Social and Demographic Factors in Perinatal Mortality: A Study Conducted in Addis Ababa, Ethiopia

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SOCIAL AND DEMOGRAPHIC FACTORS IN PERINATAL MORTALITY

A Study Conducted in Addis Ababa, Ethiopia

A Thesis
Presented to
The Faculty of the Department of Sociology
The College of William and Mary in Virginia

In Partial Fulfillment
Of the Requirements for the Degree of
Master of Arts

by
R. Douglass Arbuckle
1977
APPROVAL SHEET

This thesis is submitted in partial fulfillment of
the requirements for the degree of

Master of Arts

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Figure 1: Modern Ethiopia
The present study seeks to identify some social and demographic factors which may influence perinatal mortality (deaths occurring between the twentieth week of gestation and the end of the first week after birth). Indications from the current literature are that birth weight, gestational age, infant sex, socio-economic status, maternal parity (the number of previous pregnancies), the presence or absence of health care facilities, and whether the mother resides in an urban or rural area are all, either individually, or in combination, influential in determining whether or not an infant will survive beyond the perinatal period.

Most of these hypotheses are confirmed by the present study. In addition, the possibility that certain medical and cultural factors, such as dietary restrictions, general nutritional and health status, and the presence of various infectious agents, may intervene in such a way as to overshadow the effects of some socio-demographic factors commonly assumed to play some role in perinatal mortality, is given extensive treatment. Research designed to identify and examine some of these intervening factors may well provide clues helpful in establishing priorities for programs seeking to reduce perinatal mortality. Problems which appear to be unique to this type of research when conducted in underdeveloped areas, such as the often extreme reluctance of respondents to reveal certain information or the fact that often the respondents did not know their own age, are also discussed at some length.

The data used in the present study were collected in Ethiopia and provided by Dr. Richard L. Naeye, M.D., of the Department of Pathology of the Pennsylvania State University College of Medicine. Data analysis was primarily done along correlational lines, and extensive examination of variable distributions was also carried out. It is suggested that examination of some of the problems encountered in the present study will prove helpful in planning future studies of this nature by enabling the researcher to avoid mistakes in methodology which could have a negative impact on the research results.
SOCIAL AND DEMOGRAPHIC FACTORS IN PERINATAL MORTALITY

A Study Conducted in Addis Ababa, Ethiopia
INTRODUCTION

The present study seeks to uncover and examine some of the non-medical aspects of health in an underdeveloped country. Specifically, it deals with social and demographic factors in perinatal mortality in an urban area (Addis Ababa) of Ethiopia. These factors can often be hidden by more obvious medical problems whose influence seems more concrete and easily assessed. It is hoped that research of this type, in combination with research designed to identify and examine these more obvious, but often no more important, medical factors can provide some sense of direction to programs designed to eliminate or at least reduce the likelihood of pregnancy wastage through perinatal mortality so common in areas which can ill afford the social and economic drain caused by such waste.

In underdeveloped areas, where each family member represents an economic unit, the control of perinatal and infant mortality is of utmost importance to general development processes. This control cannot take place outside the context of development and without considering all aspects of such development since to do so would, in all likelihood, create a whole new set of equally disrupting and draining problems. Chapter I of this study presents the setting for the study, Ethiopia, by discussing the country's geographic and ethno-cultural background. Chapter II reviews the literature dealing with the generally non-medical aspects of perinatal mortality. Chapter III presents the data base and
methodology for the study, and gives the findings themselves, and Chapter IV gives the interpretation and general discussion of these findings.
FIGURE 1
MODERN ETHIOPIA
CHAPTER I

ETHIOPIA: THE SETTING

Ethiopia is one of the oldest African countries. Its history as an identifiable political and geographical entity goes back at least two thousand years, and probably longer (Jesman, 1963:10). In the course of its history, the country's boundaries have been subject to a great deal of variation. At its peak, Ethiopia’s borders have extended well into the present-day countries of Somalia and the Sudan; at other times, its borders have shrunk to less than half of its present size (Jesman, 1963:10). Modern Ethiopia has a size roughly equivalent to the combined areas of the states of Texas, Oklahoma, and New Mexico (Lipsky, 1962:28).

The eastern boundary of Ethiopia is formed primarily by the Red Sea, and by borders shared with the French Territory of the Afars and Issas (formerly French Somaliland) and Somalia. The Red Sea frontier is separated from the rest of the country by what is generally recognized as one of the most severe deserts in the world, where temperatures often pass 120° Fahrenheit, and where, in some places, no rainfall ever occurs.\(^1\) To the south, Ethiopia shares borders with Somalia and Kenya which are separated from the rest of the country by another, less severe desert, and semi-arid regions. In the west and north, Ethiopia is

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\(^1\) The author lived and worked in this area from November through December of 1973, and on several occasions experienced temperatures in excess of 120°F.
surrounded by the Sudan, access to which is cut off by high mountains and precipitous gorges, and both arid and dense tropical areas. The Ethio-Sudanese frontier is, even today, only negotiable by those familiar with the terrain and strong enough to endure at best highly rigorous travel.²

Ethiopia's physical characteristics are incredibly varied. For the most part, the country is marked by a vast series of mountains and plateaus, often separated by deep gorges. The highlands of Ethiopia, with an average altitude of between 7,000 and 8,000 feet, rise abruptly from the lowland deserts of the east and south (Ullendorff, 1973:22). The wall created by the highlands has played a major role in past Ethiopian history by providing an almost insurmountable barrier to would-be conquerors.³

The highlands are divided from northeast to southwest by the Great Rift Valley, which reaches well into Kenya and beyond. In the northwest part of the highlands, the Blue Nile winds its way downward from Lake Tana, providing another natural dividing line. The Great Rift Valley and the Blue Nile serve to separate the highlands of ancient Ethiopia from the rest of the country. This section of the highlands reaches from Asmara in the North to Addis Ababa in the south, and Jimma in the southwest, and forms what might be called the "heartland" of Ethiopia throughout its long history.

²These are more or less the author's personal observations from travels in these areas.

³It has also made for some very sharp climatic variations—temperatures on the edge of the highlands can be 60°F, while only twenty minutes away by automobile, it is twice that.
Ethiopia's climate can, in general, be thought of as temperate. With the exception of the eastern and southern deserts (which seem to have only two variations—hot and hotter), and certain tropical areas in the southwest, the country has definite seasons. From June through early October is the rainy season (kerempt) and from October through March, the dry season (bega). From late March through May, the small rains come, during which time there is light precipitation a few times per week. The eastern coast of the country enjoys a mediterranean seasonal pattern (Ullendorff, 1973:26). In Addis Ababa, which is located on the southern edge of the main highland region, the mean temperature for the month of May (the hottest month) is about 65°F, while in December (the coldest month) it is about 58°F (Ullendorff, 1973:26). At some of the higher altitudes, frost is common during the winter months, and snow is not unknown in some areas, though it is certainly not a regular occurrence.

The Ethiopian Calendar corresponds to the Julian Calendar, not the Gregorian. It is based on lunar rather than solar cycles. There are twelve, 30-day months in the Ethiopian year, and one shorter month at the end of each year, which lasts five days (six on leap years). Hours are counted beginning at 6 a.m. (roughly sunrise). Six a.m. would thus be 12 a.m. under the Ethiopian system. Each year in Ethiopia is named for one of the four apostles, this running in four-year cycles. Each day is named for a particular Saint or other holy person, and these Saint's days recur each month, with the exception of the shortened thirteenth month. Thus the twelfth of each month is St. Mikhail, the nineteenth, St. Gabriel, and the twenty-first, Mariam (the Virgin Mary), for example.

Orthodox Christianity was introduced into Ethiopia in the fourth
century A.D. by the Greek (or, according to some, Syrian) Frumentius, who is known locally as Kidus (saint) or Abba (HolyFather) Salama Berhan (the light of the faith). Since that time, Coptic Christianity has been the national religion of Ethiopia. Since the time of its introduction, the Ethiopian Coptic Christian Church has been attached to the Patriarchal See of Alexandria (Egypt), following them in the adoption of the monophysite beliefs on the nature of Christ (Lipsky, 1963:102). Until the middle of the present century, the head of the Ethiopian church was an appointee of the Coptic Patriarch in Alexandria, and was not an Ethiopian. In the early 1950's, the Emperor Haile Selassie arranged that the Ethiopian Archbishop henceforth be an Ethiopian, and in 1958 an agreement was reached with the Patriarch whereby the Archbishop would be selected by the fourteen provincial bishops subject to approval by the Emperor (Levine, 1974:127).

Not too long after its introduction into Ethiopian life, the Orthodox church adopted Che'ez, the dominant language at the Aksumite court, as its own. It continues to be the language of religious and classical literature, much in the same way Latin was in Roman Catholic areas until recently.

Until the downfall of the monarchy in 1974, the government and the church enjoyed close relations, the former serving as the secular extension of the latter. The emperor could, and often did, pronounce on matters of faith, and had effective control of the Church hierarchy from his position as "Defender of the Faith."

---

1 Various estimates place the number of Orthodox Christians at about 40 percent of the total population, Moslems at about 35 percent, and other Christian and pagan religions at about 25 percent.
Despite the power usually held by the Emperor in the church and the connections between church and state that have been found throughout Ethiopian history since Christianity was introduced, in institutional terms, the two "estates" have remained separate. According to Levine, they have separate sources of legitimacy, distinct bases of power and influence, contrasting patterns of internal organization, and specialized societal functions (1974:120).

He suggests that the legitimacy of members of the priesthood derives from their ordination by the Abun (archbishop) while that of the secular rulers is dependent on appointment by the Emperor whose own legitimacy is in turn dependent on his claim of descent from the Solomonid line. In addition, the power of the clergy is based on their ability to grant ritual favors, pronounce excommunications, and give meaningful counsel in matters of the spirit, while the power of secular rulers depends for the most part on military prowess (real or imagined), ability to provide for their followers, and the granting of rewards and favors (Levine, 1974:120-121). At least part of the Emperor's legitimacy, however, it should be noted, came from the church, which has traditionally exerted a strong, albeit informal, influence in the political arena.

The internal structure of religious and political institutions are also quite different. While the church exhibits a great deal of localized authority and autonomy, the political domain exhibits a centralized power structure, a definite hierarchy of authority, and a very high degree of role specialization (Levine, 1974:120-121).

Ethnically, Ethiopia exhibits a high degree of variation. There are three main groups, the Amhara, Tigrean, and Galla, who seem to have played dominant roles in the political and economic areas of modern
Ethiopian history. The Amhara and Tigrean groups are often considered together since they are of the same descent, having settled in different areas of the country.

A great deal of debate has occurred over the origins of Ethiopia's various peoples. Many attempts at classification have been made—along genetic, regional, linguistic, and social-structural lines, to name a few. Levine (1974) has devised an excellent, rather eclectic, approach to the classification of the Ethiopian people. His classification consists of nine categories: North Eritrean, Agew, Amhara-Tigrean, Core Islamic, Galla, Lacustrine, Omotic, Sudanic, and Caste groups (Levine, 1974:36-39). Three of these, the Amhara-Tigrean, the Galla, and the Lacustrine, seem most important and will therefore receive the most attention in the discussion to follow.

The Amhara-Tigrean group is "the historical bearer of Ethiopian Orthodox Christianity and of the Solomonid monarchy" (Levine, 1974:37). Their social organization is, for all intents and purposes, feudal; and they have an ambilineal descent system. The Tigreans speak Tigrinya (and should not be confused with the Tigre-speaking people of northern Ethiopia), and are found for the most part in Tigray and Eritrea provinces. The Amhara speak Amharic and are mostly found in Wollo, Begemdir, Gojjam, and northern Shoa provinces. Today the Amhara are to be found throughout the country since they make up the bulk of Ethiopia's modern civil service. The population of the Amhara-Tigrean group is estimated at about ten million people (Levine, 1974:37).

According to Levine (1974:38) the Galla are the most widely dispersed of all the Ethiopian people, being composed of about a dozen tribal clusters scattered in about ten provinces. They speak a number
of mutually intelligible dialects of Gallinya, and were until recently referred to by the tribal name of "Oromo" (though this is not presently known or used by all of the Galla people). The Galla are noted throughout Ethiopia for their adaptability, having been successfully assimilated into local cultures where they settle while still retaining several features of their own culture, most notably their patrilineal descent system. They seem to have become a dominant force in Ethiopia, not through conquest and warfare, but through steady infiltration of the areas in which they have settled and their cultural adaptability. The Galla population is estimated to be about 7 million people (Levine, 1974:38).

The Lacustrine people of Ethiopia, according to Levine, are so named because they live in and around the Great Rift Valley of central and southern Ethiopia. Foremost of the people in this group are the Gurage subgroup of Shoa province, and the Sidamo sub-group of Shoa and Sidamo provinces. The Gurage are commonly thought to be Moslem, though they are not exclusively so. They are believed to date from medieval times when the Semitic peoples of the north stationed military garrisons in the south. They appear to be a mixture of the Semitic Amhara-Tigrean "invaders" and indigenous Negroid stock, and their population is said to number about 2.8 million (Levine, 1974:38).

The Core Islamic peoples are, of course, Moslem, and include the Afar, Issa, and Somali peoples who inhabit the desert regions of eastern Ethiopia. The Northern Eritrean people are composed of a number of tribes living in the northern tip of Ethiopia and the part of the Sudan adjacent to it. The Omotic peoples are so named because they live around the Omo river in south-western Ethiopia, and are largely pagan and of
Negroid stock. The Agew people are indigenous to Ethiopia and were the dominant people prior to the advent of the Aksumite empire, and again during the eleventh century when they were the standard bearers of the Zagwe dynasty. There are still isolated pockets of Agew people scattered in the northern provinces, though for the most part they have been absorbed by their Amhara-Tigrean neighbors. The Caste groups are scattered throughout the country and are usually associated with one of the other groups in a rather symbiotic relationship, usually performing tasks which most of the other people either cannot or will not do. Levine (1974:27-39) estimates that these lesser groups, excluding the caste groups, consist of about 3.5 million people.

Ethnic differences in Ethiopia often seem more imagined than real. Levine (1974) has presented a good argument for viewing them as a group of sub-groups held together by a number of what he calls pan-Ethiopian traits. Because of the advantages of being of Amhara or Tigrean descent, particularly in recent times (these advantages often being more imagined than real), many will claim descent from one of these groups when they may in fact be Galla or Gurage. In any case, the differences seem to be generally more cultural and psychological than racial and physiological, though some physical differences do undoubt-edly exist.

Population figures for Ethiopia are at best only estimates since no organized census has ever been taken. The Population Reference Bureau's 1973 World Population Data Sheet sets the country's total population at about 26.8 million people, while Lipsky (1962:32) quotes a much more conservative figure of about 15 million people. Even
considering the time difference between these two estimates, it seems unlikely that Ethiopia's population could have grown more than 50 percent in ten years. The correct figure is probably somewhere in between these two, and in all likelihood, somewhat closer to the former than to the latter. Estimates for the numerical distribution of ethnic groups in the population vary widely and are, like the overall population figures, little more than guesses at best. Ullendorff (1973) has given the following estimates: Amhara, Tigray, and Agau, 40 percent; Galla, 35 percent; Somalis, 6 percent; Afars, 4 percent; and Shankellas, Sidamas (the indigenous people of Sidamo province) and others, 15 percent.

The capital of Ethiopia is Addis Ababa, which, literally translated from the Amharic means "New Flower." It is located approximately in the center of the country at an altitude of about 7,000 to 8,000 feet. It was founded by the Emperor Menelik II at the end of the nineteenth century, after he had succeeded in unifying the territory which currently falls within Ethiopia's borders. It is a city of contrasts, ranging from the very modern to the almost ancient. The skyline of the city is dominated by the Hilton Hotel, the tallest building in the city, and the new Addis Ababa municipality building, which sits at the top of the city's main street. Away from the main streets, however, the illusion of modernity is lost. The large majority of structures are mud and corrugated steel shacks which provide most of the housing for

5More accurate data may be available from the Ethiopian Government Central Statistical Bureau in Addis Ababa. However, the author has written to them several times requesting the latest figures without receiving a response. Addition of the estimates given by Levine (1974: 36-39) for each of the ethnic groups he discusses puts the total population at about 23.3 million persons, excluding foreigners who probably number roughly half a million persons at most.
the general population. Here and there among the shanties there are new houses of modern design, emphasizing both the physical and economic contrasts of the city. Street pavement came to Addis Ababa only within the last ten years on any major scale. Prior to that, the only paved street in the city was, reportedly, the Emperor's driveway.\(^6\)

Population figures for Addis Ababa, like for the rest of the country, are at best only estimates. These range from 150 thousand to 800 thousand, depending on the source.\(^7\) The population is varied at any given time, due largely to the comings and goings of people from the countryside. There is a fairly large number of people who make their homes on the city's sidewalks, as is the case in most large cities in underdeveloped countries.

There are nine major hospitals in Addis Ababa, and numerous clinics.\(^8\) There are, in addition to these, a tuberculosis sanitarium, a leprosarium, and a combination polio sanitarium-home for crippled children. Pharmacies play an important health-care role, being the source of much medical advice and treatment by the pharmacists themselves. There is at least a pharmacy, if not a clinic in every neighborhood. In addition, the various Orthodox churches and their priests are

\(^6\)While this report is probably exaggerated, it gives a good sense of the contrasts present in the city.

\(^7\)The author lived in Addis Ababa from April to August, 1974, and from January to August, 1975. His impression, given the large area of the city and the apparent high density of the population, is that there are about one million people there at any one time.

\(^8\)Of these, one is American built, two Russian built, one Swedish built, one Italian built, one Swiss built, and two built by the central government. The remaining hospital was built by and is run by the Seventh Day Adventist Church. One of the Russian hospitals was a gift to the Emperor Meneleh by the last Czar of Russia at the beginning of this century and is currently being phased out of use.
also sources of advice and treatment. Their advice, however, tends to be spiritual, and their main treatment seems to consist of holy water to drive out the "evil spirits" which cause various diseases.\(^9\)

Most of the physicians of the country are to be found either in Addis Ababa or in one of the other urban areas, making for a "feast or famine" situation in terms of the availability of physicians throughout the country as a whole. The urban areas are preferred first of all, because few want to put up with the poor conditions found in the country, and secondly, because of the lack of medical facilities which warrant the presence of a physician away from the cities. Clinics in the countryside are staffed by Public Health Officers, and Sanitarians, graduates of the Public Health College located at Gondar in Begemdir province. Following the fall of the monarchy in 1974, efforts were made, and are still being made, to disperse physicians throughout the country.

Ethiopia's economy is for the most part agrarian. There is some limited industry in Addis Ababa, and there is an oil refinery at Assab on the Red Sea coast. The main industries in Addis Ababa are a cement factory, a pasta factory, a factory which produces tennis-style shoes, a brewery, and Coca Cola and Pepsi Cola bottling plants. Most domestic production of goods is on the individual or cottage level, and many items must be imported. Pastuerized milk is available in Addis Ababa and other urban areas, but it is often less than fresh by the time it

\(^9\)The author has never himself seen this. The source for this information is the author's wife and her brother, both Ethiopians. They have both reported seeing people vomit frogs and worms following treatment by a priest with holy water. It is interesting to note that even Moslems will, as a last resort, go to the Orthodox priests for treatment.
reaches areas outside of Addis Ababa. Meat is most often sold from open, fly-infested stalls, and other food items are usually purchased at small local markets, or, in Addis Ababa, at the large central market (the "Markato").
Among the countries of Africa, Ethiopia stands out as one of the least developed. According to the Population Reference Bureau's 1973 World Population Data Sheet, Ethiopia has the sixth highest crude death rate (number of deaths in a year per thousand persons), at 25 per thousand, in Africa. At the same time, it ranks approximately twenty-second in terms of crude birth rate (146 per thousand per year). Only three other countries in Africa have lower percentage rates of population growth (Lesotho, Cameroon, and Upper Volta). These statistics must be considered in the context of the fact that Ethiopia has no real organized body of population statistics and any figures given are, therefore, tentative. In addition, it should be noted, as Peterson has pointed out, that crude rates do not present a completely accurate picture since they make no allowances for different population categories (Peterson, 1975:229). However, even from figures as tentative as these may be, it can be suggested that Ethiopia has a relatively stable population, and has not yet encountered on a wide scale the problems of population management discussed in the Introduction to this study.

Peterson (1975:229) has defined perinatal mortality as deaths between the twentieth week of gestation and the first week after birth. What are some of the factors that contribute to high perinatal mortality rates found in most of the third world? Studies seeking to answer this question and others related to it are few and far between, particularly
Soangra, Joshi and Sharma (1975) have reported that there were significant relations between stillbirth and social class in the two groups they studied at the State Zenana Hospital and Government Maternity Centres of Jaipur state in India for a period of six months from 1 December 1970 through 31 May 1971 (Soangra, et al., 1975:5). Their groups included only married mothers who had single births. The control group was composed of mothers having normal, live births, and the experimental group was composed of mothers having stillbirths. There were 100 participants in each group, and both groups were matched for maternal age and parity (Soangra, et al., 1975:5).

Soangra and his associates found several significant differences in the social attributes of the control group as opposed to the experimental group. Overall, the mothers in both groups were from the lower end of the socioeconomic scale. However, the average per capita income per month in the experimental group was Rs. 65.25 (approximately $9.32) versus Rs. 148.25 (approximately $21.18) for the control group (Soangra, et al., 1975:6). Seventy-five percent of the mothers in the experimental group were from the income group of less than Rs. 70 per capita per month as compared to only 39 percent of the control group mothers. This they found to be statistically significant (P<0.001) (Soangra, et al., 1975:6).

In addition, the literacy standard of the control group was higher than that of the experimental group. Sixty-one percent of the experimental group members were illiterate, whereas only 34 percent of the control group members were illiterate. This difference was
statistically significant \( P < 0.005 \) (Soangra, et al., 1975:6). Overall, the educational level of the fathers was higher than that of the mothers. The literacy status of the fathers in the control group was higher (90 percent) than that of the fathers in the experimental group (72 percent) (Soangra, et al., 1975:6). As might have been expected, the occupational level of the control group fathers was generally higher (26 percent professional and administrative) than the experimental group fathers (14 percent professional and administrative).

Probably most important for the present study, Soangra and his colleagues developed a scale to measure the living conditions of their subjects. They felt that it was necessary to develop a way of measuring living conditions that would be appropriate for underdeveloped areas, since per capita income only indirectly measures the "quality of life" in such areas (Soangra, et al., 1975:6). In the Soangra, et al., scale, such things as type of residence, per capita floor area (in square feet), cleanliness of rooms and premises, ventilation, light, refuse disposal, water supply, and other factors which determine the quality of living conditions were measured and evaluated. While this scale depends largely on subjective evaluation for its scoring, it nonetheless appears to be of value in the context in which it was used.

The association between socioeconomic and environmental factors and perinatal mortality (as represented by still-birth) investigated by Soangra and his associates was also established by an earlier study done by Mohan, Singh, and Singh (1974) who dealt with the broader subject of

\[1\] It has been the author's personal experience in Ethiopia and other underdeveloped areas that income alone is not an accurate determinant of living conditions.
infant mortality and pointed out differences between infant mortality rates in urban and rural settings and between males and females. Specifically, they report lower rates of infant mortality in urban settings and for females (Mohan, et al., 1974:225). The prediction that male infants have a higher perinatal (as opposed to the broader infant) mortality rate than females was made earlier by Naeye (1971). Mohan and his colleagues further report associations between infant mortality and economic status of the parents, educational levels of both parents, religion, source of household water supply, and father's occupation (Mohan, et al., 1974:226-227).

In another study, Namboze (1969) has shown the positive contribution of the presence of health care facilities in underdeveloped areas. She found that the perinatal death rate for the area surrounding the Kasangati Health Centre in Uganda was lower than the national rate (Namboze, 1969:106). Namboze also reports a higher infant mortality rate among male infants than among females (1969:104).

It has been suggested that low birth weight is another factor which is involved in perinatal mortality. Armstrong (1972) has reported that 59 percent of all infant deaths in his sample from the 1969 United States live birth cohort were considered low birth weight (under 2500 grams) infants (Armstrong, 1972:3). He also reports that the infant mortality rate for nonwhite infants in the 1960 cohort was nearly twice as high as that for white infants, suggesting that racial and/or ethnic factors may be associated with infant (and by extrapolation, perinatal) mortality.

Erhardt and Chase (1973) have further reported an association between ethnic groups and birth weight, and between socioeconomic status
(as represented by educational level for mother and father) and birth weight, noting that birth weights were highest for white infants (of both native and foreign-born mothers) and within ethnic groups for those with higher levels of education (Erhardt and Chase, 1973:17-18). Their sample consisted of the births in New York City in 1968 for which birth certificates were filed (Erhardt and Chase, 1973:17).

The expectation that ethnic differences are reflected in infant mortality rates (which include perinatal mortality rates) for different groups is further supported by Dott and Fort (1975). They reported a higher infant mortality rate among nonwhites than whites in their sample of all reported infant birth and death certificates in 1972 in Louisiana (Dott and Fort, 1975:850). Their study also noted that lower infant mortality rates were associated with higher maternal educational level, that higher neonatal mortality rates were more prevalent among very young and older women, and that there was an apparent lack of a relationship between perinatal and infant mortality and maternal parity (Dott and Fort, 1975:851-852). Their finding with regard to the relationship between infant mortality and maternal age was suggested earlier by Vavra and Querec (1973), who also reported higher perinatal and infant mortality rates among very young and older women, regardless of racial and ethnic background (Vavra and Querec, 1973:3).

From the discussion to this point, it can be readily suggested that such things as socioeconomic status (Scangra, et al., 1975), environment (Scangra, et al., 1975; Mohan, et al., 1974), sex of infant (Mohan, et al., 1974; Naeye, 1971; Namboze, 1969), infant birth weight (Armstrong, 1972; Erhardt and Chase, 1973), ethnic and racial status (Dott and Fort, 1975), and maternal age (Dott and Fort, 1975; Vavra and
Querec, 1973) act alone and in combination to influence perinatal mortality. The literature dealing with these factors is, however, somewhat inconsistent with regard to both methodology and findings. The present study seeks to further examine the relationships of these factors to perinatal mortality, as well as to replicate, where possible, the findings of the studies discussed above. In addition, an attempt will be made to profile a group (or groups) which could, from the findings, be considered at "risk" in terms of perinatal mortality. This profile will be, at best, only tentative.

In terms of generalizability of the findings of this study, it is expected that they will not be readily applicable to rural populations. This is suggested in the work of Namboze (1969) and Mohan, et al., (1974) who report lower mortality rates in areas where modern health care facilities are available, and in urban settings, respectively. In spite of the fact that Ethiopia has a ratio of physicians to population of 1:10,000, exactly the goal set by the World Health Organization (Peterson, 1975:604), and a very extensive system of health centers, most of the rural population of the country remains ignorant of modern health practices, relying instead on traditional remedies for various medical problems.

If nothing else, it is hoped that this study will make a positive contribution to the understanding of the generally non-medical aspects of perinatal mortality in the urban areas of the "third world." As development continues in underdeveloped countries, the urban centers will and do take on increased significance as they expand and diversify. As was pointed out at the beginning of this chapter, one of the first aims of developing countries must be improved health conditions and
standards. Part of this improvement will be the reduction of pregnancy wastage, and this cannot happen until the factors contributing to such wastage are understood and dealt with.
CHAPTER III

METHODOLOGY AND FINDINGS

Analysis Methodology

The general aim of this study is to examine the relationships among socio-economic status, maternal age, infant birth weight, sex of infant, religion of parents, ethnic background of parents, infant gestational age, and perinatal mortality. The data used in the present study were collected over a two-year period from December, 1973, to December, 1975, by researchers from the Pennsylvania State University College of Medicine, Department of Pathology, in collaboration with the physicians and staff of the hospitals and obstetrics clinics affiliated with the Haile Selassie I University (now Addis Ababa University) Faculty of Medicine. Approximately one-third of all the births in Addis Ababa are delivered by this system (Naeye, 1976:108). The data consist of medical, demographic, and social information gathered for the most part by social workers employed for this purpose, who interviewed the mothers as soon after birth as possible, generally the day after they had given birth.\footnote{Gestational age is defined as the length of time between the onset of the mother's last menstrual period and the time of birth.}

\footnote{Perinatal mortality is the term for deaths which occur between the twentieth week of gestation and the end of the first week after birth.}

\footnote{See Appendix A for a sample of the interview schedule. See Appendix B for a brief elaboration of the field work methods used in the data collection process.}
The two groups which compose the study sample consist of (a) stillbirths and other perinatal deaths (the "experimental" group) and (b) live births, still alive at the end of the first week after birth (the "control" group). Information on a total of 1541 cases was collected. For the experimental group, attempts were made to include all stillbirths and other perinatal deaths that occurred in the affiliated hospitals and obstetrics clinics during the study period. However, cooperation by the mothers was refused in some cases, making this impossible.* In addition, many mothers who gave birth to still-born children left the hospital or clinic before interviews could be conducted, often within an hour after giving birth.

The control group was selected from women who gave birth during certain hours each day. These hours were changed periodically to avoid as much as possible any bias which might occur in the event that certain types of women tend to deliver at certain times of day. Both groups represent, as much as possible, all segments of the population of Addis Ababa. In this respect, however, the subjects adhering to the Moslem religion are probably underrepresented since Moslem mothers, more often than not, refused cooperation when requests for interviews were made.*

Based on the literature discussed in Chapter II, it is expected that the analysis of the available data will reveal the following findings. First, it is expected that a higher proportion of the experimental group respondents, as opposed to those in the control group, will fall into the lower ranks of socio-economic status. Second, the

*See Appendix C for an elaboration of the methodological difficulties encountered during the course of the study.
The experimental group will have a higher proportion of very young and older mothers than the control group. In other words, mothers in the experimental group will be, for the most part, in their teens, late thirties and forties, while mothers in the control group will be, for the most part, in their twenties or early thirties. The data on age may not be of exceptional accuracy, since data on maternal age are based mainly on memory of the mothers and other family members. In many cases, age was estimated from statements made by the mothers and from post-partum physical examinations.

Third, the experimental group will have a significantly higher proportion of low-birthweight infants than the control group. In addition, it is expected that the highest proportion of low birthweight infants will be from mothers of low socioeconomic status. Fourth, the experimental group will have a higher proportion of male infants than the control group. Also, among the low birthweight infants, particularly in the experimental group, it is expected that there will be a higher proportion of male than female infants.

Fifth, it is expected that the control group will have a higher proportion of Amhara-Tigrean, Orthodox Christian respondents than the experimental group. The experimental group, in turn, would be expected to have a higher proportion of non-Amhara-Tigrean, Moslem, pagan, and non-religious respondents. This may be linked with socio-economic status since Amhara-Tigrean, Orthodox Christians have traditionally had easier access to education and economic well-being than that sector of the population not included in this group.

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An infant is considered to be of low birthweight if the weight at birth is under 2500 grams.
Generally, the data are analyzed using a correlational approach. This seems most appropriate for this study given the nature of the data which are, for the most part, expressed on an interval level. Correlations between variables were sought out and examined by crosstabulating them with each other. In addition, two- and three-way relationships were sought using two- and three-way analysis of variance techniques. Variable distributions are also given careful examination.

The first step in the analysis of the data was a run of the SPSS (Statistical Package for the Social Sciences) program "frequencies". This program lists each variable, indicating how many cases fall into each variable category, what the percent of the total N is in each category, and what the percent of valid (i.e., non-missing) cases is for each category. In examining the results of this operation, the main purpose was to determine how many cases would be eliminated because of missing data on the main dependent variables (birthweight, gestational age, and socioeconomic status), and how many variables would be eliminated because of missing cases. Variables were eliminated from consideration if the percentage of valid cases for a particular variable was less than 60 percent. Because information on one or more of the dependent variables was missing, many cases had to be eliminated. A further reduction in the total N for each of the two groups was necessitated in order to eliminate cases involving multiple births. This was done because there were not enough cases of multiple birth in either group to warrant analysis of this factor and to avoid any undue effects these cases might have on the results.

All data analysis was carried out using the IBM 360 computer facilities at the College of William and Mary. The programs used were from the manual, Statistical Package for the Social Sciences (Nie, et al., 1975).
have on the analysis as a whole. In addition, several cases had to be eliminated from both groups because they did not meet the criteria for inclusion in the study (i.e., they were not perinatal deaths). After completion of these elimination procedures, the total N for the experimental group was 649, while that for the control group was 473. For the experimental group, this represents an almost 40 percent reduction in the original number; and for the control group, an almost 10 percent reduction. Table 3.1 lists the dependent and independent variables and gives both absolute frequencies and percentage frequencies of valid (i.e., non-missing) cases.

Following completion of case elimination procedures, work was begun on construction of a level of living scale, to be used as a measure of socioeconomic status (S.E.S.) for the present study. This undertaking was complicated by the fact that literature on the construction of S.E.S. scales which apply to underdeveloped countries is, for all intents and purposes, non-existent. In fact, the one constructed by Soangra, et al. (1975) was the only one discovered in searches through various journals. Their exact scale could not be used because of differences in the information they collected in their study and that collected for this study. Scales developed for use in the United States and Europe were deemed inappropriate because of cultural differences which might bias the results. For example, an examination of a family's per capita income might be very revealing about the standard of living enjoyed by an American family, but would, in all likelihood, reveal very little about that of an Ethiopian family.  

For a more complete elaboration of the problems of scale construction of this type, see Appendix D.
<table>
<thead>
<tr>
<th>Variable</th>
<th><strong>Experimental Group</strong></th>
<th><strong>Control Group</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>n</strong></td>
<td><strong>% of Total N₁</strong></td>
</tr>
<tr>
<td>Gestational Age</td>
<td>649</td>
<td>100.0</td>
</tr>
<tr>
<td>Birthweight</td>
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<td>100.0</td>
</tr>
<tr>
<td>Level of Living</td>
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<td>68.9</td>
</tr>
<tr>
<td>Infant Sex</td>
<td>649</td>
<td>100.0</td>
</tr>
<tr>
<td>Maternal Age</td>
<td>577</td>
<td>88.9</td>
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<tr>
<td>Parity</td>
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</tr>
<tr>
<td>Previous Stillbirths</td>
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<td>74.7</td>
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<tr>
<td>Prenatal Care</td>
<td>450</td>
<td>69.3</td>
</tr>
<tr>
<td>Urban/Rural</td>
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<td>75.2</td>
</tr>
<tr>
<td>Paternal Tribe</td>
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<td>74.4</td>
</tr>
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<td>Maternal Tribe</td>
<td>503</td>
<td>77.5</td>
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<tr>
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<td>49.3</td>
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<td>Maternal Religion</td>
<td>502</td>
<td>77.3</td>
</tr>
<tr>
<td>Maternal Marital Status</td>
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</tr>
<tr>
<td>Maternal Education</td>
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<td>76.0</td>
</tr>
<tr>
<td>Paternal Education</td>
<td>431</td>
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</tr>
<tr>
<td>Persons in Maternal Home</td>
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</tr>
<tr>
<td>Total Family Income Per Month</td>
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</tr>
<tr>
<td>Living Children</td>
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<td>76.8</td>
</tr>
<tr>
<td>Work During Pregnancy?</td>
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<td>74.6</td>
</tr>
<tr>
<td>Servant</td>
<td>482</td>
<td>74.3</td>
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<tr>
<td>Monthly Rent</td>
<td>422</td>
<td>65.0</td>
</tr>
<tr>
<td>Light Source</td>
<td>466</td>
<td>71.8</td>
</tr>
<tr>
<td>Kitchen</td>
<td>470</td>
<td>72.4</td>
</tr>
<tr>
<td>Type Latrine</td>
<td>359</td>
<td>55.3</td>
</tr>
<tr>
<td>Water Source</td>
<td>467</td>
<td>72.0</td>
</tr>
</tbody>
</table>

*With total number of valid cases per variable (n) and percent of the total number of cases included in the group (N₁ and N₂).*
Various items, including presence or absence and type of kitchen, presence or absence and type of latrine, monthly rent, total family income per month, monthly water expenses, water source, number of persons per room in the household, and light source were considered for inclusion in the scale. Several of the items considered were eliminated on the basis of insufficient numbers of valid cases. These included total family monthly income (57 percent missing), monthly expenses for water (44.2 percent missing), and type of latrine (44 percent missing). Cross-tabulation of several of the variables revealed correlations between several of them (based for the most part on values obtained for Gamma and Kendall's Tau C). However, the numbers factor again entered the picture here. Several of the variables when paired had fewer than the 60 percent valid cases required for use. For example, the variable dealing with the type of latrine present in the household when cross-tabulated with each other, yielded a Gamma value of .676, and a Tau C value of .237 (P = 0.001), which indicate a fairly high positive correlation, but yielded a total number of valid cases equal to only 54 percent of the number of cases in the experimental group.

Guttman scaling of those variables which in combination yielded the largest number of valid cases showed the variables dealing with presence or absence of servant, type of kitchen facilities, type of latrine facilities, and water source to be the most compatible for scaling purposes. Following completion of this process, two scales, one using the two variables dealing with type of kitchen and water source, and the other using these two plus the light source variable, were computed. The two variable standard of living scale yielded missing cases totaling 31.1 percent of the experimental group and 15 percent of the control group, while the three-variable scale yielded missing cases
totaling 39.5 percent and 24.4 percent, respectively, for each group. Primarily because of the importance of the level of living scale variable to the study, the two-variable scale was chosen since it yielded the highest number of valid cases for each group.

Upon completion of the construction of the level of living scale, crosstabulations were run on the main dependent variables and a number of independent variables in order to assess the presence or absence and relative strength of the relationships predicted in Chapter II, and to determine if any unexpected relationships might be present. These findings will be presented in the next section. In addition, regression analysis and analysis of variance procedures, where appropriate, were undertaken among the dependent variables, and between the dependent variables and some of the independent variables to further document the findings of the crosstabulation procedures. These findings are also presented in the next section.

**Findings of the Present Study**

One of the first data analysis tasks undertaken was to compare the variable distributions for each group among the dependent variables and some of the main independent variables. Table 3.2 presents these findings for the following variables: infant birthweight, gestational age, level of living scale scores, infant sex, maternal tribe and religion, and maternal educational level. Table 3.3 presents an intercorrelation matrix for all of the variables used in the study.

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7It was decided to use the maternal tribe, religion, and educational level rather than the paternal for two reasons. First, in the instances of tribe and religion, maternal and paternal responses showed a very high degree of correlation. Crosstabulation of paternal tribe by maternal tribe yielded Cramer's V scores of .624 and .641, and contingency
<table>
<thead>
<tr>
<th>Variable</th>
<th>Experimental Group</th>
<th>Control Group</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>% of n</td>
</tr>
<tr>
<td>Birthweight</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1) 500-1000 grams</td>
<td>649</td>
<td>13.9</td>
</tr>
<tr>
<td>2) 1001-1500 grams</td>
<td>90</td>
<td>13.9</td>
</tr>
<tr>
<td>3) 1501-2000 grams</td>
<td>89</td>
<td>13.7</td>
</tr>
<tr>
<td>4) 2001-2500 grams</td>
<td>97</td>
<td>15.0</td>
</tr>
<tr>
<td>5) 2501-3000 grams</td>
<td>99</td>
<td>15.3</td>
</tr>
<tr>
<td>6) 3001-3500 grams</td>
<td>131</td>
<td>20.2</td>
</tr>
<tr>
<td>7) 3501-4000 grams</td>
<td>96</td>
<td>15.3</td>
</tr>
<tr>
<td>8) 4001 grams and over</td>
<td>37</td>
<td>5.7</td>
</tr>
<tr>
<td>Gestational Age</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1) 20-25 weeks</td>
<td>43</td>
<td>6.6</td>
</tr>
<tr>
<td>2) 26-30 weeks</td>
<td>85</td>
<td>13.1</td>
</tr>
<tr>
<td>3) 31-35 weeks</td>
<td>120</td>
<td>18.5</td>
</tr>
<tr>
<td>4) 36-40 weeks</td>
<td>324</td>
<td>49.9</td>
</tr>
<tr>
<td>5) 41 weeks and over</td>
<td>77</td>
<td>12.0</td>
</tr>
<tr>
<td>Level of Living</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1) Very Poor</td>
<td>63</td>
<td>14.1</td>
</tr>
<tr>
<td>2) Poor</td>
<td>102</td>
<td>22.8</td>
</tr>
<tr>
<td>3) Fair</td>
<td>225</td>
<td>50.3</td>
</tr>
<tr>
<td>4) Good</td>
<td>22</td>
<td>9.4</td>
</tr>
<tr>
<td>5) Very Good</td>
<td>15</td>
<td>3.4</td>
</tr>
<tr>
<td>Infant Sex</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1) Male</td>
<td>355</td>
<td>54.7</td>
</tr>
<tr>
<td>2) Female</td>
<td>294</td>
<td>45.3</td>
</tr>
<tr>
<td>Maternal Tribe</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1) Amhara</td>
<td>267</td>
<td>53.1</td>
</tr>
<tr>
<td>2) Tigre</td>
<td>140</td>
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<td>3) Galla</td>
<td>104</td>
<td>20.7</td>
</tr>
<tr>
<td>4) Gurage</td>
<td>67</td>
<td>13.3</td>
</tr>
<tr>
<td>5) Other</td>
<td>25</td>
<td>5.0</td>
</tr>
<tr>
<td>Maternal Religion</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1) Orthodox Coptic</td>
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<td>90.8</td>
</tr>
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<td>2) Roman Catholic</td>
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<td>0.8</td>
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<td>3) Protestant</td>
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<td>1.4</td>
</tr>
<tr>
<td>4) Other Christian</td>
<td>1</td>
<td>0.2</td>
</tr>
<tr>
<td>5) Moslem</td>
<td>35</td>
<td>7.0</td>
</tr>
<tr>
<td>6) Other</td>
<td>1</td>
<td>0.2</td>
</tr>
<tr>
<td>Maternal Education</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1) 0-1 year</td>
<td>424</td>
<td>86.0</td>
</tr>
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<td>2) 2-8 years</td>
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<td>8.7</td>
</tr>
<tr>
<td>3) 9-12 years</td>
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<td>1.8</td>
</tr>
<tr>
<td>4) Finished High School</td>
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<td>1.2</td>
</tr>
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<td>5) Education Beyond High School</td>
<td>11</td>
<td>2.2</td>
</tr>
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</table>

*With total number of valid cases per variable and per category (n) and percentage of (n) in each category.
### VARIABLE INTERCORRELATION MATRIX

<table>
<thead>
<tr>
<th></th>
<th>FERTILITYGRUP</th>
<th>LEVEL OF LIVING</th>
<th>MALE SEX</th>
<th>MALE AGE</th>
<th>PARITY</th>
<th>PREMARITAL CARE</th>
<th>PREMARITAL RELIGION</th>
<th>MARRITAL RELIGION</th>
<th>MARRITAL MARITAL STATUS</th>
<th>MARRITAL EDUCATION</th>
<th>NO. OF PERSONS IN MARRITAL HOME</th>
<th>TOTAL FACILITIES PER MOTHER</th>
<th>SERVANT</th>
<th>HELD RESPONSIVE WORK</th>
<th>HOUSE</th>
<th>SALT</th>
<th>WATER SOURCES</th>
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<tr>
<td>VITAL STATISTICAL AGE</td>
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<td>0.026a</td>
<td>0.016a</td>
<td>0.014b</td>
<td>0.13a</td>
<td>0.011a</td>
<td>0.012a</td>
<td>0.012a</td>
<td>0.012a</td>
<td>0.012a</td>
<td>0.012a</td>
<td>0.10a</td>
<td>0.116a</td>
<td>0.016a</td>
<td>0.07a</td>
<td>0.02a</td>
<td>0.052a</td>
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<td>PEREMEIGHT</td>
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<td>0.07a</td>
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<td>0.07a</td>
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<td>0.02</td>
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<td>LEVEL OF LIVING</td>
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<td>0.013a</td>
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<td>0.009a</td>
<td>0.009a</td>
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<td>MALE AGE</td>
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</table>

*Table includes all variables used in the study, plus some that were considered for use, but later eliminated. The following symbols indicate the corresponding measures:
- a Kendall's Tau C
- b Spearman's R
- c phi

In addition, "o" or "O" before the value indicates whether the value is for the experimental or control group, respectively.
Differences in the mean birthweights of the two groups, disregarding sex, were high. The mean birthweight of the experimental group was 2199 grams (2.2 kgs. or 4.8 lbs.), while for the control group it was 3054 grams (3.1 kgs. or 6.7 lbs.). Using the difference of means test, this difference was found to be statistically significant ($P < .001$).

The mean gestational age for the experimental group was found to be 35.9 weeks, while for the control group it was 40.2 weeks. The difference between the two groups (4.21 weeks) was statistically significant ($P < .001$).

The level of living scale constructed for the study had five possible categories ranging from "very good" to "very poor". As mentioned in the methodology section of this chapter, the level of living scale score for each case was a composite of the responses given to the two variables. Of the two groups, 14.1 percent of the experimental and 1.7 percent of the control group respondents fell into the "very poor" category, while 22.8 percent of the experimental and 8.2 percent of the control respondents were classified as "poor". The level of living for 12.8 percent of the experimental group and 16.7 percent of the control group was classified as either "good" or "very good". The difference of proportions of those classified as either "very poor" or "poor" between the two groups was highly significant ($P < .001$), while the difference of proportions of those classified as either "good" or "very good" between the groups was less statistically significant ($P < .06$).

Coefficients of .780 and .789 for the experimental and control groups, respectively. The correlation between maternal and paternal religion was found to be even stronger: Cramer's $V$ was equal to .996 and .975, and the contingency coefficient equaled .912 and .889 for the experimental and control groups, respectively.
These findings, while consistent with the predictions made at the beginning of this chapter, might have been expected to show a more highly significant difference.

As can be seen in Table 3.2, there were 10 percent more males than females in the experimental group, and only a one percent difference between the sexes in the control group. The difference in proportion of males in each group was found to be statistically significant at the .06 level.

The difference in mean birthweight between the males and females for the experimental group was not significant, while for the control group it was significant (P < .01). Differences between males of the two groups were statistically significant for birthweight (P < .001), as were the differences between females of the two groups (P < .001). In terms of gestational age, the difference in means (≈ 35.5 weeks for males and 35.9 for females) between males and females in the experimental group was significant (P = .05), while for the control group, it was not. Between the males in both groups, the difference in mean gestational age (≈ 35.5 weeks for the experimental group and 40.3 for the control group males) was statistically significant (P < .01). For the females in both groups, the difference in mean gestational age was also significant (P < .01). For the females, the mean gestational ages were approximately 35.9 weeks for the experimental females, and 40 weeks for the control females.

Tribal composition (based on maternal response) of the two groups was quite similar, with the exception that the experimental group is composed of slightly more Galla respondents than Gurage respondents, while the reverse of this is true for the control group. Based on data
for Ethiopia as a whole (see Chapter II), Amhara respondents seem to be overrepresented in both groups.

The composition of the two groups with regard to maternal religion is also similar, again, with one exception; the control group appears to have slightly fewer Orthodox Christian and more Moslem respondents than the experimental group. Based on the estimates of religious composition for the country as a whole which were presented in Chapter II, Orthodox Christians seem overrepresented in the study population, while Moslems, as predicted at the beginning of this chapter, are underrepresented.

There was a fairly large difference in the percentages of mothers who had prenatal care between the two groups: 74.4 percent of the mothers in the experimental group as opposed to 72.5 percent of those in the control group. Crosstabulation of the prenatal care variable with the level of living scale variable yielded Tau C values of .201 (P = .001) and .128 (P = .001) for the experimental and control groups, respectively. There is a significant relationship between whether or not a mother had prenatal care and the level of living scale score, though less so for the control group.

Within the experimental group, 79.7 percent of the mothers were from urban areas, and 20.3 percent were from rural areas. This is in contrast with the control group, in which 93.5 percent of the mothers were from urban areas, and only 6.5 percent were from rural areas. The difference in proportion of the mothers from rural areas between the two groups is significant (P < .001).

For the item dealing with maternal marital status, 10.3 percent of those in the experimental and 5.8 percent of those in the control
groups reported that they had never been married, 26.8 percent and 15.7 percent, respectively, were either widowed or divorced, and 48.0 percent and 54.7 percent, respectively, were married (and had neither been widowed nor divorced previously). Differences of proportions for all three categories between the two groups were significant ($P < .001$).

In terms of the level of maternal education, the difference in proportions of mothers with zero to one year of education between the two groups was in the predictable direction. For the experimental group, 86.0 percent had zero to one year of formal education, while for the control group, 72.0 percent were at this level. The difference between these two percentages was significant ($P < .001$). Also, the level of maternal education was found to be fairly well correlated with level of living when these two variables were crosstabulated (Tau $C = .194$ ($P = 0.001$) and Tau $C = .154$ ($P = 0.001$) for the experimental and control groups, respectively). The presence of this positive relationship tends to support the validity of the level of living scale as constructed since one would expect level of living to rise as education levels rose, especially in underdeveloped areas where formal education is so economically desirable.\(^8\)

The findings with regard to size of immediate maternal family, as measured by the number of people living in the maternal household, went contrary to what might have been expected. In the experimental group, 71.8 percent of the respondents had from one (mother alone) to four persons in the household, as opposed to 56.7 percent of the control respondents. Correspondingly, 43.2 percent of the control respondents

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\(^8\)Education is seen, individually and culturally, as a necessity for individual economic improvement.
lived in households with more than five members, while only 28.2 percent of the experimental respondents fell into this category. Of note here is the fact that the variable dealing with the number of people in the maternal household showed a weak correlation to standard of living for both groups when the two variables were crosstabulated (\(\text{Tau C} = .126 (P = .001)\) and \(\text{Tau C} = .102 (P = .001)\) for the experimental and control groups, respectively).

Examination of the data on the number of living children reported by the mothers in the two groups revealed an apparently high degree of similarity between them. Of the experimental group respondents, 64.7 percent reported either none or only one living child, while in the control group, 60.9 percent fell into this category. Within the control group, 37.8 percent reported having from three to seven children, while 33.9 percent of the experimental group respondents reported similar figures. For both groups, a crosstabulation of the variable dealing with the number of living children of the mother with the level of living variable revealed no significant correlation between the two. It might have been expected that there would have been a negative correlation.

Approximately equal proportions of the mothers in both groups held jobs outside the home during their pregnancies (27.9 percent of the experimental group respondents, and 28.8 percent of the control group respondents). Of those who worked outside the home, 73.7 percent of the experimental group and 61.2 percent of the control group did manual labor, 14.2 percent and 21.6 percent of the two groups, respectively, did clerical or sales work, and 12.1 percent of the experimental and 17.1 percent of the control respondents did work of a professional
nature (teaching or nursing). A two-tailed test for significance of difference of proportions of white-collar (clerical and sales) and professional workers between the two groups yielded a Z-score of 1.88 ($P = .06$). This is of modest significance.

Establishing relationships between the three dependent variables and the various independent variables, and among the dependent variables alone, proved somewhat less productive than the comparisons between the two groups laid out above. There were fewer significant correlations than had been previously expected.

Among the dependent variables, there was a highly significant relationship between birthweight and gestational age, as predicted. Pearson's correlation coefficient (product-moment coefficient) assumed a value of .926 ($P = .001$) for these variables in the experimental group, and a value of .770 ($P = .001$) for the control group. This indicates a fairly high likelihood that the value of one of these can be predicted from the value of the other, when one of the values is known. The difference in the values of "r" obtained for the two variables between the two groups is highly significant ($P = .001$).

A crosstabulation of the variables birthweight and gestational age, controlling for infant sex, revealed that infant sex played little or no role in the relationship between the two variables (as indicated by zero-order Gamma values of .944 and .692, and first-order partial Gamma values of .942 and .689, both values for the experimental and control groups, respectively). This is supported by the finding that crosstabulations between infant sex and birthweight and gestational age, on an individual basis, revealed no significant relations between infant sex and either of the other two variables for the experimental group,
and almost negligible correlations between infant sex and birthweight for the control group (Tau C = .163 (P < .001)). Generally, males tended to weigh more than females in both groups. Table 3.1 illustrates this.

**TABLE 3.1**

**MEAN BIRTHWEIGHTS AND GESTATIONAL AGES BY INFANT SEX**

<table>
<thead>
<tr>
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<th>Experimental</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Birthweight</strong></td>
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<td></td>
</tr>
<tr>
<td>Male</td>
<td>2212.27 grams</td>
<td>3110.69 grams</td>
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<tr>
<td>Female</td>
<td>2142.08 grams</td>
<td>2994.52 grams</td>
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<tr>
<td><strong>Gestational Age</strong></td>
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<tr>
<td>Male</td>
<td>35.55 weeks</td>
<td>40.36 weeks</td>
</tr>
<tr>
<td>Female</td>
<td>35.91 weeks</td>
<td>39.98 weeks</td>
</tr>
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</table>

Contrary to expectations was the finding that there were no significant correlations between level of living and either gestational age or birthweight for either group. Crosstabulations of each of the dependent variables with the independent variables revealed only a limited number of significant correlations, and these were not always the same for both groups.

Aside from its relationship with birthweight, mentioned above, the variable gestational age correlated significantly only with the variable dealing with whether the mother resided in either an urban or rural area (and here, only for the experimental group) and with the variable dealing with maternal parity (only for the control group). In both instances, the relationships were weak. Crosstabulation of gestational age with the urban/rural variable yielded a Gamma value of .307, and a Tau C score of .130 (P < .001) for the experimental group. The same procedure
carried out between gestational age and maternal parity within the control group, yielded a Gamma of .224 and a Tau C of .116 (P = .001).

The lack of relationships between gestational age and the independent variables is somewhat surprising, given the importance of gestational age as a factor in infant survival. This point will receive further attention in the next section.

Crosstabulation of the variable birthweight with each of the independent variables also yielded a varied pattern of correlations for each group. In the case of the urban/rural variable, it was found that as birthweight increased, so did the proportion of rural respondents, while the proportion of urban respondents went down. This, as with the gestational age-urban/rural correlation, was true only of the experimental group. In the control group, there was no discernible pattern. It was expected that as birthweight increased, so would the proportion of urban respondents.

Within the control group, significant positive relationships were present between birthweight and maternal age (Tau C = .203 (P = .001)), indicating that as maternal age increased, so did birthweight; between birthweight and maternal parity (Tau C = .226 (P = .001)), indicating the possibility that increased parity is accompanied by increases in birthweight; and between birthweight and the number of living children (Tau C = .184 (P = .001)).

Crosstabulation of the level of living variable with the independent variables yielded few significant correlations, except with those variables dealing with things commonly associated with level of living such as total monthly income, amount of rent paid per month (for the experimental group only), presence or absence of a servant, and
education levels (here the relationship was stronger between maternal education level and level of living than between paternal education level and level of living).

Within the experimental group, there was a fairly strong correlation between level of living and the prenatal care variable (Tau C = .201 (P = .001)), indicating that as level of living increased, so did the likelihood that the mother had prenatal care. Also within the experimental group, there was a strong relationship between the urban/rural variable and level of living (Tau C = .401 (P = 0.001)). This indicates that as level of living increases, so does the likelihood that the mother resided in an urban area. The asymmetric Somer's D value for this relationship, with standard of living dependent, was .613, further indicating a strong correlation between the two variables, and a high degree of dependency by level of living on urban/rural (the same value, with urban/rural dependent, was .299, which supports the finding just stated).

Regression analysis and two- and three-way analysis of variance procedures were carried out between the dependent variables and several of the independent variables to try to determine if some relationships for some reason not present in the crosstabulations might be discovered. This was not the case, and in no instance did any of the independent variables used (those used were not those among which significant correlations had been found in the crosstabulations) explain more than .1 percent of the variance of any of the dependent variables. In short, no new two- or three-way relationships were revealed by these procedures. They therefore do not warrant further attention in this section.
CHAPTER IV

INTERPRETATION AND DISCUSSION

Interpretation of the Findings

The purpose of the present study was to examine relationships among variables which might be factors in perinatal mortality in order to assess which of these variables contribute most heavily to this phenomenon. The literature on the subject, though limited in scope and quantity, indicates that such variables as birthweight, gestational age, level of living, ethnic background, parental religion, and infant sex, either individually or in combination, somehow influence whether or not the newborn will survive.

The two main problems encountered in the analysis of the data, other than the mechanics of the process, were the numbers of cases for each variable which could be included and the distributions of cases within individual variables. The skewedness of case distributions was a particular problem in the crosstabulations and may explain why expected relationships were not found in many instances. For example, within the variable gestational age, 50 percent or more of the cases were concentrated in the 36-to 40-week category. The occurrence of such heavy concentrations makes assessment of crosstabulation data difficult, in some instances leaving the findings open to question.

It seems most appropriate to begin the discussion and interpretation of the findings by attempting to relate them to the various suggestions about the data made in the second chapter. Therefore, it is
First, the prediction that the experimental group would have a higher proportion of respondents with lower socioeconomic status was made. As noted in the findings section of the previous chapter, this was, in fact, the case. This is probably due to the fact that persons of low socioeconomic status are more extensively exposed to a variety of diseases and other physical conditions (lack of proper sanitation, diet imbalances, etc.) which tend to detract from general health and could lead to pregnancy complications and perinatal death. The level of living scale developed for this study can be viewed as a partial indicator of the extent to which the members of each group were exposed to "negative" physical conditions during pregnancy, particularly lack of proper sanitation. It is made up of variables dealing with presence or absence and type of kitchen, which would indicate something about the conditions governing food preparation, and with the household water source. Both of these are clearly important to physical health and well-being. Those who fell into the lower ranges of the level of living scale thus had less adequate food preparation facilities and water source than those who fell into the upper ranges of the scale, and were thus presumably exposed to conditions less conducive to general health (and more conducive to perinatal mortality).

The second prediction was that the experimental group would have a higher proportion of younger (19 years or less) and older (35 years or over) mothers than the control group. This was not the case; the two groups were more or less equal in this regard. A number of explanations for this are possible, but the most likely seems to be inaccuracy of the maternal age data. As pointed out earlier, the data on maternal age...
were often only an estimate based on reports of relatives and on physical appearance of the mother. The lack of any uniform system of records of births makes any data regarding age for anyone more than ten years old highly suspect.

The third prediction was that the experimental group would have higher proportions of low birthweight and low gestational age infants than the control group. A review of these variables in Table 3.2 reveals this to be the case. Armstrong (1972:24) reports that infants who are lower than 2500 grams at birth and have a gestational age of less than 37 weeks are most vulnerable to mortality while those who fall into only one of these classes are the next most vulnerable. This is supported by the present findings and goes a good way toward explaining them. Infants who have a gestational age of less than 37 weeks are more likely to be incompletely developed, particularly in terms of the respiratory system. Furthermore, infants of less than 2500 grams are most often of less than normal (37 weeks) gestational age. Infants in these categories would seem most likely to fall victim to such products of incomplete gestation as respiratory and circulation problems.

The fourth prediction that the experimental group would have a higher proportion of males than the control group has also been confirmed by the findings of this study. Naeye (1971:905) has ruled out basic disease processes as an explanation for this phenomenon. He further suggests that the explanation for it based on the idea that more males than females are conceived is, by itself, inadequate. He indicates the possibility that the male "disadvantage" may be due, at least in part, to genetic and chromosomal differences between the sexes, or to the fact that male infants show a higher incidence to prenatal
infections than female infants (Naeye, 1971:906). Given the fact that males predominate in both groups in the present study, however, the idea that more males than females are conceived seems as though it may be part of the explanation for the apparent male "disadvantage."

The fifth prediction was that the control group would have higher proportions of Amhara/Tigre, and Orthodox Coptic Christian respondents, and that the experimental group would have a higher proportion of the other tribal and religious groups. The fact that the findings indicate just the opposite has a number of possible explanations.

In terms of tribal differences between the two groups, two explanations seem likely. First, as pointed out earlier, tribal distinctions are increasingly hazy in Ethiopia today and are more often than not based on perceived desirability of belonging to one tribal group as opposed to another, rather than on fact. Therefore, since the Amhara peoples of Ethiopia have traditionally enjoyed advantages not available to those of other tribes, it makes sense that many people not actually of Amhara descent would claim to be so. However, the fact that maternal and paternal tribe were so closely correlated in the present study indicates that tribal differences, if not based in any physiological fact, are nonetheless real and meaningful in psychological terms. The idea that tribal distinctions may be more psychological than physiological is further supported by the apparent lack of correlation between maternal tribe and such things as birthweight and gestational age in the present study.

The lack of predicted religious differences between the two groups may be due to chance, but consideration must also be given to the fact that both groups were very heavily weighted toward the Orthodox
Coptic Christian category of the religion variable. This skewedness of the study sample makes it difficult, if not impossible, to draw any definite conclusions from this finding. However, interpretation of this finding is still open to conjecture. It could be suggested that while considered alone religion appears to exert very little influence on the occurrence of perinatal mortality, it may prove productive to examine some of the practices carried out by adherents to particular religions. Since the overwhelming majority of the subjects in both groups were Orthodox Coptic Christians, it would be best, it seems, to focus the discussion on their practices.

The Ethiopian Coptic Christian Church, since its introduction, has played an integral role in the daily lives of its adherents. One important aspect of this influence is the fasting imposed by the Church on its adherents. The implications of fasting on the nutritional and general health status of the Christian population of Ethiopia are many, and for this reason it seems cogent to discuss this practice here.

Fasting, for Ethiopia's Copts, does not mean total abstention from oral intake as it does for the country's Moslems. Christian fasting rules are of two kinds. The first governs when food may be eaten; i.e., not until after the sun has passed its noon position. The second rule covers the foods which may be eaten. Of the foods of animal origin, only fish may be consumed. Meat, milk, butter, and egg are prohibited.  

Moslems generally fast only during Ramadan, and then only from sunrise to sunset, during which not so much as a drop of saliva may be swallowed. Though there are some restrictions on the type of food they may eat during the fast, their diet does not vary that far from the normal, making it a more psychological than physical ordeal. There is no doubt, however, that it can be physically debilitating, particularly in times when hard manual labor is being performed, and can therefore have negative effects on general health status.
during fasts, and all contacts with these must be avoided—even to smell one of these is considered by some to constitute a breaking of the fast and must be followed by a request for absolution from the church.\textsuperscript{2}

 Exceptions to fasting are few and far between. Children under the age of about seven years, pregnant and nursing women, and gravely ill people may be exempted. However, special permissions must be obtained from the Church even in these cases. Knowledge of these exemptions is not widespread, particularly in the countryside and among the illiterate Christians. Even in cases where exemptions can be obtained, the various items of food forbidden during the fast may be impossible to find, since these items are scarce or disappear during fasting times.\textsuperscript{3} Even when they can be found, high prices put them out of reach for most people.

 Knutsson and Selinus (1970) report that

 For common people, the total number of fasting days probably amounts to 110-115 days per year. For the especially pious, such as priests, monks, other people connected with the church, and for old people, the total can reach 220 days (p. 958). Brief mention of the different fasting periods will give some indication of how much they can affect the lives of Orthodox Christian Ethiopians.

 The first fast of the Ethiopian Calendar is the Christmas fast (\textit{Genna tsom}). For the clergy and the very devout, it begins two months before Christmas Day, and lasts until that morning. For most common

\textsuperscript{2}The author's wife, an Ethiopian and Coptic Christian, is the source of information on fasting rules and exemptions.

\textsuperscript{3}While living in Ethiopia from July, 1973, to August, 1974, and from January, 1975, to August, 1975, the author was often forced to fast because of the lack of availability of non-fasting foods.
people, it is only observed in the two-day period preceding Christmas. The next fast is a three-day fast before the Feast of the Epiphany (Timkat, on about January 19). There is still another fast immediately before the third week prior to Lent. This is the fast of Nineveh (Nineh tsom). Both of these fasts are generally observed only by clerics and the very old.

The longest and most strictly observed fast of the year begins eight weeks before Easter. This Easter fast (Fasika tsom) is broken on Easter morning after sunrise, and after attending church, at which time the fasters virtually eat themselves into a stupor during feasting which may last well past the end of Easter day. Strict adherence to this fast is believed to cleanse the faster of all sins, giving him a "fresh start" so to speak. The next fast, the fast of the Holy Virgin (ye Mariam tsom), lasts for two weeks in May but is generally observed only by those who are particular devotees of the Virgin.

In June, the clergy observe the fast of the disciples (Hawariat, or Newai tsom), which lasts throughout the month. The next widely observed fast is the three-week fast preceding the Assumption Day of the Holy Virgin (ye Mariam ledet), in August. This fast is observed by everyone, including young children.

In addition to these annual fasts, every Wednesday and Friday (with the exception of those falling in the two-month period after Easter) are fasting days. There is also a one- or two-day fast in September which celebrates the finding of the true cross by the ancient empress Helena. Furthermore, individuals may be ordered to fast by a priest as penance or to fulfill promises made to a particular saint in return for a favor asked by the individual.
When one considers the fact that there are probably twelve to fourteen million Orthodox Christians in Ethiopia (Knutsson and Selinus, 1970:956), it is easy to see what the effect of the extensive fasting might be. Knutsson and Selinus (1970), in their study of nutritional aspects of fasting, found that

... the fasting diets are significantly less adequate in calories and nutrients, except thiamine, niacin, and iron, than is the case during non-fasting periods... (p. 969).

They further suggested that the

... difference between the fasting and non-fasting period is especially visible in the 1/2 to 3-year age group of children. Not only did they get about 25% less than adequate total protein during fasting, but, also, there was a definite change for the worse in protein quality due to the virtual elimination of milk and other sources of animal protein (p. 965).

They indicate that this is particularly hazardous to the young child since protein supply, even during non-fasting periods, is inadequate (Knutsson and Selinus, 1970:965). They further indicate, however, that the differences between fasting and non-fasting diets for underprivileged people is not significant, since these people cannot usually afford such things as meat, butter, or eggs, even when they are available during non-fasting periods (Knutsson and Selinus, 1970:965). Fasting, a deeply ingrained part of the Orthodox Christian life-style, can generally be viewed as having a negative impact in nutritional and general health terms on a large sector of the Ethiopian population.

It is, therefore, easy to see how religious practices, if not religion itself, might exert influence on perinatal mortality and some of its contributing factors.

Other than those suggested by the review of the literature in Chapter II, very few predictions about the nature of any inter-variable
correlations (as opposed to distribution differences between groups for particular variables) were made. The inter-variable correlations must be discussed, since they will, in all likelihood, shed valuable light on the problem of which factors contribute (or do not contribute) to perinatal mortality.

The close correlation between gestational age and birthweight might have been predicted since it can be expected that an infant of low gestational age will generally also be of lower birthweight than an infant of higher gestational age. The Somer's D (asymmetric) values for both groups indicate that birthweight is more dependent on gestational age than vice versa. Therefore, one can safely predict that an infant of low gestational age will also be of low birthweight with a fairly high degree of confidence. However, predictions that infants of low birthweight are also of low gestational age must be made with considerably more reserve since there can be a great deal of case-to-case variation. This is, in all likelihood, due to the fact that while there are many things that can affect birthweight (such as maternal nutritional and health status and various infections) in such a way as to make a full-term infant have a low birthweight, there is very little that can be done to make a low gestational age infant have a high birthweight. For example, Lechtig and his associates (1975) found that maternal nutritional status was a contributing factor in many instances of low birthweight. Gebre-Medhin and Gobezie (1975) found that mothers with poor nutritional records had lower birthweight infants in a study they

\textsuperscript{4}An infant is considered to be of low gestational age if the gestational age is less than 36 or 37 weeks.
From this discussion, and from the direction taken by the gestational age-birthweight relationship, it can be concluded that while a factor that influences birthweight alone may or may not influence gestational age, there is a high degree of likelihood that something which affects gestational age will also affect birthweight.

One important question which arises here is the reason for the highly significant difference between the two groups in terms of the degree of correlation between birthweight and gestational age. It is possible that this is due to a wider variability in birthweight as gestational age increases. In both groups, there were instances of low birthweight infants with normal gestational age, but no instances of low gestational age infants of normal or above birthweight. Table 4.1, showing a crosstabulation between the gestational age and birthweight variables, illustrates this. It seems likely that as gestational age increases, birthweight is subject to a wider range of variation. Since the mean gestational age of the control group was higher than that of the experimental group, it seems likely that there would be a decreased degree of correlation between the two variables for that group; i.e., the birthweight will be more closely matched to the gestational age at low gestational ages. Thus, the difference in degree of correlation of birthweight with gestational age between the two groups can be attributed to the higher mean gestational age of the control group.

The lack of correlations between level of living scale score and any of the independent variables (except those generally associated with socioeconomic status) of any significant strength has been

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5The influence of nutrition on birthweight and perinatal mortality in general, already touched upon in the discussion of fasting practices, will be elaborated later on in this discussion.
**TABLE 4.1**

**CROSSTABULATION OF BIRTHWEIGHT AND GESTATIONAL AGE**

<table>
<thead>
<tr>
<th>Birthweight**</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>E/C</td>
<td>E</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>E</td>
<td>E</td>
<td>E/C</td>
<td>E</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>E</td>
<td>E</td>
<td>E/C</td>
<td>E</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>E/C</td>
<td>E/C</td>
<td>E/C</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
<td>C</td>
<td>E/C</td>
<td>E/C</td>
</tr>
<tr>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td>E/C</td>
<td>E/C</td>
</tr>
<tr>
<td>7</td>
<td></td>
<td></td>
<td></td>
<td>E/C</td>
<td>E/C</td>
</tr>
<tr>
<td>8</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>E</td>
</tr>
</tbody>
</table>

**Gestational Age***

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>20-25 weeks</td>
<td>26-30 weeks</td>
<td>31-35 weeks</td>
<td>36-40 weeks</td>
<td>41 weeks and over</td>
</tr>
</tbody>
</table>

*"E" or "C" indicates the presence of cases from the experimental or control group, respectively, in a particular cell.

**Value Labels (Birthweight):**
1. 500-1000 grams
2. 1001-1500 grams
3. 1501-2000 grams
4. 2001-2500 grams
5. 2501-3000 grams
6. 3001-3500 grams
7. 3501-4000 grams
8. 4001 grams or more

**Value Labels (Gestational Age):**
1. 20-25 weeks
2. 26-30 weeks
3. 31-35 weeks
4. 36-40 weeks
5. 41 weeks and over
problematic throughout the analysis of the available data. For example, it might have been expected that a positive relationship between birthweight and level of living (i.e., as level of living score increased, so did birthweight) might have been found. The fact that this relationship was not present can be at least partially explained by the fasting practices (discussed above) of the Orthodox Christians who, it will be remembered, were very much overrepresented in the study sample. In addition, peculiarities of the Ethiopian diet (which will be elaborated in the last section of this chapter) in some instances seem to favor people of lower socioeconomic status. The skewedness of the samples toward Orthodox Coptic Christians and people of middle to lower socioeconomic status may help explain why no discernible patterns were present between socioeconomic status and birthweight.

The fact that socioeconomic status, as measured by the level of living scale, did not correlate with many of the dependent or independent variables does not indicate that this is not a factor in perinatal mortality in general. What it does indicate is that it is not a factor in this particular instance. This may be due to intervening factors which may be unique to Ethiopia. For an elaboration of this, see Appendix C.

The fact that in the experimental group there was a significant relationship between level of living score and whether the maternal place of residence was urban or rural is interesting since it seems to suggest the possibility that as people move up on the socioeconomic scale, they are for some reason drawn to urban areas. The experimental group had a significantly lower mean score on the level of living scale, and also had a significantly higher proportion of rural respondents.
The lack of relationship between these two variables in the control group is probably due to the low incidence of rural respondents in that group.

One explanation for the higher incidence of rural respondents in the experimental group can be drawn from the study done by Namboze (1969) in which she discussed the positive contribution of health care facilities to the reduction of perinatal mortality. In rural areas of Ethiopia, health care facilities while generally available within a one day's walk, are seldom used to obtain prenatal care. Since, as Namboze suggests, prenatal care helps reduce the risk of perinatal mortality, it would be expected that there would be a higher proportion of the rural respondents in the experimental group. The finding that the experimental group had significantly fewer respondents who had prenatal care, and that only 10.8 percent of those who did in that group were from rural areas, tends to support this.6

From the findings of this study, it is clear that such things as low birthweight, low gestational age, low socioeconomic status, being from a rural locale, and occasionally lack of prenatal care, are all factors which contribute in varying degrees to perinatal mortality.

General Discussion

In reviewing the findings of the present study, it was noted that not all of the predicted relationships between and among variables were present. This has implications not just for the present study, but for all research of this nature which is carried out outside North

6Of the rural respondents in the experimental group, only 21.1 percent had perinatal care, as opposed to 58.6 percent of the control group rural respondents.
America and Europe. A large proportion of the literature dealing with demographic and social factors in perinatal mortality (and infant mortality in general) has been carried out in the United States and western Europe. It can be suggested that this fact tends to bias the thinking in terms of social and demographic factors in perinatal mortality, and it is to this possibility that the discussion now turns.

First of all, an elaboration of some of the differences between the United States and western Europe (the so-called "developed" countries) can help clarify this discussion. On an obvious level, the United States and western Europe enjoy levels of living and general health which were not even dreamed of fifty or one hundred years ago. In these areas, many diseases, once prevalent, no longer exist, or if they do, are easily treated or prevented. Health care of relatively high quality is available to almost everyone. In addition, free, or nearly free education is available and in most instances is required by law, with the result that illiteracy is practically nonexistent. On the other hand, in the "underdeveloped" portion of the world, life is much as it has been for hundreds, if not thousands of years for most of the people. For these people, disease, malnutrition, poverty, and illiteracy are the norms.

On another, less obvious level, it can be suggested that the United States and western Europe are oriented to living and to those things which increase the quality of life. In this orientation they are not bound by any framework, outside of the obvious legal restrictions.

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7Such research has undoubtedly been done in eastern Europe and Russia, which should also be counted among the "developed" countries, but literature dealing with such research is not generally available.
in pursuing this. There is no all-pervasive tradition directing the course they may take. There are traditions, to be sure, but they do not permeate every aspect, or even most aspects, of life. In short, the "rules of the game" can, and often do, change. This is not the case in most of the "underdeveloped" world. Most of the people in these areas are bound by traditions which direct virtually every aspect of their lives—where they live, what they eat, what work they can do, what clothes they can wear, even when they get up in the morning and what time they go to bed at night. In their instance, the "rules of the game" rarely, if ever, change. People in these areas of the world are tradition-oriented.

What does all this mean in terms of perinatal mortality? It means that prenatal care is probably available to the pregnant woman in the developed country; that she is immunized against diseases which may harm her or her unborn child; and that she has a fairly nutritious diet. It means that the pregnant woman in the "underdeveloped" world does not have prenatal care because she does not see the need for it; rather, she depends on the old ways. It means that she is not immunized against disease because such immunizations are unavailable or because she does not need them, already being protected by the bag of herbs she wears around her neck which was made by her mother who in turn got the formula from her mother, etc. It also means that she does not get the nutrition she needs to maximize her chances of bearing an infant of normal birthweight because it is either not available, or is

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8 Of course, the old ways are not necessarily bad ways. What is implied in the usage of the term here is the unthinking following of tradition, whether good or bad, so often found in "underdeveloped" countries.
prohibited by restrictive dietary regulations.

What implications does all this have for the study of demographic and social factors in perinatal mortality? In the literature dealing with such studies in the United States and western Europe, some of which was discussed in Chapter II, relationships between certain factors, most notably socioeconomic status and birthweight, were noted. The fact that these relationships were not present in this study does not mean that previous researchers were wrong. What it does indicate is the possibility that in this particular instance (and probably in studies like it), one or more other factors may have intervened to "block" this relationship. In the previous section of this chapter, it was noted that maternal nutrition has been shown to be a factor influencing birthweight. It seems appropriate at this point to try to show how, in this case, maternal nutritional status may have been the "blocking" factor. It is probable that this example can then be extended to a discussion of this problem in other areas of the world where similar research may be carried out.

One of the staples of most Ethiopian homes is a millet-like grain called tef, which is found only in Ethiopia. It is used in the making of a large, pancake-type bread (injera) which is, in turn, used as a make-shift eating utensil. There are basically two types of tef, white (nech tef) and black (tokur tef). Black tef is known to be very high in mineral content (particularly iron), and thus is a very valuable food item for those who consume it. White tef, on the other hand, is not particularly high in terms of mineral content or general nutritional value. The distinction between the two types of tef is probably similar to that between plain "white" bread and whole-wheat bread here in the
United States. In most Ethiopian households, white tef is preferred over black tef because it is considered "clean" while black tef is, because of its dark color, considered "dirty." White tef is also more expensive than black tef, which generally limits its consumption to more well-to-do households. Therefore, lower class households which cannot afford to buy white tef have somewhat of an advantage in terms of mineral intake, over the upper class households since they are "forced" to eat black tef.

One of the great delicacies in the Ethiopian diet is raw meat. This can have some rather serious repercussions on the nutritional status of those who consume it since there are very few, if any, controls on the cleanliness of meat sold in Ethiopia. This means that those who consume raw meat, most often those of higher socioeconomic status, are open to infection by any number of a wide variety of parasites found in raw meat. One of the most common of these parasites, tape worm, is found throughout Ethiopia in almost epidemic proportions. Tape worm causes a very serious nutritional drain on those infected by it, as indicated by the sometimes serious loss of weight associated with long-term infestation by the parasite. One of the most common remedies for tape worm in Ethiopia is a "tea" made from the root of a particular tree (called "kosso", which is also the name, in Amharic, for tape worm). This "medicine" is a very strong purgative, and can, in some cases, cause more negative repercussions than the infection it is meant to cure. Many Ethiopians, particularly those of lower socioeconomic status, take kosso with some degree of regularity. Pregnant women often take kosso as often as three or four times during the course of their pregnancy, obviously, if unknowingly, placing a serious drain
on both themselves and the fetus at a time when nutritional status should be at its best.

Various types of dysentery are also very common in Ethiopia. This is in large part due to the fact that there is no source of pure water generally available to the people. Further, garden plots where any vegetables consumed by a household might be grown, often serve a dual capacity as latrines for the household. This presents a rather serious problem, since it means that individuals, as they consume vegetables, are at the same time re-infecting themselves with a variety of parasites which transfer themselves from the fecal material to the items grown in the household garden.

It can be seen from the above description of some Ethiopian dietary factors how cultural peculiarities can be problematic for the researcher who hopes, in work done in underdeveloped areas, to confirm the findings of research carried out in developed areas. There are a wide variety of isolated cultural factors which can intervene and which can rarely be controlled for. In the literature dealing with studies like the present one, this cultural factor is not given very extensive consideration, but it is, nonetheless, very important since failure to consider it may leave a wide variety of findings open to question.

In addition to those factors of a cultural nature, there are also a number of other intervening factors which should be considered. For example, in the United States and western Europe, a great many medical factors have, through advances in medical research and public health education, been eliminated or controlled to a great extent. Parasites, for example, touched upon briefly in the above discussion of Ethiopian diet, can have a disastrous effect on pregnancy in particular and on
health status in general.

In the United States and western Europe, parasitic infections are rare, and easily treated when they do occur. In the underdeveloped areas of the world, however, parasitic infections are rampant, difficult to prevent given the current state of public health education in these areas, and largely untreated. The suggestion here is that these medical factors may interfere with social and demographic factors in such a way as to hide any connection they may have to perinatal mortality in underdeveloped areas. In the developed areas (such as the United States and western Europe), by elimination or control of these factors, the effects of social and demographic factors are probably more easily assessed since researchers do not have as many confounding medical variables to contend with.

One important cultural factor which may alter the findings of research conducted in underdeveloped areas is related to the method of data collection used in such studies. As mentioned in the beginning of Chapter III, and elaborated in Appendix B, data for the present study were obtained through interviewing the mothers as soon after they had given birth as was possible. This method has several problems both in the specific context of this study and in the context of similar studies in underdeveloped areas.

First of all, the interviews were not carried out under the best of conditions. In most instances, interviews were conducted while the mothers were still both physically and emotionally weak from childbirth. It is easy to see how many of the questions asked about past medical and socio-demographic history could have been answered without much thought. In addition, many of the mothers were faced with the fact that
their infants were dead, further complicating their already strained emotional situations. Given the fact that hospital stays for childbirth are short in Ethiopia (and, most probably, in other underdeveloped areas as well) the interviewing could not have been postponed to allow the mothers to recuperate from their physical and emotional traumas.

In addition to the complication of interview timing, the content of the interview schedules was also problematic. First of all, many of the questions were, of necessity, of a highly personal nature. In Ethiopian society, as well as in most underdeveloped countries, women are at best extremely shy, even in their home surroundings. It is easily imaginable how, in strange surroundings, confronted with a stranger asking questions, many if not most women would be reluctant to answer such questions as "Are you a prostitute?", or "Do you have a history of venereal disease?" or even "Did you have vaginal bleeding during your pregnancy?". Even when such questions as these are couched in the most polite terms possible, they are still highly personal, and ones which most of these women would be reluctant to answer, truthfully, or otherwise. Second, many of the questions asked dealt with things about which no records are usually kept. For example, gestational age was determined by asking the women the day their last menstrual period had begun. While this is the most accurate means of determining gestational age, it remains to be seen how many women, particularly in the instance of this study, could really pinpoint the day or even the week when this occurred.

All of this is in no sense intended to find fault with the methods used in the present study—given the conditions under which it was conducted, this method was most appropriate, and essentially the
only one possible. Rather, it is intended to point out the pitfalls of using interview methods in research of this type in underdeveloped areas. Basically, women in these areas are too reluctant to give information accurate enough to draw meaningful conclusions on a wide variety of inter-variable correlations.

How, then, might one go about getting the necessary information for such studies? It may be that the best way would be to use a combination of interview and observations. Future studies of social and demographic factors in perinatal mortality might wish to interview the mothers several times over a certain period in order to gather, and then double check the basic facts about the maternal demographic and social history, and then spend time observing many of them in their home environments to get some idea of true level of living, nutritional status, etc., as well as to assess how much weight should be given to which cultural factors when the findings are analyzed. Works of this type, though not of the same subject matter, have already been done by Oscar Lewis and others. This would provide interesting and valuable supplemental information and insights which would help to clarify and elaborate information gathered in studies such as the present one.

In conclusion, it can be seen that, for a variety of reasons, studies of a type similar to this one may often discover their findings to be contradictory to the findings of other, previous researchers. In the event that they do not conform to other findings, it is important to consider other factors which may help to explain the lack of confirmation, but which are all too often ignored or just simply overlooked.
APPENDIX A

SAMPLE INTERVIEW SCHEDULE
Sample Interview Schedule*

1 Card number, case number

2 Age in hours
   1- 0 (stillborn)
   2- less than 1
   3- 1-3.9
   4- 4-11.9
   5- 12-95.9
   6- 96 and over
   7- 1 month or older

3 Gestational Age (weeks)
   1- less than 14
   2- 15-19
   3- 20-27
   4- 28-31
   5- 32-34
   6- 35-37
   7- 38-43
   8- 44 and over

4 Single or Multiple Birth
   1- single
   2- twin
   3- triplet

5 Grade lung maturity
   1
   2
   3
   4
   5
   6

6 Infant Sex
   1- male
   2- female

7 Mother's age (years)
   1- 19 or less
   2- 20-24
   3- 25-29
   4- 30-34
   5- 35-39
   6- 40 and over

8 Number of prior pregnancies
   1- none
   2- one
   3- 2-4
   4- 5-7
   5- 8-11
   6- over 11

9 Number of previous abortions or stillbirths
   1- none
   2- one
   3- 2-3
   4- over 3

10 Length of Labor
   1- no labor
   2- less than 9 hours
   3- 9-12
   4- 13-20
   5- over 20

11 Type of presentation
   1- vertex
   2- breech
   3- other

PHYSICAL EXAMINATION ETC.

12 Mother's height (cm)
   1- 152 or less
   2- 153-160
   3- 161-167
   4- over 167

13 Mother's weight (kg)
   1- 45.5 or less
   2- 45.6-50
   3- 50.1-59
   4- 59.1-68.3
   5- 68.4-91

14 VDRL
   1- positive
   2- negative

HISTORY

15 Pregnancy wanted
   1- yes
   2- no

16 Abortifients
   1- yes
   2- no

*This is essentially the interview schedule used in the present study, except that it has been altered for coding purposes and some autopsy data has been added.
17 Jaundice
1- yes
2- no

18 Tapeworm during pregnancy
1- yes
2- no

19 Syphilis
1- yes
2- no

20 Gonorrhea
1- yes
2- no

21 Other illness during pregnancy
1- yes
2- no

SOCIAL HISTORY

22 Husband
1- yes
2- dead
3- divorced or separated
4- never had one

23 Prostitute
1- yes
2- no
3- maybe (makes tella)

MOTHER'S PHYSICAL EXAMINATION

24 Fetal heart
1- present
2- absent

25 Fetal heart highest rate
1- 60 or less
2- 61-90
3- 91-110
4- 111-130
5- 131-150
6- 151-170
7- over 170

26 Fetal heart, lowest rate
1- 60 or less
2- 61-90
3- 91-110
4- 111-130
5- 131-150
6- 151-170
7- over 170

27 Blood pressure
1- diastolic under 70
2- 71-80
3- 81-95
4- 96-110
5- over 111

28 Temperature
1- 37 and under
2- 37.1-38
3- 38.1-39
4- above 39

29 Mucous membranes
1- normal
2- other

30 Pharynx
1- normal
2- injected

31 Lungs
1- clear
2- other

32 Heart
1- normal rhythm
2- other

33 Edema
1- absent
2- present

MEDICAL HISTORY

34 Vomiting during pregnancy
1- none
2- 1st trimester
3- 2nd trimester
4- 3rd trimester
5- 1st and 2nd
6- 1st, 2nd and 3rd
35. Vomiting
   1. solids
   2. fluids
   3. everything
   4. don't know

36. Hospitalized for vomiting
   1. yes
   2. no

37. Vaginal bleeding during pregnancy
   1. yes
   2. no

38. Had vaginal bleeding during pregnancy
   1. 1st trimester
   2. 2nd trimester
   3. 3rd trimester
   4. 1st and 2nd
   5. 1st and 3rd
   6. 2nd and 3rd
   7. all three trimesters

39. Was the bleeding
   1. daily
   2. every other day
   3. once a week
   4. twice a month
   5. once a month
   6. once only

40. Did you have vaginal bleeding at the onset of labor?
   1. yes
   2. no

41. Did you have excessive swelling of your feet?
   1. yes
   2. no

42. Was your pregnancy wanted?
   1. yes
   2. no

43. Were you using contraceptives?
   1. no
   2. the pill
   3. the loop
   4. safe period
   5. coitus interrup-

44. Have you taken abortifacients?
   1. yes
   2. no

45. Fever during pregnancy?
   1. no
   2. 1st three months
   3. 4th-6 months
   4. 7th month
   5. 8th month
   6. 9th month
   7. time of delivery

46. Was the fever due to
   1. malaria
   2. pneumonia
   3. colds
   4. communicable disease
   5. other
   6. don't know

47. Have jaundice during pregnancy?
   1. no
   2. 1st trimester
   3. 2nd trimester
   4. 3rd trimester

48. Have tapeworm during this pregnancy?
   1. no
   2. 1st trimester
   3. 2nd trimester
   4. 3rd trimester
   5. more than one trimester

49. What medicine did you take for tapeworm?
   1. Kosso
   2. Enchocho
   3. Mettere
   4. Ketchemo
   5. Yomesan
   6. Other

50. Took medicine for tapeworm
   1. 1st trimester
   2. 2nd trimester
   3. 3rd trimester
   4. near time of delivery
   5. more than one trimester
51 Did you have syphilis during this pregnancy?
   1- no
   2- 1st trimester
   3- 2nd trimester
   4- 3rd trimester

52 Treated for syphilis
   1- yes
   2- no

53 Did you have gonorrhea during this pregnancy?
   1- no
   2- 1st trimester
   3- 2nd trimester
   4- 3rd trimester
   5- more than one trimester

54 Did you have tuberculosis during this pregnancy?
   1- yes
   2- no

55 Have dysentery within 3 months of delivery?
   1- yes
   2- no

56 Have convulsions during this pregnancy?
   1- yes
   2- no

57 Do you have diabetes?
   1- yes
   2- no

58 Has a doctor told you that you have heart disease?
   1- yes
   2- no

59 Has a doctor told you that you have kidney disease?
   1- yes
   2- no

60 Has a doctor told you that you have high blood pressure?
   1- yes
   2- no

61 What was your weight before the present pregnancy? (Kg)
   1- 45.5 or less
   2- 45.6-50
   3- 50.1-59
   4- 59.1-68.3
   5- 68.4-91
   6- over 91

62 Have you been examined during this pregnancy?
   1- yes
   2- no

SOCIAL HISTORY

63 Province
   1- Shoa
   2- other

64 Where live
   1- urban
   2- rural

65 Clinic where had antenatal care
   1- PTMH
   2- Lideta
   3- Ghandi
   4- Balcha
   5- Yeka
   6- Gulele
   7- St. Paul
   8- other
   9- no antenatal care

66 Clinic where delivery took place
   1- PTMH
   2- Lideta
   3- Ghandi
   4- Balcha
   5- Yeka
   6- Gulele
   7- St. Paul
   8- other
   9- at home

67 Time of history
   1- prepartum
   2- postpartum
Years lived in Addis Ababa
1- not live in Addis
2- all life
3- 1 month-1 year
4- 1.1-3 years
5- 3.1-10 years
6- over 10 years

Tribe of husband
1- Amhara
2- Galla
3- Tigre
4- Guraje
5- other
6- no husband

Tribe of patient
1- Amhara
2- Galla
3- Tigre
4- Guraje
5- other

Religion of husband
1- Ethiopian orthodox
2- Catholic
3- Protestant
4- Other Christian denomination
5- Moslem
6- other
7- don't know or no religion

Religion of patient
1- Ethiopian orthodox
2- Catholic
3- Protestant
4- Other Christian denomination
5- other
6- don't know or no religion

Marital status
1- never married
2- married polygamous
3- married monogamous
4- widowed
5- divorced
6- separated
7- widowed and remarried
8- divorced and remarried
9- other

Age of first marriage
1- 12-14
2- 15-16
3- 17-18
4- 19-25
5- 26-36
6- over 36

How long have you been married?
1- not married
2- less than 1 year
3- 1-3 years
4- 4-8 years
5- 9-15 years
6- over 15 years

How many times have you been married?
1- never married
2- once
3- twice
4- three or more times

How many times has your husband been married?
1- never been married before
2- once before
3- more than once before

Your schooling
1- never attended school
2- completed 1 year
3- 2-4 years
4- 5-8 years
5- 9-12 years
6- High school graduate
7- had higher education
8- sewing
9- home economics
10- typing
11- nursing
12- other

Do you read?
1- yes
2- no
80 Husband's schooling
   1- no husband
   2- husband had no schooling
   3- completed one year
   4- 2-4 years
   5- 5-8 years
   6- 9-12 years
   7- High school graduate
   8- had higher education

81 Does your husband write?
   1- yes
   2- no

82 Does your husband read?
   1- yes
   2- no

83 Number of persons in household
   1- patient is alone
   2- 2
   3- 3-4
   4- 5-7
   5- 8 and more

84 Total income (Eth $)
   1- none
   2- 1-10/month
   3- 11-20/month
   4- 21-40/month
   5- 41-80/month
   6- 81-140/month
   7- 141-200/month
   8- 201-400/month
   9- 401-800/month
   10- over 800/month

85 Other sources of income
   1- yes
   2- no

86 Total household income/number of persons in household/month ($)
   1- none
   2- 1-3
   3- 3.1-5
   4- 5.1-8
   5- 8.1-15
   6- 15.1-30
   7- 30.1-50
   8- 50.1-100
   9- over 100

87 Total number of children of mother who are living
   1- none
   2- one
   3- 2-4
   4- 5-7
   5- 8-11
   6- over 11

88 Husband's employment
   1- no husband
   2- employed
   3- not employed

89 Did you work during your pregnancy outside of your home?
   1- yes
   2- no

90 If yes, what kind of work?
   1- bake enjera
   2- make/sell tella
   3- servant
   4- factory
   5- clerical
   6- salesperson
   7- teacher, other profession
   8- nurse

91 Do you have a servant?
   1- no
   2- yes, during 1st trimester only
   3- 2nd trimester
   4- 3rd trimester
   5- all pregnancy or 2nd and 3rd trimester

92 Work at home during pregnancy
   1- no work
   2- enjera baking
   3- washing clothes
   4- cooking
   5- making tella
   6- other
   7- combination of 2-4
   8- combinations of 2-4+5
<table>
<thead>
<tr>
<th>Question</th>
<th>Options</th>
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<tbody>
<tr>
<td>Monthly expense for rent ($)</td>
<td>1- 0-2</td>
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<tr>
<td></td>
<td>2- 3-6</td>
</tr>
<tr>
<td></td>
<td>3- 7-10</td>
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<tr>
<td></td>
<td>4- 11-20</td>
</tr>
<tr>
<td></td>
<td>5- 21-30</td>
</tr>
<tr>
<td></td>
<td>6- 31-50</td>
</tr>
<tr>
<td></td>
<td>7- over 50</td>
</tr>
<tr>
<td>Monthly expense for water ($)</td>
<td>1- none</td>
</tr>
<tr>
<td></td>
<td>2- 0-0.30</td>
</tr>
<tr>
<td></td>
<td>3- 0.31-0.60</td>
</tr>
<tr>
<td></td>
<td>4- 0.61-1.00</td>
</tr>
<tr>
<td></td>
<td>5- 1.01-2.00</td>
</tr>
<tr>
<td></td>
<td>6- 2.01-3.00</td>
</tr>
<tr>
<td></td>
<td>7- 3.01-5.00</td>
</tr>
<tr>
<td></td>
<td>8- over 5.00</td>
</tr>
<tr>
<td>Monthly expense for food (expense/# of people in household) ($)</td>
<td>1- none</td>
</tr>
<tr>
<td></td>
<td>2- 0-0.50</td>
</tr>
<tr>
<td></td>
<td>3- 0.51-1.00</td>
</tr>
<tr>
<td></td>
<td>4- 1.01-2.00</td>
</tr>
<tr>
<td></td>
<td>5- 2.01-3.00</td>
</tr>
<tr>
<td></td>
<td>6- 3.01-5.00</td>
</tr>
<tr>
<td></td>
<td>7- 5.01-10.00</td>
</tr>
<tr>
<td></td>
<td>8- 10.01-20.00</td>
</tr>
<tr>
<td></td>
<td>9- 20.01-40.00</td>
</tr>
<tr>
<td></td>
<td>10- over 40.00</td>
</tr>
<tr>
<td>Monthly expense for alcohol (drinks) ($)</td>
<td>1- none</td>
</tr>
<tr>
<td></td>
<td>2- 0-1.00</td>
</tr>
<tr>
<td></td>
<td>3- 1.01-3.00</td>
</tr>
<tr>
<td></td>
<td>4- 3.01-10.00</td>
</tr>
<tr>
<td></td>
<td>5- 10.01-20.00</td>
</tr>
<tr>
<td></td>
<td>6- over 20.00</td>
</tr>
<tr>
<td>Lighting</td>
<td>1- electricity</td>
</tr>
<tr>
<td></td>
<td>2- kerosene lamp</td>
</tr>
<tr>
<td></td>
<td>3- fire wood</td>
</tr>
<tr>
<td></td>
<td>4- other</td>
</tr>
<tr>
<td>Housing density (persons/room)</td>
<td>1- less than 1</td>
</tr>
<tr>
<td></td>
<td>2- 1.0-2.0</td>
</tr>
<tr>
<td></td>
<td>3- 2.1-4.0</td>
</tr>
<tr>
<td></td>
<td>4- over 4</td>
</tr>
<tr>
<td>Kitchen</td>
<td>1- no kitchen</td>
</tr>
<tr>
<td></td>
<td>2- inside kitchen</td>
</tr>
<tr>
<td></td>
<td>3- outside kitchen</td>
</tr>
<tr>
<td>Do you have a latrine?</td>
<td>1- no</td>
</tr>
<tr>
<td></td>
<td>2- own (private)</td>
</tr>
<tr>
<td></td>
<td>3- shared</td>
</tr>
<tr>
<td>Quality of latrine</td>
<td>1- no latrine</td>
</tr>
<tr>
<td></td>
<td>2- water flush type</td>
</tr>
<tr>
<td></td>
<td>3- open dry type</td>
</tr>
<tr>
<td></td>
<td>4- closed dry type</td>
</tr>
<tr>
<td>If you do not have a latrine, where do you defecate?</td>
<td>1- public latrine</td>
</tr>
<tr>
<td></td>
<td>2- open field</td>
</tr>
<tr>
<td></td>
<td>3- other</td>
</tr>
<tr>
<td>Number of people served by latrine</td>
<td>1- 1</td>
</tr>
<tr>
<td></td>
<td>2- 2-4</td>
</tr>
<tr>
<td></td>
<td>3- 5-10</td>
</tr>
<tr>
<td></td>
<td>6- over 25</td>
</tr>
<tr>
<td>Source of water</td>
<td>1- well (ground water)</td>
</tr>
<tr>
<td></td>
<td>2- stream</td>
</tr>
<tr>
<td></td>
<td>3- pipe, community stand pipe</td>
</tr>
<tr>
<td></td>
<td>4- buy from neighbor tap</td>
</tr>
<tr>
<td></td>
<td>5- share tap inside compound</td>
</tr>
<tr>
<td></td>
<td>6- private tap within household</td>
</tr>
<tr>
<td></td>
<td>7- other</td>
</tr>
<tr>
<td>Work involved in water transport (buckets/day x km distance)</td>
<td>1- none</td>
</tr>
<tr>
<td></td>
<td>2- 0-1</td>
</tr>
<tr>
<td></td>
<td>3- 1.1-2</td>
</tr>
<tr>
<td></td>
<td>4- 2.1-3</td>
</tr>
<tr>
<td></td>
<td>5- 3.1-5</td>
</tr>
<tr>
<td></td>
<td>6- over 5</td>
</tr>
</tbody>
</table>
Did you carry water during your pregnancy?
1- yes
2- no

Did you smoke during pregnancy?
1- no
2- 0-10 cig/day
3- 11-20/day
4- over 20/day
APPENDIX B

FIELD METHODS USED IN THE PRESENT STUDY
FOR DATA COLLECTION
Field Methods Used in the Present Study for Data Collection

The data used in the present study were collected by interviewing the subjects as soon after they had given birth as possible. This was necessary since many of the subjects left the hospital within one or two days after giving birth. Interviews were conducted at the subjects' bedsides, primarily by two male Ethiopian social workers and a female Ethiopian nurse. On several occasions, the author was present during the interviews, and in some instances assisted in the interview process. In some cases, the interviews had to be carried out by third parties, since some of the subjects did not understand Amharic or Tigrinya, the two languages used for interviewing purposes.

During most of the interviews, the subjects were either physically exhausted or in a state of grief over the loss of their infants. On some occasions, they had just learned of the deaths of their infants. In these instances, the subjects were occasionally reluctant to provide any information and, in some cases, were even hostile. The interviewing process was, on occasion, further complicated by the fact that some of the subjects insisted that their husbands or relatives answer most of the questions for them. Also, there were times when, while the subject was willing to participate, relatives who were present interrupted during the questioning process. The fact that most of the subjects were in multi-bed wards further complicated the data gathering process by decreasing the privacy available for the interviews.

These are just some of the problems that were present during the data gathering. It is probable that these types of problems would arise in any study of this nature in underdeveloped areas.
APPENDIX C

METHODOLOGICAL DIFFICULTIES ENCOUNTERED
IN THE PRESENT STUDY
Methodological Difficulties Encountered in the Present Study

Many of the methodological difficulties encountered during the course of this study have been covered in Appendices B and D. However, there are some additional problems which need to be discussed here.

First of all is the problem of numbers, mentioned in the text of the study (Chapter III). A large proportion of the cases had to be eliminated because of insufficient data on some of the main variables. In some cases, the respondents refused to answer some of the questions for various reasons, and in some cases data gathering could not be completed because the respondents either terminated the interview before it was finished, or left the hospital or clinic before it could take place at all. Many of these cases were included in the original number because other information, not of use to this particular study, but of use to other studies to be conducted by the Pennsylvania State University College of Medicine, was present. In addition, many of the variables which might have been of value to the present endeavor had to be eliminated because not enough respondents provided answers to some of the interview questions.

Some cases were never included in the study because the mothers refused cooperation with the researchers in all aspects of the study, i.e., interviews, necropsies (autopsies), etc. This is the probable reason for the underrepresentation of Moslem respondents in the final study sample.

Finally, the variables used were of several different types, i.e., interval, nominal, and ordinal; and this entailed the use of several different types of statistical measures to assure accuracy of
the findings. This was only a problem insofar as it was time consuming as opposed to a situation where all the variables are of the same type.
APPENDIX D

CONSTRUCTION OF THE LEVEL OF LIVING SCALE
Construction of the Level of Living Scale

The Level of Living Scale used in the present study was constructed by adding the scores obtained for each case on the two variables dealing with presence or absence and type of kitchen and the water source used by the subjects' households. This is illustrated in Table D-1.

**TABLE D-1**

**COMPONENTS OF THE LEVEL OF LIVING SCALE**

<table>
<thead>
<tr>
<th>Kitchen:</th>
<th>Water Source:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) No kitchen in household</td>
<td>1) River or open well</td>
</tr>
<tr>
<td>2) Outdoor kitchen</td>
<td>2) Buy water from neighbor's tap,</td>
</tr>
<tr>
<td>3) Indoor kitchen</td>
<td>or share tap within the subject's</td>
</tr>
<tr>
<td></td>
<td>compound*</td>
</tr>
<tr>
<td></td>
<td>3) Private indoor tap</td>
</tr>
</tbody>
</table>

Level of Living Score = Kitchen (1, 2, or 3) + Water Source (1, 2, or 3)**

*A compound consists of one or more housing units inside a common fence and is a fairly typical kind of housing in Ethiopia.

**A list of the level of living scale categories can be found in Table 3.2. The minimum score was two out of a possible six points; therefore, there are only five categories in the scale.

The main problem in constructing a scale to measure level of living in underdeveloped areas is that the determinants of "good" or "bad" level of living are often culturally determined. In this particular instance, while data on total family income were available, it was felt by the author that income alone was not an adequate determinant
of level of living.¹ For example, it is very common to come upon cases where an individual will be very wealthy, yet not have an indoor bathroom or kitchen facilities. Thus, the assumption cannot be made here that if an individual is wealthy (i.e., has a high monthly family income) his level of living will also be high. In the United States, on the other hand, income and living level can be assumed to increase correspondingly; i.e., if one goes up in income, so will one's level of living.

In addition to this problem, another arose in that several of the variables available (for example, rent per month and monthly expenses for food and water) for inclusion in the scale could not be used because of inadequate numbers of respondents. The monthly rent variable in particular might have been a good one to use, except for the fact that it automatically would have excluded those who owned their own homes—those in the upper levels of the scale. There was no way of knowing whether those who did not answer this question merely failed to answer, or did not pay rent, or if they responded that they did not pay rent, if they owned their own homes, or just lived in a shanty for which they paid no rent.

¹The author consulted several Ethiopians about this and they concurred that income alone really did not tell much about the level of living of most Ethiopian households.
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Ullendorff, Edward
VITA

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In September, 1975, entered the Master of Arts program of the Department of Sociology of the College of William and Mary. Degree requirements will be completed with the approval of this thesis. The author is currently enrolled in the Master of Arts program in International Administration at the School for International Training, Brattleboro, Vermont.