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ISSUES IN THE EVALUATION OF HEALTH COMMUNICATION INTERVENTIONS

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Communication for Child Survival
HEALTHCOM

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INTRODUCTION

Health Communication for Child Survival (HEALTHCOM) was a five-year communication program designed to assist developing countries promote the widespread use of effective child survival strategies. HEALTHCOM was sponsored by the Office of Health and the Office of Education within the Bureau for Science and Technology of the U.S. Agency for International Development (USAID) and was administered by the Academy for Educational Development (AED). The program worked in some 17 countries, using a research and development approach to promote changes in behavior that affect child health.

In 1985, the Center for International, Health, and Development Communication (CIHDC) at the Annenberg School for Communication at the University of Pennsylvania was subcontracted by AED to carry out summative evaluation activities at HEALTHCOM project sites. The major goals of the evaluations were to assess the impact of the interventions on health knowledge and behavior, to provide information based on research to guide decisions about the interventions and about policy, and to examine institutionalization of the HEALTHCOM methodology. Other major activities were to assist in the diffusion of research findings and information about the HEALTHCOM methodology.

The numerous research activities conducted for HEALTHCOM evaluations have varied greatly in scope and methodology, but the major portion of resources have been devoted to large scale surveys of knowledge and practice related to immunizations and the use of Oral Rehydration Therapy (ORT) for diarrhea. The surveys involved work in at least a dozen different languages, but they all followed a similar format and content in order to assure comparability across project sites. This research teaches a great deal about how the exact formulation of questions determines the quality of the data collected, about the importance of being clear about the hypotheses underlying the survey questions, and about the tremendous latitude that exists in the analysis and presentation of survey results.

The regular discussions of the research team at the CIHDC provided an unusual opportunity for considering all aspects of survey research in a wide variety of social and cultural contexts. A great deal of time and energy was spent in the design of survey instruments. The attention paid to the

details of question formulation and coding was well spent, since these details often determined the types of analyses possible with the data. The results of earlier surveys often provided hypotheses to be tested in subsequent surveys. In this manner the entire team gained experience in all aspects of survey research.

The discussions included in this special report address some of the issues that have been confronted in data collection and analysis. The chapter on ethnomedical research in Lubumbashi presents a methodology for data collection that can be used for formative purposes in the planning of communication programs. The results of that research were used both to plan messages about the treatment of diarrhea and to formulate questions for the large scale baseline survey that followed. The chapter on translation issues discusses the importance of considering the implications of how questions are translated and pretested in the preparation of survey instruments. The chapter on cluster sampling and design effects shows how choices in sampling strategies influence the confidence intervals that apply to data analysis. The chapter on diarrhea in the Philippines examines issues considered important in the study of treatment choice and provides an example of the different ways that one can approach the analysis of data on diarrhea treatment.

Ethnomedical Study of Diarrheal Disorders in Lubumbashi, Zaire

Large scale health surveys ask questions of individuals whose definitions of disease and illness may differ from those recognized by biomedicine. For example, the symptoms recognized and the way diagnoses are made for diarrhea, pneumonia, or malaria are different in different cultural contexts, and are, in any case, not those of western medicine. What are the implications of the fact that questions are asked of people whose conception of those illnesses may be different from our own? To what degree should such differing conceptions be considered in the design of a survey instrument? What difference does that actually make? Is it not sufficient to translate the questionnaire into the local language?

While translation into a local language brings a questionnaire closer to local conceptions of illness, it does not solve the issue of how such conceptions should be considered in the formulation of the survey instrument. The report on the ethnomedical study of diarrhea in Lubumbashi provides an example of how local conceptions of illness can be examined and the information used in the formulation of specific questions. In this example it was found that in the Swahili spoken in Lubumbashi, five different types of diarrheal disorders were easily recognized by the population.

The survey instrument asked specifically about those five illnesses. Quantitative analysis showed that the local diagnosis made by mothers was a critical factor in the use of ORT, which confirmed the importance of considering local conceptions in instrument design.

Translation Issues in Survey Research: Confronting Linguistic and Cultural Variation

The issue of which language to use and how interviewers will be guided in their questioning arises in cases where a number of different languages are spoken in a survey area. Survey research on a wide scale, such as the World Fertility Survey or the World Health Organization surveys on AIDS, face this issue. The issue is complicated by the fact that in many cases, the local languages are not written at all or have been written for only a few decades, which means that most people are not accustomed to writing or reading their own language. In such cases either the interviewers are trained to translate on the spot from a major language (English, Spanish, French, etc.) into a local one, or the local languages are written out and interviewers are sought who can read the language.

The chapter on translation issues discusses the various strategies one may use in a multilingual survey situation, and the pros and cons of each strategy. The author suggests that the solution adopted must be based on pragmatic considerations of the number in the population, familiarity with the written version of the language, and the personnel and funds available. The HEALTHCOM survey faced such a situation in Guatemala in a region where Spanish was widely spoken but many people preferred to speak one of several Mayan languages. After describing the dilemma faced by researchers in this region of the country, concrete examples of interview situations are described to illustrate the problems that must be resolved in order to obtain credible information.

Design Effects for Cluster Surveys of Vaccination and Use of Oral Rehydration

It has become common to economize time and money in large scale surveys by choosing clusters at random and then interviewing a number of persons in each cluster rather than selecting individuals at random only. While this is standard practice, the measures of statistical significance normally used are based on the assumption of random selection of individuals rather than of individuals from within clusters. The number of clusters and of individuals per cluster also affects the size of the

confidence interval. The effect of such choices, however, can be calculated. The paper on design effects presents a method whereby the effects of the nature of the cluster samples can be calculated.

Understanding the Diarrhea Problem in the Philippines: Recommendations for Health Communication

In recent years many surveys of the use of ORT have collected information on women's perceptions of illness episodes in order to evaluate the impact of those perceptions on actions. It is unclear, however, what kinds of measures of perception are most appropriate. Is it signs and symptoms themselves, or degrees of relative severity, or other factors that influence treatment choice? To what extent is dehydration recognized?

The discussion on diarrhea in the Philippines provides a clear example of how to examine the relationship between women's perceptions of illness and their choice of treatment. The association of both symptoms and perceived severity to treatment choice are considered separately. These perceptions are placed in the context of the entire gamut of treatment choices at home and at health centers. These factors are examined in order to identify signs that serve as cues for treatment choice, signs that can be used in health education messages.

ETHNOMEDICAL STUDY OF DIARRHEAL DISORDERS

IN LUBUMBASHI, ZAIRE

P. Stanley Yoder

INTRODUCTION

In recent years specialists in public health and epidemiology have recognized the importance of understanding local knowledge of illness and medicine in order to plan public health messages for primary health care projects. This recognition followed changes in the strategy of health care delivery and changes in the nature of anthropological research on illness and medicine. The emphasis placed on primary health care and preventive medicine since the late 1970s has directed public health programs to give prominence to health education programs, while anthropologists have become involved with public health projects and with finding better ways to present the results of ethnographic research to the medical and development communities (van Willigen et al. 1989).

However, many barriers to more cooperation between public health experts and medical anthropologists in the study of knowledge and behavior related to illness remain. Traditional anthropological methods of data collection have demanded more time and financial resources than is available to project planners. Public health planners are often unsure of what ethnomedical knowledge actually represents and of how it might be used in making decisions about health care services. Furthermore, there is a lingering suspicion that ethnographic methods of data collection are somehow "soft" and imprecise, lacking in methodological rigor.

This paper presents a method of collecting data about knowledge of illness and analyzing the data in a short amount of time with little financial investment. An ethnomedical study recently completed in

Lubumbashi, Zaire with the HEALTHCOM[1] project demonstrates how diarrheal disorders among children are diagnosed and recognized by women speaking Swahili. The data collected also show the kinds of treatments available and some information about possible causes of these illnesses. The method of analysis of the data shows to what degree the illnesses are distinct from one another and how the classification differs from biomedicine.

The specific objective of the ethnomedical study was to provide the HEALTHCOM project with information that could be used in the development of messages for mothers about how to treat diarrhea, and to serve as a basis for developing a survey questionnaire. The study was designed and initiated by the author and completed by Bihini Yanka, an anthropologist teaching at the University of Lubumbashi.

ANTHROPOLOGICAL STUDY OF DISEASE AND MEDICINE

For many decades anthropological research on disease and medicine focused on the relationship between beliefs and practices related to disease and medicine. W.H.R. Rivers was the first scholar to systematically examine the logic of the relationship between "beliefs" and therapeutic practices (Rivers 1924). His research provided the foundations for numerous studies of traditional medicine that examined specific beliefs and traditional medical practices. It was assumed that culturally specific beliefs were the determining factors in the choice of medical practice. It was also assumed that, in time, most people would learn to use Western medicine as their beliefs changed.

By the 1950s it became apparent that while people all over the world had adopted the use of Western medicine, little evidence existed for major changes in beliefs. The concept of pluralistic medical systems was proposed to explain that populations were using medical therapies from different origins and different bases without any problems. Research focus shifted to the study of the choice of therapy, best seen in the work of John Janzen on Africa (Janzen 1978). In addition, the exemplary writing of Arthur Kleinman showed that much understanding about patient choice of treatment could be gained by examining the "explanatory models" of patients (Kleinman 1980). At about the same time, Horacio Fabrega began publishing articles about the importance of distinguishing between disease and illness (Fabrega 1977) and the comparative study of ethnomedical systems. Disease refers to bodily dysfunction while illness refers to patient experience of illness. His work contributed to the study of the taxonomy of illnesses, sometimes called "folk

[1] I would like to thank the medical authorities of the city of Lubumbashi and the personnel of the HEALTHCOM project for their interest, support and encouragement.

taxonomies," which are really ethnomedical classifications of illness. Research designed from an ethnosemantic framework also contributed to interest in folk taxonomies of illness. Finally, those anthropologists who approached research from a framework of cultural ecology continued to examine beliefs as well as environmental factors as risk factors for disease.

Research by medical anthropologists in the 1980s has differed from earlier research in three important ways. First, while the study of patient choice of medical treatment remains crucial, studies with this focus have been broadened to include North American and European contexts. Second, a number of anthropologists have conducted studies of knowledge and practices related to one disease complex such as diarrheal disorders or acute respiratory infections. Third, many anthropologists have conducted applied research for primary health care (PHC) projects to obtain information that could be used for PHC planning purposes. The second and third elements are related, for many of the studies of particular disease complexes were carried out for PHC projects.

The efforts of the World Health Organization (WHO) and others to promote oral rehydration therapy (ORT) for preventing dehydration in childhood diarrhea has led to numerous research projects on diarrheal disease. The editors of a recent volume called Anthropology and Primary Health Care remark that "while anthropological interest in popular models of illness is not new, what sets apart recent research in this area is the ability to move directly from a set of findings into specific, pragmatic applications that command the attention of decision-makers and sometimes redirect health policy." (Coreil & Mull 1990: 171). In their discussion of research on diarrheal disorders, they go on to say that "probably more than for any other health problem, anthropologists have documented for diarrhea that one cannot equate biomedical notions of illness with folk concepts, and that failure to take account of (the) ethnomedical context can devastate otherwise well-planned intervention" (ibid: 171).

In order for ethnomedical research to be useful to public health programs, it must be able to show that ethnomedical taxonomies are used in the choice of treatment, and to show the relationships between symptoms observed, diagnoses made, and treatments chosen. This can be done by the close examination of local knowledge of illness and medicine in ways that permit the researcher to follow the diagnostic process that provides the basis for the choice of therapy and the use of medical services. Furthermore, if ethnomedical studies are to prove useful to public health projects, research methods must be found that require short amounts of time and still provide information that is both valid and reliable. A few anthropologists maintain that this goal is neither desirable nor possible (Alland 1988), yet that is one of the best ways to establish a meaningful dialogue between anthropologists and the epidemiologists who advise ministers of health and who have a great impact on the form of public health projects in developing nations.

The relationship between observed symptoms and the diagnosis given by a sick person and the family has not often been given much attention in anthropological research, but in recent years some scholars in North America have become involved in public health projects that have used ethnomedical research in the design of specific health projects (Scrimshaw & Hurtado 1988; Green 1985; Nichter 1988; Mull & Mull 1988; Kendall et al. 1984). Perhaps the best review of these efforts can be found in the review of current research on diarrhea by Pelto et al (1990). Recognizing the fundamental importance of ethnomedical knowledge in the choice of treatments, these public health projects have used studies of local knowledge of illness to shape the health education component of their programs.

It should be noted that while a taxonomy of diarrheal disorders may show the systematic nature of local knowledge, it does not demonstrate the basis upon which the categories of illness or different illnesses are established and maintained in the experience of episodes of illness. In order to show how the knowledge represented in taxonomies is used, one must have information showing how specific symptoms are grouped for making a diagnosis and the kinds of treatments preferred for each illness. The ethnomedical literature has established the fact that each ethnomedical system has its own taxonomy of illness and that these taxonomies differ in form from that of biomedicine. Ethnomedical taxonomies are relative, for the significance of symptoms recognized differ. One finds, for example, that in certain societies symptoms we would recognize as indicative of specific illnesses (intestinal worms, blood in the urine) are so frequent that their presence is considered as normal (Genest 1978).

The challenge to medical anthropologists interested in collaborating with primary health care projects is to design research methods that provide information about local knowledge that can be immediately useful to primary health care projects without major investments in time and financial resources. The question is, to what extent can normative knowledge be considered as valid and sufficiently specific to serve as the basis for health education? This paper presents a method of data collection and analysis that can be used in the design of health education messages for programs aimed at the treatment of diarrhea.

A METHOD FOR THE STUDY OF CHILDHOOD ILLNESSES

General Approach

The method that structured the study in Lubumbashi was based on a research strategy developed by the author in Mauritania for a primary health care project needing information about the knowledge of childhood illnesses in three language: Hassaniya, Fufilde, and Soninke. The information was needed for the training of village health workers and in the formulation of a community survey about treatment choices. Two months were allocated for the collection and analysis of data. The same methodology was later used to provide information about different kinds of diarrheal disorders for a HEALTHCOM project in three language groups (Nupe, Hausa, Gwari) in Niger State, Nigeria.

This research strategy permits the researcher to describe the classification of childhood illnesses, to determine how symptoms are grouped for making diagnoses, and to present certain conceptions of the population regarding possible causes and preferred treatments. The analysis provides some idea of the degree to which knowledge of specific illnesses are shared in the population.
The principles of the research strategy resemble two excellent guides to rapid assessment of ethnomedical knowledge that have been recently published (Bentley 1988; Scrimshaw & Hurtado 1987). This strategy differs from the others mentioned in its narrow focus, in its emphasis upon symptoms, in how the process of interviewing is organized, and in the way the analysis is conducted. The following principles guide the collection and analysis of the data:

1) interview small groups of individuals at a time;
2) follow a cumulative progression of questioning that goes from the general to the specific;
3) choose certain illnesses for more detailed questioning on symptoms, causes and treatments;
4) organize the data on the illnesses of greatest interest into analytic tables;
5) compare the responses of the different groups to each illness;
6) write an interpretation of the results that estimates the degree to which specific knowledge about the illnesses is shared.

This research strategy can be used to examine any domain of knowledge of illness, but the domain chosen will determine what kinds of groups of individuals should be interviewed. Since the study in Lubumbashi addressed common childhood illnesses, only women with small children were

interviewed. It is also clear that the results obtained pertain only to those who share the same linguistic context as those interviewed.

Small group interviews

Interviewing small groups (three to five) of persons offers several advantages over individual interviews or those of larger groups. If individuals are randomly chosen to be interviewed, some persons will have very little to say and the interview time may not be well spent. However, asking questions of three or four persons simultaneously guarantees that there will always be a discussion, provided the usual rules about polite behavior have been followed. Having several people in a group also permits the researcher to tap the knowledge of more individuals than could be obtained with individual interviews. Assembling larger groups (seven to twelve) for interviews does not permit everyone to participate equally, something that can be accomplished in smaller groups. It is generally accepted that in groups relatively homogeneous with regard to age, gender, and social status, individuals will feel more free to participate than in heterogeneous groups, since those with higher status tend to dominate the discussion. Careful consideration of these factors in the choice of group members makes it possible to obtain the equal participation of everyone.

During the group discussion all responses and observations are noted in order to obtain an overall impression of the knowledge of each participant. It is not necessary to find a consensus in the group or even to obtain a majority opinion. Rather, one seeks to establish the range of knowledge within groups so that their responses can be later compared, with the use of the analytic tables, with those of other groups responding to the same questions. All responses given are noted without indications about how many people in the group agreed with the response.

Experience in a number of research sites has shown that one can conduct four or five group interviews per day with little difficulty. It was also found that about 45 minutes is sufficient to obtain the information sought, and that people may lose interest in participating if one tries to continue for longer periods of time.

Progression of Question Types

The questions asked follow a progression at two levels: at the level of each group discussion, and at the level of the overall period of the research. Within each group session one begins with a number of general questions about childhood illness before moving to more detailed questions. A

list of common childhood illnesses is elicited with each group before moving on to ask about specific illnesses. In addition, once a list of illnesses is obtained, that list provides the basis for further questions. In that way the researcher always uses responses of the group as a guide for more detailed questions.

For example, if the primary research interest lies in illnesses related to childhood diarrhea, the initial and general questions will ask about childhood illnesses. Once a list of 15 or 20 illnesses is obtained, those that appear to involve diarrhea can be selected and questions can be asked about symptoms, causes and treatments.

There is also a progression in the amount of time devoted to general versus detailed questions over the course of data collection. As the days pass and the information obtained contains fewer new elements, the questions can be focused more specifically on the illnesses of greatest interest. Experience has shown that after three or four days, relatively few new illnesses are obtained when asking for illness names. This allows more time for probing for distinctions among specific illnesses.

Since the criteria for classifying illnesses is unknown at the outset, it is important to vary how questions about illness are formulated. Rather than always asking for names of childhood illnesses of children in general, questions can be asked about illnesses that affect those who have not yet been weaned, or those who are only a few months old, or those who are too young to walk. In some cases the same symptoms will lead to differing diagnoses depending on the age of the child. For example, in interviews in Soninke villages in Mauritania, two diarrheal disorders were identified by the same symptoms but were different because one affects only infants a few months old, while the other may strike children up to two years of age. Illnesses distinguished by criteria specific to age or developmental phase (teething, walking, speaking) are easily missed if the questions are always phrased in the most general terms.

Identifying Illnesses for Detailed Questioning

In choosing illnesses for detailed questions, the symptoms mentioned serve as the best indicators for identifying them. Often at least a dozen groups must be interviewed before the most relevant illnesses become clear. If the research ultimately addresses acute respiratory infections, for example, one looks for illnesses characterized by coughs, colds and fever. If the research focuses

on diarrheal disorders, the indicators will be mostly loose and frequent stools along with weakness and a sunken fontanelle (dehydration).

Once a short list of perhaps five or six relevant illnesses becomes clear, the pattern of questioning can shift to focusing on that list. While it is still important to ask a few general questions about childhood illness in each group, one can ask directly about specific illnesses identified by previous groups without being afraid of having the researcher introduce new elements to the questioning process. That will allow for the collection of detailed data about those illnesses from a larger number of groups than would be possible if the initial questioning strategy were followed exclusively.

The normal time period for interviews allows for detailed questions about three or four illnesses only, since ten to fifteen minutes are required to cover each illness in this manner. Therefore, the detailed information obtained from each group about symptoms, causes and treatments will not always concern the same illnesses. That makes it particularly important to properly choose the illnesses that all form part of the domain of interest. For example, let us suppose that the early questioning indicated that there were seven illnesses related to diarrhea. If it is possible to pursue only three or four in depth in each group, then for each illness, only half of all the groups will be asked questions about it. If two of those illnesses should prove not to be important to the research, that implies that the time spent on them could have been used to discussion one of the other five illnesses with greater benefit. In ten days of research, one can conduct up to forty interviews by following a schedule of four to five per day.

This process can be illustrated by an example taken from the study in Swahili in Lubumbashi. Before the research began it was known that one term for diarrhea was *kuhara* in Swahili, and that for at least some people, *lukunga* was a dangerous childhood illness. Both illnesses were often identified in the first few groups as common childhood illnesses, but since nothing was known about the pattern of symptoms associated with them, it was unclear what sort of illness *lukunga* might be. Eventually we began asking how one knows when a child suffers from *lukunga*, or what are the symptoms associated with that illness. The responses often contained references to frequent stools and loose stools as well as to a sunken fontanelle. That information suggested that *lukunga* was one of the illnesses to select for more detailed questioning. Later groups were thus often asked about the signs and symptoms associated with this particular illness as well as about possible causes and preferred treatments.

Creation of Analytic Tables

This strategy of data collection produces notes about the responses of each group to the general questions and answers to detailed questions about the most pertinent illnesses from many but not all groups. For the Lubumbashi study, the data from each group interviewed was organized according to the six illnesses found to be related to diarrheal disorders. The responses were presented in parallel columns with one column for symptoms mentioned, one for causes, and a third for treatments. For instance, the general term for ordinary diarrhea in Swahili is kuhara. The responses for all the groups who were asked about *kuhara* were laid out in columns one after the other, as can be seen in the Appendix which presents part of the data collected. The group giving the responses were identified in the left margin. Data about illnesses not on the list of priority illnesses were not presented in the tables.

The purpose of summarizing the data collected into such tables is to permit the researcher to compare both what all the groups said about the illnesses in question, and to compare what each specific group stated about the symptoms, causes and treatments of each illness.

Interpretation of the Results

The results of the analysis in the analytic tables are read in two ways: vertically and horizontally. Each page of the tables provides the responses of from two to six groups regarding one illness. A horizontal reading gives the responses of each group to the symptoms, causes and treatments of an illness. For example, the first page of the Appendix shows the responses regarding *kuhara* of six different groups, each one identified by a black square in the left margin.

A horizontal reading shows the associations made by each group between specific symptoms and treatments chosen. For example, most groups asked about *lukunga* mentioned a sunken fontanelle as a symptom. Most groups also mentioned the illness should be treated with a medicine made by preparing a mixture of palm oil, ashes and salt to be rubbed onto the fontanelle and the palate. This shows that the identifying symptom for this illness is the sunken fontanelle, since that is the symptom singled out for treatment. For *kilonda ntumbo*, characterized by loose stools and irritation around the anus, most groups cited the use of a suppository as treatment, which indicates that mothers sought to treat the irritated anus rather than other symptoms.

A vertical reading of the tables provides a measure of the degree to which all the groups cited the same symptoms, causes, and treatments. For example, it is assumed that if most groups cite the same symptoms, the knowledge of that illness is more widely shared than if the symptoms mentioned vary widely. Each column is read separately in order to make that judgment. This reading also provides a sense of the range of symptoms, causes and treatments known to the population. For the study in Lubumbashi, almost all groups gave the same answers about symptoms and treatments for *lukunga*, permitting us to say that this illness is well recognized by mothers in Lubumbashi. In an earlier study in Mauritania, the consistency of responses to questions about measles showed that the illness was well known, while the variety of symptoms cited for what biomedicine diagnoses as schistosomiasis led us to conclude that this illness was not well recognized.

DIARRHEAL DISORDERS IN LUBUMBASHI: RESULTS

Illnesses Diagnosed

The women interviewed in Lubumbashi identified a large number of childhood illnesses with six illnesses characterized by loose and frequent stools. These illnesses were the ones chosen for detailed questioning and the illness lexemes in Swahili are the following: *maladi ya kuhara*, or simply *kuhara*, *lukunga*, *kilonda ntumbo*, *kasumbi*, *buse*, and *kantembele*. Thus the majority of the groups interviewed were asked about the symptoms, causes, and treatments for each of these six illnesses.

While these six illnesses were identified as related to diarrhea on the basis of the symptoms mentioned, further justification for considering these six as distinct illnesses come from an examination of the analytic tables which show different patterns of symptoms and treatment for each of these illnesses. The data show that these illnesses are clearly distinct from one another.

Comparison of the Symptoms

The first illness mentioned, *kuhara*, means simply diarrhea in the Swahili of Lubumbashi. Thus when a child suffers from loose and frequent stools only, most often the diagnosis will be kuhara.

Other symptoms mentioned frequently include weakness, tiredness and lack of appetite. The persons interviewed also mentioned that there are different kinds of *kuhara* associated with developmental stages (teething, beginning to walk, weaning), but they are all part of the same illness.

With the second illness, lukunga, loose or frequent stools were often mentioned, but most groups also cited as symptoms a sunken fontanelle, an irritated palate, and the child making a clacking noise with the tongue that is thought to be a sign of thirst. The term comes from Tshiluba but is widely used in Swahili as well. Some women said the illness was brought to Shaba province by the Baluba from Kasai province, but the illness is known by the same term in several other languages of Shaba. A consideration of all the symptoms together indicate that the illness would be considered as diarrhea with dehydration in biomedicine.

The third illness, *kilonda ntumbo*, is recognized by frequent stools and blood in the stools, sometimes accompanied by an irritated and reddened anus. Other symptoms mentioned were fever and passing of non-digested food. This illness biomedically may not always be diagnosed in the same manner, but it appears to be chronic dysentery or amebiasis.

Another illness is *kasumbi*, a word also of Baluba origin but familiar to Swahili speakers in Lubumbashi. The symptoms most often mentioned are frequent stools and red spots on the buttocks, indicating that it is diarrhea with a rash.

The fifth illness called *buse* is recognized not only by frequent and loose stools, but also by the circumstances of the illness episode. This is a diarrhea that originates when a mother weans her child. The illness is sometimes accompanied by the first of malnutrition, for the signs of malnutrition appear as symptoms. The symptoms cited for this illness vary more widely than for the others, suggesting some ambiguity in the diagnosis. This apparent ambiguity may well be related to the fact that family circumstances rather than only observable symptoms may be used in making the diagnosis.

The last illness, *kantembele*, is characterized by loose and frequent stools plus a fever, a cough, reddened eyes, and eruptions on the skin. The consistency of the symptoms cited indicate that it is indeed measles, an illness well known to women in Lubumbashi (loose and frequent stools are common in cases of measles). The data collected indicated that this illness satisfied the conditions of

illnesses associated with diarrhea. However, since women know this illness well, and health care programs promote vaccination rather than treatment for measles, the illness will not be included in the discussion of symptoms, causes and treatments.

Possible Treatments

A clear consistency in the symptoms mentioned for these six main illnesses can be observed in the tables, a consistency that indicates that to those interviewed, these are separate illnesses.
On the level of possible treatments, a similar consistency can be noted. The treatments also often are linked to one or two characteristic symptoms. For kuhara, the treatments most often given were rice water,water/sugar/salt solution (SSS), carrot juice, or a kind of tea made from guava leaves, all liquids given to drink. For example, of the 23 groups of women interviewed about kuhara, only three failed to mention rice water and four failed to mention SSS. Both rice water and SSS are the treatments promoted for diarrhea by the health services.

For treating lukunga, a diarrhea with dehydration, the treatments suggested are dramatically different, for almost all groups described a traditional remedy made of palm oil, ashes, and locally made salt that one rubs on the sunken fontanelle and on the palate. The substances used for the ashes varied somewhat, but generally it was banana leaves, roots of a vegetable, or the head of a catfish. Among the 29 groups interviewed about lukunga, only one failed to mention this treatment, and only four mentioned SSS as a possible treatment to give at home. It is important to note that the remedy given by virtually everyone addresses the main symptoms that characterize the illness, namely, the sunken fontanelle, where the medicine is applied.

All the treatments mentioned for *kilonda ntumbo* are chosen to treat the irritated anus, which suggests that this is the main indicating symptom for the diagnosis. The term literally means "a wound at the anus," and while this should not be taken to mean that the illness is primarily that, the women clearly consider this symptom to be the key one in the diagnosis. The treatments vary from suppositories of Vicks or tomato leaves, sitting in a basin of water mixed with mango tree bark, or a medicine made of ashes and palm oil to rub on the anus. None of the 22 groups questioned about this illness mentioned SSS or rice water as a remedy for the illness, which is further evidence that these illnesses are considered as separate illnesses rather than as variations of diarrhea.

The illness called *kasumbi* which is characterized by loose and frequent stools along with a rash, is treated with a medicine made of a powder mixed with palm oil and applied to the rash. The powder is made from banana leaves, wild onions, or burned vegetable leaves.

For treating *buse* the treatments given were medicinal plants that were not identified. Only four groups were asked about this illness since it was considered less important than the others. Four of the five groups said the child should be given vitamins as well. It appears as though the treatment for this illness is not well understood.

A comparison of the treatments suggested provides more evidence that each of these illnesses is considered as distinct, for each one has a different treatment pattern. The treatments identified do not constitute evidence in themselves of what is actually done, but rather of what is known to be possible. The data are normative statements of what should usually be done. Data on behavior could be obtained either through observations of episodes of illness or survey data derived from reported treatments given

Possible Causes

The possible causes cited for these illnesses varied widely, which suggests people are more uncertain about the etiology than about symptoms or treatment. This should hardly be surprising, since the diagnosis is made on the basis of symptoms observed and the treatments are suggested from their own experience, while possible causes are located outside empirical observation and experience. In the process of questioning, women displayed uncertainty about responding to possible causes but not to questions about symptoms and treatments.

Four different causes were proposed for kuhara: 1) intestinal worm; 2) bad food or too much food; 3) behavior typical of a stage of development (teething, weaning, first steps); 4) dirty water or germs. Several groups also mentioned other illnesses as possible causes: *kantembele* (measles), *lukunga* (dehydration), and *kilonda ntumbo* (dysentery). It is quite striking to see how wide was the range of the causes given for *kuhara*.

Reaction to questions about the causes of *lukunga* was quite different in that few causes were given and four groups said they knew of no causes. Several groups mentioned that a child could be born

with the illness, that it could be provoked by bottle feeding, or by the loss of water in the body. The majority of the women simply did not know what caused the illness.

The cause of *kilonda ntumbo* appeared clear to almost everyone, for with only one exception, all groups declared it was caused by eating food that was too sweet. Examples cited included porridge, candy, tea and soft drinks. Also mentioned as causes were eating raw manioc or green mangos. The logical relation of these causes to the symptoms and to the illness does not seem clear.

Very little was known about what might cause *kasumbi*. Among the 20 groups asked about this illness, five mentioned that it may be caused by leaving the child too long in clothes damp with urine. The others all stated that they did not know the possible causes.

Mothers stated that the illness known as *buse* may be caused by the negligence of a mother toward her child or by a pregnancy coming too soon after an earlier child, that is, when a mother becomes pregnant while still nursing. In biomedical terms these are causes of malnutrition, which is one aspect of the illness. This illness strikes children at the age of weaning when they eat poorly.

In biomedical terms, the causes given for *kuhara* and *buse* correspond to what nurses would also tell mothers. The uncertainty about the cause of *lukunga* is linked, most likely, to the fact that no connection is made between the diarrhea that may cause the dehydration, and the illness itself. The one cause cited for *kasumbi*, leaving the child in clothes wet with urine, would explain the rash associated with the illness. The logic of the association between eating too much sweet food and *kilonda ntumbo* remains puzzling.

Finally, there appears to be no relation between the causes of these illnesses and the treatments suggested except for the suggestion to give vitamins for *buse*. This point seems worth making primarily because much has been made in anthropological research about the etiology of illness as determining the treatment. At least for these diarrheal disorders, that does not seem to be the case.

CONCLUSION

This paper has described a method for data collection and analysis of local knowledge about illness that was designed to provide information to public health projects. The research strategy could be

used for exploring any domain of ethnomedical knowledge. Four main points about research methods were made.

First, it is possible to collect and analyze data about local knowledge of illness without spending long periods of time or large amounts of money on research. An experienced researcher familiar with the cultural context can conduct the data collection and do the analysis in four weeks if only one language is involved. A public health project with a limited research budget should be able to finance such a limited project.

Second, data collected and analyzed in this manner can identify illnesses of particular interest in a local language and can provide a measure for the degree to which the illnesses in question are distinct one from another. This has important program implications for health education, for the development of health education materials should begin with the consideration of local diagnoses of the illnesses to be addressed. A health education program that promotes oral rehydration for diarrheal disorders in Swahili is not likely to have much impact on the care of cases of lukunga, since that illness is not usually thought to be related to diarrhea.

Third, a comparison of symptoms with suggested treatments for specific illnesses can show which symptoms are given most attention in treatment choice. An understanding of the logic of treatment choice can be used in the development of messages for a program on health education. For example, in the treatment of lukunga, people see no need for rehydration of the child since the problem is primarily in the sunken fontanelle and the palate rather than in the loss of water from the body. By the same token, no need is seen for rehydration of children suffering from *kilonda ntumbo*, since the main symptom of concern is the irritated anus.

Fourth, with regard to the study of diarrheal disorders in Lubumbashi, the data show that while people say they give rehydrating fluids to children suffering from ordinary diarrhea, they say they use a traditional medicine for cases of dehydration. Furthermore, little connection is made between ordinary diarrhea and dehydration. This point has major implications for health education programs that promote oral rehydration therapy (ORT) for childhood diarrhea. In contexts where people already see a connection between diarrhea and dehydration, a health education campaign can build on that relationship in its promotion of ORT. In contexts where that relationship is unclear or absent, establishing that connection should be one of the priorities of an ORT program. For example, in research conducted in Niger State, Nigeria, one of the three language groups seemed to have made that connection, but the other two had not.

Information from this study was used in the formulation of a survey questionnaire on knowledge and treatment of diarrhea as well as in the development of messages about diarrhea and ORT in Lubumbashi. The HEALTHCOM program decided to promote ORT for all five different illnesses identified through the training of nurses in health centers and in the preparation of materials for distribution to the population. It is still too early to measure the effects of this effort.

Finally, the analysis of the data from Lubumbashi provides an example of the differences between an ethnomedical classification system and a biomedical one. Primary health care programs have only recently begun to consider such differences in their health education campaigns. In the case of Lubumbashi, a campaign that promotes ORT for diarrhea would have its greatest effect on the treatment of ordinary diarrhea (kuhara), and would likely have little effect on the treatment of dehydration (lukunga).

The overall objective of such ethnomedical research projects has been to provide primary health care projects with information that could be used in developing messages about how to best manage episodes of diarrhea at home. While much of the information could also be useful for nurses in their contacts with mothers who bring children to health centers for treatment, the information can best be used in health communication programs designed to reach the general public. Since that is the case, it seems like only common sense that such programs begin with information about the different types of diarrheal disorders familiar to most people. That is, however, not a common starting point for those trained to use a biomedical definition of what is real and observable.

BIBLIOGRAPHY

Alland, Alexander. 1988. Looking backward: an autocritique. Medical Anthropology Quarterly 1(4):424-431.

Bentley, Margaret. 1988 Rapid ethnographic assessment: Applications in a diarrhea program. Social Science & Medicine 27(1):107-116.

Coreil, Jeannine & J. Dennis Mull (eds.). 1990. Anthropology and Primary Health Care. Boulder: Westview Press.

Fabrega, Horacio Jr. 1977. The scope of ethnomedical science. Culture, Medicine & Psychiatry 1:201-228.

Genest, Serge. 1978. Introduction " l'ethnomédecine. Anthropologie et Société 2(3):5-28.

Green, Ted. 1985. Traditional healers, mothers and childhood diarrheal disease in Swaziland. Social Science & Medicine 20:277-285.

Janzen, John. 1978. The Quest for Therapy in Lower Zaire. Berkeley: University of California Press.

Kendall, Carl et al. 1984. Ethnomedicine and oral rehydration therapy: A case of ethnomedical investigation and program planning. Social Science & Medicine 19:253-260.

Kleinman, Arthur. 1980. Patients and Healers in the Context of Culture. Berkeley: University of California Press.

Mull, J. Dennis & Dorothy Mull. 1988. Mothers concepts of childhood diarrhea in rural Pakistan: What ORT program planners should know. Social Science & Medicine 27(1):53-67.

Nichter, Mark. 1988. From *aralu* to ORS: Sinhalese perceptions of digestion, diarrhea and dehydration. Social Science & Medicine 27:(1):39-52.

Pelto, Pertti J. et al. 1990 Applied anthropological research methods: diarrhea studies as an example. In Anthropology and Primary Health Care, Coreil et Mull, eds. Boulder: Westview Press.

Rivers, W.H.R. 1924. Medicine, Magic and Religion. New York: Harcourt & Brace.

Scrimshaw, Susan C.M.& Elena Hurtado. 1987. Rapid Assessment Procedures for Nutrition and Primary Health Care. Tokyo: United Nations University Press.

Scrimshaw, Susan C.M. & Elena Hurtado. 1988. Anthropological involvement in the Central American diarrheal disease control project. Social Science & Medicine 27(1):97-105.

John van Willigen et al. 1989. Making Ourselves Useful: Case Studies in the Utilization of Anthropological Knowledge. Boulder: Westview Press.

APPENDIX

KUHARA

Symptômes	Causes	Traitements
selles fréquentes vomissement fièvre la fatigue pas d'appétit plus d'eau dans le corps pleurer fesses rouges	sortie de dents de lait biberon mal préparé vers intestinaux lukunga diarrhée de la marche diarrhée de buse diarrhée de manger la terre	l'eau de sérum l'eau de riz jus de carotte jus de goyave
selles fréquentes selles liquides faiblesse générale soif intense	intoxication alimentaire dentition vers intestinaux allaitement artificiel manger la terre	Dispensaire: Sérum + SRO Térramycine l'eau de riz jus de carotte
faire la selle à tout moment ne pas manger se tordre pleurer beaucoup très soif	eau non-bouillie intoxication alimentaire lait mal préparé nourriture avariée vers intestinaux	l'eau de riz sérum
selles très fréquentes asthénie manque d'appétit amaigrissement	intoxication alimentaire lait mal préparé eau sale samaki ya duoza microbes	l'eau du riz sérum jus de carotte
selles fréquentes la fatigue soif intense fièvre selles très liquides	apparition des dents vers intestinaux microbes allaitement artificiel souci, négligence	l'eau de riz jus de goyave jus de carotte
selles très fréquentes la fatigue selles liquides soif intense		sérum l'eau de riz jus de carotte vermifuge

KUHARA

Symptômes	Causes	Traitements
■ selles fréquentes (5 à 6 fois par heure) déshydratation yeux enflés soif intense faiblesse du corps manque d'appétit	les dents la marche la grossesse l'eau sale les vers intestinaux les aliments pourris les aliments mal préparés	sérum (SSS) l'eau de riz vermifuges
■ selles fréquentes selles liquides faiblesse générale manque d'appétit soif intense	eau sale vers intestinaux aliments mal préparés lait mal préparé	sérum (SSS) l'eau de riz jus de carotte vermifuges Oralite
■ selles 5 à 6 fois par jour selles liquides asthénie déshydratation	vers intestinaux mauvaises nourriture mangée par la mère légumes: ex. sombe lengalenga	appliquer le Vicks à l'anus suppositoire de feuilles de tomate suppositoire de glaçon bain de siège des écorces de manguier
■ selles liquides fréquentes et contenant les histoires mangées selles avec vers intestinaux forte fièvre l'enfant mange un peu il tombe à tout moment	sombe, lengalenga en période chaude sortie des dents vers intestinaux coups aux fesses soucis, négligence	anti-diarrhéiques sérum SSS l'eau de riz charbon pilé et mélangé dans l'eau faire boire la solution à l'enfant feuilles de goyavier bouillies faire boire la solution

KUHARA

Symptômes	Causes	Traitements
■ selles très liquides asthénie manque d'appétit soif intense déshydratation fièvre	dents de lait aliments avariés légumes (sombe, lengalenga, matembele) vers intestinaux chaleur; souci allaitement artificiel premiers pas de marche lukunga kantembele négligence	l'eau de riz jus de carotte sérum (SSS) solution de feuilles de goyavier kaolin charbon Oralite
■ constipation selles fréquentes selles liquides fièvre faiblesse générale soif intense déshydratation	intoxication alimentaire eau sale dentition vers intestinaux microbes (manger la terre) allaitement artificiel soucis négligence de l'enfant lors du sevrage	sérum (SSS) les feuilles de goyavier pour le lavement dispensaire: SRO
■ selles fréquentes selles liquides faiblesse générale soif intense vomissement fièvre	allaitement artificiel intoxication alimentaire dentition vers intestinaux microbes eau sale soucis (négligence)	l'eau de sérum les vermifuges l'eau de riz charbon kaolin l'eau des feuilles de goyavier
■ selles très fréquentes faiblesse générale selles liquides fièvre	intoxication alimentaire eau de puits allaitement artificiel vers intestinaux dentition soucis; négligence microbes	l'eau de riz jus de carotte kaolin (mpemba) charbon vermifuges sérum (SSS) au dispensaire

LUKUNGA

Symptômes	Causes	Traitements
■ selles très fréquentes claquement de langue vomissement fontanelle enfoncée boutons au niveau du palais	si la maman mange le poisson kabambale ou mulonge, elle a plus de chance d'accoucher d'un enfant malade de lukunga	Brûler les racines de n'importe quel arbre ramassé aux bifurcations Mélanger avec l'huile de palme et le sel indigène. Appliquer au palais
■ claquement de langue une fente au palais fontanelle enfoncée appuyer sur la ligne au front selles fréquentes selles couleur verte	l'enfant naît avec la maladie allaitement artificiel	sel indigène + l'huile de palme. Appliquer au palais et à la fontanelle brûler la tête du mulonge + l'huile de palme et le sel indigène Écorce de banane brûlé et mélangé avec l'huile de palme et le sel indigène, puis appliquer au palais et à la fontanelle
■ claquement de langue soif intense fontanelle enfoncée boutons au palais	maladie de mauvais gens (sorcellerie) (on la ramasse a u marché)	brûler les saletés ramassées au marché + l'huile de palme et le sel indigène, appliquer au palais
■ diarrhée fontanelle enfoncée palais enfoncé boutons au palais claquement de langue	certains enfants naissent malade de lukunga	brûler les écorces de bananes, les mélanger avec l'huile de palme et le sel indigène. Vicks mélangé avec le sel indigène

LUKUNGA

Symptômes	Causes	Traitements
■ diarrhée claquement de langue boutons au palais fontanelle enfoncée bouche sèche	manger au marché ou dans la rue quand la femme est enceinte manger le kabambale quand la femme attend famille	cendres mélangées avec l'huile de palme et le sel indigène. Vicks mélangé avec l'huile de palme racines de manioc et la tête de kabambale, le tout brûlé et mélangé avec l'huile de palme et sel indigène; appliquer ces produits à la fontanelle et au palais
■ claquement de langue diarrhée fontanelle enfoncée palais enfoncé amaigrissement boutons au palais selles de couleur verte	biberon diminution d'eau dans le corps allaitement artificiel	Vicks + sel indigène et l'huile de palme brûler la tête de kabambale, la mélanger avec l'huile de palme et sel indigène Brûler les écorces de maïs, les mélanger avec l'huile de palme et sel indigène; appliquer ces produits sur la fontanelle et au palais
■ bouton au palais diarrhée fontanelle enfoncée claquement de langue bébé pleure à tout moment	maladie de musoko si la femme enceinte écrase la tête de kabambale certains enfants naissent avec la maladie	brûler les écorces de bananes et les mélanger avec l'huile de palme et sel indigène cendres mélangées avec l'huile de palme et le sel indigène; appliquer cela sur la fontanelle et au palais.

LUKUNGA

Symptômes	Causes	Traitements
■ boutons blancs au palais claquement de langue kuhara (diarrhée) vomissement fontanelle enfoncée nuque enfoncée	inconnues certains enfants naissent avec le lukunga	brûler la tête de kabambale, mélanger avec les ordures, l'huile de palme et le sel indigène: appliquer ce mélange sur la fontanelle et au palais au Dispensaire, on donne des anti-diarrhée. On recommande aux mamans d'utiliser le sérum à la maison.
■ bouche sèche fontanelle enfoncée claquement de langue kuhara vomissement fièvre boutons au palais	perte d'eau du corps on naît avec cette maladie diarrhée	brûler les écorces de banane; les mélanger avec l'huile de palme et sel indigène brûler la tête kabambale, la mélanger avec l'huile de palme et sel indigène: appliquer ce mélange sur la fontanelle et au palais sérum et Oralite.
■ diarrhée fontanelle enfoncée vomissement claquement de langue boutons au palais nuque enfoncée faiblesse	allaitement artificiel	brûler les écorces de banane, les mélanger avec l'huile de palme et sel indigène. ail ou oignons, mélangés avec le Vicks et le sel indigène; appliquer ces produits sur la fontanelle et au palais

KILONDA NTUMBO

Symptômes	Causes	Traitements
■ fièvre selles mal digérées selles liquides diarrhée à tout moment	aliments trop sucrés fruits non mûrs	Appliquer le Vicks ou les cendres des écorces de bananes et l'huile de palme à l'anus
■ fesses rouges (l'anus devient rouge) l'anus s'agrandit forte diarrhée	manger les aliments trop sucrés, par exemple: bouillie trop sucrée, boissons sucrées, thé	appliquer le Vicks suppositoire de feuilles de tomates
■ fesses rouges selles fréquentes l'anus s'agrandit selles avec morves selles mal digérées	aliments trop sucrés sucettes (bonbons) mangues non mûres	appliquer le Vicks à l'anus bain de siège avec les écorces de manguier
■ diarrhée fréquente selles mal digérées selles avec morves l'anus devient rouge		Suppositoires de: Vicks, feuilles de tomate, nkatu (poivre), pilé et mélangé avec l'huile de palme
■ anus rouge fièvre selles sanguinolentes diarrhée	aliments trop sucrés mangues vertes manioc non cuit	suppositoire de feuilles de tomates bain de siège avec les écorces de manguier
■ diarrhée selles avec du sang anus rouge selles mal digérées selles en filaments	manger les aliments trop sucrés, par ex.: thé trop sucré, bouillie sucrée, beignet sucré	suppositoire des feuilles de tomate bain de siège avec les écorces de manguier boire la solution des écorces de manguier Suppositoire de Perdolan

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KILONDA NTUMBO

Symptômes	Causes	Traitements
■ selles mal digérées fesses rouges anus rouge anus grandement ouvert selles sanguinolentes diarrhée	aliments trop sucrés, ex.: thé trop sucré mangue non mûre manioc cru	lavement avec les écorces de manguier, avec le kilulu nkunj ou avec de l'eau froide suppositoire des feuilles de tomate suppositoire des écorces de bananes brûlés mélangés avec l'huile de palme bain de siège avec les écorces de manguier
■ diarrhée fesses rouges selles sanguinolentes selles mal digérées présence des vers à l'anus	aliments trop sucrés, ex: bouillie trop sucrée, thé trop sucré	suppositoires de: feuilles de tomate, bilulunkundja, Vicks, les écorces de manguier bain de siège des écorces de manguier
■ selles liquides à tout moment selles mal digérées fesses rouges selles sanguinolentes anus agrandi petites plaies au niveau de l'anus	aliments trop sucrés, ex: biscuit bouillie, etc. l'enfant peut contracter la maladie à partir de sa mère si celle-ci a l'habitude de manger trop du sucre pendant qu'elle allaite	suppositoires de: feuilles de tomate, bilulu nkundji tshilwa benyi, etc. bain de siège des écorces de manguier

KILONDA NTUMBO

Symptômes	Causes	Traitements
■ selles à tout moment selles mal digérées fièvre plaies sur les fesses, surtout à l'anus agrandissement de l'anus	laisser l'enfant sans caleçon ni couche lorsqu'il est en train de marcher à quatre aliments trop sucrés	suppositoires de feuilles de tomate, écorces de bananes brûlés, Vicks bain de siège des écorces de manguier
■ fièvre rhume diarrhée toux bébé ne mange plus fesses rouges langue toute blanche difficulté de s'asseoir l'anus s'agrandit on se gratte beaucoup aux fesses	microbes aliments trop sucrés, mangues non m û r e s ramassées par terre	suppositoires de: Vicks; feuilles de tomate; lwenyi écorces de bananes brûlés. bain de siège avec le ndimba ou avec les écorces de manguier lavement avec les écorces de manguier
■ toux fièvre fesses rouges (surtout l'anus) kuhara manque d'appétit selles mal digérées selles sanguinolentes		

KASUMBI

Symptômes	Causes	Traitements
■ Aines rouges plaies sécrétant un liquide, et diarrhée fesses rouges	inconnues	poudre cendres rouges appliquer sur les plaies
■ fesses rouges douleurs pour uriner après avoir uriné les habits (couches) collent aux fesses diarrhée à tout moment diminution du poids plaies au niveau du bassin surtout aux fesses liquide dans les plaies	la maladie commence dans le ventre de l'enfant. en général la cause n'est pas connue	poudre + l'huile Pénatin Bidiata en Hemba: argile rouge); on broie cela, puis on mélange avec l'huile de palme; appliquer sur les plaies racines de lwenyi, les brûler, mélanger avec l'huile de palme et sel indigène; appliquer à tout moment sur les plaies
■ pour les filles, toute la partie inférieure jusqu'au vagin devient rouge gales sécrétant un liquide (plaies) ces gales deviennent des plaies avec le temps diarrhée à tout moment	non identifiées	inconnues pas de médicaments au Dispensaire on applique des poudres indigènes dont la composition est mal connue
■ gales aux fesses petites plaies aux fesses sécrétant un liquide fesses rouges diarrhée à tout moment pleurs à tout moment linges toujours mouillés	le fait de laisser l'enfant longtemps avec son linge mouillé d'urines	écraser les herbes appelés dihuka huka (Tshiluba) en extraire le liquide et l'appliquer sur les petites plaies
■ plaies aux fesses plaies secrétant un liquide aines rouges diarrhée	inconnues les enfants qui souffrent de cette maladie sont âgés entre 3 mois à 1 an	il faut appliquer l'huile de palme sur les plaies, puis ajouter de la poudre

KASUMBI

Symptômes	Causes	Traitements
■ fesses rouges aines rouges vagin rouge (fille) plaies secrétant un liquide diarrhée	inconnues parfois des insectes de couleur blanche	écrase les herbes (feuilles) on recueille le liquide pour mettre sur les plaies
■ diarrhée plaies aux fesses et à l'anus aines rouges plaies secrétant un liquide vagin rouge pleurs à tout moment	inconnues maladie des noirs maladie provenant de la région du Kasaï	médicaments traditionnels dont les mamans ne connaissent pas les noms en Swahili au Dispensaire, on recommande de donner le sérum et les antibiotiques
■ diarrhée aines rouges pleurs à tout moment plaies secrétant un liquide au niveau des fesses vagin rouge pour la fillette	urine (laisser l'enfant longtemps avec le linge mouillé d'urine)	appliquer l'huile de palme aux plaies asperger de la poudre sur les plaies briques cuites écrasées à appliquer sur les plaies
■ aines rouges anus très rouges vagin rouge (fille) plaies secrétant un liquide au niveau des fesses	laisser traîner l'enfant pendant longtemps avec les linges mouillés d'urine	cendres rouges enpoudre: les appliquer sur les plaies

KASUMBI

Symptômes	Causes	Traitements
■ diarrhée aines rouges selles mal digérées fesses rouges plaies secrétant un liquide	cette maladie vient du Kasaï	médicaments traditionnels constitués de beaucoup de sortes de poudres dont les membres du groupe ignorent les noms
■ fesses qui deviennent rouges (plus l'anus) diarrhée pleurs à tout moment gales aux fesses aines rouges	maladie du Kasaï	brûler le dihukahuka mélanger avec l'huile de palme puis appliquer sur les gales
■ selles très fréquentes aines rouges présence de petites plaies secrétant un liquide pleurs	maladie du Kasaï	appliquer à tout moment l'huile de palme ou la poudre Penatin sur les plaies parfois utiliser l'huile de Boa
■ amaigrissement aines rouges plaies secrétant un liquide diarrhée	inconnues maladie du Kasaï	appliquer la poudre rouge provenant des briques rouges sur les plaies
■ aines rouges fesses rouges diarrhée plaies secrétant un liquide	non identifiées	usages des médicaments indigènes dont les noms n'ont pas été révélés

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KANTEMBELE

Symptômes	Causes	Traitements
■ forte fièvre la bouche devient rouge yeux rouges plaies dans la bouche petits boutons sur tout le corps rhume toux (quelques fois) pleurs à tout moment diarrhée ou non	mauvais vent virus	vaccin au 9ième mois médicaments contre: la fièvre; la toux médicaments pour les yeux lavement avec le thé rouge ou avec le chanvre
■ forte fièvre diarrhée la toux yeux rouges bouche rouge pleurs petits boutons toux, rhume	vent sale virus	lavement avec le thé rouge ou avec le kilulu nkundja on fait boire l'orangeade quand les boutons n'apparaissent pas
■ yeux rouges larmes aux yeux rhume forte fièvre toux diarrhée bouche rouge plaies à la gorge l'enfant ne mange plus	maladie du vent maladie contagieuse	lavement avec le ngaingai ou avec les racines des oignons sauvages ou encore avec du thé rouge ou avec de l'orangeade au Dispensaire, on donne beaucoup de médicaments contre la toux, la fièvre et le rhume
■ forte fièvre rhume yeux rouges plaies dans la bouche diarrhée petits boutons autour du cou	maladie du vent contagion maladie de tous les enfants elle est fréquente pendant la saison sèche	lavement avec le thé rouge application du sel dans le corps faire boire de l'orangeade

BUSE

Symptômes	Causes	Traitements
■ changement du corps faiblesse pâleur chevelure rouge amaigrissement refus de manger	soucis négligence abandon de l'enfant par sa mère arrêt d'allaitement maternel	on donne des produits indigènes éloigner l'enfant du toit conjugal vitamines (dispensaire)
■ grossesse trop rapprochée enfant triste sécheresse dans la bouche	sevrage brusque nourriture mal digérée par l'enfant	plantes traditionnelles isoler l'enfant hors du toit conjugal
■ faire la selle à tout moment asthénie pleurs à tout moment manque d'appétit l'enfant ressemble à quelqu'un qui souffre de Kwashiorkor peut provoquer le Kwashiorkor	grossesses trop rapprochées jalousie (souci) abandon ou négligence de soins de l'enfant	vitamines séparation de l'enfant de sa famille médicaments indigènes
■ amaigrissement l'enfant ne mange plus selles liquides toux asthénie fièvre visage pâle probabilité de attraper le Kwashiorkor pleurs	grossesses trop rapprochées négligence de soin à apporter à l'enfant, ex: privation d'allaitement maternel	seulement les médicaments indigènes au dispensaire, on donne des vitamines et des anti-diarrhée
■ diarrhée fièvre asthénie pleurs l'enfant ne mange plus	grossesse trop rapprochée négligence souci privation d'allaitement	vitamines médicaments indigènes

KANTEMBELE

Symptômes	Causes	Traitements
■ les yeux deviennent rouges la bouche aussi les larmes sortes des yeux pleurs à tout moment forte fièvre diarrhée difficulté de manger	maladie du vent (contagion)	pas de remède pour la rougeole on soigne la diarrhée et la fièvre qu'elle entraîne; on peut également remédier au manque de vitamines, aux des yeux et aux plaies dans la bouche on peut faire des lavement avec le thé rouge, ou avec l'eau de ngaingai, ou bilulu nkundja
■ très forte fièvre yeux rouges diarrhée rhume toux boutons tout autour du corps	contagion maladie des mains des gens maladie du vent	lavement avec le thé rouge ou avec les oignons sauvages prévention enlever les habits sales avant de poser l'enfant
■ les yeux rouges la bouche rouge fièvre (± 40 degrés) rhume la toux diarrhée	maladie contagieuse maladie du vent	lavement avec le thé rouge: on applique la sombe pilée sur le corps de l'enfant ou les arachides pilés aussi
■ diarrhée toux bouche rouge yeux rouges rhume boutons tout autour du corps plaies dans la bouche	maladie contagieuse maladie du vent	lavement au thé rouge faire boire de l'orangeade à l'enfant faire boire le jaune d'oeuf à l'enfant

TRANSLATION ISSUES IN SURVEY RESEARCH: CONFRONTING LINGUISTIC AND CULTURAL VARIATION

Nancy Morris

INTRODUCTION

Questionnaire translation is a persistent issue confronting survey researchers in multilingual settings. Because of the subtleties of cultural and linguistic variation, questionnaire translation is seldom as straightforward as it might at first appear. In developing countries where cultural differences are large, the translation process can become even more complex. This note, based on field research from the Health Communications for Child Survival (HEALTHCOM) project, addresses translation issues and related questions of questionnaire administration in multilingual settings.

In general, designing survey questionnaires involves painstaking attempts to order questions propitiously, to select vocabulary that will not be threatening to the respondent, to word questions precisely, and to anticipate possible responses. Careful attention is paid to word choices; making questions clear and direct reduces the possibility of misinterpretation by respondents. These concerns are compounded when designing questionnaires for use in multilingual settings. The care taken in designing a questionnaire can be undermined if equal care is not taken in translation.

It is by now virtually undisputed that survey interviewers should be "as similar as possible to the respondents in culture, social background, and language" (Ross and Vaughan, 1986:92). There are several reasons for this stipulation. Interviewees are more at ease and more likely to provide straightforward responses to interviewers whom they perceive as similar to themselves. For their part, interviewers from the same cultural background are better able to guide the interview and interpret respondents' answers. As mentioned by Ross and Vaughan, these considerations apply to

language as well as social background. However, the steps involved in achieving the desired linguistic similarity between interviewer and respondent have often been overlooked.

ISSUES IN QUESTIONNAIRE TRANSLATION

After a questionnaire is designed, it must be translated into the appropriate language or languages spoken in the target country. The first step in the process is generally to translate from English to the principal or official language of the country to be surveyed, followed by re-translation into English by a different translator to check accuracy and work out discrepancies. The process does not usually stop there, however, because in many countries large segments of the population do not speak the principal language. Taking as given the premise that interviews should be conducted in the respondent's native language (Vaessen et al.:173), the nature of the translation process becomes an important consideration: translated written versions of the questionnaire can be prepared in the other language or languages, the original questionnaire can be administered by bilingual interviewers who translate from the original written questionnaire orally as they go along, or local interpreters can be used to translate for the interviewer.

"The task of the translator," says Joseph B. Casagrande, "is to decode a message presented in one code... and encode that message in a second code... so that the two messages are equivalent, or more accurately, [of] approximate equivalence" (338). In retreating to "approximate equivalence" Casagrande recognizes that exact equivalence between languages is unattainable. Languages vary in such obvious ways as their systems of categorizing items and events, tendencies to synthesize concepts into words or phrases, and structuring of time and attitude through tense and mood. In addition, the meaning of seemingly universal concepts and even of some nouns can vary with different contexts and between cultures. For example, in the study of diarrheal disease, HEALTHCOM has demonstrated that people of different cultures categorize diarrheal disorders according to varying criteria (Yoder, "Cultural Conceptions":1990). When a North American researcher asks about diarrhea, this apparently straightforward word does not necessarily evoke the same associations in the respondent as it does in the researcher or in members of other cultural groups. As this example shows, careful attention to language and cultural issues is essential. Because of the many and sometimes subtle ways that languages differ, multilingual settings present a distinct set of issues concerning survey comparability.

For survey responses to be comparable across different social and language groups, the questions asked must be comparable. This is a key reason for the insistence that questionnaires be administered verbatim by interviewers. This also leads to favoring written translations of questionnaires in multilingual countries, since a written instrument is assumed to better provide the desired lexical precision.

Translated written questionnaires clearly provide the greatest degree of control over the interview. A written instrument that interviewers are trained to follow exactly ensures that questions will be posed to all respondents using the same words and wording. For this reason, translated written questionnaires are seen as the most reliable way to approach equivalence. For questionnaires that are to be administered in more than one language, ideally the researcher and translator work together through any linguistic complications that may arise in the translation process, and make choices that most closely approach linguistic equivalence.

Although this process would appear to alleviate a significant problem in getting comparable data from different language groups, there is another set of difficulties associated with translated questionnaires. These difficulties often arise from the situation of indigenous languages. Many languages were not written until recent years; many still do not have fixed orthographies. Often, only a few specialists are literate in indigenous languages. Native speakers of these languages may become literate in their society's principal language through formal schooling without ever learning to read and write in their native language. This has implications for the interview setting: although translators can usually be found through government or research agencies, finding interviewers who are not only native speakers but also able to read the written translated questionnaire has proven to be difficult in various countries (McCombie; Vaessen et al.:181).

An alternative to using written questionnaires in such situations is to use bilingual interviewers who work from the original written instrument in the principal language, translating orally as they go along. This option sacrifices the precision of a written translated questionnaire, but in some cases it may be more realistic.

Another interview option, the use of non-native interviewers who speak the interview language as a second language, is generally considered unacceptable because of the need for the interviewer to establish rapport with interviewees and to handle subtleties of idiom and meaning.

The complexity of issues involved in translation decisions is beginning to receive attention and investigations into translation issues in development work have recently been undertaken in several countries. Recognizing the scope of the problem, Vaessen et al. conducted language experiments in the Philippines and the Ivory Coast as part of the World Fertility Survey, a series of national surveys concerning fertility and contraception. The purpose of the experiments was to assess interviewer accuracy in the administration of translated written questionnaires as compared to on-the-spot translation by bilingual interviewers. Tape recordings of both types of interviews were analyzed as to the number and type of deviations from the written questionnaire. The researchers concluded that "there remains little doubt that the use of verbatim local language versions of the questionnaire results in considerably less interviewer error than the use of on-the-spot translation by the interviewers" (Vaessen et al.:181). In the course of their research, the World Fertility Survey researchers noted another difficulty in multilingual fieldwork, particularly in areas in which more than one language is spoken in a single community. The greatest problem they encountered was matching respondents with interviewers who spoke the appropriate language (188).

An experiment with written questionnaires was carried out by Shanto Iyengar in Andhra Pradesh, India. Iyengar tested linguistic equivalence of English and Telugu questionnaires with different categories of bilinguals. Using data from a survey concerning political socialization, Iyengar analyzed responses of bilingual speakers of English and Telugu who filled out the same questionnaire in different languages at different times. He concluded that the more concrete the survey item, the greater the ease of attaining linguistic equivalence: "linguistic equivalence of conventional, self-administered, specific survey items is not difficult to achieve." But he found the problem of interpretation to be "formidable" for what he interpreted as "more diffuse and abstract items" (Iyengar:181). To reduce this problem, Iyengar advocates advance legwork -- consideration of potential linguistic pitfalls and omission or modification of those survey items that may not hold up across the proposed set of languages.

These experiments indicate some of the complexities of questionnaire translation, but there are still other issues that may loom in the field. For example, in some countries knowledge of which language or languages are spoken in which areas may be lacking. The decision of which local languages to include in the survey sample is significant. Speakers of different languages may vary widely in customs, ethnicity, and responses to development programs. Results from a survey sample taken from some groups may not be applicable to others. The World Fertility Survey advocates a thorough linguistic survey if necessary to determine the language distribution in the area to be sampled (Vaessen et al.:188). Such a survey could be a demanding and costly undertaking.

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Once the languages necessary for the survey have been established, the next step is selection of interviewers and, if a written version of the questionnaire is to be prepared, translators. As noted previously, it can be difficult to find interviewers--even native speakers--who are comfortable reading languages that may have only recently acquired standardized written forms. There are often dialectal differences to contend with as well, as residents of neighboring communities may speak quite distinct dialects.

THE GUATEMALAN EXAMPLE

These issues surfaced during the HEALTHCOM field experience in Guatemala. It should be borne in mind that the language situation in Guatemala does not approach the complexity of many countries. In Nigeria, for example, three official languages and more than 200 other languages are spoken (Simpson:26). In Guatemala, some 18-22 Mayan languages are spoken in addition to Spanish, the official language (Kluck:52; England:1). All are living languages spoken daily in their communities, with the number of speakers varying from approximately one million for K'iche' to some 1000 for Tektiteko (England:1). Speakers of some of these languages can understand each other with effort, cooperation, and reduced expressive range on both sides, while other languages have diverged widely over the years and are not mutually comprehensible to any degree. In addition, there are numerous dialects of these languages, mutually comprehensible but with recognizably distinct variations of vocabulary or structure. In written form, these languages also diverge. The Academy of Mayan Languages of Guatemala has recently undertaken a project to standardize them (England:5-6).

A survey that HEALTHCOM conducted in four Guatemalan *departamentos* (administrative divisions) provided an opportunity to test different translation methods of the same instrument. The principal languages in the areas of the survey were Spanish and two Mayan languages, Q'eqchi' and Kaqchiquel. The original survey questionnaire was prepared in English and translated into Spanish by HEALTHCOM researchers in the United States. Local project staffers at the program office in Guatemala reviewed the Spanish version and adjusted it for local usage. This version was used for interviewing Spanish-speaking respondents. For the Q'eqchi' language, an experienced bilingual interviewer worked from the Spanish questionnaire, translating on the spot. For the Kaqchiquel language, the questionnaire was translated by professionals at the Guatemalan

Indigenous Institute, and two native Kaqchiquel speakers with interviewing experience were hired to conduct interviews from the written questionnaire.

Reviewing the translated questionnaire, both of the Kaqchiquel interviewers disagreed with some of the vocabulary and syntax used, a reflection of dialectal variation within the language. Both interviewers practiced administering the written Kaqchiquel questionnaire, and both had difficulty with it, as they were unaccustomed to seeing their native language in written form. Neither became completely fluent with the instrument, often referring to the Spanish version for clarification.

The first interviews were conducted in a small Kaqchiquel-speaking village in the *departamento* of Sololá. In this community, few residents spoke any Spanish at all. The interviewers were accompanied by local "health promoters," resident volunteers who provide health information to the community. The Kaqchiquel-speaking interviewer's dialect differed from that spoken in the village. Explaining that he feared alienating people or causing misunderstandings with delicate health questions and terminology, he conducted the interviews through the health promoters. He read each question aloud in Spanish, the promoter asked it in Kaqchiquel, the interviewee responded in Kaqchiquel, and the HEALTHCOM interviewer noted the response on the questionnaire. On several occasions he intervened to clarify a point that he felt the health promoter was not asking correctly or to probe an interviewee's response, but at no time did he conduct an entire interview. This interview situation largely negated any advantage of having a written questionnaire. (It should be noted that in a small, closed community such as this one in which all residents know one another and strangers are viewed as intruders, local escorts would be necessary in any case, whether or not they also served as translators.)

In a larger Kaqchiquel-speaking community outside the capital of the *departamento* of Retalhuleu, the interviewers worked -- with difficulty -- directly from the Kaqchiquel questionnaire. The interviewees understood the questions, but they recognized that the interviewers spoke a Kaqchiquel that was different from theirs. Several vocabulary items elicited discussion, and often considerable amusement. The flow of the interview was interrupted on several occasions as interviewer and interviewee compared the meaning of certain terms in different areas. One child, listening to an interview, informed the interviewer that she was "not talking right."

An alternate interviewing procedure was undertaken with the Q'eqchi' language. Rather than prepare a written translation of the questionnaire, a bilingual interviewer worked directly from a Spanish questionnaire, translating the questions as he went along. Several interviews were tape

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recorded and later translated verbatim back into Spanish in order to compare the use of the written questionnaire with the on-the-spot translation in the field.

In this case, the actual process of interviewing was smoother than it had been with the written Kaqchiquel questionnaire because the interviewer was comfortable with the written Spanish version of the questionnaire and with the spoken local variant of Q'eqchi'. This is not to deny that there is greater room for variation in an interview without an instrument written in the interview language to work from, as Vaessen et al. emphasize.

Several separate but related issues can be illustrated by examining an excerpt from a Q'eqchi' interview. Although respondents in this survey were to be mothers of children under two years of age, fathers' participation, as in this excerpt, was common. The following is a section of the questionnaire and a transcription of the corresponding part of the interview--at one further remove, translated into English.

Questionnaire

Q: Did you have prenatal check-ups during your last pregnancy?
Q: Who did you see for these check-ups?
Q: How many check-ups did you have during your last pregnancy?
Q: Do you have a radio in this house?
Q: Does the radio work?

Interview transcription:

Interviewer:	"Before your child was born, did you go to be seen?"
Mother:	"I went to the health center."
Interviewer:	"Who saw you there?"
Mother:	"I don't know her - an older lady."
Father:	"When she went into labor (*cuando se compuso)* with this child we went to Coban. This child was born in Coban."
Interviewer:	"How many times did you go - when the child hadn't been born yet - when it was still in your heart?"
Father:	"Many times."
Mother:	"Many times."
Father:	"Many times - she was in a lot of pain -- hat's why she went there."
Interviewer:	"Yes, but how many times did you go?"

Father:	"Many times.."
Mother:	"Many times."
Father:	"Maybe six times...like every..."
Interviewer:	"Six times."
Father:	"At the end of every month -- you have to go again and they tell you to come next month."
Interviewer:	"Six times?"
Father:	"Maybe six or more."
Interviewer:	"Do you have a radio?"
Father:	"She was really in pain."
Interviewer:	"But do you have a radio sir?"
Father:	"They told her to come back when she was about to give birth."
Interviewer:	"Does the radio work?"
Father:	"Yes, it works."

This interview transcription illustrates the often-mentioned issue in questionnaire design and translation of the delicacy of issues related to pregnancy, and the absence of concepts such as "prenatal check-up" in some cultures. Similar problems have been noted elsewhere. For example, AIDS researchers in Africa have noted that due to different norms of social and sexual interaction, the concept of prostitution as understood in Western culture does not exist in the Chichewa culture, or, consequently, in the language. Temporal matters are also handled differently in Chichewa: the absence of the concept of "ever" as in "Have you ever...?" has posed difficulties in questionnaire translation (McCombie, 1990; Yoder, personal communication, 1990).

The Q'eqchi' interview excerpt also highlights an issue not of language differences, but of cultural differences. Questionnaires are written as if they are to be administered in a pristine environment. They do not allow for the fact that interviewees from other cultures may not be accustomed to providing responses that must fit into little boxes. The procedural need to ask questions identically in all cases can be undermined by insufficient anticipation of and respect for cultural differences.

DISCUSSION

These field experiences illustrate some of the complexities of questionnaire translation. The principal conclusion is that while written questionnaires in the relevant languages are important

tools, they cannot be relied upon as a panacea for the problems of multilingual surveys. There are several possible pitfalls to be aware of. While Vaessen et al. noted the problems of the absence of linguistic maps of an area and of matching interviewer language to interviewee language, two other issues stand out from our field experience.

The first was the difficulty that the interviewers had in reading a language they were accustomed to using only in spoken form. The second was the great dialectal variation within the same language across communities. This meant that interviewers from one Kaqchiquel-speaking community did not speak the same variation of their language as the linguist who translated the questionnaire from Spanish to Kaqchiquel, or as interviewees from still other communities. Although all Kaqchiquel speakers were able to understand one another, the precision aimed for in a carefully-translated written instrument was simply not achievable under these circumstances.

For survey purposes, one way to deal with dialectal variations of a language would be to treat each area's speech as a different language. But even the idealistic proposal of commissioning written instruments and local interviewers for all speech communities sampled would not be feasible, not only for budgetary reasons but because bilingual translators in numerous dialects probably could not be found. For these and other logistical reasons, as a practical matter the World Fertility Survey employs a rule of thumb that "advise[s] against the preparation of a language version likely to cover less than 10 percent of the sample" (Vaessen et al.: 175).

The issues of unwritten languages and dialectal variation highlighted here are alluded to but not directly addressed by the World Fertility Survey which, in a policy that could conflict with the above-noted one, advocates that generally "at least 80 percent of the interviews should be conducted on the basis of verbatim questionnaires" (Vaessen et al.:175). Even in the comparatively simple linguistic environment of Guatemala, adherence to such a stipulation could mean either a multiplicity of questionnaire languages or the exclusion of small language groups from the survey. The first option may be logistically and budgetarily impractical; the second is likely to be methodologically unacceptable. Therefore, some combination of translation methods is likely to be used for any multilingual survey. Decisions about which translation method to use in which case will depend on the availability or unavailability or translators, bilingual interviewers, and funds, a well as the researchers' and local experts' judgment.

These issues are important, and the concerns underlying them are significant. Lack of attention to language differences can result in noncomparability of survey answers and misinterpretation of

survey data. Solutions are elusive, but one clear imperative is interviewer training. With practice, interviewers unaccustomed to reading their native language can become familiar with a written questionnaire. If there is not a written translated version, interviewers can work together to standardize their oral translation from the principal language. Well-trained interviewers will also be better able to handle interruptions and digressions during the interview, as well as lexical variation.

On the part of researchers, awareness of the multilingual intricacies of many developing countries will help reduce surprises in the field and contribute to more reliable data collection. This sensitivity to language issues entails cultural sensitivity and, as with any fieldwork, requires understanding of and respect for the cultures being studied.

BIBLIOGRAPHY

Casagrande, Joseph B. 1954. "The Ends of Translation." *International Journal of American Linguistics* 4:335-340.

England, Nora. 1988. "Idiomas Mayas en Guatemala." Paper presented at the Latin American Studies Association XIV International Congress, New Orleans, Louisiana, mimeo.

Iyengar, Shanto. 1983. "Assessing Linguistic Equivalence in Multilingual Surveys" in Bulmer, Martin and Donald P. Warwick, eds., *Social Research in Developing Countries: Surveys and Censuses in the Third World.* Chichester: John Wiley and Sons.

Kluck, P.A. 1983. "The Society and its Environment" in Richard F. Nyrop, ed., *Guatemala: A Country Study*. Washington, D.C.: United States Department of the Army:41-81.

McCombie, S. 1990. Personal communication.

Ross, David A. and J. Patrick Vaughan. 1986. "Health Interview Surveys in Developing Countries: A Methodological Review." *Studies in Family Planning* 17(2):78-94.

Simpson, Ekundayo. 1984. "Translating for National Integration." *Babel* 1; 26-33.

Vaessen, Martin et al. 1987. "Translation of Questionnaires into Local Languages" in Cleland, John and Chris Scott. 1987. *The World Fertility Survey: An Assessment.* Oxford University Press.

Yoder, P. Stanley. 1990. "Cultural Conceptions of Illness and the Measurement of Changes in Morbidity" in J. Cleland and A. Hill, eds. *The Health Transition: Methods and Measures.* Canberra: Australian National University Press.

Yoder, P. Stanley. 1990. Personal communication.

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DESIGN EFFECTS FOR CLUSTER SURVEYS OF VACCINATION AND USE OF ORAL REHYDRATION

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INTRODUCTION

Evaluations of health programs in developing countries often depend on surveys designed to measure the proportion of the population that received services. Two of the most common types of evaluation are cluster surveys of vaccination coverage and home-based use of oral rehydration for treatment of diarrhea. The World Health Organization has recommended standard survey designs for measuring the coverage of these programs. For example, WHO's Expanded Programme on Immunization (EPI) recommends that vaccination coverage surveys be based on 30 survey clusters with data on the vaccination status of at least 7 children in each cluster. This sample design is intended to produce an estimate of vaccination coverage that is within 10 percentage points of the true rate.

Cluster sampling generally requires a larger total sample size than a simple random sample. The sample size required for a cluster sample depends in part on the manner in which vaccination coverage varies within the population. If each cluster (or potential survey cluster) is very similar to every other cluster in the population, then the survey results will not depend very much on which clusters are actually selected at random to be included in the survey. In this case it is not important to include a large number of clusters to insure a "representative" sample since each cluster is by itself reasonably representative of the total population. On the other hand, if there is a great deal of variation among clusters in their rate of coverage, it is important to include a larger number of clusters in the survey sample.

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Henderson and Sundaresan (1982) examined the adequacy of the standard EPI survey design by reviewing the results of 60 vaccination coverage surveys in 25 countries to determine what proportion of them actually achieved a standard error of _ 10%. In addition, they carried out several simulations. This paper extends the work of Henderson and Sundaresan to examine whether the proposed sample design is equally appropriate for urban and rural areas and for areas covered by mobile vaccination teams and static clinics. We approach these questions by 1) performing a few simulations, 2) examining the results of several surveys run by the HEALTHCOM program and 3) examining the implications of the costs per interview and per cluster. We then carry out a similar analysis for cluster surveys designed to measure use of oral rehydration therapy for treatment of diarrhea.

THE CALCULATION OF REQUIRED SAMPLE SIZES FOR CLUSTER SURVEYS

Cluster samples are generally less efficient than simple random samples (i.e., for a given sample size, the variances for parameter estimates are larger for a cluster sample than for a simple random sample). Therefore, in order to achieve the same degree of accuracy it is necessary to use a larger total sample size in a cluster survey than would be required for a simple random survey. Despite this, cluster surveys are often preferable to simple random surveys because they are generally less expensive per interview.

The efficiency of a cluster sample can be measured by the ratio of the variance of an estimate from a cluster survey to the variance of a similar estimate from a simple random sample based on the same total sample size. This ratio is known as the design effect, or DEFF. Then a cluster survey of size N has an effective sample size of N' which is equal to N divided by DEFF. The value of DEFF is determined by how much the variable of interest (e.g., the coverage of vaccination) differs across individuals and across clusters. DEFF can be calculated as:

$$DEFF = \frac{a\sigma_c^2}{\bar{P}(1-\bar{P})} \qquad (1)$$

where σ_c^2 is the variance of the coverage rates for clusters and a is the number of cases per cluster. The value of σ_c^2 can be calculated as:

$$\sigma_c^2 = \frac{\sum_{i=1}^{C} (P_i - \bar{P})^2}{C} \qquad (2)$$

where P_i is the coverage rate in cluster i and C is the total number of clusters (Cornfield, 1978). If the difference among clusters is large then DEFF will be large. However, if the clusters are all very similar, then DEFF can even be less than 1 and the cluster sample is more efficient than a simple random sample.

DEFF can be related to the intercluster correlation coefficient, ρ, by the equation:

$$\text{DEFF} = 1 + (a - 1)\rho.$$

It is the correlation coefficient between the vaccination statuses of pairs of individuals in the same cluster. Note that if we interview one person per cluster (which is comparable to a random sample in a large population with many clusters), then DEFF is 1.0 no matter what the value of ρ. However, for a given total sample size, the more individuals interviewed per cluster (i.e., the fewer the number of clusters) the more the results can be affected by the differences among clusters.

The value of ρ is determined by the manner in which vaccinated individuals are distributed geographically in the population. It is therefore outside the control of the researcher and its exact value is generally unknown. Once the survey is completed, the survey data can be used to estimate ρ. However, in order to determine the required sample size we need to make an assumption about either por DEFF. If possible it is useful to examine the values of ρ or DEFF from similar surveys in similar settings. If similar data are not available, it is often reasonable to assume that DEFF is approximately 2. In any case, it is wise to use of conservative (i.e., large) estimate of DEFF for sample size calculations.

The standard design for EPI surveys is a cluster survey of 30 clusters with enough interviews to get vaccination information on 7 children aged 12-23 months. This sample design is based on Henderson and Sundaresan's evaluation of 60 vaccination surveys from 25 countries between 1978

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and 1981 which suggest that DEFF is not likely to exceed 2 (1982:254). It is designed to get an estimate of vaccination coverage which has a standard error of less than 10 percentage points. While it is probably safe to assume that for vaccination surveys the value of DEFF is less than 2, it is likely that the exact value of DEFF depends on the way in which vaccination services are delivered to the population. In particular, DEFF for measures of vaccination coverage might depend on the extent to which services are delivered by mobile vaccination teams rather than at fixed clinic locations. To demonstrate this, we can examine two polar cases: 1) all vaccination are given by mobile vaccination teams, and 2) all vaccinations are given at fixed clinic locations.

For the first case we hypothesize a program based on vaccination teams that visit villages (clusters) quite frequently. When a team visits a village it achieves 100% coverage of the eligible children and visits frequently enough to maintain 100% coverage. If a team had not visited a village, none of the children would have been vaccinated. If all villages were the same size, the best estimate of the proportion of children vaccinated would be the proportion of villages visited by the vaccination team. Since the vaccination status of a village could be determined by asking the vaccination status of a single child in the village, the optimal sample size per village is one child.

We can state this argument in terms of the interclass correlation coefficient, ρ . Since all of the children in a given cluster have the same vaccination status, ρ is equal to 1 (that is there is a perfect correlation between the statuses of the children within each cluster). With ρ of 1 then:

$$\text{DEFF} = 1 + (a-1)\,\rho = 1 + (a-1)\,1 = a.$$

Then the effective sample size, N', (the sample size required for a simple random sample to get the same degree of accuracy as a cluster sample of size N) is N/DEFF or, in this special case, N/a. Since the sample size is equal to the number of clusters included in the sample times the average number interviewed per cluster (i.e., Ca) then the effective sample size in this hypothetical example is equal to the number of clusters included in the survey regardless of the number interviewed in each cluster. Therefore we can improve our estimate by visiting more clusters, but there is no reason to interview more than one mother in each cluster.

At the other extreme we can hypothesize a program based on vaccinations provided at health centers. We can assume that health centers are distributed evenly throughout the country and that the proportion of the population that went to clinics for vaccinations did not vary across clusters. Then an estimate of vaccination coverage for any one health center catchment area would be a good

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estimate for the whole country. In this case the interclass correlation coefficient would be 0.0 and the design effect would be 1.0 no matter how many cases there are per cluster. This means that a cluster sample is as efficient as simple random sample. Therefore it is reasonable to simplify the survey process as much as possible and reduce the cost as much as possible by visiting only one cluster.

SIMULATIONS OF THE EFFICIENCY OF CLUSTER SURVEYS

No country has a program as extreme as these polar cases. However we can easily simulate more reasonable examples. Following Henderson and Sudaresan, we can hypothesize several different types of populations and determine the appropriateness of the standard survey design for each case.

Our simulations differ from Henderson and Sudaresan's in several ways. First, we are interested in examining how the evaluation of programs based on mobile teams might differ from the evaluation of programs based only on fixed clinics. We are also interested in how programs in rural areas might require a different sampling strategy than those in urban areas. Second, while Henderson and Sundaresan hypothesized different distributions clusters of 7 children each then sampled from those distributions, we use a more direct approach based on a different method for estimating the design effect for estimates of proportions. Donner, Birkett and Buck (1981) propose a model based on the proportion of clusters in which all of the cases have the characteristic in question (in our case vaccination) and the proportion of clusters in which none of the cases have that characteristic. This approach enables us to assume a distribution of coverage rates for villages or small areas rather than for clusters of 7 children. They propose a variable k which is comparable to p. If P_1^* is the proportion of clusters in which all 7 children were vaccinated and P_0^* is the proportion of clusters in which none of the children were vaccinated then:

$$\kappa = \frac{P_1^* + P_0^* - [P^7 + (1-P)^7]}{1 - [P^7 + (1-P)^7]} \qquad (3)$$

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where P is the overall proportion vaccinated for the whole population. We can the calculate DEFF by replacing ρ with k in (1). In order to calculated P_1 and P_2 for a hypothesized population, we can examine each type of village separately. For a given class of villages (e.g., those in which there is no clinic within 5 kms.) which all have a proportion vaccinated equal to P_i, the proportion of samples of 7 children in which all 7 have been vaccinated will be equal to P_i^7. Similarly, the proportion of samples of 7 children in which none of the 7 has been vaccinated (P_0^*) is $(1-P_i)^7$. Then for the whole population we can calculate the values of P_1^* and P_0^* if we know what proportion of the population lives in each type of area.

Box 1 presents a hypothetical example of a rural area in which 38% of the population is covered by vaccination teams. These areas are equally distributed over three coverage rates of 50%, 60% and 70%. These differences in coverage could be due to differences in the effectiveness of various vaccination teams, in the acceptability of vaccination, or in the amount of time elapsed since the most recent visit of the team to the area. The other 62% of the population is covered only by relatively inefficient health clinics which achieve coverage rates of 5%, 10% and 20%. This leads to an overall coverage rate of 30%. Using (3) we calculate that k is 0.234 if there are 7 children in each cluster (i.e., a equals 7). This leads to an estimate of DEFF of 2.43. With a design effect this large and 30% vaccinated, we would need a sample of 28 clusters of 7 to achieve a 95% confidence interval of $\pm 10\%$. The relatively large value of DEFF results from the fact that if we assume that rural clinics rarely achieve coverage rates of more than 20%, then to achieve 30% coverage we need to assume that a substantial proportion of all areas are covered by effective vaccination teams. The large difference between the coverage rates in the two types of areas leads to relatively large design effects.

Type of Cluster	Coverage	% of Clusters		
Served by Teams:	70%	12%		
	60%	14%		
	50%	12%	Average Coverage:	30%
Served by Clinic only:	20%	21%		
	10%	21%	κ:	0.238
	5%	20%	DEFF:	2.43

Box 1: Calculation of ρ Based on a Scenerio of a Rural Area with Most Vaccinations Delivered by Moble Teams, Average Vaccination Coverage of 30%, and 7 Children per Cluster

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Box 2 presents several hypothetical populations that are more typical of urban areas. These examples are based on neighborhoods with relatively good clinics that achieve coverage rates of 20%, 25% and 30% and neighborhoods covered by clinics and mobile teams that achieve coverage of 60%, 70% and 80%. The first column shows a distribution of neighborhoods that leads to a coverage rate of 50%. In this situation DEFF is only 1.65 and to insure a 95% confidence interval of $\pm 10\%$ we would need a sample of only 23 clusters of 7. The reason for the much smaller design effect is that by assuming that the clinics are more successful, it is possible to achieve relatively high coverage rates without assuming exceedingly high (and unreasonable) estimates of coverage for the areas covered by mobile teams. For example, if an urban area achieved a coverage rate of 50% (which has the maximum variance from a simple random sample) with half of all neighborhoods achieving a coverage rate of only 20% and half have a rate of 80% (which leads to a high variance among clusters) then DEFF is only 2.18. Therefore, even in this very extreme case if all neighborhoods have coverage rates of at least 20% the required sample size will not exceed 30 clusters of 7.

Type of Cluster	Coverage	% of Clusters		
Served by Teams:	80%	18%		
	70%	19%		
	60%	18%	Average Coverage:	50%
Served by Clinic only:	30%	15%		
	25%	15%	κ:	0.109
	20%	15%	DEFF:	1.65

Box 2: Calculation of ρ Based on an Urban Scenerio with Most Areas Covered by Vaccination Temas, Average Vaccination Coverage of 50%, and 7 Children per Cluster

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It appears from this that if we assume that urban areas are not apt to have (many) neighborhoods with vaccination coverage rates below 15%, then we can feel relatively confident that the design effect is less than 2. In contrast, if we assume that in many rural areas covered by clinics (or without any programs) have coverage rates as low as 5%, then we must assume that the design effect is close to 2 unless there are no areas covered by successful mobile vaccination teams or very successful clinics.

THE DESIGN EFFECT FOR VACCINATION COVERAGE IN THE HEALTHCOM SURVEYS

It appears from the preceding discussion that there are theoretical reasons for guessing that the design effect for vaccination surveys in urban areas will generally be lower than those for surveys in rural areas. The HEALTHCOM surveys provide the opportunity to test whether in fact this is the case in several countries.

The most commonly used measure of vaccination coverage is the proportion of 12-23 month old children who are completely vaccinated. WHO recommends that estimates of coverage be based only on vaccinations verified by health cards. In areas where the programs often lack vaccination cards, a substantial proportion of vaccinations can be missed by this approach. Table I presents estimates of the design effect from HEALTHCOM surveys for estimates of the proportion of children aged 12-23 completely vaccinated according to the mother's reports including those with and without cards ("reported") and according to data available from cards ("verified").

Table I: The Design Effect, DEFF, for the Proportion of Children Aged 12-23 Months Who Are Completely Vaccinated, Surveys in Five Countries

	No. of Clusters	Claimed	Verified
Guatemala	534	1.66	1.54
Urban	191	0.81	0.79
Rural	343	1.86	1.73
Philippines			
Round 1 - Manila	89	1.88	1.73
Round 2 - Manila	91	1.71	0.65
Round 3 - Urban	80	1.68	1.32
Manila	32	1.15	0.74
Ecuador	60	1.83	1.53
Urban		1.49	
Rural		2.03	
Lesotho			
1st Round	40	1.20	1.71
Urban	6	0.61	1.74
Rural	34	1.25	1.10
2nd Round	30		1.86
Nigeria (Ages 0-23)	49	1.62	0.82
Urban	18	1.26	0.91
Rural	41	1.21	0.77

The design effects shown in Table I are all relatively low: only one is above 2.0[2]. This suggests that EPI surveys that follow the standard survey design are based on reasonable, though conservative, assumptions.

A closer examination reveals that for those countries with data for both urban and rural areas the design effects in the urban area are substantially lower than those in the rural areas. For example the DEFF for claims of complete vaccination in rural Ecuador is about 2.0 while DEFF for the urban areas is only about 1.5. This finding is consistent with our expectations. In general the availability and utilization of vaccination services is more even in urban areas and all urban areas receive similar program inputs. Within rural areas, there is much less variability in coverage among those areas that are within 3 kms. of a health clinic than among areas that are more than 3

[2] Since the standard procedure is to have 7 children per cluster, the values in the table are based on the values of p calculated from the surveys and an average of 7 children per cluster.

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kms. from a clinic. For those close to a clinic, the value of ρ is only 0.05 and DEFF is only 1.3. For those farther from a clinic ρ is 0.18 and DEFF is 2.1. Therefore, in rural areas DEFF can be much larger than in urban areas because access to clinics generally varies a great deal among areas and there are substantial differences between those covered only by clinics and those that are visited regularly by vaccination.

There are two urban areas which show relatively high values of DEFF. First, is the design effect for verified vaccination in Lesotho. The value of DEFF for claimed vaccinations is only 0.58 while for verified vaccinations it is 1.72[3]. In Lesotho it was discovered that many clinics did not always have a supply of vaccination cards so many vaccinations were not verifiable. Since this introduces another source of variation among clusters, it raises the design effect. In this situation, the data on verified vaccinations may be less reliable than the data on claims. This is a problem of bias (underreporting) in verified vaccinations that can not be corrected by a larger sample size. Therefore it would not be a serious problem if the sample design were based on a value of DEFF less than 1.7.

The second apparent exception is the high values of DEFF in the first survey in Manila. The first round of this survey covered Metro-Manila which includes a number of small outlying towns. In the second round the survey universe was more restricted. For the third round, Manila was limited to the city proper. Therefore the first rounds included a more heterogeneous group of clusters in the survey universe.

The lower values of DEFF for surveys in urban areas (either one large town or several towns with similar programs) mean that surveys in urban areas can be based on smaller sample sizes. Table II presents combinations of a and C that lead to a confidence interval of 10 percentage points given various values of ρ. For example, if we assume that the value of ρ is 0.09 (DEFF is 1.54 with 7 children per cluster) then survey designs with 29 clusters of 5 children, 24 clusters of 7 children, or 21 clusters of 9 children would each produce standard errors slightly smaller than ten percentage points. The advantage of these alternative survey designs is that they would require 31%, 20% and 10% fewer interviews than the standard design of 30 clusters of 7 children. A more conservative approach would be to assume a larger value of ρ, 0.12 which implies a DEFF of 1.72 with a equal to 7. Two alternative survey designs would then be 29 clusters of 6 children

[3] Both of these estimates are based on only 6 clusters and are therefore not very reliable estimates of DEFF.

and 26 clusters of 7 children. These would involve 17% and 13% fewer interviews respectively. All of these alternative designs would require fewer interviews and fewer clusters[4].

Table II: Combinations of Average Sample Size per Cluster (a) and Number of Clusters (C) Required to Acheive a Confidence Interval of 10 Percentage Points with Various Values of ρ

	ρ = 0.06		
a	5	7	9
C	27	21	18
DEFF	1.24	1.36	1.48
	ρ = 0.09		
a	5	7	9
C	29	24	21
DEFF	1.36	1.54	1.72
	ρ = 0.12		
a	5	7	9
C	32	26	23
DEFF	1.48	1.72	1.96

The design effects for rural areas range from 1.40 to 2.03. For national populations, the largest value of DEFF in the table is 1.84. If most of the vaccinations are carried out in health centers, it is probably safe to use 29 clusters of 6 children or 26 clusters of 7 as was recommended for urban

[4] It is often stated in discussions of EPI surveys that it is necessary to have at least 30 clusters. The origin of this "rule" is that the formula for the variance of an estimate based on a cluster survey is asymptotically correct as the number of clusters approaches infinity. As a rule of thumb, 30 is often taken as being large enough. However, there is nothing magical about this number. For purposes of illustration we have avoided examples with fewer than 20 clusters or 5 interviews per cluster.

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areas. However, if mobile vaccination teams are responsible for a substantial proportion of vaccinations it is better to stay with the standard of 30 clusters of 7 children.

Since measles has a very high case fatality rate in many developing countries, it is useful to look separately at the values of DEFF for the proportion vaccinated against measles. Table III presents these values for children aged 12-23 as reported by their mothers and as verified by health cards.

Table III: The Design Effect for the Proportion of Children Aged 12-23 Months Vaccinated against Measles, Surveys in Five Countries

	Claimed	Verified
Guatemala	1.54	1.72
Urban	0.78	0.79
Rural	1.73	1.47
Philippines		
Round 1 - Manila	1.82	1.23
Round 2 - Manila	1.41	0.86
Round 3 - Urban	1.58	1.50
Manila	1.44	1.36
Ecuador	1.74	1.38
Urban	1.17	0.85
Rural	2.03	1.79
Remote < 3	1.30	1.00
Remote = 3+	2.08	1.96
Lesotho		
1st Round	1.39	1.84
Urban	1.31	2.27
Rural	1.42	1.69
2nd Round		
Nig[illegible] ages 0-23)	1.58	1.43
Urban	1.22	1.20
Rural	1.40	1.30

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Although the proportion of children who have completed the sequence of vaccinations is a variable of central importance in all evaluations of vaccination programs, the choice of values of ρ or DEFF must be based on the variable of interest that has the largest design effect. Table IV presents for each survey the maximum values of ρ among the values for four common measures of vaccination coverage: the proportions completely vaccinated, ever vaccinated and vaccinated against measles as reported by the mother's report and as validated using the health cards. The table also gives the values of DEFF based on seven children per cluster. If we exclude the values for Lesotho urban areas in the first round and the values for the first two rounds of Manila (all of which are discussed above), the maximum value of DEFF for urban areas is about 1.7 and for rural areas and national population 2 is a reasonable value.

Table IV: The Maximum of the Values of ρ for Four Measures of Vaccination Coverage

	ρ	DEFF
Guatemala	0.15	1.9
Philippines		
Round 1 - Manila	0.33	3.0
Round 2 - Manila	0.17	2.0
Round 3 - Urban	0.11	1.7
Manila	0.07	1.4
Ecuador	0.14	1.8
Urban	0.08	1.5
Rural	0.17	2.0
Remote < 3	0.05	1.3
Remote = 3+	0.18	2.1
Lesotho		
1st Round	0.14	1.8
Urban	0.21	2.3
Rural	0.12	1.7
2nd Round	0.14	1.9
Nigeria (Ages 0-23)	0.10	1.6
Urban	0.04	1.3
Rural	0.04	1.2

COMPARISON WITH HENDERSON AND SUDARESAN'S RESULTS

The simulations and the results from the HEALTHCOM surveys help to explain several of Henderson and Sudaresan's findings. They compared the confidence interval from the 60 surveys they examined to the coverage rate. They demonstrated that the confidence interval for surveys with estimated coverage rates between 25% and 75% were larger than confidence intervals from surveys with higher or lower coverage rates. As they point out, this result is to be expected on theoretical grounds since the variance of an estimate of a proportion from a simple random sample performs in this way. However, there is possibly a second factor contributing to this. At low levels of coverage, almost all parts of the population are probably receiving poor coverage of vaccination and all clusters are apt to be very similar. Increases in coverage are often attributable to the introduction of mobile teams. As we have seen, programs which include mobile teams for part of the population are apt to have higher design effects.

The results presented above also help to explain a second of Henderson and Sundaresan's findings. They reported that

> "when coverage was below 50% the results had wider confidence limits than when coverage was a corresponding amount above 50%. This may be either a chance phenomenon or may indicate that the distribution of immunized children in populations whose overall immunization coverage rate is below 50% tends to be less homogeneous than the distribution of unimmunized children in populations with immunization coverage rates above 50%. In other words, a highly selected group of children may be the beneficiaries of scarce immunization services...." (1981:252).

It is likely that this finding results from the fact that it is much more likely that an area will have a vaccination coverage rate of 5% than of 95%. When overall vaccination coverage is at 30%, this is probably an average of some areas with coverage rates less than 5% and some (possibly covered by mobile teams) with coverage rates more than 55%. However, when overall coverage is at 70%, it is unlikely that there are many areas with coverage rates above 95%. Since the overall coverage rate is an average of the rates in different areas, if there are few areas with more than 95% coverage, there must be few areas with coverage rates less than 55%. In other words it is possible to achieve a rate of 30% by increasing coverage in a few areas and therefore increase the variance among clusters. However, in order to achieve a coverage rate of 70%, few clusters can

have rates above 95% or below 50% and therefore all clusters must have relatively similar coverage rates.

CHOICE OF OPTIMAL SAMPLE DESIGNS FOR EPI SURVEYS

The choice of a sample design depends in general on three things: 1) the assumed value of ρ or DEFF, 2) the degree of accuracy required, and 3) the cost of increasing the number of clusters relative to the cost of increasing the number of interviews per cluster. As for the first assumption, we have already seen that the estimation of ρ might profitably reflect whether the survey is to cover an urban or rural area and the type of program (mainly mobile teams or mainly fixed clinics). In order to optimize the sample size, we need to consider the degree of accuracy required and the relative costs of additional clusters and additional interviews.

The Required Degree of Accuracy. WHO's recommendations were calculated to give a 95% confidence interval of +/-10 percentage points or less. While this is a useful criteria for a single survey, we are often more interested in comparing surveys to determine whether vaccination coverage has increased. Therefore it might be more useful to set the sample size to give an 80% chance of finding a significant change in vaccination coverage at the 95% level if the true change in coverage is 20 percentage points (e.g., a change from 30% coverage to 50% coverage or from 50% to 70%).

Henderson and Sundaresan present calculations of the minimum change in coverage that can be detected with 95% confidence for various starting levels of vaccination. In general they find that the standard design of 30 clusters of 7 children is adequate to measure changes of about 17 percentage points or less (e.g., from 45% coverage to 61.9% or 55% to 71%). Table V presents several combinations of C and a based on a change in coverage from 30% to 50% between surveys with ρ set at 0.09, 0.12 and 0.166. With ρ set at 0.166 (comparable to the value assumed by Henderson and Sundaresan), one possible sample design is 27 clusters of 7 children each, only slightly less than the original WHO recommendation. In an urban areas or a rural area where all areas are well served by clinics, a sample of 23 clusters of 7 children should be adequate.

Table V: Combinations of Average Sample Size per Cluster (a) and Number of Clusters (C) Required to Measure a Change in Coverage from 30% to 50% with Various Values of ρ

	ρ = 0.09		
a	5	7	9
C	26	21	18
DEF F	1.36	1.54	1.72
	ρ = 0.12		
a	5	7	9
C	28	23	21
DEF F	1.48	1.72	1.96
	ρ = 0.166		
a	5	7	9
C	31	27	25
DEF F	1.66	2.00	2.33

Table VI presents sample designs that are appropriate if we want to measure a smaller change in vaccination coverage: 30% to 45% (or 55% to 70%). With ρ of 0.166, a reasonable sample design might include 40 clusters of 11 children each for a total of 440 children[5]. With a ρ of 0.12, a sample of 33 clusters of 11 children would be necessary.

[5] If we stay with 30 clusters, we would need 45 children per cluster which gives a total sample size about three times as large, 1350.

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Table VI: Combinations of Average Sample Size per Cluster (a) and Number of Clusters (C) Required to Measure a Change in Coverage from 30% to 45% with Various Values of ρ

	ρ = 0.09		
a	11	13	15
C	29	26	25
DEF F	1.90	2.08	2.26
	ρ = 0.12		
a	11	13	15
C	33	31	29
DEF F	2.2	2.44	2.68
	ρ = 0.166		
a	11	13	15
C	40	38	36
DEF F	2.66	2.99	3.32

The Effect of Cost Considerations. In a survey of a single large city, adding an additional cluster might involve a short drive between two sections of the city and as little as an extra hour for an interview team. In contrast to this, adding an additional cluster in a survey of rural areas might easily add several hours of travel and extra time meeting with local village officials. Therefore, even if we assume that a survey in a single city and a survey in rural areas involve the same value of ρ, we might choose a sample design for rural areas that includes fewer clusters and more interviews per cluster than the city survey.

While it is useful to consider the relative costs of additional clusters and additional interviews per cluster, there is no need for elaborate cost calculations before designing a survey since the interview costs are only part of the total survey costs. Most of the other costs are independent of

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the survey design. For example the costs of interviewer training, a pretest, and the analysis are not apt to be affected by small changes in total sample size. Only the cost of data entry and data cleaning is apt to be affected. Therefore even a substantial savings in interviewing time might not reduce the overall survey costs by a substantial fraction. In addition, the total interviewing costs will not vary substantially over a reasonable range of sample designs.

Figure 1 presents crude examples of cost calculations for a typical survey in an urban area. The costs are based on assumptions about the relative costs per interview and per cluster. For simplicity we assume that each interview cost one unit. The cost per cluster is assumed to be either 5 units or 15 units[6]. The figure shows cost estimates based on values of a ranging from 5 to 15 and C from 45 to 25. Each sample design leads to at least an 80% chance of finding a significant change at the 95% level with a ρ of 0.09 if the true change is from 30% to 45% coverage.

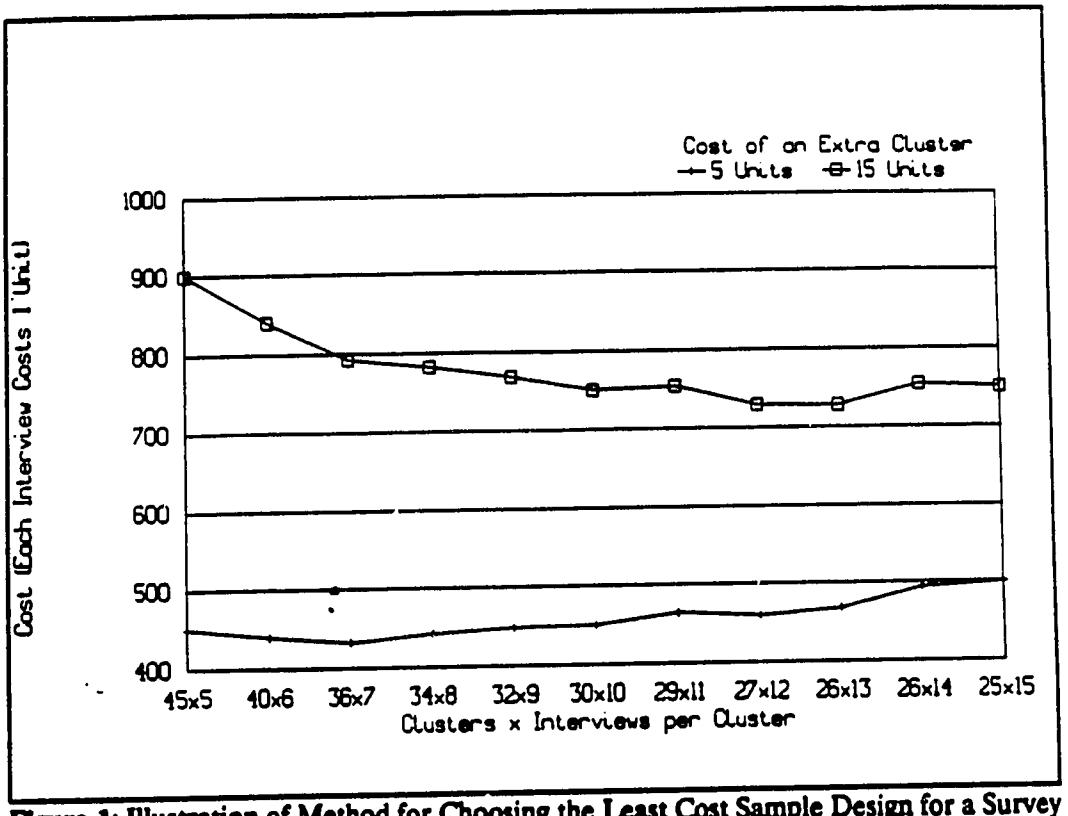

Figure 1: Illustration of Method for Choosing the Least Cost Sample Design for a Survey of Vaccination Coverage in an Urban Area

[6] In a setting where traveling to a new cluster and starting the interviewing is minimal, the time costs might be equivalent to the time required for each interviewer to perform 1 or 2 interviews each. With a team of 3 or 4 the total cost per cluster would be about 5 units. With greater travel times or more formalities at each cluster, it might be appropriate to use survey team of 5 interviewers. If traveling to each cluster and starting the interviewing process requires as much time as it would take each interviewer to perform 3 interviews, then the total cost per cluster would be 15 units.

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Over this range of sample designs, the change in cost amounts to only about 20% in both cases. With the cost per cluster at 5 units, the least cost design is 36 clusters of 7 children (432 units). In the other case, the optimum is 26 clusters of 13 children (728). Because the cost curves are relatively flat near the minimum points, we can settle on a design of 30 clusters of 10 interviews with little increase in cost for either scenario (4% and 10% respectively).

The costs per cluster are apt to vary much more in rural areas depending on the distances to be covered between clusters, the quality of the roads, and the amount of time necessary to make arrangements in each cluster. With ρ set at 0.166 and a cost per cluster of 15 units, the minimum cost design is 42 clusters of 9. With costs of 25 and 35 per cluster, the optimum designs are 40 clusters of 11 and 36 clusters of 15. Because the cost curves are relatively flat near the minimum, we can settle on 40 clusters of 11 for all three cost scenarios with an increase in cost of 3% or less in each case.

With the higher value of ρ in rural areas (0.166), the sample sizes required to detect a change from 30% to 45% are quite large (440 children for rural areas compared to only 300 in urban areas). Therefore, it might be sufficient to choose a sample design that would not provide as precise an estimate of the change in coverage. In particular, we might prefer a smaller sample size that would provide an 80% chance of finding a significant change if the true change was from 30% to 50%. In this case, the minimum cost designs with costs per cluster ranging from 15 to 35 units are all about the same as the costs of a survey of 25 clusters of 9 children each (225 children total). If the costs per cluster are towards the high end of this range, a smaller number of clusters might be appropriate (e.g., 23 clusters of 11 or 253 children).

EXPECTATIONS FOR DESIGN EFFECTS IN SURVEYS OF ORS USE

The evaluation of programs that encourage home use of ORS are generally based on questions about whether each mother has ever used ORS ("ever use") to treat a child with diarrhea and whether ORS was used to treat the most recent case of diarrhea in a child in the household ("recent use"). Recent use is generally limited to the period two weeks or a month preceding the interview.

The same logic applied to vaccination programs above can be used to guess how the design of diarrheal control programs might affect the design effects for surveys of ORS and SSS use. We pose the following hypotheses:

1) Programs that had a one-time delivery of ORS packets door-to-door or that delivered packets at vaccinations campaigns might lead to more positive interclass correlation coefficients for ever use of ORS since ever use is probably higher in areas that received distribution. However, this might have little affect on the interclass correlation coefficient for last case use.

2) Programs that rely on continuous door-to-door distribution of packets or social pressure from local leaders might have more positive interclass correlation coefficients for all measures of use if the success of the program varies substantially from area to area.

3) Since programs based on specially prepared packets for mixing oral rehydration solution (ORS) are more affected by problems of access than programs based on the use of home-based materials (sugar-salt solution, or SSS), ORS programs might tend to have higher interclass correlation coefficients than programs based on SSS.

4) Since last case use is probably determined by a larger number of social, cultural and programmatic variables than ever use and than vaccination coverage through mobile teams, we might expect the interclass correlation coefficients to be much smaller for last case use than for ever use or for vaccination coverage.

THE INTERCLASS CORRELATION COEFFICIENT IN ORS SURVEYS

When we examine the effects of cluster sampling on estimates of the use of ORS or SSS, it is important to compare values of the interclass correlation coefficient, ρ, rather than values of DEFF. The reason for this is that the number of cases of diarrhea reported per cluster in various surveys differs substantially. Since DEFF is a function of the average sample size per cluster, ρ provides a better comparison among surveys.

Table VII presents estimates of ρ for reported use of ORT or SSS during the previous two weeks and for reported ever use of ORT or SSS. The largest values in the table are for ever use in Nigeria (.26 nationally and .25 in rural areas). These values are way out of line with the other values in the table and may reflect unusual circumstances in that survey. The next largest values

Table VII: Values of ρ for Recent and Ever-Use of ORS or SSS, Surveys in Five Countries

	Use of ORS/SSS	
	Last 2 Weeks	Ever
Ecuador	0.09	0.05
Urban	0.06	0.02
Rural	0.10	0.09
Guatemala	0.04	0.16
Urban	0.01	0.08
Rural	0.04	0.19
Lesotho 1987	-0.06	0.01
Urban	-0.03	0.00
Rural	-0.06	0.01
Lesotho 1990	-0.02	0.05
Urban	0.08	0.03
Rural	-0.03	0.06
Nigeria	0.12	0.26
Urban	0.01	0.06
Rural	0.04	0.25
West Java	-0.14	0.01
Urban	-0.18	0.01
Rural	-0.13	-0.01

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are for ever use in Guatemala (.16 nationally and .19 in rural areas). These are much higher than the values of ρ for recent use in Guatemala. The reason for this is that in the program in Guatemala ORT packets were distributed through the vaccination program so that there was substantial variation among rural areas in ever use according to whether or not they were visited by a vaccination team. (See point 1 above.) Other than these extreme cases, the values for recent use and ever use are similar. Since data on recent use are only available for households that had a recent case, the sample sizes for accurate estimates of recent use are always substantially greater than for ever use. Therefore the sample size calculations must be based on recent use[7].

The largest values of ρ for recent use are about 0.11. Given this value of ρ , the value of DEFF is determined by the average number of recent cases per cluster. Table VIII presents DEFF, the number of recent cases, and the number of clusters required to achieve an 80% chance of finding a significant (95%) increase in ORS/SSS use when the real change is from 20 to 30%, with different

Table VIII: The value of DEFF, The Number of Clusters (C), the Number of Total Cases and Total Children (N) Required to Test for a Significant Change in Recent ORS/SSS Use from 20% to 30% with a Different Average Number of Casess per Cluster

a	DEFF	C	Cases=aC	Total N
3	1.22	119	357	1785
4	1.33	98	392	1960
5	1.44	85	425	2125
6	1.55	76	456	2280
7	1.66	70	490	2450
8	1.77	65	520	2600
9	1.88	61	549	2745
10	1.99	59	590	2950
11	2.10	56	616	3080
12	2.21	54	648	3240

[7] When the prevalence of diarrhea is very high and the number of cases per cluster is low, the sample sizes required for estimates of ever use can actually exceed those required for estimates of recent use. The reason for this is that the larger number of cases per cluster and the higher values of ρ for ever use can lead to exceedingly large values of DEFF.

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average numbers of recent cases per cluster. It also includes a calculation of the total number of women who have to be interviewed to achieve this number of recent cases assuming that 20% of women report a recent case[8]. The value of DEFF varies from 1.22 with an average of three cases per cluster (15 women interviewed per cluster) to 2.21 with 12 cases per cluster (60 women per cluster). Since DEFF almost doubles over this range of values of a, we need to interview almost twice as many women if we expect 12 recent cases of diarrhea per cluster rather than only 3. The choice among these options depends on the cost per cluster relative to the cost per recent case (in this case the cost of interviewing five women).

There is some evidence that ρ is related to the level of use. However, with only six surveys, it is not possible to demonstrate this with any confidence. If it could be demonstrated on a larger sample of surveys that the value of ρ declines as use increases, it would be possible to substantially reduce the sample sizes required to test for changes in use. The reason for this is that at low levels of use the standard random sample variances for the estimates of use are much smaller than they are for higher levels of use which are generally closer to 50%. Therefore if the value of ρ and the design effect decline as use increases this would tend to compensate for the increase in variance.

Figure 2 presents several calculations of hypothetical costs of various survey designs for measuring use of ORT or SSS. For the calculations for vaccination surveys we assumed a minimum cost per cluster of 5 times the cost per interview. If 20% of women report that one of their children has had a recent case of diarrhea, then the cost per cluster is equal to the cost of finding one recent case of diarrhea. The cost calculations based on this assumption lead to an unreasonably large number of clusters (more than 120) and very few cases per cluster. Therefore the minimum cost case shown in assumes a cost per cluster of 2 times the cost of finding a recent case of diarrhea. This is equivalent to a cost per cluster of 10 times the cost of interviewing a woman if 20% report a case or 5 times the cost of interviewing a woman if 40% report a recent case. The other examples have costs 2 times and 4 times as high per cluster. The intermediate cost level corresponds to a relative cost per cluster of 20 times the cost of interviewing a woman if 20% report a case or 10 times the cost of interviewing a women if 40% report a recent case. These cost scenarios therefore reflect a wide variety of costs per cluster and proportions of women reporting a recent case.

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[8] If the percentage reporting a recent case is actually twice as high as the assumed 20% (i.e., 40%) then the total sample sizes (N) in the table can be divided by 2. It is important to note that since many mothers will have more than one child in the age group being investigated this percentage is greater than the prevalence rate of diarrhea.

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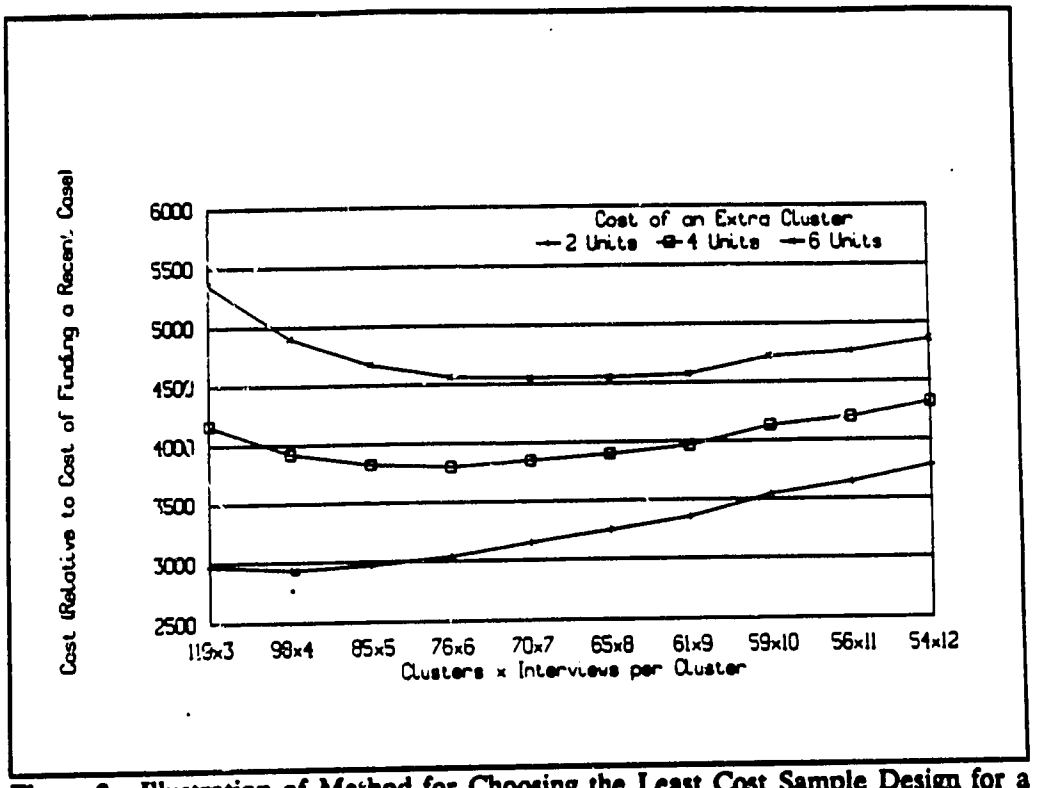

Figure 2: Illustration of Method for Choosing the Least Cost Sample Design for a Survey of Home-based Use of Oral Rehydration

The cost curve for the highest cost example is relatively flat over the range of sample designs with between 85 and 54 clusters each. Therefore any sample design in this range will lead to reasonable efficiency. For the lowest cost example, the minimum cost is at 98 clusters of 4 cases each (or about 20 interviews). However, any designs with fewer than 4 recent cases per cluster are apt to be inefficient no matter what the cost per cluster. Over the range of relative costs shown in , it appears that the most efficient sample design would be 76 clusters of 6 recent cases (about 30 women) per cluster or 70 clusters of 7 recent cases (about 35 women) per cluster.

SUMMARY

This paper extends the work of Henderson and Sudaresan to examine the relationship between the type of program for delivering vaccination services and the sample sizes required for clusters surveys to measure vaccination coverage. This involved simulations of surveys in populations covered by various mixes of mobile vaccination teams and stationary clinics, a review of the design

effects in surveys carried out by the HEALTHCOM project in urban and rural areas, and examinations of the implications of various cost structures.

This review suggests that in urban areas where the minimum coverage of vaccination surveys rarely drops below 15% the WHO recommendation of 30 clusters of 7 children overstates the sample size required to achieve a 95% confidence interval of $\pm 10\%$. In these areas, a sample design of 23 clusters of 7 children will generally be sufficient. In rural areas, where the accessibility of clinics and their effectiveness is apt to vary substantially and where mobile vaccination teams are apt to achieve high coverage rates in some areas, the WHO recommendations are appropriate.

In general we are interested in comparing the results of two surveys to determine if vaccination coverage has changed. To measure a change of 15 percentage points, the optimal survey design is 30 clusters of 10 children in urban areas. In national or rural surveys, it is necessary to have a sample of 40 clusters of 11 children to achieve a confidence interval of $\pm 15\%$. Since this is a relatively large total sample size (440 children), it might be preferable to limit national surveys and surveys in rural areas to aim for a confidence interval of $\pm 20\%$ which can almost always be measured with a sample of 25 clusters of 9 children each.

We have applied a similar approach to studying the sample sizes necessary for surveys of home use of oral rehydration. Based on the HEALTHCOM surveys, we estimate that in most cases sample size calculations can be based on the assumption that ρ is equal to 0.11 for use of ORT in recent cases of diarrhea. An examination of various cost scenarios leads to the recommendation that these surveys should be designed to include 76 clusters of 6 recent cases or 70 clusters of 7 cases each. In order to calculate the number of women to be interviewed it is necessary to multiply the number of recent cases by a conservative (i.e., low) estimate of the proportion of women who are apt to report a recent case.

REFERENCES

Henderson, R.H., Sundaresan, T. 1982. Cluster sampling to assess immunization coverage: A review of experience with a simplified sampling method. Bulletin of WHO, 60(2): 253-260.

Donner, A., Birkett, N., Buck, C. 1981. Randomization by cluster: sample size requirements and analysis. Am. J. Epidemiology 114(6): 906-914.

UNDERSTANDING THE DIARRHEA PROBLEM IN THE PHILIPPINES: RECOMMENDATIONS FOR HEALTH COMMUNICATION

Susan Zimicki

INTRODUCTION

In the Philippines, HEALTHCOM is working with the Ministry of Health to develop communication programs promoting oral rehydration therapy (ORT), immunization, and appropriate treatment for acute respiratory infections. The overall objective of the diarrhea control program is to increase use of rehydration fluids to control the dangerous effects of diarrhea, with slightly different specific objectives in each of the two test markets. This program began in May 1988. In Regions 6 (Western Visayas) and 7 (Central Visayas), where government service delivery networks are fairly strong, Oresol (the powder sachet to be mixed with one liter of water) will be promoted for home treatment at the onset of diarrhea. Oresol can be obtained free from government clinics and hospitals; it is anticipated that it also will become available at commercial outlets during the test market. In Region 10 (Northern Mindanao), where the delivery system is weaker, the program will promote use of home-prepared fluids for treatment starting at the onset of diarrhea, and use of Oresol at health clinics/hospitals at the firs sign of dehydration.

The first phase of activities in the HEALTHCOM methodology is the planning and development stage in which information is collected to help understand the overall problem and to help prepare an effective plan of implementation. The information gathered at this stage answers important questions such as:

> Who in the total population should be selected as the target audience?
>
> What behaviors should be advocated based on analysis of the responses to the questions? For example, what do people currently know, believe, and do about diarrhea in their

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children? What are the possible social, economic, or cultural constraints to change in behavior?

What communication channels are most appropriate to reach the audience?

As part of the research activities on the HEALTHCOM project[9] in the Philippines, the Annenberg School of Communications participated with Consumer Pulse, a market research firm, in developing and analyzing a survey of mothers of young children which was carried out in September and October, 1987, in three regions of the country (Regions 6, 7 and 10). The survey asked questions about the prevalence of diarrhea in children, current knowledge and beliefs about diarrhea and dehydration, treatment of diarrhea cases, and use of the mass media and other information sources.

The sample was designed to provide information about poorer urban and rural households in each of the three regions in which pilot programs are planned. In each region 400 interviews were carried out. Within regions, two provinces were sampled, then two cities (urban) and two municipalities (rural) in each province. Ten neighborhoods were chosen from those in the cities and municipalities; in each neighborhood a cluster of 20 household interviews was completed. Households eligible for interview were those judged by the interviewers to belong to the poorest socioeconomic classes, designated D and E, with at least one child five years old or younger. The results of the survey will be presented in this field note to provide answers to the major questions posed above and give recommendations about audiences and strategies for the campaign.

WHO GETS DIARRHEA? -- IS THERE A SUBPOPULATION TO TARGET?

The first question that was examined was the prevalence of diarrhea in the sampled households. Overall, 31 percent of households reported a recent

[9] The evaluation in the Philippines would not have been possible without the support from officials at the Philippine Department of Health, in particular, Undersecretary Mario Taguiwalo and Ms. Mayette Bernaje OIC PIHES, and Dr. Kenneth Farr and Dr. Dodong Capul of USAID Philippines. Darrah Estrada of Consumer Pulse ably managed the survey, coding and data entry with the assistance of Consumer Pulse staff. Helpful comments were offered by Dr. Robert Hornik of Annenberg and Dr. Sergio Piesche of WHO. Editorial assistance was offered by Dr. Judith McDivitt and Ms. Lorraine Ritacco, both of Annenberg.

case of diarrhea, either on the day of the survey or during the month prior to the survey[10]. Among the 1200 respondents, seven percent (79) reported that at least one of their children five years old or younger had diarrhea on the day of the survey. An additional 25 percent (296 respondents) reported cases in the past month. Only eight percent of the respondents said that their children five years old and younger had never had diarrhea. There was no consistent difference between rural and urban areas.

Next, characteristics of the households with recent cases of diarrhea were examined. It was found that households with more children were more likely to have experienced diarrhea: the risk of having had an episode in the month before the survey was about 23 percent for households with one child less than six years old, 35 percent where there were two children, and 45 percent where there were three or more (see Table 1). In addition, families without running water and those of lower socioeconomic status also were likely to report having had diarrhea in the household. This suggests that specific target audiences for the campaign are mothers with more children and mothers with fewer facilities, lower incomes, and less education.

Table 1

Percent of households having at least one child with recent diarrhea

	All households	Controlling for number of children in household		
		1	2	3+
Overall	31.3	22.6	34.8	45.2
Running water:				
Do not have	32.4	23.6	35.6	46.9
Have	24.7	17.4	30.3	30.4
Income:				
< P1000	34.6	22.4	41.2	47.2
P1001-2000	30.0	27.3	27.6	41.5
P 2001+	24.3	14.7	27.2	47.5
Elementary education:				
Did not complete	35.1	22.8	40.3	52.0
Completed	26.5	22.5	33.8	43.2

[10] The questions asked in the survey were about the most recent case in a child from 0-5 years of age in the household. If two children had diarrhea simultaneously, the questions were asked about the younger of the two. Analysis is limited to recent episodes of diarrhea because the data indicated fairly strong recall bias associated with time since an episode.

HOW ARE DIARRHEA, SEVERE DIARRHEA AND DEHYDRATION RECOGNIZED?

Information about how people recognize diarrhea and how they assess its severity is important. Most episodes of diarrhea are mild, and many children with diarrhea do not lose enough fluid to make it advisable that they be given ORS. Because ORS packets are neither free nor available in infinite supply, it is useful to know if there are cues that could indicate when ORS should be used at home or when a child should be brought to the health center for treatment. To examine this, mothers were asked how they could tell if a child had diarrhea, how they could tell if the diarrhea was getting worse, and how they could tell if the case of diarrhea was very serious. The results are presented in Table 2.

Overall, in responses to the question "How can you tell if a child has diarrhea?" the sign most frequently mentioned - by about 75 percent of respondents - was loose, watery stools. The next most common signs were more frequent or irregular bowel movements and some kind of abdominal pain -- stomach ache, cramps, or gas pains -- followed by the child's becoming weak or tired, having sunken eyes, and loss of appetite.

When the pattern of responses to the question "How can you tell if a child's diarrhea is getting worse?" were examined, weakness, sunken eyes and loss of appetite were relatively more important and loose stools, frequent stools and stomach pain less important than among responses to the previous question. The signs of weakness and loss of appetite were even more important among the responses to the question: "What are the signs that a case of diarrhea is very serious?" Thus, in mothers' minds, weakness, sunken eyes, and loss of appetite seem to be cues indicating the seriousness of the diarrhea.

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Table 2

Percent of respondents reporting various signs

	Diarrhea	Getting worse	Very serious
Loose stools	75.8	32.9	34.6
Frequency	28.5	31.5	33.6
Stomach pain	24.9	3.3	1.8
Weakness	16.8	44.7	63.8
Sunken eyes	11.8	24.7	26.9
Loss of appetite	4.7	12.8	18.0

Another way to examine this is to compare the mother's reports of how sick the child was with the symptoms she reported the child had during the most recent episode. While the signs of loose stools, increased frequency of stools, and stomach pain did not show any particular pattern with relation to severity of the episode, the signs of weakness, loss of appetite and sunken eyes were mentioned for increasing proportions of children who were "a little sick" and "very sick" relative to children who were "not at all sick" (see Table 3).

Ideally, in order to inform people about when to use ORS, it would be helpful to have a sign that is recognized in most or all severe episodes and that is associated only with severe episodes. Unfortunately, this situation does not seem to exist. The signs that are reported most frequently for severe episodes also are those reported most frequently for mild episodes.

Table 3

Percent of episodes associated with various symptoms

Report of how sick the child was

	Not at all	A little	Very
Loose stools	75.0	68.3	69.2
Frequency	39.6	32.2	38.5
Stomach pain	14.6	19.5	15.4
Weakness	6.9	14.6	34.6
Sunken eyes	5.6	10.2	15.4
Loss of appetite	2.8	5.3	7.7
Number of episodes	144	205	26

However, the three signs that are associated with severity (weakness, sunken eyes and loss of appetite) were each reported about twice as frequently for children who were perceived as "a little sick" as they were for children perceived as "not sick at all." Of these three, weakness showed the greatest contrast for children perceived as "very sick" and was reported about five times more for this group than for children who were not sick at all. Sunken eyes and loss of appetite were each only reported three times more frequently for severe than for mild episodes.

"Weakness/tiredness" is one sign that should be considered as a cue for treatment. It was mentioned as a sign of diarrhea by about 17 percent of respondents, as a sign of worsening diarrhea by 45 percent, as a sign of serious diarrhea by 64 percent, and as a consequence of prolonged diarrhea by 61 percent. It is better correlated with perceived severity of last case than of any other commonly mentioned signs.

HOW DO MOTHERS CURRENTLY TREAT DIARRHEA IN THEIR CHILDREN?

Overall, 80 percent of recent cases received some kind of treatment. Seventy-six percent of cases received treatment at home and 35 percent received some kind of treatment outside the home. This shows that mothers who did treat a case were likely to provide more than one treatment.

What are the Cues for Treatment?

This section examines the signs that are more likely to be associated with getting a child treated. A sense of whether there are any cues for treatment can be discovered by examining information about recent cases of diarrhea and relating the reported signs and the perceived severity of the illness to whether anything was done at all, and to the proportion of cases for which something was done at home and for which outside advice was sought. The results of this are presented in Table 4.

Overall, something was done for about 80 percent of all recent episodes with 76 percent receiving some treatment at home, and treatment or advice sought outside the home for about 35 percent. The presence of any sign increases the probability of treatment over the average, but the strongest cues are loss of appetite and the child having stopped playing; all children reported as having either sign received some kind of treatment. There are no unequivocal cues for treatment outside the home; against an average rate of 35 percent for all recent episodes, outside advice or treatment was more likely to have been sought only for those children with any of the signs associated with severity.

Table 4

Relationship between treatment sought and reported signs of illness during the most recent episode

	N with sign	% of cases	% With sign for whom something was done		
			At all	At home	Outside
Volunteered					
Loose stools	266	70.9	80.5	76.7	33.5
Frequent stools	133	35.5	82.7	78.9	35.3
Pain	65	17.3	83.1	81.5	27.7
Weakness	49	13.1	87.8	85.7	46.9
Sunken eyes	33	8.8	97.0	87.9	57.6
Loss of appetite	17	4.5	100.0	100.0	58.8
Asked specifically					
Vomit	55	14.7	92.7	85.5	47.3
Blood in stool	32	8.5	87.5	81.3	46.9
Fever	137	36.5	88.3	85.4	47.4
Perceived severity					
A little sick	205	54.7	82.0	80.0	38.5
Very sick	26	6.9	92.3	88.5	73.1
Played less	129	34.4	86.8	84.5	43.4
Stopped playing	27	7.2	100.0	96.3	66.7
Total	375	100.0	79.5	76.0	34.9

Similar data was examined to identify signs that might be cues for particular kinds of treatment -- both positive and negative -- in the home. Fifty-nine percent of respondents reported giving extra fluid to the child, and 26 percent reported giving special food. In contrast, seven percent of respondents reported giving the child a purgative, and 30 percent of the respondents who were breastfeeding their children reported that they stopped breastfeeding during the episode. However, no sign was very strongly associated with any of these kinds of treatment.

What Home Treatments Were Used?

All those who reported ever having a case of diarrhea among children in the household were asked if they had ever heard of Oresol, the oral rehydration solution used in health centers. Overall, 79 percent claimed that they had heard of Oresol, with slightly higher proportions in Region 6 and in rural Region 10 reporting knowledge than in Region 7 and urban Region 10 (see Table 5). Those who claimed hearing of it were asked if they or anyone else had given it to the child during the most recent episode. If we assume that those who did not claim to hear about it did not use it, we can compute the proportion of all most recent episodes for which people reported use when they were questioned directly. This can be compared to the proportion of those who mentioned Oresol spontaneously when they reported what they had done or the advice that they had received. Both are much lower than the proportion who claim to have heard of Oresol. The proportion of respondents who mentioned it spontaneously was generally somewhat lower than that of those claiming use in response to a direct question.

Table 5

Percent of Oresol recognition and use

		Urban			Rural		
	Total	6	7	10	6	7	10
Ever heard	79.0	87.2	72.8	72.1	86.0	72.4	83.1
Used in most recent episode:							
Elicited response	24.4	23.2	21.3	24.0	28.7	17.2	31.4
Spontaneous response	18.5	23.2	14.2	18.8	24.2	12.3	19.1

Respondents who had heard of Oresol but had not used it during the most recent episode were asked why they had not (see Table 6). The most common response was that there was no supply available; this is clearly an area where improvement can be made during the pilot projects. The second type of response can also be related to failure of a provider to recommend Oresol or to respondents' lack of knowledge about it and can also be affected by education of mothers and of health providers. The third common type of response was essentially that there was no need for Oresol when the diarrhea was mild, or it was cured by other home remedies or medicines. An additional reason for non-use was that the child did not like the taste.

Table 6

Reasons for non-use of Oresol

	Percent
No supply	37.5
Not prescribed	9.2
Didn't know about it	5.4
Didn't know how to prepare	8.1
Diarrhea mild	18.7
Cured by other medicine	12.9
Cured by home remedies	6.6
Child didn't like taste	7.1

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How Did Mothers Feed Their Children During Diarrhea?

More than half of the respondents reported giving extra fluid to children with diarrhea, and about a quarter gave special food. The most commonly given fluid was water, either plain (47 percent) or boiled (six percent) followed by tea (21 percent), herbal decoctions (21 percent), and soft drinks (19 percent). Rice water (six percent) and Pedialyte (five percent) were used by many fewer respondents.

Special foods given were primarily lugao (63 percent), fruit (23 percent), soda crackers (19 percent), eggs (14 percent) and broiled fish (14 percent). It is interesting that 15 percent of respondents said that they avoided giving fruit (unfortunately we don't have details about the kinds of fruit that are given and avoided). However, the foods that the greatest proportions of respondents reported avoiding were milk (22 percent), oily foods (20 percent), and rice (11 percent). About one-third said that they did not avoid any particular type of food.

Where Did Mothers Go For Treatment and What Treatment or Advice Did They Get?

Although up to 50 percent of episodes are treated only at home, mothers consult with people outside the home for the remainder of cases. Thus, it is important to understand the kinds of treatment recommended or provided by different sources so that a realistic decision can be made about the need to educate providers.

Five hundred and sixty-one respondents reported that they went outside the home to get advice or obtain treatment for the most recent episode of diarrhea among young children in the household. They were asked to list up to three places they went and to tell up to three things that each source recommended they do or use (see Table 7). While most only sought advice from one source, 121 (22 percent) reported going to two sources, and 14 (3 percent) reported going to three. The most commonly reported source was the private medical sector (40 percent of contacts), followed by health center personnel (20 percent), government hospitals (12 percent), friends, neighbors and relatives (12 percent) and traditional healers (9 percent). Barangay health workers accounted for only five percent of all contacts, and pharmacies for three percent.

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An examination of the advice/treatment received from each source reveals that about one-third of all contacts with government hospitals, the private medical sector, or people in the community, and one-fifth of all contacts with a health center involved a recommendation for antibiotics (see Table 7). About one-third of health center, government hospital and private sector visits and about one-fourth of community contacts involved a recommendation for antidiarrheals or similar drugs. Oresol was recommended in more than 40 percent of the contacts with health centers and about 20 percent of those with government hospitals; other rehydration solutions were recommended about 20 percent of the time by government hospitals and the private sector.

Table 7

Type of advice/treatment received from each type of source (most recent episode)

	Friends, relatives	Traditional healers	Health center	Govt hospital	Private sector
Antibiotics	33.8	3.3	18.1	31.4	38.5
Antidiarrheals	25.0	3.3	36.2	29.1	38.5
Liquids	6.3	3.3	4.3	2.3	6.8
Herbal preparations	32.5	53.3	6.5	1.2	.7
Oresol	6.3	0.0	42.0	18.6	5.8
Other rehydration sol'ns	2.5	6.7	4.3	20.9	18.0
Other specific remedies	20.0	36.7	8.0	8.1	14.7
Don't know	0.0	0.0	8.7	14.0	11.5
N of contacts	80	60	138	86	278
% of contacts	11.5	8.6	19.8	12.4	39.9

WHAT ARE POSSIBLE CONTACT POINTS FOR EDUCATION ABOUT ORAL REHYDRATION?

Two possible ways to reach mothers with new information about diarrhea treatment are through health care providers and through the mass media.

Which Health Care Providers are Good Sources of Information?

Information about the last case of diarrhea in the household can be used with caution to predict the efficiency of any particular kind of health care provider for dissemination of new information about diarrhea treatment. Information about the sources people have ever contacted can be used to determine if frequency of contact with some sources is so low that those sources are of no practical value.

It is clear that the private medical sector is a significant source of information about diarrhea treatment. In urban areas people are about two to three times as likely to go to the private sector as to a health center. The overall pattern in rural areas is less clear (see Table 8).

Table 8

Percent of respondents mentioning various sources of treatment or advice about the last case of diarrhea:

		Urban			Rural		
	Total	6	7	10	6	7	10
Private dr/clinic/hospital	28.4	28.7	29.6	29.0	22.3	32.5	27.9
Health center staff	14.1	12.2	10.7	16.8	22.9	9.8	12.8
Government hospital	8.8	10.4	11.2	8.4	8.3	5.5	8.7
Traditional healer	6.1	3.6	4.7	3.9	5.0	11.7	7.5
Pharmacy	2.2	3.0	0.6	0.6	5.1	0.6	3.5
Barangay health worker	3.3	1.8	1.2	0.6	7.6	3.1	5.2
Did not go	42.7	43.3	45.0	49.4	35.7	42.9	40.1
Respondents	1200	200	200	200	200	200	200

(Respondents were asked for up to three sources, so percents in each column add up to more than 100%.)

Respondents were also asked if they had ever received advice or help from specific sources: private hospitals or clinics, health workers, traditional healers and pharmacies. Overall, more had gone to private clinics or hospitals than to any other source, with health workers the next most important source and traditional healers and pharmacies less important -- reported by fewer than 25 percent

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of respondents. This pattern was strongest in urban areas, where from 64 percent to 75 percent of the respondents reported having visited private clinics or hospitals, and 25 percent to 49 percent reported contact with health workers for diarrhea. In rural areas, having ever visited a health worker was reported more frequently and private clinics or hospitals less frequently than in urban areas, although contact with each type of source was reported by at least 50 percent of respondents (see Table 9).

Table 9

Percent of mothers reporting ever having contact with various sources of treatment/advice

		Urban			Rural		
	Total	6	7	10	6	7	10*
Private clinic/ hospital	64.7	75.7	72.8	64.0	50.0	69.7	54.8
Health worker	51.6	25.0	47.5	48.5	50.7	64.5	71.6
Hilot	15.0	13.2	11.7	16.9	21.4	13.2	14.2
Herbolario	13.2	13.9	9.9	7.4	19.3	18.4	10.3
Pharmacy	16.3	20.1	13.6	20.6	15.0	3.[illegible]	25.2

*Health regions

Some of the differences observed for contact with health workers probably reflects a lack of health workers -- or at least active health workers -- in urban areas. In response to the question "Do you have any health workers in your community?" 38 percent of the respondents in urban areas of Region 6 and 18 percent of those in rural areas said "no", in contrast to 12 percent in urban Region 10 and less than five percent in both urban and rural areas of Region 7 and rural Region 10.

What Mass Media Channels Would be Best to Reach Mothers?

The respondents' access to media is summarized in Table 10. More than two-thirds of the mothers listened to the radio at least once a week, making that the best means of reaching the target audience. TV, which probably reached slightly more than half the target audience in urban areas of Regions 6 and 7, and about a third in urban Region 10, is clearly a secondary medium. The high proportions of mothers reading newspapers, comics, or magazines less than once a month suggests that print media are not good channels.

Table 10
Media characteristics

		Urban			Rural		
	Total	6	7	10	6	7	10
Own TV	16.5	34.0	26.5	19.0	8.5	9.0	2.0
Watch TV							
In past week	32.2	59.0	55.0	32.5	20.5	16.5	9.5
Not at all	54.8	31.5	25.0	53.5	68.5	68.0	82.0
Own radio	53.0	59.0	68.5	56.0	51.5	39.5	43.5
Listen to radio							
In past week	67.9	73.0	84.5	65.5	62.0	68.0	54.5
Not at all	25.0	24.5	11.0	22.0	31.5	27.5	33.5
Read paper							
Nearly everyday	7.5	24.4	33.3	27.8	3.5	.5	2.5
< Once/month	72.6	60.0	48.5	68.0	80.0	90.0	89.0
Read comics							
Nearly everyday	12.5	22.0	9.5	11.5	20.0	4.0	8.0
< Once/month	65.8	51.5	62.5	63.5	58.0	80.5	78.5
Read magazines							
Once/wk or more	10.0	14.5	10.5	19.0	7.5	2.5	6.0
< Once/month	77.2	69.5	62.5	69.0	84.0	90.5	88.0

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CONCLUSIONS

Based on the results of this survey, some recommendations can be made about how to reach mothers, what messages to use in promoting awareness of dehydration, ancillary groups to target, and factors besides rehydration fluids that will be important in diarrhea control.

First, it is critical that mothers be informed directly about Oresol. Respondents sought advice outside the home for only 35 percent of cases occurring in the past month. Even for children who were perceived as very sick, outside advice was sought for only 75 percent of cases. Radio will be the best medium for reaching this target audience, while TV should clearly be secondary.

When mothers sought advice, they were more likely to go to private physicians, clinics, and hospitals than government health centers or hospitals. Unfortunately, the private sources are much less likely to provide Oresol. Thus serious consideration should be given to involving the private medical sector in the diarrhea campaigns. In contrast, pharmacies are not a significant source of treatment or advice about diarrhea; thus while they will be important as distribution points, they should not be seriously considered as places where women can learn about Oresol.

Messages about dehydration will be more comprehensible if they emphasize signs that mothers already recognize and view as indications of severe diarrhea. "Weakness" in particular should be seriously considered as a cue for treatment. Behavioral signs -- weakness, loss of appetite, and playing less or not at all -- are more commonly reported and more sensitive indicators of severity than the classic physical signs. In response to a question about signs of serious diarrhea, "sunken eyes" (mentioned by only 27 percent) was the only classic physical sign of dehydration mentioned by more than five percent of respondents. An additional problem is that this sign is that it tends to appear late in the course of dehydration, when the condition may be difficult to reverse without large amounts of rehydration solution. An advantage of using weakness as an indicator is that it appears relatively early, and that mothers get immediate results when they use Oresol.

In addition to emphasizing rehydration, an important secondary focus that can be considered is continuing breastfeeding during diarrhea. About 30 percent of the respondents with breastfeeding children reported stopping feeding during the diarrhea episode.