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Costing of the Integrated Management of Childhood Illnesses in Bangladesh: A Study Based on Matlab Data

April 2000

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Partnerships for Health Reform
PHR

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Abstract

This study estimates the costs of resources—primarily manpower and medications—that Bangladesh would need to adopt Integrated Management of Childhood Illnesses (IMCI) guidelines into its community-level health services provision nationwide. The use of IMCI guidelines would replace the “reported symptoms” methodology now in use. The study was carried out by community health workers and paramedics at health care sub-centers in the Matlab district, under the direction of the International Center for Diarrheal Disease Research, Bangladesh. It compared current illness patterns, referral rates, personnel time, drug prescribing practices and costs, and patient care seeking behavior to what would have occurred using IMCI. It estimates that, in theory, nationwide use of IMCI would save the country $6.8 million in drug costs per year. (In reality, since Bangladesh suffers an acute drug shortage, meeting all drug needs would increase drug expenditures, but that is not due to IMCI.). Because of the additional time adherence to IMCI would require health workers to spend examining and treating children and counseling their parents or guardians on follow-up care, implementation of IMCI would more than double the current number of health workers. The cost of this additional workforce is estimated to be $2.6 million per year.

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Foreword

Part of the mission of the Partnerships for Health Reform Project (PHR) is to advance "knowledge and methodologies to develop, implement, and monitor health reforms and their impact." This goal is addressed not only through PHR's technical assistance work but also through its Applied Research program, designed to complement and support technical assistance activities. The main objective of the Applied Research program is to prepare and implement an agenda of research that will advance the knowledge about health sector reform at the global and individual country levels.

An important component of PHR's applied research is the Small Applied Research (SAR) program. SAR grants are awarded, on a competitive basis, to developing-country research institutions, individuals, and non-profit organizations to study policy-relevant issues in the realm of health sector reform. The SAR program has twin objectives: to provide data and analyses relevant to policy concerns in the researcher's own country, and to help strengthen the health policy research capacity of developing country organizations. While PHR provides technical advice and support to the SAR grantees, the content and conclusions in the final research reports are the responsibility of the grantees. They do not necessarily reflect the views of USAID or PHR.

A total of 16 small research grants have been awarded to researchers throughout the developing world. Topics studied include health financing strategies, the role of the private sector in health care delivery, and the efficiency of public health facilities.

SAR grant recipients are encouraged to disseminate the findings of their work locally. In addition, final reports of the SAR research studies are available from the PHR Resource Center and via the PHR website. A summary of the findings of each study are also disseminated through the PHR "in brief" series.

Small Applied Research Grants

Dr. Joseph K. Konde-Lule (Institute of Public Health, Makerere University). "User Fees in Government Health Units in Uganda: Implementation, Impact and Scope."

Dr. R. Neil Söderlund (University of Witswatersrand). "The Design of a Low Cost Insurance Package."

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Acronyms

ARI	Acute Respiratory Infection
CHWs	Community Health Workers
DSS	Demographic Surveillance System
FTE	Full-time Equivalent
FWC	Family Welfare Center
FWV	Family Welfare Visitor
HA	Health Assistant
HDS	Health and Demographic Survey
HPSP	Health and Population Sector Program
ICDDR, B	International Center for Diarrheal Disease Research, Bangladesh
IMCI	Integrated Management of Childhood Illnesses
MCH-FP	Maternal and Child Health-Family Planning
ORS	Oral Rehydration Solution
PHR	Partnerships for Health Reform Project
SD	Standard Deviation
Tk	Taka (currency of Bangladesh)
UNICEF	United Nations Children's Fund
USAID	United States Agency for International Development
WHO	World Health Organization

Currency Conversion

Tk 48.5 = US$ 1

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The research ideas of this study evolved gradually over a relatively long period of time during 1997-98, and the authors thank the many individuals who offered ideas and advice during the period. Professor Patrick Vaughan, London School of Tropical Medicine and Hygiene and division director of ICDDR,B, advised the ICDDR,B health economics team to conduct a study on IMCI costing. Initial discussions on the scope and methodology of a costing study took place with Dr. Jennifer Bryce of the World Health Organization in March 1997. Later in April, further discussions took place in Geneva with Dr. Bryce and Dr. Thierry Lambretchs. The Geneva meeting was instrumental in finalizing the methodology of the study and the research protocol. Dr. Lambretchs carefully examined the regularly collected data by the Matlab paramedics to see whether the information could be used to derive the IMCI categorization of illnesses for the children seeking care. It was found that the IMCI categorization could be derived if the paramedics asked two additional questions. The possibility of collecting the additional information through the regular data collection system of Matlab was discussed with Dr. M. Yunus, director of the Matlab Project and Mr. Chakraborty, manager of Matlab field research. The Matlab project group provided additional comments and suggestions to improve the data collection procedure.

We also acknowledge the help received from the CHWs and the paramedics of Matlab during the data collection phase. During the severe flood of 1998, the paramedics and the CHWs kept the project informed about the flood situation. They were also kind enough to come to Matlab hospital in June 1999, to discuss some of the research findings. Finally, the research team based at the ICDDR,B Health Economics Program provided the research support at all stages of this research.

This research is funded through the Partnerships for Health Reform, and the matching fund for the work came from the DFID support of the Health Economics Program.

Executive Summary

The purpose of this study is to estimate the cost implications of implementing the newly proposed Integrated Management of Childhood Illnesses (IMCI) algorithm in first-level health care facilities in rural areas of Bangladesh. Bangladesh policymakers need to know the cost of IMCI prior to its implementation so that they allocate adequate resources—particularly personnel and drugs, and the associated financial resources—to health facilities.

The data for the study came from Matlab, an experimentation station of the International Center for Diarrheal Disease Research, Bangladesh (ICDDR,B). ICDDR,B health workers (60 community health workers [CHWs], in the community, and four paramedics, one at each of four sub-center clinics) collected data on morbidity of children ages two months to five years via a questionnaire. Questionnaires were designed to collect all the required information needed for classification of illness conditions according to the IMCI module. Data were coded and entered immediately after the survey, and then used by public health physicians to categorize into IMCI illness classifications. Additional data, on prevalence of childhood illnesses, was derived from the record books of the CHWs, who visit households every other week to note all the morbid cases of children.

All children who sought out care from the CHWs at the CHWs' homes, and from paramedics at the sub-centers, during the survey period constitute the sample for the study. That is, children treated by CHWs during their routine home visits are not included in the sample. This is because IMCI is a facility-based illness management strategy, and thus medical care provided at patient homes should not be included in the estimations.

The four-month data collection period (interrupted in some survey areas by severe flood conditions) generated a sample of 1,921 childhood illness cases at the CHW level and 3,584 children at the sub-center level. The lower number of cases seen by CHWs is due to their involvement in family planning activities and routine data collection for the Matlab medical care delivery system. In the average month, about 508 sick children visited the 60 CHWs, while the four paramedics saw 977 children.

Illness Patterns

Fever, cough, and cold dominated the reported illness pattern at the CHW level; about 66 percent of all cases reported one or more of the three conditions. Approximately one-third reported skin disease as a major complaint, 17 percent reported oral sores and eye and ear problems, and about 11.5 percent reported diarrhea and dysentery. More than half of the sick children seeking care were malnourished by weight-for-age Z-scores (less than –2SD [standard deviation]). About 23 percent were severely malnourished, with weight-for-age Z-scores less than –3SD. The Z-scores are calculated using the international standard for weight-for-age.

The illness pattern at the sub-center level shows similarities to and differences with the pattern at the CHW level. Similar to the CHW level, approximately 61 percent of all cases reported one or more of the symptoms related to fever, cough, and cold. However, only 1.5 percent of cases presented to the sub-centers complaining of diarrhea, compared to more than 11 percent at the CHW level. About one-fifth reported to the sub-centers with skin conditions as a major symptom, compared with one-

third at the CHW level. Like CHWs, sub-centers considered more than half (53 percent) of children malnourished; 17 percent were severely malnourished cases, compared to 23 percent at the CHW level.

Referral Rates

During the survey period, CHWs referred more than 77 percent of children seeking care (1,486 cases) to sub-center paramedics for further assessment and management. Most referred children got no treatment from the CHWs; some received a first dose of medication. If the IMCI module had been followed, only 7.8 percent (149 cases) would have been referred to a higher facility. This extremely high level of referrals reduces the effectiveness of CHWs, and it may explain the reason for low utilization of CHWs by local households. In this sense, the paramedic level at Matlab should be considered the first-level health facility for the implementation of IMCI.

In contrast to the number of referrals by CHWs, paramedics at the sub-center level referred only 2.8 percent of total cases to higher-level facilities. Based on the same reported symptoms and physical exam, the IMCI would have referred about 3.2 percent of cases; it is possible that the paramedics currently do not report all the important information needed for determining IMCI referral. At the CHW level, Questionnaire I ensured that all information was collected and reported.

Of the 149 referrals that would have taken place at the CHW level under IMCI, most (116, almost 78 percent) would have been for a serious, urgent problem and the rest for further assessment. At the sub-center level, many (60 percent) would have been for further assessment. If the weighted average of referrals from the two levels is considered, IMCI is likely to refer 5 percent of cases to higher-level facilities. The weighted average also implies that 37 percent of all referred cases will be for further assessment; the remaining 63 percent will be for serious illnesses that require urgent interventions.

Personnel Time

To estimate the time inputs needed for implementation of IMCI, CHWs noted in a survey questionnaire the time they needed to obtain all the information required for IMCI classification and to provide treatment and counseling. The average time needed was about 16.3 minutes, plus 2.5 minutes for counseling; there was little variation in time requirements for different illness type. In contrast, CHWs and the paramedics estimated through common agreement in a group meeting that the average time currently spent on a sick child is about eight minutes, with 0.4 minute for counseling.

Drug Prescribing Practices and Costs

The current drug prescription pattern of CHWs is quite different from what the IMCI would prescribe. For example, CHWs currently recommend higher levels of antibiotics than does the IMCI, and their use of paracetamol is eight times greater than that of IMCI. The IMCI module does not recommend the use of antihistamine syrup, which is also widely prescribed and dispensed by the CHWs. It should be noted that the CHWs in Matlab are considered to be conservative in drug prescriptions, and the actual drug use for childhood illnesses is likely to be much more intensive in the use of histamine syrup, paracetamol, and antibiotics.

Comparing the cost of drugs for current practice to IMCI at the CHW level first requires adjustment in the number of cases managed. The current practice is to refer most of the cases to paramedics by giving the initial dose of drugs. In comparing cost levels, this study assumed that the average cost of treatment can be used to inflate the actual drug costs to derive the total cost if all children were managed at the CHW level. It also assumed that the management strategy of non-IMCI health conditions will not change due to the implementation of IMCI. The calculations indicate that the drug cost of IMCI would be 15 percent lower than that of the current practice.

At the sub-center level, the paramedics treated 3,422 children and prescribed drugs worth Tk. 152,721. The paramedics prescribed on average 1.9 drugs per child, with an average drug cost of Tk. 45. The number of diagnoses per child was 1.1. Assuming that the non-IMCI illness management practice will not be affected by the introduction of IMCI, the IMCI would have spent Tk. 101,205, or about Tk. 30 per child. In other words, introduction of IMCI should reduce the drug cost at the sub-center level by about 33 percent.

Morbidity Rates and Care Seeking Behavior

The household visit record of the CHWs for November 1998 indicates that about 240 children per 1,000 children were sick in that month. This prevalence rate of morbidity is much higher than the rate reported by the Bangladesh Bureau of Statistics' Health and Demographic Survey (Bangladesh Bureau of Statistics, 1998), which reported only about 225 per 1,000 in a year. That survey's long recall period of three to four months may have led to underestimation of the overall morbidity prevalence. For estimating the cost of IMCI, this study uses the prevalence rate found in Matlab.

In Matlab, about 15.7 percent of sick children visit CHWs to obtain care. About 35.9 percent visit sub-centers. The sub-center level includes the children referred by the CHWs, about 66 percent of whom actually seek care at the sub-center level. (This ratio was derived by matching the identification number of the case referred and utilization of services at the sub-center level by the same individual at a later date.) Therefore, the percentage of all sick children seeking care from either CHWs or paramedics or both is estimated to be about 44.5 percent. Also, if the CHWs did not visit the homes in the locality on a regular basis, some of the sick children managed by them at home would have traveled to see the CHWs or the paramedics. Allowing some additional visits for cessation of home visits, the proportion of all ill children seeking care should be about 50 percent.

Estimated Costs of Implementing IMCI

If the current drug prescribing practice observed in Matlab is implemented throughout Bangladesh, the total drug cost for the management of childhood illnesses will become $20.32 million per year. In contrast, if the country implements IMCI, the drug cost should be about $13.52 million. In other words, IMCI will, in theory, save about $6.8 million per year. However, in actuality, implementation of IMCI will not generate such savings due to acute shortage of drugs in the country. The current availability of drug expenditures is not known but it is estimated to be around $3.3 million per year. Therefore, nationwide implementation of IMCI will need an additional $10 million in drug expenditures.

This estimate does not take into account that drugs are currently obtained by parents from the open market. Assuming that 50 percent of children who are prescribed drugs obtain them from the market, the public sector and households taken together spend about $10.16 million. Therefore, the net cost of drugs for implementing IMCI should be about $0.35 per child per year. The rest of the

cost, about $0.46 per child per year, is due to reallocation of drug expenditure from households to the public sector

The implementation of IMCI is quite intensive in terms of time inputs of the health care providers. Under current management practices, the time requirement per case is eight minutes, plus an additional 0.4 minute per case for counseling. If IMCI is followed, the time requirement per case will increase to about 16.3 minutes for management and 2.5 minutes for counseling. This additional time input translates to a need for 2,721 additional full-time equivalent health workers (4,919 full-time equivalents), a 124 percent increase in the number of workers exclusively employed in childhood health activities.

In the context of the Bangladesh health care delivery system, which is being reformed to integrate all curative and preventive services, health workers provide medical care services to all patients, both children and adults. Therefore, with the proportion of time that paramedics spend on child health—about 25 percent—the total number of health workers needed to implement the current practice will be 8,792. After implementation of IMCI, assuming adult health care demand does not change and new workers continue to allocate 25 percent of their time to child care services, total health workers needed will approach 19,700. The cost of this additional work force is estimated to exceed $2.6 million per year.

In sum, this study estimates the cost of implementing IMCI in the public health sector of Bangladesh to be around $13 million, or about $0.81 per child per year.

1. Introduction

1.1 Background

The Integrated Management of Childhood Illnesses (IMCI) module was launched in 1995 by the World Health Organization (WHO) and UNICEF in order to address five leading causes of childhood deaths in the world. These five diseases—pneumonia, diarrhea, measles, malaria, and malnutrition—are associated with about 70 percent of all childhood deaths in the developing world (World Health Report 1997). It has been reported that at least three out of four children seeking medical attention suffer from one of these five conditions (WHO 1995; WHO 1997). There is a considerable overlap in the signs and symptoms of several major childhood diseases. A single diagnosis for a sick child is often inappropriate because it identifies only the most apparent problem and can lead the medical care provider to overlook an associated and potentially life-threatening condition (WHO 1995). Integrated management of the sick child allows more accurate identification of illnesses in outpatient settings and ensures more appropriate and combined treatment of all the major illnesses. The IMCI also is more efficient in identifying the severe cases and helps to speed up the referrals of severely ill children. In addition, IMCI emphasizes the training of health workers on how to communicate key health messages to mothers, thus promoting health messages to protect and improve the health of children.

The IMCI initiative has three main components: improvements in case-management skills of health staff; improvements in health systems; and improvements of family and community practices. The IMCI algorithm was developed to help health workers in developing countries to diagnose and treat major childhood illnesses through a standard approach. The IMCI integrates various vertical disease control programs to improve the quality of medical care services provided and to ensure more efficient use of available resources. The implementation of IMCI itself may affect the rate of utilization of health facilities, which, in turn, will affect the cost of treating illness in the community.

Management of the sick child was identified as one of the interventions with very high impact on global burden of diseases by the *World Development Report 1993* (World Bank). Management of sick children can potentially avert 14 percent of total burden of diseases in low-income countries. The World Bank report ranked management of the sick child among the 10 most cost-effective interventions in both low- and middle-income countries. Disease-specific control programs have been quite effective in reducing morbidity and mortality among children but often the multiplicity of programs can lead to inefficient use of resources due to duplication of efforts. Integrated management of the sick child should reduce misdiagnosis by avoiding the disease-specific treatment approach and should allow better use of limited resources by integrating the activities. Therefore, the integrated approach could potentially result in cost savings or higher benefits or both although an initial investment will be needed for training, reorganization, and adjusting the availability of various medical supplies and equipment to meet the needs of IMCI.

The purpose of this study is to examine the costs associated with the delivery of IMCI at the first-level health facilities in a developing country. The costing study requires good data on the present pattern of utilization of health facilities, illness categories of children seeking medical care, treatment cost when IMCI categorization is not used, and treatment cost when IMCI is used. Although the health workers at these low-level facilities are not using IMCI, the data generated can be

used for estimating the costs of implementing IMCI. In this sense, the study is a prospective costing of IMCI, i.e., what the recurrent cost implications will be at the first-level health facilities if IMCI is fully implemented.

1.2 Objectives

The main objective of this study is to:

> Estimate the recurrent cost implications of implementing IMCI in the first-level health facilities in rural Bangladesh.

Additional objectives are to:

> Derive the IMCI classifications for each of the sample cases using the reported health conditions and clinical evaluation of the cases;

> Identify relevant cost components for the delivery of IMCI;

> Compare the treatment costs of childhood illnesses with or without using the IMCI algorithm; and

> Help the policymakers in designing and implementing the IMCI by providing the parameters on costs and resource needs at the local level.

1.3 Research questions

The study addresses the following questions to estimate the IMCI cost in a poor rural economy:

> What is the underlying morbidity pattern of children in the rural community?

> How can the IMCI classification of illnesses be made using the data collected by the community health workers and paramedical staff?

> What is the utilization pattern of first-level health facilities in the area, given the underlying morbidity pattern?

> How can the cost of medical management with and without the implementation of IMCI be estimated?

> How can the total budget needed for implementing IMCI in rural Bangladesh be estimated?

> How can the sensitivity of estimated IMCI costs with respect to morbidity pattern, cost of drugs, and other medical services be examined?

1.4 Significance of Costing IMCI

Inappropriate management of childhood diseases is wasteful of scarce resources and increases the probability of mortality and morbidity of children. Management of sick children is therefore

among the most cost-effective health interventions in both low-income and middle-income countries. It is considered the most effective intervention in reducing the global burden of disease. The World Summit for Children has set a goal to reduce of childhood mortality by 50 percent by the year 2000. The IMCI is considered essential for achieving this goal. This approach alone is expected to prevent 14 percent of total burden of disease in low-income countries.

The IMCI is currently being implemented in many countries. Initial implementation began in 20 countries, located throughout the world, and at least 50 others are starting the process of introducing the initiative (WHO 1997). One country, Uganda, was in the expansion phase in May 1997 (WHO 1997). Although IMCI implementation is taking place, no cost estimates are available to guide the policymakers in the decision-making process. This study was initiated as a case study to estimate the major cost parameters for IMCI so that total recurrent cost of implementing IMCI can be calculated. Field-level data from Bangladesh will be used to estimate the additional resources that would be needed to implement the IMCI module.

The government of Bangladesh has agreed to implement IMCI in Bangladesh, starting in fiscal 1999-2000. Initially, the IMCI module will be adapted to Bangladesh situation and then will be implemented by phases. Clearly, the government's decision to include IMCI in the Health and Population Program of 1998-2003 makes it much more important to examine the resource requirements. The adaptation will change some of the requirements but is unlikely to significantly change the overall costs due to the adaptation. This study will estimate and report the major cost parameters so that if the adaptation of IMCI changes certain aspects of costs significantly, it will be possible to carry out a sensitivity analysis by using the parameters estimated.

2. Survey Area and Survey Design

2.1 Methodology

2.1.1 Study Area

The study was conducted in the experimental site of the International Center for Diarrheal Disease Research, Bangladesh (ICDDR,B) Center for Health and Population Research, located at Matlab in Chandpur district of Bangladesh, 55 kilometers southeast of the capital city, Dhaka. Matlab is the principal field station of ICDDR,B, offering opportunities for conducting a wide range of studies for scientists from different disciplines and from different countries of the world. Few, if any, rural areas of the developing world have been studied as intensively, as extensively, and for as many years as Matlab. Few other field stations have witnessed the first trials and the training of so many scientists who now hold the key positions in the world of international health (Fauveau 1994). Among its field activities is one of the largest and oldest demographic surveillance systems ever to be set up in a developing country. Since 1966 the Demographic Surveillance System (DSS) has maintained the registration of births, deaths, and migrations, in addition to conducting occasional censuses. A Maternal and Child Health-Family Planning (MCH-FP) program was introduced in the intervention areas of Matlab in 1977 (70 villages with 107,231 population).

Under the Matlab MCH-FP program, health care services are delivered by 60 community health workers (CHWs) through fortnightly home visits. CHWs provide counseling on family planning and reproductive health, nutrition education, vaccinations, and safe birth practices, and they distribute vitamin A capsules. They also treat children with minor illnesses, and identify and refer those children with severe illnesses and malnutrition to sub-center clinics for further management. These children, as well as self-referred or CHW referred patients of other age groups, receive treatment for diarrhea and other illnesses at the sub-center clinics. Paramedics at the clinics also provide counseling, and health and nutrition education.

There are four sub-centers run by the ICDDR,B in the Matlab area: Bardia, Khadergaon, Naergaon, and Torki. These sub-centers are located in the four blocks (catchment areas) defined by the Matlab health program in its intervention area. The four sub-centers are responsible for the delivery of health and family planning services to the blocks: Bardia is responsible for block A, Khadergaon for block B, Naergaon for block C, and Torki for block D. The sub-centers are connected with each other and the ICDDR,B hospital by road and river communications. The usual mode of communication between Bardia and Matlab hospital is by road and for the other three it is more convenient to use the river routes. However, one can also go to Khadergaon from Matlab sub-center by road. Each sub-center has 16 CHWs, of which 15 are regular and one is stand-by. The CHWs visit the households assigned to them by the sub-center once in a fortnight. The principal purpose of the regular visits is to collect data on selected childhood morbidity and family planning practices, to supply family planning materials, and to treat children if they are sick. Each sub-center has its own catchment area clearly defined for efficient programming of data collection and service delivery.

The CHWs in a block meet once in a fortnight to discuss their work, update the books with new data, and report the problems faced or new concerns emerging in the communities. The meeting dates

are fixed by the Matlab administration for the whole year at the beginning of the year. This study used these meeting days to discuss the progress of data collection, problems faced, etc., with the CHWs. Study investigators visited the sub-centers on the meeting days to monitor and supervise the data collection of the study. This process also enabled the regular collection of completed questionnaires from the CHWs and the paramedics to transport them back to Dhaka for data management.

The reason for selecting Matlab for the IMCI study was to obtain cost estimates of running IMCI if implemented in a "fully functioning" health care delivery system. The public sector health care delivery system is often not functional, and estimating the cost difference from a biased base will distort the real differences in the cost. When the current system is not working, the implementation of IMCI will have to make the system "functional" as well. Moreover, for prospective cost studies, it is necessary to identify the health care-seeking behavior for childhood illnesses in a functional system. The health seeking pattern in a non-functional system will lead to significant underestimation of costs.

In addition to its advantages, selecting Matlab as the site for the study also created a number of problems or limitations. The Matlab experimentation site has developed an integrated approach of providing care to women and children. Although the integrated approach of providing care has been adopted as the model by the government, it has not been implemented in most of the areas of the country. There is also no guarantee that under the new Health and Population Sector Program (HPSP), this particular model of integration will be adopted. Specifically, the HPSP will gradually phase out the community health workers, family welfare visitors, and other health workers. The HPSP is also supposed to create "community clinics" for each 1,000 households. In Matlab health system, the sub-centers provide care to about 4,000 households. Therefore, the new system could be different enough from the Matlab structure to necessitate new estimates of costs and utilization.

Another potential problem of using the Matlab data is related with the illness pattern of children in the area compared to the illness pattern expected in rural Bangladesh on the average. In Matlab, the illness pattern is likely to be biased due to intensive prevention and treatment interventions against diarrhea. The Acute Respiratory Illness (ARI) Control program has also been in operation in the area since early 1980s. The illness patterns observed in other rural areas of Bangladesh will not represent the illness pattern to be observed in a fully functioning IMCI center. In fact, it is not clear whether the comparison of illness pattern of medical care seekers in Matlab can be compared with the illness pattern observed in another rural facility.

2.1.2 Sampling

All children ages two months to five years visiting the sub-centers or treated at the home of a CHW were included in the study. During the data collection period, all children seeking care at the home of CHWs or at the sub-centers, irrespective of whether they were treated or referred to the higher facilities for further management, were included. Since IMCI is a facility-based management strategy, data collection on illnesses and management of illnesses were limited to visits to the sub-centers or to the homes of the CHWs. Costing of IMCI would be biased upwards if this study included the illness cases seen by the CHWs during regular home visits. Although the regular routine of home visits might affect the health seeking behavior of the population, the cases seen by the CHWs during their routine home visits are not considered in this exercise.

2.1.3 Data Collection

The study collected data through the CHWs and the paramedics of the sub-centers appointed in different blocks of Matlab experimentation site of ICDDR,B. A number of structured questionnaires were designed for data collection.

2.1.3.1 Illness Questionnaire I

Questionnaire I was developed to collect data on childhood illnesses from the community by the CHWs. The questionnaire was developed using the WHO/UNICEF module on "Management of Childhood Illnesses: 2 months to 5 years." The questions included in this questionnaire provided the information necessary for categorizing children into IMCI illness groups.

The CHWs used this questionnaire whenever sick children ages two months to five years visited them at their residences to seek health care. They also recorded the time required for physical examination and management of the sick children and counseling of the mothers on nutrition of both the child and the mother.

It should be mentioned here that one of the important components of the IMCI is to deal with malnutrition among children. In Matlab, although the paramedics at the sub-centers routinely collect data on weight of the children, the CHWs do not report weights as they do not have access to weighing scales. Many of the child patients may not come to the sub-centers unless they are referred by the CHWs for ongoing management or urgent care. So, to get the real malnutrition situation of children at the community level, the study decided to collect information on the weights of sick children. To collect data on weight of the children, the study borrowed 28 uni-scales from the Bangladesh Integrated Nutrition Project and UNICEF. Seven CHWs from each block were randomly selected for the distribution of the scales.

2.1.3.2 Illness Questionnaire II

This data collection form was designed to collect data on the sick children who visited the sub-centers for illnesses. Paramedics at the sub-centers keep records on illnesses and management of sick children in outpatient registers. This form was designed to facilitate the transfer of the information from the outpatient department registers to the forms and, at the same time, to ensure collection of additional information at the sub-center level.

Translating the symptoms and findings into IMCI illness categories is not a straightforward exercise. The IMCI requires additional information not regularly collected by the paramedics at the sub-centers. This lack of information led to under-coding of the illness category, i.e., considering an illness as not severe when in fact it may fall under the most severe category.

The paramedics used this questionnaire to transfer data of children ages two months to five years from their outpatient registers as well as to collect additional information about the illnesses. Data on complaints of the patients, with duration, main findings of the physical examination of the patients by the paramedics, and the management (drug treatment and advice) given were included. The questionnaire also included data on whether or not the patients were referred to the higher-level facility for further management. The questionnaire also noted the provisional diagnosis made by the paramedics based on the chief complaints and findings from physical examination. The weights of children visiting sub-centers were obtained from the outpatient registers.

2.1.3.3 Prevalence of Childhood Illnesses: Community-level Information

Apart from these two questionnaires, data were also collected on the morbidity of children of target age group found during the fortnightly home visits of the CHWs. This was to better understand the underlying morbidity pattern of the target children in the community. A simple data collection form was designed to transfer the morbidity data of one month (November 1998) from the record books of CHWs. The CHWs during their regular home visits record a number of selected morbidities of children occurring in the household in the previous two weeks. Therefore, the home visit-based morbidity should reflect the underlying morbidity of children in the community.

2.1.3.4 Time Spent by CHWs for the Management of Sick Children

Another form was also distributed among the seven CHWs randomly selected from each sub-center to record time they require for managing a sick child when they do not use the "IMCI module on management of sick child" (Questionnaire I).

Data collection took place between July 1998 and mid-January 1999. It was interrupted during July-September 1998 due to widespread flooding in Bangladesh. Data collection resumed in October 1998 after the flood and continued until the middle of January 1999. The recording of time by the CHWs when they do not use the IMCI-type questionnaire were organized during April 1999. The variation in the sample size among the four blocks is mainly due to the variation in duration of data collection in the blocks. The analysis presented here has taken this variability into consideration in reporting the results.

2.1.4 Data Processing

2.1.4.1 Data Coding and Entry

Data collected in the field were transferred from Matlab to Dhaka on a regular basis. Coding of the data was done immediately after the questionnaire reached Dhaka. Data were entered using FoxPro in interactive mode with all possible consistency and bounds checks programmed into the data entry template developed.

2.1.4.2 IMCI Illness and Management Categorization

The IMCI illness categorization was done based on the reported symptoms of children and findings of physical examination performed by the CHWs and paramedics. The recommended management for the IMCI illness type was derived for each of the cases using the IMCI management guideline. The IMCI-based illness categorization and the recommended management strategy were derived manually by a public health physician. The IMCI illnesses and management types derived from the guideline were coded and computerized to become part of the data set for analysis.

One important aspect of IMCI illness categorization of fever is based on the risk of malaria in high-prevalence regions of the world. Considering Matlab as a low-prevalence area for malaria, and due to lack of information about the nature of the fever, no case was considered as malaria. On the other hand, the data collected through the questionnaire designed for the CHWs and additional information collected by the paramedics allowed categorization of fever and other illnesses into IMCI illness groups.

2.1.4.3 Quality Assurance of Data

The CHWs and paramedics were trained by the investigators on how to use the questionnaires. The questionnaires were pre-tested and necessary changes were made before the initiation of final data collection.

The CHWs were also given some training on important clinical issues that they do not use on a regular basis, e.g., method of recording respiratory rate, signs of the degree of dehydration, and taking temperature for every child. The IMCI module advocates asking each of the various health-related questions to all children irrespective of the reported symptoms of the child. It was important to ensure that the CHWs spent the extra time to ask all the questions, even when some of the questions appear unnecessary or irrelevant. The bi-weekly meetings were used to emphasize these points.

The paramedics, on the other hand, were specially instructed on how to transfer data from their outpatient registers to the form supplied to them by the study. The paramedics were also instructed to ask a number of additional questions so that IMCI categorization would be feasible. A review of the data collected by the paramedics before the start of the study indicated low emphasis placed by paramedics in noting the respiratory rate when the child's main complaint is not ARI-related. The paramedics were asked to measure the respiratory rates more carefully for all children and also to inquire about the duration of the symptoms. Regular review of data collected by the paramedics ensured consistent quality of data collection for the survey.

To supervise data collection and monitor field survey of the study, the investigators routinely visited all the four sub-centers during data collection phase. The fixed days for the meetings at the sub-centers were used to meet all the CHWs and the paramedics of a block. During these visits, feedback from the CHWs and paramedics were obtained. Necessary instructions on data collection and quality of data collected were also given to them if needed. Completed questionnaires were collected to carry back to Dhaka for data coding and entry. A regular account of data collection (number of samples from both CHW and sub-center levels) was maintained.

2.1.5 Sample Size for the IMCI Survey

Table 2.1 shows the duration of data collection at different levels in different blocks of Matlab and the number of child patients visiting CHWs and the sub-centers. The duration of data collection differed by blocks, ranging from three months in block B to seven months in block C. This was mainly due to the flood or flood-related disruptions in communications. In block B, data collection was suspended for the duration of the floods, but in block D it continued without interruption. In blocks A and C, data collection was interrupted, but for a shorter period than in block B.

Table 2.1 shows considerable variation in the number of children managed in different blocks, ranging from 13 percent of total patients for block B to 34 percent in block D. To a large extent, this variation can be explained by the duration of the survey in the block. For example, total survey days in block B was 171 days out of 1,235 total days of survey for the study, or about 14 percent of total survey days. This explains why only 13 percent of children in the sample were from block B.

Table 2.1: Duration of Data Collection and Number of Patients in All Facilities, Sampled by Block

Block	Duration of Data Collection (in days)		Number of Children		Total Children		Number of Children / 30 Days	
	CHW	Sub-center	CHW	Sub-center	#	%	CHW	Sub-center
A	154	151	515	756	1,271	23	100	150
B	95	76	264	464	728	13	83	183
C	167	179	427	1191	1,618	29	77	200
D	210	203	715	1,173	1,888	34	102	173
Total	626	609	1921	3,584	5,505	100	92	177

Table 2.2 presents another way of examining the hypothesis that the variability in the number of survey children is due to the variability of survey duration. The table shows that there is high variability in the number of children surveyed by individual block. It ranges from 14 percent of total children in block B to 37 percent in block D. About 27 percent and 22 percent of the sample came from block A and C respectively. If the number of children in a block is corrected for the length of the survey (i.e., estimating the number of children surveyed in 30 days), the variability lowers considerably, although block B remains low compared to other blocks. It is possible that many of the sick children were taken directly to the ICDDR,B hospital or to other health facilities of Matlab rather than going through the CHWs and the sub-centers.

Table 2.2: Number of Patients at CHW Level by Gender and by Blocks

Block	Gender of the Patients				Total Patients (2 months to 5 years of age)		Percentage of Total Child-months Surveyed (2 months to 5 years of age) in Block
	Male		Female				
	N	%	N	%	N	%	
A	278	26.5	237	27.1	515	26.8	29.9
B	145	13.8	119	13.6	264	13.7	16.3
C	225	21.5	202	23.1	427	22.2	27.2
D	400	38.2	315	36.1	715	37.2	26.5
Total	1,048	100.0	873	100.0	1,921	100.0	100.0

3. Findings: Illness Categories and Treatments at the CHW Level

3.1 Demographic Characteristics of the Study Population at the CHW Level

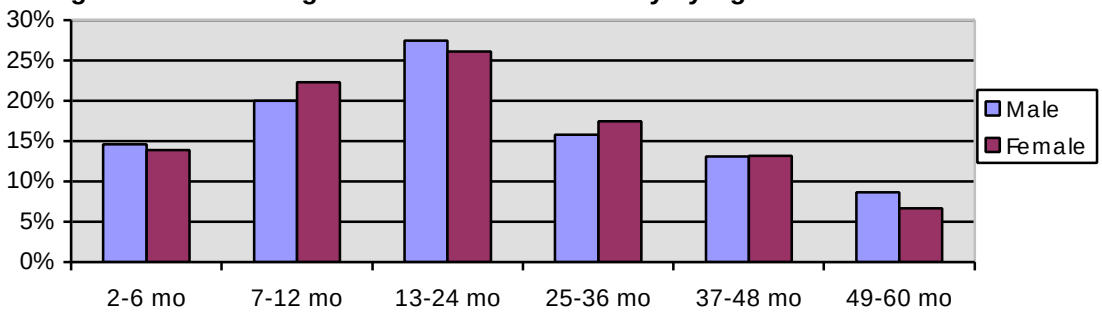
Table 3.1 shows the age and gender of children surveyed for the study at the CHW level. Overall, a slightly higher proportion of male children (55 percent) visited the CHWs than did female children. This difference was observed in all six age categories. In the oldest age category (49-60 months), more than 60 percent of children seeking medical care were male. Underlying morbidity and/or male-preference may account for the lower proportion of girls being seen by the CHWs.

Table 3.1: Age and Gender Distribution of Children Studied at CHW Level

Age (in months)	Gender				Total	
	Male		Female		N	%
	N	%	N	%		
2-6	153	55.6	122	44.4	275	14.3
7-12	210	51.9	195	48.1	405	21.1
13-24	289	55.9	228	44.1	217	26.9
25-36	166	52.0	153	48.0	319	16.6
37-48	138	54.3	116	45.7	254	13.2
49-60	92	60.9	59	39.1	151	7.9
Total	1,048	54.6	873	45.4	1921	100.0

In terms of total number of children surveyed (including visits to CHWs and sub-centers), the proportion in the 7-12 month age range was high, about 21 percent, and even higher, nearly 27 percent, in the 13-24 month group. Then, the number of children seeking care from CHWs declined rapidly with age. Figure 3.1 illustrates the age group distribution.

Figure 3.1: Percentage of Total Children in Study by Age and Gender



3.2 Major Illness/Symptom Categories

Table 3.2 and Figures 3.2 and 3.3 describe the broad categories of reported symptoms based on the first main complaint. (The average number of symptoms reported was 2.3 symptoms per child.) Overall, more than 80 percent of the reported symptoms are related to four ailments: cough, fever, runny nose, and skin problems.

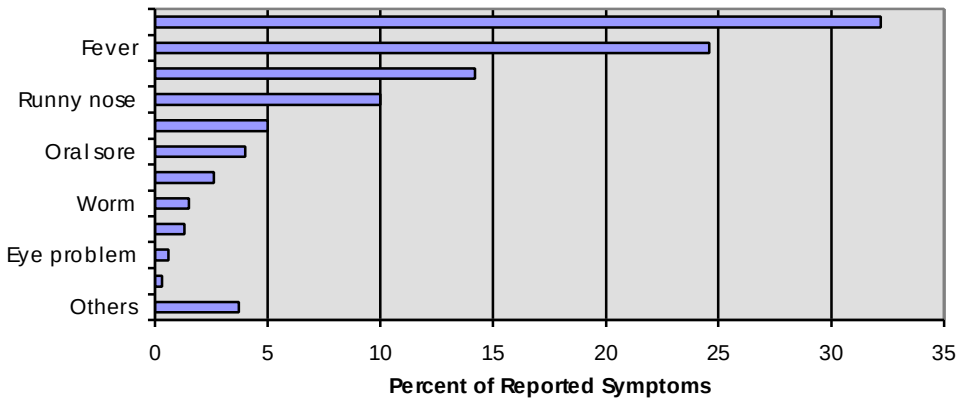
Table 3.2: Major Symptom Categories, by Frequency of Main Complaint

Symptom Category	Complaints						Total	
	Main Complaints			Associated Complaints				
Illness/Symptom	First	Second	Third	First	Second	Third	N	%
Fever	624	95	55	269	47	13	1,103	24.6
Cough	313	448	95	288	261	39	1,444	32.2
Runny nose	151	35	26	177	42	17	448	10.0
Drh/Dys	130	17	3	49	16	10	225	5.0
Worms	40	2	1	21	5	—	69	1.5
Skin problems	431	56	8	105	25	10	635	14.2
Oral sores	87	18	3	54	11	6	189	4.0
Ear problems	62	8	3	33	10	1	117	2.6
Eye problems	8	1	2	17	1	—	29	0.6
Abdominal problems	23	3	—	201	10	2	58	1.3
Injury/burns	11	—	—	2	—	—	13	0.3
Others	36	23	11	58	26	11	165	3.7
Total	1,916*	706	207	1,093	454	109	4,485	100

*N=1921; complaints of five patients were not recorded by CHWs.

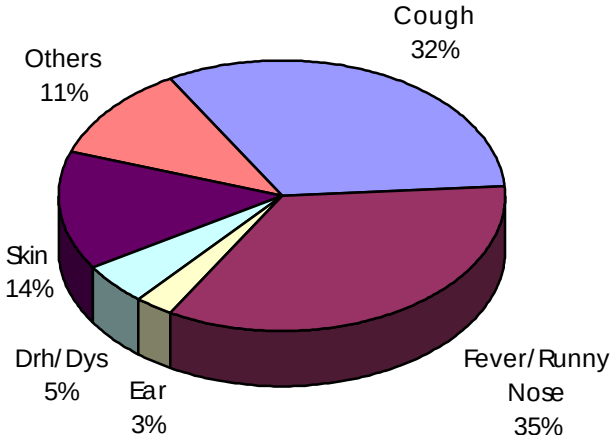
Cough is the most frequent symptom mentioned or reported (32 percent). The next two most frequent symptoms are fever (25 percent) and skin diseases (14 percent). The combination of runny nose with fever is the most prevalent category (35 percent) of reported illness conditions. Diarrhea and dysentery together represent only 5 percent of total reported illness. This low percentage may be due to several factors: (1) the CHWs treat diarrhea during their home visits not included in this study; (2) diarrhea cases directly go to the Matlab hospital, or (3) people in Matlab effectively treat diarrhea at home, reducing the need for contact with the health care provider. Among other broad categories, oral sores (4 percent) and ear problems (2.6 percent) contribute 7 percent to the overall illness burden.

Figure 3.2: Major Symptom Categories Reported to CHWs, by percent (reported by children's mothers/guardians)



The reported symptoms considered important for identifying IMCI target illnesses comprise almost three-fourths (74.4 percent) of total illnesses reported. This is consistent with the findings of a study carried out in Gondar, Ethiopia, where "these conditions typically account for three out of four sick children seeking care at a health facility" (WHO 1995).

Figure 3.3: Broad Categories of Illnesses Reported to CHWs



3.3 Reported Symptoms, by Gender

Table 3.3 shows the prevalence rates of reported illnesses by gender among those who sought medical attention from the CHWs. The table also shows the ratios of these prevalence rates between male and female children for each illness/symptom category. The ratio of prevalence rates is a measure of relative risk of having these illnesses between male and female children seeking care. The relative risk of most illnesses were found to be same for male and female children. Relative risk of oral sores (1.24) and eye problems (1.31) were higher for the male children. On the other hand, girls are more susceptible to intestinal worms (0.73) and ear infection (0.64).

Table 3.3: Prevalence of Symptoms Reported Symptoms to CHWs and Relatives Risk by Gender

Illness Category	Gender				Ratio Male to Female	Total	
	Male (N=1048)		Female (N=873)			N	%
	N	Per 1,000 patients	N	Per 1,000 patients			
Fever	618	590	485	556	1.06	1,103	24.6
Cough	794	758	650	745	1.02	1,444	32.2
Runny nose	233	222	215	246	0.90	448	10.0
Drh/Dys	122	116	103	118	0.98	225	5.0
Worms	32	31	37	42	0.73	69	1.5
Skin problems	330	315	305	349	0.90	6.5	14.2
Oral sore	107	102	72	82	1.24	179	4.0
Ear problems	51	49	66	76	0.64	117	2.6
Eye problems	18	17	11	13	1.31	29	0.6
Abdominal pain	32	31	26	30	1.03	58	1.3
Injury/burns	7	7	6	7	1.00	13	0.3
Others	90	86	75	86	1.00	165	3.7
Total	2,434		2,051			4,485	100.0

3.4 Nutritional Status Of Children

As mentioned in the methodology section above, seven CHWs were provided with weighing machines to weigh the children visiting them to seek care. This allowed the nutritional status of a sub-sample of children seen by the CHWs (404 children) to be calculated. It was found that 48 percent of the children are in the category of more than -2SD whereas slightly more than half (51.7 percent) are in the less than -2SD category by weight-for-age scores (Table 3.4). Almost one-fourth (23.5 percent) of all children were below –3SD weight-for-age Z-score, indicating a high prevalence of severe malnutrition. Another one-fourth (28.2 percent) were moderately malnourished.

Table 3.4: Nutritional Status of Children Examined by CHW, by Block and Gender

Weight for age Z-score	Blocks				Sex		Total	
	A	B	C	D	M	F	N	%
< -3SD	25	24	29	17	47	48	95	23.5
> -3SD to < 2SD	45	30	18	21	70	44	114	28.2
> -2SD	76	45	29	45	111	84	195	48.3
Total	146	99	76	83	228	176	404	100
Percentage of all children malnourished	36.1	24.5	18.8	20.5	56.4	43.6		
Prevalence rate	47.9	54.5	61.8	45.8	51.3	52.3		

Table 3.4 also indicates that among all the malnourished children seeking care from the CHWs, 56 percent were male. There is also a slight difference in the prevalence of malnutrition when gender is considered. About 51 percent of male children in the sample were malnourished (severe and moderate combined) while 52 percent of female children were malnourished. When severe malnutrition is considered, the gap between male and female children widens: About 21 percent of males were found to be below the -3SD level compared to 27 percent of female children. These differences in male-female prevalence rates may not reflect the underlying differences in malnutrition situation between male and female.

It should be mentioned here that during categorization of illnesses, IMCI identified 39 additional cases as malnourished. The additional number of malnutrition cases is due to the fact that there were a few children who were not weighed by the CHWs but presented with some kind of visible wasting or with palmer pallor. These children were classified under the malnutrition categories according to their findings.

Table 3.5 uses the malnutrition rates observed in the limited sample to project the total number of malnourished children in the entire sample. The projection or adjustment process allowed variability in malnutrition rates by blocks only. The calculations indicate that when the severity of malnutrition is considered, block C has the highest proportion (31 percent) of severely malnourished cases. Blocks A and B each have about one-fourth of total severely malnourished cases (26 percent and 25 percent respectively).

Table 3.5: Adjusted Number of Children with Malnutrition According to the IMCI

Block	Number of Children Identified as Malnourished according to IMCI (N=404)			Total			Adjusted Number of Children with Malnutrition (N=12921)		
	< -3SD	> -3SD to < -2SD	> -2SD	Actual	Adju-sted	%	< -3SD	> -3SD to < -2SD	> -2SD
A	25	45	76	146	693	36.1	118 (26.2)	214(39.4)	361(38.9)
B	24	30	45	99	471	24.5	114(25.3)	143(26.3)	214(23.1)
C	29	18	29	76	362	18.8	138(30.6)	86(15.8)	138(14.9)
D	17	21	45	83	395	20.5	81(18.0)	100(18.4)	214(23.1)
Total	95	114	195	404	1,921	100	451 (100)	543 (100)	927 (100)

3.5 Patient Advice and Counseling by CHWs

Table 3.6 reports the different types of instructions for follow-up self-care that the CHWs gave to patients during treatment, irrespective of whether drugs were prescribed. More than one-fourth (27 percent) of children were not given any advice; the remaining 72 percent were provided with at least one instruction. A large proportion of the instructions (20.6 percent) were so diverse that researchers grouped them into the residual category "others."

Table 3.6 also shows that the CHWs gave counseling or advice to about 1,400 cases but the total individual instructions numbered more than 3,000. In other words, an average patient received more than two pieces of advice.

Table 3.6: Advice Given to Patients*

Type of Advice	Frequency	%
Number of children given no advice	525	27.3
Number of children given advice	1,396	72.7
Types of advice given		
Keep away from cold	448	13.7
Use medicine properly	357	10.9
Clean ear with cotton	268	8.2
Pour water on head	226	6.9
Cold sponge the body	344	10.5
Bathe with neem leaf	121	3.7
Maintain cleanliness	468	14.3
Take food carefully/properly	358	11.0
Others	672	20.6
Total	3,262**	100

*Given to the mothers/guardians of children
**Multiple Advice

3.6 Referral of Patients by CHWs

Table 3.7 shows the referral pattern of child patients by the CHWs. Overall, 77 percent of all children seeking care from the CHWs were referred to higher facilities for further treatment. The high proportion of referral may be due to lack of authority of the health workers to deal with certain types of patients or their lack of training in certain types of illness. Other referrals may be made at the request of children's mothers and guardians.

Table 3.7: Referral of Patients by CHW

Block	Male		Female		Total	
	N	%	N	%	N	%
A	215	26.2	183	27.6	398	26.9
B	108	13.1	85	12.8	193	13.0
C	195	23.7	176	26.5	371	25.0
D	304	37.0	220	33.1	524	35.3
Total	822	100	664	100	1,486	100
% of children referred	78.4		76.1		77.4	

Male children are referred to a higher facility slightly more often (78 percent) than the females (76 percent). This variation in referral rate by sex is not high enough to indicate the presence of gender bias in referral pattern.

When the referral pattern is considered by blocks, the proportions of referrals were similar to the proportions of child patients in the blocks. Minor variations were observed in blocks C and D. In block C the ratio of these two proportions was 1.1 whereas in block D it was 0.9.

3.7 Drug Treatment Provided by the CHWs

Table 3.8 shows the type of drugs the CHWs used for treating children. The drugs prescribed were quite simple. Only 35 percent of children visiting CHWs for illness received drug treatment.

Table 3.8: Drugs Used for Treatment of Patients by CHWs

Drugs	Frequency	%
ORS	100	14.6
Paracetamol	404	59.0
Cotrimoxazole	111	16.2
Amoxycillin/Penicillin	9	1.2
Nalidixic acid	4	0.6
Mebendazole	58	8.5
Gentian violet	46	6.7
Whitfield	10	1.5
Others (Mycostatin/Histacin/Scabicidal/ Antibiotic ointment)	11	1.6
Subtotal	684	35.6
No drugs	1,237	64.4
Total	1,921	100

There are two possible explanations for this low prescription rate. First, most illnesses for which children seek care from CHWs may be simple and require no drug therapy, and second, since the CHWs refer so many cases to higher facilities, drugs are prescribed by the higher facilities rather than by the CHWs. Therefore, the management practice followed by the CHWs is basically to identify the cases to send to the paramedics rather than trying to provide primary health care services.

It appears that the CHWs in the study area provide screening services to distinguish mild illnesses from those requiring interventions from paramedics. Although in the structure of ICDDR,B medical care delivery system, the CHWs are at the first level of contact, they cannot be considered the first-level medical care facility mentioned in the IMCI module. However, the analysis of the cases seeking care at the CHW level is important to obtain a realistic estimate of IMCI costs.

4. Illness Management and Costs by CHWs: Comparison of Current Practice and IMCI

4.1 Illness Categories Based on IMCI Classification

Table 4.1 presents the summary of broad illness categories for the sick children seen by the CHWs if the IMCI illness classification procedure is used. These categories were constructed from the primary symptoms noted by the CHWs and the findings from the physical examination. The CHWs were instructed to ask each and every question in Questionnaire I of the survey. As mentioned earlier, the questionnaire was designed to enable this research to follow IMCI guidelines to define the illness categories. Therefore, a child who presented only with respiratory difficulty was also asked and examined for diarrhea, fever, measles, malnutrition, immunization, and ear problems.

The IMCI advocates multiple diagnoses for complaints of the same problem. For example, a child presenting with cough and fever is not diagnosed as ARI. Rather, IMCI identifies the first complaint as respiratory difficulty according to the severity and depending on other associated findings. At the same time IMCI recognizes the presence of fever and categorizes fever according to its severity. In this way, there may be multiple diagnoses of a single case, making the number of diagnosis becomes higher than the number of children with illnesses.

IMCI takes into consideration the health conditions that are not its primary focus or interest. It has been found that a substantial portion of illness is in the "other" category. To provide more information about the category, a number of sub-groups were defined and presented in this report. This will allow a better understanding of the illness pattern of the children seeking care and the prevalence of other illnesses not directly targeted by the IMCI but in need of medical management. The sub-groups of the "other" illness category are presented in selected tables of this report.

Table 4.1 shows broad categories of illnesses according to the IMCI system of grouping. Overall, respiratory ailment is the most prevalent illness category, accounting for more than one-fourth (28.7 percent) of total illnesses seen by the CHWs. The second most important illness category is febrile illnesses, which also accounts for more than one-fourth (27.3 percent) of all illnesses. Because Matlab is located in a low risk area for malaria, all febrile illnesses were considered fever. It is important to note here that these two illnesses together represent 56 percent of total illness burden among the children of two months to five years seen by the CHWs. In contrast, diarrhea and dysentery together represent only 5.5 percent of the illnesses. Ear problems account for 4 percent of the illnesses.

Table 4.1: Summary of Illness Categories According to the IMCI Illness Classification, by Block

IMCI Illness Category	Blocks				Total	
	A	B	C	D	N	%
Cough or respiratory distress	339	161	268	429	1,197	28.7
Diarrhea/Dysentery	60	57	47	64	228	5.5
Febrile illness						
High malaria risk	—	—	—	—	—	—
Low malaria risk	347	130	237	423	1,137	27.3
Measles (with or without complications)	6	4	14	21	45	1.0
Ear problems	40	19	42	70	171	4.1
Malnutrition	164	103	86	90	994*	10.6
Others	218	23	233	371	845	22.7
Total	1,174	596	927	1,468	4,716	100.0

*This is the adjusted number of malnourished children.

One important aspect of IMCI disease classification is the malnutrition issue among the children of this age group. Table 4.1 shows that malnutrition represents 10 percent of all illnesses or 443 in absolute numbers. This is a very low number for rural Bangladesh, where malnutrition is much more common. The sub-sample of children weighed to determine malnutrition indicates that about half of all children seeking care would be considered malnourished if the anthropometric indicators were used. So, the sub-sample-based prevalence rate of malnutrition was used to determine the number of malnourished children with the IMCI system of illness categorization. These derived numbers are presented in the table.

If the "other" illness category in the IMCI system is broken down into specific illness conditions, skin problems alone represent about 12 percent of the category. Other significant illnesses in this category are oral sores (5 percent), worms (1.5 percent) and eye problems (1.2 percent). It is important to note here that in Bangladesh, skin problems, while in the IMCI "other" group, constitute the third single largest category of all illness conditions, after respiratory ailments and febrile illnesses.

4.2 Comparison of Illness Types by IMCI and Reported Symptoms

Table 4.2 compares the illness types based on reported symptoms and categorization based on IMCI guidelines. To allow easy comparison with IMCI, the broad categories of IMCI illness types are used in the table.

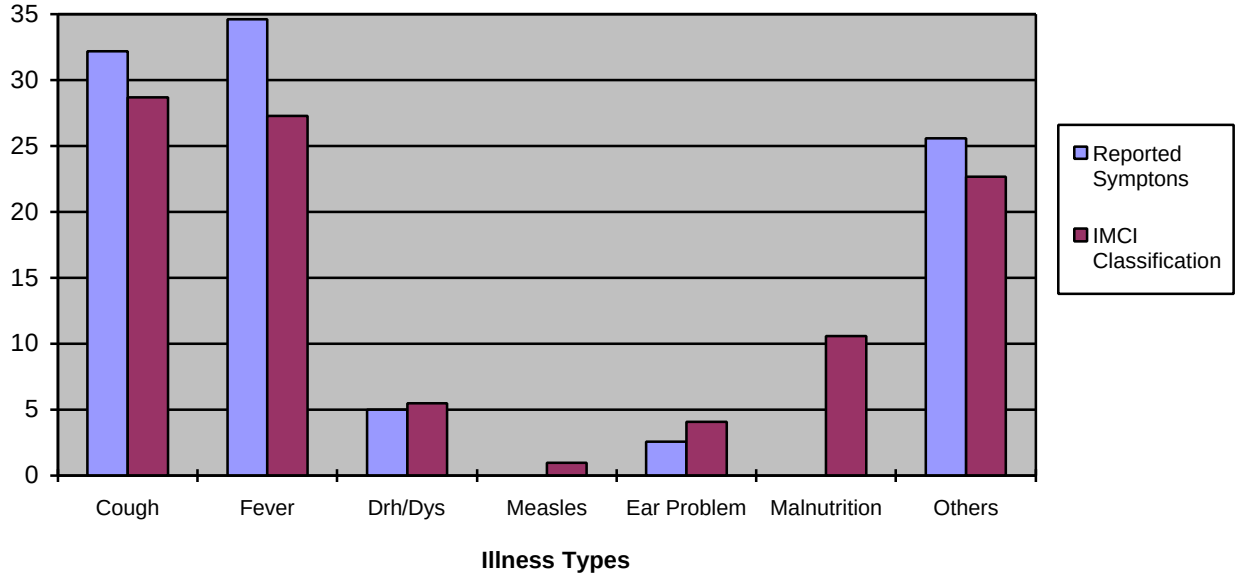
Table 4.2: Comparison of IMCI Illness Types with Illness Types Based on Reported Symptoms

Illness Type	Reported Illness		IMCI Illness Type	
	N	%	N	%
Cough or respiratory distress	1,444	32.2	1,197	28.7
Diarrhea/dysentery	225	5.0	228	5.5
Febrile illness	1,551	34.6	1,137	27.3
Measles	—	—	45	1.0
Ear problems	117	2.6	171	4.1
Malnutrition	—	—	994*	10.6
Others				
Skin problems	635	14.2	516	12.4
Oral sores	179	4.0	207	5.0
Worms	69	1.5	61	1.5
Eye problems	29	0.6	52	1.2
Others	236	5.3	108	2.6
Total	4,485	100.0	4,716	100.0

*Adjusted number of malnourished cases

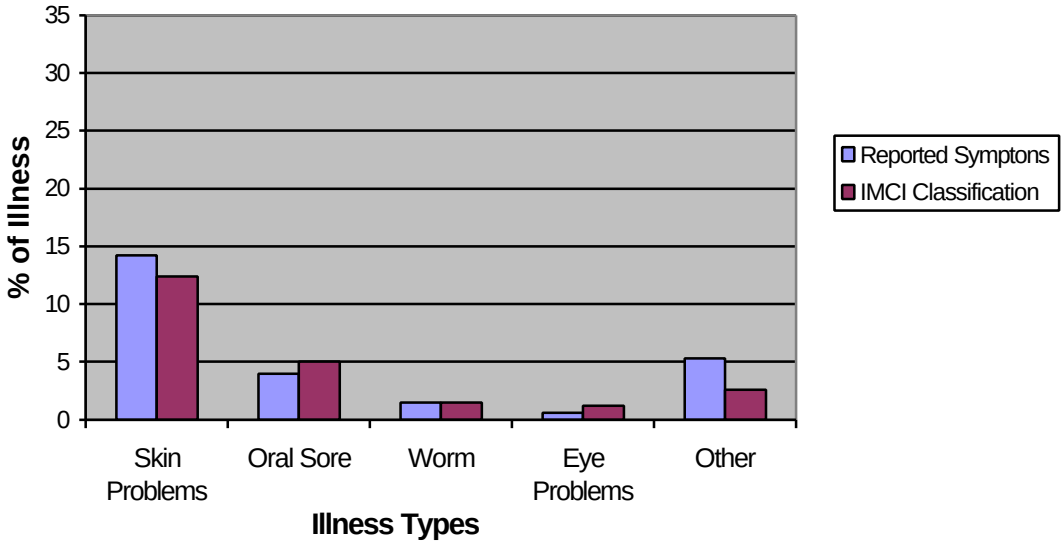
Overall, the number of illnesses by IMCI categorization is about 5 percent higher than the number of illnesses currently identified using the reported symptoms. A significant variation was observed for fever; it was about 35 percent if based on reported symptoms and 27 percent if the IMCI classification is used. The higher proportion of fever in the first category results from adding up the number of cases with the complaint "runny nose" with fever, which is 10 percent of total reported symptoms (refer to tables 3.2 and 3.3 in Section 3). Figure 4.2 illustrates these comparisons. Respiratory illness (cough) is the most prevalent illness type among reported symptoms, representing one-third of all cases (32 percent). There are further variations in the proportion of illness types between these two types of classifications: Respiratory illness drops to about 29 percent of all illnesses in the IMCI illness classification. On the other hand, diarrhea and dysentery together represent almost 5 percent of total illness in both types of classifications. It is important to note here that measles and malnutrition, the two major causes of childhood morbidity and mortality, are not represented among the illness types based on reported symptoms. This may be due to the fact that presenting complaints for these two illnesses are likely to be included in other categories. For example, complaints associated with measles may be recorded as skin eruption, rash, or redness of skin etc. As IMCI considers both the reported symptoms and the findings from physical examination, the IMCI classification may be more accurate and appropriate. This is also true for childhood malnutrition. Malnutrition as such is not the reported symptom for most of the cases and so the CHWs did not categorize even a single case as malnutrition. Measles represents 1 percent and malnutrition about 11 percent of total illnesses in the IMCI classification.

Figure 4.2: Comparison of Broad Illness Types, Reported Symptoms vs. IMCI



In the "others" category, it has been observed that the two classification schemes generate similar proportions of illness types (Figure 4.3). This is not unexpected when most of these illness categories are not target illnesses for IMCI and so the diagnoses of CHWs were used for classification.

Figure 4.3: Comparison of "Other" Illnesses, Reported Symptoms vs. IMCI



4.3 Referral of Patients by CHWs and IMCI

Table 4.3 compares referral cases recommended by the CHWs and by the IMCI module. Overall, 77 percent of patients were referred to higher facilities by the CHWs for further management. IMCI guidelines would decrease this figure to less than 8 percent. This means that the CHWs refer child patients almost 10 times more often.

Table 4.3: Comparison of Referrals by IMCI and CHWs, and by Gender

Referral	Gender				Total	
	Male		Female		N	%
	N	%	N	%		
By CHWs	822	55.3	664	44.7	1,486	77.4
By IMCI guidelines	85	57.0	64	43.0	149	7.8
Urgent	*65*	*76.5*	*51*	*79.7*	*116*	*77.9*
For assessment	*20*	*23.5*	*13*	*20.3*	*33*	*22.1*

Among the IMCI referrals, 78 percent of children need urgent referral due to the severe nature of their illness, and the remaining 22 percent need referral for assessment on a non-urgent basis.[1]

Table 4.3 also shows that male patients are referred more often than females, by both the CHWs and IMCI guidelines. This may be due to higher proportion of male children in the study sample. Among the IMCI referrals, gender ratios by for urgent referral or for assessment are similar to the overall breakdown of male and female children.

Table 4.4 compares the referral pattern for CHWs and IMCI guidelines, by block studied. The total referrals currently made (1,486) is almost 10 times higher than would be made under IMCI guidelines (149). There are variations by block: they range from 672 percent higher than IMCI in B block to 1,147 percent higher in D block. Even so, the study identified 11 cases not referred by the CHWs that would have been referred under IMCI guidelines. It would be interesting to learn why these 11 referrals were not made.

Table 4.4: Comparison of Referral of Patients by CHWs and IMCI Guidelines

Block	Referred			Number of Children Not Referred by CHWs but IMCI Referrals
	Actual	IMCI	% Difference over IMCI	
A	398	37	975.7	In all Blocks
B	193	25	672.0	
C	371	45	724.4	11
D	524	42	1,147.6	
Total	1,486	149	897.3	11

[1] Urgent referrals include children with severe illnesses: severe pneumonia, severe persistent diarrhea, very severe febrile diseases, severe complicated measles, mastoiditis, severe malnutrition or severe anemia. These children are recommended urgent referral after one dose of the appropriate antibiotic. Referral for assessment includes children with fever for more than one week, cough for more than one month, and for nutritional assessment.

4.4 Time Required for Managing the Child Patients

Table 4.5 shows the time that CHWs require to examine and manage medically the children who visit them seeking care, when they use the quasi-IMCI questionnaire—in other words, the time required to complete Questionnaire I. The table also breaks down the required time by gender.

Table 4.5: CHW Time Required for Physical Examination and Patient Management, by Gender (using Questionnaire 1)

Time Spent (in minutes)	Male			Female			Total		
	N	%	Average	N	%	Average	N	%	Average
=<10	162	15.9	9.2	122	14.3	9.2	284	15.2	9.2
11-15	414	40.7	14.0	347	40.6	14.0	761	40.7	14.0
16-20	315	31.0	18.6	267	31.2	18.7	582	31.1	18.6
21-25	78	7.7	24.1	83	9.7	23.7	161	8.6	23.9
26-30	38	3.7	29.3	4	0.5	39.5	14	0.7	29.1
>30	10	1.0	39.3	4	0.5	39.5	14	0.7	39.6
Total	1,017	54.3	16.2	855	45.7	16.4	1,872*	100.0	16.3

*Time was not recorded for 49 patients

Overall, the average time required for a case is 16.3 minutes. Eighty-seven percent of cases require less than 20 minutes and 40 percent require, on average, 14 minutes. Only 13 percent require more than 20 minutes. There is no significant variation in time spent when gender is considered.

The tendency of rounding up the recorded time appears to be a problem in the data presented. If all the time inputs are accurately recorded and reported, the average of time used within a time-spent class should be close to the mid-value of the class. In Table 4.5, the mean values are not at the mid-point. In other words, the time inputs needed may have been overestimated. Assuming that the degree of overestimation can be estimated by comparing the mid-value with the class mean, the time inputs appear to be overestimated by 7.69 percent for the 11-15 minutes time category and 3.33 percent for the 16-20 minutes category. For all other categories, the overestimation appears to be about 4 percent. Using these numbers and the percentage of cases in each time category as weights, the average over-estimation becomes 5.12 percent.[2] Therefore, the corrected average time required to manage a child following the IMCI module is followed should be about 15.5 minutes rather than the 16.3 minutes found by the survey.

[2] The apparent overestimation of time by CHWs may be due to the fact that many of the activities are new to them. With experience and practice, time required for managing a case using IMCI should be lower than the average time required during the study.

4.5 Time Required by Illness Category

Table 4.6 shows by broad illness category the mean time required for sick child management when following IMCI guidelines. A survey was administered to determine time needed to manage a sick child without using IMCI guidelines. However, times reported by caregivers showed extremely high variability.[3] Therefore, a group meeting held in July 1999 estimated the time needed for sick child management when not using IMCI guidelines to be about 8 minutes on average.

Table 4.6: CHW Time required for Physical Examination and Patient Management by Illness Types (using Questionnaire I),

Illness Types	When Q1 used* Mean Time in Minutes	When Q1 not used** Mean Time in Minutes
Fever	15.7	
Cough	17.0	
Runny nose	16.7	
Diarrhea/Dysentery	17.2	
Worms	13.6	
Skin problems	15.3	
Oral sore	15.8	
Ear problems	14.9	
Eye problems	14.9	
Abdominal problems	14.9	
Injury/burns	13.9	
Others	16.3	
Overall average	16.3	8

*N=1868
**N=224

4.6 Drug Treatment by CHWs and by IMCI guidelines

Section 3.7 discussed the types and quantity of drugs used by the CHWs for treating child patients. This section examines the types and quantity of drugs that would have been used if IMCI recommended treatment protocol had been implemented. Table 4.7 lists the drugs that would have been required to treat the types of illnesses observed in the sample. There are several significant differences between IMCI-recommended drug treatments and those currently used: IMCI recommends “soothing syrup” for more than half (52 percent) of all illness cases. It uses antibiotics for only 13 percent of total drug use, in contrast to the current high rate of antibiotic use by the CHWs for the same sample of children (see Table 4.9 below). Another discrepancy is in the use of paracetamol: the IMCI module recommends its use in only 7 percent of cases whereas CHWs use paracetamol in 59 percent of cases, a use-rate about eight times higher than IMCI. In Bangladesh, it is extremely common among the providers to prescribe paracetamol for all fevers with temperature of 37.5 degrees Celsius (99.5 degrees Fahrenheit). The IMCI recommends paracetamol when the

[3] For example, some CHWs reported taking a long time to deal with the patients, which may be due to social and cultural reasons or simply because they see only about one patient per day; low utilization of their services probably makes the visit a social visit as well.

temperature is 38.5 degrees Celsius or more (101.3 degrees Fahrenheit). Such a minor change in the cut-off of temperature level changes the utilization of drugs very significantly.

Table 4.7: Summary of Drug Treatment According to the IMCI Treatment Schedule

Drugs	Frequency		%
	Multiple Dose	First Dose	
Soothing syrup	1,113		52.4
Paracetamol	119(80.4)	29(19.6)	7.0
Cotrimoxazole	196(70)	84(30)	13.2
Chloroquine	69		3.3
Mebendazole	58		2.7
Tetracycline eye ointment	25	1.2	
Gentian violet	197		9.3
Rehydration plan A	87		4.1
Rehydration plan B	1		—
Rehydration plan C	62		2.9
Vitamin A	78		3.8
Iron	5		0.2
Total	2,010	113	

4.7 Advice and Feeding Counseling Recommended by IMCI

Table 4.8 shows that if IMCI is used, 1,736 cases in the study (about 90 percent of the total) should receive advice and counseling regarding care at home and follow-up visits. Requirements for advice and counseling must be evaluated very carefully as these activities demand appreciable time from health care providers. These accurate time inputs determine the need for human resources for proper implementation of IMCI.

Table 4.8: IMCI Guidelines for Advice and Feeding Counseling

Blocks	Advice		Feeding Counseling		Total	
	N	%	N	%	N	%
A	386	28.6	146	39.0	532	30.6
B	179	13.1	91	24.3	270	15.6
C	280	20.6	66	17.6	346	19.9
D	517	38.0	71	19.0	588	33.9
Total	1,362	100	374*	100	1,736	100

*This number is biased downwards due to non-availability of weight-for-age Z-scores for all children. Using prevalence of malnutrition, the number should be 979.

IMCI advocates that the mother or other caregiver of every child with any illness, severe or trivial, should receive advice or counseling from the health care providers. This is to educate them on how to use the drugs prescribed and what to do in situations where no drug is needed. Thus a child may get both advice and counseling if he/she presents nutritional problems as well with other illnesses. Because advice and counseling is such an important aspect of IMCI, it should be included in the costing of these activities with the clinical evaluation. Thus, the numbers of advice and counseling should total more than the number of children seeking care. It is likely that most of the children in Bangladesh will receive both advice and feeding counseling if IMCI is implemented properly. properly.

Table 4.8 shows that the total number of children given advice and feeding counseling (1,736) is actually less than the number of children studied (1,921). This number must be qualified in two respects, however. First, if we consider all the cases of malnutrition requiring feeding counseling, the number of advice and counseling provided becomes 2,341. Second, children with severe illness conditions who were urgently referred to another level of care (78 percent of the total 149 referrals according to the IMCI guidelines) were not given advice or counseling before being referred. If this group is excluded, 1,805 children in the study obtained a total of 2,341 advice and counseling, i.e., about 1.3 advice or counseling per child.

4.8 Cost of Drug Treatment

4.8.1 Cost of Drugs Currently Provided by the CHWs

Table 4.9 shows 14 drugs commonly prescribed by CHWs and their cost. More than half of the total cost (almost 55 percent) was attributable to oral rehydration saline (ORS). It is assumed here that one patient requires 15 packets of ORS irrespective of age and type and severity of diarrhea. Although the assumed quantity appears high, this recommendation is designed to help prevent the development of severe dehydration, which requires intravenous fluid infusion, a procedure that significantly increases the cost of care at the primary health care facilities.

It is important to keep in mind when comparing the cost of current treatment to that recommended by IMCI (next section), that these costs do not include referral cases.

Table 4.9: Cost of Drugs Currently Prescribed by CHWs

Drugs	Quantity Required	Unit Price (in Tk)	Total Price (in Tk)
ORS	1500	5	7500
Syp. Penicillin	7	18	126
Syp. Amoxycillin	1	45	45
Syp. Paracetamol	137	12	644
Tab. Paracetamol	1202	0.6	721
Syp. Cloxacillin	2	44	88
Syp. Histacin	1	12	12
Syp. Mebendazole	58	14	812
Gentian Violet	46	12	552
Tab. Cotrimoxazole	1110	1.5	1665
Whitfield	10	5	50
Scabicidal solution	6	20	120
Antibiotic ointment	2	18	36
Zinc syrup	5	25	125
Total			Tk 13,496

The cost of the various antibiotics used is the most expensive component of the total drug costs (14 percent). The most common antibiotic used is cotrimoxazole, which accounts for 12 percent of the total cost. Paracetamol contributes another 12 percent to the drug cost. The cost incurred for paracetamol by the patients at the CHW level is twice as high as the cost expected in this category if the IMCI guidelines were used.

4.8.2 Cost of Drugs Recommended by IMCI Guidelines

Table 4.10 shows what drug costs would be if IMCI guidelines were used in treating the children seeking care from the CHWs. Thirty-six percent of the total cost of drugs would be for procuring the so-called "soothing syrup" (warm water, honey, lemon juice, tulsi leaf juice, etc.), recommended for patients with cough or any type of difficult breathing. Although one-fourth of illness burden in this study is related to respiratory problems, the cost for treating these cases becomes relatively more important due to the assumption used for costing this syrup. The IMCI module avoids the use of any antihistamine syrup for children with difficult breathing, and, therefore, one cannot use the market price of these syrups to evaluate the market value of soothing syrup recommended by IMCI. Currently in Bangladesh, there are no such preparations available in the market. It is assumed that if the time cost and other cost of preparing the soothing syrup is considered, the cost per case will be about Tk 10 (US$ 0.20).

Table 4.10: Cost of Drugs Using IMCI Treatment Schedule

Drugs	Quantity Required	Unit Price (in Tk)	Total Price (in Tk)
Soothing syrup	1,113	10	11,130
Paracetamol	148	12	1,776
Cotrimoxazole	280	20	5,600
Chloroquine	69	14	966
Mebendazole	58	14	812
Tetracycline eye ointment	25	15	375
Gentian violet	197	12	2,364
Rehydration plan A	87	10	870
Rehydration plan B	1	20	20
Rehydration plan B	62	111	6,882
Vitamin A	78	10	780
Iron	5	25	125
Cotton for ear wicking	5(400 gm)	55	275
Total			Tk 30,5111

Approximately 18 percent of total IMCI drug cost is due to the use of cotrimoxazole, which represents a higher percentage of costs than antibiotics in the illness management approach followed by the CHWs (14 percent). This difference may be due to the fact that the CHWs actually treated only 22 percent of total patients and referred relatively severe cases (78 percent) to the higher level while most of these cases can be managed at the first-level facilities if IMCI is used. IMCI would have referred only 8 percent of the cases. This makes the use of antibiotic drugs relatively more important if IMCI module is followed.

4.9 Cost of Treatment: Management Approach of CHWs versus IMCI

Table 4.11 compares the cost of drugs prescribed by the CHWs with the estimated costs of drugs if the IMCI module were followed. It has been mentioned earlier that the CHWs referred 78 percent of all patients to higher facilities. Therefore, the CHWs actually managed only 22 percent of the 1,921 patients seeking care from them. In some cases, patients with severe illnesses were referred to sub-centers after receiving the first dose of treatment at this level. This treatment cost was considered in calculating the drug costs incurred by the CHWs. Since the referred children were not fully managed at the CHW level, including the cost of drugs of referral cases will underestimate the total drug cost. If the drugs given to referred cases are excluded, total drug cost of the patients fully managed by the CHWs becomes Tk 12,948.

The cases obtaining full medical management from the CHWs were treated by the CHWs with Tk 12,948 of prescription drugs. In contrast, IMCI would have fully treated 92 percent, at a drug cost of Tk 30,511. However, IMCI guidelines do not cover all the illnesses that show up for treatment. Although some of the drugs used by CHWs for treating non-IMCI conditions are included in IMCI cost estimates, not all could be included due to the presence of multiple symptoms in a child. In general, about 20 percent of symptoms and conditions reported can be considered non-IMCI, and it is reasonable to inflate the IMCI drug costs by about 15 percent to correct for underestimation. It is important to mention here that IMCI did not imply treating all the sick children by using drug therapy and many would have received only advice and feeding counseling.

Table 4.11: Comparison of Drug Costs for Treatment by CHWs and IMCI Guidelines

Events	Current Practice of CHWs	Treatment Recommended by IMCI
% of patients not treated (referrred)	78	7.8
% of patients treated by CHWs	22	92.2
Drug cost for treatment	Tk 12,948	Tk 35,088*
Drug cost for all patients (if there were no referral)	Tk 58,855	Tk 38,056*
Drug cost of treatment by IMCI is lower than current treatment by CHWs	35%	

*Inflated by 15% to allow for possible underestimation of drug costs

To compare the two sets of costs, it is necessary to adjust the number of sick children managed by the CHWs and the IMCI. Therefore, it is assumed that all children seeking care at the CHW level are managed at that level. In other words, the drug costs are projected for the whole sample assuming that the cost per case treated remains constant. Adjusting the CHW and IMCI cost data using the respective average costs, the total cost of drugs becomes Tk 58,855 for treatment by CHWs and Tk 38,056 for treatment by CHWs and IMCI. Therefore, the estimated drug cost for the whole sample would have been 35 percent lower for IMCI than the drug costs implied by the current management practice of the CHWs.

In terms of average level of drugs used, the CHWs prescribe drugs worth Tk 30.64 per child treated while the IMCI would use Tk 19.81 worth of drugs. Clearly, IMCI would use a much lower quantity of drugs than the current practice despite the fact that IMCI categorization increases the number of comorbidities present in the community. It should also be mentioned here that the drug prescribing pattern of CHWs in the study area is closely monitored by the ICDDR,B and it is likely that they are much more conservative in terms of drug prescribing than any other independent practitioners in the country. In that sense, the drug-cost savings implied by a comparison of current practice with IMCI is an underestimate of the total cost savings to be achieved in the country.

5. Findings: Illness Categories and Treatment at the Sub-center Level

This section presents data about medical care delivery obtained from the sub-center level. Medical care at the sub-centers is provided by the paramedics.

5.1 Demographic Characteristics of the Study Population at the Sub-center Level

Table 5.1 shows the distribution of age and gender of the children seeking care from the paramedics at the sub-centers of Matlab health care delivery system. One-fourth of all children seeking care were 1-2 years of age. One-fifth of the children were in the of 7-12 month age category and 38 percent were one year old. This number is high even though the survey did not include illness cases for children from birth to two months of age. The number of children seeking care increases with age until about two years and then the number declines with age. Only 8.5 percent of children 40-60 months sought care from the sub-center level.

Table 5.1: Age and Sex Distribution of Children Studied at Sub-center Level

Age (in months)	Gender				Total	
	Male		Female		N	%
	N	%	N	%		
2-6	358	55.4	288	44.6	646	18.0
7-12	384	52.5	348	47.5	732	20.4
13-24	498	55.6	397	44.4	895	25.0
25-36	311	55.7	247	44.3	558	15.6
37-48	243	54.4	204	45.6	447	12.5
49-60	156	51.0	150	49.0	306	8.5
Total	1,950	54.4	1,634	45.6	3,584	100

The table also shows that the proportion of male children seeking care is higher than female in all age categories, and 54 percent of all children were male. The ratio of male to female in different age categories ranges from 1.04 in the 49-60 month group to 1.26 in the 25-36 month group. The gender disparity in the number of children seeking care tends to decline with age. Figure 5.1 illustrates the age and gender breakdown of the children in the study population.

Figure 5.1: Children Seeking Care at Sub-centers, as a Percentage of Total Children in Study, by Age and Gender

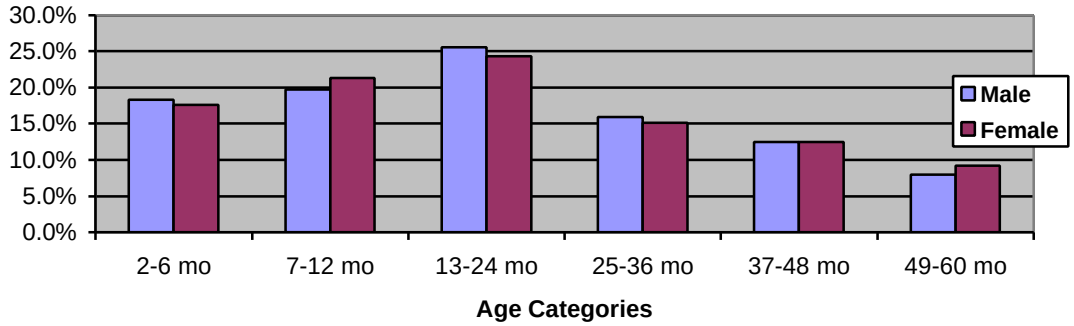


Figure 5.1 shows that the proportion of males seeking care at the sub-centers versus all male children in the study was highest in the age group 13-24 months. This is the modal age group for female children as well. In health seeking behavior, the relative importance of female children was found to be slightly higher than male children in the age group 49-60 months. The age distribution among female children seeking care at the sub-centers appears to be slightly less skewed than the distribution of male children.

Table 5.2 reports the number of children seen by paramedics in different blocks of the Matlab area. The number of patients seeking care varies from one center to another. Blocks C and D together represent almost two-thirds (65.9 percent) of total children in the sample. The other two blocks, on the other hand, represent only one-third of total children seen by the paramedics. Among all children seeking care at the sub-centers, one-fifth (21 percent) sought care from block A and only 13 percent from block B.

Table 5.2: Number of Patients at Sub-center Level, by Gender and by Block

Blocks	Gender of Patients				Total Patients (2 mos-5 yrs)		Percentage of Total Child-months surveyed (2 mos-5 yrs) in the Blocks
	Male		Female		N	%	
	N	%	N	%			
A	397	20.4	359	22.0	756	21.1	30
B	257	13.2	207	12.7	464	12.9	14
C	615	31.5	576	35.3	1,191	33.2	30
D	681	34.9	492	30.1	1,173	32.7	26
Total	1,950	100	1,634	100	3,584	100	100

One reason for the variability in the number of children per block is differences in the duration of the survey in each block. To correct for differences in survey days, researchers calculated the months of survey by sub-center. Table 5.2 shows the percentage of child months in each block. Clearly, the smaller sample size from block B is not due to lower utilization of the health center but to shorter duration of data collection in this block than in other three locations.

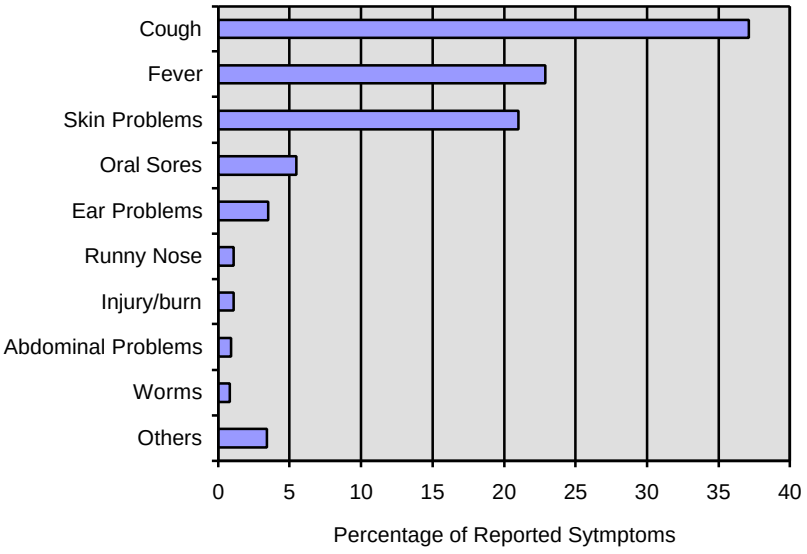
5.2 Broad Categories of Reported Symptoms

Table 5.3 shows prevalence of illnesses by broad categories of reported symptoms; Figure 5.2 lists them in order of prevalence. Eighty-one percent of illnesses report within three broad categories: fever, cough, and skin problems. Of these, cough is the most frequent complaint, accounting for 37 percent of total illnesses. If the number of patients with runny nose is combined with those with fever, this category is the second-most frequent set of complaints in the study, representing almost one-fourth (25 percent) of total illness.

Table 5.3: Prevalence of Reported Symptoms at Sub-centers, and Relative Risks by Gender

Illness Category	Gender				Ratio Male to Female	Total	
	Male (N=1950)		Female (N=1635)			N	%
	N	Symptoms per 1,000 patients	N	Symptoms per 1,000 patients			
Fever	738	379	605	370	1.0	1,343	22.9
Cough	1,242	637	937	573	1.1	2,179	37.1
Runny nose	38	20	29	18	1.1	67	1.1
Drh/Dys	50	26	38	23	1.1	88	1.5
Worms	27	14	21	13	1.1	48	0.8
Skin problems	636	326	596	365	0.9	1,232	21.0
Oral sore	180	92	145	89	1.0	325	5.5
Ear problems	105	54	102	62	0.9	207	3.5
Eye problems	39	20	30	18	1.1	69	1.2
Abdominal problems	32	16	22	14	1.2	54	0.9
Injury/burns	32	16	60	18	0.9	62	1.1
Others	90	46	112	69	0.7	202	3.4
Total	3,209		2,667			5,876	100

Figure 5.2: Major Symptoms Categories Seen at Sub-centers, by Percent (reported by mothers/guardians)



Following fever, cough, and skin problems, the next two highly prevalent illnesses following respiratory conditions and fever are oral sore and ear problem, which represent 5.5 percent and 3.5 percent of total illnesses respectively. The "other" illness category represents 3.4 percent.

One important finding in this data set is the very low prevalence of diarrheal diseases observed among the children seeking care. Diarrhea and dysentery together represent only 1.5 percent of total illness cases here. This is probably due to the fact that most of the diarrheal disorders are treated by "neighborhood mothers" (an assigned woman in a local community who acts as a depot holder of ORS) and CHWs during their regular home visits. Another reason may be that the households in Matlab are more aware of the management of mild diarrhea due to the presence of ICDDR,B program, and so deal with it themselves.

The ratio of gender-specific illness incidences indicates the relative risk ratios for male and female children. The ratios are not significantly different for most of the illness conditions.

5.3 Illness Categories by Diagnosis of Paramedics

Table 5.4 shows the illness types found in children diagnosed by the paramedics in the sub-centers. Overall, respiratory ailments represent almost half (48 percent) of the diagnoses. "Fever" was diagnosed in only 2.5 percent of cases, which is very low compared to the number of children presenting with fever. Fever is a symptom of illness rather than an illness itself, and is often associated with many other complaints.

Table 5.4: Diagnoses by Sub-center Paramedics by Blocks

Diagnosis	Sub-Center								Total	
	A		B		C		D		N	%
	N	%	N	%	N	%	N	%		
Respiratory ailments	409	47.7	232	46.2	674	44.8	693	51.1	1,908	47.7
Drh/Dys	3	0.3	46	9.2	2	0.2	6	0.4	57	1.4
Skin problem	281	32.8	134	26.7	399	31.1	368	27.1	1,182	29.6
Ear problem	45	5.2	32	6.4	55	4.3	60	4.4	192	4.8
Eye problem	21	2.4	8	1.6	23	1.8	20	1.5	72	1.8
Worms	5	0.6	5	1.0	12	0.9	42	3.1	64	1.6
Fever	2	0.2	3	0.6	63	4.9	33	2.4	101	2.5
Injury	8	0.9	9	1.8	19	1.5	20	1.5	56	1.4
Others	84	9.8	33	6.6	134	10.5	115	8.5	366	9.2
Total	858	100	502	100	1,281	100	1,357	100	3,998*	100

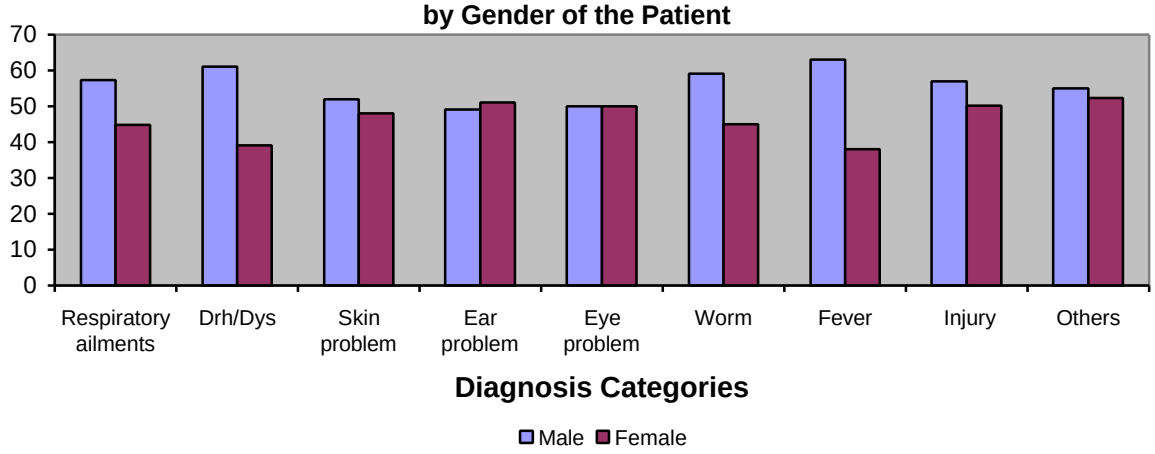
*Multiple diagnosis

The table also indicates that a large proportion (30 percent) of children seeking care suffer from skin diseases. Ear infections constitute about 5 percent of all illnesses, higher than the presenting complaints (3.5 percent). All other types of diagnoses represent less than 2 percent of total cases, except the residual category "others," which represents 9 percent of total illnesses.

The disease patterns diagnosed by the paramedics are similar in all the four blocks. The exceptions are diarrhea in block B (9.2 percent), intestinal worms in block D (3 percent), and fever in block C (5 percent) all of which are significantly higher than the proportions found in these categories in other blocks.

Figure 5.3 shows the variations in diagnosis when gender is considered. In most diagnosis categories, the number of male children seeking care was higher than the number of female children. Skin, ear, and eye problems have similar distributions among males and females. However, male children sought care at a higher rate than female children for respiratory ailments, diarrheal diseases, worm infestations, and fever.

Figure 5.3: Diagnosis of Patients by Paramedics in the Sub-centers by Gender of the Patient



5.4 Nutritional Status of Children

Table 5.5 shows the nutritional status of children seeking treatment at the sub-centers. Nutritional status has been measured by weight-for-age Z-score, and all children below -2SD level have been classified as malnourished. Children below -3SD weight-for-age have been categorized as severely malnourished.

Table 5.5: Nutritional Status of Children Examined by Paramedics by Block and Gender

Weight for age Z-score	Blocks				Sex		Total	
	A	B	C	D	M	F	N	%
< -3SD	119	56	130	188	274	219	493	17.3
> -3SD - < -2SD	255	148	246	358	547	460	1007	35.3
> -2SD	301	190	353	511	747	608	1355	47.5
Total	675	394	729	1,057	1,568	1,287	2,855	100
Percent of children malnourished	23.6	13.8	25.5	37.0	54.9	45.1		

The table shows that 53 percent of children show some degree of malnutrition by weight-for-age Z-scores. Further categorization of malnutrition implies that about 17 percent of children were severely malnourished and the rest (35 percent) were moderately malnourished.

Table 5.6 shows the adjusted figures of malnutrition cases identified at the sub-center level. At the sub-center level, about 800 children were not weighed properly or weight data were not reported. The adjustment simply distributes proportionately among the Z-score categories all the children for whom Z-scores are not available.

Table 5.6: Adjusted Number of Children with Malnutrition According to IMCI

Block	Number of Children identified as malnourished according to IMCI			Total			Adjusted Number of Children with Malnutrition (N=3584)		
	< -3SD	> -3SD to < -2SD	> -2SD	Actual	Adjusted	%	< -3SD	> -3SD to < -2SD	> -2SD
A	119	255	301	675	847	23.6	149(24.1)	320(25.3)	378(22.2)
B	56	148	190	394	495	13.8	70(11.3)	186(14.7)	239(14.1)
C	130	246	353	729	915	25.5	163(26.3)	309(24.4)	443(26.0)
D	188	358	511	1057	1327	37.0	237(38.3)	449(35.5)	641(37.7)
Total	493	1007	1355	2855	3584	100	619(100)	1264(100)	1701(100)

5.5 Referrals to Higher-level Facilities

Table 5.7 shows that the number of referrals is very low in all the sub-centers. Overall, only 3 percent of children are referred from sub-centers to the higher-level facilities. Among the four blocks, block C referred the highest percentage of children: 56 of 99, or 56.6 percent. Only five children (5.1 percent) were referred from block B. About 54 percent of all referred children were male. This is consistent with the percentage (54.4 percent) of male children in the sample.

Table 5.7: Referral of Patients by the Paramedics from Sub-center to Higher Level by Blocks and Gender

Block	No. of Referrals	%	Gender	
			Male	Female
A	15	15.2		
B	5	5.1	53	46
C	56	56.6		
D	23	23.2	(53.5%)	(46.5%)
Total	99	100	99(2.8%)	

Table 5.8 shows the number of contacts of children at sub-centers after they were referred by the CHWs.[4] About one-third (33.6 percent) of children referred by the CHWs to sub-centers for further management did not visit the sub-centers. The remaining two-thirds (66.4 percent) visited the sub-centers one or more times.

[4] The CHWs referred almost 80 percent of all children seeking care from them.

Table 5.8: Contacts of Patients at the Sub-centers after CHW Referral, by Block

No. of Contacts	Blocks				Total	
	A	B	C	D	N	%
0	222	68	63	149	502	33.6
1	136	108	202	224	670	44.8
2	33	18	71	101	223	14.9
3	7	2	25	38	72	4.8
>3	—	—	12	15	27	1.7
Total	398	196	373	527	1494	100

Table 5.8 indicates the differences in referral compliance rates among the blocks. In block A more than half (56 percent) of the children did not show up after the referral. In the other three blocks, the proportions of referral compliance are much higher than that in block A. The lowest non-compliance rate was for block C, which was about 12 percent. There are many explanations for low compliance. First, a number of referred cases may directly go to the Matlab hospital, bypassing the sub-centers. Second, some households may decide not to seek additional care from the ICDDR,B system once the child is referred to sub-center by the CHWs.

It is important to note that almost one-fifth of the children came more than once after being referred by the CHWs, and 6 percent visited the sub-centers more than twice. However, from the data presented in Table 5.8, it is not possible to conclude whether all the visits were due to the same episode of illness or for different illnesses. It is possible that the children became sick more than once over the four-and-one half months of the survey, and, since referrals at the CHW level takes place everyday, some of these visits may be actually for other health conditions rather than compliance with the referral. Therefore, the proportion of referral compliance implied by the data presented in Table 5.8 is actually an overestimation. However, in the costing exercise, the referral compliance rate will not affect the estimate of costs significantly.

5.6 Drugs Prescribed by Paramedics

Table 5.9 describes the drug prescription pattern of paramedics in treating the children. Paracetamol was the most common drug prescribed, representing one-fourth of total drugs prescribed by paramedics. It is important to note that an antibiotic was used in 42 percent of the cases; this includes different types of oral antibiotic suspensions, tablets, capsules, and injectables. The drug Histacin, which is mainly for complaints related to cough and sometimes for body itching, represents about 8 percent of total drugs prescribed. Although this antihistamine preparation can be used in some allergy (itching) cases, it is contra-indicated in the management of ARI. It is a common practice in Bangladesh to use antihistamine syrup in ARI management.

Table 5.9: Drugs Used for Treatment of the Patients by Paramedics According to their Combined Use

Drugs	Frequency	%	Drugs	Frequency	%
ORS	32	0.5	Mebendazole	83	1.3
Paracetamol	1643	24.6	Salbutamol	163	2.4
Cotrimoxazole	58	0.9	Inj. Ampicillin	32	0.5
Penicillin	484	7.2	Mycostatin	205	3.0
Amoxycillin	1235	18.5	Eye drop/ointment	79	1.2
Cloxacillin	988	14.8	Scabicidal	109	1.6
Nalidixic acid	43	0.6	Gentian violet	642	9.6
Metronidazole	2	—	Vitamin	203	3.0
Histacine	507	7.6	Others	57	0.8
Total drug used	6668 (100)				
No. getting drugs	3422 (95.5)				
No. not prescribed	162 (4.5)				
Total Children	3584(100)				

Table 5.9 also shows that 95.5 percent of children receive some type of drug treatment; the remaining 4.5 percent was not prescribed any drugs. The cases not getting any drugs are usually the mild illness cases. A number of children referred to higher facilities from the sub-centers also did not get any drug from the paramedics. Sometimes patients with severe illness conditions are referred to higher facilities after receiving the first dose of antibiotic or paracetamol at the sub-centers. If the total number of drugs and number of children seeking care are considered, a patient on average receives almost two drugs for their illness at the sub-center level.

5.7 Cost of Drug Treatment at the Sub-centers

Table 5.10 shows the cost of drugs used for treating the children at the sub-center level. The cost of drugs was calculated using the market price of the drugs rather than the cost of procuring the drugs by the ICDDR,B health care delivery system. The retail prices of the drugs were collected from three pharmacies in Dhaka City and the average prices of drugs were considered in the calculation. In general, the price variability of drugs is quite low in Bangladesh due to a highly competitive market structure.

Table 5.10: Cost of Drugs Prescribed by Sub-center Paramedics

Drugs	Price in Tk	Drugs	Price in Tk
ORS	800	Syp. Mebendazole	1,106
Syp. Paracetamol	19,536	Tab. Albendazole	20
Tab. Paracetamol	27	Syp. Salbutamol	196
Syp. Cotrimoxazole	580	Inj. Ampicillin	544
Tab. Cotrimoxazole	435	Syp. Mycostatin	4,060
Syp. Penicillin	7,020	Tab. Mycostatin	40
Tab. Penicillin	1,410	Eye drop/ointment	948
Syp. Amoxycillin	55,575	Scabicidal lotion	2,180
Syp. Cloxacillin	43,472	G/violet	3,210
Syp. Nalidixic acid	1,290	Vitamin	2,842
Syp. Metronidazole	1,106	Iron	100
Syp. Histacine	6,084	Whitefield	140
Total			Tk 152,721

Almost three-fourths (72 percent) of total drug cost is for antibiotics, of which 65 percent of the cost is for two particular antibiotics, amoxycillin and cloxacillin. The next most costly drug paracetamol, which accounts for 13 percent of total drug cost. Other major cost items are antihistamine syrup (4.5 percent) and antifungal suspension (4 percent). All other types of drugs contribute 2 percent or less each to total cost of drugs.

To summarize the use pattern of drugs for paramedics at the sub-center level:

- Total drug cost (in Tk) 152,721
- Total number of children treated with drug 3,422
- Drug cost per child (in Tk) 45
- Number of drugs used per child 1.9
- Number of diagnosis per child 1.1

6. Illness, Management and Costs at the Sub-center Level: Current Practice and IMCI

This section compares illness categories, current management strategies, and treatment costs at sub-centers with the medical management pattern recommended by the IMCI module. The current practice of the paramedics is observed during the survey. The information obtained from the paramedics' evaluation of children has been used to categorize the childhood illnesses into IMCI suggested groups. Once the IMCI category of an illness is determined, the module suggests certain management practices, which are used to examine the drug prescription pattern and the cost of managing the illness.

6.1 IMCI Illness Categories

Table 6.1 summarizes illness categories by block, using the IMCI-based classification scheme. In the IMCI classification, cough or respiratory illnesses represent about a quarter of all illnesses; this is lower than the rate at the CHW level, which is 29 percent. Diarrhea and dysentery taken together represent only 1 percent, also much lower than the rate found by the CHWs. Eighteen percent of total illness is considered fever-related. No case was placed into the measles category; routine home visits by the CHWs probably identify all the measles cases and, therefore, these cases rarely show up at the CHW or paramedic level.

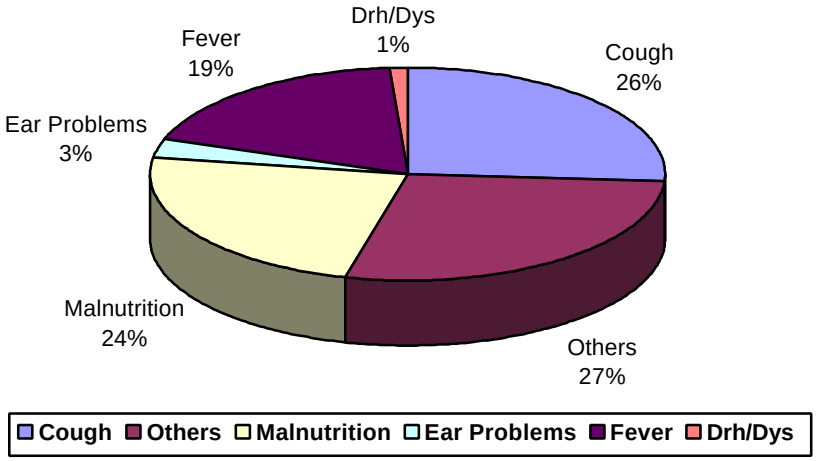
Table 6.1: Summary of Illness Categories according to the IMCI illness Classification, by Block

IMCI Illness Categories	Blocks				Total	
	A	B	C	D	N	%
Cough or respiratory illness	456	246	693	737	2,132	26.2
Diarrhea/dysentery	4	63	12	9	88	1.1
Febrile illness						
High malaria risk	—	—	—	—	—	—
Low malaria risk	485	163	466	377	1491	18.3
Measles (with or without complications)	—	—	—	—	—	—
Ear problems	54	36	60	67	217	2.7
Malnutrition	469	256	472	686	1,883*	23.1
Others	455	282	725	769	2,231	27.4
Total	2,127	1,186	2,684	3,013	8,042	100

*Adjusted number of malnutrition

Ear problems contribute 2.7 percent to total illness burden. Malnutrition, when it is adjusted, represents 23 percent. More than one-fourth of (27 percent) illnesses are in the residual category "others."

Figure 6.1: Broad Categories of Illness According to the IMCI Guidelines



6.2 Comparison of Illness Types by Paramedics and by IMCI Module

Table 6.2 compares the illness categorization based on the reported symptoms and clinical evaluation by sub-center care providers and the classification based on the IMCI module. It is notable that illness classifications made by paramedics are much more consistent with IMCI classifications than are those made by CHWs. The absolute number of cases in each of the categories is quite close, excepting the category "malnutrition." The IMCI module identifies all malnourished cases requiring interventions, but the paramedics totally ignored the nutritional status of children. About one-quarter of children in the sample were malnourished and needed health interventions; paramedics dealt only with the reported symptoms and ignored the presence of malnutrition.

Table 6.2: Comparison of IMCI Illness Types by Reported Symptoms and IMCI

Illness Type	Reported Illness		IMCI Illness Type	
	N	%	N	%
Cough or respiratory distress	2,179	37.1	2,132	26.5
Diarrhea/dysentery	88	1.5	88	1.1
Febrile illness	1,410	24.0	1,491	18.5
Measles (with or without complications)	—	—	—	—
Ear problems	207	3.5	217	2.7
Malnutrition	—	—	1,883*	23.4
Others				
Skin problems	1,232	21.0	1,190	14.8
Oral sore	325	5.5	365	4.5
Worms	48	0.8	46	0.6
Eye problem	318	5.4	564	7.0
Others	318	5.4	564	7.0
Total	5,876	100.0	8,042	100.0

*Adjusted number of malnourished cases

6.3 Referral of Patients According to IMCI at the Sub-center Level

Table 6.3 presents what referrals would have been had patients been assessed according to IMCI guidelines. The analysis indicates that there are 116 cases in four blocks that would have needed a referral to higher-level facilities. This is only 3.2 percent of all children who sought treatment at the sub-centers. The sub-center in block C had a particularly high proportion of cases (63 percent) who would have needed referral in both urgent and assessment categories when compared to other blocks and to the proportion of all children visiting the block. Block A would have had a referral rate of almost 21 percent. Block D would have had a low referral rate (8 percent) in comparison to the number of children seeking care. Although block B saw only 13 percent of all children, referral cases from the block would have been only 8.6 percent if IMCI module had been used. It is not clear why the referral rates by IMCI are so high for blocks A and C.

Table 6.3: Referral of Patients According to the IMCI Guidelines

Block	Referrals				Total	
	Urgent		For Assessment		N	%
	N	%	N	%		
A	5	10.6	19	27.5	24	20.7
B	2	4.2	8	11.6	10	8.6
C	35	74.5	38	55.1	73	62.9
D	5	10.6	4	5.8	9	7.8
Total	47	100	69	100	116	100

Table 6.4 compares patterns between actual referrals made by the paramedics and the referrals that would have been made if IMCI guidelines were used. The percentage difference of actual referrals ranges from -50 percent in block B to +156 percent in block D when compared to the number of referral cases by IMCI.

Table 6.4: Comparison of Referrals by Paramedics and by IMCI Guidelines, by Block

Block	Referred		
	Actual by Paramedics	IMCI	% Difference over IMCI
A	15	24	-37.5
B	5	10	-50.0
C	56	73	-23.3
D	23	9	155.6
Total	99	116	-14.7

6.4 Drug Treatment by IMCI Guidelines

Table 6.5 shows which drugs would have been required by IMCI given the illness pattern of the children at the sub-center level. Similar to the CHW level, "soothing syrup" is prescribed frequently, here for almost 61 percent of all cases. Antibiotic use would be only one-fifth (19.3 percent) of total drug use if the IMCI module were followed. This is much lower than the antibiotics currently used (42 percent) by the paramedics.

Since Matlab is a low malaria risk area, use of the antimalarial drug chloroquine would be zero with the IMCI module. Drugs that would have been used at a high rate under IMCI management strategy are paracetamol and gentian violet.

Table 6.5: Summary of Drug Treatment According to the IMCI Treatment Schedule

Drugs	Frequency		%
	Multiple Dose	First Dose	
Soothing syrup	2,055		60.9
Paracetamol	17 (7%)	225 (93%)	7.2
Cotrimoxazole	604 (93%)	46 (7%)	19.3
Chloroquine	—	—	—
Mebendazole	45		1.3
Tetracycline eye ointment	17		0.5
Gentian violet	325		9.6
Rehydration plan A	25		0.7
Rehydration plan B	6		0.2
Rehydration C	—		—
Vitamin A	1		—
Iron	8		0.2
Total	3,103	271	100

Table 6.5 shows that paracetamol, which represents 7 percent of all drugs prescribed by IMCI, is recommended in most cases (93 percent) as a single dose therapy . This type of single dose management strategy is used in special circumstances when patients need urgent referral. As discussed in Section 4.6, IMCI recommends the use of paracetamol only if a child's temperature is 38.5 degrees Celsius or more, but the normal practice of health workers in Bangladesh is to prescribe this medicine if the temperature is 37.5 degrees Celsius or more. The IMCI recommended use of paracetamol is appreciably lower than current use, where it comprises about 25 percent of all the drugs prescribed.

Table 6.6 shows what drug costs would have been required had IMCI treatment protocols been followed. Soothing syrup accounts for one-fifth of total drug costs. Cotrimoxazole, the only antibiotic used by the IMCI treatment protocol, would have been 14 percent of the total drug cost. Gentian violet, which is used for treating oral sores, and paracetamol, used to treat fever and pain, would have been 4 percent and 3 percent respectively. Each of the other drugs would have contributed less than 1 percent to total drug cost.

Table 6.6: Cost of Drugs Using IMCI Treatment Schedule

Drugs	Quantity Required	Unit Price (in Tk)	Total Price (in Tk)
Soothing syrup	2,055	10	20,550
Paracetamol	242	12	2,904
Cotrimoxazole	650	20	13,000
Mebendazole	45	14	630
Tetracycline eye ointment	17	15	255
Gentian violet	325	12	3,900
Rehydration plan A	25	10	250
Rehydration plan B	6	20	120
Vitamin A	1	10	10
Iron	8	25	200
Cotton for ear wicking	10(400 gm)	55	550
Subtotal			42,369
Cost for treating skin problems and other non-IMCI conditions			58,836
Total			101,205

Table 6.7 summarizes the drug cost comparisons discussed above. If the drug prescriptions are corrected for the number of children treated by the paramedics, total drug cost for clinical management as currently practiced by the paramedics (Tk 157,120) becomes 50 percent higher than that recommended by the IMCI module (Tk 104,551). IMCI costs are lower because it uses low-cost drugs and it prescribes high-cost soothing syrup less frequently.

Table 6.7: Comparison of Drug Costs for Treatment by Paramedics and IMCI Guidelines

Events	Treatment Given by Paramedics	Treatment Recommended by IMCI
% of patients not treated	2.8	3.2
% of patients treated by paramedics	97.2	96.5
Drug cost for treatment	Tk 152,721	Tk 101,205
Treatment cost of all patients (if there were no referral)	Tk 157,120	Tk 104,551
Drug cost of treatment by IMCI is lower than current treatment by paramedics	33%	

6.5 Treatment Cost by Illness Type

Table 6.8 shows by type of illness the drug cost of treatment that would be provided by the sub-center paramedics under the IMCI module. Calculations assume that the treatment of cases not directly included in the IMCI will continue to cost what they currently do.

Table 6.8: Drug Cost of Treatment by Illness Type Diagnosed by Paramedics and IMCI (Tk)

Illness Types Based on Diagnosis by Paramedics	Drug Cost by Paramedics		Drug Cost by IMCI	
	Total Cost	Average Cost	Total Cost	Average Cost
Respiratory ailments	66,146	40	32,112	15
Drh/Dys	1,605	32	1,785	20
Skin problem	51,757	50	51,757*	50
Ear problem	8,043	51	2,954	14
Worm infestation	134	5	204	3
Fever	1,060	19	3,600	2
Injury	2,695	53	2,695*	53
Others	4,384	26	4,384	26
	Tk 136,071		Tk 99,738	

*The drug cost of these cases are assumed to be the same as what is currently prescribed by paramedics.

Table 6.9 shows the drug cost of treatment according to the IMCI treatment protocol by IMCI illness classification. The table also reports the proportion of different IMCI illness categories among the children under study. As IMCI identifies multiple diagnoses based on the presenting symptoms and findings from physical examination, the number of illnesses exceeds the number of patients.

Table 6.9: Drug Cost per Illness According to IMCI Illness Classifications and Proportions of Illness Among Children

	Average Drug Cost to Treat a Case (in Tk)	Proportion of Illness Among the Children
Severe pneumonia or very severe disease	20	1.4
Pneumonia	30	12.8
Cough or cold: no pneumonia	10	45.3
Severe dehydration	90	—
Some dehydration	25	0.2
No dehydration	25	0.8
Severe persistent diarrhea	90	—
Persistent diarrhea	0	—
Dysentery	20	1.5
High malaria risk		
Very severe febrile disease	47	—
Malaria	32	—
Low malaria risk		
Very severe febrile disease	47	—
Malaria	27	—
Fever: malaria unlikely	12	41.6
Severe complicated measles	34	—
Measles with eye or mouth complications	19	—
Measles	2	—
Mastoiditis	32	—
Acute ear infection	37	3.0
Chronic ear infection	5	—
No ear infection	0	3.1
Severe malnutrition or severe anemia	2	0
Anemia or very low weight	39	41.4
No anemia or not very low weight	0	38.1
Others		
Skin problems	50	33.2
Oral sore	—	10.2
Worms	17	1.3
Eye problems	5	1.8

7. Estimating the Total Cost of IMCI at the First-level Facilities

This section estimates the cost implications for Bangladesh if IMCI becomes the management guide for childhood illnesses at first-level medical care facilities. The costs estimated here are the two important components of recurrent costs, namely, the cost of drugs used and the time-input of the medical care providers. Implementation of IMCI may incur additional recurrent costs, such as immunization cards and other materials. However, this study assumes that supplies associated with well-baby, preventive, and promotive care are already available at the community level in sufficient quantities, and thus their costs are not included in this analysis. [5]

Estimating the cost of IMCI at the first-level facilities requires obtaining a number of parameters for the country using the data collected at the CHW and sub-center levels of Matlab. Not all the parameters required are known. A number of parameters are derived using very simplistic assumptions. Therefore, the parameters reported here are more likely to be applicable for Matlab area rather than for the whole country. Despite this bias, the cost estimates will use these parameters with minor adjustments, because they provide more realistic cost implications if IMCI is introduced in well-functioning medical care facilities. The introduction of IMCI is likely to improve the quality of services provided and the utilization of health centers by the population. In the Matlab area, the population considers the health centers to be of high quality, and drugs are available at the health center free of charge. Therefore, the best outcome in terms of utilization of health care services to expect in Bangladesh is the level of utilization observed in the Matlab area.

7.1 Prevalence of Illness and Health Seeking Behavior

To estimate the cost of implementing IMCI at the first-level facilities in Bangladesh, it is necessary to know the prevalence of illnesses among children in Bangladesh over a month and the health seeking behavior of sick children.

To investigate the prevalence rate of illnesses among children in a month, a simple information sheet was prepared to transfer data from the record books of CHWs. The CHWs visit households every other week and note all the morbidities of children during the preceding two weeks. Since the recall period is relatively short, morbidities reported by mothers should be quite reliable. The analysis of the CHW records indicate that the total number of illness cases in a month in Matlab was about 240 per 1,000 children. In other words, about a quarter of all children become sick in a month on the average. This is a relatively high level of morbidity, especially when compared with the level reported by national surveys like Health and Demographic Surveys (HDS). The 1995 HDS reports a morbidity prevalence rate of 225 per 1,000 children per year. One reason that the HDS estimate of morbidity prevalence is lower may be that the recall period (three months) is long. Mothers are more likely to ignore minor illness conditions when the recall period is longer. For the costing of the IMCI, the morbidity rate found for Matlab will be used.

[5] The availability of vaccines and vitamin A in Bangladesh is considered adequate to meet the needs of the entire population. Therefore, implementation of IMCI should not affect the cost of care in these preventive care activities.

Not all children who are sick come to health facilities to obtain medical care. The HDS found that 88.1 percent of children with illness seek care from a health care provider. Again, the high rate of health seeking may be due to the recall error. The survey also found that among those who seek medical attention, only about 27 percent of cases go to a modern "qualified" physician. More than half of all morbid cases went to "unqualified" physicians. Again, it is not clear whether the paramedics and other trained non-physicians are included in the "qualified" category or not. Due to the potential misclassification of medical care provider categories, it was decided not to use the national parameters on health seeking behavior.

From the information collected from the Matlab survey area, it is possible to estimate the proportion of sick children visiting the CHWs and/or the paramedics in a month. Among the children with morbidity, only 15.7 percent visited the CHWs; other cases were seen and treated during CHW home visits. About 35.9 percent of all sick children visited the sub-centers to obtain medical care from the paramedics. However, the cases referred from the CHW level are also included in the total number of children seen at the sub-center level. Since the CHWs refer 77 percent of all children seeking care from them and as 66 percent of the referral actually show up at the sub-centers, the number of illness cases seeking care from CHWs and paramedics should be about 44.5 percent.

It is likely that the proportion of children seeking medical care from CHWs and paramedics would have been slightly higher if the CHWs had not visited the homes of the locality on a regular basis. Mothers may not visit the CHW or paramedic if the scheduled home visit of CHW is within the next few days of the onset of illness. In other words, in a health care delivery system that does not provide home visits, the proportion of ill children seeking care would be higher than the 44.5 percent mentioned above. However, the prevalence of illness should be relatively low and it is not likely to increase the proportion seeking care by more than 5 percent. Adding this number with the observed proportion seeking care, about 50 percent of all sick children are likely to visit the health care providers. This proportion implies that the number of children seeking care will be about 120 per 1,000 children per month.

7.2 Costs of Implementing IMCI

7.2.1 Cost of Drugs With and Without IMCI

This report estimates drug costs under current illness management practices and under IMCI guidelines at the CHW and the sub-center levels. The drug costs at the two levels differ: The average drug cost at the CHW level was lower than the average drug cost at the sub-center level. Such a difference is often attributable to both the severity and mix of illness cases; however, because here the mix of morbidity conditions is similar at the two levels, the most likely explanation for the differences is severity of illness.

To estimate the drug costs with and without IMCI, it is necessary to consider all cases seeking medical attention. The average drug cost will be a weighted average of CHW-level and paramedic-level costs. One known factor is that the number of children seeking care is 15.7 percent at the CHW level and 35.9 percent at the sub-centers. As mentioned above, the CHWs would have seen another 5.5 percent of cases if there were no home visits, making the total proportion of sick children visiting CHWs be around 21.2 percent. The CHWs refer 77.4 percent of cases to sub-centers; therefore, the proportion of sick children actually managed by them is about 5 percent. The remaining 45 percent of sick children are managed at the sub-center level. Therefore, in costing of the drugs, it is necessary to weight the average drug cost at the CHW level by 0.1 and at the sub-center level by 0.9.

Table 7.1 shows the average estimated drug cost for the current practice and for IMCI. The drug cost savings reported in the table, US$ 6.8 million, is based on the assumption that the current practice of Matlab CHWs and the paramedics is representative of the medical management practice of health assistants and other health auxiliaries in rural Bangladesh. In reality, a significant portion of childhood illnesses are managed by private-sector providers, who likely prescribe higher amounts of drugs than the amounts observed in Matlab. Therefore, the average drug cost per 1,000 children should be higher than Tk 5,232—if the drugs are actually available and purchased or procured by the households. A second assumption on which the drug cost savings is based is that the drugs prescribed by the current practice are indeed available in the public sector; if so, money can be reallocated to buy the IMCI drugs. However, data on current availability of relevant drugs in the public sector are not available; anecdotal evidence suggests that they are in short supply, and this hampers the efficient management of childhood illnesses.

Table 7.1: Estimating Average Drug Cost for Bangladesh With and Without IMCI

Sick Children	Current Practice	With IMCI
Matlab		
Percent sick children managed by CHWs	5	0
Percent managed by paramedics	45	50
Number of sick children per month	240 per 1,000	240 per 1,000
Number seeking care per month	120 per 1,000	120 per 1,000
Average drug cost per managed case		
At CHW level	Tk 31	Tk 20
At sub-center level	Tk 45	Tk 30
Average drug cost per case managed	Tk 43.6	Tk 29.0
Drug cost per 1,000 children per month	Tk 5,232	Tk 3,480
Estimates for Bangladesh*		
Total drug cost in Tk per year	985.71 million	655.63 million
Total drug cost in US$	20.32 million	13.52 million
Drug cost savings per year over the current practice	US$ 6.8 million	

*Based on number of children under 5 yrs = 15.7 million

The $410 million that the government of Bangladesh spent on health and family planning in 1999 is the total of $220 spent on health and $190 spent on family planning. The health expenditure is divided equally into salary and non-salary expenditures; in other words, non-salary expenditures were $110.

There is no estimate of government allocation for drugs. Most doctors in Bangladesh believe that drugs are used less intensively for children than for adults. Thus, the proportion of the total drug cost for treating children is assumed to be less than the proportion of children in the population.[6] Therefore, this study assumes that drug costs accounted for 20 percent, or $22 million, of the non-salary expenditures. Again, due to lack of data, this study assumes that government should be able to allocate relatively more for childhood illnesses; it therefore uses an estimate of 15 percent of current cots, $3.3 million, for expenditures on drugs to treat childhood illnesses.

An alternative approach to additional financing needed for drugs is to use the data from the National Health Accounts of Bangladesh, which found that Tk 304 million ($62.68 million) was spent

[6] Children under the age of five represent about 12.3 percent of the population.

on medical and surgical requisites (MSR).[7] Assuming that half of the expenditures are on drugs, annual drug expenditures should be about $31.34 million. Again, allocating 15 percent of all drugs to children, current expenditure on drugs for children is assumed to be about $4.7 million, a shortfall in annual drug expenditure of $8.8 million from the IMCI requirements.

7.2.2 Personnel Costs With and Without IMCI

A second important component of recurrent cost associated with the implementation of IMCI is personnel cost. Using the Matlab data, the study approximated the additional time inputs needed for implementation. It collected data on time required to address all the IMCI module queries including diagnosis and management, at the CHW level. (It assumed that the time needed to collect the information needed for IMCI classification—weighing children, taking temperature and respiration rate, etc.—will be the same at the sub-center level.) The time estimated to manage a child under IMCI was 16.3 minutes. Average time needed to manage a sick child without IMCI (the current practice), obtained through a qualitative survey at a joint meeting of all CHWs and paramedics in Matlab, was eight minutes per child. This includes management of the illness and advice but excludes counseling.

About 10 percent of children are normally counseled by the CHWs and paramedics to improve feeding practice, caretaking, etc. The reported average time needed for counseling a child is four minutes; this averages out to about 0.4 minutes per illness case, bringing the total current average time to 8.4 minutes. IMCI guidelines would find about half of the children malnourished and therefore in need of feeding counseling. Assuming that feeding counseling requires the IMCI standard of five minutes per malnourished child, additional time needed for counseling in IMCI is estimated at 2.5 minutes per illness case, bringing the IMCI average to 18.8 minutes.

Table 7.2 summarizes these parameters and estimates the additional cost of medical care providers' time for practicing IMCI. The full-time equivalent (FTE) of health workers needed is estimated by assuming that the effective work day is six hours, the health workers work 240 days a year, and their average salary and benefits is Tk 48,000 per year. Most time-use studies indicate that the effective hours are actually less than six hours. If a lower hour of work is assumed, total time cost will be higher than the costs reported in the table.

The table indicates that, based on current practice at Matlab, the FTEs needed to manage sick children in Bangladesh are 2,198 health workers at the community level. Childhood illness cases currently demand about 25 percent of the total available time of Matlab CHWs and paramedics.[8] Since all health workers in Bangladesh are supposed to care for both children and adults, the total personnel requirement for current practice is estimated to be about 8,792. The additional personnel requirement for IMCI is estimated to be 2,721 FTEs, for a total of 4,919 FTEs for children (and 19,676 for both children and adults). This will increase the estimated personnel cost by Tk 130.61 million (US$ 2.69 million), from Tk 105.50 million to Tk 236.11 million. Improvements in service delivery for effective implementation of IMCI may also affect the service utilization of adults. However, that aspect of cost can not be considered the additional cost of implementing IMCI.

[7] About Tk 236 million came from the development budget. Since the development budget is for investments and new initiatives, drugs and regular supplies should not be included in that part of the budget. However, because in many cases the distinction between the revenue and development budget is not clear, this study uses the whole amount as regular MSR.

[8] For example, the four paramedics see about 977 children in a month. Assuming 8.4 minutes per child and six-hour work days, the days of work needed to manage the ill children should be slightly more than five working days per month or about 25% of their available time.

Table 7.2: Additional Cost of Health Worker Time for IMCI

	Current Practice	IMCI
Time input needed per child:		
Basic Consultation	8.0 minutes	16.3 minutes
Counseling	0.4	2.5
Total time per child	8.4 minutes	18.8 minutes
Time needed per 1,000 children per month	1,008 minutes	2,256 minutes
Inputs needed for Bangladesh*	15.7 million	
FTEs needed**	2,198	4,919
Salary and benefits per year per FTE	Tk 48,000	Tk 48,000
Total salary cost	Tk 105.50 million	Tk 236.11 million
Additional salary cost	Tk 130.61 million = US$ 2.69 million	

* Number of children in Bangladesh

** FTE estimated by assuming 6 hours per work per day, 240 working days in a year)

Implementing IMCI throughout Bangladesh will be the responsibility of family health visitors (FHVs) and health assistants (HAs) , who, similar to the CHWs of Matlab, are first-level health and family-planning care providers in rural Bangladesh. They currently number about 10,000. Like CHWs, they will need length and rigorous training to effectively apply IMCI guidelines. It is possible that the Ministry of Health and Family Welfare can identify for training 9,000 relatively more experiences and better-trained FWVs and HAs, the number of FTEs estimated to be needed to implement IMCI throughout Bangladesh. This assumption reinforces the estimation of additional personnel cost of implementing IMCI that is derived in Table 7.2.

7.2.3 Aggregate Cost of Implementing IMCI

Total cost of implementing IMCI should include the additional personnel cost, drug cost, and the cost of providing preventive and promotive services. As noted above, IMCI is not expected to increase the cost of preventive care. It will necessitate, however, expenditures of an additional $10 million per year for drugs and another $2.69 million for personnel. Therefore, the total additional cost of IMCI will be $12.69 million, or about $0.81 per child per year.

7.2.4 Referral Costs under IMCI

One aspect of IMCI recurrent costs not considered here is the cost of managing referral cases. Although not many patients are referred to a higher medical care facility, availability of referral services is an important component of the IMCI package. A significant portion of referred cases are for assessment rather than urgent referral to deal with life threatening situation. From Matlab, 5 percent of cases referred were for further assessment (weighted average of CHW and sub-center levels). Cost per referred case should be higher than the average cost at the community level but this study made no independent estimate of the cost.

7.3 Sensitivity of IMCI Costs

Using the cost parameters presented in the earlier chapters, it is possible to carry out a number of sensitivity analyses to examine the effect of changing illness pattern among children, reallocation of available funding for drugs to deal with childhood illnesses, increased or decreased utilization of health care facilities, changing prevalence of morbidity among children, etc.

One study carried out in the ICDDR,B extension project area (Wirzba and Juncker 1995) reports the utilization of public family welfare centers (FWCs) in three rural areas of Bangladesh. The study found that the number of children seen at the FWCs by the family welfare visitors and health assistants was 195 in a month, or about 122 children per month per provider (a FWV spends 60 percent of her time at the FWC). The number of children seen by a paramedic in a month at the sub-centers was 244 on the average, exactly double the number seen by FWVs and HAs at the FWCs. Clearly, the FWCs are not fully functional, and it is likely that many severe cases of illness simply go elsewhere. For this reason, using the current pattern of illness seen at the FWCs will be inappropriate to estimate the additional cost of IMCI, since illness pattern and management is expected to change under IMCI.

Nevertheless, the FWC illness pattern can be used to estimate the actual drug cost if current practice is considered. It can also indicate what the drug cost will be if IMCI methods are applied to the current utilization pattern. According to the Bangladesh Health and Demographic Survey 1998, about 17 percent of all illness episodes are related to diarrhea. However, it is not clear whether diarrhea is equally important in health care seeking as well. The pattern of morbidity observed in Matlab indicates quite low utilization of medical care for diarrhea. Wirzba and Juncker found the diarrhea rate at FWCs to be 20 percent. Assuming that the overall proportion of children seeking care for diarrhea is higher than the level observed in Matlab, total cost under IMCI will actually decline if the illness prevalence and health care seeking proportions remain constant.

Table 7.3 compares the patterns of illness found in FWCs and at the sub-centers in Matlab.

Table 7.3: Illness Pattern of Children Observed in Three FWCs and Matlab Sub-centers

Disease	Percent of Children Seeking Care for the Illness	
	FWCs	Matlab sub-centers
Diarrheal diseases	19.1	1.4
Respiratory ailments	10.4	47.7
Skin problems	24.5	29.6
Ear problems	2.3	4.8
Worms	13.9	1.6
Eye problems	6.6	1.8
Fever	7.8	2.5
Injury	1.1	1.4
Others	6.9	9.2
Well-baby care	7.5	—

Using this pattern and the average cost of treating an illness under IMCI (assuming zero drug costs for well-baby care and excluding those cases to derive the average), the drug cost per case becomes Tk 24.79, about 15 percent lower than the average drug cost for the disease pattern observed in Matlab. The cost of drugs given to children at the FWCs was about Tk 7.25 per child, implying that under the IMCI the drug cost will be Tk 17.54 higher than the current FWC practice. If these parameters are used, additional drug costs should be about $8.18 million for the implementation of IMCI rather than $10 million (see Section 7.2).

8. Concluding Observations

The purpose of this study is to estimate the additional resource requirements of implementing IMCI in a fully functional health facility. The estimation procedure derived the cost parameters without actually implementing IMCI at the first-level health facilities. In that sense, the study is a prospective cost estimation of IMCI focusing on the additional resource requirements in terms of personnel time and drugs. Total cost of IMCI, if fully implemented, will require additional management resources, training, supplies and other recurrent expenses. To simplify the cost estimation procedure, it is assumed that resource requirements other than drugs and personnel time will remain at the current level. Therefore, the exercise actually may underestimate the additional cost requirements of implementing IMCI.

To estimate the additional personnel costs and drugs, the study needed to identify a health care delivery system that may be considered fully functional. Many of the government health centers in rural Bangladesh are not functional and lack of drugs and absence of providers lead to poor utilization of the facilities. Since the utilization pattern of health centers is one of the most important parameters of costing, it is important to choose health facilities that are used by the population in the area. This study chose the sub-centers of Matlab for precisely this reason. For example, number of children seen by a provider in Matlab was found to be twice that seen by providers (family welfare visitors and health assistants) in ICDDR,B extension project sites in three rural communities.

Using Matlab as the research site created some problems as well. First, it is possible that the underlying prevalence of illnesses in Matlab is lower than in other areas of Bangladesh due to the activities of ICDDR,B. The prevalence of illness in Matlab was found to be about 240 per 1,000 children per month. This is a relatively high prevalence rate of illness; other national and local estimates of illness rates are lower. The lower rates may be due to non-reporting of illnesses that mothers consider not serious. Therefore, Matlab data should not underestimate the costs due to lower underlying prevalence rates of illnesses.

It is also possible that the illness pattern observed in Matlab may be significantly different from the pattern expected in rural Bangladesh on the average. It is difficult to test whether Matlab's pattern of illness is actually different or not. In other government-run facilities, the illness patterns of medical care seekers are biased by the population's perception about poor quality of health care. In general, illness pattern observed in Matlab sub-centers is biased by the presence of the diarrheal hospital in Matlab. Many of the diarrhea cases may choose to go to the hospital directly rather than coming to the sub-centers. The illness types found by the study in Matlab sub-centers indeed indicate such a behavioral pattern; among all the cases visiting the sub-centers, less than 2 percent can be categorized as having diarrhea or dysentery.

The study collected additional information from all illness cases to categorize the cases into IMCI illness groups. After the re-categorization of the illnesses, the IMCI recommended drug therapies were used to estimate what drug costs would be if the IMCI module were followed. The IMCI drug cost was compared with the drug cost actually incurred at the sub-centers to find the difference in costs between the current practice and the IMCI. The study found that the IMCI drug cost, on the average, is actually lower. In fact, the current practice implies drug costs at the sub-center level are about 50 percent higher than the IMCI drug cost.

Even though the drug cost of IMCI was found to be lower than the actual drug cost in the sub-centers, implementation of IMCI in Bangladesh will require additional drugs. This expansion of drug coverage will raise rather than lower the overall cost of acquiring drugs. Implementation of IMCI will be successful only when all the basic ingredients of the system are available in the right proportions, at the right time and location. Therefore, implementation of IMCI means that the required drugs must also be made available. Given the extreme scarcity of drugs in the public sector, implementation of IMCI will need drug expenditures of $9–$10 million dollars more than the current expenditure of about $3.3 to $4.7 million.

This study also made an attempt to estimate the additional personnel cost needed at first-level health facilities if IMCI is implemented. A questionnaire was developed using the IMCI module so that total time needed to collect or obtain all the information necessary for IMCI categorization could be estimated. Community health workers noted the time spent on a child patient if the questionnaire was used to collect the information. This methodology allowed the study to estimate the time cost of IMCI categorization without actually implementing IMCI. The time input needed to examine and manage a child patient when IMCI is not used could not be collected from the CHWs or the paramedics. To get this information, paramedics and CHWs were queried in a general meeting. Consensus was that the average time requirement per child was about 8 minutes. The differences in the time inputs needed for IMCI and without IMCI implies that the country needs an additional 2,700 full-time personnel to implement IMCI. Hiring these personnel will require an additional allocation of $2.7 million per year at the current governmental salary scales.

This approach of estimating time inputs is crude. For example, the time estimated in the general meeting may not be very reliable. Moreover, time needed for the implementation of IMCI may decline with practice and the gap between it and current practice may become smaller. However, without further study on time use by the paramedics and the CHWs, it is not possible to obtain a more reliable estimate of personnel cost.

References

Bangladesh Bureau of Statistics. 1998. *Health and Demographic Survey.* Dhaka.

Fauveau, Vincent. 1994. *Matlab: Women, Children and Health.* Bangladesh: International Center for Diarrheal Disease Research, Bangladesh.

Wirzba, Helene and Juncker, Therese. 1995. "Disease Patterns, Treatment Practices and Drug Requirements in Rural MCH-FP Government Facilities." Bangladesh: International Center for Diarrheal Disease Research, Bangladesh.

World Bank. 1994. *World Development Report 1993.* New York: Oxford University Press.

World Health Organization. 1995. *Bulletin of WHO.* Update. Geneva.

———. 1997. *Child Health Development.* Geneva.

World Health Organization/UNICEF. n.d. "Management of Childhood Illnesses: 2 months to 5 years." Geneva.