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An Evaluation Of A Village Health Worker Program In Indonesia

Tonny Sadjimin

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AN EVALUATION OF A VILLAGE HEALTH WORKER PROGRAM IN INDONESIA

by

Tonny Sadjimin

Department of Epidemiology and Biostatistics

Submitted in partial fulfilment
of the requirements for the degree of
Doctor of Philosophy

Faculty of Graduate Studies
The University of Western Ontario
London, Ontario

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ABSTRACT

Primary health care is an alternative approach to improve the unacceptable health status of the majority of world population. It is expected to make essential health care universally accessible to individuals and families in the community in an acceptable and affordable way and with their full participation. The village health worker scheme was implemented in the Yogyakarta Special Territory of Indonesia in 1981, in an attempt to provide primary health care

This research has attempted to evaluate the function of village health workers in health promotion, prevention and curative services provided for rural children under five years of age.

A survey was conducted to determine maternal knowledge of childhood infectious diseases and childhood immunization, and to compare the immunization status of children aged 6-23 months in villages with and without a village health worker. A Cohort study was carried out to compare the medical care provided for diarrhea, fever and cough to children aged 6-59 months in villages with and without a village health worker.

It was expected that the DPT immunization coverage (2-doses) of children in villages with a village health worker would be 10 percentage points higher than that of children in villages without a village health worker. It was also expected that the medical care provided by the village health worker would not be substantially inferior to that provided by health centre personnel (i.e. the frequency of a poor outcome of illness would not be more than 10

. . .

percentage points higher among the former).

A multivariate analysis showed that DPT immunization coverage in villages with and without a village health worker was not statistically significantly different. Coverage of BCG immunization was better in villages with village health workers, but coverage of polio immunization was better in villages without village health workers.

No outstanding or consistent differences were found between study and control villages in maternal knowledge of childhood infections. In both groups, maternal knowledge was less than optimal.

The availability of village health workers in the villages reduced the duration of illness before the child was brought for medical attention. Village health workers were less aggressive in giving drugs for diarrhea, fever and cough and more aggressive in giving oral rehydration solution for diarrhea. Virtually all mothers in both groups received advice on the use of medication. There was a limited number of mothers in both groups who received advice about feeding and breast feeding of the sick child.

In the univariate analysis, the health care system with village health workers showed a better outcome for diarrhea, fever and cough than the health care system without village health workers. After adjustment for potential confounding variables the differences were not significant.

The over-all mortality rate and the mortality rate for diarrhea in children under five years of age was lower in the villages with village health workers but the diferences did not reach statistical significance.

The results suggest that the village health workers provide adequate care for common childhood illnesses but do not enhance immunization coverage of the child population. Definitive studies need to be carried out to determine the best means of training of the village health worker to provide preventive services as well as therapeutic services for common illnesses.

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Island	Percent of Total Land	Percent of Total Population	Density of Population (per sq. km)
Java (Incl. Madura)	6.9	61.9	690
Sumatera	24.7	19.0	59
Sulawesi	9.9	7.1	54
Kalimantan	28.1	4.6	13
Bali	0.3	1.7	430
Irian Jaya	22.2	.8	3
Other	7.9	4.9	50
Total	100.0	100.0	77
Total Population: 147,490,000			

Source: BPS, 1982 (16), CBS - UNICEF, 1984 (28).

CHAPTER I

INTRODUCTION

The International WHO-UNICEF CONFERENCE on Primary Health Care, held in Alma-Ata, U.S.S.R in 1978, declared that the health status of hundreds of millions of people in the world is unacceptable, particularly in developing countries (160). Some important indicators used to measure the health status of the people in accordance with the Alma-Ata conference are infant mortality rate, child mortality rate, maternal mortality rate and life expectancy at birth. The infant mortality rate in the developed countries is between 10 to 20 per 1,000 live births and between 100 to more than 200 in the developing countries. The death rate of children between 1 and 5 years of age is only about 1 per 1,000 in most developed countries, but ranges between 20 to 30 in developing countries. The maternal mortality rate is less than 1 per 10,000 live births in the developed countries and averages about 30 per 10,000 in the least developed countries. Whereas average life expectancy at birth is about 74 years in the developed countries, it is only about 58 years in the developing countries and in some African and southern Asian countries about 46 years (58, 150).

Indonesia, in this context, had an infant mortality rate of 90 per 1,000 live births, a child mortality rate of 18 per 1,000 children aged 1 to 4 years, a maternal mortality rate of 30 per 10,000 live births and a life expectancy at birth of 58 years (25, 150).

These figures apparently are the highest among the members of ASEAN (the Association of South East Asia Nations which include: Brunei, Indonesia, Malaysia, Phillipines, Singapore and Thailand) although data for Brunei are not available.

The data mentioned above, combined with other health indicators, indicate that Indonesia faces major health problems, particularly those for which known remedies exist. Immunization protects infants and children from specific infectious diseases. Oral rehydration therapy prevents death from diarrhea. If food is available growth monitoring can help mothers to prevent most child malnutrition before it begins. Breast feeding ensures the best possible food and a considerable degree of immunity from common infections during the first four to six months of life (150).

To enhance the health status of the people of a country such as Indonesia, the health service system has to focus its attention on children under five years of age and women of child-bearing age. Approximately fifteen percent of Indonesia's population were children under five (22), the segment of the population which accounted for the high morbidity and mortality rates from diseases that are preventable and treatable in the early stages.

To conquer these problems, a less sophisticated type of health worker is preferable to a highly qualified type of health worker (143). Several studies (86, 111, 126, 139) have shown that workers or laymen can be trained to administer simple measures to solve the most basic health problem(s) and they also showed a satisfactory performance at the expected level.

Indonesia has committed itself to the idea that the primary health care approach is imperative to bring the health status of its population to an acceptable level. Yet, in so doing, several fundamental concepts of primary health care need to be studied to maximize the benefit of such care to the population.

CHAPTER II

THE PURPOSE OF THE STUDY

Primary health care is intended to close the gap between the "haves" and "have-nots", to achieve a more equitable distribution of health resources and ~~to~~ attain a level of health for the population that will permit them to lead socially and economically productive lives (160).

In Indonesia, forty-five percent of all deaths in the first five years of life are due to diarrhea and immunizable diseases. Respiratory infections account for more than one-fifth of the total deaths in this age group (25). Health interventions to overcome these problems have been proved in many studies (43, 109, 153).

In the Indonesian Household Health Survey, 1980, it was shown that over half of all who were surveyed, suffering from any illness, did not receive care from qualified health professionals and 45 percent of them never received any treatment (22).

Immunization against diphtheria, whooping cough, tetanus and tuberculosis has achieved an estimated 40 percent coverage, whereas protection against polio and measles has reached a smaller proportion of the target population (25).

The low ratio of health manpower to population is another obstacle to achieving the long term objectives of the National Health System.

This situation clearly indicates that the vast majority of children who need available health care are not covered, for various reasons, by the existing health care system. Yet, the ultimate goal of health development in Indonesia is to ensure that all people have access to an optimal state of health and to live a healthy and productive life.

The village health worker, as an additional source of health manpower, was proposed as a means of increasing the accessibility and utilization of the health care system. The Yogyakarta Special Territory, Indonesia launched the Village Health Worker Scheme in 1981 and attached this new health worker to the existing health care system.

The purpose of this study is to examine the benefits of adding the village health worker to the health care system.

The health centre, in Indonesia, as the first level of primary health care, provides promotion of health care, preventive and curative measures and rehabilitation. This study will attempt to examine the promotional, preventive and curative measures of health care that are delivered by the health care system that includes the village health worker.

There are 3 areas of interest in this study:

1. The role of the village health worker in the utilization of the immunization source for children provided by the health centres.
2. The role of the village health worker in the promotion of immunization against childhood diseases and childhood diarrhea provided by the health centres.
3. The quality of health care provided to children aged 6-59 months, for diarrhea, fever or cough, and the diarrhea mortality

rate of the under-five years of age children will be studied to examine the role of the village health worker on curative measures provided by the health centres.

This study was carried out in the Yogyakarta Special Territory, Indonesia, from September 1983 to September 1984. The author was responsible for the design of the study, the training and supervision of field workers and the analysis of data.

CHAPTER III

BACKGROUND

3.1 The Geography of Indonesia

Indonesia, lying between two continents, Asia and Australia, and two oceans, the Indonesian Ocean (Indian Ocean) and the Pacific Ocean, is composed of 13,667 islands, 75 percent of which are uninhabited (see Figure 3.1). There are five large islands which contribute 85 percent of the total Indonesian land area, namely, Kalimantan, Sumatera, Irian Jaya, Sulawesi and Java. Java (where this study was conducted) is the most densely populated and developed region in the country.

The equator, which divides Indonesia into north and south parts, causes only two seasons, namely, the dry and wet monsoons. The wet season usually occurs from December until March, when rain falls in south Sumatera, Java and Nusa Teuggara.

3.2 Demographic Features of Indonesia

It is estimated that the total population of Indonesia in 1983 was 158 million, up from 119 million in 1971 and 147 million in 1980 (16, 25). This is the fifth most populated country in the world, after the People's Republic of China (1,007.76 million), India (676.22 million), U.S.S.R. (267.72 million) and the United States (229.85 million) (148).

The population of Indonesia is distributed very unevenly (see Table 3.2.1). Java Island, which has only about 7 percent of the

Figure 3.1 Provinces of the Republic of Indonesia

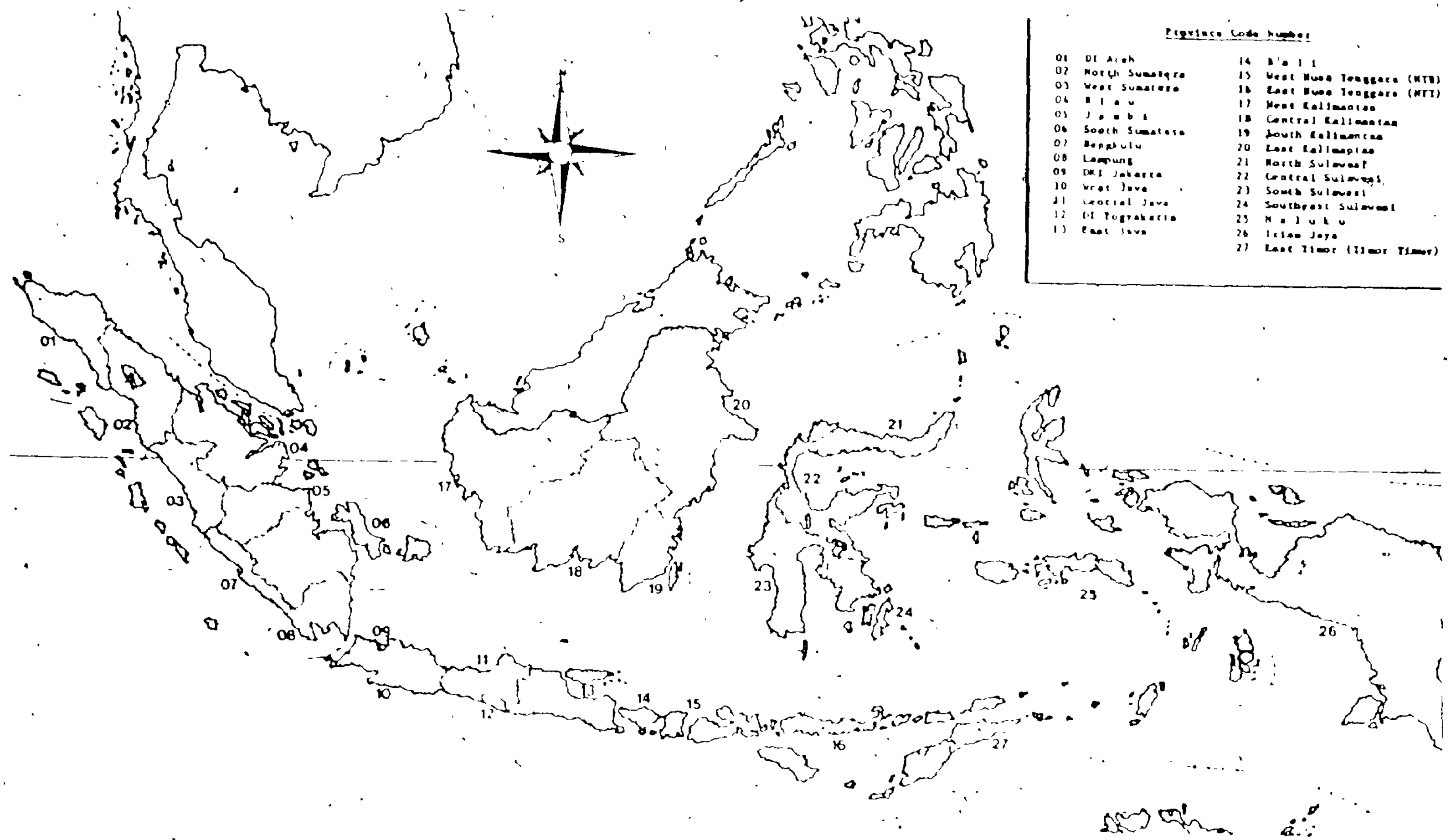

Table 3.2.1 Distribution of Land and Population among the Islands of Indonesia, 1980

Island	Percent of Total Land	Percent of Total Population	Density of Population (per sq. km)
Java (Incl. Madura)	6.9	61.9	690
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Irian Jaya	22.2	.8	3
Other	7.9	4.9	50
Total	100.0	100.0	77
Total Population: 147,490,000			

Source: BPS, 1982 (16), CBS - UNICEF, 1984 (25).

total land area, is inhabited by 62 percent of the population. With an average density of 690 persons per square kilometer, Java is among the most densely populated areas in the world. On the average, the population density of Indonesia is about 77 persons per square kilometer.

The population of Indonesia is of "young" age composition (see Table 3.2.2). Forty-one percent were under 15 years of age and 35 percent of these were under five years of age. The median age of the total population was only 18.2 years.

The population is also distributed unevenly between rural and urban areas, with a strong tendency toward urbanization. Eighty-three percent of the population lived in rural areas in 1971 (155) and this figure was reduced to 77.6 percent in 1980 (16). The majority of the population, however, is still settled in the rural areas.

The chief characteristics of the Indonesian population are, therefore, a young-age population, mostly living in rural areas, 62 percent of which inhabit Java Island.

3.3 Health Status and Health Facilities

To assess the health status of any given country, W.H.O. introduced two types of indicators--those that measure the health status and related quality of life, and those that measure the provision of health care (161). The basic health indicators and the health status indicators of Indonesia in comparison with those from neighboring countries are presented in this section. The mortality and morbidity patterns of the under-five children in Indonesia are discussed to outline the dimensions of the health problem. Coverage of the immunization program in Indonesia is analyzed to obtain

Table 3.2.2 Age Distribution of the Population, Indonesia, 1980

Age	Number ('000)	Percentage
0- 4	21,190	14.4
5- 9	21,232	14.4
10-14	17,619	12.0
15-19	15,283	10.4
20-24	13,002	8.8
25-34	19,511	13.2
35-44	15,970	10.8
45-54	11,560	7.8
55-64	6,619	4.5
65+	4,770	3.2
Unknown	734	0.5
All Ages	147,490	100.0

Source: CBS - UNICEF, 1984 (25).

information on the utilization of preventive measures provided by the government. Health facilities in Indonesia and their utilization will be discussed briefly at the end of this section.

Infant Mortality is one of the important indicators of child welfare because it synthesizes the health and nutritional status of children, the availability, utilization, effectiveness and efficiency of health care, the economic level of the average household and the parents' level of education (25, 148). The IMR (infant mortality rate) of Indonesia fell from 110 per 1,000 live births in 1976 to 98 per 1,000 live births in 1980, indicating that the health situation of Indonesia has improved. While the IMR of 98 in 1980 is considerably lower than those in Indian sub continent countries (Bangladesh, India and Nepal) (see Table 3.3.1), it is still higher than the level achieved in other ASEAN countries (Association of South East Asia Nations).

The child mortality rate (CMR) reflects the quality and the quantity of health care, environmental factors, the poverty level and the socio-economic development of the community that affect the health of the child. While the IMR in Indonesia was two to four times higher than those in Malaysia, Thailand and the Philippines, the CMR was three to six times higher. This indicates that there is much room for improvement in the health and welfare of the under-five children in Indonesia. As is known, the majority of deaths among children aged one to four years can be prevented. The interventions that should be introduced to minimize deaths in this age group are those that relate to nutrition, sanitation, communicable diseases and accidents occuring in and around the home; besides the improvement of general socio-economic conditions of the population.

Table 3.3.1 Health Status of the Population in Selected Countries

Country	IMR 1982	CMR 1982	LEB 1982	Percentage of Children Under Five Suffering from Severe Malnutrition 1975-1981
Nepal	150	33	46	7
Bangladesh	130	19	48	21
India	120	11	52	5
Indonesia	98*	13	52	3
Malaysia	29	2	67	+
Thailand	55	4	63	2
Philippines	55	4	64	3

*: 1980
+: Not Available
IMR: Infant Mortality Rate
CMR: Child Mortality Rate
LEB: Life Expectancy at Birth

Source: UNICEF, 1985 (150).

Life expectancy at birth (LEB) is defined as the age a newborn can expect to reach under the mortality pattern prevalent in the community or country. This factor is considered a general indicator of the level of health of a population. To improve life expectancy at a given age, the age-specific mortality rate at and beyond that age should be analyzed and the major causes of death should be overcome. Indonesia has an LEB 9 to 15 years shorter than those in Thailand, the Philippines and Malaysia due mainly to the greater number of deaths in under-five children.

Nutritional deficiency was identified as a major contribution to the death of under-five children. Severely malnourished children experienced about a three-fold higher rate of mortality in comparison to their better nourished counterparts (27). Thirty percent of Indonesian under-five children are estimated to suffer from some degree of protein-energy malnutrition, of which three percent are classified as severe. This figure is not much above those in Thailand and the Philippines. However, with a large population scattered over a wide area, Indonesia faces complex challenges in reducing this problem. Growth monitoring programs in the community could help mothers prevent most child malnutrition before it begins, even recognizing the fact that socio-economic development must be considered when dealing with this problem.

Even though the health status of the Indonesian population is better than that in Indian sub continent countries, it is still worse than that in the ASEAN countries.

The under-five children are the most vulnerable human beings. They suffer from poor environmental and socio-economic conditions and the values and habits of the society in which they live. To strengthen the national characteristics of future generations, it is imperative that this age group should be treated as a priority in the national health and welfare system.

In 1980, approximately 4.9 million Indonesians were born and 1.7 million died. More than half of all deaths occured in children under the age of 15 and 90 percent of these children were under five. In the Indonesian Household Health Survey, in 1980, it was found that 11.48 percent of the surveyed population had been ill during the previous months and more than one-fifth of these illnesses occured among under-five children. Within this age group, influenza/pneumonia, acute respiratory infections and diarrhea accounted for 55 percent of the total illnesses (see Table 3.3.2). The age specific morbidity rates, which give information about the extent to which the illnesses were distributed in under-five children are presented in Table 3.3.3. Children aged 1-4 years have almost twice the chance of suffering from chronic respiratory diseases than those in the first year of life. Influenza/pneumonia, acute respiratory infections, diarrhea and measles occurred with equal frequency in each group but with different magnitudes. The measles morbidity rate was about 7 per 1,000 children in both the infant and child aged groups, whereas the influenza/pneumonia morbidity rate was about 50 per 1,000 in children. But influenza/pneumonia occurred almost 7 times more often than measles.

Rohde and Sadjimin (112), based on a two-week recall period, have shown that the incidence of diarrhea among under-five children was 370 episodes per 100 children per year. Whereas Budiarso (22),

Table 3.3.2 Distribution of Five Major Diseases in Children (0-4 Yrs.), Indonesia, 1980

Disease	Percent of Total Illness Infant (< 1 Yr.) n=615	Child (1-4 Yrs.) n=2,563	Total (0-4 Yrs.)
Influenza/ Pneumonia	33.17	25.01	26.59
Acute Respiratory Infections	14.64	14.20	14.29
Dysentery Diarrhea Diseases	15.61	14.00	14.32
Skin Infections	12.20	13.46	13.22
Chronic Respiratory Diseases	3.25	4.88	4.56
Measles	4.71	3.75	3.93
Others	16.42	24.7	23.09
Total	100.00	100.00	100.00

n = Number of Sick Children According to Age

Source: Budiarso, 1980 (22)

Table 3.3.3 Age Specific Morbidity Rates (per 1,000 Population) for Major Diseases and Groups of Diseases, Indonesia, 1980

	Infant (<1 Yr.)	Child (1-4 Yrs.)	Total (0-4 Yrs.)
Influenza/Pneumonia	52.6	43.6	49.5
Other Acute Respiratory Infections	23.2	27.6	26.6
Dysentery/Diarrhea Diseases	24.8	27.2	26.7
Skin Infections	19.3	26.2	24.6
Chronic Respiratory Diseases	5.2	9.5	8.5
Measles	7.5	7.3	7.3

Source: Budiarso, 1980 (22)

based on a one month recall period, found 455 episodes of diarrhea among 17,067 under-five children. The incidence of diarrhea in this age group, therefore, was estimated to be 32 episodes per 100 children per year for the same time period as found by Rohde and Sadjimin (112). The problem of recall by the respondent, seasonal variation and the environmental conditions of the subjects may explain the discrepancy between the results of the two studies. Diarrhea was the most common cause of death in children aged 1-4 years, accounting for 34 percent of the total deaths in this age group (see Table 3.3.4). When combined with deaths from influenza/pneumonia, diarrhea accounted for 50 percent of all mortality, which demonstrates the magnitude of the problem created by these two illnesses. It can be stated that one-fifth of all deaths in infants was due to tetanus, 88 percent of which occurred in the neonatal period (25).

There are two peak mortality periods in countries with a high level of childhood mortality (25). The first occurs during the neonatal period, and the second during the weaning period, usually between the ages of one and two years. The major causal factors in the first mortality peak are tetanus neonatorum, followed by birth injuries and other perinatal causes. Malnutrition, along with dehydration due to diarrhea, and respiratory infections are believed to be the major causes of the second peak of mortality.

Intervention measures to prevent most of these early childhood diseases could achieve a very substantial improvement in the health status of the population.

Indonesia launched its first vaccination program in 1856 in an attempt to control smallpox (141). With the eradication of smallpox

Table 3.3.4 The Proportionate Mortality Rate from Major Diseases in Children Under Five, Indonesia, 1980

	Age Group (Year)		
	< 1 N = 253	1-4 N = 160	0-4 N = 413
Diarrhea	23.3	34.4	27.6
Influenza/Pneumonia	22.1	28.2	24.2
Tetanus	20.2	2.5	13.3
Meningitis	7.5	13.8	9.9
Birth Injuries and other Perinatal	9.1	-	5.6
Other	17.8	21.1	19.4
	100.0	100.0	100.0

N = Number of deaths reviewed

Source: Budiarso, 1980 (22)

from Indonesia in 1972, it was decided that BCG immunization be given to all children under 15 years of age together with the first dose of DPT immunization.

Following the WHO's Expanded Program on Immunization (EPI), Indonesia implemented its EPI in 1976/1977 in 1.5 percent of all subdistricts, and this increased to 46.8 percent in 1980 (53). An 80 percent coverage was anticipated in 1984 (58).

Immunization procedures are being implemented through a static component (the health centre) and a mobile component (the vaccination team going out to villages). The static component relies on the integrated work of the health centre's staff and the capacity of the health centre's medical officers. Target populations are immunized during sessions organized once or twice a week. As expected, the utilization of this component is relatively poor; 20 percent of the immunizations given are performed at the health centre. The second component, the mobile one, relies on vaccinators, midwives and nurses from the health centre's side and the village leaders from the community side. One "collection point" in every village has been established in an attempt to eliminate the problems of distance and socio-cultural level. Villages are notified in advance of the date and place of the immunization session and each collection point is visited every three months.

Every immunization shot given in the study area is recorded twice. Once on the health centre's immunization record, which is kept by the vaccinator, and again on the child's weighing card, which is kept by the family.

The Indonesian Expanded Program on Immunization carried out two childhood immunization schedules, (a) basic and (b) extended schedule (see Table 3.3.5). The extended schedule is to accommodate the field trial of the third dose of DPT and polio vaccine, whereas measles immunization is conducted in a more limited area. The immunization schedule in Indonesia is presented in Table 3.3.5.

In 1980, an immunization coverage assessment was carried out for the EPI program in Indonesia (53) (see Table 3.3.6). The country was divided into 5 areas and a set of 30 clusters was assessed in each area. Only BCG and DPT are included in this analysis for comparative purposes. The vaccination coverage in Jakarta was under-estimated compared to the other areas, since only 8 clusters out of 30 clusters surveyed in Jakarta were included in the EPI program, whereas in the other areas all the 30 clusters were covered by EPI programs.

The results of the survey showed that BCG immunization coverage was in the range of 60 to 90 percent and DPT_2 in the range of 41 to 69 percent (excluding Jakarta). To achieve the planned 80 percent coverage of the immunization program, a better method of implementing the EPI program in Indonesia should have been thought out.

The current health infra-structure of Indonesia is identified by the community health centre (health centre), which is intended to serve as the focal point of all health-related activities and to be the institution of first resort for health promotion, illness prevention, treatment and rehabilitation, practiced in an integrated manner. Beginning in 1974 polyclinics and maternal and child health centres

Table 3.3.5 Vaccination Schedule in Indonesia

	Vaccines	Dose	Age
BASIC	BCG*	2 injections	3-14 months 6-7 years
	DPT+	2 injections	3-14 months
	TT	2 injections	3-8 months of pregnancy
		1 injection (Booster)	every 3 years
EXTENDED	BCG*	2 injections	3-11 months 6-7 years
	DPT+	3 injections	3-14 months
	DT‡	1 injection	6-7 years
	Antipolio	3 OPV	3-14 months
	Measles	1 injection	6-12 months
	TT	2 injections	3-8 months of pregnancy
		1 injection (Booster)	every 3 years

*BCG = Anti-Tuberculosis Vaccine
+DPT = Diphtheria, Pertussis and Tetanus Vaccines
‡DT = Diphtheria and Tetanus Vaccines
TT = Tetanus Toxoid

Table 3.3.6 Vaccination Coverage
Indonesia, 1980

Area	Sample Size	Percent Receiving Specific Dose BCG	DPT_1	DPT_2
Jakarta	210	42.8	29.5	23.8
West Java	210	60.0	60.0	45.2
Central Java and Yogyakarta	210	91.4	75.7	69.0
East Java and Bali	210	65.4	71.6	52.6
Province Outside Java	210	62.9	57.6	41.3

Source: Foster, 1981 (53)

were merged with the health centre as one of its satellite sub-centres.

The area of responsibility of one health centre for the provision of health care is a sub-district or a population of up to 30,000. However, a number of health centres still have to serve populations of up to 50,000.

A health centre is supposed to be directed by a medical officer and is staffed by a part-time dentist (one dentist serving five health centres), a mid-wife, a nurse, a sanitarian and other trained workers. Yet, not all health centres have a doctor and only 60 percent of them have adequate support staff (27). By the end of 1984 there were more than 5,250 health centres in Indonesia--at least one in each of the nations 3,517 sub-districts--in addition to approximately 13,500 sub-centres.

Table 3.3.7 shows the distribution of health resources in Indonesia compared to figures from neighboring countries. The ratio of population to physicians in Indonesia was the highest. The uneven distribution of physicians, most of whom are clustered in the big cities, makes this ratio worse for remote areas, especially outside Java. Although the ratio of populatron to nurse and the distribution of nurses across the country is better than the physicians, the situation in Indonesia is still worse than that in Malaysia, the Philippines and Thailand.

In order to better serve the population of Indonesia as a whole, good health manpower management with acceptable quality productivity is required. It is now compulsory for all new graduate physicians in Indonesia to spend up to 5 years in a government position, mostly at

Table 3.3.7 Distribution of Health Facilities in Some Asian Countries

Year	Indonesia* 1982	India 1981	Bangladesh 1982	Malaysia 1978	Philippines 1978	Thailand 1981
Physicians	16,00	268,700	12,789	2,789	49,110	6,931
Population per physicians	9,657	2,546	7,228	3,768$	932	6,951
Nurses	40,616	113,455+	4,500	22,500	94,411	37,942
Population per Nurses	3,804	5,685	20,457	478	485	1,270
Population per beds	1,502	1,254+	6,595**	357	670**	734

Source : United Nations (149)

* Ref 138
\+ Ref 148
** 1979
$ 1977

the health centres.

In spite of the availability of facilities and services to combat the major health problems, the health care delivery system in Indonesia remains greatly under-utilized. The out-patient load in health centres ranges from 14 to 63 persons per day which is 60 percent below target.

Table 3.3.8 shows the utilization of the health resources by those who were ill in the last seven days of the survey (22). It shows that 26 percent of the population surveyed who were ill did not seek medical care at all and only 23 percent went to the hospital, health centre or sub-health centres. Twenty six percent of the population used self medication and the rest sought help from the private sector or from traditional healers. Further, it was observed that 80 percent of the health centre attendance was from the 60 percent middle and upper household economic class (25).

These figures demonstrate the magnitude of the problem of the low usage of the health delivery system in Indonesia. A serious policy to fill the gap in manpower by introducing a less highly-trained type of worker into the existing health delivery system has been initiated in several provinces in Indonesia.

3.4 Yogyakarta Special Territory

Yogyakarta Special Territory (Yogyakarta) is a relatively small province located in the central-south part of Java Island. This province consists of four regencies (Sleman, Bantul, Gunung Kidul and Kulon Progo) and one municipality (Yogyakarta municipality), with a total of seventy three subdistricts. The population in 1980 was 2.76 million, and 63 percent of the activity was agricultural. All the

Table 3.3.8 Utilization of Health Resources by those who were Ill in the Last Seven Days, Indonesia, 1980

Health Resources	Percent of Cases
Not Treated	26.2
Treated at Hospital	4.9
Treated at Health Centre or Sub-Health Centre	17.9
Treated at Private Sector (Doctor, Nurse, Mid-Wife)	20.5
Treated by Traditional Healer	4.4
Self-Medication	25.7
Others	.4
	100.0

N = 13,840

Source: Budiarso (22)

villages in the province are accessible via paved roads by vehicle all the year round. Telephone communication is available up to sub-district level.

In 1974, the Faculty of Medicine, the University of Gadjah Mada launched a Community Medicine Education Program for undergraduate medical students. The surrounding community and its health service system are used as a laboratory for the program. This creates a good relationship between the Faculty of Medicine and the local health service system in this province.

Two out of the four regencies, Gunung Kidul and Kulon Progo, which are most in need of assistance in development, were chosen to receive a Village Health Worker Scheme (VHW) attached to the existing primary health care system. It was proposed that the program would be implemented first in 13 out of 25 sub-districts in these two regencies. Due to one or another reason, the program has been implemented in all 25 subdistricts. This has affected the original design of this study, which was intended to be a comparison of subdistricts with and without a village health worker.

A group from the Community Medicine Program at the Faculty of Medicine, the University of Gadjah Mada, in collaboration with the Provincial Health Office (in future called the provincial team in this thesis), is responsible for the planning, monitoring and evaluation of the VHW program. The selection, training and follow-up of the VHW are the responsibility of the subdistrict office and the health centre.

The proposed procedure and management of the program was as follows:

The procedure for selection of VHW was supposed to be done by using a socio-metric method. Every household in the hamlet, 50-100 households, selected three candidates from community members to be trained as a VHW to serve his/her own hamlet; candidates to be approved by the subdistrict office. Finally, only one VHW would be selected for each hamlet.

The criteria of the candidate for VHW are as follows:

1. A resident of the hamlet
2. Age 20 years or more
3. Education: Minimal primary school
4. Willingness to participate in the program.

The health centre personnel were trained by the provincial team in the implementation and monitoring of the VHW program, and the use of VHW manuals. Further, they trained the VHW at the village level. The proposed basic training consisted of 104 hours of lectures and practice which would then be supplemented by a 4-hour monthly session. Training started in 1981.

The content of the VHW training program is as follows:

1. The health services provided by health centres
2. The objectives of the Comprehensive Community Development Program
3. Identification of health problems in the community
4. Simple methods of health education/communication
5. The diagnosis of common illnesses, drug doses and referral systems
6. The Family Planning Program
7. The Nutrition Surveillance Program for children under five
8. Antenatal care

9. Basic schedule of Expanded Program on Immunization
10. Communicable disease recognition: tuberculosis, dengue hemorrhagic fever/deugue fever, measles, pertussis, tetanus, malaria, cholera, food poisoning and poliomyelitis
11. The reporting and recording system for the health centre.

At the conclusion of the training the VHW is supposed to be able:

1. To actively participate in the village development committee's activities in the village
2. To give information on the health status of the population, hamlet level, to the village committee
3. To report on his/her activities to the village committee
4. To give information on the incoming health program in the village to mothers individually or as a group on the Family Welfare and Education Movement at the village level
5. To support the health centre's activities in the village
6. To provide a service for simple treatment of common illnesses to the entire population in the hamlet and refer cases to the health centre or the hospital when necessary
7. To support and participate in the family planning and nutrition surveillance program in the village
8. To motivate pregnant mothers to have good antenatal care and tetanus toxoid vaccination
9. To motivate parents to bring their infant for vaccinations

10. To motivate families to have a healthy excreta disposal, safe water supply and practise personal hygiene

11. To do routine reporting and recording of their activities to the health centre.

CHAPTER IV

LITERATURE REVIEW

4.1 Introduction

Research reports dealing with the following two topics are relevant to the present study; child health care and the village health worker. There are five separate areas in child health care to be discussed in this chapter. First, epidemiologic studies in maternal knowledge related to childhood diarrhea. This topic will be discussed in sub-section 4.2.2. An overview of research assessing the level of utilization of immunization programs will be presented in sub-section 4.2.3 and studies on the management of diarrhea, febrile illnesses and cough in childhood will be presented in the next three sub-sections, 4.2.4, 4.2.5, and 4.2.6, respectively.

Two major sub-sections will be presented in section 4.3 dealing with the topic of the village health worker; the management of village health workers and the evaluation of programs that are utilizing the village health worker as its equivalent.

4.2 Child Health Care

The promotion of child health care, especially for the under-five children, shall be done through the parents, since parents determine the life style of the children (protection from infectious diseases) and the use of the health care system for the children (take a sick child to either health care system available).

4.2.1 Introduction

Diarrhea is a leading cause of illness and death among young children in developing countries (129). The role of the village health worker who deals with diarrhea in the community is to promote good parental health practices (the behavioural patterns of the parents) in response to childhood diarrhea. Studies that deal with maternal knowledge of childhood diarrhea will be included in this review.

The success of a community vaccination program depends on the efficacy of the vaccine used and on its utilization by the target population (98). It is not the aim of this section to offer a review of the literature on the efficacy of the vaccine.

The role of the VHW in preventive measures, however, is to increase the use of the immunization program by the target population. Therefore, the goal of this section is to present a number of techniques that have been applied to increase coverage by the immunization program.

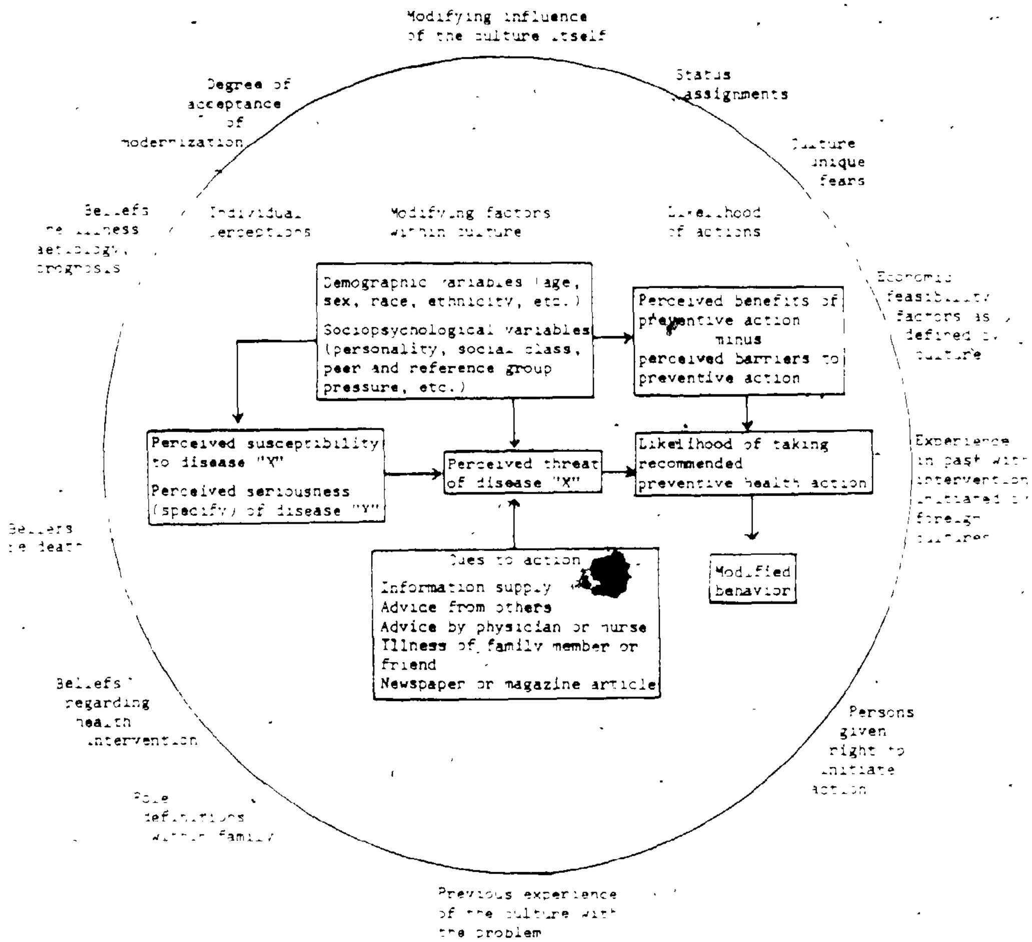
The village health worker has the ability to provide a curative service for common illnesses to the population with standard medications that are provided by the health centre at a very low cost. Studies that deal with the process and/or the outcome of diarrhea, febrile and cough illnesses and cough in childhood will be discussed in this section. The emphasis of the analysis in this section will be on the design of the study, the study population, the explanatory variables, the outcome and the clinical and statistical analysis of the study.

4.2.2 Maternal Knowledge of Childhood Diarrhea

Diarrhea and accompanying dehydration constitute a major threat to the life and health of children 0 to 5 years in most developing countries. In attempting to reduce the magnitude of problems created by diarrhea illnesses in childhood many interventions have been introduced and studied. Three categories of intervention are known in dealing with diarrhea: the reduction in the number of episodes of diarrhea (19, 50, 101, 110, 165); to overcome the impact of diarrhea on the health status of the child (37, 66, 109); and to reduce mortality associated with diarrhea illnesses (99, 104).

Isely (71) pointed out that diarrhea is harmful in two ways: dehydration and malnutrition. The effects of diarrhea on the health of the child are determined by the child's physical condition prior to the diarrhea attack and the maternal response to childhood diarrhea. Examples of physical conditions which may affect the prognosis of diarrhea are: birth weight, nutritional status, feeding practices and frequency of other contracted illnesses. Maternal behavioural patterns that may affect the prognosis of diarrhea are those that are explained in illness behaviour of the health belief model (76) and some additional factors that are described by Isely (71), see Figure 4.1. However, of all factors described in the model, only mother's beliefs about illness etiology, prognosis and treatment of diarrhea were actually studied. It is imperative to recognize that the most important immediate change needed to reduce the morbidity and mortality of children from diarrhea is in the behaviour of the people in the use of oral rehydration solution (ORS). Change in socio-economic and hygienic conditions, which are as important as ORS, will

Figure 4.1 An Adaptation of the Original Belief Model to a Traditional Culture (71)



need more time to be put into effect. Table 4.2.1 presents the studies on behavioural patterns of mothers on childhood diarrhea reviewed in this section.

The definition of diarrhea, adopted in two studies (48, 118), dealt with the consistency, content and color of the stools, whereas subjective frequency of passage stool was used in Sahid (118). The definition of diarrhea given by most scientific health workers, however, is simpler, i.e. three or more abnormally loose or watery stools in a twenty four hour period (90, 112, 117, 120, 170).

The perceived etiology of diarrhea by mothers varies among the studies under review. De Zoysa et al. (170) classified the causes of diarrhea into 6 categories, i.e. polluted water, dietary causes, life event milestones, climate, social or spiritual environment. The polluted environment was most often mentioned by members of the household as the cause of diarrhea, whereas teething, as the perceived cause of diarrhea, was found to have a strong relationship to the age of the child. Escobar et al. (48) found that exposure to 'cold' conditions or ingestion of foods designated as 'cold' are perceived by 46 percent of mothers as the cause of diarrhea in childhood. Seventy percent of those with a lower level of education perceived 'cold' as the cause of diarrhea, in contrast to 19 percent of those with a higher level of education.

Two other studies from Indonesia (118, 156) found similar maternal perceptions of the etiology of diarrhea. Causes of diarrhea as perceived by mothers in these two studies were dietary causes, environmental conditions, weather, helminths, gastro-enteritis, masuk angin (common cold), improved intelligence and others. "Masuk angin"

TABLE 4.2.1. Studies on the Behavioural Pattern of Childhood Diarrhea

Country/ Reference	Study Design	Subject	N	Behaviour Factor Measured	Analysis	
Cali, Columbia 15	Cross - Sectional	Mothers of children 0-4 years old	861	Etiology of Diarrhea	$p > 0.05$	Relationship with diarrhea period prevalence rates for children under five for a two-week period
				Health resources in case of diarrhea	$p < 0.05$	
				Home treatment	$p < 0.01$	
				Mother's age	$p < 0.01$	
				Mother's education	$p < 0.05$	
				Mother's marital status	$p < 0.05$	
				Mother's birth place	$p < 0.05$	
				House appearance	$p < 0.01$	
				Floor of house	$p < 0.05$	
				Type of water service	$p < 0.01$	
			583	Perceived malnutrition	$+(p < 0.01)$	At least one child 0-4 years old in the family had diarrhea in the preceding two weeks
				Mother's age	$-(p < 0.01)$	
				Mother's birth place	$+(p > 0.05)$	
				Mother's general knowledge of diarrhea	$-(p < 0.05)$	
				House appearance	$-(p > 0.05)$	

TABLE 4.2.1. (Cont'd) Studies on the Behavioural Pattern of Childhood Diarrhea

Country/ Reference	Study Design	Subject	N	Behaviour Factor Measured	Analysis
Lima, Peru 48	Cross - Sectional	Mothers of diarrhea cases	91	Definition of diarrhea Etiology of diarrhea Prognosis of diarrhea	Descriptive
		Mothers of "healthy" small children	25	Health resources in case of diarrhea Medication of diarrhea Feeding during diarrhea	
		Adolescent girls and young women	23	Definition of rehydration	
Semaraug, Indonesia 118	Case Control	Mothers of diarrhea cases at MCH clinic vs	100	Definition of diarrhea Etiology of diarrhea Prognosis of diarrhea	No statistically significant relationship between groups and any item
		Mothers of diarrhea at OPD Hospital vs	100	Health resources in case of diarrhea Medication of diarrhea	
		Mothers of non-diarrhea cases at OPD Hospital	100	Source of information on medication of diarrhea Feeding during diarrhea Knowledge on ORS	

TABLE 4.2.1. (Cont'd) Studies on the Behavioural Pattern of Childhood Diarrhea

Country/ Reference	Study Design	Subject	N	Behaviour Factor Measured	Analysis
Medan, Indonesia 121	Cross - Sectional	Mothers of diarrhea cases	285	Knowledge on ORS Source of Information on ORS Resource of ORS Result on ORS	Descriptive
Palembang, Indonesia 156	Cross - Sectional	Mothers	1200	Health resources used for diarrhea Etiology of diarrhea Prognosis of diarrhea Medication of diarrhea Feeding during diarrhea	
Zimbabwe 170	Cross - Sectional	Household	367	Etiology of diarrhea	Age of the child and etiology of diarrhea $(p<0.001)$
				Action taken in case of diarrhea	Relationship between no remedial action with access to health service $(p<0.01)$ Etiology of diarrhea with health resources $(p<0.05)$

or common cold and improved intelligence as perceived causes of diarrhea were not observed by Bertrand et al. (15), Escobar et al. (48) or de Zoysa (170). An improvement in the intelligence of child, however, should be considered the result of diarrhea rather than the etiology, because the intelligence of the child is believed to improve after an episode of diarrhea.

These findings indicate that the indigenous beliefs system about diarrhea show that it is not always as an infectious phenomenon.

The child's loss of weight and dehydration, either alone or in combination, were the most important effects of diarrhea perceived by mothers in Lima, Peru (48). This is similar to the findings of Sahid et al. (118) in Indonesia. Widagdo et al. (156) found that weakness and thirst, as the first signs of dehydration, were the most common results of diarrhea as perceived by mothers.

The studies under review found that 24 percent to 55 percent of mothers interviewed felt that diarrhea needed medical attention, but self medication was preferred by 38 percent to 62 percent of mothers. The traditional healer was thought of as the first resource in the care of diarrhea by 0.4 percent to 7 percent of the respondents.

Widagdo et al. (156) classified home remedies for diarrhea into four categories, i.e. medication, fluids, herbs and others. Among the medication group, entero-vioform was most often chosen to treat diarrhea (118, 156). Tea with or without sugar was named as the first home treatment for diarrhea by 14 percent to 36 percent of mothers (48, 118, 156). Oral rehydration solution (ORS) was selected by about 10 percent of the mothers as the first choice for diarrhea treatment (118, 156). Saragih et al. (121) found that 54 percent of the respondents had at some time used oral rehydration solution for diarrhea. The relationship between the use of ORS and the level of education of parents was small and was not statistically significant. Sixty four percent of the information regarding ORS was obtained from physicians and 17 percent from friends and relatives (121).

The use of home remedies and health services may not be mutually exclusive and a common pattern is the concurrent serial use of both systems. The first selected system, however, is believed to be a function of individual behaviour when faced with a specific health problem.

Bertrand and Walmus (15) examined the relationship between maternal factors and the occurrence of diarrhea among the children. A two-week recall was used to measure the episodes of diarrhea. They found, using logistic regression analysis, that maternal perceived malnutrition of the child showed a significantly positive relationship with the occurrence of diarrhea, whereas age of mother, environmental conditions and mother's general knowledge of diarrhea showed a negative relationship with the episodes of diarrhea in children.

Maternal demand for health services and the readiness of mothers to act in the case of diarrhea are more the function of perception of severity of diarrhea. As explained by Kirscht (76), in illness behaviour in the health belief model, a complex judgement of the perceived severity of a given hypothetical symptom affected the readiness of self-referral of cases to the various health resources, and the choice of method of self-care. The action taken as the result of both perceived severity and perceived susceptibility in illness behaviour can not be separated.

4.2.3 Childhood Immunization

The immunization program has two arms: (a) the containment or eradication of the disease, and (b) the selection of appropriate vaccination (98).

The indications for the selection of appropriate vaccinations, which include the purpose of travel, occupational risk, containment of a disease outbreak, and others, are beyond the scope of this study and, therefore, will not be discussed in this section.

The aim of the Expanded Program on Immunization is to reduce morbidity and mortality from six diseases that can be prevented by immunization (56, 61). Routine immunization for children includes BCG, DPT, measles and poliomyelitis vaccines. However, the basic procedure of the EPI in Indonesia offers only BCG and DPT (2 doses) to children aged 3-14 months.

Parents' compliance with immunization programmes offered to their children is affected by several factors:

1. The social factors of the subject (55, 114). These factors included socio-demographic characteristics, social pressure, geographic location, etc.
2. The personal readiness factors include the motives, attitudes, and beliefs of parents which affect their willingness to take voluntary action with regard to their health (11, 77, 107, 114). There are three components of a parent's readiness to take the action to immunize his/her child namely: perceived susceptibility to and seriousness of a disease, and perceived safety and effectiveness of the vaccine. These components are derived from the Health Belief Model (11, 71)

3. Maternal attitudes and motivational patterns include procrastination apathy, laziness and the like (29). Neither of these items define a dynamic process of action taken or suggest ways for the health providers to overcome the problems (114)
4. Communication to inform and persuade the target population to participate in the immunization program should be considered from both the consumers and the providers point of view (63)
5. Administration and management of the program should be analysed at all managerial levels to obtain the optimal attendance of the immunization program

Studies that endeavour to examine factors which affected vaccination use by the target population are presented on Table 4.2.2. The completeness of immunization varies in the studies under review (28, 55, 73, 74, 85, 94, 103, 115, 168). Two studies measured the immediate action taken by the subject (parent) (87, 168) and one study examined the readiness of parents to take action by consenting to participate in a vaccine trial (29).

There are several methods of measuring the immunization status of children. The most reliable evidence of the immunization status of the child is BCG and smallpox vaccination scars (12, 62). Two studies (59, 85) used parent recall to measure the immunization status of the children, and three studies (28, 55, 103) used both parent recall and medical certification of vaccination. The problem of inaccurate recall of the type and occurrence of immunization, e.g. the problem of a mix-up between the injection for DPT vaccination and the regular medication injection, should be considered if the history given by the parents is used to assess the immunization status of the children.

TABLE 4.2.2. Studies on Factors Affecting Compliance with Childhood Immunization

Country/ Ref.No.	Subjects	N	Outcome	Measurement	Variables	Intervention	Result Clinical	Result Statistical
Ghana 12	0-4 yrs.	787	BCG/Smallpox vaccination	Vaccination scars	Distance (mile)	0-1 1-3	87% 68%	$p<0.001$
United States 29	Mothers	175	Consent to participate in polio vaccine trial (% of consent)	Letter of consent	Maternal education	Less than high school	21%	$p<0.001$
						High school and more	79%	
					Discussed with others	Discussed Not Discussed	72% 28%	$p<0.001$
					Perceived on vaccine safety	Yes No	82% 12%	$p<0.001$

TABLE 4.2.2. (cont'd) Studies on Factors Affecting Compliance with Childhood Immunization

Country/ Ref.No.	Subjects	N	Outcome	Measurement	Variables Intervention	Result Clinical		Statistical
Australia 28	1-9yrs.	93	Adequately immunized- DPT, D-T, OPV (%of adequately immunized)	History of immunization + confirmed by GP or council	Providers of immunization	Council and GP	6%	$p>0.05$
						Council only or GP only	29%	
					Parental knowledge	Greatest under-standing	19%	$p>0.05$
						Others	25%	
					Source of informat-ion on need for immuniz-ation	Common knowledge	31%	$p>0.05$
						From others*	25%	

TABLE 4.2.2.(cont'd.) Studies on Factors Affecting Compliance with Childhood Immunization

Country/ Ref.No.	Subjects	N	Outcome	Measurement	Variables Intervention	Result Clinical		Statistical
The Philippines 55	2months-5years	145	Completed 2 immunization (%completed)	Special record history	Visit "Hilot"+	Yes No	19% 44%	p<0.01
					Knowledge of diseases	Yes No	89% 75%	p<0.05
					Desire door-to door service	Yes No	72% 80%	p<0.02
					Time not convenient	Yes No	45% 68%	p<0.01
					No. of children in family	0-2 3+	32% 52%	p>0.05
					Mother's education	<6 years >6 years	31% 42%	p>0.05

TABLE 4.2.2. (cont'd) Studies on Factors Affecting Compliance with Childhood Immunization

Country/ Ref.No.	Subjects	N	Outcome	Measurement	Variables Intervention	Result Clinical		Statistical
					Parental partici- pation in community	Yes No	60% 33%	p<0.05
					Perceived the benefit of immuniz- ation	Yes No	41% 30%	p>0.05
United States 59	0-4 yrs	842	Polio im- munization one or more	History	Socio-econ- omic status	Upper Middle Lower	93% 93% 86%	p<0.01
					Perception of their friends expectation	Yes No	92% 80%	p<0.01

TABLE 4.2.2 (Cont'd)

Studies on Factors Affecting Compliance with Childhood Immunization

Country/ Ref. No.	Subjects	N	Outcome	Measurement	Variables/ Intervention		Result Clinical	Statistical
The United States 73	0-14 yrs.	-	Percent increase or decrease of completed immunization (percentage point)	Vaccination record from health dpt., physicians and school	State law on immunization of school children	DPT		
						<5 yrs.	+23%	N/A
						5-14 yrs.	+110%	
						D-T		N/A
						5-14 yrs.	+46%	
						Poliomyelitis		
						<5 yrs.	+43%	N/A
						5-14 yrs.	+142%	
						Measles		
						<5 yrs.	-23%	N/A
						5-14 yrs.	-53%	
						Rubella		
						<5 yrs.	+123%	N/A
						5-14 yrs.	+141%	

TABLE 4.2.2 (Cont'd)

Studies on Factors Affecting Compliance with Childhood Immunization

Country/ Ref. No.	Subjects	N	Outcome	Measurement	Variables/ Intervention		Result Clinical	Result Statistical
Manchester, U.K. 74	Preschool children	-	Proportion of live births completing basic course	Computerized immunization record	Domiciliary service for immunization defaulter	Before Service	78%	N/A
						After Service	81%	
The United States 85	2-year-old children	1003	Completed basic immunization (DPT, OPV, measles)	History	Paternal education (years)	<12	54.1%	p<0.001
						12	77.3%	
						13-15	81.7%	
						>16	91.2%	
					Maternal education (years)	<12	61.7%	p<0.02
						12	77.3%	
						13-15	83.3%	
						>16	83.3%	
					No. of siblings	0	79.1%	p<0.01
						1	73.7%	
						2	71.4%	
						3+	52.9%	

TABLE 4.2.2 (Cont'd)

Studies on Factors Affecting Compliance with Childhood Immunization

Country/ Ref. No.	Subjects	N	Outcome	Measurement	Variables/ Intervention		Result	
							Clinical	Statistical
The United States 87	4-month-old children	453	Started immunization by 4 months (% started immunization)	Health department and physicians record	Notice urging DPT and poliomyelitis immunization for 3-week-old infant	DPT		
						Sent notice	83%	$p>0.05$
						No notice	80%	
						Poliomyelitis		
						Sent notice	77%	$p>0.05$
						No notice	80%	
	8-month-old children	317	Started immunization by 8 months (% immunized against DPT and poliomyelitis)	-n-	Area of residence	Urban	94.5%	$p<0.01$
						Rural	81.4%	
					Family income	<\$3,000	79.6%	$p<0.01$
						>\$3,000	92.3%	
					Parity	1 child	95.8%	$p<0.01$
						2 children	86.7%	
						3 or more children	80.7%	

TABLE 4.2.2 (Cont'd)

Studies on Factors Affecting Compliance with Childhood Immunization

Country/ Ref. No.	Subjects	N	Outcome	Measurement	Variables/ Intervention		Result Clinical	Result Statistical
					Age of mother (years)	15-24 25-34 35-45	88.6% 87.4% 86.2%	$p>0.05$
					Maternal education (years)	0-9 10 or more	73.3% 92.2%	$p<0.01$
North Yorkshire 94	Children born Jan. 1, 1970 - Dec. 31, 1980	5338	Completed primary immunization against diphtheria, pertussis, tetanus and polio (% completed for individual vaccine)	Computerized record	Computer controlled system	Diptheria Computer Non Computer	 95.6% 88.5%	$p<0.001$
						Pertussis Computer Non Computer	 50.6% 50.0%	$p>0.05$
						Tetanus Computer Non Computer	 95.6% 88.5%	$p<0.001$

TABLE 4.2.2 (Cont'd)

Studies on Factors Affecting Compliance with Childhood Immunization

Country/ Ref. No.	Subjects	N	Outcome	Measurement	Variables/ Intervention	Result	Clinical	Statistical
						Polio-myelitis Computer	95.7%	$p<0.001$
						Non Computer	88.4%	
		7235	Booster immunization against diphtheria, tetanus and poliomyelitis (% boostered for individual vaccine)	-n-	-n-	Diphtheria Computer	88.3%	$p<0.001$
						Non Computer	69.4%	
						Tetanus Computer	88.3%	$p<0.001$
						Non Computer	69.4%	
						Polio-myelitis Computer	89.3%	$p<0.001$
						Non Computer	70.1%	

TABLE 4.2.2 (Cont'd)

Studies on Factors Affecting Compliance with Childhood Immunization

Country/ Ref. No.	Subjects	N	Outcome	Measurement	Variables/ Intervention		Result Clinical	Statistical
The United States ‡ 103	2-6 yrs.	Gen. pop.= 17295 thousand HMO= 380	Completed immunization against DPT, poliomyelitis, measles, rubella, mumps (% completed)	History + physicians chart	Children enrolled in HMO	DPT US Pop.§ HMO	 74.8% 84.9%	p<0.001
						Polio US Pop.§ HMO	 63.5% 80.9%	p<0.001
						Measles US Pop.§ HMO	 64.9% 81.3%	p<0.001
New Mexico U.S.A. ‡ 115	2-6 yrs.	94	Completed immunization against diphtheria, pertussis, tetanus, polio, measles, and rubella (% completed)	Official document	Perceived vulnera-bility to individual disease	Diphtheria Yes No	 56.5% 48.0%	p>0.05
						Pertussis Yes No	 56.0% 50.0%	p>0.05
						Tetanus Yes No	 58.8% 50.0%	p>0.05

TABLE 4.2.2 (Cont'd)

Studies on Factors Affecting Compliance with Childhood Immunization

Country/ Ref. No.	Subjects	N	Outcome	Measurement	Variables/ Intervention	Result Clinical	Result Statistical
					Polio		
					Yes	57.0%	p>0.05
					No	43.5%	
					Measles		
					Yes	55.2%	p>0.05
					No	42.9%	
115			Completed polio immunization (% completed)	-n-	Recall of poliomyelitis Yes	56.7%	p>0.05
					No	51.7%	
			Completed DPT, rubella, and polio immunization (% completed)		Ethnic group	N/A	p=0.32
					Mother's age	N/A	P=0.71
					Mother's education	N/A	p=0.21

TABLE 4.2.2 (Cont'd)

Studies on Factors Affecting Compliance with Childhood Immunization

Country/ Ref. No.	Subjects	N	Outcome	Measurement	Variables/ Intervention		Result Clinical	Result Statistical
The United States 168	6-month-old	211	Received vaccine (% took action)	Tracing	Reminder letter	Yes No	48.1% 32.3%	p=0.02
			Completed immunization 3 DPT injections and 2 OPV doses (% completed)			Yes No	34.9% 22.9%	p=0.06

* = Information from clinic/council, GP, hospital, media
\+ = Village women who act as midwives and specialist in sprains and paediatric problems
‡ = For the purpose of this section, only DPT, polio and measles immunization are analysed,
$ = Estimated number, based on data given in the article
N/A = Not available/not applicable where appropriate

Smith and Knox (128) stated that parents are not considered to be a good source of information of the child's immunization status. The immunization status of the child as assessed by vaccination certificate gives the most accurate picture. McBean et al. (88) observed that only of 51 percent of children susceptible to measles received measles vaccine, and of these only 40 percent showed seroconversion.

Pope (103) reported that children whose parents responded to questions about immunization were more likely to have immunizations noted in their charts. An attempt to generalize the result of such a study will overestimate the real figure in the population.

Records of the immunization facility were used to assess the immunization status of the children in three studies (73, 87, 115). However, Rawson et al. (106) and Smith et al. (128) found that there were significant discrepancies in the information on immunization status kept by different agencies involved in childhood immunization programs. Rawson et al. (106) examined the immunization records of 503 children who received 2,726 immunization procedures. The record of routine immunizations of each child may be found in two places. One is the file kept by the health authority and the other is the personal file kept by the patient's general practitioner. The study found that 73 percent of the records agreed upon the date of immunization, 29 percent upon the vaccine batch, and 40 to 90 percent upon the type of vaccine used (excluding pertussis for only one case).

Regarding factors that affected parents' compliance with immunization of their children, the studies reviewed in this section observed several results.

Most of the studies attempted to examine social and situational factors that influence the voluntary action of parents to immunize their children. It is worth noting that there was no consistency in statistical results on the relationship between these factors and the immunization status of the children.

Maternal education, which is believed to be the most important component of these factors, will be taken as an example. All studies of this factor found the same trends in the relationship between maternal education and the immunization status of the children; the higher the education of mothers, the higher the immunization status of the children (29, 55, 85, 115, 168). But only three studies (29, 55, 87) found that the relationship is statistically significant, and two studies (55, 115) found no statistical significance. Inadequate sample size and the level of education might account for the variation of study results.

Other components of the social and situational factors that are of interest from a health facility are distance, use of traditional resources for maternal and child health care, participation of parents in community programs, paternal education, economic status, and number of children in the family. All of these variables proved to have a significant relationship with the action taken to immunize the children.

A few studies examined the effect of the personal readiness factor on the immunization status of the children. The three basic components of this factor (114) were:

1. Perceived susceptibility i.e. the extent to which the parent believes that his/her child is susceptible to the specific disease

2. Perceived seriousness, i.e. the seriousness with which he regards the consequences of his/her child getting the disease, and
3. Belief about the safety and effectiveness of vaccination in reducing susceptibility and seriousness

Cummings et al. (32) found that the personal readiness factor influences the parent's intention to have a child immunized. Rosenblum et al. (115) reported that the relationship between perceived vulnerability to individual disease and the immunization status of the children was not statistically significant. It is important to note that the design of these two studies was different. The first study (32) collected data prospectively, whereas the second study (115) interviewed mothers at the same time as the child's immunization status was determined. It is understood that perceived vulnerability to individual disease, if measured before immunization, will explain the action taken for immunization (77, 114). However, if the criterion is measured after the immunization is given, the results of the measurement may be different. After immunization, the child's susceptibility to the disease will be reduced or eliminated if the vaccine is efficaceous. Therefore, the relationship between the perceived vulnerability of the child by the parents and immunization may change. Caution should be used when interpreting the study results.

Clausen et al. (29) showed that the correlation between perception of vaccine safety and the consent given by mothers to participate in the polio vaccine trial was statistically significant. But Friede et al. (55), in the Philippines, found that there was no statistically significant relationship between the perceived benefit of immunization and the immunization status of the children.

Maternal attitude and motivational patterns were reported as the causal factors in 27 percent of the non-immunized children, 88 percent of which was due to refusal by the child as reported by the mother (55). Adjaye (4) reported that 30 percent of the children who failed to receive measles vaccine were affected by maternal attitude, 19 percent of those 30 percent were caused by mothers forgetting to attend the clinic. Belcher et al. (12) found that 91 percent of the reasons given by mothers for nonattendance were related to factors such as lack of information (39 percent) and inability to attend the clinic owing to work committments (34 percent). The remaining 27 percent were due to maternal attitude and motivational factors, forgetfulness, late arrival at clinic, fear of mother, religious belief and others.

Friede et al. (55) reported that more of those who failed to complete the immunization program of children would have liked a door-to-door service, compared with those who completed the immunization programs and Jones (74) showed that immunization coverage could have been increased by providing a domiciliary service to the hard-to-reach population.

Communication is an important tool to persuade people to respond to the childhood immunization program. It must be coordinated with the planning and implementation of an immunization campaign. The most effective method of administering vaccines is by attracting people to immunization centres (63).

Clausen et al. (29) observed that those who discussed the polio trial with friends, nurses, physicians, or teachers more often gave consent to participation in the trial (72 percent) compared with those who did not discuss the trial (28 percent). Martin et al. (87) sent notices urging DPT and polio immunization when the child reached three weeks of age but the result of this study was not clinically nor statistically significant. Young et al. (168) were able to show that a reminder letter improved the immediate action taken for immunization by 49 percent and completed immunization by 52 percent. The long period between the time when the parents received the notice and the time the child should have received the vaccine and the already high use of immunization in the general population were factors that might have affected the result shown by Martin et al. (87). Thirty five percent of mothers who failed to attend the immunization clinics in the study by Belcher et al. (12) received no prior information about the program.

In many countries the immunization coverage is still less than optimal; one reason for this is the fact that, frequently, health workers present long lists of contra-indications to immunization (56). Nineteen percent of mothers refused measles vaccinations for their children because they were advised to do so by a member of the health profession (4). Good administration and management is the backbone of any successful program. One of the most important factors for the planners of an immunization program (especially those in the field) is to know the target population. Identification of the unimmunized and hardest-to-reach groups in the population is a crucial step in achieving the goals of the program (63).

Newman (94) demonstrated that the use of a computerized recording system significantly increased both the completeness of primary immunization (except for pertussis) and booster shots. Jones (74) used computerized immunization records to identify children who failed to receive immunization, and subsequently he made a home visit to immunize these children.

The enforcement of school immunization laws, which require parents to present certification that the child is adequately immunized at the time of initial entry to school, improved the immunization status of the target population (54, 73). Robbins et al. (108) compared the status of school immunization laws in areas with low incidence of measles versus those with high incidence of measles. The study found that the school immunization laws that cover the total school population and have a school exclusion policy were statistically significantly related to the incidence of measles.

4.2.4 Diarrhea in Childhood

Valman (151) defines diarrhea as the passage of loose stools more often than would be expected from the diet and the age of the infant, whereas others define childhood diarrhea as three or more loose stools in the same 24 hours (90, 112, 117, 120, 170).

Study design, intervention implemented and clinical and statistical results of studies that deal with the management of diarrhea, especially the use of oral rehydration solution (ORS), will be reviewed in this section.

Loss of fluids and electrolytes are the most unportant life-threatening aspects of diarrhea. Diarrhea is in fact not a disease but a symptom which has multiple etiologies. The known etiologies of diarrhea can be categorized into primary G.I. infection, infections in other parts of the body and other types of diarrhea (110).

Logically, management to control the loss of and to maintain the balance of fluids and electrolytes is the crucial approach to the solution of this problem (64, 110, 132, 137). An attempt to prevent diarrhea by improving the nutritional status of the children (49, 165), and the environmental sanitation of the community (18, 49), however, can be achieved following economic development of the community (132).

The use of oral rehydration solution was initiated in 1950 (64, 137) and the first controlled clinical trial of ORS was carried out in 1967 (92).

Studies dealing with the management of diarrhea in childhood reviewed in this section are summarized in Table 4.2.3

From 11 studies included in the review, there were 7 studies performed in the hospital and 4 studies carried out in the community.

4.2.4.1 Hospital Studies

In the 7 studies performed in the hospital, 5 types of comparisons were made by the investigators. First is the comparison between oral rehydration solution (ORS) with intravenous fluid drip (IVFD) (120). Second was the comparison between standard treatment plus ORS with standard treatment without ORS performed in the Philippines (68). The standard treatment used was anti-diarrhea drugs and antibiotics. Third was the comparison of glucose as the component of ORS compared with sucrose (17), or no carbohydrate component (116). Fourth was the comparison between ORS plus breast feeding and ORS without breast feeding (75). The fifth comparison

Table 4.2.3 Studies on the Management of Diarrhea in Childhood

Country/ Ref.	Study Site	Subject	Intervention	R.C.T.*	Outcome	Result Clinical	Result Statistical
Iran (9)	population	diarrhea cases aged 3-36 months n = 804	Standard treatment with ORS versus standard without ORS provided by village health worker	No	Mean weight change <72 hrs (gram)	Study 100 Control 40	p<0.01
					Duration of diarrhea (days)	Study 3.67 Control 3.69	NS
					Case fatality rate per 1,000 cases	Study 3.4 Control 13.7	NS
Ankara, Turkey (47)	population	diarrhea cases aged 0-4 n=1237	Midwives with ORS versus midwives without ORS	No	Followed-up by midwives	Study 94.8% Control 63.8%	p<0.01
					Referred by midwives to physicians	Study 3.8% Control 33.8%	p<0.001
					Duration of illness from initial consultation (days)	Study 2.57 Control 4.97	p<0.01

Table 4.2.3(cont'd.) Studies on the Management of Diarrhea in Childhood

Country/ Ref.	Study Site	Subject	Intervention	R.C.T.*	Outcome	Result: Clinical	Result: Statistical
Bangladesh (17)	Treatment center	Rotavirus-Associated diarrhea cases aged <5 years n=784	Glucose ORS vs. Sucrose ORS	No	Success rate (see text)	Glucose 92.3% Sucrose 88.5%	NS
					Weight gained <mild dehydration	Glucose 1% Sucrose 1.2%	NS
					Vomiting (% children with vomiting)	Glucose 36.6% Sucrose 47.4%	$p<0.001$
					Purging rate (ml/kg/hr) <mild dehydration	Glucose 3.2 Sucrose 3.4	NS
					>moderate dehydration	Glucose 4.6 Sucrose 4.7	NS

Table 4.2.3(cont'd.) Studies on the Management of Diarrhea in Childhood

Country/ Ref.	Study Site	Subject	Intervention	R.C.T.*	Outcome		Result Clinical	Result Statistical
Burma (75)	Hospital	Diarrhea cases aged 6-24mos N=34	ORS with breast feeding versus ORS without breast feeding	Yes	Stool output (mL/kg/case)	ORS + BF	89.2	NS
						ORS	115.8	
					Stool passed (mean)	ORS + BF	12.1	p<.05
						ORS	17.4	
					Vomiting (mL/cases)	ORS + BF	22.9	NS
							15.2	
					Duration of diarrhea in hospital (hours)	ORS + BF	43.3	NS
						ORS	45.7	
					ORS required (mL/case)	ORS + BF	1570.4	p<.02
						ORS	2119.2	
Bangladesh (104)	Population	Total population N=22,228	Villages with versus villages without distribution of ORS	No	Case fatality Rate (%) <1yr	study	0.5	p<.01
						control	6.3	
					1-4yr	study	0.9	NA
						control	2.3	

Table 4.2.3(cont'd.) Studies on the Management of Diarrhea in Childhood

Country/ Ref.	Study Site	Subject	Intervention	R.C.T.*	Outcome		Result Clinical	Result Statistical
					Diarrhea 0-4 yr. Mortality	study	1.8	NA
						control	9.2	
Indonesia (116)	Hospital	Diarrhea cases aged 2-30 months n=60	ORS with glucose versus ORS without glucose	Yes	Success rate (%) (see text)	Glucose	80.0	p>.05
						No glucose	83.3	
U.S. and Panama (120)	Hospital	Well-nourished diarrhea cases aged 3-24 months	W.H.O. ORS versus modified ORS versus standard treatment	Yes	The United States			
					Stool out-put (mL/kg)	WHO	181	
						Modified	193	
						Control	112	p<.02 to WHO and modified
		n=52 (U.S.) n=94 (Panama)			Duration of diarrhea (hrs)	WHO	33	NS
						Modified	33	
						Control	34	
					Weight gained at discharged (%)	WHO	4.3	NS
						Modified	2.8	
						Control	5.0	

Table 4.2.3(cont'd.) Studies on the Management of Diarrhea in Childhood

Country/ Ref.	Study Site	Subject	Intervention	R.C.T.*	Outcome		Result Clinical	Result Statistical
					Panama Stool output (mL/kg)	WHO Modified Control	90 113 168	p<.001 for control p<.05 for modified
					Duration of diarrhea (hrs)	WHO Modified Control	34 34 34	NS
					Weight gain at discharge (%)	WHO Modified Control	6.7 6.3 6.7	NS
U.K. (40)	Hospital	Diarrhea cases aged 3mos-3yrs n=[illegible]03	1 Loperamide 0.8mg/kgBW 2 Loperamide 0.4mg/kgBW 3 Placebo in addition to to rehydration	Yes	Relative recovery rate	Loperamide 0.8 Loperamide 0.4 Placebo	1.11 1.0 0.9	p<0.03
					Weight gained by day 3 after admission (%)	Loperamide 0.8 Loperamide 0.4 Placebo	58 51 36	p<0.02
Indonesia (122)	Hospital	Diarrhea cases aged 4-24months n=58	Enterovioform versus placebo; in addition to rehydration	Yes	Duration of diarrhea (<4days;%)	Enterovioform Placebo	76.7 89.3	p>0.05

Table 4.2.3(cont'd.) Studies on the Management of Diarrhea in Childhood

Country/ Ref.	Study Site	Subject	Intervention	R.C.T.*	Outcome		Result Clinical	Result Statistical
					Frequency of diarrhea (<6times/ day;%)	Enterovioform	76.7	$p > 0.05$
						Placebo	67.8	

*RCT: Randomized Controlled Trial

was that among various anti-diarrhea medications.

There were several outcomes used to evaluate the benefit of ORS in the studies under review which were similar to the outcome criteria used in the present study.

The case fatality rate of diarrhea and the population mortality rate from diarrhea will be reviewed. Results in terms of duration of diarrhea, weight gained ("regained weight"), volume and frequency of diarrhea will also be discussed. Finally the hospitalization rate will be discussed as a process variable in the health care provided to diarrhea cases. Although many other outcomes are shown presented in Table 4.2.3 they will not be discussed in this section.

<u>Oral rehydration solution versus intravenous fluid drip</u>

The question of whether the relatively high sodium content of the WHO-ORS may induce hypernatremia (51, 96) was investigated in a study comparing the WHO-ORS (90 mmol/litre of sodium) with a modified ORS (55 mmol/litre of sodium) and with IVFD (120). No statistically significant difference in weight gain or duration of illness was found between these three medications. 2.8 percent to 6.7 percent of the cases were "regained weight" during the hospitalization. Duration of diarrhea was measured within hour after admission to hospital, with the mean of 33 to 34 hours. In the study in the United States, the total stool output of children who received ORS was greater than in those who did not receive ORS. But an investigation in Panama found the reverse, with the total stool output of children who received ORS smaller than that of children not receiving ORS. In both studies the differences were statistically significant. The contrasting results of these studies might be related to an early return to solid food in Panama (120).

<u>Standard treatment with oral rehydration solution versus standard treatment alone</u>

All children up to the age of 5 years with diarrhea were included in a study that was carried out by the International Study Group in the Philippines (68). In this cohort study the standard treatment of anti-diarrhea drugs and antibiotics was given to all diarrhea cases, and ORS only to the experimental group. The average weight gain before and after diarrhea in the study group (149 grams) was statistically significantly higher than that in the control group (77 grams) for children aged 1 to 5 years. Children aged less than 1 year failed to show any difference between study and control groups weight change during the attack. Duration of diarrhea showed no difference nor did the rate of hospitalization.

<u>Glucose versus alternatives</u>

It is generally recognized that the principles of rehydration therapy are to replace the water and electrolyte deficits present at the onset of therapy, to replace abnormal losses due to further diarrhea and vomiting, to supply the normal losses from the lungs, skin and urine while the patient is undergoing treatment and to initiate nutritional repair of the deficit produced by reduced food intake and tissue breakdown due to the disease process (110). The absorption of sodium and water by the small intestinal mucosa is enhanced by glucose and certain neutral amino acids (84). However, if the levels of sodium ion and glucose are still in balance, further supply of glucose in the ORS is not needed.

Black et al. (17) compared glucose with sucrose as the component of carbohydrate in the ORS among diarrhea cases with none or moderate dehydration and as replacement therapy for cases with moderate and severe dehydration after they had been rehydrated with IVFD. In both groups and sub study population no statistically significant difference was found in weight gain or volume of stool output. When full rehydration was used as the criterion, again no statistically significant difference was found between glucose-ORS and sucrose-ORS.

Rosyid et al. (116) compared the use of ORS with the component of glucose with ORS without the component of carbohydrate as a rehydration for mild and moderately dehydrated diarrhea cases. When the cases were rehydrated after the use of either one of the ORS under study within the first six hours of hospitalization, they were considered a success. Otherwise an IVFD was given for further rehydration. The result was similar to that of the previous study reviewed in that no statistically significant difference was found between the two oral rehydration solutions.

The results of these studies were similar to those of other similar intervention studies (102). The efficacy of such a modification of substrate component of ORS has not been studied in severe cases where the absorption of water and electrolytes is impaired.

<u>Oral rehydration solution with breast feeding versus oral rehydration solution without breast feeding</u>

In a randomized controlled trial Khin-Maung-U et al. (75) studied the effect of breast feeding in addition to ORS. It was found that the frequency of bowel movements was lower in patients who received ORS plus breast feeding during the illness ($\overline{X}$ = 12.1) compared with those who received ORS without breast feeding ($\overline{X}$ =

17.4) during the hospitalization. This difference was statistically significant. The volume of diarrhea, however, did not show a statistically significant difference.

The role of breast feeding is thought to be as follows. First, the absorption of water and sodium may be enhanced by the digestion of breast milk, thus promoting the water and electrolytes replacement and reducing stool output and frequency. Second, in the acute phase of a diarrhea attack, breast feeding is important to prevent the short term deprivation of nutrients.

Medication in diarrhea

The loss of fluids and electrolytes in diarrhea is the main concern of investigations designed to improve the morbidity and mortality from diarrhea. Since the failure rate in ORS therapy is a direct function of the rate of purging, an agent that could stop the process of loss of fluids and electrolytes would be of great value as long as it did not create other complications. Three types of drugs have been introduced in this context, i.e. antimotility, antisecretory, and absorbent drugs (60, 110).

Antimotility agents (opiates, lomotil) may increase the duration of secretion of fluid, prolong the passage of pathogens, increase fever and fever-related catabolism and decrease absorption of nutrients through stasis and pooling in the gut (44). In cholera, a hidden fluid loss may not be recognized because fluid is pooled in the distended gut lumen (60).

Antisecretory drugs (bismuth subsalicylate, chlorpromazine, ~~loperamide~~) working through a variety of mechanisms on the mucosal cell diminishes or reverses the secretory process induced by various bacterial enterotoxins (40). A large dose of bismuth subsalicylate is needed to have an effect on the process of diarrhea, which makes it unsuitable for use in children (45). Chlorpromazine has been thought to have anti-secretory properties, but was found not to have this effect when used to treat cholera. Loperamide, an opioid analogue, had been shown in earlier studies not be effective for diarrhea in children (40, 45).

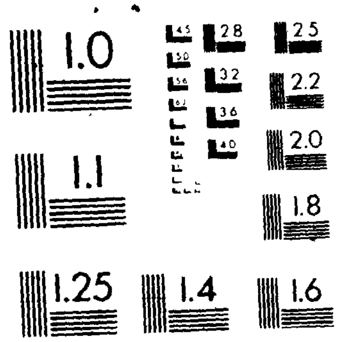
The Diarrhoeal Diseases Study group (40) argued that the failure of loperamide in the earlier study was due to the small dose (0.2mg/kg daily) of loperamide applied. A high dose of this medication (0.4mg and 0.8mg/kg/24h) was examined in comparison with placebo given with ORS. The relative recovery rate (the observed number of resolutions of diarrhea divided by the expected number) was significantly greater in the groups that received loperamide. The significance was no longer present when the analysis adjusted for the presence or absence of pathogens in stools.

Children who received loperamide showed higher proportions of weight gain, (58% and 51% for 0.8mg loperamide group and 0.4mg loperamide group, respectively) compared with those who received placebo (36%).

Setiyono et al. (122) examined the effect of enterovioform in comparison with placebo in small children who suffered from diarrhea. As enterovioform is of no value in any but amebic diarrhea, the non significant effect on the duration of illness and frequency of diarrhea in this study was as expected, given the proportion of those who terminated diarrhea in four days or less, 76.7% in the vioform group and 89.3% in the placebo group.

2

MICROCOPY RESOLUTION TEST CHART
NBS 1010a
ANSI and ISO TEST CHART No. 2



4.2.4.2 Community Studies

Two such studies attempted to compare the use of ORS in addition to standard treatment with standard treatment alone (9, 47).

Two groups of villages in which a female health worker scheme was established were included in a study carried out in Iran (9). A standard regime of diarrhea treatment had been available in both groups, sometimes before the study began. The ORS was introduced, in addition to the standard treatment, to the experimental group only. In the first 72 hours, the average weight gain in the experimental group was 100 grams and that in the control group was 40 grams, a difference that was statistically significant. The mean duration of diarrhea was similar in the two groups, 3.67 days and 3.69 days in the study group and the control group respectively. The case fatality rate in the Iran Study per 1,000 cases was 3.4 in the experimental group and 13.7 in the control group approximately a fourfold difference.

Egemen et al. (47) carried out a similar study in Ankara. In the study group the mean duration of diarrhea after consultation with the midwife was 2.57 days and in the control group it was 4.97 days, a statistically significant difference. The midwife's emphasis on breast feeding, other liquid food and foods with low residue and the early introduction of ORS might have shortened the duration of diarrhea.

Two studies from Bangladesh examined the effectiveness of ORS distribution at the village level by training the lay person in the community (26, 104). Chen et al. (26) studied hospitalization for diarrhea in 233 villages, divided into study (ORS distribution) and control (no ORS distributed) groups. The rate of hospitalization was reduced by 4.5 percent in the study group during the study period and by 16 percent in the control group. The difference was shown to be statistically significant.

Rahaman et al. (104) also compared communities with and without ORS distribution. They measured the case fatality rate of diarrhea cases and population mortality rate that related to diarrhea. In this review the discussion was limited to the under five children only.

The ratio of the diarrhea case fatality rate in the control group to that in the ORS group was 12.6 for children aged less than 1 year and 2.6 for children aged 1-4 years in Rahaman et al.'s study (104). For the under five group as a whole, the ratio was 4.8 (95% confidence limit of 1.8 to 14.2), which was similar to the ratio found by Barzgar et al. in Iran (9). The population mortality rate from diarrhea in children under five was 5.11 greater in those who did not have access to ORS compared to those who did have access. However, the 95% confidence limits were very wide; 0.3% to 81.5%. During this study, a measles epidemic occurred. If the control group had more severe measles than the study group, the number of deaths related to diarrhea should be reconsidered because mortality from diarrhea is significantly increased during an epidemic of measles. Measles is one of the major causes of death among young children. If the cause of death was not clearly documented and in the control group most of the deaths were attributed to measles, then it was difficult to conclude that the discrepancy of population mortality rate was due to the effectiveness of ORS.

In summary, the reviews of studies of treatment of diarrhea in children support the usefulness of ORS. In many but not all the studies, there is evidence that ORS had an effect on the duration of diarrhea, hospitalization rate, population mortality rate due to diarrhea, the case fatality rate, and the volume and frequency of diarrhea.

Anti-diarrhea drugs were shown not to be effective in reducing the duration of diarrhea. Most cases of diarrhea in childhood are caused by mircrorganisms whose mechanism of action is not affected by these drugs.

There was no evidence in this review that antibiotics have an effect on common diarrhea of children.

4.2.5 Febrile Illness in Childhood

Fever is a symptom of a disturbance in the regulation of body temperature by the central nervous system (7). Engogenuous pyrogen, produced by phagocytic cells is the mediator for a rising temperature in infectious diseases (7, 78, 127, 154). All causes that drop the core temperature with resulting fall in surface temperature will produce a raised body temperature (7, 154).

The normal temperature of young children less than 2 years of age is generally higher than that in adults. This will gradually decrease to the adult's normal temperature as the child grows older (153)

There is ho agreement among researchers on the level of body temperature intervention to reduce fever. The child is considered to have a fever when the temperature rises to 38°C, taken rectally (31,

167) or 37.4°C taken orally (31). Most of the time, especially in developing countries, parents use palpation as a screening method for fever. The unavailability of a thermometer is the main reason for this practice. Two studies examined the palpation technique as a screening test to assess the presence of fever in children by nurses (13) and mothers (65). Measurement of body temperature using either a rectal or oral thermometer, according to the age of the child, was the standard method for the screening test. In both studies, a body temperature of 38°C or more was considered as indicative of fever. The sensitivity of this screening test was 73.9 percent in one study and 81.6 percent in the other. The specificity was 85.6 and 94.5 percent respectively and the positive predictive value was 52.3 and 58.0 percent, respectively observed by Banco and Veltri (65) and Bergeson and Steinfeld (13). Weiss (154) stated, however, that if the child was thought to be warm to the touch, fever did actually exist 98 percent of the time, an opinion not shared by the authors cited above.

Kresch (130) examined the use of axillary temperature as the screening test for measuring body temperature in children. He found that the sensitivity of the screening test was unacceptably low, 33.3 percent. The specificity was 97.7 percent and the positive predictive value was 78.0 percent.

These two screening tests used to assess the presence of fever in children are affected by other factors.

In children aged less than two years with rectal temperatures of 39°C or more, bacteria were found in four to 10 percent (39, 89, 91, 144). Tomlinson (146) observed that 80 percent of children hospitalized with fever of 40°C or more were diagnosed as having respiratory tract infections, i.e. nasopharyingitis, streptococcal pharyngitis, otitis media,, cervical adenitis, bronchitis and pneumonia. 4.7 and 2.7 percent of children were diagnosed as having gastroenteritis and urinary tract infections, respectively. Obi and Ileli (100) observed that the clinical findings in 50 children with hyperpyrexia in Nigeria were respiratory tract infections (24 percent), malaria (17 percent), pyrexia of unknown origin (14 percent), gastroenteritis (10 percent), followed by septicaemia, meningitis and measles.

Cone (31) suggested no treatment for moderate and low grade elevations of temperature, i.e. less than 38.9°C. Studies that attempted to reduce body temperature of 40°C or more in children are reviewed in this section (see Table 4.2.4). Study design, intervention, outcome and results of these studies will be analyzed.

Three studies examined the effect of aspirin and acetaminophen or a combination of both (135, 136, 142). Gibson (57) studied the efficacy of bed rest in reducing fever. In a series of mild to moderately ill children with fever, he found that those who remain in bed during the fever period showed no difference in the duration of fever when compared with those who were up and about during their illness. Measuring the term of bed rest objectively was a major problem in replicating this intervention.

Tarlin et al. (142) and Steele et al. (136) found that acetaminophen was an equally effective antipyretic as aspirin. The effect of these two drugs on reducing body temperature lasted only for 3 to 4 hours; thereafter the temperatures began to rise again.

TABLE 4.2.4

Studies on the Management of Fever in Childhood

Ref.	Age	N	Temperature Threshold (^{o}C)	Intervention	Outcome	Result		
Gibson (57)	1-15 yrs.	1082	Not stated	Bed rest vs. no bed rest	Temperature normal by 4th day	Bed rest No bed rest	79.6 79.6	NS
Leduc et al (80)	0-10 yrs.	259	38.0	Paediatricians vs. General Practitioners	Duration of symptoms <7days (%)	Paediatricians General Practitioners	91.7 87.5	p>0.05
					Antibiotics used (%)	Paediatricians General Practitioners	47.2 43.2	NS
					Hospitalization (%)	Paediatricians General Practitioners	0.8 3.0	NS
					Roentgenogram	Paediatricians General Practitioners	10.8 32.4	p<0.05
					Culture	Paediatricians General Practitioners	20.2 4.5	p<0.05

TABLE 4.2.4 (Cont'd)
Studies on the Management of Fever in Childhood

Ref.	Age	N	Temperature Threshold (°C)	Intervention	Outcome	Result
					Screening for Strepto-coccal infection	Paediatricians 18.9 p<0.05 General Practitioners 1.8
Steele et al. (136)	6-59 mos.	120	38.9	Combination aspirin and acetaminophen vs. aspirin	Reduce body temperature (hrs.)	No number presented Combination was significantly better than aspirin or acetaminophen "alone"
Tarlin et al. (142)	6-71 mos.	63	38.9	Acetaminophen vs. aspirin	Body temperatures (hrs.)	No number presented "Each drug produced an almost identical antipyretic effect"
Steele et al. (135)	6-59 mos.		39.4	1. Placebo 2. Sponging + oral placebo 3. Acetaminophen 4. Acetaminophen + sponging with tepid water	Body temperature less than 38.3°C in 2 hrs. (%)	1. 0 2. 53 3. 68 4. 92 5. 100 6. 100

TABLE 4.2.4 (Cont'd)
Studies on the Management
of Fever in Childhood

Ref.	Age	N	Temperature Threshold (°C)	Intervention	Outcome		Result
				5. Acetaminophen + sponging with ice water 6. Acetaminophen + alcohol + tepid water	Comfortable to children (%)	1. 73 2. 33 3. 78 4. 44 5. 8 6. 4	Tepid water (2,4) more comfortable than ice water (5) and alcohol (6) $p<0.001$

The combination of acetaminophen and aspirin was shown to be superior to either acetaminophen or aspirin given alone in its rapid and sustained reduction of fever (136).

The first study which attempted to reduce fever by using a placebo was done by Steele et al. (135). The study compared the efficacy of 6 methods of lowering high body temperatures in children aged 6 to 59 months. Acetaminophen combined with sponging with either ice water or alcohol and tepid water was shown to be more efficaceous than sponging alone, acetominophen alone, or acetaminophen with tepid water in reducing fever. However, the two most efficaceous methods were observed to be the most uncomfortable for the children, judging by the amount of crying and apparent efforts to avoid the procedures.

Leduc and Pless (123) investigated the process and outcome of medical care provided by pediatricians in comparison to medical care provided by general practitioners. The process of medical care was measured by evaluating the use of antibiotics and the type of investigative tests ordered. Use of antibiotics was found to be similar in both groups. Specific agents were ordered more often by pediatricians, but the invasive examination, roentgenogram, was ordered less often by pediatricians. The use of antibiotics by pediatricians, even though not explicitly mentioned in the article, seems to be based on careful thought and the results of investigative tests.

The proportion of those with resolved symptoms in six days or less was not significantly different between groups (difference of 4.2 percentage points). The hospitalization rate of those who received care from the general practitioners was not statistically significantly different from those who received care from pediatricians. A larger number of subjects included in such a study will permit firm conclusions.

4.2.6 Cough in Childhood

Cough, involving a complex reflex, is caused by any factor which irritates the receptors that stimulate the bronchodilator. Cough receptors are located in the respiratory tract system, ear canals and drums, stomach, pericardium and diaphragm (70).

Cough, which is mostly due to acute respiratory infections, accounted for 43 percent of consultations made with general practitioners (157). Moreover, acute respiratory infection (ARI) of any origin is the leading cause of death and hospitalization in many developing countries (23).

Valman (152) classified respiratory tract infection into three categories: a) upper respiratory tract infection (URTI)--common cold, tonsillitis, and otitis media; b) middle respiratory tract infection (MRTI)--acute laryngitis and epiglottisis; c) lower respiratory tract infection (LRTI)--bronchitis, bronchiolitis and pneumonia.

The vast majority of acute respiratory infections are upper respiratory tract infections with an incidence peak of 8 to 9 episodes per year in young children (38).

Isolation and culture of organisms that cause ARI, either viral or bacterial, is difficult. Therefore, information concerning the micro biological nature of this infection, especially in developing countries, is limited (159). Liu (82) mentioned that more than 90 percent of URTI is caused by non bacterial agents, and viruses are considered to be the principal cause (38, 151). Ngalikpima (95) observed that 42 percent of the etiologic agents of respiratory infection in children aged 1 to 5 years were due to bacterial infections either alone or combined. However, Wulff et al (166) found that 50 percent of naso-pharyngeal cultures of URTI in children showed bacterial agents and 50 percent showed viral agents. Bottone et al. (36) found that 51 percent of the total cultures of respiratory infections in children were bacterial.

The use of antibiotics in URTI was shown, in several studies reviewed, to be not efficaceous either in shortening the duration of illness, preventing complications, reducing pathogens in the nasopharynx, or exerting any other beneficial effect (36).

Townsend and Radebaugh (147) conducted a prospective double-blind study in 781 children believed to have viral URTI. Three hundred and fifty eight children were treated as controls and 423 children received medications, either one of the sulfonamides, tetracycline, chloramphenical, or penicillin. In children with an uncomplicated course of illness (without a secondary bacterial infection), fever lasted for a mean of 3.6 days regardless of medication received. In those who developed complications, fever lasted 3.7 days without and 3.5 days with antibiotic treatment. Complications developed in 12 percent of those who received placebo and in 11 percent of those who received antibiotics. Since the inclusion criterion was those suspected of having a viral URTI, the study results are not suprising.

Ackerman (3), in a prospective double-blind study involving 60 infants, assessed the effectiveness of ten days of treatment with penicillin V potassium (100,000 units four times daily) versus tetracycline (50 mg four times daily) versus glyceryl-quaiacolate (robitussin). The mean duration of fever was two to three days in all groups. At the end of 48 hours there were no differences in the proportion of infants who were "improved", "unimproved" or "worse". The mean duration of respiratory morbidity, however, was substantially different among groups. The mean duration of respiratory morbidity in the group receiving tetracycline was 4.3 days, in the group receiving penicillin 6.2 days and in the group receiving robitussin 7.5 days. The difference, however, was not statistically significant. The relatively small number of subjects included in the study may not have permitted a statistically significant difference. The total number of late complications which developed in each intervention group were approximately the same.

Abbot and Fergusson (2) investigated general practitioners' prescribing practices for respiratory infections in children. The information was collected through maternal diaries, maternal recall and direct contact with the general practitioners. Cases were divided into lower respiratory infections, otitis media or suspected otitis media, and other upper respiratory infections. The medication was further divided into antimicrobials, antitussives, decongestants, sedatives and analgesics, antihistamines, bronchodilators and others. In a three year study with a total sample of 1,143 children and 5,630 consultations, several outcomes were revealed. More than 50 percent of the cases received antimicrobials from the physicians, 12 to 17 percent received antitussives and 6 to 10 percent decongestants. The "other" group of medication was given less than 10 percent of the time by physicians. This suggests that physicians still believe that antibiotics have an impact on the treatment of respiratory infection in children. However, most studies will not support that belief.

4.2.7 Summary

The main reason for examining maternal socio-demographic characteristics is to identify groups of children that have a high risk of contracting diarrhea. These groups should then be used as target populations for health education programs, parallel in importance with the curative measures provided by health professionals. Often health education taught in the community by health workers uses terminology that is beyond the understanding, beliefs and culture of the society. Therefore, knowledge of maternal behavioural patterns in childhood diarrhea is necessary to develop better strategies of health education. Maternal knowledge, attitude and practice regarding the etiology, treatment and prognosis of diarrhea were the variables most often examined by investigators in this field.

A model that was developed by Isely ([illegible]) based on the Health Belief Model is preferable in developing the health education program that comprises the prevention and management of diarrhea, and the management of dehydration.

Information on the immunization status of children is best collected from the vaccination record, especially when only one agency is responsible for the implementation of the the program and recording of the data. The relationship between the socio-demographic characteristics and the immunization status of the children was inconsistent from one study to another, mostly due to different study populations and varying discrimination levels of the characteristics. Maternal attitudes and beliefs, social pressure, parental activities in the community, law enforcement and better immunization program administration have been shown to affect the immunization status of children.

Oral rehydration therapy is a technique for preventing and treating dehydration which can result from diarrhea. Twenty countries have launched a national oral rehydration therapy, yet less than 15 percent of the world's families are using this method as the primary remedy for diarrhea (157). The parameters used to evaluate the effect of ORS on diarrhea for the studies under review are: weight change, frequency and volume of stools passed, acceptance of ORS by patients, and referral of cases as part of the process of health care, and case fatality rate and population mortality rate related to diarrhea and outcomes of health care. Most of the above appeared to be affected by the use of oral rehydration solution.

Catford (24) and Valman (151) strongly disagree with prescribing anti-diarrheal remedies for infantile diarrhea. DuPont et al. (44) stated, as the result of their study, that lomotil is contra-indicated in shigellosis diarrhea. Studies reviewed in this section which examined the effect of an anti-diarrhea drug on reducing the length of the illness showed inconsistent results. The use of antibiotics, in addition to standard treatment, did not affect duration of diarrhea. Differing sample sizes and methods of measurement may be factors that account for discrepancies in the study results.

Some believe that fever should not be treated because it may obliterate a valuable diagnostic or prognostic sign, while others say that fever should be treated to relieve the discomfort experienced by patients and to avoid the febrile-associated complications that are the polar considerations of the management of fever (145).

Variables used to measure the outcome of intervention against fever are: the time taken to reduce the fever, the sustained reduction of fever, comfort/discomfort of the child, the duration of symptoms, and the hospitalization rate. The antibiotics prescribed and the investigative tests ordered by physicians are used to measure the process of the medical care rendered.

Cough is usually secondary to acute respiratory tract infection which is caused by bacterial, viral and other factors. Duration of cough, complications which develop and medication prescribed by physicians are the dependent variables most used in measuring the outcomes in the studies reviewed in this section.

4.3 The Village Health Worker

"Primary health care", as defined in the Alma-Ata Declaration, "is a practical approach to making essential health care universally accessible to individuals and families in the community in an acceptable and affordable way and with their full participation."

This concept of primary health care in Indonesia is expressed through the Village Community Health Development Program which has a broader focus on community health and development. The village health worker (VHW) is the main operational component of the program which has been introduced since the early 1970's as part of an attempt to improve the health service resources in rural areas.

The role of the VHW in child health care is the main interest of the present study in spite of the fact that it is only part of the complex functions of the VHW in community development movements.

Studies that have evaluated child health care provided by a health system involving a village health worker (or equivalent) will be reviewed.

Three different components were used for evaluating medical care, namely, structure, process and outcome (42, 134). Geyndt (35) added to the original components, the content of care and the impact of care on appropriateness of treatment, availability, accessibility and acceptability.

Nine studies are included in the review of front-line health workers, both mono purpose and multi purpose. The mono purpose health worker was evaluated in 4 studies (9, 26, 69, 104), the multi purpose health worker in 4 studies (5, 14, 83, 139) and one study evaluated the medical care provided by a family health worker trained in the management of diarrhea and lower respiratory tract infection.

The improvement after training of the knowledge of the VHW on broad health issues was studied by Suyadi et al. (139). Although this was used to evaluate the training program it can also be used to measure the adequacy of the VHW's qualifications. Eighty-seven percent of the mean score was correctly answered by the VHW at the end of the training session, compared with 60 percent before training.

Amondo-Lartson et al. (5) used tracer conditions to evaluate medical care provided by the community clinic attendance for cough, diarrhea and fever. The actual performance levels of community clinic

TABLE 4.3.1
Studies on the Evaluation
of the Village Health Worker Program

Country Reference	Health Workers	Training	Activities	Structure	Evaluation Process	Outcome
Ghana 5	Community Clinic Attendance	N/A	Simple medication for common illnesses	-	Tracer conditions cough, diarrhea and fever	-
Iran 9	Family Health Worker	N/A	Treatment diarrhea	-	ORS consumed Duration between onset and first visit for medication	Case Fatality Rate, Duration of illness Weight change
Indonesia 14	Village Health Worker	Common health problems in the area	Promotion, prevention and simple medication for common illnesses	-	Coverage of curative service	-
Bangladesh 26	Female Village Worker	Diarrhea and ORS	Treatment diarrhea	-	ORS produced ORS distributed Hospitalization	-

TABLE 4.3.1 (Cont'd)
Studies on the Evaluation
of the Village Health Worker Program

Country Reference	Health Workers	Training	Activities	Structure	Evaluation Process	Outcome
The Philippines 69	"Local ORS Deliverers"	Diarrhea and ORS	Treatment diarrhea	-	ORS consumed KAP of households on diarrhea Hospitalization	Case Fatality Rate
The Dominican Republic 83	Community Health Worker	N/A	Vital statistics Immunizing children Simple medications for common illnesses Family planning	-	Immunization coverage Contraception users	-
India 90	Family Health Worker	Management for diarr. and lower respiratory tract infection (LRTI)	Treatment diarrhea and LRTI	-	-	Case Fatality Rate Duration of illnesses
Bangladesh 104	Community Leader	Diarrhea and ORS	Treatment diarrhea	-	ORS consumed	Case Fatality Rate Mortality Rate

TABLE 4.3.1 (cont'd.)
Studies on the Evaluation
of the Village Health Worker Program

Country Reference	Health Workers	Training	Activities	Structure	Evaluation Process	Outcome
Indonesia 139	Village Health Worker	Common health problems in the area	Promotion, prevention and simple medication for common illnesses	Knowledge of VHW	Number of users Referral to health centres	Nutritional status of a feeding program

attendance compared with the tracer conditions were 61.2 percent, 26.2 percent, 74.3 percent and 72.4 percent for history taking, examination, treatment and prescription, respectively.

Only a limited number of health workers can be included in such an evaluation and the excessive supportive research management tools needed are the main problems in such a study.

The acceptance of oral rehydration solution as the process of medical care was measured by most studies that examined care provided for diarrhea (9, 26, 69, 104).

Berman (14) measured the coverage and equality of curative care provided by village health workers in two villages. He found that the utilization of health services when the VHW was present was above the average rate for the regency. This finding was similar to that of Danusugondho (35).

MacCarquodale (83) evaluated community health workers (CHW) who were trained for a wide range of responsibilities. The study examined the achievements of the program in relation to the age, sex, marital status and education level of the health workers. Age, marital status and level of education of the health workers, however, did not show a significant relationship with the effectiveness of the health worker. Male health workers had immunized 71.7 percent of the target children with DPT and women health workers had immunized 64.1 percent of the target children. This discrepancy was highly statistically significant. Levels of contraceptive use were similar for men and women health workers.

Suyadi et al. (139) found that the referral of cases from a VHW to a health centre ranges from .05 percent at the beginning of the program to 3.8 percent after 6 months in progress.

Duration of illness was used as the outcome of medical care in 2 studies (9, 90), although the definition of duration was not explained in either study.

The case fatality of diarrhea cases was measured in 4 studies (9, 69, 90, 104). The likelihood that milder cases will go to the VHW while more severe cases will seek care from a more sophisticated level of the health system must be considered as a potential source of bias. This bias will favour the VHW.

Rahaman et al. (104) used population diarrhea mortality rate as the outcome of the use of ORS distributed by trained lay persons in a community.

A randomized control trial is the most powerful study design in evaluating medical care provided by the VHW. The experimental unit should be a community in a defined area, instead of individual persons used, for example, in a clinical trial conducted in a hospital. the role of the VHW in primary health care should deal, not only with individual health problems in the village, but with health problems in the village as a whole. For example, the availability of medicines for use by the VHW should be the responsiblity of the community not the sick person or the health centre.

Such a study design needs abundant resources; however, they are very rarely available.

In summary, the evaluation of a VHW program or its equivalent has been done in several studies. The role of the VHW should consist of the promotion, prevention and curative components of health care. However, at present, there is no study which attempts to evaluate the role of the VHW or its equivalents in all components of health care.

Five out of 9 studies reviewed dealt with a limited number of aspects of health problems, i.e. diarrhea and lower respiratory tract infection. However, four child health problems were of interest to investigators, namely, cough, fever, diarrhea and the immunization status of children.

Only one study measured the structure of medical care by examining the VHW's knowledge of various aspects of health problems.

The process of medical care from the performance of the health worker to the knowledge, attitude and behaviour toward illness of household members was measured using various techniques.

Case fatality rate, cause specific mortality rate and duration of illness were the variables most frequently used to evaluate the outcome of medical care.

CHAPTER V

GENERAL METHODS

5.1 Introduction

The study was done in Yogyakarta Special Territory between September 1983 and September 1984. Yogyakarta Special Territory is one of 27 provinces in Indonesia. This province is divided into 4 regencies and one municipality. In one regency there are about 12-17 sub-districts, each of which consists of 3-8 villages. The structure of the administrative territory of Yogyakarta can be seen in Figure 5.1.

In order to meet the goals of the study mentioned earlier, two study designs were carried out. A cross-sectional design was used to examine the immunization status of children and maternal knowledge of child health. A cohort design was used to examine the quality of health care for common childhood infections.

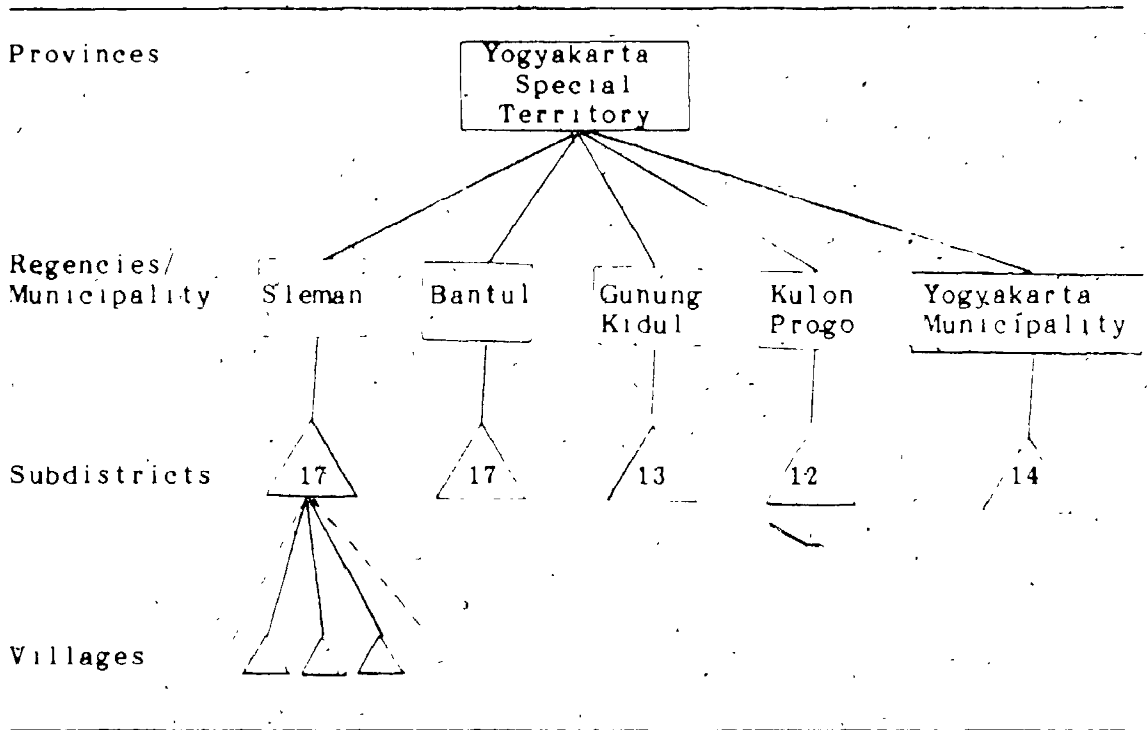
5.2 Objectives

5.2.1 Maternal Knowledge of Child Health

The objectives of this study were:

1. To measure differences in maternal knowledge of and attitude toward pertussis and childhood immunization between villages with and without a VHW.
2. To measure differences in maternal knowledge of childhood diarrhea between villages with and without a VHW.

Figure 5.1 Administrative Structure of Yogyakarta Special Territory



3. To study social and demographic factors influencing maternal knowledge of childhood diarrhea.

5.2.2 Childhood Immunization

It is the policy of the Indonesian EPI to immunize children before the age of 14 months, but in reality they are sometimes not immunized until the age of 2 years.

Hence the primary objective of the study of childhood immunization was to determine whether the level of second DPT-immunization coverage of children aged 6-23 months in villages with a VHW was at least 10 percentage points higher than in villages without a VHW.

5.2.3 Medical Care for Common Childhood Infections

Three illnesses regarded as the most common cause of morbidity in early childhood were selected for the study, viz: diarrhea, fever and cough.

Under this heading three aspects of care were chosen for investigation: accessibility, quality of medical care and mortality of children under five years of age. The objectives of each aspect will be presented in sequence in this section.

5.2.3.1 Accessibility

Research on the impact of medical care should consider the accessibility of health care to the population. It is postulated that in an area without a VHW, parents will delay in bringing the sick child for care. Hence the objectives of the study were to

1. Measure the differences in time from the start of symptoms to the time of initial visit to the village health worker in the study group and to the health centre personnel in the control group.
2. To assess the difference in overall cost as perceived by the families of children with diarrhea, fever or cough in villages with and without a VHW.

5.2.3.2 Quality of Medical Care for Common Childhood Infections

There are 3 study objectives dealing with a comparison of the quality of care provided by a health care system with and without a VHW. They are concerned with determining an acceptable minimum quality of care provided by the VHW.

1. To compare the medication given and advice about medication, feeding and breast feeding offered by the health worker in villages with and without a VHW.
2. To compare compliance with medication in villages with and without a VHW.
3. To determine whether the proportion of children aged 6-59 months with diarrhea, fever or cough who had a poor outcome was not more than 10 percentage points higher among those who received care from the VHW compared to those who received their initial care from a health centre. This was the primary objective of Medical Care Study.

5.2.3.3 Population Mortality

The mortality of the target population is an important measure of outcome of the medical care provided by the health service system.

Ideally, a comparison of changes in mortality rates over a period of time in study and control areas should be conducted to measure the effect of the VHW program on the mortality of children under five years of age. A before-and-after study design would be appropriate (see Figure 5.2). Such a design could not be used because no population mortality rates are available. It was necessary to carry out a mortality investigation specifically for this study and this could be done only once.

The objectives of this study in accordance with the mortality of children under five years of age were:

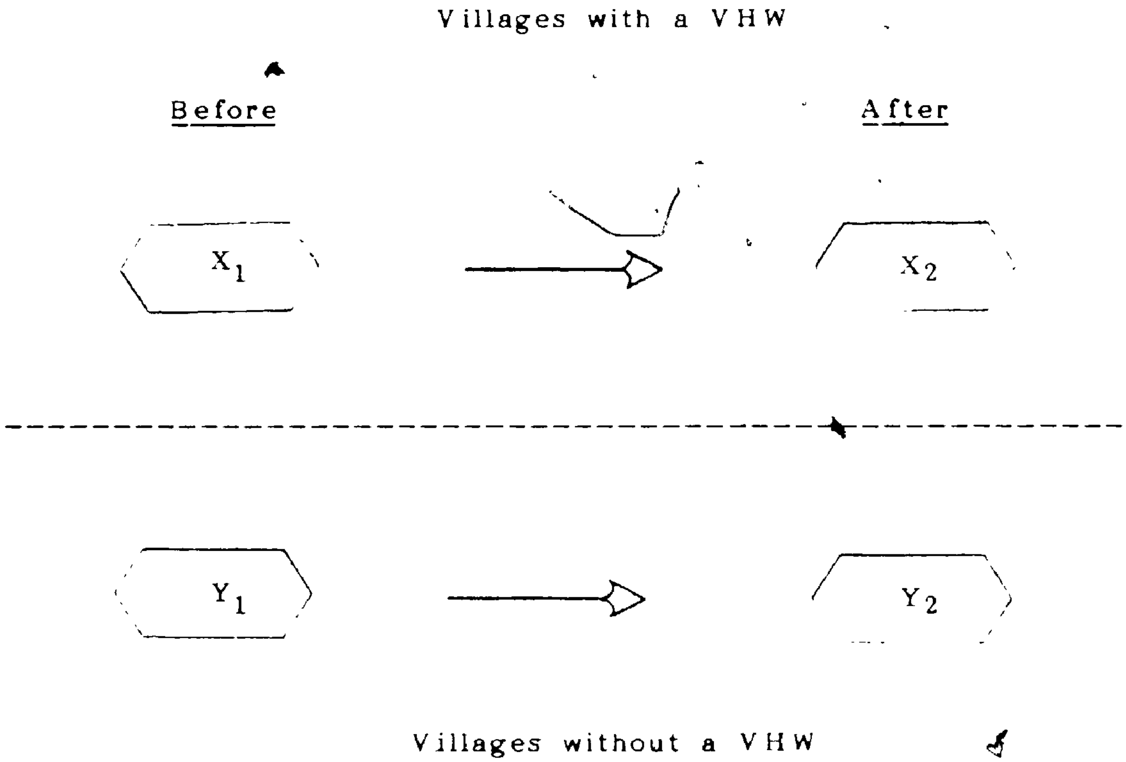
1. to measure the difference between mortality from all causes in children under five years of age in villages with and without a village health worker.
2. To measure the difference between diarrhea mortality in children under five years of age in villages with and without a village health worker.

5.3 Sampling and Design

5.3.1 Introduction

In the planning phase of the study it was anticipated that the VHW program would have been implemented in 13 subdistricts in two regencies, namely Kulon Progo and Gunung Kidul regencies. These 13 subdistricts were supposedly included in the study group. Therefore 46 subdistricts in all 4 regencies had been selected as the potential subdistricts for the control group. The proposed study design is presented in Figure 5.3. The proposed study design had the advantage of being able to compare subdistricts with and without the

Figure 5.2 The Ideal of Mortality Study Design



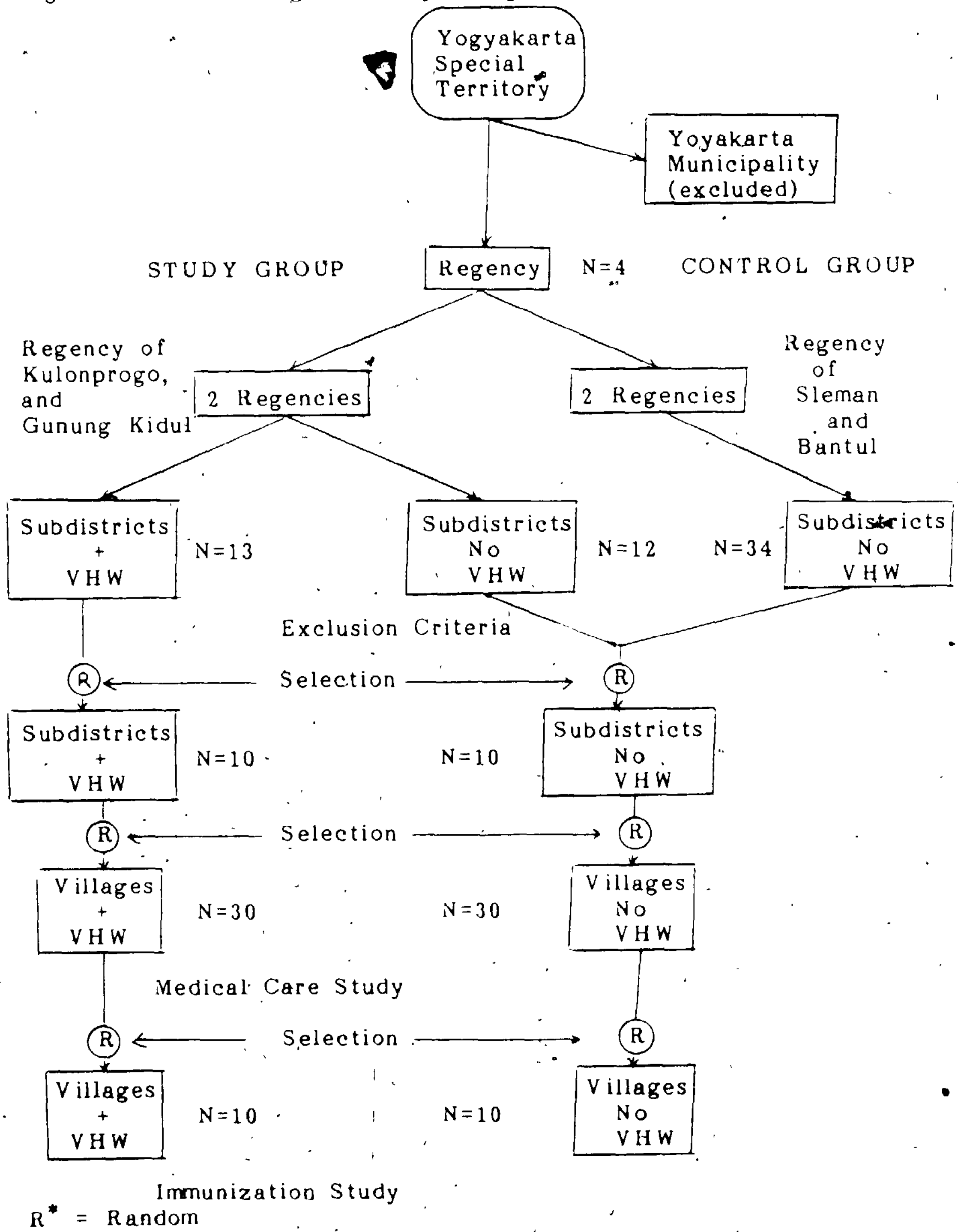
X1 : mortality rate before VHW program in villages with a VHW.

X2 : mortality rate after VHW program in villages with a VHW.

Y1 : mortality rate before VHW program in villages without a VHW.

Y2 : mortality rate after VHW program in villages without a VHW.

Figure 5.3 The Original Study Design

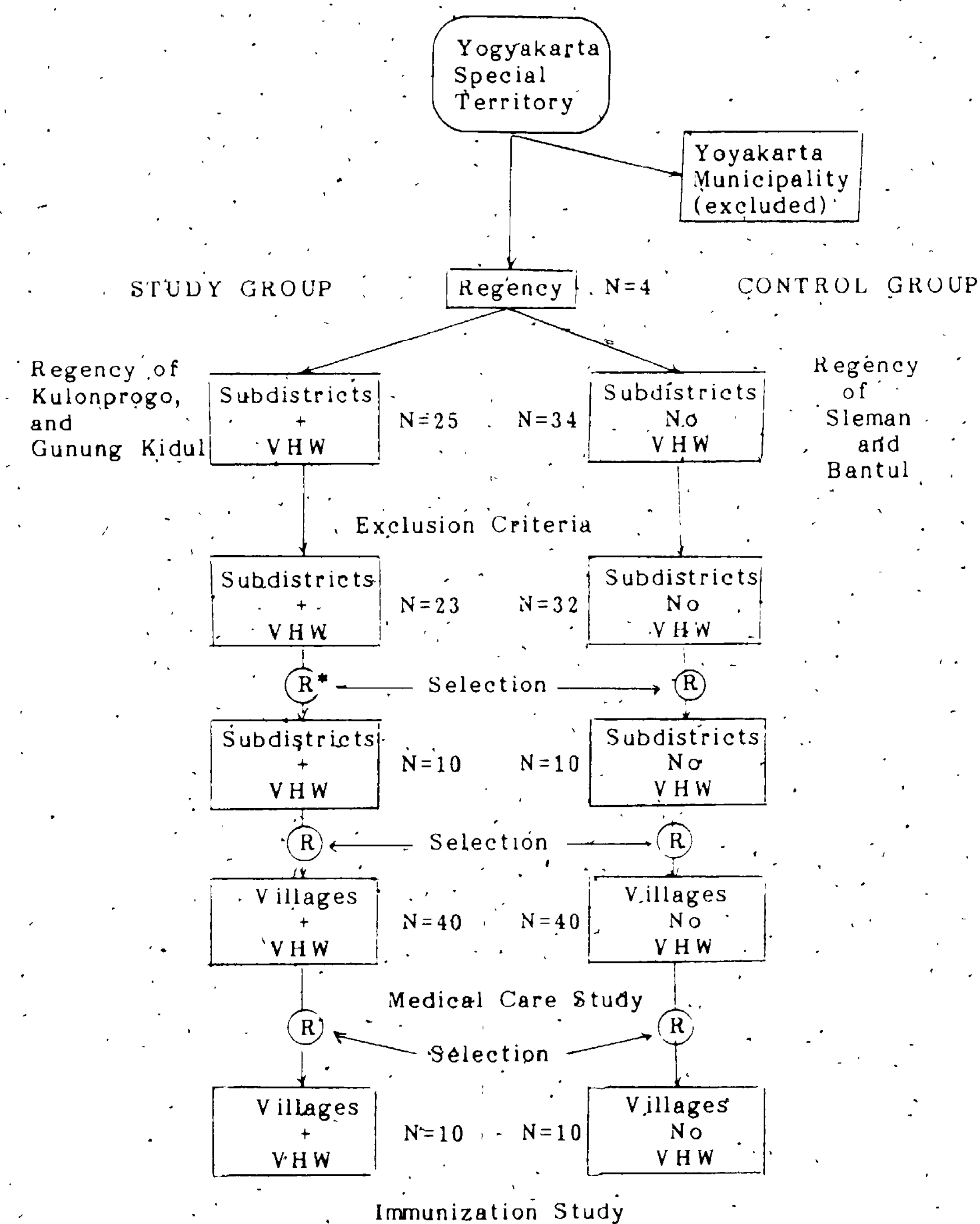


VHW program, from the same regency. Twelve subdistricts from the two study regencies had a potential to be selected as a control subdistrict.

However, the implementation of the village health worker (VHW) program covered all subdistricts in the two regencies mentioned earlier, which was a departure from the original plan. All the 25 subdistricts in these two regencies (Kulon Progo and Gunung Kidul) were included in the VHW program. The study was planned in the University of Western Ontario, London, Canada between January 1983 and July 1983. Some changes in policy were made in March 1983. These changes and their impact on the design of the study could not have been foreseen or prevented. The design was therefore altered as follows: two regencies that received the VHW program were included in the study group and two other regencies that did not receive the VHW program were included in the control group (see Figure 5.4).

Subdistricts that are located in the capital of the regency were excluded from the study, since they had many private health facilities (hospital, physicians, paramedics) not available in the other subdistricts. The availability of the VHW at the place where the patients live is expected to reduce the time in obtained medical service and to increase the continuity of care by the health care system. A particular design was proposed in the orginal planning of the study. In the control group, ten of the 30 villages in the quality of care study would be randomly selected for the accessibility study. Ten other villages in each distance category (<5km, 5-8km and >8km) would be randomly selected from the eligible villages. In the study

Figure 5.4 The Actual Study Design



R* = Random

group, however, the villages for the accessibility study would be the same as those in the quality of care study (see Table 5.1). This design was not applicable in this study, since the distance of the village to the health centre or its branches is less than 5 km. To comply with the issue of distance, the distance of the hamlet or neighbourhood was used in this study.

The aim of the study was to compare the health care provided in villages with and without a VHW. Therefore, it was imperative that study villages had a VHW considered by the health centre to be active. There were 49 villages in the study area that met the criterion and 42 villages available in the control area.

The demographic similarity between study and control group can be seen in Table 5.2.

It shows that population density in the study group was less than the control group. The population-health centre ratio in the study and control groups were similar with 8546 and 8628 in the study and control groups respectively. The ratio of population to physicians was 24,497 and 21,030 in the study and control groups respectively.

As was mentioned in chapter III, two schedules of DPT immunization are implemented in Indonesia. All 20 health centres that were included in the study provided two doses of DPT immunization, but only 6 health centres, 2 in the control group and 4 in the study group, out of 20 provided DPT immunization in three doses. For further discussion in this study, DPT-Basic refers to two doses of DPT immunization and DPT-Extended refers to three doses of DPT immunization.

Table 5.1 The Proposed Number of Sample Villages by Distance from the Health Centre in the Medical Care and Immunization Studies

Study Purpose	Sub Study Purpose	Distance From Health Centre	Study Group	Control Group
Medical Care Study	Quality of Care	<5km.	10	30
		5-8km.	10	
		>8km.	10	
	Accessibility	<5km.	10*	10†
		5-8km.	10*	10§
		>8km.	10*	10§
Immunization Study		<5km.	3	3
		5-8km.	3	3
		>8km.	3	3

Notes: * The villages as those in Quality of Care

† The villages randomly selected from Quality of Care Study Villages

§ New Villages for the Accessibility Study

Table 5.2 Comparison of Study and Control Areas, 1983

Indicator	Study Area	Control Area
Land Area (Sq Km)	2,072.	1,080.
Total Population	1,102,406.	1,345,898.
Population Density (per Sq. Km)	581.	1,247.
Health Centre and Sub Health Centre	129.	156.
Number of Physicians	45.	64.

Source: Soemarmo (131)

5.3.2. Childhood Immunization Study

5.3.2.1. Sampling Procedures for the Immunization Study

A list of the health centres was received from the Provincial Health Office. A random selection was performed to select 10 sub-districts from the sub-districts group with and without the VHW program. This was the maximum number that could be handled by the investigators. These twenty health centres were used as the area of study for the immunization and medical care study.

As was mentioned earlier there were 49 villages in the study area and 42 villages in the control area available for the study. Forty villages were randomly selected in each comparison group for the Medical Care Study, based on the expectation of patient recruitment. One village in every health centre in the Medical Care Study was then randomly selected for the Immunization Study. The study villages that were included in the Immunization and Medical Care Studies are presented in Appendix I.

A letter was sent to each village through the participating health centre, asking for an inventory of all the children in the village who were born between January 1982 and June 1983, in order to meet the age criteria of 6-23 months as of December 1983 (see Appendix II). The inventory was picked up by the study worker from the health centre. If the inventory had not been sent to the health centre, the investigator or his representative visited the village leader to obtain the list. The inventory was filled out by consulting the birth registry book available in each hamlet.

All children listed in the inventory were included in the immunization study.

Mothers of children who were in the inventory were included in the studies for maternal attitudes toward childhood immunization and maternal knowledge of childhood diarrhea. In cases where one family contained more than one eligible child, the toss of a coin was used to determine which child should be the subject.

5.3.3. The Medical Care Study

5.3.3.1. Sampling Procedure for the Medical Care Study.

From the list of villages made ~~by health~~ health centre physicians in consultation with the personnel responsible for the VHW scheme, 40 villages were selected randomly in each comparison group.

All children aged 6-59 months resident in the selected village, who were brought to a health care facility with diarrhea, fever or cough, were included in the study. An abstractor who had been trained for data collection was responsible for the inclusion of cases into the study.

For the mortality study, six sub-districts that were randomly selected from each study and control regency, were added to the 10 sub-districts already in the study. The aim was to increase the sample population within the limitations of the study. A total of 32 sub-districts in both comparison groups were covered for the mortality study (see Appendix I.2).

5.4. Collection of Data.

5.4.1. Introduction.

The data collection activities of the study will be presented under separate sub-headings for each part of the study. The recruitment of, training of, and problems related to the interviewers for each part of the study will be presented.

The questionnaires used in this study are found in Appendix II.

Table 5.3 presents the data collected and the person who was responsible for each type of data collection.

5.4.2. Interviewer Training.

The author, during the preparation phase, made an announcement in survey research centres in the University of Gadjah Mada about the need for interviewers. In the original design of the study, it was anticipated that the interviewers could be recruited from the Population Institute of the University of Gadjah Mada. However, at the time of recruitment, these people were otherwise employed and were not available for this study.

From 10 candidates who applied for the job, 6 were chosen as the first group of interviewers and they participated in a three day training program. The content of the training included an explanation of the general aims of the study, omitting any reference to comparisons to be made between one area and another. This was necessary to prevent any bias that might develop if the interviewers recognized that a comparison was being made between the VHW and the health care worker in the health care centres. This was also necessary in order to avoid the possibility of rivalry bias and exposure suspicion bias, and to increase the accuracy of data collected. Explanations were given of the meaning of each question on the interview and practice in their use took place during the first and second days of training. Height and circumference measurements of children were described and practiced in the training class. The

Table 5.3 Data Collection

Study Component	Responsible Person	Content
Immunization Study	Interviewer A	- Immunization Status - Socio Demographic Characteristics
Maternal Knowledge of Child Health	Interviewer A	- Maternal Knowledge of Pertussis - Maternal Knowledge of DPT Immunizations - Maternal Knowledge of Childhood Diarrhea
Medical Care Study	Health Worker	Medical Record
	Parents or Representative	Illness Monitoring Card
	Abstractor	- Socio Demographic Characteristics - Outcome - Abstracted Medical Record and Illness Monitoring Card.
Mortality Study	Interviewer B	- Socio Demographic Characteristics - Mortality of Under Five Years of Age Children
Quality Control	Interviewer C	- Re-survey.

third day of training was used to review the previous exercises, to explain the implementation of the survey, and the method of interview. Interviewers were told at the end of the class that the quality of their data would be evaluated by the investigator.

A quality control survey conducted by the investigator revealed that data gathered by the first round of interviews was unreliable. The potential problems of unreliable data were explained to the interviewers.

However, after four villages were surveyed and the quality of data gathered by this first group of interviewees was still found to be inadequate, the survey was stopped and the contract with this group was cancelled.

The investigator again approached the Population Institute to request further interviewers. Eight people were recruited and divided into three job categories. One person was designated as the leader, five persons were hired as interviewers and two persons were named as coding editors. The training program for this second group was exactly the same as for the first group except that explanations of the problems encountered with the earlier group were given. The leader was responsible for the implementation of the survey, and the editors were responsible for the accuracy of the coding. Those interviewers with incomplete questionnaires or who had problems with the responses were told to revisit the respondents. This second group of interviewers started the interview from the beginning and did not see the results of the first interview.

In the original proposal, it was intended that independent nurses from outside the health centres serve as abstractors. This policy was rejected by the health centres' leaders. Instead, the abstractors were recruited from the health centres' personnel; one abstractor for every health centre. The abstractors were trained at the Regency Health Offices.

The investigation was described to the abstractors as a study of the medical care given to children aged 6-59 months with diarrhea, fever and cough. The abstractors in the study and control groups were trained separately. This was necessary because the questionnaires used in the study villages had a separate section for recording the medical care given by the VHW.

The contents of the medical record, the illness monitoring card and the parental interview questionnaire were explained and discussed in class. The method of interview, the measurement of height and area circumference, medical record and illness monitoring card, and recording of medication taken were explained, discussed and practiced in class. These activities were done in two days with 5-6 abstractors per training course.

The interviewer B was recruited from the malaria field workers. This type of worker routinely covers every hamlet in a village during a one month period and is the appropriate worker for the purpose of collecting information on deaths.

In addition to the investigator, two workers were responsible for quality control (Interviewer C). These were the first workers recruited for the study who were involved in every training program for all types of interviewer and health worker.

5.4.3. Childhood Immunization.

An inventory of all children born between January 1982 to June 1983 was made by the village leader from the birth registry book. The mothers of the children were asked by the village leader to be home on the day of interview. Interviewer A stayed in one village for three days to interview respondents. Evening interviews were conducted for those missed during the daytime. After three failed attempts to obtain an interview, a household was dropped from the study.

All information regarding the immunization status of a child was obtained from the Road-to-Health card (K.M.S.) kept by the mother. If the mother did not produce the card, the immunization record of the child kept by the vaccinator at the health centre was consulted.

Data concerning socio-demographic characteristics, participation of each parent in the community, status of family planning use, and the number of children ever born, still alive, less than 5 years and 10 years of age were collected during the interview with the mother. The same data were collected for the other types of study and the discussions would not be repeated. The questionnaire can be found in Appendix II.

5.4.4. Assessment of Maternal Knowledge of Child Health.

Data on maternal attitude toward childhood immunization and maternal knowledge of childhood infections were collected simultaneously by Interviewer A, and will be presented together in this sub-section. Content of the interview can be found in Appendix II.

The information requested regarding maternal attitude towards childhood immunization was divided into four sections:

1. Mother's knowledge of the immunization schedule and the source of this knowledge. Mothers were considered to be fully informed about the immunization program when they gave the correct date and place of the next immunization schedule in their village.
2. The experience of mothers with children having whooping cough, and the mothers' knowledge of the symptoms of whooping cough. If the mother mentioned that the symptoms included cough, whooping for long periods of time, and vomiting, she was considered to know about whooping cough.
3. Whether or not the subject child had ever suffered from whooping cough.
4. The perceived severity of whooping cough, the perceived efficacy of immunizations and the perceived vulnerability to whooping cough.

The information regarding maternal knowledge of childhood diarrhea was divided into 4 sections:

1. Knowledge of the cause of diarrhea.
2. Knowledge about severity and prognosis of diarrhea was covered in two questions; one concerning the effect of diarrhea on the child, the other, the life threatening potential of diarrhea.
3. The health resources that would be consulted when a child has diarrhea.

4. Medication to be given to a child with diarrhea at home, and the source of this knowledge about medication.

The questionnaire can be found in Appendix II.

5.4.5. The Medical Record.

A special medical record for children with diarrhea, fever or cough was developed for this study. The nurses at the health centres and the VHW in the villages were trained by the investigator to fill out the medical record using simulated cases.

The information that could be collected from the medical record was:

1. Personal identification of the child, and the parents' names.
2. The major complaint, either diarrhea, fever, or cough.
3. The results of follow-up at 4 day intervals.
4. The history of the illness, physical examination findings, laboratory tests, and diagnosis of the illness.
5. The dosage and amount of medication prescribed in order to measure compliance by a medication count.
6. The advice given to mother or accompanying adult and the plan for follow-up.
7. Consultation and referral of the case to a higher level of personnel or hospital.
8. Judgement of severity of the case by the nurse or VHW.

In practice, several problems were encountered which detract from the total usefulness of the medical record:

1. The health workers in both study groups were reluctant to

fill out the medical record completely, because they felt that they were being judged.

2. Medical records were sent to the abstractors too soon to record if any follow-up was done. Therefore, only personal identification of the child, the main complaint, the medication and the severity of the case in the medical record was collected.

Information about hospitalization was collected by the investigator at the hospital. The medical record used in this study can be found in Appendix II.

Ten to fourteen days after the first visit to either a health centre or a village health worker, the abstractor made a home visit to interview the mother and to take anthropometric measurements. The information requested was divided into six sections:

1. Duration of illness before initial visit.
2. Conditions of the child at the time of home visit, i.e. cured, under treatment by other health resources, symptoms still present, or dead.
3. Medication received from the health centre or VHW.
4. Advice given regarding medication, planning of follow-up and feeding of the child.
5. Perceived cost of the medical care for the child's illness.
6. Non-prescribed medication given by the parent at home.

5.4.6. The Illness Monitoring Card.

During the training of the health centre personnel and the VHW's, the illness monitoring card was introduced and practiced in class. In both groups the health worker was instructed to explain to the person accompanying the child how to fill out the illness monitoring card. Identifying information was entered on the card by the health worker, who also entered the dates for which a parental report of the child's illness was required. The parents or care-takers of the child recorded for each day a "+" sign only if the symptoms of the illness were still present or had re-appeared, and a "-" sign if the symptoms were absent. The appropriate sign was recorded every day until there were seven consecutive "-" signs. The duration of the illnesses was determined from the entries on the illness monitoring card. In the regular meeting the abstractor ascertained the ability of parents to fill out this card. The illness monitoring card can be found in Appendix II.

5.4.7. The Mortality Study.

A malaria worker at the health centre collected the mortality data. During the study, the malaria worker made an additional inquiry about any death of a child less than 5 years of age from September 1, 1983 to February 29, 1984.

For each mother whose child had died, information was requested about the symptoms of the fatal illness, duration of illness and health resources used prior to death. For the purpose of calculating the mortality rate, a distribution of under five years of age population was collected from the secondary data available in every village. The questionnaire used in the Mortality study can be found in Appendix II.

5.4.8. Nutritional Status.

In a field study such as this the nutritional status of the children could not be evaluated using weight-for-age. It was not possible for interviewers to carry a sensitive weight scale. The height of the child was measured using a modified method suggested and used by others in field studies (65, 123, 140). A table was placed against a wall or a house pillar. The child was stretched out on the table, his head touching the wall or house pillar as the fixed headboard. While the mother kept the child's knees extended as far as possible, the interviewer made a mark on the table at the child's heel. Using a special tape introduced by Shakir and Morley (124) the left mid-upper-arm circumference was measured after measuring the height.

All measurements were done three times consecutively and recorded in the questionnaire. The average of these three measurements was used for the height and arm circumference of the child.

5.4.9. Quality Control.

In both the immunization and medical care studies, a re-survey of 10% of the subjects was done to measure the reliability of the measurements and the interview data. Subjects were not told in advance about the re-survey. More than ten were randomly selected from respondents in the first interview in case one of the ten failed to be re-interviewed.

The quality control survey for the immunization study was done one week after the primary survey. All items on the questionnaire were repeated, except for age and immunization status which had been obtained directly from a record.

A quality control survey was conducted every week in four randomly selected health centres. Health centres already selected for the quality control survey were not included in the next draw.

Quality control for the Mortality study was not done.

Chapter VI

Analysis and Results.

6.1. General Description of Data Management and Analysis.

The information contained on the questionnaires and forms that were completely filled out in the study was coded and filed on a floppy disc of an Apple IIe microcomputer. A reliability check on a 10 percent random sample revealed a 94% accuracy rate for the transfer of data from paper to floppy disc. For the analysis, data were transferred into the Cyber 35 at the computer centre of the University of Western Ontario, London, Ontario, Canada.

Most of the analyses were carried out using a statistical package for the social sciences (97). Multivariate logistic regression analysis used the BMDP statistical soft ware (41). Logistic analysis is a multivariate statistical procedure which permits classification of individuals in one of two categories based on the particular combination of characteristics they possess. A logistic transformation of the odds ratio (log P/1-P) for the dichotomous dependent variable is used, where P is the proportion of cases in one response category and 1-P the proportion in the other (1, 6, 41). The outcome of this analysis is analogous to multiple regression with coefficient being determined for the independent variables.

6.1.1. Sociodemographic characteristics of the Study and Control Populations.

Two population samples in the immunization study were used, one from the areas with BCG and DPT-Basic immunization programs, and one from areas with polio and DPT-Extended immunization programs.

Only information about sex of children could be gathered for the total populations. Other information about sociodemographic characteristics of the family and the age of the children was obtained from the families included in the study samples.

The descriptions of the sample populations that were included in the immunization and medical care studies will be presented in this section. The distributions of the mortality study sample populations will be discussed later under the topic of the mortality study (see section 6.4.3).

Areas with BCG and DPT Basic Immunization Study

Children who entered the Basic Immunization Study consisted of 1257 boys and 1253 girls and the sex distribution of the study and control groups was similar. Appendix III presents the distribution of sociodemographic characteristics in the study and control groups in the Immunization and Medical Care Studies.

The majority of parents had achieved only primary school education. The proportion of illiterates, 12.3% of mothers and 6.24% of fathers, was lower than that in the total Indonesian population in 1980, which was 28% (16).

The highest proportion of the occupation of the parents was peasant, which was similar in both the study and control groups.

More than 90% of parents in the study and control groups did not participate in community activities.

The proportion of current users of contraception in the study and control groups was similar.

It should be noted that even though the difference in the proportions of some variables between study and control groups was small, it was statistically significant, due to the large sample size.

The mean and S.D. of continuous sociodemographic variables in the study and control groups showed that there was no substantial difference between the study and control groups regarding sociodemographic characteristics of family.

Areas of Polio and DPT Extended Immunization Study

Six health centres of the twenty health centres included in the immunization study provided the extended programs of immunizations. At these health centres, DPT immunization was given in three doses instead of the two doses provided in the basic schedule. Polio immunization was given together with DPT-Extended immunization up to three doses. There were two such health centres in the control group and four centres in the study group. The distribution of sociodemographic characteristics of children can be found in Appendix III, 3-4.

The study included 54% boys and 46% girls and the distribution in the study and control groups was similar.

A large percentage of the parents had achieved only a primary school education (6 years formal education or less). There were three times as many illiterate fathers in the control group than in the study group and three times as many fathers with a secondary school education (7-9 years formal education) in the study group than in the control group.

The occupational distribution of both parents was different in the study and control groups, with fewer labourers and more peasants in the study group.

The social participation categories of the parents were collapsed into two categories because of the small number who participated in community activities. The social participation of both parents was slightly greater in the study group than in the control group, although the difference was not statistically significant.

The proportion of current users of contraceptives was slightly higher in the study group.

The mean and S.D. of the continuous sociodemographic variables showed that there were no important differences observed in any of the variables in the study and control groups (see Appendix III, 4).

<u>Medical Care Study</u>

There were 1746 boys and 1535 girls who participated in the medical care study, similarly distributed in the control and study groups.

The distribution of sociodemographic characteristics in the study and control groups can be seen in Appendix III.5-6.

There were more illiterate mothers and fewer with secondary school education in the study group than in the control group. The education level of the fathers in the study and control groups was similar.

The distribution of the occupation of mothers was similar in the study and control groups. The study group had more fathers who were peasants and fewer who worked as labourers and businessman than the control group.

The participation of mothers in community activities was similar in the study and control groups. There was a slightly higher proportion of fathers in the study group who participated in community activities than in the control group.

The proportion of current users of contraceptives was similar in both the study and control groups.

There was no clinical difference in the means of the continuous sociodemographic variables in the study and control groups.

6.1.2. Response Rate.

A total of 2912 children aged 6-23 months were listed by the village leader for the immunization study. There were 12.9% and 14.7%, in the study and control groups respectively, whose mothers could not be interviewed.

Of the 4005 children participating in the medical care study, 16.9% in the study group and 19.0% in the control group did not have a medical record filled out by the health worker.

6.1.3. Reliability.

The discussion of the reliability of data on immunization, maternal knowledge of childhood immunization, diarrhea, and on the medical care study will be presented in sequence.

The intraclass correlation coefficient (Kappa) is a widely used measure of inter-rater reliability. The formula used for measuring Kappa in this study was based on that suggested in the literature (30).

The Kappa value for inter-rater reliability in the immunization study is presented in Appendix IV. The values of Kappa for the demographic data in the immunization study ranged between .64 to .88, which is in the acceptable range.

The Kappa statistic for the questions about mother's knowledge of pertussis in childhood varied between .63 and .67.

The Kappa value for maternal knowledge of DPT immunization status ranged between .57 and .63.

For maternal knowledge of childhood diarrhea, it ranged between .55 and .81. The response to the question regarding cause of diarrhea had the highest inter-rater reliability (K=.81), whereas the response to the question about home remedies for diarrhea had the lowest (K=.55).

The response to questions regarding sociodemographic characteristics of the subjects in the medical care study showed an acceptable level of agreement (Kappa >.60). The response to the question about the father's social participation in the community had the lowest Kappa (.64) while the response to the question about the number of children in the family had the highest (K >.80)

The inter-rater reliability for the response to questions about giving advice about medications to the child and advice about breast feeding was lower (K = 44), but still within the level of fair agreement. (52).

6.2. Analysis of Maternal Knowledge about Child Health.

In this part of the study, maternal knowledge of child health was divided into 3 categories; i.e. maternal knowledge of pertussis, childhood diarrhea and childhood immunization.

Pertussis and DPT immunization were chosen as representatives of the topic of immunization. Moreover, immunization against pertussis is included in DPT immunizations which are available in every village in the study area, whereas polio and measles immunizations are available only in selected villages.

6.2.1. Pertussis.

Pertussis has typical symptoms that should not be difficult for mothers to recognize. However, some children infected by Bordetella pertussis have an atypical or abortive form of the disease. Huovila (1982) found that 50% of children who had positive Bordetella pertussis culture developed typical pertussis, 43% developed atypical pertussis, and the remainder were abortive form or symptom free.

Table 6.2.1 (a) to (e) presents the response given by mothers to the questions about pertussis.

More mothers in the study group had seen a pertussis case which probably explains their superior knowledge of the symptoms of the disease.

In the study group a higher proportion of mothers answered that their child had suffered from pertussis. In both groups, most of the mothers perceived that pertussis is a severe or moderately severe disease, with this proportion slightly higher in the study group.

No statistically significant difference was observed between the comparison groups in the mother's response to the question about the vulnerability of the child to pertussis.

When knowledge of pertussis was analysed in relation to the child's immunization status (DPT basic), only the perceived severity of

Table 6.2.1 Relationship Between Maternal Knowledge of Pertussis and Comparison Group

a) "Have you ever seen a child with Pertussis?"

Answer	Percentage distribution of replies	
	Study Group N = 1171	Control Group N = 1227
Yes	31.0	25.3
No	69.0	74.7
Total	100.0	100.0

$x^2 = 9.75$ d.f. = 1 $p = .0021$

b) "Can you tell me which of the following symptoms would make you believe that a child has pertussis?"

Answer	Percentage distribution of replies	
	Study Group N = 1171	Control Group N = 1227
Right	24.7	17.2
Wrong	26.0	29.4
Don't Know	49.3	53.4
Total	100.0	100.0

$x^2 = 20.52$ d.f. = 2 $p < .0001$

c) "Has (child's name) ever contracted pertussis?"

Answer	Percentage Distribution of Replies	
	Study Group N = 1171	Control Group N = 1227
Yes	6.7	4.7
No	93.3	95.3
Total	100.0	100.0

$x^2 = 3.835$ d.f. = 1 $p = .0502$

d) "How do you perceive the severity of pertussis if suffered by a child aged (child's age)?"

Answer	Percentage Distribution of Replies	
	Study Group N = 1171	Control Group N = 1227
Severe & Moderate	97.5	93.8
Mild	1.5	3.8
Undecided	.9	2.4
Total	99.9	100.0

$x^2 = 19.78$ d.f. = 2 $p = .0001$

e) "What do you think the chances are that child's name will get pertussis?"

Answer	Percentage Distribution of Replies	
	Study Group N = 1171	Control Group N = 1227
Possible	36.7	34.1
Not Possible	52.7	53.2
Undecided	10.6	12.6
Total	100.0	99.9

$X^2 = 3.301$ d.f. = 2 $p = .1919$

pertussis and perceived vulnerability to pertussis showed a significant relationship (Table 6.2.2 (a) to (e)). Mothers who perceived that pertussis is severe had more children with completed immunization than mothers who perceived that pertussis is mild. Children of mothers who perceived that their child was not susceptible to pertussis were more likely to have completed the DPT-Basic immunization, although this relationship was not particularly strong.

6.2.2 DPT Immunization

For an immunization program to be successful, mothers must be motivated to bring their child to the collection point for immunization.

Mothers were informed about the place and time of the next immunization. Table 6.2.3 shows that maternal knowledge of the place and date of the next immunization schedule was similar in the study and control groups.

In the study group it was more often the local people (village leader, neighbour) who informed mothers about the next immunization schedule, whereas in the control group the health centre personnel were found to be more important. (See Table 6.2.4)

There were slightly more mothers in the study group who disagreed that two doses of DPT immunization will protect children from pertussis than those in the control group. However more mothers in the control group were undecided about the efficacy of two doses of DPT immunization (Table 6.2.5). Table 6.2.6 shows that maternal knowledge of the date and place of the next immunization schedule did not affect the completeness of DPT basic immunization.

Table 6.2.2 Relationship Between Maternal Knowledge of Pertussis and DPT Basic Immunization Status (Comparison Groups Combined)

a) "Have you ever seen a child with Pertussis?"

DPT Basic Immunization Status	Percentage Distribution of Replies	
	Yes N = 673	No N = 1725
Completed	50.1	46.4
Not Completed	49.9	53.6
Total	100.0	100.0

$x^2 = 2.68$ d.f. = 1 p = .1016

b) "Can you tell me which of the following symptoms would make you believe that a child has pertussis?"

DPT Basic Immunization Status	Percentage Distribution of Replies		
	Right N = 500	Wrong N = 666	Don't Know N = 1232
Completed	48.7	46.0	47.8
Not Completed	51.3	54.0	52.2
Total	100.0	100.0	100.0

$x^2 = .909$ d.f. = 2 p = .6347

c) "Has child's name ever contracted pertussis?"

DPT Basic Immunization Study	Percentage Distribution of Replies	
	Yes N = 136	No N = 2262
Completed	41.8	47.9
Not Completed	58.2	52.1
Total	100.0	100.0

x^2 = 2.29   d.f. = 1   p = .1300

d) "How do you perceive the severity of pertussis if suffered by a child aged (child's age)?"

DPT Basic Immunization Study	Percentage Distribution of Replies		
	Severe or Moderate N = 2291	Mild N = 66	Undecided N = 41
Completed	48.0	33.9	40.0
Not Completed	52.0	66.1	60.0
Total	100.0	100.0	100.0

x^2 = 5.98   d.f. = 2   p < .0502

e) "What do you think the chances are that child's name will get pertussis?"

DPT Basic Immunization Status	Percentage Distribution of Replies		
	Possible N = 849	Not Possible N = 1270	Undecided N = 279
Completed	40.6	54.6	36.2
Not Completed	59.4	45.4	63.8
Total	100.0	100.0	100.0

$x^2 = 55.49$ d.f. = 2 $p = .0000$

Table 6.2.3 Percentage Distribution of Maternal Knowledge of DPT Immunization Schedule in Study and Control Groups

Knowledge	Percentage Distribution of Replies	
	Study Group N = 1171	Control Group N = 1227
Right	43.8	46.5
Wrong	56.2	53.5
Total	100.0	100.0

$x^2 = 1.85$ d.f. = 1 $p = .1738$

Table 6.2.4 Percentage Distribution of Source of Information on DPT Immunization Schedule in Study and Control Groups

Source of Information	Percentage Distribution of Replies	
	Study Group N = 1171	Control Group N = 1227
Health Care System	10.8	28.8
Village Leader	65.4	53.9
Others	23.8	17.4
Total	100.0	100.0

$x^2 = 122.92$ d.f. = 2 $p < .0001$

Table 6.2.5 Percentage Distribution of Maternal Perception of Efficacy of DPT Immunization (2 - doses) in preventing Pertussis (Study and Control Groups)

Answer	Percentage Distribution of Replies	
	Study Group N = 1171	Control Group N = 1227
Agree	71.9	70.2
Disagree	23.2	19.9
Undecided	4.9	9.9
Total	100.0	100.0

$x^2 = 24.04$ d.f. = 2 $p < .0001$

Table 6.2.6 Relationship Between Maternal Knowledge of DPT Immunization Schedule and DPT Basic Immunization Status (Comparison Groups Combined)

DPT Basic Immunization Status	Maternal Knowledge of Immunization Schedule (Percentage Distribution of Replies)	
	Right N = 1083	Wrong N = 1315
Completed	46.5	48.2
Not Completed	53.5	51.8
Total	100.0	100.0

$x^2 = .673$ d.f. = 1 $p = .4120$

Table 6.2.7 indicates that the source of information about the immunization schedule did not affect the completeness of basic DPT immunization.

Maternal perception of vaccine efficacy was found to have no relationship with the completeness of DPT basic immunization of the children (Table 6.2.8).

6.2.3 Childhood Diarrhea

The comparison of maternal knowledge of childhood diarrhea in the study and control groups will be presented first in this section.

Table 6.2.9 presents a comparison of maternal knowledge of childhood diarrhea in the study and control groups.

Maternal knowledge that diarrhea in childhood is caused by infection, food, milk or drinks was similar both in the study and control groups. The major difference was the proportion who did not now the cause of diarrhea. Sahid et al (118) found that 41 percent of mothers believe that diarrhea is caused by infection, food, milk or drinks, which was similar to the findings in this study. Escobar et al (48) in Peru also observed a similar proportion of mothers (39%) who believe that infection, food or milk are the cause of diarrhea in childhood. Widagdo et al (156) observed that most mothers believed that foods are the cause of diarrhea (64%).

Table 6.2.10 shows that a slightly higher proportion of mothers in the study group recognized that diarrhea causes dehydration. However, there was also a slightly higher proportion of mothers in the study group who believed that diarrhea is a sign of rising intelligence of the child, compared with mothers in the control group.

Table 6.2.7 Relationship Between Source of Information on DPT Immunization Schedule and DPT Basic Immunization Status (Comparison Groups Combined)

DPT Basic Immunization Status	Health Care System N = 479	Village Leader N = 1426	Others N = 493
	Percentage Distribution of Replies		
Completed	46.8	47.9	46.8
Not Completed	53.2	52.1	53.2
Total	100.0	100.0	100.0

$X^2 = .29$ d.f. = 2 p = .8633

Table 6.2.8 Relationship Between Maternal Perception of DPT Immunization Efficacy and DPT Basic Immunization Status (Comparison Groups Combined)

DPT Basic Immunization Status	Agree N = 1703	Disagree N = 516	Undecided N = 179
	Percentage Distribution of Replies		
Completed	47.7	49.2	40.2
Not Completed	52.3	50.8	59.8
Total	100.0	100.0	100.0

$X^2 = 4.445$ d.f. = 2 p = .1084

Table 6.2.9 Maternal Knowledge of Cause of Childhood Diarrhea in Study and Control Groups

a) "Do you know what is the cause of diarrhea in childhood?" (= cause of diarrhea)

	Percentage Distribution of Replies	
Cause of Diarrhea	Study Group N = 1171	Control Group N = 1227
Infection	1.1	.8
Foods	24.2	22.1
Milk; Drinks	8.5	10.2
Weather, Cold	49.6	44.1
Don't Know	15.0	21.1
Others	1.5	1.8
Total	99.9	100.1

$x^2 = 19.749$ d.f. = 5 p = .0014

Table 6.2.10 Maternal Knowledge of Prognosis of Childhood Diarrhea in Study and Control Groups

b) "What will happen after a child has diarrhea for three consecutive days?" (= prognosis of diarrhea)

	Percentage Distribution of Replies	
Prognosis of Diarrhea	Study Group N = 1171	Control Group N = 1227
Dehydration	30.2	29.3
Rising Intelligence	37.2	34.4
Nothing	17.0	14.3
Don't Know	10.4	13.4
Others	5.1	8.6
Total	99.9	100.0

$x^2 = 19.092$ d.f. = 4 p = .0008

This belief arises because diarrhea occurs in an age group of rapid development, so that the child displays more advanced behaviour after each attack of diarrhea. The diarrhea, rather than age-related development, is given "the credit".

Maternal perception of the severity of diarrhea is considered to be crucial to the adoption of the prevention of the diarrhea intervention program (71). In the univariate analysis it was shown that there were slightly more mothers in the control group who perceived that diarrhea is severe (Table 6.2.11).

For multivariate analysis, maternal perception of the severity of diarrhea was collapsed into two categories, i.e. perceived as severe (coded 1) or not severe (coded 0). Appendix IX Table 3 shows that education of mothers, occupation of mothers and current use of contraceptives were related to the perceived severity of diarrhea. Therefore these variables were entered into the regression analysis. Two percent of cases were excluded from the analysis due to missing data.

Table 6.2.12 presents the result of the logistic regression analysis of maternal perceived severity of diarrhea. It shows that there were more mothers in the control group who perceived that diarrhea is severe. Mothers with high school education and over were less likely to perceive that diarrhea is severe compared with mothers who were illiterate. Mothers who stayed at home were less likely to believe that diarrhea is severe compared with mothers who worked in offices.

Table 6.2.13 shows that a slightly higher proportion of mothers in the control group preferred to have diarrhea cases treated by the

Table 6.2.11 Maternal Preception of the Severity of Diarrhea in Study and Control Groups

e) "How do you perceive the severity of diarrhea in a child for three consecutive days?" (= severity of diarrhea)

Percentage Distribution of Replies

Severity of Diarrhea	Study Group N = 1171	Control Group N = 1227
Severe	73.6	77.2
Moderate	7.3	7.7
Mild	18.7	13.6
Undecided	.4	1.6
Total	100.0	99.9

$x^2 = 19.846$ d.f. = 3 $p = .0002$

Table 6.2.12 Results of Logistic Regression Analysis of Maternal Perceived Severity of Diarrhea*

Variables	Coefficient	Ratio to SE	p
Comparison Group	.098	2.13	.033
0 = Study Group			
1 = Control Group			
Education of Mothers			
Illiterate (= reference)			
Primary School	.150	1.08	.280
Secondary School	-.039	-.35	.726
High School +	-.190	-2.45	.014
Occupation of Mothers			
Office Worker (= reference)			
Business	-.130	-1.36	.174
Labour	-.063	-.67	.503
Peasant	.235	1.75	.080
Housewife	-.430	-3.16	.003
Current User of Contraception	-.071	-1.54	.124
0 = User			
1 = Non User			

* 0 = Not Severe
1 = Severe

Table 6.2.13 Health Resources for Diarrhea Perceived by Mothers in Study and Control Group

d) "Where the mother in this village should take her child aged (child's age) with diarrhea?" (= health resources for diarrhea)

Health Resources for Diarrhea	Study Group N = 1171	Control Group N = 1227
	Percentage Distribution of Replies	
Health Care System	74.3	79.7
Self Treatment	13.2	10.5
Others	12.6	9.8
Total	100.1	100.0

$x^2 = 9.95$ d.f. = 2 $p = .0069$

health care system compared with mothers in the study group. De Zoysa et al (170) found that half of the respondents would take diarrhea cases to medical facilities, a lower number than that found in the present study.

Oral rehydration solution is the most powerful tool in reducing child mortality from diarrhea. More than four million children can be saved from dying each year from diarrheal dehydration (156). In all cases, dehydration can be counteracted by parents willing and able to give ORS to a child with diarrhea.

Table 6.2.14 shows that the proportion of mothers who gave ORS as the first remedy for diarrhea was double in the study group compared with the control group. Nearly twice as many mothers in the control group preferred to give antidiarrhea medication to a child with diarrhea compared with mothers in the study group. Only seven to sixteen percent of mothers reported that they would give O.R.S. for childhood diarrhea in the studies by Bertrand et al, (15) and Sahid et al, (118), a much lower proportion than that found in the study group in this investigation (52.4%).

In the multivariate analysis, maternal perceived home treatment with ORS for diarrhea was collapsed into two categories, i.e. perceived ORS as the home treatment for diarrhea (Coded 1) and perceived other than ORS as the home treatment for diarrhea (Coded 0). Appendix IX, Table 5 shows the results of the univariate analyses. Age, education, occupation, social participation of mothers and status of current user of contraception had a statistically significant relationship with the perception of mothers about home treatment for diarrhea. All of these variables were included in the

Table 6.2.14 Home Treatment for Diarrhea Perceived by Mothers in Study and Control Groups

f) "When a child aged (child's age) has diarrhea, what should the mother do for him at home?" (= home treatment for diarrhea)

Home Treatment	Percentage Distribution of Replies	
	Study Group N = 1171	Control Group N = 1227
Oral Rehydration Solution	52.3	27.1
Antidiarrhea Drugs	12.7	22.4
Tea	6.6	13.9
Traditional Medicine	28.4	36.6
Total	100.0	100.0

$X^2 = 172.12$ d.f. = 3 $p < .0001$

regression analysis. Sixty cases (2.4%) were excluded from the analysis due to missing data.

Table 6.2.15 presents the results of the logistic regression analysis of maternal perceived home treatment for diarrhea. It shows that there were more mothers in the study group who perceived that ORS is a home treatment for diarrhea. Mothers who actively participate in the community and current users of contraception were more likely to give ORS for diarrhea. Mothers who had primary and secondary education were more likely to give ORS for diarrhea compared with illiterate mothers. Age and occupation of mothers, and number of children no longer had significant relationships with the perception of home treatment for diarrhea.

Table 6.2.16 shows that in the study group the information about the use of ORS for diarrhea was more often received from the health care system and that the VHW has a major role on the maternal knowledge of O.R.S. for diarrhea, as claimed by mothers.

Knowledge of Diarrhea by Socio-demographic Factors

The relationship between maternal knowledge of childhood diarrhea and socio-demographic characteristics of mothers is presented in Appendix IX.1-6.

Causes of Diarrhea

There were no obvious difference in maternal knowledge of tne cause of diarrhea among maternal age groups. The higher the education of mothers the greater the belief that food and infection are the causes of diarrhea. Mothers who had the highest education level were the least likely to believe that weather and cold are the causes of diarrhea. Mothers who worked in an office (village leaders,

Table 6.2.15 Results of Logistic Regression Analysis of Maternal Perceived Home Treatment with ORS for Diarrhea*

Variables	Coefficient	Ratio to SE	p
Comparison Group 0 = Study Group 1 = Control Group	-.583	-12.8	.000
Social Participation of Mothers	.453	5.11	.000
Education of Mothers			
Illiterate (= reference)			
Primary School	.585	4.63	.000
Secondary School	.479	4.53	.000
High School +	-.097	-1.28	.201
Occupation of Mothers			
Office Worker (= reference)			
Business	-.091	-1.02	.308
Labour	-.001	-.02	.984
Peasant	-.025	-.20	.841
Housewife	-.099	-.71	.472
Current User of Contraception 0 = User 1 = Non User	-.160	-3.52	.000
Number of Children Aged Less Than 10 Years	-.076	-1.47	.142
Age of Mothers	-.010	-1.12	.263

* 0 = Other than ORS
1 = ORS

Table 6.2.16 Source of Information on Oral Rehydration Solution for Diarrhea in Study and Control Groups

Source of Information	Percentage Distribution of Replies	
	Study Group N = 612	Control Group N = 332
Health Care System	89.2 H.C. 36.3 VHW 52.9	64.2
Others	10.8	35.8
Total	100.0	100.0

$X^2 = 84.20$ d.f. = 1 $p < .0001$

civil servants or teachers) were most likely to believe that food was the cause of diarrhea. Mothers who were active in the community more often believed that food is the cause of diarrhea, than mothers who were not active in the community. The belief that weather or cold is the cause of diarrhea was less often held by mothers who were active than by mothers who did not participate in any activities in the village.

Current use of contraception did not show a relationship with knowledge of the cause of diarrhea.

<u>Prognosis of Diarrhea</u>

Mothers in the younger age groups were four times more likely than mothers in the oldest age group to believe that diarrhea causes dehydration.

A similar proportion of mothers in all age groups believed that diarrhea is a sign of rising intelligence of the child.

The higher the education of mothers, the higher the proportion who believed that diarrhea causes dehydration, whereas the lower the education the higher the proportion who believed that diarrhea is a sign of rising intelligence. Mothers who worked in an office were three times more likely than mothers with other types of occupations to believe that diarrhea will cause dehydration, and much less likely to believe that diarrhea is a sign of rising intelligence.

Among mothers who participate in community activities nearly twice as many believed that diarrhea causes dehydration compared with non-participating mothers. A smaller proportion of the active mothers believed that diarrhea is a sign of rising intelligence.

More mothers who were current users of contraceptives believed that diarrhea causes dehydration compared with mothers who were not current users.

Perceived Severity of Diarrhea

Maternal perception of the severity of diarrhea in children was not related to maternal age.

There was no systematic relationship between maternal perception of the severity of diarrhea with maternal education.

Mothers who worked in an office had the highest proportion who perceived that diarrhea is severe in children, while mothers who were housewives had the lowest proportion. Participation of mothers in community activities did not show a relationship with perceived severity of diarrhea, nor did current use of contraception.

Health Resources for Diarrhea

There was no difference in the proportion of preferred health resources for diarrhea among maternal age groups.

There was no systematic relationship between maternal education and health resource preference for diarrhea.

Mothers who worked in businesses (shop, market, etc.) were the least likely to use health care systems for medical care of diarrhea.

There was a slightly higher proportion of mothers active in the community who preferred to use the health care system for diarrhea compared with mothers who were not active in the community.

Home Treatment for Diarrhea

The younger the mothers the higher the proportion who replied that O.R.S. is the home treatment for diarrhea. The higher the education of mothers the higher the proportion who selected O.R.S. as the home medication of diarrhea. Saragih et al. (21) observed that 56 percent of mothers with high school education or more were aware of O.R.S. as a treatment for diarrhea, compared with 49 percent of mothers with primary school education, proportions that are similar to those observed in the present study. Antidiarrhea drugs were selected by illiterate mothers for home treatment of diarrhea twice as frequently as by mothers with high school education or more. O.R.S. was more often selected as diarrhea home treatment by mothers who worked in offices than by mothers with other categories of occupation. Four times as many mothers who worked in businesses preferred antidiarrhea drugs as the first treatment for diarrhea compared to mothers who worked in offices. Peasants and housewives did not differ in their treatment preferences. Among mothers who were active in the community a much higher proportion selected O.R.S. for diarrhea medication compared with mothers who were not active. Twice as many of the mothers who were not active in the community selected traditional medicine for diarrhea compared with mothers who were active in the community. Mothers who were current users of contraceptives selected O.R.S. more frequently than non-users, and selected traditional medicine less frequently.

<u>Source of Information on O.R.S. for Diarrhea</u>

Mothers aged 40 years or more had the highest proportion of those receiving information about O.R.S. from the health care system.

There was no systematic relationship between the source of information on O.R.S. with maternal education. However, mothers with high school education or more were more likely to receive information from other sources.

There was no association between the occupation of mothers with the source of information on O.R.S. A similar result was observed on the activities of mothers in the community and current users of contraception.

6.3 Analysis of Childhood Immunization

6.3.1 B.C.G. Immunization

Immunization against tuberculosis (B.C.G.) has been in practice for a long period of time. It used to be given together with smallpox vaccination until 1974 when smallpox vaccination was discontinued.

There were 1967 (78.4%) children from the total sample who had been immunized against tuberculosis in this study. B.C.G. immunization coverage in the study group was 79.7% and 77.1% in the control group (Table 6.3.1). The difference was not statistically significant.

The hypothesized difference in BCG immunization coverage between the study and control groups was 10 percentage points. The statistical power of this study to detect a difference of 10 percentage points (Type I error <.05, 2-tailed) was 99.9%, taking into account that BCG immunization coverage in the control group was 77.1%.

The coverage of B.C.G. immunization is 1980/1981 for the general population of the four regencies in Yogyakarta Special Territory was 76.5% (123) (Table 6.3.2).

The relationship between B.C.G. immunization status and the socio-demographic characteristics of the family were presented in Appendix V, Table 1-2.

Table 6.3.1 B.C.G. Immunization Status of Children in Study and Control Groups

Immunization Status	Study Group N = 1243	Control Group N = 1267
	Percentage Distribution of Children	
Immunized	79.7	77.1
Not Immunized	20.3	22.9
Total	100.0	100.0

$x^2 = 2.50$ d.f. = 1 p = .1138

Table 6.3.2 B.C.G. Immunization Status in Yogyakarta Special Territory 1980/1981

Regency Size	Sample	Children Immunized Number	Percentage
Kulon Progo*	286	218	76.2
Gunung Kidul*	530	405	76.2
Bantul+	429	335	78.0
Sleman+	276	206	74.6

Source: 123

* Study group in the present study.

\+ Control group in the present study.

There was no relationship between the education of mothers and the B.C.G. immunization status of the children. Children whose fathers had lower education had a higher B.C.G. coverage than children of fathers with higher education. The total difference, however, was just on the borderline of statistical significance ($p = .059$).

Mothers who worked in offices had the lowest proportion of children who received B.C.G. immunization than any other category of occupation.

Children whose parents were using contraception showed a higher proportion of the B.C.G. immunization status than those whose parents were not current users of contraception.

There was no important relationship between the continuous socio demographic variables and the B.C.G. immunization status observed in this study.

6.3.2 DPT Immunization

6.3.2.1 DPT Basic Immunization

The goal for immunization against diphtheria, pertussis and tetanus in Indonesia was to achieve by 1990 at least 65 percent coverage of children in the 3-14 month age group with two doses of DPT (25). Thus in the analysis that follows, a child's immunization is regarded as complete only if two doses were received.

The coverage of the second dose of DPT Immunization was 47.1 percent and 46.3 percent in the study group and control group respectively (See Table 6.3.3). The expected difference in the DPT Basic Immunization coverage between the study and control groups was

Table 6.3.3 DPT Basic Immunization Status in Study and Control Groups

Immunization Status	Percentage Distribution of Subjects	
	Study Group N = 1243	Control Group N = 1267
Completed	47.1	46.3
Not Completed	52.9	53.7
Total	100.0	100.0

x^2 = .1966 d.f. = 1 p = .6575

Table 6.3.4 DPT Basic Immunization Status in Study and Control Groups (Every Single Dose)

Immunization Status	Percentage Distribution of Subjects	
	Study Group N = 1243	Control Group N = 1267
Completed (2nd Dose)	47.1	46.3
Completed (1st Dose)	33.2	29.5
Not Vaccinated	19.7	24.2
Total	100.0	100.0

x^2 = 8.64 d.f. = 2 p = .0133

10 percentage points. The statistical power of this study to detect a difference of 10 percentage points (Type 1 error <.05, 2-tailed) was 99.9%, given that the coverage of the DPT Basic Immunization in the control group, was 46.3%. The immunization coverage for the second dose of DPT found in this study was much lower than that reported elsewhere for the Indonesian population. It was reported that the coverage of the second dose of DPT was 69 percent for the Province of Central Java and Yogyakarta Special Territory, combined (53). In the present study virtually all of the areas were rural. This might be the reason for the discrepancy.

When the immunization status of children was broken down into three categories: i.e. none, one and two doses of DPT, a significant difference was found in favour of the study group, although it was very small (Table 6.3.4).

The correlation between the DPT Basic Immunization status of children and socio-demographic characteristics of the family can be seen in Appendix VI, Tables 1 and 2. The higher the maternal education the more likely the child completed DPT basic immunization. Children whose fathers worked in offices had the highest proportion completed DPT basic immunization, compared to those whose fathers were active in the community. Parents who were current users of contraception had a slightly higher proportion of children who completed DPT basic immunization.

This implies that the better socio-economic status of the parents, the more likely the child completed DPT basic immunization status.

6.3.2.2 DPT Extended Immunization

Four health centres in the study group and two health centres in the control group used the extended schedule of immunization program, i.e. three doses of DPT and Polio immunization.

A further analysis to examine the coverage of three doses of DPT immunization was done for these six health centres (Appendix VII, Table 3 and 4).

There were 600 children from the study villages and 215 children from the control villages included in this analysis. This defference was due to the number of villages in the study and control groups. Forty seven percent of children in the control group received the third dose of DPT vaccine and 35.6 percent in the study group, a difference that was statistically signrficant (Table 6.3.5)

Children who had completed the third dose of DPT vaccine were significantly older than those who had not. Girls showed a substantially higher proportion of complete immunization compared with boys, 42.9 percent and 34.9 percent for girls and boys, respectively.

The occupation of mothers and the height of children were the other variables that had a significant relationship with completion of the third dose of DPT. Mothers who worked in an office (village leader, civil servant and teacher) had the smallest proportion of children with three doses (27.8 percent) while those who worked as labourers had the highest (53.3%). Mothers who were at home had 35.6% of their children immunized. Children with three doses of DPT were slightly taller than those whose DPT was incomplete, which was most likely a result of age difference.

Table 6.3.5 DPT Extended Immunization Status in Study and Control Groups

DPT Immunization Status (Extended Schedule)	Percentage Distribution of Children	
	Study Group N = 600	Control Group N = 215
Completed	35.6	47.0
Not Completed	64.4	53.0
Total	100.0	100.0

$x^2 = 8.20$ d.f. = 1 p = .0042

6.3.3 Polio Immunization

The same six health centres were included in the polio immunization study as in the DPT extended immunization study.

The coverage of polio immunization program in the study and control groups is shown in Table 6.3.6. For children under 2 years of age, 52.6 percent of children in the control group had been immunized compared with 30.9 percent in the study group, a difference that was highly significant statistically.

Appendix VII presents the correlations between the polio immunization status of children and various socio-demographic characteristics.

Those who had completed polio immunization were significantly older than those who had not; the mean ages were 16.78 months and 14.14 months respectively.

Girls had a higher proportion of completed polio immunization (41.1%) than boys (32.7%), a difference that was statistically significant.

Fathers who participated in community activities had more children who had completed polio immunization (52.2%) than fathers who did not participate (36.4%). This difference was statistically significant. Children who had completed immunization for polio had significantly fewer siblings, either those ever born or those still alive, than children who had not completed the immunization.

6.3.4 Regression Analysis of Immunization Coverage in the Study and Control Groups

Further analysis was necessary to adjust for independent

Table 6.3.6 Polio Immunization Status in Study and Control Groups

Polio Immunization Status	Percentage Distribution of Children	
	Study Group N = 600	Control Group N = 215
Completed	30.9	52.6
Not Completed	69.1	47.4
Total	100.0	100.0

$x^2 = 32.02$ d.f. = 1 $p = .00001$

variables found to have a significant relationship with immunization status or comparison group. In order to recognize such variables the study group and control group were compared on all the socio-economic variables influencing immunization status. This was done separately for B.C.G., DPT (Basic Schedule), DPT (Extended Schedule) and Polio Immunization. The procedure is described in detail using BCG immunization as an illustration in Appendix VIII.

B.C.G. Immunization

The purpose of the analysis presented in this section was to compare B.C.G. immunization status between the comparison groups (Study and Control) adjusting for the potential confounding variables presented in Appendix VIII, Table 6.

Seven potential confounding variables were selected for inclusion in the regression analysis. Age of child, number of children under five in family, height, and distance from health centre or one of its branches were the continuous variables. Father's education, Mother's education and current user of contraception were the categorical variables.

A total of 2,429 subjects were included in this analysis - the number for whom information was available for all of the variables examined. Because of missing values, 3.2% of subjects had to be excluded.

Table 6.3.7 presents the results of the logistic regression analysis.

A positive coefficient is interpreted as indicating a positive relationship to immunization status (Not Immunized Coded 0; Immunized Coded 1).

Table 6.3.7 Results of Logistic Regression Analysis for B.C.G. Immunization*

Variable	Coefficient	Ratio to SE	P
Comparison Group 0 = Study Group 1 = Control Group	-.128	-2.42	.016
Age of Child	.0217	2.09	.037
Children Under Five in Family	-.223	-2.54	.011
Current User of Contraception 0 = Current User 1 = No Current User	-.112	-2.11	.035
Distance from Health Centre	-.0428	-1.38	.168
Height	.0007	1.19	.234
Father's Education (Reference: Illiterate)			
Primary School	-.0281	-.226	.818
Secondary School	-.269	-2.39	.017
High School+	-.0835	-.944	.347
Mother's Occupation (Reference: Office Worker)			
Business	.0233	.239	.810
Labour	.199	2.04	.041
Peasant	-.0621	-.462	.646
Housewife	.267	1.66	.097

* 0 = Not Immunized
1 = Immunized

The variable, comparison group (Study vs Control group), after adjustment for all potential confounding variables was statistically significant. The older the child, the fewer number of children under five in the family the greater the likelihood of being immunized. Children whose father had a secondary level of education had a lower proportion immunized with B.C.G. than children whose father was illiterate. Children of mothers who were labourers had a higher proportion of immunization for B.C.G. than children whose mothers were office workers.

DPT Basic Immunization

Eleven variables were selected to be included in the logistic regression analysis. Age of child, number of under fives, arm circumference, height and distance from health care facility were the selected continuous variables. Mother's education, father's education, mother's occupation, father's occupation, father's social participation and current user of contraception were the selected categorical variables. There were 2,391 subjects included in this analysis, excluding the 14.7 percent of cases with missing values.

Table 6.3.8 presents the results of the logistic regression analysis, the variables, the coefficient of the variables, the ratio of that coefficient to the standard error and the p-value for significance of the coefficient based on the normal approximation.

As found in the univariate analysis, the comparison group showed no association with DPT Basic Immunization of the child in the multivariate analysis. The older the child, the fewer number of children under five in the family, the more likely of being immunized.

Table 6.3.8 Results of Logistic Regression Analysis for DPT Basic Immunization*

Variable	Coefficient	Ratio to SE	p
Comparison Group 0 = Study Group 1 = Control Group	.0001	.0034	1.0
Age of Child	.0565	5.21	.000
Children Under Five in the Family	-.236	-3.11	.000
Height	.0006	.573	.562
Distance from Health Centre	-.0066	-.227	.818
Arm Circumference	.0017	.407	.682
Father's Education (Reference: Illiterate)			
Primary School	-.0705	-.605	.542
Secondary School	.0496	.503	.617
High School+	.0421	.563	.575
Mother's Occupation (Reference: Office Worker)			
Business	-.0341	-.405	.682
Labour	.172	2.07	.044
Peasant	.0949	.799	.424
Housewife	-.138	-1.07	.285
Father's Participation 0 = Not Participated			
1 = Participated	.127	1.53	.126
Current User of Contraception 0 = Current User			
1 = Not Current User	- .0668	-1.55	.121
Mother's Education (Reference: Illiterate)			
Primary School	.0653	.499	.617
Secondary School	.0654	.634	.529
High School+	.142	1.96	.050
Father's Occupation (Reference: Office Worker)			
Business	-.196	-2.60	.009
Labour	.0699	.754	.453
Peasant	-.0120	-.092	.928

* 0 = Not Immunized; 1 = Immunized

Mothers who were labourers had a higher proportion of children immunized with a second dose of DPT than did mothers who worked in offices. Mothers with a high school education or more had a higher proportion of children immunized with a second dose of DPT vaccine than did illiterate mothers. Children whose fathers' occupation was business (shop, market, etc.) had a lower proportion immunized with a second dose of DPT vaccine.

<u>DPT Extended Immunization</u>

A logistic regression analysis, as previously described, was then carried out. There were 7 variables, namely, age of child, height, sex of child, mother's occupation, father's occupation, father's education and current user of contraception selected from the univariate preliminary analysis of the data. Of these variables, only one variable was related both to Immunization status and comparison group, and 6 were related to one or the other.

Of the 812 children in the health centres included in the DPT Extended Immunization Study, 36 (4.4%) were excluded because of missing values.

Variables, the regression coefficient, the ratio of the coefficient to the standard error, and the p-value for significance of the coefficient are presented in Table 6.3.9.

After adjusting for potential confounding variables, the greater immunization coverage of the Control Group attained borderline statistical significances.

The age of the child remained significant, with the older children more likely to have received three doses of DPT. Mothers who worked as peasants had a higher proportion of children who were

Table 6.3.9 Results of Logistic Regression Analysis for DPT Extended Immunization*

Variable	Coefficient	Ratio to SE	p
Comparison Group 0 = Study Group 1 = Control Group	.173	1.85	.064
Age of Child	.116	6.90	.000
Height	-.0014	-1.29	.197
Sex of Child 0 = Male 1 = Female	.133	1.67	.095
Mother's Occupation (Reference: Office Worker)			
Business	-.145	-.843	.401
Labour	.146	.838	.401
Peasant	.682	2.96	.003
Housewife	.0724	.261	.795
Father's Education (Reference: Illiterate)			
Primary School	.287	1.30	.194
Secondary School	.0767	.412	.682
High School+	-.0283	-.205	.834
Father's Occupation (Reference: Office Worker)			
Business	-.257	-1.73	.084
Labour	.0059	.036	.726
Peasant	.373	1.46	.144
Current User of Contraception 0 = Current User 1 = Not Current User	-.0505	-.630	.529

* 0 = Not Immunized
1 = Immunized

fully immunized than mothers who worked in offices. The other variables found significance in the univariate analysis, i.e. sex and height of child were not significantly related to immunization status in the multivariate analysis.

Polio Immunization

A logistic regression analysis was carried out for Polio immunization using procedures that have been described earlier.

Variables that had a significant relationship either with Polio immunization status or with the comparison group, were included for logistic regression analysis. There were 9 variables, namely, age of child, number of children still alive, height, sex of child, father's education, mother's occupation, father's occupation, father's participation and current user of contraception.

The coefficients for the variables, the ratio of each coefficient to its standard error, and the p-value for the significance of the coefficient are presented in Table 6.3.10.

The immunization status of children in villages without a VHW remained higher, statistically significant, than those in village with a VHW.

The older and taller the children the higher the proportion who were immunized with the Polio vaccine. The smaller the number of living children in the family, the higher the proportion who received a complete schedule of Polio vaccine. Female children had a higher proportion of complete immunization than male children.

Children of mothers who worked as peasants completed their Polio immunization more than did those whose mothers worked in offices, whereas other categories of maternal occupations showed no

Table 6.3.10 Results of Logistic Regression Analysis for Polio Immunization

Variable	Coefficient	Ratio to SE	p
Comparison Group	.569	4.92	.000
0 = Study Group			
1 = Control Group			
Age of Child	.0898	3.63	.000
Children Still Alive in Family	-.233	-3.69	.000
Height of Child	.0055	2.29	.022
Sex of Child	.219	2.27	.023
0 = Male			
1 = Female			
Father's Social Participation			
0 = Not Participated)			
1 = Participated	.479	2.57	.010
Current User of Contraception			
0 = Current User	-.203	-2.13	.033
1 = Not Current User			
Father's Education (Reference: Illiterate)			
Primary School	.184	.675	.497
Secondary School	.0753	.336	.734
High School+	.0315	.188	.[illegible]49
Mother's Occupation (Reference: Office Worker)			
Business	-.158	-.815	.603
Labour	.174	.875	.379
Peasant	1.03	3.62	.000
Housewife	.393	1.18	.238
Father's Occupation (Reference: Office Worker)			
Business	-.0500	-.277	.779
Labour	-.317	-1.62	.105
Peasant	-.158	.521	.803

* 0 = Not Immunized
1 = Immunized

2

MICROCOPY RESOLUTION TEST CHART

NBS 1010a

ANSI and ISO TEST CHART No. 2

1.0 2.8 2.5

3.2 2.2

3.6 2.0

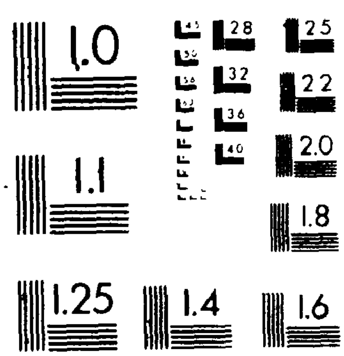
1.1 4.0

1.8

1.25 1.4 1.6

3

MICROCOPY RESOLUTION TEST CHART
NBS 1010a
ANSI and ISO TEST CHART No. 2



differences when compared with mothers who worked in offices.

Fathers who participated in community activities had a higher proportion of children fully immunized against Polio than fathers who did not participate. Parents who were current users of contraception had a higher proportion of children who were fully immunized with Polio vaccine than those parents who were not current users.

6.4 Medical Care for Common Childhood Infections (Diarrhea, Fever or Cough)

6.4.1 Analysis of accessibility to medical care.

The Village Health Worker (VHW) has often been used as the primary vehicle for extending primary health care services to populations not adequately covered by existing services. As the most peripheral worker in the rural health service structure, the VHW is usually expected to provide primary care for the most common health problems and to be easily accessible. Three components of accessibility were known in this study, i.e. cultural, physical and economic (161). Duration of illness from the time the symptoms were observed by the family member to the time of the first contact with the health worker was used as the total measure of accessibility. This measure in further discussion, will be referred to as "time sick-at-home". The villagers are concerned with being "clean", and ready to meet with other people at the health centre or its branch, a fact which may cause delay in taking the sick child for medical care, hence the term cultural accessibility. This problem, however, should be less common when the parents are dealing with the VHW.

The distance from the hamlet to the health centre was used to measure physical accessibility to health care. Although the patients in the study group had a completely accessible VHW, the accessibility of the nearest Health Centre to whom the VHW could make a referral has to be considered in the study group as well as in the control group. The total area of the regencies in the control group is relatively small compared to the total area in the study group. Distribution of subjects according to distance, therefore, was expected to be better in the control group compared to those in the study group.

For the common illnesses under study three days duration of time sick-at-home was taken as the maximal acceptable duration of illness before seeking care.

Three kilometers was used as the cut off-point to differentiate those who had immediate access to the health centre and those who did not have immediate access.

Table 6.4.1 compares the study and control cases, presenting the percentage distribution according to time sick-at-home, and Table 6.4.2 according to distance from the health centre. It was found that, there was little difference between the two groups in the proportion who were sick-at-home for more than three days.

Table 6.4.2 shows that the study group, however, had more cases that were 4 km or more distance from the health centre (19.7 percent), compared to those in the control group (5.7 percent), a difference that was statistically significant.

A further analysis therefore was needed to examine the difference between study and control groups in time sick-at-home according to distance from the health centre. The results are shown in Table 6.4.3. The test for homogeneity of odds ratios was used to

Table 6.4.1 Comparison of Study and Control Cases of Diarrhea, Fever or Cough by Time Sick-at-Home

Time Sick at Home	Percentage Distribution of Cases	
	Study Group N = 1719	Control Group N = 1568
≤ 3 days	93.9	92.6
> 3 days	6.1	7.4

$X^2 = 1.97$ d.f. = 1 $p > .05$

Table 6.4.2 Comparison of Study and Control Cases of Diarrhea, Fever, or Cough by Distance from Health Centre

Distance	Percentage Distribution of Cases	
	Study Group N = 1719	Control Group N = 1568
≤ 3 km	80.3	94.3
≥ 3 km	19.7	5.7

$x^2 = 140.68$ d.f. = 1 $p < .0001$

Table 6.4.3 Percentage Distribution of Illness Duration before Initial Visit by Distance from Health Centre

Distance from HC	Sick-at-Home	Percentage Distribution of Cases: Study Group N	%	Control Group N	%	Odd Ratio*†
< 3 km	< 3 days		93.3		92.8	1.09
	> 3 days		6.7		7.2	
	Total	1381	100.0	1479	100.0	
> 3 km	< 3 days		96.2		89.9	2.63
	> 3 days		3.8		10.1	
	Total	338	100.0	89	100.1	

*Test of Homogeneity of Odds Ratio

$x^2 = 3.945$ d.f. = 1 $p < .05$

† For sick-at-home > 3 days

compare the odds ratios for time sick-at-home in the control group versus the study group according to distance (52). It was found that the proportion sick-at-home longer than 3 days was greater in the control group only for cases at a long distance from the health centre.

Economic Accessibility

There are two methods by which the villagers pay the cost of medication provided by the Village Health Worker. The household may subscribe to a Village Health Insurance Plan (DANA SEHAT) with a low family premium of $.10 per month or the family may pay the discount price of the medicine received. The health centre provides the medication at a very low cost to the Village Health Worker. Patients that are referred by VHW pay a lower rate in the Health Centre compared to those who come by themselves (the latter pay $.20 for service and medication per visit). Therefore it was believed that the cost of care in the control group would be higher than that in the study group. Because the method of payment varied, it was not possible to compare the actual costs. Therefore the family's perceived cost of care was used as a measure of economic accessibility. For this purpose, the total cost rather than just the cost of medication was considered.

The distribution of the perceived total cost of medical care is presented in Table 6.4.4. Eighty-nine percent of the family in the study group perceived that the cost of medical care was cheap, compared to 42.5 percent of the control group. More than half of the control families perceived the cost as moderate, compared to 10 percent of families in the study group. The differences between the

Table 6.4.4 Percentage Distribution of Perceived Overall Cost of Medical Care by Comparison Group

Perceived Cost	Percentage Distribution of Replied	
	Study Group N = 1716	Control Group N = 1557
Expensive	.6	.9
Moderate	10.1	56.6
Cheap	89.3	42.5
Total	100.0	100.0

$x^2 = 815.13$ d.f. = 2 $p < .0001$

groups in their perception of costs were statistically significant.

6.4.2. Analysis of the Quality of Care

Four issues were considered in the analysis of the quality of care: the medications that were given to the patients, the advice offered by the health workers and the compliance of patients to the medication prescribed were considered to represent the process of medical care. The fourth was the outcome of care.

The dissimilarity of total cases between tables in this section was due to missing data.

6.4.2.1. Medication Given to the Patients

The medication prescribed by health workers will be discussed separately for each category of illness, i.e. diarrhea, fever and cough.

<u>Diarrhea</u>

Table 6.4.5 presents the results of the use of oral rehydration. It was found that O.R.S. was given three times more frequently in the study group compared with the control group, a difference which was highly significant. Table 6.4.6 shows that in the control group diarrhea cases received antidiarrhea drugs twice as often as in the study group. This difference was also highly significant statistically. Iodochloroquinoline was the one most often prescribed by the health worker. Table 6.4.7 shows that antibiotics were given nearly four times more frequently in the control group compared to the study group. The difference between the two comparison groups on antibiotics was also statistically significant.

Table 6.4.5 Use of Oral Rehydration Solution for Diarrhea in Study and Control Groups

Oral Rehydration Solution	Percentage Distribution of Cases: Study Group N = 436	Control Group N = 416
Yes	93.1	32.0
No	6.9	68.0
Total	100.0	100.0

$x^2 = 339.87$ d.f. = 1 $p < .0001$

Table 6.4.6 Use of Antidiarrhea Drugs in Study and Control Groups

Antidiarrhea	Percentage Distribution of Cases: Study Group N = 437	Control Group N = 420
Iodochloro quinoline	25.2	57.1
Other	1.4	6.4
Combination	.5	4.3
No Antidiarrhea	73.0	32.1
Total	100.0	99.9

$x^2 = 148.74$ d.f. = 3 $p < .0001$

Table 6.4.7 Use of Antibiotics for Diarrhea in Study and Control Groups

Antibiotics	Percentage Distribution of Cases Study Group N = 439	 Control Group N = 420
Yes	28.5	96.0
No	71.5	4.0
Total	100.0	100.0

$x^2 = 409.80$ d.f. = 1 $p < .0001$

Table 6.4.8 Use of Antipyretic for Fever in Study and Control Groups

Antipyretics	Percentage Distribution of Cases Study Group N = 733	 Control Group N = 659
Yes	96.2	87.9
No	3.8	12.1
Total	100.0	100.0

$x^2 = 32.83$ d.f. = 1 $p < .0001$

Fever

Table 6.4.8 shows that almost every child with fever received an antipyretic both in the study and control groups. A slightly higher proportion of patients received antipyretics in the study group than in the control group, a difference which was statistically significant. Table 6.4.9 shows that in the control group, children with fever were three times more likely to receive antibiotics than those in the study group. The difference was highly statistically significant.

Cough

Table 6.4.10 shows that cough medicine was more often prescribed in the study group than in the control group, a difference which was statistically significant. Table 6.4.11 shows that patients with cough in the control group were nearly four times more likely to receive antibiotics compared with patients in the study group. The difference was statistically significant.

6.4.2.2 Advice Offered by Health Workers

There were three aspects of advice given by the health worker to mothers when they took the sick child for medical care. These will be discussed individually.

Medication

The adult who accompanies the patient should receive a message about how the medicine should be given to the sick child.

Table 6.4.12 shows that in both groups, and for all three illnesses, advice was given about the use of the medication. Advice was given slightly more often in the study group, but although the difference was statistically significant, it was not clinically significant.

Table 6.4.9 Use of Antibiotics for Fever in Study and Control Groups

Antibiotics	Percentage Distribution of Cases: Study Group N = 742	Control Group N = 658
Yes	31.7	92.6
No	68.3	7.4
Total	100.0	100.0

$x^2 = 537.37$ d.f. = 1 $p < .0001$

Table 6.4.10 Use of Cough Medicine for Cough in Study and Control Groups

Cough Medicine	Percentage Distribution of Cases	
	Study Group N = 538	Control Group N = 489
Yes	89.8	60.5
No	10.2	39.5
Total	100.0	100.0

$x^2 = 118.02$ d.f. = 1 $p < .0001$

Table 6.4.11 Use of Antibiotics for Cough in Study and Control Groups

Antibiotics	Percentage Distribution of Cases	
	Study Group N = 538	Control Group N = 489
Yes	29.2	92.2
No	70.8	7.8
Total	100.0	100.0

$x^2 = 418.97$ d.f. = 1 $p < .0001$

Table 6.4.12 Medication Advice Offered by Health Worker in Medical Care Study

a) Diarrhea

Medication Advice	Percentage Distribution of Replies	
	Study Group N = 439	Control Group N = 420
Yes	100.0	96.0
No	0.0	4.0
Total	100.0	100.0
x^2 = 15.68	d.f. = 1	p = .0001

b) Fever

Medication Advice	Percentage Distribution of Replies	
	Study Group N = 742	Control Group N = 658
Yes	100.0	96.8
No	0.0	3.2
Total	100.0	100.0
x^2 = 21.38	d.f. = 1	p <.0000

c) Cough

Medication Advice	Percentage Distribution of Replies	
	Study Group N = 538	Control Group N = 489
Yes	99.8	96.9
No	.2	3.1
Total	100.0	100.0
x^2 = 11.65	d.f. = 1	p <.0001

Feeding Advice

Feeding advice is essential to remind mothers that it is not necessary to withhold food during the illness. Table 6.4.13 presents the feeding advice offered by the health worker. As reported by mothers of fever cases, there were slightly higher proportions of mothers in the study group who claimed that the health worker gave some advice on the child's feeding. However in both study and control groups, a substantial proportion of mothers reported no advice on feeding.

Advice on Breast-Feeding During the Illness

These results apply only to children who were still being breast-fed at the time of the illness. Table 6.4.14 shows that advice on breast-feeding was given to only a minority of mothers, both in the study and control groups, for all three illnesses. Higher proportions of mothers in the study group replied that they had received a message about breast feeding from the health worker, compared with mothers in the control group. These differences were statistically significant.

6.4.2.3 Compliance with Medication

In practice the medication provided by the health centres is for three days treatment, whereas the VHW only provides medication for a maximum of two days. Compliance is defined as the extent to which the patient takes the medications that are prescribed by the health worker.

Table 6.4.15 presents the mean compliance with medication provided by the health worker under study in both comparison groups.

Table 6.4.13 Feeding Advice Offered by Health Worker in Medical Care Study

Feeding Advice	Percentage Distribution of Replies	
	Study Group N = 439	Control Group N = 420
Yes	56.0	57.5
No	44.0	42.5
Total	100.0	100.0

$x^2 = .25$ d.f. = 1 $p > .5$

b) Fever

Feeding Advice	Percentage Distribution of Replies	
	Study Group N = 742	Control Group N = 658
Yes	53.0	43.5
No	47.0	56.5
Total	100.0	100.0

$x^2 = 12.38$ d.f. = 1 $p < .0001$

c) Cough

Feeding Advice	Percentage Distribution of Replies	
	Study Group N = 538	Control Group N = 489
Yes	52.8	54.0
No	47.2	46.0
Total	100.0	100.0

$x^2 = .19$ d.f. = 1 $p > .5$

Table 6.4.14 Breast Feeding Advice Offered by Health Worker in Medical Care Study

a) Diarrhea

Advice	Percentage Distribution of Replies: Study Group N = 252	Control Group N = 237
Yes	40.1	30.4
No	59.9	69.6
Total	100.0	100.0

$x^2 = 4.61$ d.f. = 1 $p < .05$

b) Fever

Advice	Percentage Distribution of Replies: Study Group N = 364	Control Group N = 287
Yes	38.6	29.6
No	61.4	70.4
Total	100.0	100.0

$x^2 = 5.49$ d.f. = 1 $p = 0.02$

b) Cough

Advice	Percentage Distribution of Replies: Study Group N = 250	Control Group N = 264
Yes	43.6	29.5
No	56.4	70.5
Total	100.0	100.0

$x^2 = 10.36$ d.f. = 1 $p = .001$

Table 6.4.15 Compliance, Mean % of Medication Taken, by Comparison Group

Comparison Group	N	X	S.D.	t-value	p
Diarrhea					
Study Group	439	97.8	10.5	1.50	.134
Control Group	420	96.5	13.2		
Fever					
Study Group	742	98.2	8.6	1.34	.180
Control Group	658	97.5	10.8		
Cough					
Study Group	538	98.6	7.9	1.42	.156
Control Group	489	97.8	9.4		

It shows that an average of more than 97% compliance was achieved for all categories of illnesses in both the study and experimental groups. Differences in compliance between study and control populations were not different clinically or statistically.

The relationship between compliance with medication and socio-demographic characteristics of the family is presented in Table 6.4.16. It shows that parental education, father's occupation, participation of parents in the community and the current use of contraception were not significantly associated with compliance. The occupation of the mother, however, had a significant relationship with compliance. Mothers who worked in the office and housewives showed the highest compliance (98%) and mothers who worked in business had the lowest (95%). Although the discrepancy was not clinically significant, statistically it was significant.

6.4.2.4. Outcome of Medical Care

<u>Univariate Analysis</u>

The duration of illness after the initial visit to health workers was used as the criteria of outcome. A good outcome was defined as a duration of 6 days or less. A poor outcome was defined as duration after initial visit of more than 6 days, or the child died, or brought by the parents to another health resources.

The outcomes are presented in table 6.4.18; 6.4.19; and 6.4.20 for diarrhea, fever and cough cases respectively. The proportion of children with a good outcome was slightly higher in the study than in the control group for each of the three illnesses. Although the differences were statistically significant, the magnitude of the

Table 6.4.16 Relationship Between Compliance with Medication and Socio-Demographic Characteristics (Analysis of Variance)

Categorical Variables

Variables	X	S.D.	F-Ratio	p
1. Mother's Education				
Illiterate	98.5	8.3	1.85	.1367
Primary School	97.8	9.9		
Secondary School	97.3	10.9		
High School+	96.5	12.7		
2. Father's Education				
Illiterate	97.8	8.5	.7786	.5060
Primary School	97.[illegible]	9.7		
Secondary School	97.2	10.9		
High School+	97.6	11.5		
3. Mother's Occupation				
Office Worker	98.0	8.7	4.48	.0005
Business	94.7	16.1		
Labour	97.5	11.2		
Peasant	97.4	10.7		
Housewife	98.7	7.7		
4. Father's Occupation				
Office Worker	97.6	10.6	.3225	.8630
Business	97.5	10.3		
Labour	97.7	10.7		
Peasant	97.9	9.8		
5. Social Participation of Mother				
Participating	97.7	10.4	.0316	.8590
Not Participating	97.8	9.9		
6. Social Participation of Father				
Participating	98.2	8.8	1.1157	.2911
Not Participating	97.7	10.3		
7. Current User of Contraception				
Current User	97.8	9.8	.0588	.8085
Not Current User	97.7	10.8		

Table 6.4.17 Relationship Between Compliance With Medication and Socio-Demographic Characteristics

Continuous Variables

Variables	Pearson Corr. Coef. (r)	p	n
Age of Child	.0449	.006	3167
Age of Mother	.0515	.002	3167
Age of Father	.0404	.006	3167
Children Everborn in Family	.0443	.006	3167
Children Still Alive in Family	.0423	.009	3167
Children Less Than 10 Years Old in Family	.0580	.001	3167
Children Less Than 5 Years Old in Family	.0481	.003	3167
Distance from Health Centre	.0116	.256	3167
Height of Child	-.0745	.001	3167
Left-Upper-Mid-Arm Circumference	-.0804	.001	3167

Table 6.4.18 The Outcome of Medical Care for Diarrhea in Study and Control Groups

Outcome	Percentage Distribution of Cases	
	Study Group N = 439	Control Group N = 420
Good Outcome	97.5	91.9
Poor Outcome	2.5	8.1
Total	100.0	100.0

$x^2 = 12.41$ d.f. = 1 $p = .0004$

Table 6.4.19 The Outcome of Medical Care for Fever in Study and Control Groups

Outcome	Percentage Distribution of Cases	
	Study Group N = 742	Control Group N = 658
Good Outcome	96.5	92.1
Poor Outcome	3.5	7.9
Total	100.0	100.0

$x^2 = 12.00$ d.f. = 1 $p = .0005$

Table 6.4.20 The Outcome of Medical Care for Cough in Study and Control Groups

	Percentage Distribution of Cases	
Outcome	Study Group N = 538	Control Group N = 489
Good Outcome	94.2	90.0
Poor Outcome	5.8	10.0
Total	100.0	100.0

$x^2 = 5.89$ d.f. = 1 $p = .0152$

Table 6.4.21 The Outcome of Medical Care for Diarrhea in Study and Control Groups for Immediate Access to Health Care

4

	Percentage Distribution of Children	
Outcome	Study Group N = 439	Control Group N = 396
Good Outcome	97.5	92.6
Poor Outcome	2.5	7.3
Total	100.0	100.0

$x^2 = 9.56$ d.f. = 1 $p = .002$

differences were not clinically significant.

It was believed that distance from the hamlet to the closest health centre or one of its branches might have an effect on outcome. A further analysis to examine this issue was conducted. All cases in the study group were considered to be a short distance from a VHW. In the control group, only cases that had a travel distance of 3 hours or less were considered to have easy access to care.

Tables 6.4.21, 6.4.22 and 6.4.23 present the results of this analysis for diarrhea, fever and cough, respectively.

It is seen that the slightly favourable position of the study group persisted when the comparison was restricted to control children with easy access to health care.

The outcome of medical care is also influenced by the severity of illness. In this study the level of illness severity was judged by a health worker at the initial visit. Because numbers in the categories of very severe, severe and very mild were small, the severity categories were collapsed into moderate and mild.

Tables 6.4.24, 6.4.25 and 6.4.26 present the distribution of cases according to severity in the two comparison groups for diarrhea, fever and cough respectively.

The severity of diarrhea and fever cases was similar in the study and control groups. For patients with cough, however, the control group had a higher proportion of cases of moderate severity than did the study group, a difference which was statistically significant.

Table 6.4.27, 6.4.28, and 6.4.29 present the relationship between the outcome of care and the severity of illness for diarrhea, fever and cough, respectively.

Table 6.4.22 The Outcome of Medical Care for Fever in Study and Control Groups for Immediate Access to Health Care

Outcome	Percentage Distribution of Children	
	Study Group N = 742	Control Group N = 617
Good Outcome	96.5	91.9
Poor Outcome	3.5	8.1
Total	100.0	100.0

$x^2 = 4.33$ d.f. = 1 $p = .038$

Table 6.4.23 The Outcome of Medical Care of Cough in Study and Control Groups for Immediate Access to Health Care

Outcome	Percentage Distribution of Children	
	Study Group N = 538	Control Group N = 465
Good Outcome	94.2	90.3
Poor Outcome	5.8	9.7
Total	100.0	100.0

$x^2 = 4.92$ d.f. = 1 $p = .0266$

Table 6.4.24 Percentage Distribution of Severity of Illness of Diarrhea in Study and Control Groups

Severity of Illness	Study Group N = 439	Control Group N = 420
Moderate	14.4	13.3
Mild	85.6	86.7
Total	100.0	100.0

$x^2 = .11$ d.f. = 1 $p = .7394$

Table 6.4.25 Percentage Distribution of Severity of Illness of Fever in Study and Control Groups

Severity of Illness	Study Group N = 742	Control Group N = 658
Moderate	9.4	11.6
Mild	90.6	88.4
Total	100.0	100.0

$x^2 = 1.45$ d.f. = 1 $p = .2280$

Table 6.4.26 Percentage Distribution of Severity of Illness of Cough in Study and Control Groups

Severity of Illness	Study Group N = 538	Control Group N = 489
Moderate	11.2	18.6
Mild	88.8	81.4
Total	100.0	100.0

$x^2 = 10.777$ d.f. = 1 $p = .001$

Table 6.4.27 Relationship Between Severity and Outcome of Medical Care for Diarrhea (Study and Control Groups Combined)

Outcome	Percentage Distribution of Cases	
	Moderate N = 119	Mild N = 740
Good Outcome	79.0	97.3
Poor Outcome	21.0	2.7
Total	100.0	100.0

$x^2 = 65.56$ d.f. = 1 $p < .0001$

Table 6.4.28 Relationship Between Severity and Outcome of Medical Care for Fever (Study and Control Groups Combined)

Outcome	Percentage Distribution of Cases	
	Moderate N = 146	Mild N = 1254
Good Outcome	66.4	97.7
Poor Outcome	33.6	2.3
Total	100.0	100.0

$x^2 = 236.83$ d.f. = 1 $p < .0001$

Table 6.4.29 Relationship Between Severity and Outcome of Medical Care for Cough (Study and Control Groups Combined)

	Percentage Distribution of Cases	
Outcome	Moderate N = 151	Mild N = 876
Good Outcome	70.9	95.9
Poor Outcome	29.1	4.1
Total	100.0	100.0

$x^2 = 108.88$ d.f. = 1 $p < .0001$

It is evident that the severity of illness, as judged by the health worker, showed a highly clinically and statistically significant relationship with outcome. A poor outcome for cases of moderate severity of illness was found to be 8, 15 and 7 times more frequent than for cases of mild severity for diarrhea, fever and cough, respectively.

The relationship between outcome and medication prescribed for diarrhea cases is described in Table 6.4.30.

It shows that diarrhea cases who did not receive antibiotics more often had a good outcome compared with cases who received antibiotics. The difference is statistically significant.

The antibiotic was given by the health worker in the health centre. Patients in the study group who were referred by VHW to the Health Centre were likely those who still had the illness for more than 2 days after the initial visit, which means that they were among those who had longer duration of illness. Medication, including antibiotics, was given by the health centre for only 3 days, which is clearly not enough for infectious illnesses. These were the most probable conditions that might influence the relationship between antibiotic medication and the outcome of medical care.

There was no significant difference in outcome observed between cases who received antidiarrhea drugs and those who did not receive such drugs.

Diarrhea cases who received oral rehydration solution (O.R.S.) showed slightly higher proportions with good outcome compared with those who did not receive O.R.S. This difference was statistically significant.

Table 6.4.30 Relationship Between Outcome of Medical Care and the Medications Prescribed for Diarrhea

		n	% Good Outcome	p
1.	Received Antibiotics	528	92.8	.001
	Did Not Receive Antibiotics	331	97.9	
2.	Received Antidiarrheal Drugs	407	93.4	.1122
	Did Not Receive Antidiarrheal Drugs	452	96.0	
3.	Received O.R.S.	541	95.9	.0443
	Did Not Receive O.R.S.	318	92.8	
4.	Received Home Remedies Before Initial Visit	518	93.0	.0057
	Did Not Receive Home Remedies Before Initial Visit	341	97.0	
5.	Received Home Remedies After Initial Visit	790	94.8	.4356
	Did Not Receive Home Remedies After Initial Visit	69	92.3	

Home treatment before the initial visit showed a relationship with outcome. Diarrhea cases who received a home remedy before the initial visit showed a lower proportion of good outcome compared with cases who did not receive home treatment. This difference is statistically significant. Home treatment after the initial visit, however, showed a smaller relationship to outcome which was not statistically significant.

Table 6.4.31 presents the relationship between outcome of medical care and medication for fever cases.

As with diarrhea, it was found that cases who did not receive antibiotics had a higher proportion of good outcome compared with those who received antibiotics. Although the difference is small it is statistically significant.

Little relationship with outcome of antipyretic drugs and home remedies was found for fever cases.

Table 6.4.32 presents the relationship between outcome of medical care and medication for cough cases.

Cases who did not receive antibiotics showed a slightly higher proportion of good outcome than those who did receive antibiotics, the difference just approaching a significant level (p = .07). A simrlar result was found for cough medicine.

Home remedies, whether taken before or after the initial visit showed no relationship to outcome for cough cases.

Appendix XI presents the relationship between outcome of medical care and continuous independent variables. It was found that only duration of sickness before initial visit (time sick-at-home) in fever and cough cases had a relationship with outcome. Those who

Table 6.4.31 Relationship Between Outcome of Medical Care and the Medication Prescribed for Fever

	n	% Good Outcome	p
1. Received Antibiotics	844	92.9	.002
Did Not Receive Antibiotics	556	96.8	
2. Received Antipyretic	1291	94.4	1.00
Did Not Receive Antipyretic	109	94.5	
3. Received Home Remedies Before Initial Visit	896	94.6	.6412
Did Not Receive Home Remedies Before Initial Visit	504	94.0	
4. Received Home Remedies After Initial Visit	1286	94.6	.2591
Did Not Receive Home Remedies After Initial Visit	114	92.1	

Table 6.4.32 Relationship Between Outcome of Medical Care and Medication for Cough Cases

	n	% Good Outcome	p
1. Received Antibiotics	608	91.0	.0703
Did Not Receive Antibiotics	419	94.0	
2. Received Cough Medicine	796	91.5	.1253
Did Not Receive Cough Medicine	231	94.8	
3. Received Home Remedies Before Initial Visit	738	92.3	1.0000
Did Not Receive Home Remedies Before Initial Visit	289	92.2	
4. Received Home Remedies After Initial Visit	959	92.4	.7174
Did Not Receive Home Remedies After Initial Visit	68	90.3	

had a poor outcome had a slightly longer time sick at home before the visit to a health worker than did those who had a good outcome, a difference which was statistically significant. The other variables, namely, compliance, age, height, and arm circumference, age of the parents, number of children in the family were not significantly related to outcome.

Logistic Regression Analysis of Medical Care Study

Further analysis to compare the outcome of medical care between study and control groups used logistic regression to adjust for potential confounding factors (41).

Two methods were used to select the variables that were included in the regression equation. First, the results of the univariate analysis identified independent variables that had a significant relationship with outcome. Other variables were added if they were felt to be potentially important on clinical or epidemiological grounds even if they did not reach significance in the univariate analysis.

Variables that related to medical care provided by health workers were not included in the analysis. These variables were the use of antibiotics (diarrhea, fever and cough) and ORS in diarrhea.

Logistic Regression Analysis for Outcome of Diarrhea

Table 6.4.33 presents a summary of the logistic regression analysis for outcome of diarrhea.

A total of 851 cases were included in the analysis - the number for whom information was available for all of the variables examined. Because of missing values, 0.9% were excluded from the analysis. Good outcome is coded 0, poor outcome is coded 1.

Table 6.4.33 Results of Logistic Regression Analysis for Outcome of Diarrhea*

Variables	Coefficient	Ratio to SE	p
Severity of Illness 0 = Mild 1 = Moderate/Severe	1.48	11.9	.000
Compliance with Medication	.001	2.18	.029
Comparison Group 0 = Study Group 1 = Control Group	.281	1.94	.052
Distance (km) from Health Centre	-.148	-1.72	.085
Home Remedies Before Initial Visit 0 = Received Home Treatment 1 = Did not Receive Home Treatment	-.168	-1.55	.121
Arm Circumference	.01	1.28	.201
Number of Siblings Aged Less Than 10 Years	.09	1.06	.289
Occupation of Father Office Worker = Reference			
Business	-.117	-.704	.484
Labour	-.03	-.142	.889
Peasant	.258	1.00	.317
Education of Father Primary School = Reference			
Illiterate	-.026	-.08	.936
Secondary School	.232	.94	.347
High School+	-.144	-.352	.726
O.R.S. 0 = Did Not Receive ORS 1 = Received ORS	-.131	-.98	.327
Height	-.001	-.679	.497
Antibiotics 0 = Did Not Receive Antibiotics 1 = Received Antibiotics	-.003	-.03	.764

* 0 = Good Outcome
1 = Poor Outcome

It shows that comparison group just approached a statistically significant relationship with outcome, after adjustment for the potential confounding variables (p = .052). The sign of the regression coefficient indicates that the study group had a higher proportion of children with a good outcome than did the control group. The odds ratio of good outcome in villages with a VHW as compared with villages without a VHW was 1.75 (95% confidence interval of .994 - 3.10), a reduction from the odds ratio of 3.43 found in the univariate analysis.

The severity of illness and compliance with medication had statistically significant relationships with outcome. The inverse association of compliance may represent increased use of medication when recovery is delayed.

If the treatments, ORS and Antibiotics, had been significantly associated with a good outcome in the regression analysis, it would have been desirable to repeat the analysis with the treatment variables excluded in order not to obscure a comparison group effect that was due to better treatment in one group than in the other. Since the treatments did not show a significant relationship with outcome after adjustment for other variables, this was not necessary.

<u>Logistic Regression Analysis for Outcome of Fever</u>

The summary of the logistic regression analysis for fever was presented in Table 6.4.34. A total of 1401 subjects was included in the analysis, with no missing values observed. The comparison groups, after adjusted for other potential confounding variables, did not have a statistically significant relationship with outcome. The odds ratio of 1.15, with 95% confidence interval of .629 - 2.09 is a reduction from the odds ratio of 2.36 found in the univariate analysis.

Table 6.4.34 Results of Logistic Regression Analysis for Outcome of Fever*

Variables	Coefficient	Ratio to SE	p
Severity of Illness 0 = Mild 1 = Moderate/Severe	1.52	14.3	.0001
Distance from Health Centre	-.175	-2.63	.009
Antibiotic Medication 0 = Did Not Receive Antibiotics 1 = Received Antibiotics	.162	1.83	.067
Compliance with Medication	.001	1.78	.075
Presence of Other Illnesses 0 = No Other Illnesses 1 = With Other Illnesses	-.016	-.19	.849
Height	-.000	-.03	.976
Arm-Circumference	-.008	-1.21	.226
Comparison Group 0 = Study Group 1 = Control Group	-.069	-.732	.465

* 0 = Good Outcome
1 = Poor Outcome

It shows that only severity of illness and the distance from the health centre or one of its branches had a statistically significant relationship with outcome.

Logistic Regression Analysis for Outcome of Cough

Table 6.4.35 presents the summary of the logistic regression analysis for cough cases. All of the 1027 cough cases were included in the analysis. The comparison group, study vs control, no longer had a significant relationship with the outcome. The odds ratio of good outcome for cough was 1.36, with 95% confidence interval of .923 - 2.01, is a reduction from the odds ratio of 1.82 found in the univariate analysis.

It shows that severity of illness and compliance with medication had a positive significant relationship with outcome.

6.4.3 Analysis of Mortality in Study and Control Populations

The mortality study was carried out over a period of six months and covered a total of 32 sub-districts. Data on 325 deaths of children aged less than 5 years collected from 359 deaths that were recorded by the study worker, gave missing data of 9.5 percent.

The mortality rates for children under five, from all causes in the study and control groups were 37 per 10,000 and 41 per 10,000 respectively. The ratio of the rates is 1.11 with 95% confidence limits of .85 - 1.26. The statistical power for the mortality study, based on the data collected (α = .05, 2 tailed), was only 18.9%.

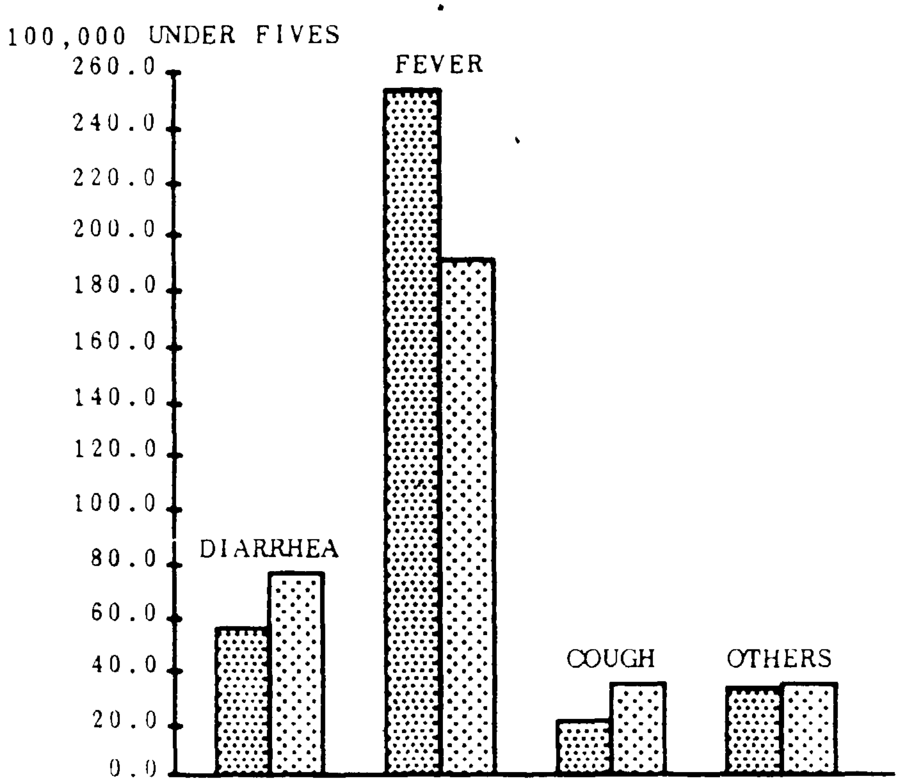
Figure 6.1 presents the Cause Specific Mortality Rate according to Comparison Group. For diarrhea the control population had a higher mortality rate than the study population. The ratio of the two rates is 1.36, with 95% confidence limits of .819 - 2.26. The study

Table 6.4.35 Results of Logistic Regression Analysis for Outcome of Cough*

Variables	Coefficient	Ratio to SE	p
Severity of Illness 0 = Mild 1 = Moderate/Severe	1.24	11.9	.0001
Compliance with Medication	.001	2.63	.009
Distance from Health Centre	.093	1.69	.091
Height	.001	1.42	.156
Antibiotics Medication 0 = Did Not Receive Antibiotics 1 = Received Antibiotics	-.124	-1.32	.187
Arm-Circumference	-.004	-.692	.490
Comparison Group 0 = Study Group 1 = Control Group	.154	1.42	.156
Social Participation of Father 0 = Yes 1 = No	-.431	-.697	.490

* 0 = Good Outcome
1 = Poor Outcome

Figure 6.1 Cause Specific Under Five Mortality Rate According to Comparison Group



Study Group (N = 46,378)

Control Group (N = 45,877)

population had a higher mortality rate from fever than the control population. The ratio of rates is .75 with 95% confidence limits of .58 - 1.12. The control population also had a higher mortality rate from cough. The ratio of rates is 1.62 with 95% confidence limits of .73 - 3.56. Death rates from other causes were nearly identical in the two populations.

Table 6.4.36 presents the source of health care by cause of death.

It showes that medical care (hospital, health centre, physician, private paramedic or V.H.W.) had been consulted for more than 50 percent of the deaths. Traditional medicine, however, had been used more often for fever and "others" illnesses than for diarrhea and cough. Although 11.5 percent of death caused by diarrhea were untreated, this proportion was much lower than for fever, cough and other causes of illness.

The relationship between the last health resources used before the child death was presented in Table 6.4.37.

In both groups the utilization of medical care (hospital, health center, physician, private paramedic or V.H.W.) were similar. In the study group there was more traditional medicine used as the last resource (21 percent) compared with that in the control group (12 percent).

Table 6.4.36 Relationship Between Cause of Death and The Last Health Resource Used

Health Resources	Diarrhea N = 61	Fever N=206	Cough N = 26	Others N = 32
Medical Care	67.2	53.4	69.2	56.3
Traditional Medicine	8.2	19.4	7.7	21.9
Home Treatment	13.1	8.7	3.8	.0
No Treatment	11.5	18.4	19.2	21.9
Total	100.0	99.9	99.9	100.1

$x^2 = 14.37$ d.f. = 9 $p = .1097$

Table 6.4.37 Percentage Distribution of Last Health Resources Used Before the Child's Death by Comparison Group

Health Resources	Study Group N = 170	Control Group N = 155
Medical Care	57.1	58.1
Traditional Medicine	20.6	12.3
Home Treatment	4.1	12.9
No Treatment	18.2	16.8
Total	100.0	100.0

$x^2 = 11.03$ d.f. = 3 $p = .0116$

Chapter VII

Discussion

7.1. Introduction.

An attempt was made in this study to investigate the benefit of having village health workers as a component of the health care system in delivering child health care in rural areas of the Yogyakarta Special Territory.

It is the purpose of this discussion to examine the results of the study in light of the Expanded Program on Immunization and Child Health Care.

7.2. Consideration of the findings with respect to the Expanded Program on Immunization. (E.P.I.)

Two aspects of E.P.I. were studied, maternal knowledge of pertussis and DPT immunization, and the actual immunization status of the children.

The village health worker is a health worker who supposedly provides health education related to the E.P.I. to villagers in her area. It was expected that maternal knowledge of the pertussis and DPT immunization program would be better in villages with village health workers than in villages without village health workers.

This study observed that there were more mothers in the study group who recognized the symptoms of pertussis than mothers in the control group. This difference was unlikely to be the result of VHW intervention.

The most probable explanation of this result was that more mothers in the study group had seen pertussis compared with mothers in the control group. As reported by the mothers, more children in the study group had contracted pertussis than children in the control group. This may be related to the lower DPT immunization coverage in the study group during the years prior to the study period. Soediyanto (130) reported that the DPT Basic Immunization coverage of children in the regencies which are included in the study group was 35.5% in 1978-79 and 51.8% in 1979-80, whereas for regencies which are included in the control group it was 43.6% in 1978-79, and 64.0% in 1979-80.

Maternal perception that DPT immunization is efficaceous in preventing children from contracting pertussis was similar in the study and control groups. Further, it was observed that in the study group a small proportion of mothers claimed that their knowledge of the DPT immunization schedule was received from the village health worker.

Maternal perceived severity of pertussis in the study group did not show an important difference from that in the control group, although it was statistically significant, whereas maternal perceived susceptibility of children to pertussis was shown to be similar in the study and control groups.

It was interesting to note that mothers who perceived that pertussis was moderate or severe had more children who completed DPT Basic Immunization, and that mothers who perceived that their children were not susceptible to pertussis had a significantly higher proportion of children fully immunized with DPT Basic Vaccines. These findings suggest that mothers who perceived that pertussis is severe were more likely to bring their children for immunization, and mothers whose children were fully immunized with DPT Basic Vaccines perceived that their children were not susceptible to pertussis. This means that these mothers believed that DPT immunization is efficaceous in preventing their children from contracting pertussis.

Mothers' replies to questions asked concerning their perception of the efficacy of DPT immunization showed no relationship with the completeness of the immunization status of their children. This may have been partly due to the fact that not all mothers who agreed that DPT immunization is efficaceous had yet had an opportunity to show that they would comply with DPT immunization.

The coverage of DPT Basic Immunization was similar in the study and control groups. In a population where obedience to authority is high, the managerial skill needed to execute an immunization program is more complex than in a more developed society. There needs to be a satisfactory relationship with the local people in planning the strategy for implementing the program. The village leader's support is very important in getting mothers to bring their children for immunization. Parents should not only get the order to bring the child to the collection point, but they also should receive information about the benefits of immunization to the child. Side effects that may occur after immunization must be stated (8,140) to avoid a subsequent negative reaction to immunization by the community. A knowledge of the individual immunization status of children in the village is important in sending a specific message to the right parents.

The results of this study imply that it is necessary for the village health workers program to evaluate the training of the village health worker in relation to the immunization program. The communication between the VHW program and the village leaders should be improved. It is considered to be important to share the responsibility of health issues (in this case spreading the information on immunization service to villagers) from village leaders to village health workers.

7.3. Consideration of the findings with respect to child health care.

This study was able to investigate child health care in rural areas provided by a health care system with village health workers and a health care system without village health workers.

Three issues will be discussed in this subsection, i.e. Maternal knowledge of childhood diarrhea, the process of medical care provided by the health worker, and the outcome of medical care for three common childhood illnesses.

Maternal knowledge of childhood diarrhea

The awareness of parents, especially mothers, of the relative importance of diarrhea in childhood is necessary for the health care system to implement its mission in the community.

Studies of health education to improve the awareness of mothers showed that the occurrence of diarrhea in childhood was reduced (17,101). An understanding of the nature of maternal knowledge of diarrhea in childhood is needed in order to develope a suitable health education program in the community. This study observed that only 30 percent of the mothers in rural villages believed that diarrhea is transmitted by food, milk and water. This issue is important because knowledge concerning the prevention of contamination of food, milk and water in child feeding is essential for the prevention of diarrhea.

Village health workers should motivate mothers and society in general to practice personal and feeding hygiene regularly and continuously, taking into account the barriers against doing so; i.e. cost, inconvenience and cultural beliefs. It is imperative to mention that adequate water supply and sanitation should be part of the overall community health program, in order to reduce diarrhea morbidity and mortality (34,164).

It was found that maternal awareness that dehydration is the consequence of diarrhea was similar in both study and control groups. Based on this result it was expected that maternal perception of the use of oral rehydration solutions as the home treatment for diarrhea should be similar in the study and control groups. However, the results showed that twice the proportion of mothers in the study group perceived that oral rehydration is the home treatment for diarrhea. These results suggest that village health workers concentrated on diffusing the use of ORS for diarrhea in the population, rather than explaining the reason for use of oral rehydration for diarrhea.

In the multivariate analysis, adjusted for other independent variables, the proportion of mothers who perceived that diarrhea is severe was greater in the control group than in the study group.

The proportion of mothers having knowledge of the cause and consequences of diarrhea in childhood was found to be similar in the study and control groups. These findings indicate that VHW's have not educated the villagers on the severity of diarrhea, other than by promoting the use of oral rehydration.

The training and performance of village health workers related to the diarrhea disease control program should be evaluated in order to optimize the benefit of the village health worker scheme.

The Process of Medical Care for Children

Delay in bringing the sick child to the health worker was significantly shorter in the study group suggesting that cultural, physical and economical barriers to accessibility to the health care system were overcome with the introduction of the village health workers. Rahaman et al. (105) observed that attendance at the diarrhea clinic was reduced with distance, and the diarrhea-related mortality rate increased with distance.

This study failed to investigate all the processes of medical care provided by health workers for diarrhea, fever and cough. Amondo-Lartson and DeVries (5) used 4 indicators of the tracer conditions for diarrhea, fever and cough, i.e. History-taking, examination, treatment and prescription. Only the treatment and prescription provided by health workers in the study and control groups could be evaluated in the present study.

Treatment, i.e. medication, given by the health worker in the study group was shown to be less agressive than in the control group.

Amondo-Lartson et al. (5) observed that the health workers in their study gave anti-diarrhea drugs to 98.6% of cases and oral rehydration to 4.1% of cases. In the present study, 27% and 93.1% of the children with diarrhea were provided with anti-diarrhea drugs and oral rehydration respectively by the village health workers. In the control group it appeared that the health centre personnel were less likely to give oral rehydration but more likely to give anti-diarrhea drugs.

The excess use of antibiotics found in the control group (above 90% of all cases received antibiotics) is considered to indicate that the health centres may be doing more harm than good. This policy of an excessive use of antibiotics may produce significant problems of microbacterial resistancy in the community.

Advice about how to take the medication prescribed was given to almost every mother in both the study and control groups, an observation similar to that made by Amondo-Lartson et al. (5).

Advice concerning feeding of the sick child given by the health worker, as stated by mothers, was sparse both in the control and study villages. Advice related to breast feeding, during an illness for children who were still nursing, was found to be low in both study and control groups. However, it was shown that frequency of advice related to breast feeding in the study group was higher than that in the control group, the difference being statistically significant. This finding may be related to the fact that a breast feeding campaign was included in the village health worker training. However, since only 40% of nursing mothers in the study group received advice related to breast feeding, there is clearly room for improvement in this aspect of the VHW's training.

<u>The Outcome of Medical Care</u>

Egemen et al. (47) observed that the use of ORS by the health worker, in addition to standard treatment, significantly reduced duration of illness, and Rahaman et al. (104) found that the distribution of ORS in the community reduced the case fatality rate of diarrhea cases. The health care system in the study group placed great emphasis on the distribution of oral rehydration in the community.

Although there was a small difference favouring the study group in the outcome of diarrhea, it was found in the multivariate analysis to be only of borderline statistical signifience. Two studies (6,68) compared the use of ORS plus a standard treatment with the standard treatment alone in the community and found that duration of illness in both groups was not different, whereas Santosham et al. (120) found that duration of diarrhea was similar between hospitalized cases who were treated with ORS and those without ORS.

The outcome diarrhea in the present study was based chiefly upon duration of illness after the initial visit to the health worker. The main effect of ORS, however, is not to reduce duration of illness, but more to control the loss of and to maintain the balance of fluids and electrolytes. Therefore, it is not surprising that although the study group used ORS much more than the control group, the outcome of diarrhea was only slightly better for the study group cases. Nevertheless, ORS is expected to reduce mortality related to diarrhea (150). The sample size in this study was not large enough to provide a high probability of detecting a statistically significant difference in mortality. The observed difference in mortality from diarrhea favoured the study group but was not statistically significant.

It has been observed in several studies that medical care provided by different health professionals does not alter significantly the course of undifferentiated fever in children (80). Most of the undifferentiated fevers in childhood are of unknown causal origin, probably viral infections, which are self-limited illnesses.

Several studies observed that the use of antibiotics in the management of undifferentiated respiratory tract infection was not efficaceous (3,82). Probably this is because the majority of respiratory infections in childhood are caused by viral agents and most of these illnesses are usually self-limiting without complications. In this study, after adjustment for confounding variables, it was found that the outcome for fever and cough was similar in the study and control groups, as would be expected.

The incidence of acute respiratory infections (ARI) of children aged less than 5 years in Indonesia was 75.9 per 1,000 children (22) which was similar to the rate in other developing countries and nearly twice as high as in developed countries (46,163). It is unlikely in the short term that improvement of health and welfare conditions to reduce susceptibility of children to ARI will take place. Medical measures, however, are essential to reduce mortality from pneumonia complicating such infections. It was found in this study that children with cough who received initial medical care from VHWs had a similar outcome to those who received initial medical care from health centres. The most probable explanation is that most of the acute respiratory infections in this study needed only symptomatic treatment and the few that required treatment for complications had been referred to the health centre by the VHWs.

WHO (162) and Shann et al. (125) described the usefulness of a flow chart for the management of ARI. The use of such a flow chart by VHW's in the management of children with cough might be advisable.

7.4. Consideration of findings with respect to the Village Health Worker

Many studies have shown that the availability of the VHW in the community improves the utilization of the health care system by reducing the problem of accessibility to health facilities for the villagers (14,157). This study failed to show that the coverage of DPT Basic Immunization in the villages with VHWs was at least 10 percentage points higher than in those villages without village health workers. The possible explanations of this failure are as follows. First, more time may be needed for the health care system with village health workers to increase immunization coverage beyond the level already achieved. A more likely explanation, based on the observations of this study, indicates that the village health workers did not inform mothers about the immunization service. Essentially it appears that the village health worker played no role in the immunization program. Thus the participation of the village health worker in the immunization program needs improvement.

Planners of immunization programs should explicitly use village health workers to deliver information to mothers about the immunization service. However, the local authority with its political power should back up the activity of VHWs in the community, and, as mentioned before, share the responsibility to spread the information about immunization. In the report of the integrated health services (POS YANDU) provided by the health centre, the role of village health workers in the implementation of immunization programs was not acknowledged (72).

This study observed that the VHW had educated a substantial proportion of people about ORS as the first aid for diarrhea. This is a convincing example of the fact that village health workers are able to influence villagers toward a better health practice.

The two different results found in this study, i.e. the role of the village health worker in the immunization programs and the role of the VHW in the diarrhea control program, indicate that health planners did not maximize the ~~use~~ of the village health worker to support the health centre program in the community.

The major concern of the new national health program, through an integrated approach to health, nutrition and family planning in Indonesia, is to create health awareness, to prevent disease, to provide medical care, to improve the nutrition of the family, and to provide contraceptive services (138). In the implementation of this five-part program the emphasis has been on the mobilization of the health centre's personnel in the expectation of increasing the coverage of the health service system (72). Therefore a team from the health centre visits the villages in a subdistrict every two months.

The advantage of this program is that it bears a high political commitment at all levels of the administrative structure, which may play a big role in increasing the compliance of the populations to the programs.

However, since the visiting cycle is 2 months and the occurence of illness is not concentrated on the day of the visit, the problems of accessibility and availability of immediate and continued care are unlikely to be corrected by this approach. Although this periodic visiting may be suitable for the family planning program, it is too irregular to be effective in improving the treatment of illness.

Based on the results of this and other studies, it appears that a properly managed village health worker scheme could replace the peripheral visiting program, mentioned above.

The main cost of the village health worker scheme in Indonesia is for training, supervision, maintenance and rewards for village health workers. These costs should be shared between the government and the community.

The replacement of the peripheral visiting programs with the village health worker scheme raises some important issues concerning cost. The results of this study suggest that the excessive use of antibiotics and anti-diarrhea drugs in the regular health care system would be reduced significantly if the village health worker scheme was implemented. Lerman et al. (81) estimated that the annual cost of the management of diarrhea can be reduced by 50% if the use of antibiotics in the health centre is restricted. The cancellation of the peripheral visiting program, which the VHW scheme would allow, would also reduce costs. These two sources of savings would help to offset the costs of the village health worker.

This study has shown that the addition of VHWs to the existing health care system did not lead to a poorer outcome of illness. These results indicate that village health workers can be safely used as a neighborhood extension of the health centre system, and might produce a health benefit if they were more actively involved in immunization.

7.5. Limitations of the Study

From the beginning of the study it was recognized that caution should be exercised in interpreting results.

The study of immunization, maternal knowledge of childhood infections and mortality had an "after-only" design. Therefore, changes in the events under investigation before and after the implementation of the village health worker scheme could not be measured.

This study clustered the individual sample into four regencies; two regencies each for the study and control groups. The study, therefore, contributed less information than if the data had been collected from a larger number of regencies (21). This means that the generalizability of the study results are limited to the regencies included in the study.

It may not have been possible to completely prevent the abstractors and other health centre personnel from being aware of the study's hypothesis. This could have created a bias in that, as the result of professional solidarity, the abstractors might have been prone to see a good outcome of the care provided by their colleagues at the health centre. Such a bias, if it occurred, is more likely to have arisen in the control group, because in the study group there was no such relationship of solidarity between abstractors and village health workers.

The awareness of health workers in the control group of the nature of the study could have created a rivalry bias, thereby improving the performance of medical care above the level regularly practiced. This could have happened in the control group because the health centre's personnel would have a feeling of pressure due to comparison with another type of health worker with lower qualifications. This feeling of pressure would be less likely among village health workers.

These two biases, if they occurred, would have led toward a better outcome in the control group. However, this study found that for diarrhea, fever and cough, the outcome of medical care did not differ between control and study groups. These results are not what would be expected if the solidarity and rivalry biases were operating.

The selection of which villages would have a VHW and which would not was beyond the control of the author. The two regencies which received the village health worker scheme were the most in need of improvements in health and development services. For this reason it might be expected that the results would have been better in the control group, because it was more advanced socioeconomically. A multivariate analysis was applied in order to adjust for the differences in socio-demographic characteristics that could have acted as confounding variables. Although adjustment for measurable confounders is important, this procedure is not a substitute for a randomized experimental intervention. The latter would have been preferable but was not possible.

7.6. Direction of Future Research

Results of the present study raised several suggestions with regard to the usefulness of the addition of a VHW to the existing health service system.

Since the benefits of having a VHW added to the existing health service system for the immunization program were found to be minimal, further study is needed of the efficacy of health education and individual immunization records provided by VHWs to improve the immunization coverage of EPI. Such a study should be designed as a randomized intervention.

Since this study showed that the village health workers provided adequate medical care for common childhood illnesses, a full cost-benefit analysis of the village health worker scheme should be carried out.

The present study was too small to detect a significant reduction of mortality of children under five from diarrhea as the result of extensive use of oral rehydration solution by village health workers. A randomized intervention trial should be undertaken to measure the extent to which mortality in children under five can be reduced by a properly managed village health worker scheme. The sample size should be sufficient to detect a reduction in mortality of at least 50 percent.

Chapter VIII

Summary and Conclusions

A study of the effects of adding a village health worker to the regular health care systems in the coverage of Childhood Immunization, Maternal Knowledge of childhood infections and Medical Care for diarrhea, fever or cough has been conducted in the Yogyakarta Special Territory of Indonesia.

In the multivariate analysis, the DPT Immunization status of children between villages with and without village health workers was not statistically significantly different. Coverage of BCG immunization was better in villages with village health worker, but Polio immunization was better in villages without village health workers.

No outstanding or consistent differences were found between study and control villages in maternal knowledge of childhood infections. In both groups, knowledge was less than optimal.

In the univariate analysis, the health care system with VHWs showed a better outcome for diarrhea, fever and cough than the health care system without village health workers. After adjustment for potential confounding variables the differences were not significant.

The over-all mortality rate and the mortality rate from diarrhea in children under five years of age was lower in the villages with village health workers but the difference did not reach statistical significance.

The results suggest that the village health workers provide adequate care for common childhood illnesses. Definitive studies need to be carried out to evaluate the management of the scheme and to determine the best means of training of the village health worker to provide preventive services (immunization) as well as therapeutic services for common illnesses.

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Appendix I

List of Study Areas

Table 1:	List of Villages Included in the Immunization and Medical Care Study
Table 2:	List of Subdistricts Included in the Mortality Study

Table 1 List of Villages Included
in the Immunization and Medical Care Study

Group	District	Health Centre	Village
Study Group	Gunung Kidul	Rongkop	Semugih*
			Pucanganom
			Karangwuni
		Ponjong	Sumbergiri
			Genjahan
			Ponjong*
			Sidoreju
		Semin	Kalitekuk*
			Bulurejo
			Sumberejo
			Bendung
			Rejosari
		Karangmojo	Ngawis*
			Wiladeg
			Bejiharjo
		Playen	Bandung*
			Ngunut
			Logandeng
			Ngleri
		Paliyan	Karangduwet
			Karangasem
			Pampang
			Jetis*
			Giring
	Kulon Progo	Kalibawang	Banjararum*
			Banjarasri*
			Banjarharjo
			Banjaroyo
		Nanggulan	Donomulyo
			Wijimulyo*
			Tanjungharjo
			Jatisarono
		Pengasih	Kedungsari
			Sendangsari
			Pengasih
			Karangsari*

Group	District	Health Centre	Village
		Galur	Karangsewu Banaran* Pandowan Tirtorahayu
Control Group	Sleman	Prambanan	Madurejo* Sambirejo Wukirharjo Bokoharjo Sumberharjo
		Ngemplak	Widodomartani* Bimomartani Sindumartani Umbulmartani Wedomartani
		Turi	Donokerto* Bangunkerto Girikerto Wonokerto
		Minggir	Sendangarum* Sendangsari Sendangrejo sendangagung
		Moyudan	Sumberagung* Sumberrahayu Sumberarum
	Bantul	Pajangan	Triwidadi* Sendangsari Guwosari
		Pandak	Wijirejo Gilangharjo Triharjo*
		Srandaican	Trimurti* Poncosari
		Kretek	Tirtosari* Tirtomulyo Tirtohargo Donotirto Parangteritis

Group	District	Health Centre	Village
		Dlingo	Muntuk*
			Temuwuh
			Dlingo
			Terong
			Jatinulyo
			Mangunan

*Immunization Study Area

Table 2 List of Sub-Districts Included in Mortality Study

Group	District	Sub-District
Study Group	Gunung Kidul	Tepus
		Rongkop
		Ponjong
		Semin
		Karangmojo
		Playen
		Paliyan
		Panggang
	Kulon Progo	Kalibawang
		Nanggulan
		Pengasih
		Lendah
		Galur
		Sentolo
		Temon
		Kokap
Control Group	Sleman	Prambanan
		Berbah
		Cangkringan
		Ngemplak
		Turi
		Moyudan
		Minggir
		Gamping
	Bantul	Pajangan
		Pandak
		Srahdakan
		Kretek
		Dlingo
		Piyungan
		Sanden
		Sedayu

Appendix II

Questionnares and Records Used in the Study

F1. List of Children for Immunization Study

F2. Personal and Socio-Demographic Characteristics Questionnaire Form

F3. Maternal Knowledge of Child Health Questionnaire Form

F4. Medical Record Form

F5. Illness Monitoring Card Form

F6. Abstract From Medical Record Form

F7. Medical Care Study Questionnaire for Study Group Form

F8. Medical Care Study Questionnaire for Control Group Form

F9. Mortality Study Questionnaire Form

Appendix II

F.1

List of Children for Immunization Survey
Born January 1982 - June 1983

Village :
Sub-District :
District :

No.	Child Name	Age/ Birth Date	Father's Name	Mother's Name	Hamlet

Appendix II

F.2

Personal and Socio-Demographic Characteristics

1.	Sub-District :		2
2.	Village :		4
3.	Study Number :		7
4.	Child's Name :		
5.	Sex	1. Boy; 2. Girl	8
6.	Date of Birth	______/______/______ Day Month Year	10

Father's Name :
Mother's Name :
Interviewer :

<u>The following questions related to parents' and family's identification.</u>

7. What is the parent's age this year?

Mother	______	12
Father	______	14

8. What is the last education the parents ever had?

1. Illiterate	Mother	______	15
2. Up to 3 Years			
3. 4 - 6 Years	Father	______	16
4. Secondary School			
5. High School			
6. College+			

9. What is the main occupation of parents?

1. Village Leader	Mother	______	17
2. Civil Servant Other than Teacher	Father	______	18
3. Teacher			
4. Business			
5. Labour			
6. Peasant			
7. Housewife			
8. Other (Specify)			

10. What is the position of parents in the community?

    1. Regular Community Member

       Mother ______ 19

    2. Executive Board of Village Committee   Father ______ 20

    3. Village Committee Member

    4. Hamlet Leader

    5. Member of the Board of Community Family Planning Organizationj

    6. Member of Village Social Institute (= LKMD)

    7. Others (Specify)

11. Do the parents practice Family Planning? 21

    1. Yes

    2. No

    3. Don't Know

    4. No Answer

12. How many children ever born in this family? 23

13. How many children still alive in this family?. 25

14. How many children aged less than 5 years in this family? 26

15. How many children aged less than 10 years in this family? 27

    Now I will measure the length and left arm circumference of (child's name)

16. Length (three measurements) 31

    First ____.____ cm
    Second ____.____ cm
    Third ____.____ cm

17. Left upper-mid-arm circumference (three measurements) 34

First ______.______ cm
Second ______.______ cm
Third ______.______ cm

18. What is the distance between this neighbourhood to the nearest health centre or its branches? 36

__________ km

Appendix II

F.3

Maternal Knowledge of Child's Health

1. Sub-District :
2. Village :
3. Hamlet/Neighbourhood :
4. Child's Name :
5. Do you know about the vaccination that should be given to children aged 3-14 months?
   1. Yes
   2. No
6. Can you tell me when will be the next schedule for DPT immunization for this village?

   ______/______
   Day Month

7. Can you tell me where the next schedule for DPT immunization in this village will take place?
   1. If Q.6 and Q.7 are right 1
   2. If either Q.6 or Q.7 is wrong or Q.5 is No.
8. Who gave you the information about the next DPT immunization schedule?
   1. Health Centre Personnel
   2. Village Health Worker
   3. Village Leader
   4. Hamlet Leader
   5. Village Women Welfare Organization (P.K.K.) 2
   6. Others (Specify) ________
9. Have you ever seen a child suffering from pertussis? 3
   1. Yes
   2. No

10. Can you tell me which of the following symptoms would make you believe that a child has pertussis? 4

1. Paraxysm Cough
2. Paraxysm Cough for Long Period of Time
3. Whooping and Paroxysm Cough for Long Period of Time and Vomiting
4. Chronic Cough
5. Don't Know

If the response give is no to? 1, 2, 4 or 5 read the following explanantion.

Pertussis is a cough with whooping, paroxysm and vomiting. The eyes are red, and during the attack the face becomes red. The cough usually go for 100 days.

11. How would you estimate the severity of pertussis to a child at the age of (child's age). 5

Severe	Moderate	No Opinion	Mild	Very Mild
5	4	3	2	1

I am going to read a statement and than ask your opinion about it. You can educate whether you strongly support the statement or whether you are just somewhat supportive. On the other hand, you may disagree with the statement or you may disagree very strongly. Finally, you may have no opinion on the statement that I've read.

12. If a child has received two doses of DPT immunization he will not get pertussis. 6

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
5	4	3	2	1

13. How likely do you think it will be that (child's name) will get pertussis? 7

Very Possible	Possible	No Opinion	Not Possible	Not At All Possible
5	4	3	2	1

14. Does (child's name) have Immunization Card or "Road-to-Health" Card? 9

1. Yes - Go to Q.15 11
2. No - Get information from Health Centre (see 17) 13

15. May I see the card? 15

1. Information on Immunization Available - Go to Q.16 17
2. No Information on Immunization 19
   Get Information from Health Centre (see 17) 21

16.

Immunization	Day	Month	Year
BCG	___	___	___
DPT_1	___	___	___
DPT_2	___	___	___
DPT_3	___	___	___
$Polio_1$	___	___	___
$Polio_2$	___	___	___
$Polio_3$	___	___	___

17. (Data from Immunization Recording Book in Health Centre)

Immunization	Day	Month	Year
BCG	___	___	___
DPT_1	___	___	___
DPT_2	___	___	___
DPT_3	___	___	___
$Polio_1$	___	___	___
$Polio_2$	___	___	___
$Polio_3$	___	___	___

Now I am going to ask you about diarrhea in children.

18. Do you know of anything that can cause diarrhea?

1. Don't Know 22
2. Infection
3. Food
4. Milk; Drinks
5. Weather, Cold
6. Others ________
   (Specify)

19. What will happen after a child has diarrhea for three consecutive days? 23

1. Don't Know
2. Dehydration
3. Rising Intelligence
4. Nothing
5. Others ________
   (Specify)

20. Where could the mother in this village take her child aged (child's age) with diarrhea that has been present for three consecutive days? 24

1. Don't know
2. Wiseman, Traditional Healer
3. Village Health Worker
4. Health Centre
5. Self-Treatment
6. Other ________
   (Specify)

21. How would you estimate the severity of diarrhea for three consecutive days to a child at the age of (child's age)? 25

Severe	Moderate	No Opinion	Mild	Not A Problem
5	4	3	2	1

22. When a child aged (child's age) has diarrhea, what should the mother do for him at home? 26
1. Suspend Food and Drinks
2. O.R.S.
3. Antidiarrhea
4. Concentrated Tea
5. Traditional Medicine
6. Other ________
   (Specify)

23. From whom dod you learn about the treatment for diarrhea you have mentioned above? 27
1. Physician
2. Health Centre Personnel
3. Private Paramedics
4. Village Health Worker
5. Village Leader
6. Neighbour
7. Parents
8. Other ________
   (Specify)

Appendix II

F.4

Medical Record

Study Number:

1. Sub-District :

2. Village :

3. Hamlet/Neighbourhood :

4. Child's Name :

5. Date of Birth _____/_____/_____
Day Month Year

6. Sex 1. Boy; 2. Girl

7. Father's Name :

8. Mother's Name :

9. Main Complaints

Diarrhea	1. Yes;	2. No
Fever	1. Yes;	2. No
Cough	1. Yes,	2. No

10. Complaints(s) other than the main complaint.

____
(Specify)

11. History

12. Physical Examination Findings

13. Laboratory

Blood: Stool:

Urine: Swab :

Others:

14. Diagnose

15. Medication

Medication	Doses	Amount

1.
2.
3.
4.
5.

16. Referral 1. Yes; 2. No

To:

Reason:

17. Severity of Illness

1. Very Severe
2. Severe
3. Moderate
4. Mild
5. Very Mild

18. Hospitalization 1. Yes; 2. No

Hospital's Name :

Date of Admission :

Date of Discharge :

Diagnose :

Result :

Health Worker

Appendix II

F.5

Illness Monitoring Card

Sub-District: Study Number:
Village:
Hamlet:

Child's Name: Age: Sex:
Father's Name:
Mother's Name:

Main Complaint
1. Diarrhea
2. Fever
3. Cough

Please give sign "+"/"-" for the appropriate symptoms and dates.

Symptoms	To Day*	Date
Diarrhea		
Fever		
Cough		

*Filled by health worker, to demonstrate use of the sign.

Appendix II

F.6

Abstract from Medical Record

	Study Number:		10
	Main Complaint	1. Diarrhea 2. Fever 3. Cough	
	<u>Other Complaints</u>		
1.	Diarrhea	1. Yes; 2. No	11
2.	Fever	1. Yes; 2. No	12
3.	Cough	1. Yes; 2. No	13
4.	Measles	1. Yes; 2. No	14
5.	Vomiting	1. Yes; 2. No	15
6.	Ear Infection	1. Yes; 2. No	16
7.	Skin Infection	1. Yes; 2. No	17
8.	Chicken-pox	1. Yes; 2. No	18
9.	Others	1. Yes; 2. No	19
	<u>Medication</u>		
11.	O.R.S.	1. Yes; 2. No	20
12.	Antidiarrhea	1. Yes; 2. No	21
13.	Antibiotics	1. Yes; 2. No	22
14.	Vitamin	1. Yes; 2. No	23
15.	Cough Mixture	1. Yes; 2. No	24
16.	Antitussive	1. Yes; 2. No	25
17.	Antipyretics	1. Yes; 2. No	26

18. Severity of Illness	27
1. Very Severe 2. Severe 3. Moderate 4. Mild 5. Very Mild	
19. Duration in Hospital, if applicable	28
20. Result of Hospitalization	29

Appendix II

F.7

Medical Care Study Questionnaire for Study Group

Study Number:

1. Sub-District
2. Village
3. Hamlet
4. Child's Name

The following questions will ask you about the sickness(es) of (child's name) and the health care provided by the V.H.W.

5. When was the symptom of the sickness(es) of (child's name) recognized by the member of the family?

_____/_____
Day   Month

6. How many days after the symptoms were recognized did (child's name) have a contact with V.H.W.? _______ days 2

7. Did you take (child's name) to other health resources after he/she received care from V.H.W., that was not V.H.W.'s suggestion?

   1. Yes ___________ (Specify)
   2. No

8. How is (child's name) now? 3

   1. Well
   2. Died
   3. Still Sick

*If the subject is still sick, stop the interview and make a plan to come back next week. Give the parents another Illness Monitoring Card to be filled out.

9. Duration of sickness after the first visit to V.H.W. 5
(See Illness Monitoring Card)

10. Did (child's name) receive medication from V.H.W.?

1. Yes
2. No

11. May I see the drug containers?
(Count the medication taken)

Medication	Given (a)	Taken (b)	% Taken (b/a x 100%)
1.			
2.			
3.			
4.			
5.			

The average percentage of medication taken 9
______________%

12. Did the V.H.W. give you advice on how (child's name) should take the medicine? 10

1. Yes
2. No

13. Did the V.HY.W. tell you to take (child's name) to the health centre? 11

1. Yes
2. No

14. Did you take (child's name) to the health centre as suggested by the V.H.W.? 12

1. Yes
2. No

15. Did (child's name) receive injection at the health centre for the sickness? 13

No = 0
Yes = ______ times

16. Did (child's name) receive medication from the health centre?

1. Yes
2. No

17. May I see the drug's container's?
(Count the medication taken)

Medication	Given (a)	Taken (b)	% Taken (b/a x 100%)
1.			
2.			
3.			
4.			
5.			

The average percentage of health centre's medication taken. 17

_____._____ %

18. Did the health centre personnel give you advice about how (child's name) should take the medicine?

1. Yes
2. No

19. Did the V.H.W. give you advice about (child's name) feeding?

1. Yes - Go to 20
2. No - Go to 22

20. Can you tell me what was the advice

21. Feeding advice from V.H.W. 18

1. Yes, repeated the advice
2. Yes, could not repeat the advice
3. No advice

22. Is (child's name) still on breast-feeding

1. Yes - Go to Q.23
2. No - Go to Q.25

23. Did the V.H.W. give you advice about breast-feeding for (child's name) during the sickness?

1. Yes - Go to Q.24
2. No - Go to Q.25

24. Can you tell me what was the advice?

25. Breast-feeding advice from V.H.W. 19
   1. Weaned
   2. Yes, respeated the advice
   3. Yes, could not repeat the advice
   4. No advice

In the following question I want you to tell how you perceived the overall cost for medical care. What I mean by "overall cost" is all the expenses that you paid, including cost of medicine, transportation, tickets, parking, food, and drinks while you were away for treatment.

26. For helping you to make a judgement, I will ask you several questions regarding how much you have spent for the items that I have mentioned ear54lier.

   1. For the Medication at the V.H.W. ______
   2. For the Health Centre ______
   3. For the Transportation ______
   4. For the Foods and Drinks ______

   Total ______

27. For a family in your socio-economic condition, the over cost to get treatment from health personnel as you have spent for such sickness of a child at the age of (child's age) is 20
   1. Too Expensive
   2. Expensive
   3. Fair
   4. Cheap
   5. Very Cheap
   6. Don't Know
   7. No Answer

Appendix II

F.8

Medical Care Study Questionnaire for Control Group

Study Number:

1. Sub-District:
2. Village:
3. Hamlet:
4. Child's Name:

The following questions will ask you about the sickness(es) of (child's name) and the health care provided by the Health Centre personnel.

5. When were the symptoms of the sickness(es) of (child's name) recognized by the member of the family?

   ____/____
   Day Month

6. How many days after the symptoms were recognized did (cchild's name) have a contact with Health Centre Personnel? 2

   ________ days

7. Did you take (child's name) to other health resources after he/she received care from Health Centre Personnel, that was not Health Centre Personnel's suggestion?

   1. Yes ________ (Specify)
   2. No

8. How is (child's name) now?

   1. Well
   2. Died
   3. Still Sick

*If the subject is still sick, stop the interview and plan to come back next week. Give the parents another Illness Monitoring Card to be filled out.

9. The result of medical care.

1. Used other health resources
2. Cured 3
3. Died

Duration of sickness after the first visit to Health Centre. 5
(See Illness Monitoring Card)

_______ days

10. Did (child's name) receive injection at the Health Centre for the sickness?

No = 0 6
Yes = _______ times

~~11. Did~~ (child's name) receive medication from Health Centre?

1. Yes
2. No

12. May I see the drug's containers?
(Count the medication taken)

Medication	Given (a)	Taken (b)	% Taken (b/a x 100%)
1.			
2.			
3.			
4.			
5.			

The average percentage of medication taken. 10

_______ %

13. Did the Health Centre Personnel give you advice about how (child's name) should take the medicine?

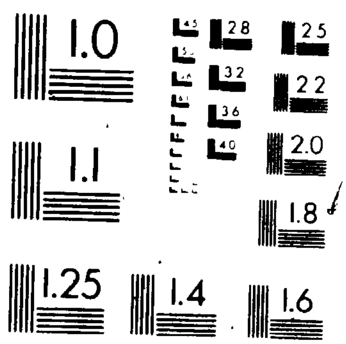
1. Yes 11
2. No

14. Did the Health Centre Personnel give you advice about (child's name) feeding?

1. Yes - Go to Q.15
2. No - Go to Q.16

4

MICROCOPY RESOLUTION TEST CHART
NBS 1010a
ANSI and ISO TEST CHART No. 2



15. Can you tell me what the advice was?

____
____
____

16. Feeding advice from Health Centre Personnel.

    1. Yes, repeated the advice
    2. Yes, could not repeat the advice 12
    3. No advice

17. Is (child's name) still on breast-feeding?

    Yes - Go to Q.18
    No - Go to Q.20

18. Did the Health Centre Personnel give you advice about breast-feedng for (child's name)?

    1. Yes - Go to Q.19
    2. No - Go to Q.20

19. Can you tell me what was the advice?

____
____
____

20. Breast-feeding advice from Health Centre Personnel.

    1. Weaned
    2. Yes, repeated the advice 13
    3. Yes, could not repeat the advice
    4. No advice

In the following question I want you to tell how you perceived the overall cost of medical care. What I mean by "overall cost" is all the expenses that you paid, including cost of medicine, transportation, tickets, parking, food, and drinks while you were away for treatment.

21. For helping you to make a judgement, I will ask you several questions regarding how much you have spent for the items that I have mentioned earlier.

    1. For the Health Centre ______
    2. For the Transportation ______
    3. For the Foods and Drinks ______

    Total ______

22. For a family in your socio-economic condition, the over cost to get treatment from health personnel as you have spent for such sickness of a child at the age of (<u>child's age</u>) is 20

    1. Too Expensive
    2. Expensive
    3. Fair
    4. Cheap
    5. Very Cheap
    6. Don't Know
    7. No Answer

Appendix II

F.9

Mortality Study

Study Number:

1. Sub-District:

2. Village:

3. Hamlet:

4. Deceased's name:

5. Sex 1. Boy; 2. Girl

6. Date of Birth: _____/_____/_____ Day Month Year

7. Date of Death: _____/_____/_____ Day Month Year

I want to ask you about the sickness and medical care that (child's name) had before he/she died.

8. How long was? (child's name) sick before he/she died? 11

1. < 3 days
2. 4 - 7 days
3. 8 - 13 days
4. 14 - 29 days
5. > 1 month

9. What is the main symptoms of the sickness before he/she died? 12

1. Diarrhea
2. Fever
3. Cough
4. Other: _______ (Specify)

10. Where did you take (child's name) for the last before he/she died?

1. No Treatment
2. Self-Treatment
3. Village Health Worker
4. Wiseman; Traditional Healer
5. Private Paramedic
6. Private Physician
7. Health Centre
8. Hospital
9. Other ________ (Specify)

13

Appendix III Comparison of Socio-Demographic Characteristics in Study and Control Population

Table 1.	Contingency Tables of Socio-Demographic Characteristics by Comparison Group in Immunization Study (Basic Schedule)
Table 2.	Mean and S.D. of Socio-Demographic Characteristics by Comparison Group in Immunization Study (Basic Schedule)
Table 3.	Contingency Tables of Socio-Demographic Characteristics by Comparison Group in Immunization Study (Extended Schedule)
Table 4.	Mean and S.D. of Socio-Demographic Characteristics by Comparison Group in Immunization Study (Extended Schedule)
Table 5.	Contingency Tables of Socio-Demographic Characteristics by Comparison Group in Medical Care Study
Table 6.	Mean and S.D. of Socio-Demographic Characteristics by Comparison Group in Medical Care Study

Appendix III

Table 1 Contingency Tables of Socio-Demographic Characteristics by Comparison Group in Immunization Study (Basic Schedule)

1. Education of Mother

Education	Study Group N = 1206	Control Group N = 1258
	Percentage distribution of children	
Illiterate	12.9	11.8
Primary School	66.7	64.3
Secondary School	12.4	14.1
High School+	8.0	9.9
Total	100.0	100.1

$x^2 = 4.61$ d.f. = 3 p = .2027

2. Education of Father

Education	Study Group N = 1201	Control Group N = 1249
	Percentage distribution of children	
Illiterate	6.9	5.6
Primary School	63.9	63.8
Secondary School	16.1	15.9
High School+	13.1	14.7
Total	100.0	100.0

$x^2 = 3.93$ d.f. = 3 p = .4151

3. Occupation of Mother

Occupation	Percentage distribution of children Study Group N = 1206	Control Group N = 1258
Village Committee	.4	.4
Civil Servant	.5	1.5
Teacher	1.7	2.5
Business	7.5	9.6
Labour	12.9	11.4
Peasant	42.3	39.5
Housewife	34.4	34.9
Other	.3	.2
Total	100.0	100.0

$x^2 = 14.06$ d.f. = 7 p = .0501

4. Occupation of Father

Occupation	Percentage distribution of children Study Group N = 1201	Control Group N = 1249
Village Committee	1.8	.5
Civil Servant	5.6	6.2
Teacher	5.7	5.0
Business	6.3	6.7
Labour	21.0	22.2
Peasant	59.0	58.8
Other	.6	.7
Total	100.0	100.1

$x^2 = 11.44$ d.f. = 6 p = .0756

5. Social Participation of Mother

Social Participation	Percentage Distribution of children Study Group N = 1206	Control Group N = 1258
Lay People	92.0	92.9
Village Committee	2.7	2.0
Hamlet Leader	.3	.5
Board of Family Planning Organization (APSARI)	3.1	3.6
Village Social Institute (LKMD)	.6	.8
Other	1.3	.2
Total	100.0	100.0

$x^2 = 11.89$ d.f. = 5 $p = .0362$

6. Social Participation of Father

Social Participation	Percentage Distribution of children Study Group N = 1201	Control Group N = 1249
Lay People	91.5	92.2
Village Committee	3.0	2.2
Hamlet Leader	.6	.6
Current Users Family Planning Organization (APSARI)	.0	.1
Village Social Institute (LKMD)	4.6	4.7
Other	.3	.3
Total	100.0	100.1

$x^2 = 2.70$ d.f. = 5 $p = .7468$

7. Current User Contraception

Current User	Percentage Distribution of children	
	Study Group N = 1206	Control Group N = 1258
Yes	55.8	53.0
No	44.2	47.0
Total	100.0	100.0

$x^2 = 1.85$ d.f. = 1 $p = .1742$

Appendix III

Table 2 Mean and S.D. of Socio-Demographic Characteristics by Comparison Group in Immunization Study (Basic Schedule)

Variable	X	S.D.	N
1. Age of Child			
Study Group	14.93	5.48	1243
Control Group	14.95	5.50	1267
t = -.09	d.f. = 2508	p = .932	
2. Age of Mother			
Study Group	27.69	5.69	1206
Control Group	27.97	5.87	1258
t = -1.20;	d.f. = 2462;	p = .230	
3. Age of Father			
Study Group	32.18	6.8	1201
Control Group	32.65	7.0	1249
t = -1.68;	d.f. = 2450;	p = .093	
4. Number of Children Everborn			
Study Group	2.54.	1.73	1206
Control Group	2.65	1.73	1258
t = -1.67;	d.f. = 2462;	p = .095	
5. Number of Children Still Alive			
Study Group	2.50	1.71	1206
Control Group	2.55	1.63	1258
t = -.78	d.f. = 2462;	p = .437	
6. Number of Chldren Aged Less than 5 Years			
Study Group	1.38	.55	1206
Control Group	1.47	.59	1258
t = -4.29;	d.f = 2462;	p = .0001	

7. Number of Children Aged Less Than 10 Years

Study Group	2.02	1.01	1206
Control Group	2.06	1.01	1258

t = -1.09; d.f. = 2462; p = .275

8. Height of Children (cm)

Study Group	72.78	5.63	1193
Control Group	72.41	5.84	1244

t = 1.60; d.f. = 2435; p = .110

9. Left Upper-Mid-Arm Circumference

Study Group	14.26	1.06	1193
Control Group	14.25	1.10	1244

t = .30; d.f. = 2435; p = .764

10. Hamlet Distance from the Nearest Health Centre or Health Centre's Branch

Study Group	2.57	1.47	1206
Control Group	2.30	1.41	1258

t = 9.41; d.f. = 2462; p = .0001

Appendix III

Table 3 Contingency Tables of Socio-Demographic Characteristics by Comparison Group in Immunization Study (Extended Schedule)

1. Education of Mother

	Percentage distribution of children	
Education	Study Group N = 579	Control Group N = 215
Illiterate	7.4	7.4
Primary School	73.9	71.6
Secondary School	12.3	11.6
High School+	6.4	9.3
Total	100.0	99.9

$x^2 = 2.02$ d.f. = 3 $p = .5690$

2. Education of Father

	Percentage distribution of children	
Education	Study Group N = 576	Control Group N = 215
Illiterate	4.7	12.1
Primary School	66.8	72.0
Secondary School	17.7	5.6
High School+	10.8	10.3
Total	100.0	100.0

$x^2 = 29.42$ d.f. = 3 $p = .00001$

3. Occupation of Mother

Occupation	Percentage distribution of children: Study Group N = 579	Control Group N = 215
Office Worker	1.2	5.1
Business	6.3	6.0
Labour	7.0	24.2
Peasant	49.2	30.7
Housewife	36.3	34.0
Total	100.0	100.0

$x^2 = 62.74$ d.f. = 4 p = .00001

4. Occupation of Father

Occupation	Percentage distribution of children: Study Group N = 576	Control Group N = 215
Office Worker	12.4	11.7
Business	5.8	5.6
Labour	19.4	45.3
Peasant	62.5	37.4
Total	100.0	100.0

$x^2 = 57.42$ d.f. = 3 p = .00001

5. Social Participation of Mother

Participation	Percentage Distribution of Children Study Group N = 579	Control Group N = 215
Yes	8.8	5.1
No	91.2	94.9
Total	100.0	100.0

$x^2 = 2.97$ d.f. = 1 p = .0849

6. Social Participation of Father

Participation	Percentage Distribution of Children Study Group N = 576	Control Group N = 215
Yes	9.5	6.0
No	90.5	94.0
Total	100.0	100.0

$x^2 = 2.44$ d.f. = 1 p = .1180

7. Current User of Contraception

Current User	Percentage Distribution of Children Study Group N = 576	Control Group N = 215
Yes	56.9	47.4
No	43.1	52.6
Total	100.0	100.0

$x^2 = 5.70$ d.f. = 1 p = .0211

Appendix III

Table 4 Mean and S.D. of Socio-Demographic Characteristics by Comparison Group in Immunization Study (Extended Schedule)

Variable	X	S.D.	N
1. Age of Subject			
Study Group	15.11	5.33	600
Control Group	15.09	5.23	215
t = .05	d.f. = 813	p = .962	
2. Age of Mother			
Study Group	27.18	5.52	579
Control Group	27.39	5.44	215
t = -.48;	d.f. = 792;	p = .631	
3. Age of Father			
Study Group	31.67	6.69	576
Control Group	31.90	6.82	215
t = -.42;	d.f. = 789;	p = .675	
4. Number of Children Everborn			
Study Group	2.31	1.56	579
Control Group	2.46	1.57	215
t = -1.24;	d.f. = 792;	p = .214	
5. Number of Children Still Alive			
Study Group	2.28	1.58	579
Control Group	2.32	1.47	215
t = -.32	d.f. = 792;	p = .745	
6. Number of Chldren Aged Less than 5 Years			
Study Group	1.34	.51	579
Control Group	1.34	.53	215
t = -.14;	d.f = 792;	p = .891	

7. Number of Children Aged Less Than 10 Years

Study Group	1.88	.96	579
Control Group	1.88	.93	215

t = .04; d.f. = 792; p = .970

8. Height of Children (cm)

Study Group	72.72	5.52	574
Control Group	72.20	5.32	215

t = 1.18; d.f. = 787; p = .239

9. Left Upper-Mid-Arm Circumference (cm)

Study Group	14.35	1.14	574
Control Group	14.19	1.04	215

t = 1.80; d.f. = 787; p = .072

10. Hamlet Distance (km) from the Nearest Health Centre or Health Centre's Branch

Study Group	2.8	1.67	579
Control Group	2.9	1.2	215

t = -1.76 d.f. = 514; p = .078

Appendix III

Table 5 Contingency Tables for Socio-Demographic Characteristics by Comparison Group in Medical Care Study

1. Education of Mother

Education	Percentage distribution of children: Study Group N = 1709	Control Group N = 1569
Illiterate	14.5	9.1
Primary School	69.5	70.6
Secondary School	11.4	14.5
High School+	4.6	5.9
Total	100.0	100.1

$x^2 = 29.24$ d.f. = 3 p = .00001

2. Education of Father

Education	Percentage distribution of children: Study Group N = 1701	Control Group N = 1565
Illiterate	5.7	2.6
Primary School	69.3	67.4
Secondary School	14.0	16.2
High School+	11.0	13.9
Total	100.0	100.1

$x^2 = 27.67$ d.f. = 3 p = .00001

3. Occupation of Mother

Occupation	Percentage distribution of children: Study Group N = 1709	Control Group N = 1569
Village Committee	1.4	1.8
Civil Servant	.8	1.2
Teacher	1.9	2.2
Business	3.6	4.5
Labour	13.8	14.0
Peasant	44.4	42.4
Housewife	34.1	33.8
Other	.0	.1
Total	100.0	100.0

$x^2 = 6.77$; d.f. = 7 p = .4529

4. Occupation of Father

Occupation	Percentage distribution of cases: Study Group N = 1701	Control Group N = 1565
Village Committee	1.25	1.7
Civil Servant	6.8	8.3
Teacher	4.1	4.5
Business	7.0	10.2
Labour	17.8	20.3
Peasant	62.7	54.6
Other	.1	.3
Total	100.0	99.9

$x^2 = 27.90$ d.f. = 6 p = .0001

5. Social Participation of Mother

Social Participation	Percentage Distribution of Cases Study Group N = 1709	Control Group N = 1569
Lay Person	80.5	80.6
Village Committee	.9	1.7
Hamlet Leader	2.6	2.5
Board of Family Planning Organization (APSARI)	14.9	14.0
Village Social Institute (LKMD)	.9	1.1
Others	.2	.1
Total	100.0	100.0

$x^2 = 5.27$; d.f. = 5; p = .3833

6. Social Participation of Father

Social Participation	Percentage Distribution of Cases Study Group N = 1701	Control Group N = 1565
Lay Person	82.4	85.6
Village Committee	4.4	1.2
Hamlet Leader	2.1	.6
Family Planning Organization (APSARI)	.4	.6
Village Social Institute (LKMD)	10.5	11.6
Others	.2	.3
Total	100.0	99.9

$x^2 = 46.43$; d.f. = 5; p = .00001

7. <u>Current User of Contraception</u>

Current User	Percentage Distribution of Cases	
	Study Group N = 1701	Control Group N = 1565
Yes	73.4	73.5
No	26.6	26.5
Total	100.0	100.0

x^2 = .00094 d.f. = 1 p = .9755

Appendix III

Table 6 Mean and S.D. of Socio-Demographic Variables by Comparison Group in edical Care Study

Variable	X	S.D.	N
1. Age of Mother			
Study Group	28.88	5.65	1709
Control Group	27.66	5.40	1569
t = 6.30;	d.f. = 3276;	p = .0001	
2. Age of Father			
Study Group	33.82	7.66	1701
Control Group	32.03	6.48	1565
t = 7.24;	d.f. = 3276;	p = .0001	
3. Number of Children Everborn			
Study Group	2.82	1.74	1709
Control Group	2.41	1.51	1569
t = 7.16;	d.f. = 3276;	p = .0001	
4. Number of Children Still Alive			
Study Group	2.75	1.88	1709
Control Group	2.32	1.41	1569
t = 7.31;	d.f. = 3276;	p = .0001	
5. Number of Chldren Aged Less than 5 Years			
Study Group	1.03	.161	1709
Control Group	1.04	.193	1569
t = -1.94;	d.f = 3276;	p = .052	
6. Number of Children Aged Less Than 10 Years			
Study Group	2.29	1.07	1709
Control Group	2.05	1.03	1569
t = 6.51;	d.f. = 3276;	p = .0001	

7. Height of Children (cm)

Study Group	81.77	10.90	1719
Control Group	82.67	47.72	1568

t = -.73; d.f. = 1715; p = .466

8. Left Upper-Mid-Arm Circumference (cm)

Study Group	14.83	1.21	1719
Control Group	14.95	1.32	1568

t = -2.84 d.f. = 3169; p = .004

9. Hamlet Distance (km) from the Nearest Health Centre or Health Centre's Branch

Study Group	1.24	.52	1709
Control Group	1.06	.24	1569

t = 13.15; d.f. = 2453; p = .0001

Appendix IV

Inter-Rates Reliability Response and
the Kappa Values

Table 1.	Kappas for variables collected in Immunization Study
Table 2.	Kappas for variables collected in Maternal Knowledge of Child Health Infection
Table 3.	Kappas for variables collected in Medical Care Study

Appendix IV

Table 1 Kappas for Variables Collected in Immunization Study

Variable	Po	Pe	K
Mother's Age	.94	.485	.88
Father's Age	.823	.353	.73
Mother's Education	.915	.49	.83
Father's Education	.907	.449	.83
Mother's Occupation	.82	.289	.747
Father's Occupation	.88	.415	.796
Mother's Participation	.919	.75	.676
Father's Participation	.908	.743	.64
Current User	.893	.516	.779

Appendix IV

Table 2 Kappas for Variables Collected in Maternal Knowledge of Child Health

Pertussis	Po	Pe	K
Ever Seen Pertussis	.862	.612	.644
Signs of Pertussis	.791	.358	.674
Has the Child ever Contracted Pertussis	.964	.902	.633
Perception of Severity of Pertussis	.898	.715	.642
DPT Immunization	**Po**	**Pe**	**K**
Perceived efficacy of Immunization Against Pertussis	.77	.377	.631
Perceived Susceptibility to Pertussis	.729	.377	.565
Knowledge of Time and Place of Next DPT Immunization Schedule	.78	.453	.598
Source of Information for next DPT Immunization Schedule	.381	.743	.585
Knowledge About Childhood Diarrhea	**Po**	**Pe**	**K**
Cause of Diarrhea	.866	.299	.809
Prognosis of Diarrhea	.683	.265	.569
Seriousness of Diarrhea	.885	.638	.682
Health Resources for Treatment of Diarrhea	.821	.549	.603
Severity of Diarrhea	.878	.589	.703
Home Remedies for Diarrhea	.694	.326	.546
Source of Knowledge on Home Remedies for Diarrhea	.76	.213	.695

Appendix IV

Table 3 Kappas for Variables Collected in Medical Care Study

Variable	Po	Pe	K
Mother's Age	.896	.425	.819
Father's Age	.853	.394	.757
Mother's Education	.855	.565	.66
Father's Education	.859	.497	.719
Mother's Occupation	.763	.296	.66
Father's Occupation	.808	.399	.68
Mother's Participation	.888	.603	.718
Father's Participation	.871	.64	.64
Current User of Contraception	.926	.655	.786
Children Everborn	.867	.24	.825
Children Still Alive	.88	.24	.85
Duration Before Initial Visit	.733	.305	.616
Medical Advice	.957	.923	.44
Breast Feeding Advice	.790	.624	.44
Food Advice	.809	.391	.686

Appendix V Relationship Between Socio-Demographic Characteristics and BCG Immunization Status

Table 1. Contingency Tables of BCG Immunization Status by Socio-Demographic Characteristics

Table 2. Mean and S.D. of Socio-Demographic Characteristics by BCG Immunization Status

Appendix V

Table 1 Contingency Tables of BCG Immunization Status by Socio-Demographic Characteristics

1. Education of Mother

Immunization Status	Illiterate N = 303	Primary School N = 1613	Secondary School N = 327	High School+ N = 221
	Percentage Distribution of Children			
Immunized	76.9	80.6	78.9	79.2
Not Immunized	23.1	19.4	21.1	20.8
Total	100.0	100.0	100.0	100.0

$x^2 = 2.52$ d.f. = 3 $p = .4725$

2. Education of Father

Immunization Status	Illiterate N = 153	Primary School N = 1565	Secondary School N = 390	High School+ N = 342
	Percentage Distribution of Children			
Immunized	82.4	81.1	75.4	78.3
Not Immunized	17.6	18.9	24.6	21.7
Total	100.0	100.0	100.0	100.0

$x^2 = 7.43$ d.f. = 3 $p = .0594$

3. Occupation of Mother

Immunization Status	Office Worker N=87	Business N=211	Labour N=299	Peasant N=1007	House Wife N=860
	Percentage Distribution of Children				
Immunized	69.0	82.0	78.6	81.9	78.8
Not Immunized	31.0	18.0	21.4	18.1	21.2
Total	100.0	100.0	100.0	100.0	100.0

$x^2 = 10.55$ d.f. = 4 $p = .0321$

4. Occupation of Father

Immunization	Office Worker N=302	Business N=160	Labour N=529	Peasant N=1459
	Percentage Distribution of Children			
Immunized	81.7	76.3	81.3	79.5
Not Immunized	18.3	23.7	18.7	20.5
Total	100.0	100.0	100.0	100.0

$x^2 = 2.745$ d.f. = 3 $p = .4334$

5. Social Participation of Mother

Immunization Status	Percentage Distribution of Children Yes N = 185	No N = 2279
Immunized	77.3	80.0
Not Immunized	22.7	20.0
Total	100.0	100.0

$x^2 = .79$ d.f. = 1 p = .4271

6. Social Participation of Father

Immunization Status	Percentage Distribution of Children Yes N = 199	No N = 2251
Immunized	78.9	80.0
Not Immunized	21.1	20.0
Total	100.0	100.0

$x^2 = 613$ d.f. = 1 p = .7182

7. Current User of Contraception

Immunization Status	Percentage Distribution of Children: Yes N = 1337	No N = 1127
Immunized	81.3	78.1
Not Immunized	18.7	21.9
Total	100.0	100.0

$X^2 = 3.98$ d.f. = 1 $p = .0458$

Appendix V

Table 2 Mean and S.D. of Socio-Demographic Characteristics by BCG Immunization Status

Variable	X	S.D.	N
1. Age of Child (Months)			
Immunized	15.10	5.44	1967
Not Immunized	14.37	5.64	542
t = 2.73; d.f. = 2507; p = .006			
2. Age of Mother (Years)			
Immunized	27.74	5.72	1966
Not Immunized	28.23	6.01	497
t = -1.70; d.f. = 2461; p = .089			
3. Age of Father			
Immunized	32.33	6.87	1958
Not Immunized	32.76	7.11	492
t = -1.23; d.f. = 2448; p = .229			
4. Number of Children Everborn			
Immunized	2.56	1.69	1966
Not Immunized	2.76	1.87	497
t = -2.24; d.f. = 714; p = .025			
5. Number of Children Still Alive			
Immunized	2.48	1.63	1966
Not Immunized	2.70	1.82	497
t = -2.49; d.f. = 709; p = .013			
6. Number of Children Aged Less than 5 Years			
Immunized	1.41	.551	1966
Not Immunized	1.49	.636	497
t = -2.64; d.f = 694; p = .009			

7. Number of Children Aged Less Than 10 Years

Immunized	2.02	1.00	1966
Not Immunized	2.15	1.05	497

$t = -2.60$; d.f. = 2461; $p = .009$

8. Height of Children (cm)

Immunized	72.72	5.61	1951
Not Immunized	72.07	6.21	485

$t = +2.10$; d.f. = 693; $p = .036$

9. Left Upper-Mid-Arm Circumference (cm)

Immunized	14.27	1.07	1951
Not Immunized	14.20	1.15	485

$t = +1.15$; d.f. = 703; $p = .250$

9. Hamlet Distance (km) from the Nearest Health Centre or Health Centre's Branch

Immunized	2.28	1.42	1966
Not Immunized	2.40	1.64	497

$t = -1.61$; d.f. = 734; $p = .109$

Appendix VI Relationship Between Socio-Demographic Characteristics and DPT Immunization Status

Appendix VI

Table 1 Contingency Tables of
DPT Basic Immunization Status
by Socio-Demographic Characteristics

1. Education of Mother

Immunization Status	Illiterate N = 303	Primary School N = 1613	Secondary School N = 327	High School+ N = 221
	Percentage Distribution of Children			
Completed	39.3	48.6	48.8	49.8
Not Completed	60.7	51.4	51.2	50.2
Total	100.0	100.0	100.0	100.0

$x^2 = 9.63$ d.f. = 3 $p = .0220$

2. Education of Father

Immunization Status	Illiterate N = 153	Primary School N = 1565	Secondary School N = 390	High School+ N = 342
	Percentage Distribution of Children			
Completed	43.1	47.6	48.5	48.2
Not Completed	56.9	52.4	51.5	51.8
Total	100.0	100.0	100.0	100.0

$x^2 = 1.39$ d.f. = 3 $p < .7085$

3. Occupation of Mother

Immunization Status	Office Worker N=87	Business N=211	Labour N=299	Peasant N=1007	House Wife N=860
	Percentage Distribution of Children				
Completed	46.0	43.3	49.5	49.5	46.0
Not Completed	54.0	56.7	50.5	50.5	54.0
Total	100.0	100.0	100.0	100.0	100.0

$x^2 = 4.37$ d.f. = 4 p = .3586

4. Occupation of Father

Immunization Status	Office Worker N=302	Business N=160	Labour N=529	Peasant N=1459
	Percentage Distribution of Children			
Completed	53.2	48.4	50.9	45.2
Not Completed	46.8	51.6	49.1	54.8
Total	100.0	100.0	100.0	100.0

$x^2 = 9.39$ d.f. = 3 p = .0245

5. Social Participation of Mother

Immunization Status	Percentage Distribution of Children: Yes N = 185	No N = 2279
Completed	50.0	47.4
Not Completed	50.0	52.6
Total	100.0	100.0

x^2 = .37   d.f. = 1   p = .5405

6. Social Participation of Father

Immunization Status	Percentage Distribution of Children: Yes N = 199	No N = 2251
Completed	54.6	47.0
Not Completed	45.4	53.0
Total	100.0	100.0

x^2 = 3.91   d.f. = 1   p = .0481

7. Current User of Contraception

Immunization Status	Percentage Distribution of Children Yes N = 1337	No N = 1127
Completed	49.4	45.2
Not Completed	50.6	54.8
Total	100.0	100.0

$X^2 = 4.26$ d.f. = 1 $p = .0390$

Appendix VI

Table 2 Mean and S.D. of Socio-Demographic Characteristics by DPT Basic Immunization Status

Variable	$\bar{X}$	S.D.	N
1. Age of Child			
Completed	15.87	5.28	1170
Not Completed	14.13	5:55	1340
t = 8.03; d.f. = 2508; p < .0001			
2. Age of Mother			
Completed	27.72	5.63	1170
Not Completed	27.94	5.92	1294
t = -.96; d.f. = 2462; p = .339			
3. Age of Father			
Completed	32.34	6.92	1165
Not Completed	32.48	6.92	1285
t = -.52; d.f. = 2448 p = .604			
4. Number of Children Everborn			
Completed	2.47	1.65	1170
Not Completed	2.71	1.79	1294
t = -3.52; d.f. = 2462; p = .0001			
5. Number of Children Still Alive			
Completed	2.39	1.59	1170
Not Completed	2.64	1.73	1294
t = -3.65; d.f. = 2462; p = .0001			
6. Number of Chldren Aged Less than 5 Years			
Completed	1.38	.544	1170
Not Completed	1.47	.589.	1294
t = -3.87; d.f = 2462; p = .0001			

7. Number of Children Aged Less Than 10 Years

Completed	1.95	.984	1170
Not Completed	2.13	1.031	1294

$t = -4.44$; d.f. = 2462; $p = .0001$

8. Height of Children (cm)

Completed	73.40	5.38	1156
Not Completed	71.86	5.95	1281

$t = 6.68$; d.f. = 2435; $p = .0001$

9. Left Upper-Mid-Arm Circumference (cm)

Completed	14.29	1.08	1156
Not Completed	14.22	1.09	1281

$t = 1.67$; d.f. = 2435; $p = .095$

10. Hamlet Distance (km) from the Nearest Health Centre or Health Centre's Branch

Completed	2.27	1.44	1170
Not Completed	2.33	1.50	1294

$t = -1.12$; d.f. = 2462; $p = .262$

Appendix VI

Table 3 Contingency Tables of DPT Extended Immunization Status by Socio-Demographic Characteristics

1. Education of Mother

Percentage Distribution of Children.

Immunization Status	Illiterate N = 59	Primary School N = 582	Secondary School N = 96	High School+ N = 57
Completed	30.5	41.0	39.6	35.1
Not Completed	69.5	59.0	60.4	64.9
Total	100.0	100.0	100.0	100.0

$x^2 = 2.99$ d.f. = 3 $p = .3917$

2. Education of Father

Percentage Distribution of Children

Immunization Status	Illiterate N = 53	Primary School N = 539	Secondary School N = 114	High School+ N = 84
Completed	34.0	39.9	39.8	41.7
Not Completed	66.0	60.1	60.2	58.3
Total	100.0	100.0	100.0	100.0

$x^2 = .88$ d.f. = 3 p = .83[illegible]0

3. Occupation of Mother

Immunization Status	Percentage Distribution of Children				
	Office Worker N=18	Business N=49	Labour N=92	Peasant N=349	House Wife N=286
Completed	27.8	40.8	53.3	39.9	35.6
Not Completed	72.2	59.2	46.7	60.1	64.4
Total	100.0	100.0	100.0	100.0	100.0

$x^2 = 10.15$ d.f. = 4 p = .0379

4. Occupation of Father

Immunization Status	Percentage Distribution of Children			
	Office Worker N=96	Business N=45	Labour N=208	Peasant N=441
Completed	38.5	45.5	45.2	37.0
Not Completed	61.5	54.5	54.8	63.0
Total	100.0	100.0	100.0	100.0

$x^2 = 4.58$ d.f. = 3 p = .2049

5. Social Participation of Mother

Immunization Status	Percentage Distribution of Children Yes N = 62	 No N = 728
Completed	46.8	39.0
Not Completed	53.2	61.0
Total	100.0	100.0

$x^2 = 1.44$ d.f. = 1 p = .2871

6. Social Participation of Father

Immunization Status	Percentage Distribution of Children Yes N = 67	 No N = 723
Completed	48.5	38.9
Not Completed	50.5	61.1
Total	100.0	100.0

$x^2 = 2.38$ d.f. = 1 p = .1226

7. Current User of Contraception

Immunization Status	Percentage Distribution of Children Yes N = 429	No N = 361
Completed	41.5	37.1
Not Completed	58.5	62.9
Total	100.0	100.0

$X^2 = 1.62$ d.f. = 1 p = .2037

Appendix VI

Table 4 Mean and S.D. of Socio-Demographic Characteristics by DPT Extended Immunization Status

Variable	$\bar{X}$	S.D.	N
1. Age of Child			
Completed	16.74	4.51	315
Not Completed	14.14	5.48	499
t = 7.37;	d.f. = 812;	p = .0001	
2. Age of Mother			
Completed	27.35	5.54	313
Not Completed	27.14	5.50	477
t = .53;	d.f. = 788;	p = .598	
3. Age of Father			
Completed	31.65	6.73	313
Not Completed	31.77	6.75	477
t = -.26;	d.f. = 788;	p = .799	
4. Number of Children Everborn			
Completed	2.26	1.50	313
Not Completed	2.40	1.60	477
t = -1.18;	d.f. = 788;	p = .237	
5. Number of Children Still Alive			
Completed	2.17	1.48	313
Not Completed	2.36	1.59	477
t = -1.62;	d.f. = 788;	p = .106	
6. Number of Children Aged Less than 5 Years			
Completed	1.31	.522	313
Not Completed	1.35	.509	477
t = -1.27;	d.f = 788;	p = .203	

7. Number of Children Aged Less Than 10 Years

Completed	1.83	.977	313
Not Completed	1.91	.930	477

t = -1.13; d.f. = 788; p = .259

8. Height of Children (cm)

Completed	73.93	4.77	307
Not Completed	71.76	5.70	479

t = 5.74; d.f. = 784; p = .0001

9. Left Upper-Mid-Arm Circumference (cm)

Completed	14.28	1.09	307
Not Completed	14.32	1.13	479

t = -.58; d.f. = 784; p = .565

9. Hamlet Distance (km) from the Nearest Health Centre or Health Centre's Branch

Completed	2.93	1.69	313
Not Completed	2.80	1.37	477

t = 1.14; d.f. = 788; p = .253

Appendix VII

Relationship Between Socio-Demographic Characteristics and Polio Immunization Status

Table 1.	Contingency Tables of Polio Immunization Status by Socio-Demographic Characteristics
Table 2.	Mean and S.D. of Socio-Demographic Characteristics by Polio Immunization Status

Appendix VII

Table 1 Contingency Tables of Polio Immunization Status by Socio-Demographic Characteristics

1. Education of Mother

Polio Immunization Status	Percentage Distribution of Children			
	Illiterate N = 53	Primary School N = 582	Secondary School N = 96	High School+ N = 57
Completed	25.4	39.9	33.3	33.3
Not Completed	74.6	60.1	66.7	66.7
Total	100.0	100.0	100.0	100.0

$x^2 = 6.26$ d.f. = 3 $p = .0995$

2. Education of Father

Polio Immunization Status	Percentage Distribution of Children			
	Illiterate N = 53	Primary School N = 539	Secondary School N = 114	High School+ N = 84
Completed	32.1	37.4	38.6	41.7
Not Completed	67.9	62.6	61.4	58.3
Total	100.0	100.0	100.0	100.0

$x^2 = 1.34$ d.f. = 3 $p = .7193$

3. <u>Occupation of Mother</u>

Polio Immunization Status	Percentage Distribution of Children Office Worker N=18	Business N=49	Labour N=92	Peasant N=349	House Wife N=286
Completed	33.3	40.8	51.1	35.9	35.1
Not Completed	66.7	59.2	48.9	64.1	64.9
Total	100.0	100.0	100.0	100.0	100.0

$x^2 = 8.65$ d.f. = 4 p = .0705

4. <u>Occupation of Father</u>

Polio Immunization Status	Percentage Distribution of Children Office Worker	Business	Labour	Peasant
N=96	N=45	N=208	N=441	
Completed	42.7	40.0	41.3	34.6
Not Completed	57.3	60.0	58.7	65.4
Total	100.0	100.0	100.0	100.0

$x^2 = 4.15$ d.f. = 3 p = .2460

5. Social Participation of Mother

Polio Immunization Status	Percentage Distribution of Children Yes N = 62	No N = 728
Completed	43.5	37.1
Not Completed	56.5	62.9
Total	100.0	100.0

$x^2 = 1.02$ d.f. = 1 p = .3820

6. Social Participation of Father

Polio Immunization Status	Percentage Distribution of Children Yes N = 67	No N = 723
Completed	52.2	36.4
Not Completed	47.8	63.6
Total	100.0	100.0

$x^2 = 6.57$ d.f. = 1 p = .0104

7. Current User of Contraception

Polio Immunization Status	Percentage Distribution of Children	
	Yes N = 429	No N = 361
Completed	40.1	34.8
Not Completed	59.9	65.2
Total	100.0	100.0

$X^2 = 2.34$ d.f. = 1 p = .1263

Appendix VII

Table 2 Mean and S.D. of Socio-Demographic Characteristics by Polio Immunization Status

Variable	$\overline{X}$	S.D.	N
1. Age of Child			
Completed	16.78	4.44	298
Not Completed	14.14	5.53	516
t = -7.43;	d.f. = 812;	p = .0001	
2. Age of Mother			
Completed	27.29	5.42	298
Not Completed	27.19	5.55	495
t = -.23;	d.f. = 791;	p = .821	
3. Age of Father			
Completed	31.58	6.72	298
Not Completed	31.83	6.74	492
t = .50;	d.f. = 788;	p = .618	
4. Number of Children Everborn			
Completed	2.21	1.40	298
Not Completed	2.42	1.65	495
t = 1.90;	d.f. = 791;	p = .058	
5. Number of Children Still Alive			
Completed	2.12	1.37	298
Not Completed	2.39	1.64	495
t = 2.41;	d.f. = 791;	p = .016	
6. Number of Children Aged Less than 5 Years			
Completed	1.31	.516	298
Not Completed	1.36	.514	495
t = 1.49;	d.f = 791;	p = .136	

7. Number of Children Aged Less Than 10 Years

Completed	1.81	.921	298
Not Completed	1.92	.966	495

$t = 1.67$; d.f. = 791; $p = .096$

8. Height of Children (cm)

Completed	74.10	4.60	298
Not Completed	71.66	4.75	490

$t = -6.56$; d.f. = 786; $p = .0001$

9. Left Upper-Mid-Arm Circumference (cm)

Completed	14.30	1.10	298
Not Completed	14.30	1.12	490

$t = .06$; d.f. = 786; $p = .954$

10. Hamlet Distance (km) from the Nearest Health Centre or Health Centre's Branch

Completed	2.86	1.70	298
Not Completed	2.85	1.37	495

$t = .06$; d.f. = 521; $p = .948$

Appendix VIII

Procedure for Logistic Regression Analysis of BCG Immunization

Appendix VIII Procedure for Logistic Regression Analysis of BCG Immunization

Variables that were tested for regression analysis are presented in Appendix VIII, Table 1.

The t-values, degree of freedom and probability level for the relationship between the continuous variables and comparison group can be found in Appendix VIII, Table 2.

The number of children in the family can be expressed in four ways, i.e. the number of children everborn, number of children still alive, number of children less than 10 years old, and number of children less than 5 years old. These are not mutually exclusive. All four were tested for a significant relationship with comparison group. Because the number of children less than 5 years old would be expected to have the greatest influence on the mother's time for child care, this was the variable of greatest interest. If it was not significantly related to comparison group of the subject, but one or more of the other three were significant, the one with the most significant relationship was chosen.

A criterion probability of .06 or less was selected for inclusion; therefore only variables that at least approached a significant relationship with comparison group were included in the equation. Only two variables, the number of children in the family less than 5 years old, and distance to the Health Centre met this criterion.

Chi-square values for the relationship between the categorical variables and comparison group can be found in Appendix VIII, Table 3. A p-value of .06 or less was again selected as the criterion value for inclusion. Mother's social participation in the community was the only variable selected.

1. List of Independent Variables Included for Tested in Univariate Analysis in Immunization Study

<u>Continuous</u> <u>Variables</u>

1. Age of Child
2. Age of Mother
3. Age of Father
4. Number of Children Less Than 5 Years of Age.
5. Number of Children Less Than 10 Years of Age.
6. Number of Children Still Alive in the Family.
7. Number of Children Everborn in the Family.
8. Left Mid-Upper-Arm Circumference
9. Height
10. Distance

<u>Nominal</u> <u>Level</u> - Dummy Variables

1. Mother's Occupation - with <u>Office</u> <u>Worker</u> as the Reference Category

    Business
    Labour
    Peasant
    Housewife

2. Father's Occupation - with <u>Office</u> <u>Worker</u> as the Reference Category

    Business
    Labour
    Peasant

3. Mother's Education - with <u>Illiterate</u> as the Reference Category

    Primary School
    Secondary School
    High School+

4. Father's Education - with Illiterate as the Reference Category

   Primary School
   Secondary School
   High School+

5. Mother's Social Participation - with No Participation as Reference Category

   Participated

6. Father's Social Participation - with No Participation as Reference Category

   Participated

7. Current User Contraception - with Current User as the Reference Category

   No

8. Sex - with Boy as the Reference Category

   Girl

9. Comparison Group - with Study Group as the Reference Category

   Control Group

2. Table of t-values, d.f., and p between Continuous Variables and Comparison Group in B.C.G. Immunization]

Variables	t	d.f.	p
Age of Child	-.09	2508	.932
Age of Mother	-1.20	2461	.230
Age of Father	-1.68	2450	.093
Number of Children Less Than 5 Years Old	-4.29	2457	.0001
Left Mid Upper Arm Circumference	.30	2435	.764
Height	1.60	2435	.110
Distance from Health Centre	1.08	2484	.0001

3. Chi-square Values for Interrelationship Between Categorical Variables and Comparison Group in B.C.G. Immunization

Variables	X^2	d.f.	p
Sex of Child	1.25	1	.2635
Mother's Education	4.61	3	.2027
Father's Education	2.90	3	.4079
Mother's Occupation	10.62	4	.0312
Father's Occupation	1.51	3	.6791
Mother's Social Participation	.69	1	.4489
Father's Social Participation	.20	1	.6583
Current User of Contraception	1.85	1	.1742

The t-value, degree of freedom and probability level between continuous variables with B.C.G. immunization status of the child can be found in Appendix VIII, Table 4. The following variables met the criterion mentioned above: Age of subject, number of under five, and height.

Whereas the chi-square values for the relationship between categorical variables and B.C.G. immunization status of the child were presented in Appendix VIII, Table 5. Three more variables were selected to be included in the equation, i.e. father's education, mother's occupation, and current user of contraception.

Therefore a total of 7 variables were selected to be included in the equation, see Appendix VIII, Table 6. Of these, two were related both to Immunization Status and Comparison Groups, and 5 were related, only to one or the other. The later were included in the multivariate analysis in order to be conservative.

4. Table of t-values, d.f., and p of Continuous Variables and B.C.G. Immunization Status

Variable	t	d.f.	p
Age of Child	2.73	2507	.006
Age of Mothers	-1.70	2461	.089
Age of Fathers	-1.23	2448	.229
Number of Children Less Than 5 Years Old	-2.64	694	.009
Left-Mid-Upper Arm Circumference	1.15	703	.250
Height	2.10	693	.036
Distance from Health Centre	-1.61	734	.109

5. Chi-square Values for Interrelationship Between Categorical Variables and BCG Immunization Status

Variable	X^2	d.f.	p
Comparison Group	2.50	1	.1138
Sex of Child	2.03	1	.1690
Mother's Education	2.52	3	.4725
Father's Education	7.43	3	.0594
Mother's Occupation	10.55	4	.0321
Father's Occupation	2.74	3	.4334
Mother's Participation	.79	1	.4271
Father's Participation	.13	1	.7182
Current User of Contraception	3.98	1	.0458

6. Variables Selected to be Included in the LRA* in B.C.G. Immunization Study

Age of Child

Number of Children
Less Than 5 Years Old

Height

Distance from Health Centre

Comparison Group

Father's Education

Mother's Education

Current User of Contraception

LRA - Logistic Regression Analysis

Appendix IX Relationship Between Maternal Knowledge of Childhood Diarrhea and Socio-Demographic Characteristics of Mothers

1. Relationship Between Maternal Knowledge of Cause of Diarrhea and Socio-Demographic Characteristics of Mothers.

2. Relationship Between Maternal Knowledge of Prognoses of Diarrhea and Socio-Demographic Characteristics of Mothers.

3. Relationship Between Maternal Perceived Severity of Diarrhea and Socio-Demographic Characteristics of Mothers.

4. Relationship Between the Preference Health Resources for Diarrhea Cases and Socio-Demographic Characteristics of Mothers.

5. Relationship Between the Perference Home Treatment for Diarrhea and Socio-Demographic Characteristics of Mothers.

6. Relationship Between the Source of Information on ORS for Diarrhea and Socio-Demographic Characteristics of Mothers.

Appendix IX

1. Relationship Between Maternal Knowledge of Cause of Diarrhea and Socio-Demographic Characteristics

1. Age of Mothers

Percentage Distribution of Children

Cause of Diarrhea	< 29 Yrs. N = 1462	30 - 39 Yrs. N = 788	40 yrs.+ N = 148
Infection	1.1	.6	1.4
Food	24.9	21.2	15.6
Milk; Drinks	9.8	9.0	7.5
Weather, Cold	44.9	49.7	49.0
Don't Know	17.6	17.8	25.9
Others	1.7	1.6	.7
Total	100.0	99.9	100.1

$x^2 = 17.835$ d.f. = 10 $p = .0578$

2. Education of Mothers

Percentage Distribution of Children

Cause of Diarrhea	Illiterate N = 298	Primary School N =1576	Secondary School N = 316	High School N = 208
Infection	0.0	.8	1.6	2.4
Food	14.1	21.4	29.1	39.9
Milk; Drinks	10.1	8.9	8.9	13.0
Weather, Cold	42.3	48.1	51.3	36.5
Don't Know	31.5	19.5	7.6	4.8
Others	2.0	1.3	1.6	3.4
Total	100.0	100.0	100.1	100.0

$x^2 = 139.034$ d.f. = 15 $p < .0001$

3. Occupation of Mother

Cause of Diarrhea	Office Worker N = 80	Business N = 200	Labour N = 291	Peasant N = 976	Housewife N = 851
	Percentage Distribution of Replies				
Infection	1.2	1.5	.3	.7	1.3
Food	40.0	18.5	16.8	22.5	25.5
Milk;Drinks	5.0	13.5	5.5	9.5	9.1
Weather, Cold	36.2	51.0	43.6	46.2	48.7
Don't Know	6.3	15.5	32.6	19.4	13.2
Others	1.2	0.0	1.0	1.7	2.1
Total	99.9	100.0	99.8	100.0	99.9

$x^2 = 94.36$ d.f. = 20 $p < .0001$

4. Social Participation of Mothers

Cause of Diarrhea	Yes N = 180	No N = 2218
	Percentage Distribution of Replies	
Infection	.6	1.0
Food	38.3	21.9
Milk; Drinks	10.6	9.3
Weather, Cold	38.3	47.5
Don't Know	10.0	18.8
Others	2.2	1.6
Total	100.0	100.1

$x^2 = 30.66$ d.f. = 5 $p < .0001$

5. Current User of Contraception

Cause of Diarrhea	Percentage Distribution of Replies	
	Yes N = 1306	No N = 1902
Infection	1.0	.9
Food	24.3	21.7
Milk; Drinks	8.9	0.0
Weather, Colds	47.0	46.5
Don't Know	17.2	9.2
Others	1.6	1.6
Total	100.0	99.9

$x^2 = 3.86$ d.f. = 5 $p = .5702$

Appendix IX

2. Relationship Between Maternal Knowledge of Prognosis of Diarrhea with Socio-Demographic Characteristics

1. Age of Mothers

Prognosis of Diarrhea	Percentage Distribution of Children ≤ 29 Yrs. N = 1462	30 - 39 Yrs. N = 788	40 yrs.+ N = 148
Dehydration	29.5	32.4	8.4
Rising Intelligence	37.8	32.5	34.0
Nothing	13.8	16.8	27.2
Don't Know	12.3	11.0	13.6
Others	6.6	7.4	6.8
Total	100.0	100.1	100.0

$x^2 = 30.14$ d.f. = 8 $p = .0002$

2. Education of Mothers

Prognosis of Diarrhea	Percentage Distribution of Children Illiterate N = 298	Primary School N =1576	Secondary School N = 316	High School N=208
Dehydration	17.4	24.9	47.2	57.2
Rising Intelligence	40.3	39.1	25.0	20.2
Nothing	13.8	17.4	13.0	8.7
Don't Know	23.2	11.8	7.3	4.3
Others	5.4	6.7	7.6	9.6
Total	100.1	99.9	100.1	100.0

$x^2 = 206.09$ d.f. = 12 $p = .0000$

3. Occupation of Mothers

Prognosis of Diarrhea	Office Worker N = 80	Business N = 200	Labour N = 291	Peasant N = 976	Housewife N = 851
	Percentage Distribution of Replies				
Dehydration	75.0	26.0	23.4	27.5	31.3
Rising Intelligence	7.5	34.5	45.0	37.9	33.0
Nothing	7.5	22.5	9.3	6.4	6.2
Don't Know	3.7	9.5	19.6	10.8	11.5
Others	6.3	7.5	2.7	7.4	7.6
Total	100.0	100.0	100.0	100.0	100.1

$x^2 = 136.81$ d.f. = 16 $p = .0000$

4. Social Participation of Mothers

Prognosis of Diarrhea	Yes N = 180	No N = 2218
	Percentage Distribution of Replies	
Dehydration	52.2	27.9
Rising Intelligence	22.2	36.9
Nothing	10.6	16.1
Don't Know	8.9	12.2
Others	6.1	6.9
Total	100.0	100.0

$x^2 = 48.02$ d.f. = 4 $p = .0000$

5. Current User of Contraception

Prognosis of Diarrhea	Percentage Distribution of Replies	
	Yes N = 1306	No N = 1902
Dehydration	33.4	25.4
Rising Intelligence	34.4	37.5
Nothing	4.0	17.6
Don't Know	11.4	12.6
Others	6.8	7.0
Total	100.0	100.1

$x^2 = 20.05$ d.f. = 4 p = .0005

Appendix IX

3. Relationship Between Maternal Perceived Severity of Diarrhea with Socio-Demographic Characteristics

1. Age of Mothers

Perceived Severity of Diarrhea	< 29 Yrs. N = 1462	30 - 39 Yrs. N = 788	40 yrs.+ N = 148
	Percentage Distribution of Replies		
Severe	75.7	77.7	73.8
Moderate	7.7	6.9	10.3
Mild	16.6	15.5	15.9
Total	100.0	100.1	100.0

$x^2 = 2.78$ d.f. = 4 p = .5959

2. Education of Mothers

Perceived Severity of Diarrhea	Illiterate N = 298	Primary School N =1576	Secondary School N = 316	High School N=208
	Percentage Distribution of Replies			
Severe	79.3	74.2	77.7	84.1
Moderate	10.5	7.4	8.0	4.3
Mild	10.2	18.3	14.3	11.5
Total	100.0	100.0	100.0	99.9

$x^2 = 23.608$ d.f. = 6 p = .0006

3. Occupation of Mothers

Perceived Severity of Diarrhea	Office Worker N = 80	Business N = 200	Labour N = 291	Peasant N = 976	Housewife N = 851
	Percentage Distribution of Replies				
Severe	91.2	69.8	81.0	76.2	74.5
Moderate	5.0	3.0	7.3	8.4	8.2
Mild	3.7	27.1	11.8	15.4	17.3
Total	99.9	99.9	100.1	100.0	100.0

$x^2 = 38.759$ d.f. = 8 p = .0000

4. Social Participation of Mothers

Perceived Severity of Diarrhea	Yes N = 180	No N = 2218
	Percentage Distribution of Replies	
Severe	79.7	76.0
Moderate	5.8	7.7
Mild	14.5	16.3
Total	100.0	100.0

$x^2 = 1.362$ d.f. = 2 p = .5060

5. Current User of Contraception

Perceived Severity of Diarrhea	Yes N = 1306	No N = 1902
	Percentage Distribution of Replies	
Severe	77.4	74.8
Moderate	8.6	6.4
Mild	14.0	18.8
Total	100.0	100.0

$x^2 = 12.634$ d.f. = 2 p = .0018

Appendix IX

4. Relationship Between the Preference Health Resources for Diarrhea and Socio-Demographic Characteristics

1. Age of Mothers

Health Resources	Percentage Distribution of Replies < 29 Yrs. N = 1462	30 - 39 Yrs. N = 788	40 yrs.+ N = 148
Health Care System	77.2	76.5	78.9
Self Treatment	11.6	12.2	11.6
Others	11.2	11.3	9.5
Total	99.9	100.0	100.0

$x^2 = .61$ d.f. = 4 p = .9619

2. Education of Mothers

Health Resources	Percentage Distribution of Replies Illiterate N = 298	Primary School N =1576	Secondary School N = 316	High School N=208
Health Care System	83.9	75.3	80.1	76.4
Self Treatment	6.7	14.1	8.2	7.2
Others	9.4	10.7	11.7	16.3
Total	100.0	99.9	100.0	100.0

$x^2 = 29.79$ d.f. = 6 p = .0000

3. Occupation of Mothers

Health Resources	Office Worker N = 80	Business N = 200	Labour N = 291	Peasant N = 976	Housewife N = 851
	Percentage Distribution of Replies				
Health Care System	80.0	71.5	80.1	77.1	77.8
Self Treatment	3.7	20.5	9.6	11.3	11.9
Others	16.2	8.0	10.3	11.6	11.2
Total	99.9	100.0	99.9	100.1	99.9

$x^2 = 23.85$ d.f. = 8 $p = .0024$

4. Social Participation of Mothers

Health Resources	Yes N = 180	No N = 2218
	Percentage Distribution of Replies	
Health Care System	84.4	76.5
Self Treatment	5.6	12.3
Others	10.0	11.2
Total	100.1	99.9

$x^2 = 8.03$ d.f. = 2 $p = .0180$

5. Current User of Contraception

Health Resources	Percentage Distribution of Replies Yes N = 1306	No N = 1902
Health Care System	78.8	75.0
Self Treatment	10.3	13.6
Others	10.9	11.4
Total	100.0	100.0

$x^2 = 6.97$ d.f. = 2 $p = .0307$

Appendix IX

5. Relationship Between the Preference Home Treatment for Diarrhea and Socio-Demographic Characteristics

1. <u>Age of Mothers</u>

Health Treatment	Percentage Distribution of Replies		
	< 29 Yrs. N = 1462	30 - 39 Yrs N = 788	40 yrs.+ N = 148
O.R.S.	42.2	36.5	25.9
Antidiarrhea	16.8	18.9	20.4
Tea	10.9	9.4	9.5
Traditional Medicine	30.1	35.2	44.2
Total	100.0	100.0	100.0

$x^2 = 25.16$ d.f. = 6 p = .0003

2. <u>Education of Mothers</u>

Health Treatment	Percentage Distribution of Replies			
	Illiterate N = 298	Primary School N =1576	Secondary School N = 316	High School N=208
O.R.S.	20.1	37.7	52.8	59.1
Antidiarrhea	20.8	18.8	14.6	9.6
Tea	13.1	9.5	11.1	12.0
Traditional Medicine	46.0	34.1	21.5	19.2
Total	100.0	100.1	100.0	99.9

$x^2 = 121.28$ d.f. = 9 p = .0000

3. Occupation of Mothers

Home Treatment for Diarrhea	Percentage Distribution of Replies				
	Office Worker N = 80	Business N = 200	Labour N = 291	Peasant N = 976	Housewife N = 851
O.R.S.	57.5	36.0	37.1	39.5	39.1
Anti-Diarrhea	6.3	24.0	10.7	18.6	18.7
Tea	15.0	4.5	14.4	9.7	10.6
Traditional Medicine	21.2	35.5	37.8	32.2	31.7
Total	100.0	100.0	100.0	100.1	100.1

$x^2 = 46.82$ d.f. = 12 p = .0000

4. Social Participation of Mothers

Home Treatment for Diarrhea	Percentage Distribution of Replies	
	Yes N = 180	No N = 2218
O.R.S.	66.1	37.2
Antidiarrhea	12.8	18.1
Tea	4.4	10.8
Traditional Medicine	16.7	33.9
Total	100.0	100.0

$x^2 = 59.72$ d.f. = 3 p = .0000

5. Current User of Contraception

Home Treatment for Diarrhea	Percentage Distribution of Replies: Yes N = 1306	No N = 1902
O.R.S.	43.6	34.3
Antidiarrhea	8.0	17.3
Tea	10.0	10.8
Traditional Medicine	28.5	37.5
Total	100.1	99.9

$x^2 = 28.42$ d.f. = 3 $p = .0000$

Appendix IX

6. Relationship Between Source of Information on O.R.S. for-Diarrhea with Socio-Demographic Characteristics

1. Age of Mothers

Source of Information	Percentage Distribution of Replies		
	< 29 Yrs. N = 618	30 - 39 Yrs. N = 228	>40 Yrs. N = 34
Health Care System	80.4	79.2	89.5
Others	19.6	20.8	10.5
Total	100.0	100.0	100.0

$x^2 = 2.26$ d.f. = 2 $p = .3224$

2. Education of Mothers

Source of Information	Percentage Distribution of Replies			
	Illiterate N = 60	Primary School N =594	Secondary School N = 167	High School+ N = 123
Health Care System	78.3	82.2	83.8	68.3
Others	21.7	17.8	16.2	31.7
Total	100.0	100.0	100.0	100.0

$x^2 = 14.01$ d.f. = 3 $p = .0029$

3. <u>Occupation of Mothers</u>

Source of Information	Office Worker N = 46	Business N = 72	Labour N = 108	Peasant N = 385	Housewife N = 333
	Percentage Distribution of Replies				
Health Care System	71.7	77.8	85.2	79.7	81.4
Other	28.3	22.2	14.8	20.3	18.6
Total	100.0	100.0	100.0	100.0	100.0

x^2 =. 4.38 d.f. = 4 p = .3566

4. <u>Social Participation of Mothers</u>

Source of Information	Participating N = 119	Not Participating N = 825
	Percentage Distribution of Replies	
Health Care System	82.4	80.1
Others	17.6	19.9
Total	100.0	100.0

x^2 = .20 d.f. = 1 p = .6528

5. <u>Current User of Contraception</u>

Source of Information	Current User N = 569	Not Current User N = 375
	Percentage Distribution of Replies	
Health Care System	80.5	80.3
Others	19.5	19.7
Total	100.0	100.0

x^2 = .01 d.f. = 1 p = .9320

Appendix X Relationship Between Outcome and Socio-Demographic Characteristics

Appendix X

Table 1. The Contingency Tables of Socio Demographic Characteristics by Outcome in Diarrhea Study

1. Education of Mothers

Outcome	Percentage Distribution of Cases			
	Illiterate N = 112	Primary School N =6146	Secondary School N = 103	High School+ N = 30
Good Outcome	95.5	95.3	92.2	89.7
Poor Outcome	4.5	4.7	7.8	10.3
Total	100.0	100.0	100.0	100.0

$x^2 = 3.31$ d.f. = 3 $p = .3463$

2. Education of Fathers

Outcome	Percentage Distribution of Cases			
	Illiterate N = 40	Primary School N =607	Secondary School N = 126	High School+ N = 86
Good Outcome	95.0	96.4	91.0	88.4
Poor Outcome	5.0	3.6	9.0	11.6
Total	100.0	100.0	100.0	100.0

$x^2 = 13.71$ d.f. = 3 $p = .0033$

3. Occupation of Mother

Outcome	Percentage Distribution of Cases				
	Office Worker N=23	Business N=37	Labour N=103	Peasant N=437	Housewife N=259
Good Outcome	100.0	100.0	96.1	95.6	91.5
Poor Outcome	.0	.0	3.9	4.4	8.5
Total	100.0	100.0	100.0	100.0	100.0

$x^2 = 9.87$ d.f. = 4 $p = .0427$

4. Occupation of Father

Outcome	Percentage Distribution of Cases			
	Office Worker N=98	Business N=75	Labour N=145	Peasant N=541
Good Outcome	95.9	86.3	93.7	96.1
Poor Outcome	4.1	13.7	6.3	3.9
Total	100.0	100.0	100.0	100.0

$x^2 = 13.26$ d.f. = 3 $p = .0041$

5. Social Participation of Mother

Outcome	Participating N = 668	Not Participating N = 191
	Percentage Distribution of Cases	
Good Outcome	94.8	94.7
Poor Outcome	5.2	5.3
Total	100.0	100.0

$x^2 = 0$ d.f. = 1 p = 1.0

6. Social Participation of Father

Outcome	Participating N = 721	Not Participating N = 138
	Percentage Distribution of Cases	
Good Outcome	94.6	95.6
Poor Outcome	5.4	4.4
Total	100.0	100.0

$x^2 = .24$ d.f. = 1 p = .6278

7. Current User of Contraception

Outcome	Current User N = 631	Not Current User N = 228
	Percentage Distribution of Cases	
Good Outcome	94.4	95.5
Poor Outcome	5.6	4.5
Total	100.0	100.0

$x^2 = .41$ d.f. = 1 p = .5211

Appendix X

Table 2. The Contingency Tables of Socio Demographic Characteristics by Outcome in Fever Study

1. Education of Mothers

Percentage Distribution of Cases

Outcome	Illiterate N = 167	Primary School N = 989	Secondary School N = 174	High School+ N = 71
Good Outcome	94.6	94.3	94.2	95.8
Poor Outcome	5.4	5.7	5.8	4.2
Total	100.0	100.0	100.0	100.0

x^2 = .28 d.f. = 3 p = .9628

2. Education of Fathers

Percentage Distribution of Cases

Outcome	Illiterate N = 49	Primary School N = 989	Secondary School N = 191	High School+ N = 172
Good Outcome	93.3	94.4	94.1	95.3
Poor Outcome	6.7	5.6	5.9	4.7
Total	100.0	100.0	100.0	100.0

x^2 = .41 d.f. = 3 p = .9376

3. Occupation of Mothers

Outcome	Percentage Distribution of Cases				
	Office Worker N=68	Business N=53	Labour N=210	Peasant N=610	Housewife N=460
Good Outcome	92.5	84.6	96.2	95.6	93.5
Poor Outcome	7.5	15.4	3.8	4.4	6.5
Total	100.0	100.0	100.0	100.0	100.0

x^2 = 13.51 d.f. = 4 p = .0090

4. Occupation of Fathers

Outcome	Percentage Distribution of Cases			
	Office Worker N=189	Business N=118	Labour N=257	Peasant N=837
Good Outcome	94.1	93.7	94.8	94.5
Poor Outcome	5.9	6.3	5.2	5.5
Total	100.0	100.0	100.0	100.0

x^2 = .19 d.f. = 3 p = .9796

5. Social Participation of Mothers

Outcome	Percentage Distribution of Cases: Participating N = 1138	Not Participating N = 263
Good Outcome	94.1	95.8
Poor Outcome	5.9	4.2
Total	100.0	100.0

$x^2 = .88$ d.f. = 1 $p = .3469$

6. Social Participation of Fathers

Outcome	Percentage Distribution of Cases: Participating N = 1188	Not Participating N = 213
Good Outcome	94.4	94.8
Poor Outcome	5.6	5.2
Total	100.0	100.0

$x^2 = .04$ d.f. = 1 $p = .8379$

7. Current User of Contraception

Outcome	Percentage Distribution of Cases: Current User N = 1037	Not Current User N = 364
Good Outcome	95.0	92.8
Poor Outcome	5.0	7.2
Total	100.0	100.0

$x^2 = 2.43$ d.f. = 1 $p = .1189$

Appendix X

Table 3. The Contingency Tables of Socio Demographic Characteristics by Outcome in Cough Study

1. Education of Mothers

Outcome	Percentage Distribution of Cases			
	Illiterate N = 110	Primary School N =696	Secondary School N = 149	High School+ N =72
Good Outcome	90.9	92.4	91.8	93.1
Poor Outcome	9.1	7.6	8.2	6.9
Total	100.0	100.0	100.0	100.0

x^2 = .39 d.f. = 1 p = .9410

2. Education of Mothers

Outcome	Percentage Distribution of Cases			
	Illiterate N = 52	Primary School N =646	Secondary School N = 183	High School+ N =146
Good Outcome	92.3	91.9	93.4	91.8
Poor Outcome	7.7	8.1	6.6	8.2
Total	100.0	100.0	100.0	100.0

x^2 = .50 d.f. = 3 p = .9184

3. Occupation of Mothers

Outcome	Percentage Distribution of Cases				
	Office Worker N=62	Business N=46	Labour N=144	Peasant N=381	Housewife N=394
Good Outcome	93.5	90.7	94.4	92.7	90.9
Poor Outcome	6.5	9.3	5.6	7.3	9.1
Total	100.0	100.0	100.0	100.0	100.0

$x^2 = 2.38$ d.f. = 4 p = .6656

4. Occupation of Fathers

Outcome	Percentage Distribution of Cases			
	Office Worker N=155	Business N=95	Labour N=228	Peasant N=549
Good Outcome	92.9	89.0	93.4	92.0
Poor Outcome	7.1	11.0	6.6	8.0
Total	100.0	100.0	100.0	100.0

$x^2 = 1.89$ d.f. = 3 p = .5942

5. Social Participation of Mothers

Outcome	Percentage Distribution of Cases: Participating N = 838	Not Participating N = 189
Good Outcome	92.8	89.3
Poor Outcome	7.2	10.7
Total	100.0	100.0

$x^2 = 2.17$ d.f. = 1 $p = .1405$

6. Social Participation of Fathers

Outcome	Percentage Distribution of Cases: Participating N = 846	Not Participating N = 181
Good Outcome	93.1	87.8
Poor Outcome	6.9	12.2
Total	100.0	100.0

$x^2 = 5.76$ d.f. = 1 $p = .0164$?

7. Current User of Contraception

Outcome	Percentage Distribution of Cases: Current User N = 724	Not Current User N = 303
Good Outcome	93.2	89.7
Poor Outcome	6.8	10.3
Total	100.0	100.0

$x^2 = 3.1$ d.f. = 1 $p = .0784$

Appendix X

Table 4. Relationship Between Outcome of Medical Care and Continuous Independent Variables in Medical Care Study

1. Diarrhea

Variables	N	$\bar{X}$	S.D.	t value	p
Compliance					
Good Outcome	794	97.3	11.5	.72	.475
Poor Outcome	44	95.3	18.3		
Time-Sick-at-Home					
Good Outcome	814	1.9	1.0	-1.09	.280
Poor Outcome	45	2.1	1.4		
Age					
Good Outcome	814	24.1	14.0	.25	.803
Poor Outcome	45	23.6	15.8		
Height					
Good Outcome	813	79.4	10.2	-.75	.451
Poor Outcome	43	80.6	11.0		
Arm Circumference					
Good Outcome	813	14.8	1.2	-.75	.452
Poor Outcome	43	14.9	1.2		
Age of Mother					
Good Outcome	814	27.8	5.3	-.09	.930
Poor Outcome	45	27.9	5.8		
Age of Father					
Good Outcome	810	32.7	7.1	.70	.481
Poor Outcome	45	31.9	6.9		

Distance from the Health Centre					
Good Outcome	814	2.3	1.5	1.36	.180
Poor Outcome	45	2.1	1.1		
Number of Children Everborn in Family					
Good Outcome	814	2.6	1.6	1.49	.136
Poor Outcome	415	2.2	1.7		
Number of Children Still Alive in Family					
Good Outcome	814	2.5	1.6	1.54	1.24
Poor Outcome	45	2.2	1.8		
Number of Children Aged Less Than 10 Years					
Good Outcome	814	2.2	1.1	1.88	.061
Poor Outcome	45	1.9	1.2		
Number of Children Age Less Than 5 Years					
Good Outcome	814	1.4	.6	1.62	.106
Poor Outcome	45	1.3	.5		

2. Fever

Variables	N	$\bar{X}$	S.D.	t value	p
Compliance					
Good Outcome	1265	97.9	9.8	-.48	.629
Poor Outcome	74	98.4	9.7		
Time-Sick-at-Home					
Good Outcome	1322	1.9	1.0	-2.02	.047
Poor Outcome	78	2.1	1.2		
Age					
Good Outcome	1322	27.2	14.9	.17	.865
Poor Outcome	78	26.9	15.8		

Height					
Good Outcome	1322	82.1	10.9	.61	.544
Poor Outcome	78	81.3	11.6		
Arm Circumference					
Good Outcome	1322	14.9	1.3	-1.22	.222
Poor Outcome	78	15.1	1.4		
Age of Mother					
Good Outcome	1322	28.6	5.6	.64	.520
Poor Outcome	78	28.2	5.3		
Age of Father					
Good Outcome	1314	33.3	7.4	1.35	.177
Poor Outcome	77	32.1	6.4		
Distance from the Health Centre					
Good Outcome	1322	2.1	1.4	1.53	.130
Poor Outcome	78	1.9	1.0		
Number of Children Everborn in Family					
Good Outcome	1322	2.7	1.6	.18	.854
Poor Outcome	78	2.6	1.6		
Number of Children Still Alive in Family					
Good Outcome	1322	2.6	1.5	.10	.920
Poor Outcome	78	2.6	1.6		
Number of Children Aged Less Than 10 Years					
Good Outcome	1322	2.2	1.0	.33	.743
Poor Outcome	78	2.1	1.1		
Number of Children Age Less Than 5 Years					
Good Outcome	1322	1.5	.6	.99	.324
Poor Outcome	78	1.4	.6		

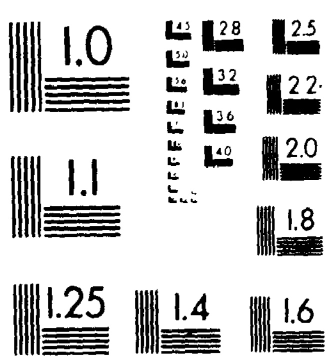
3. Cough

Variables	N	$\bar{X}$	S.D.	t value	p
Compliance					
Good Outcome	913	98.2	8.7	-.22	.825
Poor Outcome	76	98.4	8.4		
Time-Sick-at-Home					
Good Outcome	947	2.1	1.2	-2.06	.042
Poor Outcome	80	2.5	1.5		
Age					
Good Outcome	947	25.7	15.4	.54	.587
Poor Outcome	80	24.7	17.4		
Height					
Good Outcome	947	81.3	11.1	.12	.905
Poor Outcome	79	81.1	13.5		
Arm Circumference					
Good Outcome	947	14.9	12.5	.23	.818
Poor Outcome	79	14.8	11.7		
Age of Mother					
Good Outcome	947	28.3	5.7	.56	.578
Poor Outcome	80	27.9	5.5		
Age of Father					
Good Outcome	944	32.9	7.1	.43	.668
Poor Outcome	80	32.5	6.6		
Distance from the Health Centre					
Good Outcome	947	2.2	1.5	-.61	.545
Poor Outcome	80	2.3	1.4		

Number of Children Everborn in Family					
Good Outcome	947	2.6	1.7	-.61	.542
Poor Outcome	80	2.7	2.0		
Number of Children Still Alive in Family					
Good Outcome	947	2.5	1.6	-.98	.332
Poor Outcome	80	3.0	4.5		
Number of Children Aged Less Than 10 Years					
Good Outcome	947	2.1	1.0	.60	.550
Poor Outcome	80	2.1	1.1		
Number of Children Age Less Than 5 Years					
Good Outcome	947	1.4	.6	1.28	.203
Poor Outcome	80	1.3	.6		

5 OF/DE 5

MICROCOPY RESOLUTION TEST CHART
NBS 1010a
ANSI and ISO TEST CHART No. 2



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