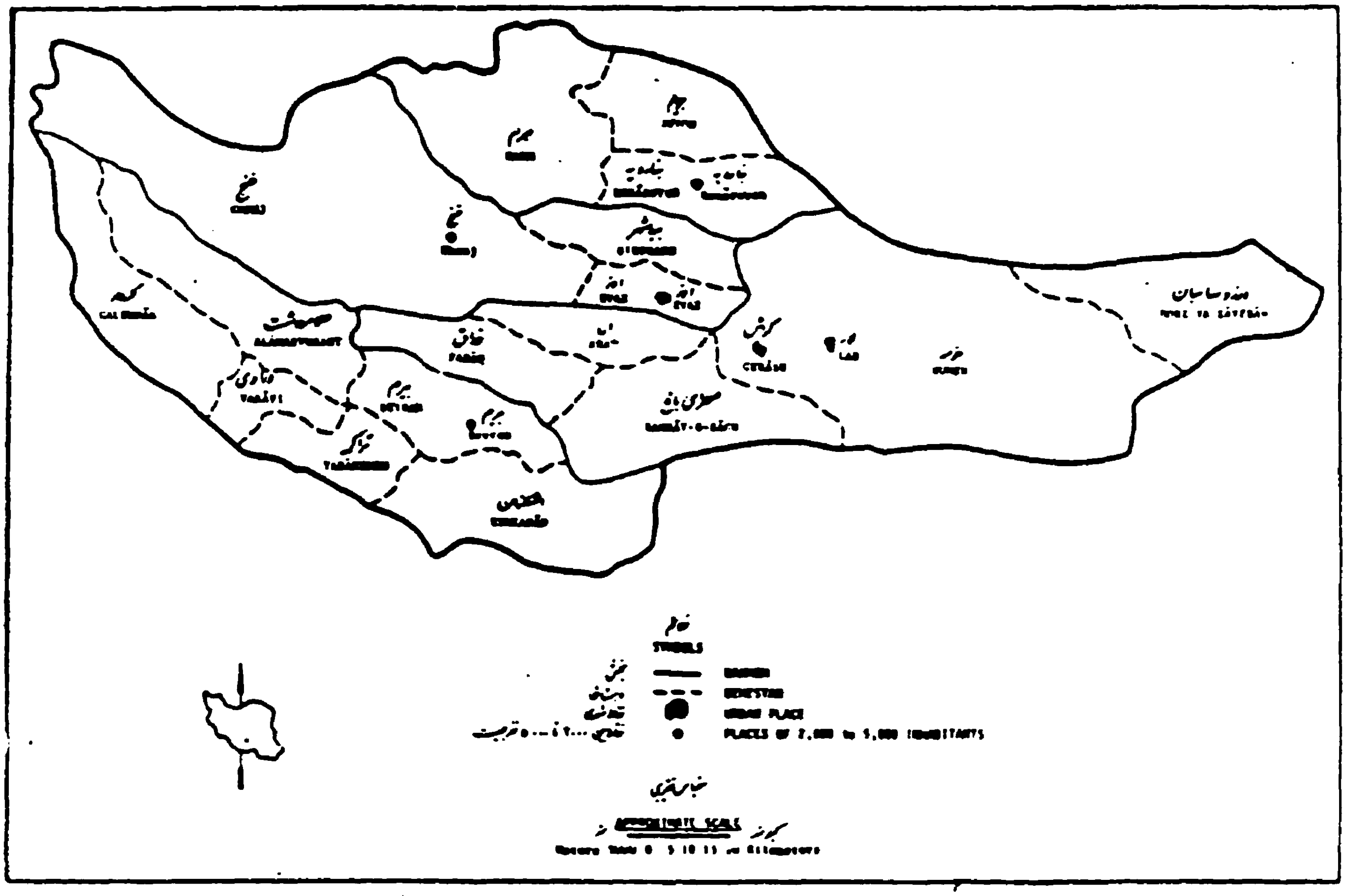


Large-scale maps of this shahrestan showing dehestans, places and roads at the time of the National Census of Population and Housing, November 1966 may be purchased from the Iranian Statistical Centre, Tehran.

A5: Lar Shahrestan

نقشه شهرستان — لار - بتفکیک دهستانها ، نقاط شهری و نقاطی که از ۲۰۰۰ تا ۵۰۰۰ نفر جمعیت دارند .

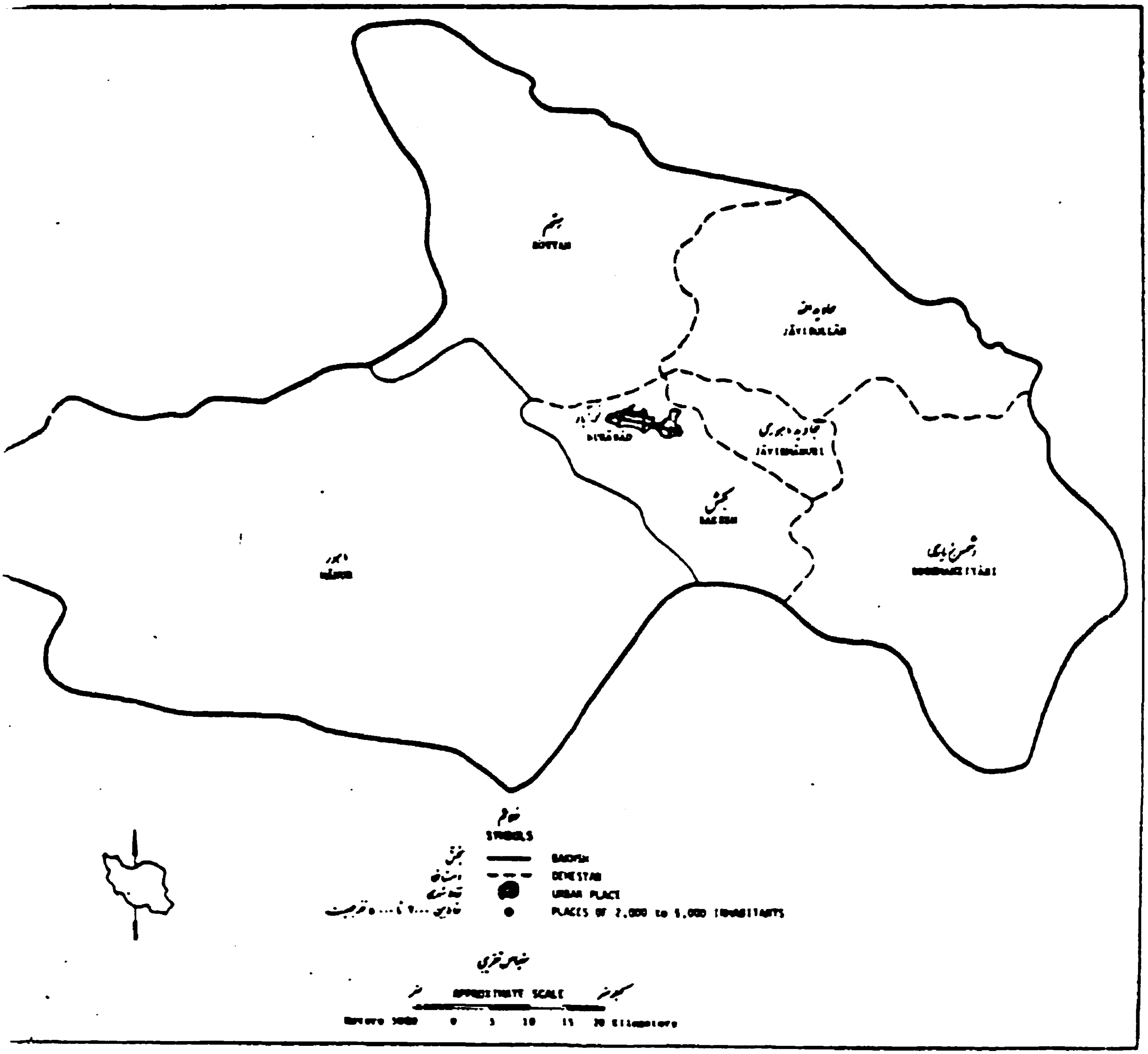
LAR SHAHRESTAN - DEHESTANS, URBAN PLACES, AND PLACES OF 2,000 to 5,000 INHABITANTS



Large-scale maps of this shahrestan showing dehestans, places and roads at the time of the National Census of Population and Housing, November 1966 may be purchased from the Iranian Statistical Centre, Tehran.

نقشهٔ شهرستان ممسنی تفکیک دهستانها و نقاط شهری

MAMASANI SHAHRESTAN – DEHESTANS, AND URBAN PLACES



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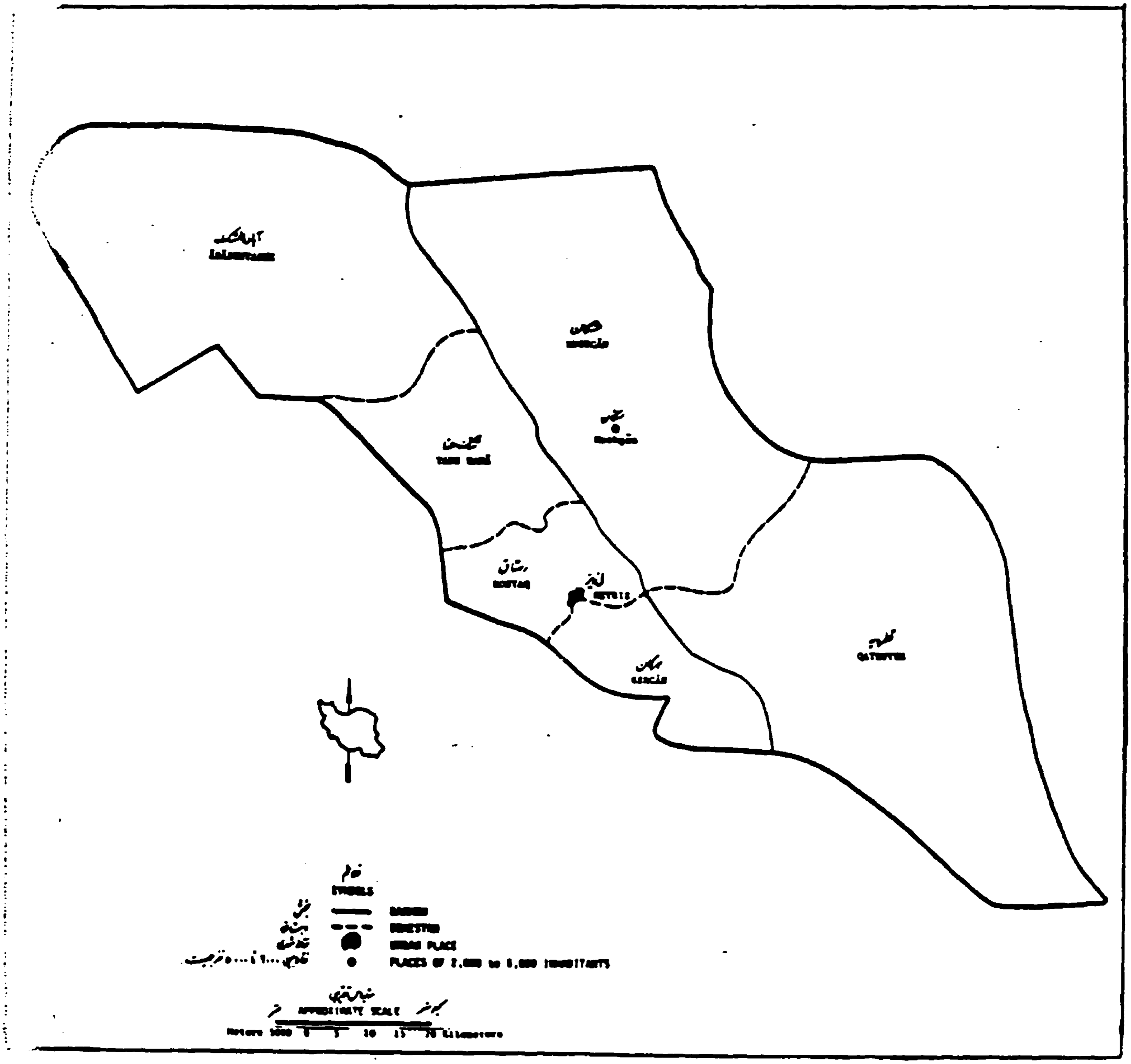
نقشه شهرستان نی‌ریز بتفکیک دهستانها، نقاط شهری و نقاطی که از ۲۰۰۰ تا ۵۰۰۰ نفر جمعیت دارند

NEYRIZ SHAHRESTAN - DEHESTANS, URBAN PLACES , AND PLACES OF 2,000 to 5,000 INHABITANTS



Large-scale maps of this shahrestan showing dehestans, places and roads at the time of National Census of Population and Housing, November 1966 may be purchased from the Iran Statistical Centre, Tehran.

APPENDIX B
QUESTIONNAIRE

B1: The Questionnaire

B2: list of men's occupation

B3: list of women's occupation

B4: list of rural and urban areas

STUDY OF DETERMINANTS OF CHILDHOOD MORTALITY IN DEVELOPING COUNTRIES: A case study of Iran.

A PROJECT OF CENTER FOR POPULATION STUDIES
SHIRAZ UNIVERSITY
SHIRAZ, IRAN

SPONSORING ORGANIZATIONS:
1. Center for Population Studies of Shiraz University
2. Office of Research Chancellor of Shiraz University

ACADEMIC AND RESEARCH CENTER:
1. Shiraz University, Center for Population Studies
2. McGill University, Department of Sociology

PRINCIPLE INVESTIGATOR:
Jalil Iranmahboob

RESEARCH ASSOCIATES:
Dr. Anthony Masi

DATE: --------------

QUESTIONNAIRE NO. ---------------

PLACE NO. -----------

MAIN: ------------

SUBSIDIARY: ------------

TOWN/VILLAGE: --------------

DISTRICT (DEHESTAN): --------------

NAME OF SHAHRESTAN: -------------

PROVINCE: -------------

INTERVIEWER'S NAME: ---------------

SUPERVISOR'S NAME: --------------

LANGUAGE USED: --------------

CODER'S NAME: ---------------

Interviewer: Introduce yourself and explain about the interview.

1. How old are you? ☐

2. Are you married, ☐ divorced, ☐ separated, ☐ widowed ☐

3. Is this your first marriage? Yes ☐ No ☐

   Your age at marriage:

   Your age at first marriage:

4. Is your husband your relatives? Yes ☐ No ☐

   specify, please:

5. Is your x-husband your relatives? Yes ☐ No ☐

   specify, please:

6. What level of education have you completed?

   Illiterate ☐

   Reading & writing ☐

   Primary school ☐

   Third grade of high school ☐

   Secondary school/associate of art ☐

   B.A./ M.A. ☐

   PhD. ☐

7. What level of education has your husband completed?

- Illiterate
- Reading & writing
- Primary school
- Third grade of high school
- Secondary school/associate of art
- B.A./ M.A.
- PhD.

8. What sort of work do you do (occupation)?

9. What sort of work does your husband do?

10. Where were you born?

10.a. If the place of birth is not the same where she lives, how long has she been here?

11. Where your husband was born?

11.a. If the place of birth is not the same where he lives, how long has he been here?

****

Housing information of household

12. What sort of housing do you have?

- Usual house
- tent
- slum
- hut
- other — please state

13. What type of building is this?

- Metal structure/reinforced concrete
- Brick and metal
- Brick/stone and wood
- Cement ceiling
- Complete brick
- Complete wood
- Sun-dried brick and wood
- Sun-dried brick and mud
- Other

14. How many households are living in this unit?

15. How many rooms does this unit have?

16. How many rooms does this family has?

17. What kind of occupier are you?

- private property
- owner of building but not the ground
- rental
- free of charge
- governmental housing
- standing and area property
- other please state

18. What facilities are there in your house?

- Electricity ☐
- Telephone ☐
- Piped water ☐
- Cooler ☐
- Gas ☐
- Heater ☐
- Kitchen ☐
- Bathroom ☐
- W.C. ☐

19. Which of the below assets do you have?

19. a. For urban area

- Car ☐
- B&W T.V. ☐
- Colour T.V. ☐
- Cooler ☐
- Dishwasher ☐
- Washing machine ☐
- Vacuum cleaner ☐
- Freezer ☐
- Refrigerator ☐
- Stove with oven ☐
- Stove without oven ☐

19. b. For rural area

- Stove ☐
- Radio ☐
- Cassette player ☐

Iron	
Sewing machine	
Refrigerator	
fan	
T.V.	
Bicycle	
car	
Land in hectare	
Garden in Hectare	
Number of Cows	
Number of sheep/geese	

0. Have you lost any member of your family in the last year?

Yes ☐ No ☐

Order	Name	Sex		Age *	Relationship with head of household	Cause of death
		M	F			

* More than one year in year and less than a year in month and day.

21. Pregnancy information table:

Information of living children			Information about dead children, and abortions		
1	2	3	4	5	6
Order	Name	Age	Between	N Dead	N Abortion
1th child			Marriage & 1th living child		
2nd child			1th & 2nd living child		
3rd child			2nd & 3rd living child		
4th child			3rd & 4th living child		
5th child			4th & 5th living child		
6th child			5th & 6th living child		
7th child			6th & 7th living child		
[illegible]			7th & 8th living child		
9th child			8th & 9th living child		
10th child			9th & 10th living child		
11th child			10th & 11th living child		
12th child			11th & 12th living child		
13th child			12th & 13th living child		
14th child			13th & 14th living child		
15th child			14th & 15th living child		

Total pregnancies = living children + dead children + abortions

22. Information about the last five years' pregnancies:

Order			1 2 3 4 5 6 7
Pregnancy outcome		alive children	
		alive birth leads to death	
		abortion	
Information about delivery		mother's age at delivery	
		duration of pregnancy (in weeks)	
	type of delivery	normal	
		abnormal	
	delivery location	hospital	
		home	
	delivery aid	physician	
		untrained midwife	
		trained midwife	
		relatives	
		total visits of physician during pregnancy	
Information about alive children		Name	
	Age	Year	
		Month	
	Sex	Female	
		Male	
Information about alive birth	Child's weight after birth	less than 2500 Gm	
		more than 2500 Gm	
		unknown	
	Nutrition of baby	breast feeding	
		milk powder	
		bottle-fed	
		duration	

23 . Information about live birth, dead in last five years:

Order	The same order as Table 13	Age at time of death (month)	Sex		Cause of death	Type of Vaccination										
						Polio			Triple #			Measles		Repeated		
			Female	Male		1st time	2nd time	3rd time	1st time	2nd time	3rd time	1st time	repeated	Polio	triple	haven't done
1																
2																
3																
4																
5																
6																
7																

To do vaccination of tetanus, typhoid and diphtheria simultaneously.

APPENDIX B

List of Men's Occupations

1. Professionals
   - -university professor
   - -Physician
   - -executive
   - -engineer
   - -judge
   - -nurse
   - -physiotherapist
   - -artist
   - -writer

2. Commercials
   - -Firm and factory owner
   - -company owner
   - -contractor
   - -producer
   - -whole seller, distributor
   - -hotel, restaurant owner
   - -jewelry
   - -boutique
   - -magazine
   - -auto-auction

3. Clericals
   - -teacher
   - -government and private employee
   - -military force
   - -clergy

4. Semi-professionals
   - -nurse aid
   - -technician
   - -uneducated but experienced architecture
   - -topographer
   - -prosthodontist (uneducated dentist through experience)

5. Services
   - driver
   - hair dresser
   - bricklayer
   - doorman
   - repairmen
   - photographer
   - painter
   - construction technician
   - carpenter
   - dress-maker
   - cooker
   - auto-serviceman
   - shoe-maker or repair
   - skilled laborer
   - handicraftsman

6. Retail Traders

7. Laborers (farm and non-farm)

8. Unemployed

List of Women Occupation

1. Home-makers

2. Working Women
   - teacher
   - secretary
   - type writer
   - dress maker
   - hair dresser
   - government employee
   - private employee
   - mid wife
   - weaving (carpet,...)
   - farm or husbandry laborer
   - door man
   - nurse
   - student
   - doctor
   - accounting
   - engineer
   - writer
   - expertis
   - handicraft worker
   - physiotherapist
   - health practitioner
   - technician
   - trader
   - semi-skilled laborer

List of villages (rural setting) and towns (urban setting in **Bold**)

Code	Abadeh Shahrestan	Code	Shiraz Shahrestan	Code	Laar Shahrestan	Code	Mamasani Shahrestan	Code	Neiriz Shahrestan
12	**Abadeh**	66	**Shiraz**	46	**Evaz**	26	**Noor Abad**	1	**Neiriz**
13	Bahman	67	Tork Abad	47	Beraack	27	GavShakhy	2	Abadehtash k
14	Dehdagh	68	Marolgo	48	Mor	28	Gol goon	3	Jahan Abad
15	Bandeno	69	Becket	49	Erad	29	Shahrac Gachgaran	4	Tamshooly
16	Dasht Raeesi	70	**Saadat Abad**	50	Ashena	30	Chah Chanar	5	Cargah
17	Tojroy	71	Cote Gonbad	51	Coordeh	31	Oshcaft roomeh	6	Shahrack Imam
18	**Saghad**	72	Aladin	52	Didehban	32	Rashk alieh	7	Ghotravieh
19	**Soorian**	73	Hekvan	53	Mahmood Zenea	33	Cheshmeh Sefeed		
20	**Dehbeed**	74	Dolat Abad	54	**Garash**	34	Sarsang Bozorg		
21	Beedack	75	Deh shib	55	**Khange**	35	Amooee		
22	Ali Abad	76	Baghan	56	Latifi	56	Gavasnagan		
23	Marvshekan	77	MOzafary	57	Chahtos	37	Dasht Rasm		
24	Najaf Abad	78	Post KheirAbad	58	Ghodagh	38	Mehranjan		
25	Chenar	79	Hosein Abad	59	**Laar**	39	Khoomehzar		
		80	Moez Abad			40	Baghery		
		81	Tarbarsadat			41	Ackbary		
		82	Tarbarjafary			42	hoseinAbad		
		83	Khaneh Khamis Sofla						
		84	Deh Noshar Abad						

Continue of the List of villages (rural setting) and towns (urban setting in **Bold**)

Code	Abadeh Shahrestan	Code	Shiraz Shahrestan	Code	Laar Shahrestan	Code	Mamasani Shahrestan	Code	Neiriz Shahrestan
		85	Malehgaleh						
		86	Bab Eivar						
		87	Ismaeel Abad						
		88	Dehack						
		89	Hasan Abad						
		90	**Kherameh**						
		91	**Kavar**						
		92	**Sarvestan**						
		93	**Zarghan**						
		94	Bavanack						
		95	Fatth Abad						
		96	Canoe						
		97	Lashcar Abad						

APPENDIX C

C1: indirect estimation computer output

C2: survival rates computer output

C3: recoding maps

Appendix C: Indirect Estimation for Urban areas, Fars, Iran.

INPUT DATA FOR IRAN, CHILD MORTALITY SURVEY 1991.
BOTH SEXES
ENUMERATION DATE: JUN 1991

Age Group of Women	Number of Women	Number of Children Surviving	Number of Children Dead
15-19	398.	540.	6.
20-24	1424.	2753.	78.
25-29	1681.	5124.	173.
30-34	1425.	5912.	261.
35-39	1021.	5436.	257.
40-44	452.	2812.	177.
45-49	106.	791.	59.

Source: calculated from the survey data

INDIRECT ESTIMATION OF EARLY AGE MORTALITY FOR IRAN, CHILD MORTALITY SURVEY 1991.
BOTH SEXES
ENUMERATION DATE: JUN 1991

AGE OF WOMAN	AVERAGE NO. CHILDREN BORN	AVERAGE NO. CHILDREN SURVIVING	PROPORTION DEAD	AGE x	COALE-DEMENY MODELS (TRUSSELL EQUATIONS) NORTH q(x)	NORTH t(x)	SOUTH q(x)	SOUTH t(x)	EAST q(x)	EAST t(x)	WEST q(x)	WEST t(x)
15-19	1.377	1.357	.015	1	.000	(3.6)	.000	(3.6)	.000	(3.7)	.000	(3.7)
20-24	1.988	1.933	.028	2	.016	(5.2)	.018	(5.3)	.022	(5.4)	.020	(5.3)
25-29	3.151	3.040	.033	3	.029	(6.2)	.032	(6.4)	.032	(6.4)	.032	(6.4)
30-34	4.329	4.146	.042	5	.045	(6.8)	.046	(6.9)	.045	(7.0)	.045	(6.9)
35-39	5.576	5.324	.045	10	.053	(7.1)	.051	(7.2)	.050	(7.2)	.051	(7.1)
40-44	6.613	6.221	.059	15	.069	(7.8)	.066	(7.9)	.065	(8.0)	.066	(7.9)
45-49	8.019	7.462	.069	20	.078	(9.9)	.075	(10.3)	.075	(10.5)	.077	(10.3)

COALE-DEMENY: AGE OF WOMAN	NORTH REFERENCE DATE	NORTH q	SOUTH REFERENCE DATE	SOUTH q	EAST REFERENCE DATE	EAST q	WEST REFERENCE DATE	WEST q
INFANT MORTALITY RATE: q(1)								
15-19	1987.8	.000	1987.8	.000	1987.8	.000	1987.8	.000
20-24	1986.3	.015	1986.2	.000	1986.1	.021	1986.1	.019
25-29	1985.3	.025	1985.1	.030	1985.0	.029	1985.1	.028
30-34	1984.7	.033	1984.5	.040	1984.5	.039	1984.6	.036
35-39	1984.3	.034	1984.3	.043	1984.3	.041	1984.3	.037
40-44	1983.7	.040	1983.6	.051	1983.5	.050	1983.5	.045
45-49	1981.5	.040	1981.2	.055	1981.0	.053	1981.1	.047
PROBABILITY OF DYING BETWEEN AGES 1 AND 5: $_4q_1$								
15-19	1987.8	.000	1987.8	.000	1987.8	.000	1987.8	.000
20-24	1986.3	.003	1986.2	.000	1986.1	.002	1986.1	.003
25-29	1985.3	.007	1985.1	.004	1985.0	.004	1985.1	.005
30-34	1984.7	.012	1984.5	.007	1984.5	.006	1984.6	.009
35-39	1984.3	.013	1984.3	.008	1984.3	.007	1984.3	.009
40-44	1983.7	.017	1983.6	.011	1983.5	.009	1983.5	.013
45-49	1981.5	.018	1981.2	.013	1981.0	.010	1981.1	.014
PROBABILITY OF DYING BY AGE 5: q(5)								
15-19	1987.8	.000	1987.8	.000	1987.8	.000	1987.8	.000
20-24	1986.3	.018	1986.2	.000	1986.1	.023	1986.1	.021
25-29	1985.3	.032	1985.1	.033	1985.0	.033	1985.1	.033
30-34	1984.7	.045	1984.5	.046	1984.5	.045	1984.6	.045
35-39	1984.3	.047	1984.3	.050	1984.3	.047	1984.3	.046
40-44	1983.7	.056	1983.6	.062	1983.5	.058	1983.5	.057
45-49	1981.5	.057	1981.2	.068	1981.0	.062	1981.1	.050

NOTE: A q VALUE OF .999 DENOTES VALUE BELOW A LEVEL 1 MODEL LIFE TABLE
" .000 " ABOVE A LEVEL 25 "

INDIRECT ESTIMATION OF EARLY AGE MORTALITY FOR IRAN, CHILD MORTALITY SURVEY 1991.
BOTH SEXES
ENUMERATION DATE: JUN 1991

AGE OF WOMAN	AVERAGE NO. CHILDREN BORN	AVERAGE NO. CHILDREN SURVIVING	PROPORTION DEAD	AGE x	UNITED NATIONS MODELS (PALLONI-HELIGMAN EQUATIONS) LATIN AM q(x)	LATIN AM t(x)	CHILEAN q(x)	CHILEAN t(x)	SO ASIAN q(x)	SO ASIAN t(x)	FAR EAST q(x)	FAR EAST t(x)	GENERAL q(x)	GENERAL t(x)
15-19	1.377	1.357	.015	1	.003	(1.3)	.006	(2.7)	.003	(1.4)	.005	(1.9)	.005	(1.5)
20-24	1.988	1.933	.028	2	.022	(4.5)	.025	(4.9)	.022	(4.6)	.023	(4.7)	.023	(4.5)
25-29	3.151	3.048	.033	3	.032	(6.0)	.033	(6.2)	.033	(6.1)	.032	(5.1)	.032	(5.0)
30-34	4.329	4.146	.042	5	.044	(6.1)	.044	(6.1)	.045	(6.2)	.043	(6.2)	.044	(6.1)
35-39	5.576	5.324	.045	10	.049	(5.5)	.047	(5.4)	.049	(5.5)	.047	(5.7)	.048	(5.5)
40-44	6.613	6.221	.059	15	.061	(5.4)	.061	(5.6)	.062	(5.3)	.061	(6.0)	.061	(5.6)
45-49	8.019	7.462	.069	20	.072	(8.3)	.071	(8.8)	.072	(7.8)	.073	(9.3)	.072	(8.5)

MEAN AGE AT MATERNITY = 28.93

UNITED NATIONS: AGE OF WOMAN	LATIN AM REFERENCE DATE	LATIN AM q	CHILEAN REFERENCE DATE	CHILEAN q	SO ASIAN REFERENCE DATE	SO ASIAN q	FAR EAST REFERENCE DATE	FAR EAST q	GENERAL REFERENCE DATE	GENERAL q
INFANT MORTALITY RATE: q(1)										
15-19	1990.2	.000	1989.3	.000	1990.1	.000	1989.5	.000	1989.9	.000
20-24	1987.0	.000	1986.6	.000	1986.9	.000	1986.8	.021	1987.0	.000
25-29	1985.4	.000	1985.3	.000	1985.3	.000	1985.4	.027	1985.4	.027
30-34	1985.3	.034	1985.3	.039	1985.3	.035	1985.3	.034	1985.3	.035
35-39	1986.0	.035	1986.0	.040	1986.0	.036	1985.8	.035	1986.0	.035
40-44	1986.0	.041	1985.9	.050	1986.2	.044	1985.4	.042	1985.8	.042
45-49	1983.2	.045	1982.7	.055	1983.5	.048	1982.1	.044	1982.8	.046
PROBABILITY OF DYING BETWEEN AGES 1 AND 5: $_4q_1$										
15-19	1990.2	.000	1989.3	.000	1990.1	.000	1989.5	.000	1989.9	.000
20-24	1987.0	.000	1986.6	.000	1986.9	.000	1986.8	.004	1987.0	.000
25-29	1985.4	.000	1985.3	.000	1985.3	.000	1985.4	.005	1985.4	.005
30-34	1985.3	.011	1985.3	.005	1985.3	.010	1985.3	.009	1985.3	.010
35-39	1986.0	.011	1986.0	.005	1986.0	.011	1985.8	.009	1986.0	.010
40-44	1986.0	.015	1985.9	.008	1986.2	.015	1985.4	.013	1985.8	.013
45-49	1983.2	.017	1982.7	.009	1983.6	.017	1982.1	.014	1982.8	.015
PROBABILITY OF DYING BY AGE 5: q(5)										
15-19	1990.2	.000	1989.3	.000	1990.1	.000	1989.5	.000	1989.9	.000
20-24	1987.0	.000	1986.6	.000	1986.9	.000	1986.8	.025	1987.0	.000
25-29	1985.4	.000	1985.3	.000	1985.3	.000	1985.4	.033	1985.4	.034
30-34	1985.3	.044	1985.3	.044	1985.3	.045	1985.3	.043	1985.3	.044
35-39	1986.0	.046	1986.0	.046	1986.0	.047	1985.8	.044	1986.0	.045
40-44	1986.0	.055	1985.9	.057	1986.2	.058	1985.4	.054	1985.8	.055
45-49	1983.2	.061	1982.7	.064	1983.5	.064	1982.1	.058	1982.8	.061

NOTE: A q VALUE OF .999 DENOTES VALUE FROM TABLE WITH LIFE EXPECTANCY LESS THAN 35
" .000 " GREATER THAN 75

Appendix C: Indirect Estimation for Rural areas, Fars, Iran.

INPUT DATA FOR
BOTH SEXES
ENUMERATION DATE: JUN 6

Age Group of Women	Number of Women	Number of Children Surviving	Number of Children Dead
15-19	319.	436.	16.
20-24	902.	2167.	103.
25-29	956.	3772.	205.
30-34	829.	4615.	315.
35-39	701.	4803.	365.
40-44	313.	2447.	294.
45-49	104.	848.	95.

INDIRECT ESTIMATION OF EARLY AGE MORTALITY FOR
BOTH SEXES
ENUMERATION DATE: JUN 6

AGE OF WOMAN	AVERAGE NO. CHILDREN BORN	AVERAGE NO. CHILDREN SURVIVING	PROPORTION DEAD	AGE x	COALE-DEMENY MODELS (TRUSSELL EQUATIONS) NORTH q(x)	NORTH t(x)	SOUTH q(x)	SOUTH t(x)	EAST q(x)	EAST t(x)	WEST q(x)	WEST t(x)
15-19	1.417	1.367	.035	1	.000	(3.0)	.000	(2.9)	.009	(3.0)	.003	(3.0)
20-24	2.517	2.402	.045	2	.031	(4.5)	.034	(4.6)	.038	(4.7)	.036	(4.6)
25-29	4.108	3.893	.052	3	.047	(5.8)	.051	(5.9)	.051	(6.0)	.050	(6.0)
30-34	5.947	5.567	.064	5	.066	(6.8)	.066	(7.0)	.066	(7.1)	.067	(7.0)
35-39	7.372	6.852	.071	10	.080	(7.8)	.078	(8.0)	.076	(8.0)	.077	(7.9)
40-44	8.757	7.818	.107	15	.171	(9.0)	.116	(9.3)	.114	(9.4)	.116	(9.3)
45-49	9.067	8.154	.101	20	.110	(11.4)	.107	(11.9)	.105	(12.1)	.108	(11.8)

COALE-DEMENY: AGE OF WOMAN	NORTH REFERENCE DATE	NORTH q	SOUTH REFERENCE DATE	SOUTH q	EAST REFERENCE DATE	EAST q	WEST REFERENCE DATE	WEST q
INFANT MORTALITY RATE: q(1)								
15-19	3.5	.000	3.5	.000	3.4	.009	3.5	.000
20-24	2.0	.028	1.9	.032	1.8	.036	1.8	.033
25-29	.7	.038	.5	.045	.4	.046	.5	.043
30-34	-.4	.045	-.6	.055	-.6	.056	-.6	.051
35-39	-1.3	.048	-1.5	.060	-1.5	.060	-1.5	.053
40-44	-2.6	.063	-2.8	.080	-3.0	.081	-2.8	.072
45-49	-4.9	.053	-5.4	.072	-5.7	.072	-5.3	.053
PROBABILITY OF DYING BETWEEN AGES 1 AND 5: $_4q_1$								
15-19	3.5	.000	3.5	.000	3.4	.001	3.5	.000
20-24	2.0	.008	1.9	.004	1.8	.005	1.8	.007
25-29	.7	.016	.5	.009	.4	.008	.5	.012
30-34	-.4	.022	-.6	.013	-.6	.011	-.6	.017
35-39	-1.3	.024	-1.5	.016	-1.5	.013	-1.5	.018
40-44	-2.6	.036	-2.8	.029	-3.0	.023	-2.8	.030
45-49	-4.9	.028	-5.4	.024	-5.7	.018	-5.3	.024
PROBABILITY OF DYING BY AGE 5: q(5)								
15-19	3.5	.000	3.5	.000	3.4	.010	3.5	.000
20-24	2.0	.036	1.9	.036	1.8	.041	1.8	.040
25-29	.7	.053	.5	.053	.4	.053	.5	.054
30-34	-.4	.066	-.6	.068	-.6	.066	-.6	.067
35-39	-1.3	.070	-1.5	.075	-1.5	.072	-1.5	.070
40-44	-2.6	.097	-2.8	.107	-3.0	.102	-2.8	.100
45-49	-4.9	.080	-5.4	.094	-5.7	.089	-5.3	.085

NOTE: A q VALUE OF .999 DENOTES VALUE BELOW A LEVEL 1 MODEL LIFE TABLE
" .000 " ABOVE A LEVEL 25 "

INDIRECT ESTIMATION OF EARLY AGE MORTALITY FOR
BOTH SEXES
ENUMERATION DATE: JUN 6

AGE OF WOMAN	AVERAGE NO. CHILDREN BORN	AVERAGE NO. CHILDREN SURVIVING	PROPORTION DEAD	AGE x	LATIN AM q(x)	LATIN AM t(x)	CHILEAN q(x)	CHILEAN t(x)	SO ASIAN q(x)	SO ASIAN t(x)	FAR EAST q(x)	FAR EAST t(x)	GENERAL q(x)	GENERAL t(x)
					UNITED NATIONS MODELS (PALLONI-HELIGMAN EQUATIONS)									
15-19	1.417	1.367	.035	1	.015	(1.2)	.020	(1.9)	.015	(1.3)	.020	(1.7)	.018	(1.4)
20-24	2.517	2.402	.045	2	.039	(3.9)	.043	(4.3)	.039	(4.0)	.040	(4.1)	.040	(4.0)
25-29	4.108	3.893	.052	3	.051	(5.6)	.053	(5.8)	.052	(5.7)	.051	(5.5)	.051	(5.5)
30-34	5.947	5.567	.064	5	.067	(6.3)	.066	(6.4)	.067	(6.4)	.065	(6.4)	.066	(6.3)
35-39	7.372	6.852	.071	10	.076	(6.5)	.073	(5.5)	.075	(6.6)	.074	(5.7)	.075	(5.5)
40-44	8.757	7.818	.107	15	.110	(7.3)	.110	(7.5)	.113	(7.3)	.110	(7.7)	.110	(7.4)
45-49	9.067	8.154	.101	20	.104	(10.4)	.103	(10.8)	.104	(10.2)	.105	(11.0)	.105	(10.5)

MEAN AGE AT MATERNITY = 28.70

UNITED NATIONS:	LATIN AM		CHILEAN		SO ASIAN		FAR EAST		GENERAL	
AGE OF WOMAN	REFERENCE DATE	q	REFERENCE DATE	q	REFERENCE DATE	q	REFERENCE DATE	q	REFERENCE DATE	q
INFANT MORTALITY RATE: q(1)										
15-19	5.2	.000	4.5	.000	5.2	.000	4.7	.020	5.0	.000
20-24	2.5	.034	2.2	.040	2.4	.034	2.4	.036	2.5	.035
25-29	.9	.041	.7	.048	.8	.042	.8	.042	.9	.042
30-34	.2	.048	.1	.057	.1	.050	.1	.049	.1	.049
35-39	-.1	.051	-.1	.060	-.1	.053	-.2	.051	-.1	.052
40-44	-.8	.067	-1.0	.084	-.8	.072	-1.2	.068	-1.0	.069
45-49	-3.9	.061	-4.4	.076	-3.8	.065	-4.5	.060	-4.1	.062
PROBABILITY OF DYING BETWEEN AGES 1 AND 5: $_4q_1$										
15-19	5.2	.000	4.5	.000	5.2	.000	4.7	.004	5.0	.000
20-24	2.5	.011	2.2	.005	2.4	.010	2.4	.010	2.5	.010
25-29	.9	.015	.7	.007	.8	.014	.8	.013	.9	.013
30-34	.2	.019	.1	.010	.1	.018	.1	.016	.1	.017
35-39	-.1	.021	-.1	.011	-.1	.020	-.2	.018	-.1	.019
40-44	-.8	.033	-1.0	.019	-.8	.033	-1.2	.028	-1.0	.030
45-49	-3.9	.028	-4.4	.015	-3.8	.028	-4.5	.023	-4.1	.025
PROBABILITY OF DYING BY AGE 5: q(5)										
15-19	5.2	.000	4.5	.000	5.2	.000	4.7	.024	5.0	.000
20-24	2.5	.044	2.2	.045	2.4	.044	2.4	.045	2.5	.045
25-29	.9	.055	.7	.055	.8	.055	.8	.054	.9	.055
30-34	.2	.067	.1	.066	.1	.067	.1	.065	.1	.066
35-39	-.1	.070	-.1	.070	-.1	.072	-.2	.068	-.1	.070
40-44	-.8	.097	-1.0	.101	-.8	.103	-1.2	.095	-1.0	.096
45-49	-3.9	.087	-4.4	.090	-3.8	.092	-4.5	.081	-4.1	.085

NOTE: A q VALUE OF .999 DENOTES VALUE FROM TABLE WITH LIFE EXPECTANCY LESS THAN 35
" .000 " GREATER THAN 75

Table C.1 Survival data of child mortality by age of dead children

Intrvl Start Time	Number Entrng this Intrvl	Number Wdrawn During Intrvl	Number Exposd to Risk	Number of Termnl Events	Propn Termi-nating	Propn Sur-viving	Cumul Propn Surv at End	Proba-bility Densty	Hazard Rate
.0	17509.0	1.0	17508.5	13.0	.0007	.9993	.9993	.0007	.0007
1.0	17495.0	.0	17495.0	29.0	.0017	.9983	.9976	.0017	.0017
2.0	17466.0	.0	17466.0	15.0	.0009	.9991	.9967	.0009	.0009
3.0	17451.0	.0	17451.0	31.0	.0018	.9982	.9950	.0018	.0018
4.0	17420.0	.0	17420.0	18.0	.0010	.9990	.9939	.0010	.0010
5.0	17402.0	.0	17402.0	13.0	.0007	.9993	.9932	.0007	.0007
6.0	17389.0	.0	17389.0	16.0	.0009	.9991	.9923	.0009	.0009
7.0	17373.0	.0	17373.0	12.0	.0007	.9993	.9916	.0007	.0007
8.0	17361.0	.0	17361.0	4.0	.0002	.9998	.9914	.0002	.0002
9.0	17357.0	.0	17357.0	8.0	.0005	.9995	.9909	.0005	.0005
10.0	17349.0	.0	17349.0	2.0	.0001	.9999	.9908	.0001	.0001
11.0	17347.0	.0	17347.0	7.0	.0004	.9996	.9904	.0004	.0004
12.0	17340.0	.0	17340.0	4.0	.0002	.9998	.9902	.0002	.0002
13.0	17336.0	.0	17336.0	.0	.0000	1.0000	.9902	.0000	.0000
14.0	17336.0	.0	17336.0	3.0	.0002	.9998	.9900	.0002	.0002
15.0	17333.0	.0	17333.0	1.0	.0001	.9999	.9899	.0001	.0001
16.0	17332.0	.0	17332.0	1.0	.0001	.9999	.9899	.0001	.0001
17.0	17331.0	.0	17331.0	3.0	.0002	.9998	.9897	.0002	.0002
18.0	17328.0	.0	17328.0	5.0	.0003	.9997	.9894	.0003	.0003
19.0	17323.0	.0	17323.0	.0	.0000	1.0000	.9894	.0000	.0000
20.0	17323.0	.0	17323.0	.0	.0000	1.0000	.9894	.0000	.0000
21.0	17323.0	.0	17323.0	.0	.0000	1.0000	.9894	.0000	.0000
22.0	17323.0	.0	17323.0	.0	.0000	1.0000	.9894	.0000	.0000
23.0	17323.0	.0	17323.0	.0	.0000	1.0000	.9894	.0000	.0000
24.0	17323.0	.0	17323.0	8.0	.0005	.9995	.9890	.0005	.0005
25.0	17315.0	.0	17315.0	.0	.0000	1.0000	.9890	.0000	.0000
26.0	17315.0	.0	17315.0	.0	.0000	1.0000	.9890	.0000	.0000
27.0	17315.0	.0	17315.0	2.0	.0001	.9999	.9889	.0001	.0001
28.0	17313.0	.0	17313.0	1.0	.0001	.9999	.9888	.0001	.0001
29.0	17312.0	.0	17312.0	.0	.0000	1.0000	.9888	.0000	.0000
30.0	17312.0	.0	17312.0	3.0	.0002	.9998	.9886	.0002	.0002
31.0	17309.0	.0	17309.0	1.0	.0001	.9999	.9886	.0001	.0001
32.0	17308.0	.0	17308.0	.0	.0000	1.0000	.9886	.0000	.0000
33.0	17308.0	.0	17308.0	.0	.0000	1.0000	.9886	.0000	.0000
34.0	17308.0	.0	17308.0	.0	.0000	1.0000	.9886	.0000	.0000
35.0	17308.0	.0	17308.0	.0	.0000	1.0000	.9886	.0000	.0000
36.0	17308.0	.0	17308.0	4.0	.0002	.9998	.9883	.0002	.0002
37.0	17304.0	.0	17304.0	.0	.0000	1.0000	.9883	.0000	.0000
38.0	17304.0	.0	17304.0	.0	.0000	1.0000	.9883	.0000	.0000
39.0	17304.0	.0	17304.0	.0	.0000	1.0000	.9883	.0000	.0000
40.0	17304.0	.0	17304.0	.0	.0000	1.0000	.9883	.0000	.0000
41.0	17304.0	.0	17304.0	.0	.0000	1.0000	.9883	.0000	.0000
42.0	17304.0	.0	17304.0	1.0	.0001	.9999	.9883	.0001	.0001
43.0	17303.0	.0	17303.0	.0	.0000	1.0000	.9883	.0000	.0000
44.0	17303.0	.0	17303.0	.0	.0000	1.0000	.9883	.0000	.0000
45.0	17303.0	.0	17303.0	.0	.0000	1.0000	.9883	.0000	.0000
46.0	17303.0	.0	17303.0	.0	.0000	1.0000	.9883	.0000	.0000
47.0	17303.0	.0	17303.0	.0	.0000	1.0000	.9883	.0000	.0000
48.0	17303.0	.0	17303.0	10.0	.0006	.9994	.9877	.0006	.0006
49.0	17293.0	.0	17293.0	.0	.0000	1.0000	.9877	.0000	.0000
50.0	17293.0	.0	17293.0	.0	.0000	1.0000	.9877	.0000	.0000
51.0	17293.0	.0	17293.0	.0	.0000	1.0000	.9877	.0000	.0000
52.0	17293.0	.0	17293.0	1.0	.0001	.9999	.9877	.0001	.0001
53.0	17292.0	.0	17292.0	.0	.0000	1.0000	.9877	.0000	.0000
54.0	17292.0	.0	17292.0	1.0	.0001	.9999	.9876	.0001	.0001
55.0	17291.0	.0	17291.0	.0	.0000	1.0000	.9876	.0000	.0000

56.0	17291.0	.0	17291.0	.0	.0000	1.0000	.9876	.0000	.0000
57.0	17291.0	.0	17291.0	.0	.0000	1.0000	.9876	.0000	.0000
58.0	17291.0	.0	17291.0	.0	.0000	1.0000	.9876	.0000	.0000
59.0	17291.0	.0	17291.0	.0	.0000	1.0000	.9876	.0000	.0000
60.0+	17291.0	17130.0	8726.0	161.0	.0185	.9815	.9694	**	**

** These calculations for the last interval are meaningless.

Source: Calculated by the survey data

Table C.2: Survival data of rural child mortality

LIFE TABLE
SURVIVAL VARIABLE MAGE5
FOR PREGRESU

INTVL START TIME	NUMBER ENT'NG THIS INTVL	NUMBER WDRAWN DURING INTVL	NUMBER EXPOSD TO RISK	NUMBER OF TERMNL EVENTS	PROPN TERMINATING	PROPN SURVIVING	CUMUL PROPN SURV AT END	PROBABILITY DENSTY	HAZARD RATE	SE OF CUMUL SURVIVING	SE OF PROBABILTY DENS	SE OF HAZRD RATE
0.0	2..4.0	7.0	210.5	0.0	0.0000	1.0000	1.0000	0.0000	0.0000	0.000	0.000	0.000
1.0	207.0	0.0	207.0	102.0	0.4928	0.5072	0.5072	0.4928	0.6538	0.035	0.035	0.061
2.0	105.0	0.0	105.0	10.0	0.0952	0.9048	0.4589	0.0483	0.1000	0.035	0.015	0.032
3.0	95.0	0.0	95.0	12.0	0.1263	0.8737	0.4010	0.0580	0.1348	0.034	0.016	0.039
4.0	83.0	0.0	83.0	11.0	0.1325	0.8675	0.3478	0.0531	0.1417	0.033	0.016	0.043
5.0	72.0	0.0	72.0	11.0	0.1528	0.8472	0.2947	0.0531	0.1654	0.032	0.016	0.050
6.0	61.0	0.0	61.0	10.0	0.1639	0.8361	0.2464	0.0483	0.1786	0.030	0.015	0.056
7.0	51.0	0.0	51.0	7.0	0.1373	0.8627	0.2126	0.0338	0.1474	0.028	0.013	0.056
8.0	44.0	0.0	44.0	3.0	0.0682	0.9318	0.1981	0.0145	0.0706	0.028	0.008	0.041
9.0	41.0	0.0	41.0	6.0	0.1463	0.8537	0.1691	0.0290	0.1577	0.026	0.012	0.064
10.0	35.0	0.0	35.0	2.0	0.0571	0.9429	0.1594	0.0097	0.0588	0.025	0.007	0.042
11.0	33.0	0.0	33.0	2.0	0.0606	0.9394	0.1498	0.0097	0.0625	0.025	0.007	0.044
12.0	31.0	0.0	31.0	4.0	0.1290	0.8710	0.1304	0.0193	0.1377	0.023	0.010	0.069
13.0	27.0	0.0	27.0	0.0	0.0000	1.0000	0.1304	0.0000	0.0000	0.023	0.000	0.000
14.0	27.0	0.0	27.0	1.0	0.0370	0.9630	0.1256	0.0048	0.0377	0.023	0.005	0.038
15.0	26.0	0.0	26.0	1.0	0.0385	0.9615	0.1208	0.0048	0.0372	0.023	0.005	0.039
16.0	25.0	0.0	25.0	0.0	0.0000	1.0000	0.1208	0.0000	0.0000	0.023	0.000	0.000
17.0	25.0	0.0	25.0	2.0	0.0800	0.9200	0.1111	0.0097	0.0833	0.022	0.007	0.059
18.0	23.0	0.0	23.0	3.0	0.1304	0.8696	0.0966	0.0145	0.1375	0.021	0.008	0.080
19.0	20.0	0.0	20.0	0.0	0.0000	1.0000	0.0966	0.0000	0.0000	0.021	0.000	0.000
20.0	20.0	0.0	20.0	0.0	0.0000	1.0000	0.0966	0.0000	0.0000	0.021	0.000	0.000
21.0	20.0	0.0	20.0	0.0	0.0000	1.0000	0.0966	0.0000	0.0000	0.021	0.000	0.000
22.0	20.0	0.0	20.0	0.0	0.0000	1.0000	0.0966	0.0000	0.0000	0.021	0.000	0.000
23.0	20.0	0.0	20.0	0.0	0.0000	1.0000	0.0966	0.0000	0.0000	0.021	0.000	0.000
24.0	20.0	0.0	20.0	5.0	0.2500	0.7500	0.0725	0.0242	0.2857	0.018	0.011	0.126
25.0	15.0	0.0	15.0	0.0	0.0000	1.0000	0.0725	0.0000	0.0000	0.018	0.000	0.000
26.0	15.0	0.0	15.0	0.0	0.0000	1.0000	0.0725	0.0000	0.0000	0.018	0.000	0.000
27.0	15.0	0.0	15.0	1.0	0.0667	0.9333	0.0676	0.0048	0.0690	0.017	0.005	0.069
28.0	14.0	0.0	14.0	0.0	0.0000	1.0000	0.0676	0.0000	0.0000	0.017	0.000	0.000
29.0	14.0	0.0	14.0	0.0	0.0000	1.0000	0.0676	0.0000	0.0000	0.017	0.000	0.000
30.0	14.0	0.0	14.0	1.0	0.0714	0.9286	0.0628	0.0048	0.0741	0.017	0.005	0.074
31.0	13.0	0.0	13.0	1.0	0.0769	0.9231	0.0580	0.0048	0.0800	0.016	0.005	0.080
32.0	12.0	0.0	12.0	0.0	0.0000	1.0000	0.0580	0.0000	0.0000	0.016	0.000	0.000
33.0	12.0	0.0	12.0	0.0	0.0000	1.0000	0.0580	0.0000	0.0000	0.016	0.000	0.000
34.0	12.0	0.0	12.0	0.0	0.0000	1.0000	0.0580	0.0000	0.0000	0.016	0.000	0.000
35.0	12.0	0.0	12.0	0.0	0.0000	1.0000	0.0580	0.0000	0.0000	0.016	0.000	0.000
36.0	12.0	0.0	12.0	2.0	0.1667	0.8333	0.0483	0.0097	0.1813	0.015	0.007	0.128
37.0	10.0	0.0	10.0	0.0	0.0000	1.0000	0.0483	0.0000	0.0000	0.015	0.000	0.000
38.0	10.0	0.0	10.0	0.0	0.0000	1.0000	0.0483	0.0000	0.0000	0.015	0.000	0.000
39.0	10.0	0.0	10.0	0.0	0.0000	1.0000	0.0483	0.0000	0.0000	0.015	0.000	0.000
40.0	10.0	0.0	10.0	0.0	0.0000	1.0000	0.0483	0.0000	0.0000	0.015	0.000	0.000
41.0	10.0	0.0	10.0	0.0	0.0000	1.0000	0.0483	0.0000	0.0000	0.015	0.000	0.000
42.0	10.0	0.0	10.0	0.0	0.0000	1.0000	0.0483	0.0000	0.0000	0.015	0.000	0.000
43.0	10.0	0.0	10.0	0.0	0.0000	1.0000	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

SPSS RELEASE 4.1 FOR IBM OS/MVS
MCGILL UNIVERSITY, MONTREAL PQ IBM 3090-200E   IBM MVS/ESA

INTVL START TIME	NUMBER ENTRNG THIS INTVL	NUMBER WDRAWN DURING INTVL	NUMBER EXPOSD TO RISK	NUMBER OF TERMNL EVENTS	PROPN TERMI-NATING	PROPN SURVI-VING	CUMUL PROPN SURV AT END	PROBA-BILITY DENSTY	HAZARD RATE	SE OF CUMUL SURV-IVING	SE OF PROB-ABILTY DENS	SE OF HAZRD RATE
44.0	10.0	0.0	10.0	0.0	0.0000	1.0000	0.0483	0.0000	0.0000	0.015	0.000	0.000
45.0	10.0	0.0	10.0	0.0	0.0000	1.0000	0.0483	0.0000	0.0000	0.015	0.000	0.000
46.0	10.0	0.0	10.0	0.0	0.0000	1.0000	0.0483	0.0000	0.0000	0.015	0.000	0.000
47.0	10.0	0.0	10.0	0.0	0.0000	1.0000	0.0483	0.0000	0.0000	0.015	0.000	0.000
48.0	10.0	0.0	10.0	7.0	0.7000	0.3000	0.0145	0.0338	1.0769	0.008	0.013	0.343
49.0	3.0	0.0	3.0	0.0	0.0000	1.0000	0.0145	0.0000	0.0000	0.008	0.000	0.000
50.0	3.0	0.0	3.0	0.0	0.0000	1.0000	0.0145	0.0000	0.0000	0.008	0.000	0.000
51.0	3.0	0.0	3.0	0.0	0.0000	1.0000	0.0145	0.0000	0.0000	0.008	0.000	0.000
52.0	3.0	0.0	3.0	1.0	0.3333	0.6667	0.0097	0.0048	0.4000	0.007	0.005	0.392
53.0	2.0	0.0	2.0	0.0	0.0000	1.0000	0.0097	0.0000	0.0000	0.007	0.000	0.000
54.0	2.0	0.0	2.0	0.0	0.0000	1.0000	0.0097	0.0000	0.0000	0.007	0.000	0.000
55.0	2.0	0.0	2.0	0.0	0.0000	1.0000	0.0097	0.0000	0.0000	0.007	0.000	0.000
56.0	2.0	0.0	2.0	0.0	0.0000	1.0000	0.0097	0.0000	0.0000	0.007	0.000	0.000
57.0	2.0	0.0	2.0	0.0	0.0000	1.0000	0.0097	0.0000	0.0000	0.007	0.000	0.000
58.0	2.0	0.0	2.0	0.0	0.0000	1.0000	0.0097	0.0000	0.0000	0.007	0.000	0.000
59.0	2.0	0.0	2.0	0.0	0.0000	1.0000	0.0097	0.0000	0.0000	0.007	0.000	0.000
60.0+	2.0	0.0	2.0	2.0	1.0000	0.0000	0.0000	**	**	0.000	**	**

** THESE CALCULATIONS FOR THE LAST INTERVAL ARE MEANINGLESS.

THE MEDIAN SURVIVAL TIME FOR THESE DATA IS 2.15

Table C.3:Survival data of urban child mortality

LIFE TABLE
SURVIVAL VARIABLE MAGE5
FOR PREGRESU = 2

INTVL START TIME	NUMBER ENTRNG THIS INTVL	NUMBER WDRAWN DURING INTVL	NUMBER EXPOSD TO RISK	NUMBER OF TERMNL EVENTS	PROPN TERMI-NATING	PROPN SURVI-VING	CUMUL PROPN SURV AT END	PROBA-BILITY DENSTY	HAZARD RATE	SE OF CUMUL SURV-IVING	SE OF PROB-ABILTY DENS	SE OF HAZRD RATE
0.0	164.0	6.0	161.0	0.0	0.0000	1.0000	1.0000	0.0000	0.0000	0.000	0.000	0.000
1.0	158.0	0.0	158.0	85.0	0.5380	0.4620	0.4620	0.5380	0.7357	0.040	0.040	0.074
2.0	73.0	0.0	73.0	5.0	0.0685	0.9315	0.4304	0.0316	0.0709	0.039	0.014	0.032
3.0	68.0	0.0	68.0	19.0	0.2794	0.7206	0.3101	0.1203	0.3248	0.037	0.026	0.074
4.0	49.0	0.0	49.0	7.0	0.1429	0.8571	0.2658	0.0443	0.1538	0.035	0.016	0.058
5.0	42.0	0.0	42.0	2.0	0.0476	0.9524	0.2532	0.0127	0.0488	0.035	0.009	0.034
6.0	40.0	0.0	40.0	6.0	0.1500	0.8500	0.2152	0.0380	0.1622	0.033	0.015	0.066
7.0	34.0	0.0	34.0	5.0	0.1471	0.8529	0.1835	0.0316	0.1587	0.031	0.014	0.071
8.0	29.0	0.0	29.0	1.0	0.0345	0.9655	0.1772	0.0063	0.0351	0.030	0.006	0.035
9.0	28.0	0.0	28.0	2.0	0.0714	0.9286	0.1646	0.0127	0.0741	0.029	0.009	0.052
10.0	26.0	0.0	26.0	0.0	0.0000	1.0000	0.1646	0.0000	0.0000	0.029	0.000	0.000
11.0	26.0	0.0	26.0	5.0	0.1923	0.8077	0.1329	0.0316	0.2128	0.027	0.014	0.095
12.0	21.0	0.0	21.0	0.0	0.0000	1.0000	0.1329	0.0000	0.0000	0.027	0.000	0.000
13.0	21.0	0.0	21.0	0.0	0.0000	1.0000	0.1329	0.0000	0.0000	0.027	0.000	0.000
14.0	21.0	0.0	21.0	2.0	0.0952	0.9048	0.1203	0.0127	0.1000	0.026	0.009	0.071
15.0	19.0	0.0	19.0	0.0	0.0000	1.0000	0.1203	0.0000	0.0000	0.026	0.000	0.000
16.0	19.0	0.0	19.0	1.0	0.0526	0.9474	0.1139	0.0063	0.0541	0.025	0.006	0.054
17.0	18.0	0.0	18.0	1.0	0.0556	0.9444	0.1076	0.0063	0.0571	0.025	0.006	0.057
18.0	17.0	0.0	17.0	2.0	0.1176	0.8824	0.0949	0.0127	0.1250	0.023	0.009	0.088
19.0	15.0	0.0	15.0	0.0	0.0000	1.0000	0.0949	0.0000	0.0000	0.023	0.000	0.000
20.0	15.0	0.0	15.0	0.0	0.0000	1.0000	0.0949	0.0000	0.0000	0.023	0.000	0.000
21.0	15.0	0.0	15.0	0.0	0.0000	1.0000	0.0949	0.0000	0.0000	0.023	0.000	0.000
22.0	15.0	0.0	15.0	0.0	0.0000	1.0000	0.0949	0.0000	0.0000	0.023	0.000	0.000
23.0	15.0	0.0	15.0	0.0	0.0000	1.0000	0.0949	0.0000	0.0000	0.023	0.000	0.000
24.0	15.0	0.0	15.0	3.0	0.2000	0.8000	0.0759	0.0190	0.2222	0.021	0.011	0.128
25.0	12.0	0.0	12.0	0.0	0.0000	1.0000	0.0759	0.0000	0.0000	0.021	0.000	0.000
26.0	12.0	0.0	12.0	0.0	0.0000	1.0000	0.0759	0.0000	0.0000	0.021	0.000	0.000
27.0	12.0	0.0	12.0	1.0	0.0833	0.9167	0.0696	0.0063	0.0870	0.020	0.006	0.087
28.0	11.0	0.0	11.0	1.0	0.0909	0.9091	0.0633	0.0063	0.0952	0.019	0.006	0.095
29.0	10.0	0.0	10.0	0.0	0.0000	1.0000	0.0633	0.0000	0.0000	0.019	0.000	0.000
30.0	10.0	0.0	10.0	2.0	0.2000	0.8000	0.0506	0.0127	0.2222	0.017	0.009	0.156
31.0	8.0	0.0	8.0	0.0	0.0000	1.0000	0.0506	0.0000	0.0000	0.017	0.000	0.000
32.0	8.0	0.0	8.0	0.0	0.0000	1.0000	0.0506	0.0000	0.0000	0.017	0.000	0.000
33.0	8.0	0.0	8.0	0.0	0.0000	1.0000	0.0506	0.0000	0.0000	0.017	0.000	0.000
34.0	8.0	0.0	8.0	0.0	0.0000	1.0000	0.0506	0.0000	0.0000	0.017	0.000	0.000
35.0	8.0	0.0	8.0	0.0	0.0000	1.0000	0.0506	0.0000	0.0000	0.017	0.000	0.000
36.0	8.0	0.0	8.0	2.0	0.2500	0.7500	0.0380	0.0127	0.2857	0.015	0.009	0.200
37.0	6.0	0.0	6.0	0.0	0.0000	1.0000	0.0380	0.0000	0.0000	0.015	0.000	0.000
38.0	6.0	0.0	6.0	0.0	0.0000	1.0000	0.0380	0.0000	0.0000	0.015	0.000	0.000
39.0	6.0	0.0	6.0	0.0	0.0000	1.0000	0.0380	0.0000	0.0000	0.015	0.000	0.000
40.0	6.0	0.0	6.0	0.0	0.0000	1.0000	0.0380	0.0000	0.0000	0.015	0.000	0.000
41.0	6.0	0.0	6.0	0.0	0.0000	1.0000	0.0380	0.0000	0.0000	0.015	0.000	0.000
42.0	6.0	0.0	6.0	1.0	0.1667	0.8333	0.0316	0.0063	0.1818	0.014	0.006	0.181
43.0	5.0	0.0	5.0	0.0	0.0000	1.0000	0.0316	0.0000	0.0000	0.014	0.000	0.000

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INTVL START TIME	NUMBER ENTRNG THIS INTVL	NUMBER WDRAWN DURING INTVL	NUMBER EXPOSD TO RISK	NUMBER OF TERMNL EVENTS	PROPN TERMI-NATING	PROPN SURVI-VING	CUMUL PROPN SURV AT END	PROBA-BILITY DENSTY	HAZARD RATE	SE OF CUMUL SURV-IVING	SE OF PROB-ABILTY DENS	SE OF HAZRD RATE
44.0	5.0	0.0	5.0	0.0	0.0000	1.0000	0.0316	0.0000	0.0000	0.014	0.000	0.000
45.0	5.0	0.0	5.0	0.0	0.0000	1.0000	0.0316	0.0000	0.0000	0.014	0.000	0.000
46.0	5.0	0.0	5.0	0.0	0.0000	1.0000	0.0316	0.0000	0.0000	0.014	0.000	0.000
47.0	5.0	0.0	5.0	0.0	0.0000	1.0000	0.0316	0.0000	0.0000	0.014	0.000	0.000
48.0	5.0	0.0	5.0	3.0	0.6000	0.4000	0.0127	0.0190	0.8571	0.009	0.011	0.447
49.0	2.0	0.0	2.0	0.0	0.0000	1.0000	0.0127	0.0000	0.0000	0.009	0.000	0.000
50.0	2.0	0.0	2.0	0.0	0.0000	1.0000	0.0127	0.0000	0.0000	0.009	0.000	0.000
51.0	2.0	0.0	2.0	0.0	0.0000	1.0000	0.0127	0.0000	0.0000	0.009	0.000	0.000
52.0	2.0	0.0	2.0	0.0	0.0000	1.0000	0.0127	0.0000	0.0000	0.009	0.000	0.000
53.0	2.0	0.0	2.0	0.0	0.0000	1.0000	0.0127	0.0000	0.0000	0.009	0.000	0.000
54.0	2.0	0.0	2.0	1.0	0.5000	0.5000	0.0063	0.0063	0.6667	0.006	0.006	0.629
55.0	1.0	0.0	1.0	0.0	0.0000	1.0000	0.0063	0.0000	0.0000	0.006	0.000	0.000
56.0	1.0	0.0	1.0	0.0	0.0000	1.0000	0.0063	0.0000	0.0000	0.006	0.000	0.000
57.0	1.0	0.0	1.0	0.0	0.0000	1.0000	0.0063	0.0000	0.0000	0.006	0.000	0.000
58.0	1.0	0.0	1.0	0.0	0.0000	1.0000	0.0063	0.0000	0.0000	0.006	0.000	0.000
59.0	1.0	0.0	1.0	0.0	0.0000	1.0000	0.0063	0.0000	0.0000	0.006	0.000	0.000
60.0+	1.0	0.0	1.0	1.0	1.0000	0.0000	0.0000	**	**	0.000	**	**

** THESE CALCULATIONS FOR THE LAST INTERVAL ARE MEANINGLESS.

THE MEDIAN SURVIVAL TIME FOR THESE DATA IS 1.93

APPENDIX C:3

Table C.1: Recode Map for Chapter Six

Variable Name	Old Values	New Values
Mother's education (Table 6.1)	0=No answer 1=No education 2=Some primary 3=Complete primary 4=Some secondry 5=Complete secondry 6=B.A; M.A. degree 7=PhD degree	0=Missing cases 5=High school & more
Father's education (Table 6.1)	treated the same as mother's education	
Land (Table 6.3)	1 through 96 Hectars 97=less than 1 Hectars 98=landless 99=Irrelavent	1-97=having land 2=landless 3=Irralevent
Garden (Table 6.3)	Treated the same as land variable	
Cow (Table 6.3)	1 through 97 heads 98=No cows 99=Irrelavent	1=having cows 2=having no cow 3=Irrelavent, =missing cases
Sheep (Table 6.3)	1 through 997 heads 998=No sheep 999=Irrelavent	1=having sheep 2=hahing no sheep 3=Irrelavent, =missing case

Father's occupation (Table 6.5)	1=professionals 2=commercials 3=clericals 4=semi-professionals 5=services 7=retail traders 8=unempoyed	1=skilled(1-5=1) 2=unskilled(6,8=2) 3=laborer(7=3)
Mother's education (Table 6.5)	as above	1=no schooling 2=primary(3=2) 3=secondry(4,5=3) 4=traitary(6,7,8=4)
Father's education (Table 6.5)	Treated the same as mother's in Table 6.5.	

Table C.2: Recode Map for Chapter Seven

Variable Name	Old Values	New Values
Age of mother, Pregnancy age, Age of first marriage. (Table 7.5; 7.6)	single age single age single age	20> =1 20-29=2 30-39=3 40-49=4 Else=missing value
Breast-feeding duration (Table 7.5; 7.6)	in month	1> month =1 2-3 months=2 4-6 months=3 7-12 months=4 13+ months=5

Table C.3: Recode Map for Chapter Eight

Variable Name	Old Values	New Values
Pregnancy period (week) (Table 8.1)	1 through 40	1-12=1 13-24=2 25-36=3 37+ =4
Type of delivery (Table 8.1)	0=undeclared	0=missing value
Place of delivery (Table 8.1)	0=undeclared	0=missing value
Assistance of delivery (Table 8.1)	0=undeclared 1=doctor 2=trained midwife 3=untrained midwife 4=relatives 5=nobody	0=missing value 1,2=1 3-5=2
Visiting doctor (Table 8.1)	coded the frequencies 95=non 96=regularly 97=every month 98=seldom	0=missing value visited=1 not visited=2
Birth weight (Table 8.2)	0=do not know	0=missing value
Vaccination (Table 8.2)	0=no answer 9=irrelavent	0,9=missing value
Feeding status (Table 8.2)	1=breast-feeding 2=milk-powder 3=cow milk 4=1 & 2 5=1 & 3 6=2 & 3 7=1,2,3 9=irrelevant	0,9=missing value 1=breast-fed 2=bottle-fed

Table C.4: Recoding Map for the Table 11.2 and 11.3

Variable	Old Value	New Value
Pregnancy period	in week	25-28 week
		29-32 week
		33-36 week
		37 + week
		else=missing
Visiting Doctor	frequency	regularly
		seldom
Birthweight	3=don't know	missing
	0=no answer	missing
	9=irrelevant	missing
Pregnancy result	3=wastage	missing
	2=dead	0
Type of House	1=regular	1=good quality
	2=tent	else=bad quality
	3=slum	
	4=type of tent	
Pregnancy age	single years	19 - =1
Age at first marriage		20-29=2
		30-39=3
		40-49=4
		else =missing
pregnancy order	by each order	4+ =4
Mother education	1=illiterate	2=2+3
	2=reading & writing	3=4+5
	3=elementary	4=6+7
	4=some high school	
	5=high school diploma	
	6=B.A.& M.A.	
	7=PhD	
Number of rooms	numbers	4+ =4

Table C.5: Recoding Map for the Table 11.2 and 11.3

Variable	Old Value	New Value
Quality of housing (construction material)	1=metal beam skeleton or reinforced concrete	1=1+2
	2=brick and iron, or stone and iron	2=3+4+5
	3=adobe and wood, or adobe and mud	3=6+7+8+9
	4=cement blocks	
	5=brick only, or brick and stone	
	6=all wood	
	7=adobe & wood	
	8=adobe & mud	
	9=other	
Feeding	1=breastfed	1=breastfed
	2=powder milk	2=2 through 7
	3=cow milk	9=missing
	4=1+2	
	5=1+3	
	6=2+3	
	7=1+2+3	
	9=irrelevant (wastage)	