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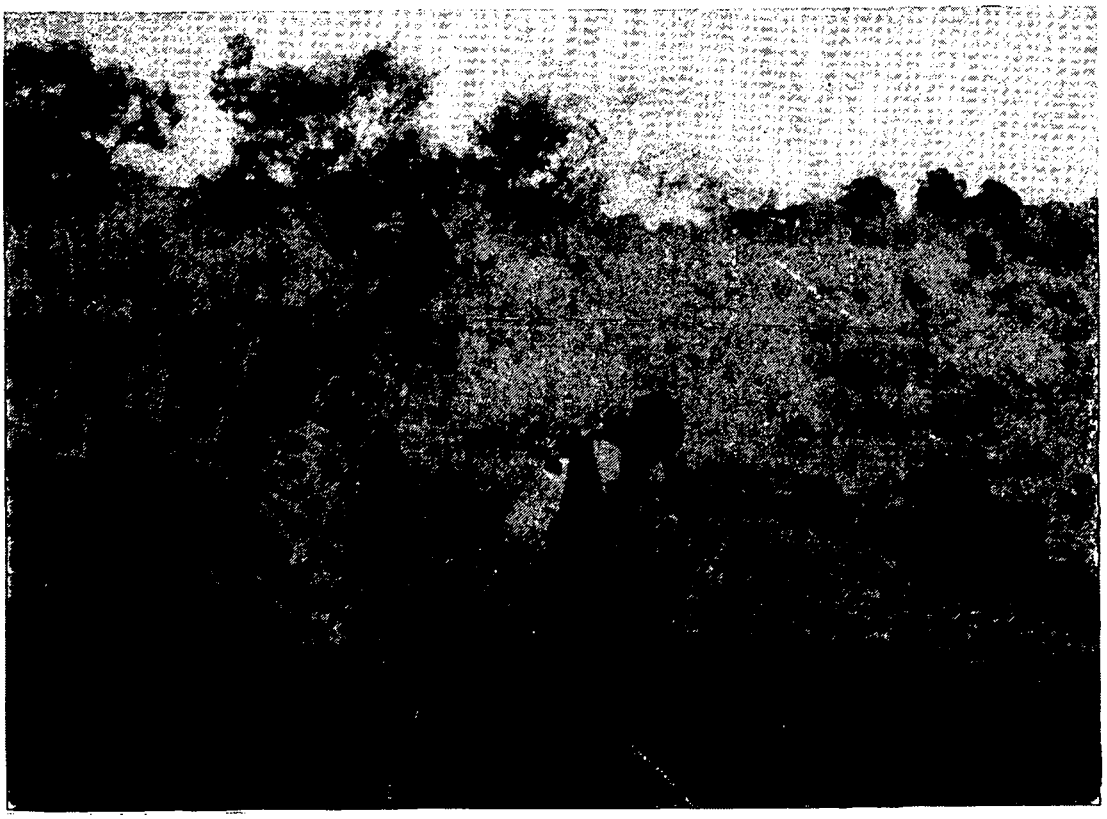
Kibwezi Health Risk Study



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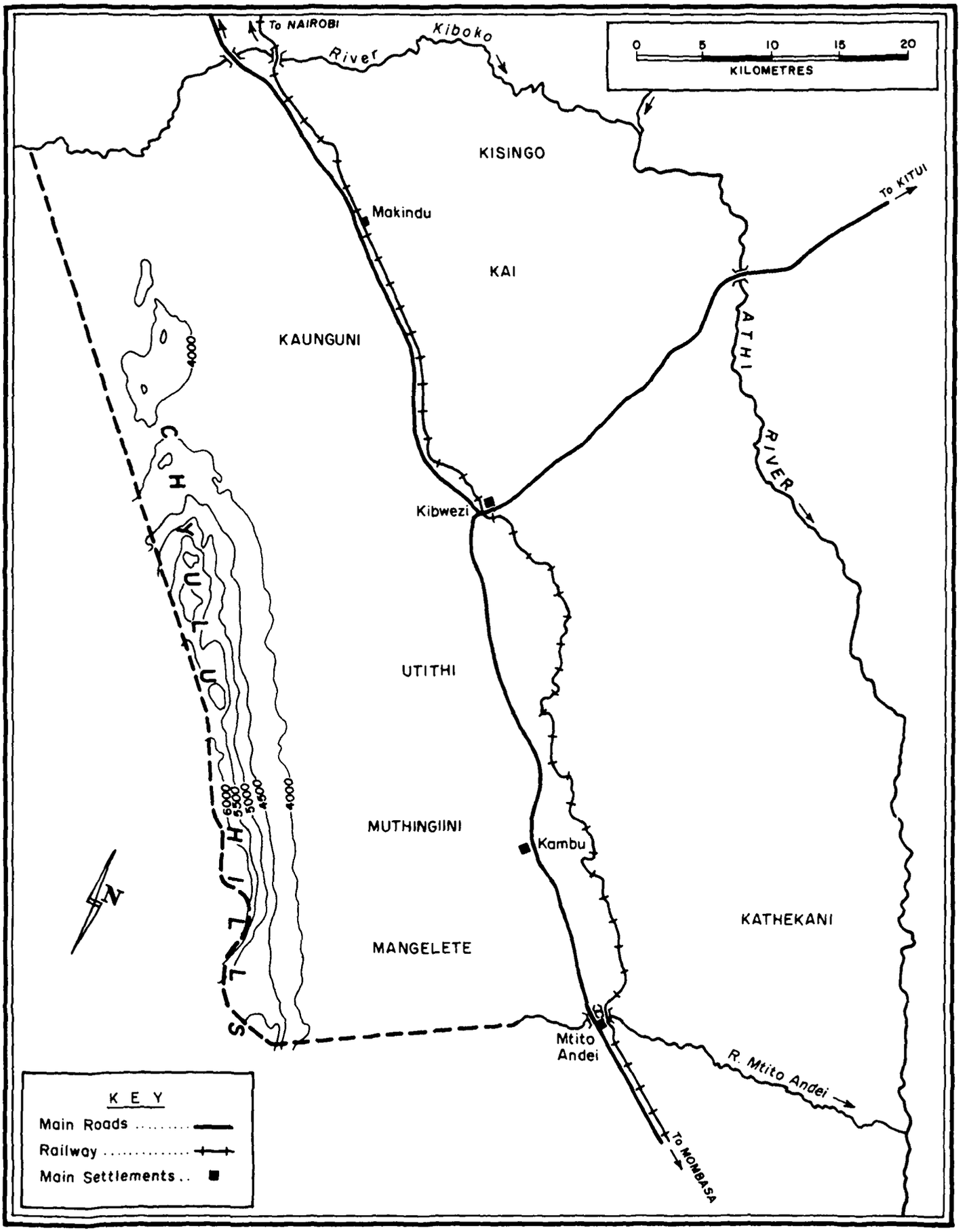

FOREWORD

The Kibwezi Rural Health Project, a joint venture between the community of Kibwezi, AMREF and the Ministry of Health, has been operating since 1978. A number of studies were undertaken to provide information for project planning. However, no epidemiological study had ever been carried out in the project area. The project's community health worker record system, introduced in 1980, had never quite managed to produce the required community-based health information for the project managers, the workers and the people of Kibwezi. A survey to collect, analyze and disseminate information on the pattern of selected diseases and of deaths in the population of Kibwezi was clearly long overdue.

However, a study relevant to the project's needs and concerns required much more than the collection and analysis of epidemiological data. After protracted and passionate discussions on objectives and methods by the researchers and the advisory committee, it was agreed that the intended survey was to develop and test methods for identifying those groups and households in the community that are at greatest risk of sickness and death, for the explicit purpose of establishing a sound basis for orienting community health workers activities to these vulnerable groups.

Toward that end, morbidity and mortality data were to be related to selected socio-economic indicators. One set of indicators was selected by the authors, based primarily on the Multiple Stress Index, developed by Dr. Alan Ferguson during an earlier AMREF study, the Kibwezi Integrated Survey. Another set was developed with the community health workers by systematically exploring their perceptions of factors related to health risk, using Repertory Grid Analysis, a method which seeks to maximize respondent initiative and minimize interviewer and instrument bias. The direct involvement of the community health workers in conducting the survey, and the full utilization of their rich experience and knowledge in identifying risk factors were important aspects of the survey. There is great concern within AMREF that many surveys have failed to involve health workers and community members in design and implementation. Thus, the participative approach used in this study was important for philosophical and for practical reasons alike.

The study has been a most interesting and stimulating exercise and produced important insights. An excellent team designed and implemented a complex survey in record time. To keep the survey sample of a manageable and affordable size, the types of diseases to be investigated had to be carefully reviewed and reduced. The problem of obtaining reliable retrospective mortality data from a small sample had to be faced. With a large number of stakeholders and participants, it was at times difficult to do justice to everyone's concerns and questions without overloading the survey. In the event, several technical departments within AMREF, the Medical Research Centre of KEMRI and the Royal

Tropical Institute of Amsterdam collaborated successfully. Researchers, project managers, health centre staff and community health workers worked together. In this team effort may well lie the key to making a study relevant and applicable, and to assuring the eventual application of its conclusions and recommendations.

The authors have moved with great courage and skill in difficult areas. This refers to the hot, dusty and dry land of Kibwezi as well as to the slippery concepts of risk, vulnerability and stress. In doing so, they have charted new territory in the development of a community-based risk approach.

The study features three groups of variables: health risk factors developed with the community health workers; socio-economic factors developed by the authors based on the Multiple Stress Index of the Kibwezi Integrated Survey; and health risk indicators, represented by nutritional status of under fives, child morbidity, mortality and vaccination status.

The households in the survey consisted of two groups of equal size, selected by the community workers as being prone to health risk in times of drought, famine or epidemic, or relatively free of such risks. The results showed a clear separation of the groups in all three area: CHW perception of risk factors, socio-economic factors and all health risk indicators except morbidity. The risk factors are easily identifiable and are valid predictors of health outcomes.

Low-risk households were better off in a variety of ways: they had higher per capita water consumption, better houses, greater livestock holdings, more access to money through employment or cash crops, lower proportion of under-fifteens, mother with more education and significantly higher proportions of males or females in the 20 to 29 years age cohort than the high-risk households. Against these characteristics, poor nutritional status and a high level of chronic disability emerged as the most sensitive indicators of health risk, and were significantly higher in high-risk households. Only morbidity patterns measured as prevalence of common conditions were found to be evenly spread between low- and high risk households.

These findings in themselves are not surprising. The main achievement of the study lies in developing a method for making explicit community perceptions of what factors are important in determining risks and for identifying low- and high-risk households on the basis of these and the socio-economic characteristics selected by the investigators. Having established that within the same environment of Kibwezi there is a significant difference between the two groups of households thus identified is another important achievement.

Since the study's findings are immediately applicable in establishing an early warning system for households-at-risk in the Kibwezi, and its methods can be readily replicated, two much

talked-about criteria of relevance are met. The results must now be fully utilized.

In Kibwezi, high-risk households should be identified in the whole project area and targeted surveillance and intervention programmes developed.

But the findings of the study take us well beyond the boundaries of Kibwezi. To assure that the most vulnerable are addressed first, the methods used here should be applied in identifying high risk groups and establishing a health risk approach in other community-based health care projects.

Katja Janovsky
August 1986

ACKNOWLEDGEMENTS

The Kibwezi Health Risk Study was planned during the second half of 1985, begun in the field in February 1986 and completed in June of that year. While the sample sizes and field logistics were less problematic than in the preceding Kibwezi Integrated Survey, the completion of the study over such a tight schedule could only have been achieved with maximum support and encouragement from AMREF and other staff both in the field and in Nairobi.

Acknowledgement of this support is firstly due to Dr Katja Janovsky, Director of Planning and Evaluation of AMREF for initiating the project and bringing the principal investigators together. Dr Janovsky also assembled a team of advisors who made valuable comments before and after the fieldwork stage. In particular our thanks are due to Dr Paget Stanfield of AMREF and Dr A. Kielman of University of Nairobi, Department of Applied Nutrition.

In Kibwezi we soon found that a hard-working, cheerful and efficient field team had been formed around us, which made the inevitable logistical problems bearable and the fieldwork enjoyable and trouble free. The field team consisted of: Joyce Nduku, Rebecca Mavua, Sebastian Muli, Mary Kimeu, Jane Wairimu, Lawrence Musimba, John Mutie. The Community Health Workers participated extensively throughout the field work and are greatly acknowledged for their tireless co-operation. Kibwezi Health Centre staff provided support and information based on their great wealth of local knowledge, particularly Mary Ngali, Community Nurse and Mujahidin Abdi, driver.

During the data processing stage, Jared Onyango of AMREF and Paul Ndego of MRC did careful work on coding and entering data while Eva Nabeta, Magdalen Mujwahuzi and Connie Amri worked wonders with constantly changing drafts of the report.

Finally, thanks are due to Carnegie Corporation, New York for their generous financial support which made this study possible.

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1. INTRODUCTION

1.1 The Context: environment and people [1]

Kibwezi division is a part of Machakos District, just halfway between Nairobi City and the south-east coast of Kenya. It is bordered by the Chyulu Hills to the west and the Athi River plateau to the east. (See map.) Most of the area is semi-arid. Rainfall occurs sporadically, and is erratic, both temporally and spatially, with mean annual totals of around 510 mm. Despite the unsuitability of most of the area for agriculture, subsistence crops form the basis of livelihood. Maize, plus the more drought resistant crops of beans, millet, cassava and cow-peas are the main subsistence crops. Sheep, goats and cows are commonly kept. The unreliable rainfall leads to frequent crop-failures. 1983-85 was a particularly bad period with severe drought and famine and only since the second quarter of 1985 till now - mid 1986 - has rainfall been adequate.

In a few favoured parts of the division, spring-fed or river-fed irrigation allows the commercial growing of fruits and vegetables for urban and overseas markets. Only a small proportion of the total population benefits from irrigated commercial agriculture in addition to the employment offered by the sisal plantations near Kibwezi township.

There are few non-agricultural income-generating activities in the area. A ribbon of small market centres benefits from the transit trade of the Nairobi-Mombasa road. Kenya Railways, the district administration and a few other government or parastatal functions provide some employment, but most of Kibwezi's residents are small subsistence farmers.

Many heads of households are women with husbands and sons employed or seeking employment in Nairobi and Mombasa. Remittance of savings back to Kibwezi from the urban areas is likely to account for a significant proportion of the meagre cash incomes of the small farmers. Divisional population is put at just under 100,000 by the 1979 census, but is now probably nearer to 150,000. Net in-migration from the more crowded upper reaches of Machakos District is taking place, and, in many areas, the 18-40 year age groups are more heavily represented than the national population profiles would suggest. Rapid population increase in the division is therefore due to both high rates of natural increase and net in-migration.

Shortage of land is not, as yet, a problem in the division; rather, it is the varying productivity of the land. Population density over the whole division was 29 persons per square kilometre (psk) in 1979 and varied greatly amongst the sublocations. Population is widely dispersed in the area and clear-cut boundaries between villages are often lacking.

Health-care facilities before the Kibwezi Rural Health Scheme (KRHS) took off, as well as most other services, were located on

or near the main axial road and rail routes connecting Nairobi with Mombasa.

In many aspects, therefore, Kibwezi division reflects the problems of semi-arid environments: the unreliability of rainfall and the associated frequency of crop failures, the dispersed, low density population with high rates of natural increase and in-migration from more productive but overcrowded areas, the lack of employment and income-generating activities and the low level of infrastructure, commercial and health-care facilities are all typical of this type of environment.

In several other ways, however, Kibwezi is not quite so typical. Firstly, although internal communications are difficult, the area is within two hours drive of Nairobi and three hours from Mombasa. The area is, therefore, much more accessible to the main urban centres of the country than many other semi-arid environments.

Secondly, the population of the division is almost entirely Kamba. This facilitates community development as the complications of multi-lingual and multi-cultural integration are avoided. In addition, the Akamba have a fair history of co-operative efforts with the tradition of the self-help mwethya* groups being long-established and blending easily into the post-independence Harambee* philosophy.

Thirdly, the demography of the area suggests a relatively young population with some basic education, more likely to be receptive to new ideas than in areas more dominated by traditional elements and with older populations. Primary schools are widely distributed even in the more dispersed parts and attendance rates are estimated at 90-95% for both boys and girls.

1.2 Health Care

Besides the numerous available traditional practitioners and healers and traditional birth attendants (TBA's) health care in Kibwezi division comprises of a sub-district hospital at Makindu, government dispensaries at Kalulini and Ngwata and a sprinkling of small private or mission facilities at Kibwezi, Kambu and Mtito Andei (see map). A subsequent survey of these facilities by AMREF staff found that most were heavily used and that facilities were inadequate. Lack of buildings, space, equipment and trained personnel were common problems and, being located on or near the main road, the health facilities were remote from the population of the area living along the Athi River or Chyulu Hills.

The general disease pattern is rather typical for semi-arid areas. The main ailments reported at the health facilities were respiratory infections, malaria, gastro-enteritis, malnutrition,

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*Mwethya means a co-operative group, usually consisting of women
Harambee means pulling together

childhood infections, and worm infestations. Since the last 10 years though, a more innovative approach towards health care has been added in the form of a project initiated and implemented to a large extent by AMREF. The project started in 1977 based on an agreement between AMREF and the Ministry of Health and was fully operational from mid-1981 onwar s. The project is called Kibwezi Rural Health Scheme (KRHS) and consists of two mutually-supportive components. One is a centrally located health centre which has, in addition to out-patient and modest in-patient facilities, training facilities such as a classroom-cum-community meeting place, demonstration garden, a nutritional rehabilitation unit and an extensive MCH Unit in addition to outpatient and modest inpatient facilities. Staffing follows Ministry of Health patterns and most staff are paid by the Ministry. The second component is a community based health care programme whose aim is to facilitate self-health care in the community. Training of Community Health Workers (CHWs) and later also Traditional Birth Attendants (TBAs) are important elements.

1.3 Community Based Health Care Programme in Kibwezi

In 1980 community leaders or self-help groups of Kai sub-location were contacted by AMREF senior health personnel who explained the purpose of village health care and requested the groups to identify potential community health workers to be sent for training at the Kibwezi Health Centre. Usually young ambitious men with full primary school education were sent. This whole process took several weeks. Standard training with no formalized follow-up and the concept of CHWs as drug dispensers as well as health promoters were basic aspects. Since that time the approach has changed to a much more prolonged sensitization process before training starts. Training of CHWs and TBAs now follows a more participatory and learner-oriented approach, although the use of this methodology of self-discovery by the learner during training and refresher courses still needs to be much improved. Although a community health needs assessment in the different sub-locations has never been done,the experiences of community health care activities and the more careful sensitization process over the year has led to a better understanding of community needs.

A standard job description for CHWs is not used as it is considered to lead to professionalization of the workers. Instead, during the training and refresher courses, an outline of potential tasks are described in the trainer's manual and dealt with during the course. Depending on local needs and demands, emphasis is given to different parts of the task outline. In general the outline mentions preventive, rehabilitative and promotional activities (e.g. encouragement and education in environmental sanitation, nutrition and hygiene), curative activities (e.g. advising on remedies, treatment and referrals), and administrative activities (e.g. record keeping, birth, death and pregnancy registration, preparing the community for MCH clinics and intensifying relationships with village health

committees or the village administration). By the end of 1985 85 CHWs were active (Table 1).

Table 1

Training of CHWs in Kibwezi Division

Year	Sublocation	No. of villages	Population size 1985 projection	trained CHWs	Active CHWs as per Nov '85 M	F	No.	Dropout %
1980 +84	Kal/Kaungunl	13	7,301	44	8	19	27	61.4
1981	Mangelete/Kathekanl/ Muthinglnl	60	36,958	43	20	9	14	32.6
1982	Ngandanl	7	5,958	9	2	-	7	77.8
1983	Kisingo/Utlthl	22	not known	38	16	22	-	0.0
1984	refresher course Kal and new intake Kaungunl (see page)							
1985	no training done due to logistical problems							
			Total	134	86		48	35.8

Performance of CHWs

From a number of reports based on observations and interview studies, we can get an idea of what CHWs are actually doing. Ideally this information should have come from a standardized monitoring system handled by the CHWs themselves, but, apart from a recently introduced household registration book, visual or written monitoring sheets are still very haphazardly used and need to be further developed. Action-oriented operational surveys and impact studies of their activities are still in the planning phase.

Two assessments were made of the CHWs' attitudes and performance in different sublocations in 1981 and 1983 using a questionnaire approach. The following characteristics emerged:

CHWs are responsible for around 60-100 households (exceptionally up to 300). They spend on average 2 days a week on their community health work. Part of this time is spent talking in village meetings, barazas, schools, addressing self-help groups and partly visiting individual households. CHWs visit on average 25 to 30 homes per month with a wide range of 3-120 depending on the population density and on the season (on average 10 per month in the wet season).

CHWs see patients mostly during the home visits but sometimes patients seek their advice at home. It is estimated that, based on interviews and checking of the registration book in 1983, 20-40 patients are seen per month. As the CHWs do not dispense drugs, advice is given for home remedies or referrals are made to the nearby dispensaries, Makindu Hospital or Kibwezi Health Centre. If possible the CHW accompanies the patient to hospital

or health centre where preferential attendance is supposed to occur. A common complaint of CHWs is that this preferential attendance is not happening.

Health promoting activities within the households mentioned by the CHWs as being undertaken by villagers were digging latrines (the most frequent resulting activity), cleaning up houses and compounds, digging rubbish pits, clearing surrounding bush and grass cutting. Attending regular MCH clinics, improving personal hygiene and improving weaning practices were less frequently mentioned activities following the promotional talks of the CHWs. MCH-linked activities are limited, a fact which is partly explained by the small numbers of female CHWs selected in the early phase.

Hopefully,a clearer picture of the preventive and promotional activities of CHWs will be gathered as soon as a health-oriented information and monitoring system is developed and utilized.

Even more important for improving the relevancy of CHWs activities was the collection of information on the attitude towards work and the problems seen by CHWs. Almost all mentioned the long walking distances and tiredness as their biggest problem. More than half complained of having no drugs as a major problem and around one third complained of receiving no financial rewards or food for their work. Obviously, the community reward promised by many community leaders initially did not materialize. About the reasons for this lack of community support, we can only speculate, but observations tend to show that the CHW sees him/herself much more as a person directed and guided by the AMREF project than as a representative of the village. Involvement of village committees during the work period of the CHW is still minimal and dependency on AMREF is still clearly apparent.

The needs expressed by the CHWs for better functioning and solutions were all in the personal material sphere (payment, drugs, bicycles, badges, rainproof clothing, bags) and rarely in the community relationships or responsibilities (community to collect money to transport patients was mentioned, but one CHW stated clearly: ".. people are used to being helped from outside"). It reflects a basic problem where there is a tradition that either the government or an outside project has a long tradition of providing goods and services. In this way many community initiatives have been suppressed, resulting in a community attitude of "wait and see".

As a result of the above-mentioned interview study, bicycles were provided to all CHWs in 1985. As the sensitization and demand-creating phase prior to CHW identification receive more attention, it is hoped that material and drug expectations can be minimized. A note should be made here that, where a working load of well over fifty households is to be covered monthly at varying distances, some kind of compensation has to be found. Decreasing the workload by training as many as possible CHWs per village may

be another way to decrease the mentioned "tiredness" and diminish demands from the project. To shift reward responsibilities towards the community, innovative ways have to be found to integrate the community into the CHW operations, leaving the health centre staff involved in refresher training and technical supervision only.

1.4 A community based risk approach

From the experience so far described in the Kibwezi Rural Health Scheme it became evident that relevant health care had to be founded on community needs matched with appropriate tools of intervention. As community needs were never properly investigated during the planning phase of KRH Scheme, a different type of study had to be set up during the implementation phase. Trying to understand the community needs in relation to the living conditions of the people, and assessing the vulnerability towards health hazards of the people in the Kibwezi environment, the Kibwezi Integrated Survey, was carried out between September 1983-March 1984 and addressed the question of stress for the first time (3). Vulnerability was expressed in a number of environmental- and socio-economic stress factors and was compared with health status indicators such as nutritional status.

Findings of the Kibwezi Integrated Survey (KIS)

In order to understand the well-being of people better, the KIS tried to interrelate health and socio-economic variables. This cross-sectional survey was based on a cluster sample of households through-out the division. 21 widely-used dry season water sources were taken as focal points from which 25 randomly chosen households were selected for interview by the community health workers.

In particular, information was gathered on the following aspects influencing the living conditions of the people:

- household demography;
- water collection and use;
- agricultural activities and livestock;
- nutritional status children and mothers;
- knowledge, attitude and practices regarding diarrhoeal diseases;
- chronic disability.

For each of those aspects a simple but detailed questionnaire and observation list was designed to give a deeper insight into how the different aspects are distributed amongst the communities. In this way Community Health Workers themselves could appreciate better the stress and needs of their community.

A few examples of the findings of importance for the formulation of the present study of community based risks are:

a) a very high proportion of children under-fifteen were

present (58%) and a high crude birth rate leading to high dependency rates. More adult females than males were present. The highest dependency rates were in the most dry and inaccessible areas.

b) a very low water consumption (over 25% of households consume less than 6 litres per adult per day for all domestic use). Distances for water collection were extremely long but with great variations; water collection mainly done by women in childbearing age.

c) forty per cent of households did not have cash crops, only subsistence farming but insufficient quantities of each crop grown.

d) Livestock holding was universal but low in quantity. Any agricultural/livestock surplus sold when prices are low, and when need is biggest (pre-harvest times); purchasing mainly at times of very high prices.

e) chronic disability as defined by household members themselves not being able to participate fully in daily village routine, was present in particular among women of child-bearing age. Around 20% of households had at least one chronically disabled member, most had sought treatment from formal health facility at least once but without any improvement.

f) high estimated occurrence of diarrhoea but less than 20% of the mothers knew how to make home solutions. Withholding of food was common during diarrhoea.

g) nutritional status of underfives was poor, and stunting particularly prevalent

Height for age below 90% NCHS median	: 33.3%
Weight for height below 80% NCHS median	: 6.1%
Weight for age below 80% NCHS median	: 28.3%

Women were of short stature and had very little body fat, Quetelet index below 2.0 for half of the sampled women. (2.0 is the WHO minimal standard.)

It seems that, for the adult women in Kibwezi, there is a vicious circle of high fertility, poor nutritional status, heavy physical labour and a high incidence of chronic disability. No clear association could be found by statistical analysis between nutritional status and any of the socio-economic variables.

An attempt was made to produce a rating system for households where the different socio-economic, environmental and health-related stress factors were shown to affect living conditions. This multiple stress index represented a mixture of past, present

and future stress and was shown to follow a normal distribution among the sampled households.

WHO defines risk factors as one link or an indicator of a link in a chain of associations, leading to an illness or death. Stress factors as found in the KIS are steps in this sequence of links and prompted ideas about developing a community based risk approach. Questions arose as what would be the communities perception of risk at household level instead of at individual level. Could that be investigated through the community health worker? Could an experienced CHW identify such stress factors easily and early? Were his/her perceived stress factors indeed true risk factors for the health status of the household members? Knowing the validity of risk factors predicting the health impact, one could then better appreciate and plan an appropriate priority of surveillance and intervention activities.

In this way a community based risk-approach could then be introduced within the project in Kibwezi. Community Health Workers would then be able to develop an early warning system for identifying households at risk and take appropriate action. These questions and ideas were the basic concepts for the Kibwezi Health Risk Study.

1.5 Objectives of the Kibwezi Health Risk Study

The broad aim of the study is to get a better understanding of the risk approach in health care at community level. The eliciting of CHW perceptions of health risk and the assessment of their ability to distinguish high- and low-risk households are the key elements of the survey.

Specific Objectives

1. To investigate the community's self assessment of health risk factors.

2. To provide additional measures of vulnerability based on the stress factors from the Kibwezi Integrated Survey.

3. To measure nutritional status of mothers and children, morbidity patterns and child mortality within the sample.

4. To test the validity of stress factors as risk predictors by relating them to the observed pattern of nutritional status, morbidity and mortality.

5. To improve the CHWs effectiveness using the results to provide a simple method of identifying high risk households within the community.

1.6 References:

1. Part of this chapter is a revision of the text in Kibwezi Rural Health Scheme 1978-83 by A. Ferguson, AMREF, Nairobi.

2. A. Ferguson, Agricultural Marginalization and Women's health: an example from Kenya, 1985, AMREF, Nairobi.

3. Kibwezi Integrated Survey, April 1985, A. Ferguson, E. Absalom, W. Kogi, D. Omambia, AMREF, Nairobi.

2. SURVEY DESIGN AND METHODOLOGY

2.1 Introduction

Two specific criteria guided the design of the study: the need to identify high-risk and low-risk households and the need to view risk-related factors through the eyes of the CHWs as well as those of the investigators. The survey design which emerged from these criteria is not a conventional one, but it is held to be, nonetheless, scientifically sound and capable of providing more valuable insights than more conventional methodologies. The final survey design was such that the sample of households included was effectively selected by the CHWs although they were unaware of this at the time. The two-stage field survey which resulted is described in the following sectors.

The objectives of the study call for the identification of risk factors together with a range of socio-economic characteristics which have possible association with health risks. Many clues to relevant risk factors such as water consumption, livestock holdings, presence of cash crops and demographic dependency were provided by the Integrated Survey (KIS). The KIS did not, however, explicitly test these factors against any set risk criteria such as morbidity and mortality and this is a major area to which the current study addresses itself. At the same time, means of identifying the community's view of what factors constitute a health risk had to be sought, there being no guarantee that factors seen as key ones by investigators would necessarily be matched by the ideas of the CHWs. Thus, the two criteria mentioned above were set and a methodology for meeting them evolved.

2.2 The Concepts of Stress, Risk and Outcome

For the purpose of this study, the investigators have defined variables dealing with the concept of being at risk as follows. (Table 2.1)

a) First step in the development of a concept of risk:

Households within a community are subject to a variety of living conditions which may make the household members vulnerable to a decline in their health. These conditions can be of socio-economic origin as a result of poverty and lack of formal education. Poor construction of the houses, high functional illiteracy, lack of easy access to safe water, lack of cash crops or insufficient livestock are examples. We may call these conditions "stress or risk factors" which, on their own, or, in inter-relation with each other, may make the household members more vulnerable to e.g. easy transmission of diseases, not being vaccinated or having insufficient nutritional intake. These stress factors may therefore be seen as predictors of health status. Households having one or more stress factors are those in which the household members could develop more frequent or more serious diseases, a lower nutritional status or lower vaccination

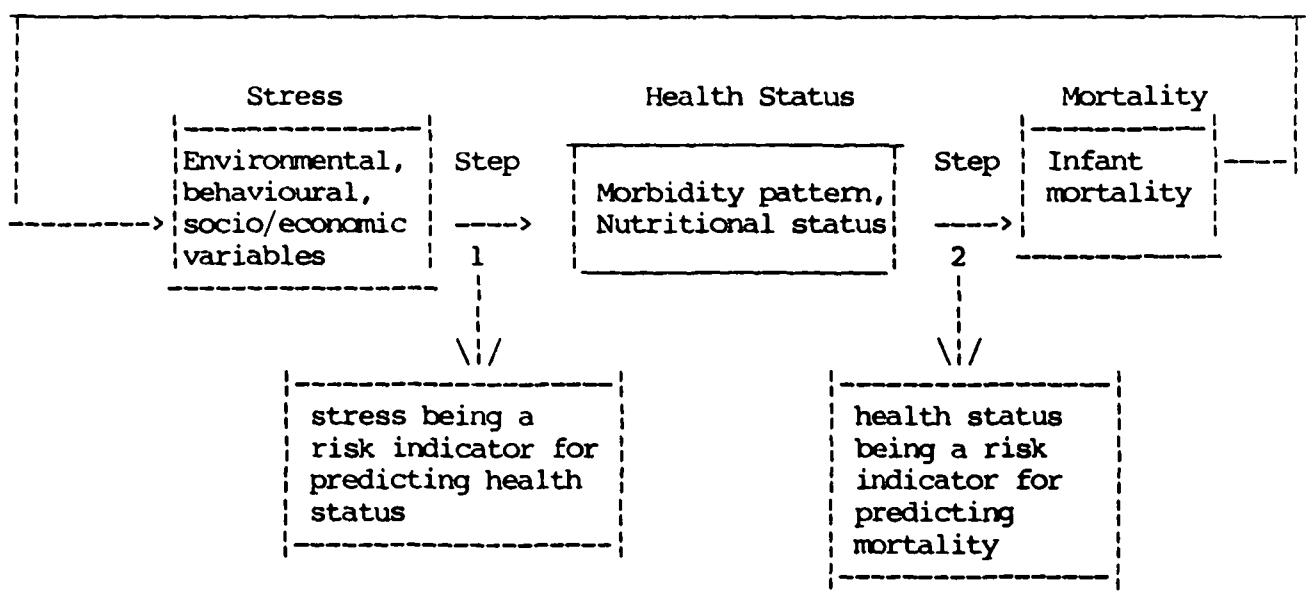
coverage, the outcome in health terms of the existence of high stress and vulnerability.

b) Second step in the development of a concept of risk:

The health variables of household members are seen as risk indicators of a more final outcome, namely mortality.

The health pattern at household level follows a complex mutual interaction between, among others, environmental and housing conditions resulting in a pathogen density and the immunological status of the household members. The latter depends mainly on the nutritional and partly on the vaccination status. This interaction determines the severity of the illness and predicts the final end-result, mortality. Thus, relatively easily measurable variables such as nutritional status, vaccination status, morbidity pattern or disease severity can be seen as risk indicators predicting mortality.

Table 2.1: The development of stress, risk and health outcome



A further step in the development of risk is the realization that final outcomes are, in themselves, risk predictors for further deterioration of health status of members within a household. For example, a past infant death in a household may be a strong predictor of future mortality risk for other children in the same household. The above description of risk factors is in line with a recent definition suggested by the WHO Risk Approach Task Force: "a risk factor is one link or an indicator of a link, in a chain of associations leading to an illness or death", (Backett, et al, 1984). Although the task force is mainly concerned with vulnerability and risk factors of the individual, this study attempts to clarify risk factors operating at individual and household and community level.

2.3 Risk Measurement and Sample Size

The possible criteria for measuring health risk are many and varied. Risk factors may also be very area-specific. The concern here is mainly with easily-measured non-clinical indicators which will give a fair reflection of health status and stress whose outcome is health risk. For this reason, four relatively simple ways of assessing risk were used:

a) Nutritional status of children under five years.

b) Morbidity recall of under-fives and prevalence of chronic disability in children and adults.

c) Mortality recall of any child dying since 1981 aged under five years.

d) Vaccination status of under-fives.

The study therefore concentrates mainly on young children as the major risk group.

The nutritional status of children is considered to be the main criterion of risk, for badly malnourished children are more susceptible to severe disease and are likely to have a higher chance of dying than well-nourished children. Given the devastating drought which affected Kibwezi in 1983-84, it was expected that children from high and low risk households would have substantially different nutritional status as revealed through anthropometry.

The recall of morbidity is taken to give some reflection of current health status. A one-week recall of 5 highly prevalent named conditions - diarrhoea, fever, coughing, running nose and eye infection, together with any "other specified disease" category was established for children under five years. Additionally, chronic disability, found to be fairly prevalent in the KIS, was also included as a criteria of health risk, reflecting past vulnerability, but also related to future risk. In this respect, the two questions defining chronic disability on a functional basis were included as additional risk criteria.

Mortality recall of the under-fives is, similarly, taken as diagnostic of past vulnerability in the households as well as influencing future risk of the surviving members. Even more specifically, the cause of death is a criterion for health risk. Some diseases are clearly a result of socio-economic and environmental stress while others cannot be easily attributed to these stress factors. Careful probing during an open interview about recent deaths can elicit the most likely disease or condition leading to death (verbal autopsy).

The vaccination status of children is directly indicative of risk. Absence of immunization exposes young children to TB, diphtheria, whooping cough, polio, tetanus and measles, which

have all been deadly diseases in Africa but which are now being successfullly reduced through the E.P.I. intervention. A child who has been missed completely or is only partially immunised is at a much greater risk than a fully immunised child.

Having set the criteria to be used in assessing the risk status of each household, the next question concerns the selection of sample size.

Anthropometric measurement of children under five years was seen as the main single risk criterion, so the sample frame was designed around this factor. With a random sampling framework, a fairly large number of households would have to be covered to produce differences in nutritional status which would be statistically significant. However, in the present case, the intention was to select households from opposite ends of the health risk spectrum. Assuming nutritional status to be a reasonable measure of risk, the differences between the two groups should emerge with a relatively small sample.

A targeted sample size of 250 households, 125 in each group, was set. Assuming an average of 1.5 under-fives per household - a conservative estimate, since KIS registered 1.75 - the two comparative groups would contain about 187 children each. A difference of means between the groups of 1% in, for example, height for age, with a coefficient of variations of 8%, about that expected, would be significant at p=0.01 in a difference of means test with a sample size of 375. Thus, a sample of 250 households was considered statistically adequate and logistically manageable for the task at hand.

2.4 Questionnaire Design

The main questionnaire incorporated the risk indicators mentioned above, together with a range of socio-economic factors thought to be influential. A fairly comprehensive demographic record of each household was required, plus information on water collection, income generation, livestock holdings and household attributes.

The choice of which variables to measure was relatively easy: a major store of information had been collected by the KIS and there was need only to repeat some of the key variables identified there plus a few supplementary questions. A short questionnaire was seen as both desirable and adequate.

Since one of the objectives of the study was to test the Multiple Stress Index produced in the KIS as a predictor of risk, the variables contributing to this index were re-measured, i.e., water consumption, distance to water source, livestock holdings, demographic dependency ratio, presence of cash crop and presence of a household head employed away from home.

Several other measures were included. Education level of all household members was recorded in the demographic form on the hypothesis that female education levels may be related to health

risk. Globally, female education levels are clearly related in a negative way to infant mortality rates; at a micro-scale the identification of any relationship between children's health and mothers' education level is important.

More details about the role of wage employment of household members were sought. After piloting, separate questions were posed to distinguish those who were employed, (either by running their own businesses or in wage employment) but living at home, and those who were employed in towns. The frequency of remittances to the home for those with household members working outside was also included.

Household attributes were included to give additional information on the level of wealth in the household. The presence or absence of a latrine, and whether the latrine was used was observed, and the presence or absence of cement floor, corrugated iron roof and plastered walls were noted. The final household attribute was whether or not there was a radio in the house and if so, whether or not it was currently in working order.

The socio-economic features are all hypothesised to be related to health risk, mainly by providing measurable factors of relative wealth and poverty. The results of the KIS suggest that a high degree of inter-relation will exist amongst these variables described. A reasonable range of socio-economic factors is also useful for comparison with the factors perceived by the CHWs as being related to health risk.

The socio-economic questions were arranged in a logical order together with the health risk factors to produce the schedule used in the fieldwork. Form A comprises the repertory grid techniques used while interviewing the CHWs and is described in detail in section 5 and Appendix 2. Form B to Form H were used in the household survey and consist of the following:

FORM B	:	Household demographic records
FORM C	:	Risk-related factors (socio-economic)
FORM D	:	Morbidity/Mortality recall
FORM E	:	Chronic disability details
FORM F(1)	:	Child nutrition and vaccination status
FORM F(2)	:	Mothers form (nutrition and pregnancies)
FORM G	:	Verbal Autopsies (children who died over past one year)
FORM H	:	Morbidity revisit*

The final version of the forms appear in Appendix 1.

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*Included to test whether the initial presence of the team inflated morbidity recall, but discontinued after two clusters.

2.5 Selection of CHWs and Households

The study was restricted to the areas of Kibwezi in which CHWs are active and the required sample of 250 households was split into 25 clusters of 10 households each. Thus, 25 CHWs were required to assist in the study and these were to be distributed roughly in proportion to the extent of coverage of the CHW programme.

Selection of the households formed the first part of the methodology used to elicit the CHW views on risk factors. This involves the technique of repertory grids which is described separately in the next section.

The process of selection began by meetings with the village leaders and CHWs in the sub-locations where the study was to take place. The only sub-location with CHWs not included was Ngandani which was reserved for piloting purposes. CHWs were informed of the nature of the survey, although not its explicit methodology, and given some time to select, from amongst themselves, the required number of participants. It appears that the CHWs selected themselves mainly on the grounds of providing a reasonable coverage of their sub-location, plus fairness in giving someone a chance to participate where others had been involved in previous surveys. Only CHWs who were felt to know their households "well" were elected to participate and, therefore, those elected had been CHWs for at least two years.

The 25 CHWs selected included 14 men and 11 women whose ages ranged from 22 to 51 years; 10 had some secondary education, 10 had completed primary school, a further three had some primary education and two (both women) had never attended school. The distribution by sub-location is given in table 2.2

Table 2.2 Distribution of CHWs and Households

Sublocation	Male	Female	Households
Utithi	2	1	30
Mangelete	1	3	40
Muthingini	4	1	50
Kathekani	1	1	20
Kai	0	4	40
Kisingo	4	0	40
Kaunguni	2	1	30
	14	11	250

The next stage of the study involved the elicitation of the perception of CHWs of health risk factors, as described in the next section. As a starting point in this process, CHWs selected five households in their area which they saw as "high risk" and five seen by them as "low risk".

This selection was done carefully, giving each CHW exactly the same information each time. Each CHW was interviewed individually by the same two team members. After a general talk about the CHWs work a standard question was posed in Kikamba: "If there was to be another famine or drought in your area, or an epidemic of a bad disease, can you tell me the names of the heads of five households you know which would be badly affected". The CHW then named five family heads. The question was then repeated, but this time the CHW had to consider five households which would not be badly affected in these circumstances. Again, these were noted.

By this method, a separation of 5 "high risk" and 5 "low risk" households was obtained in from each CHW. It is important to note the elements in the question posed - drought, famine and disease - for these are being suggested as the major risk-causing factors in the study, reflecting the main environmental stresses which have occurred in Kibwezi in recent years.

The interview proceeded to the repertory grid process described below, but the sample for that cluster/CHW had already been selected. After a few days, the second survey team conducted the questionnaire together with the CHW in each of the 10 households selected by the CHW. The interviewing was done blind in that the survey team did not know which households belonged to which group, high risk or low risk, as they had been randomized during the first stage of interviewing the CHW.

Each CHW area or cluster was completed in the following steps:

1. Village leaders and CHWs sensitized to survey.

2. CHWs selected those participating.

3. High and low risk households selected and repertory grid performed with CHWs.

4. CHWs alert households to arrival of survey team and prepare order of visits.

5. Survey teams conduct questionnaires and make anthropometric measurements

6. Revisits for missed households, mothers or children, where necessary.

2.6 Measuring CHW Perception of Risk

It would have been possible to prepare a simple conventional questionnaire designed to obtain CHW views on what factors are important in determining risk. Results, however, would not be likely to shed much light on thought processes. Much questionnaire work attempting to elicit opinions, particularly in rural Kenya, unearths only received wisdom, respondents being either constrained by bounded questions, or else giving the interviewer what he perceives the correct attitude to be, irrespective of his own real opinion. While most CHWs have an instilled sense of community service, they have all been trained by AMREF staff and therefore are conditioned to certain "popular" responses which they know to be desirable. In such circumstances, the value of conducting a conventional questionnaire is dubious.

What was required, therefore, was a technique which is as undirected as possible but which can still elicit relevant information, leaving the questions, answers and levels of measurement largely in the hands of the respondents. Several open-ended methods exist but one of the least directed is the technique of repertory grid (RG) analysis which was chosen for this part of the study. Since the technique is not commonly used either in medical or social research, it is necessary to describe it in some detail.

Repertory grid analysis has its roots in the theory of personal constructs attributed to the psychologist Kelly in 1955. In simple terms, Kelly suggested that people tend to organise and simplify their thoughts and feelings about other people, events or other stimuli in terms of dichotomies or polar opposites such as good-bad, easy-difficult, hot-cold, etc. Kelly used this tendency to elicit perceptions or personal constructs from his subjects using what was called a "triad sort". Here, a subject was presented with three objects (e.g. people, towns, paintings, pieces of music, etc.) and asked to give any way in which any two objects were similar to each other, but, at the same time, different from the third. For example, if given three types of cloth to consider, a subject might classify two as "smooth" and the third as "rough", or two as "brightly coloured" and one as "dark", or two as "expensive" and the other as "cheap". Such responses (smooth-rough, bright-dull, expensive-cheap) are personal constructs and reveal something of how the respondent thinks about the object without the interviewer directing his thoughts in any way. The construct is a mental tool which serves to separate two of the objects from the third.

The triad sort is the basic mechanism of the RG technique. In practice, the respondent is confronted with several different triads and a range of constructs are elicited. Scoring of the responses commonly employs a simple binary system - a "one" is allocated to the object if it belongs to the first pole of the construct mentioned and a "zero" otherwise. Recording of the process takes the form of a grid or matrix, with the objects under consideration forming the columns and the constructs, the

rows. At each triad sort, three cells are filled with 1 or 0 and the construct elicited written in the left margin of the grid. The triad sorts continue until no more constructs can be elicited or until some pre-determined number is reached.

In the present study, the ten households identified by the CHW form the objects - in this case interviewer participation does not extend even to selection of the objects. These households were written along the first row of a pre-prepared form (see Appendix 2). Each household head named was also written on a separate index card. The cards were then shuffled and three names drawn at random by the CHW. The CHW then thought about the three households selected and produced some way in which two were similar but at the same time different from the third. This construct was written into the grid and the three households scored 1 or 0. The cards were reshuffled, a further three redrawn and another construct elicited. The process continued until each CHW had given 12 constructs. Thereafter, the interviewer reviewed each construct with the CHW and the seven remaining households in each row allocated to one or other pole. The process is shown for an actual Kibwezi grid in Appendix 2.

The completed grid therefore consists of 10 households (objects) and 12 constructs serving to distinguish them. The body of the table is a matrix of ones and zeros. While apparently simple, a completed grid contains a wealth of information. Several analytical techniques may be applied to finished grid, varying in statistical sophistication, but even the simplest methods can draw out structures from the grid.

The main advantage of RG analysis over a conventional questionnaire approach is the high degree of openness of the technique and the corresponding minimisation of interview bias and thought-channelling. In the present application both the households and the constructs emanate from the CHW and the investigators simply provide the context and the means of separation.

The value of RG analysis is particularly high in cross-cultural studies where a greater divide exists between interviewer and respondent. Barker (1977) has used the technique to evaluate indigenous knowledge of agricultural systems in West Africa, Townsend (1977) employed RG methodology in a study of the perception of frontier settlers in Colombia and Ferguson and Barker (1979) used RG as one of a number of techniques eliciting young people's perceptions of employment opportunities in town and countryside in Kenya.

The main disadvantage of RG analysis is that, there being a great measure of openness, the categories of response may differ substantially and, unless more interviewer control is imposed, it is difficult to build up and analyse grids in the same way as a conventional data matrix. Again, the concept of the triad sort may be difficult to understand, at least initially. Despite this, it is often found that RG's, by putting the respondent more in

control of questions and answers, bring about much more animated interviews than conventional approaches where the interviewer is clearly directing the progress of the interview.

In Kibwezi, the main objective of applying RG techniques was to identify the ways in which CHWS identify risk, without channelling or biassing their thoughts. Each construct separating the households can be seen as the identification of a risk-associated factor. Comparison of the types and frequencies of these constructs with the socio-economic variables on the questionnaire, and subsequent integration of both of these with the health risk criteria is a major goal.

2.7 Field Organization and Piloting

Preparations in Kibwezi began in early February 1986 with the alerting of the first groups of CHWs to the goals of the survey. Recruitment of field personnel followed. Training and piloting of the instruments continued for one week. The first repertory grid was carried out on 20 February and the first cluster of households covered the day after.

2.7.1 Personnel

Field personnel were recruited for the separate tasks of conducting the RG analysis, weighing and measuring children and mothers and carrying out the home interviews.

One male "A" level leaver with previous experience of interviewing with AMREF was retained and trained in RG techniques, also acting as assistant supervisor during some of the household interviews.

Two highly experienced nutrition field workers were seconded from other Medical Research Centre projects to weigh and measure children and mothers and to conduct verbal autopsies where necessary. Both were mature women, Kamba speakers, from the Northern division of Machakos District.

Four field workers were recruited for the household survey. These were local "O" level leavers, Kamba speakers, familiar with local customs and environment. They were selected from over 20 applicants by means of a standard aptitude test and short interview.

Initially, the idea was to work with two independent teams during the household survey, each team consisting of one supervisor, one nutritional field worker and two field workers. Field logistics however dictated that, for most of the time, the whole team operated within a single cluster, although normally working simultaneously at different households.

One driver was allocated from Kibwezi Health Centre for the whole field period and another was used when all three teams were active or when two vehicles were available.

2.7.2 Testing the instruments

The household questionnaire had been prepared at AMREF headquarters in a dual English-Kamba format. The Kamba version was retranslated into English by the assistant supervisor and some linguistic alterations made.

The entire team went over the questionnaire line by line and practice sessions in interviewing and recording methods conducted, firstly within the Health Centre and then in Kibwezi town. Subsequently, all instruments - household questionnaire, repertory grid, weighing and measuring and verbal autopsies - were field tested in Ngandani with a CHW who was not involved in the main survey. Standard length board and Salter balances with slings were used to measure and weigh the children, while a somatometer and bathroom scales were used to measure the mothers.

Role plays about the verbal autopsies were done between the nutritional field workers and a public health nurse of Kibwezi Health Centre. Special emphasis was placed on how to create a confidential atmosphere away from the rest of the interview team. Importance was given to tactful elicitation of information. In particular, the way in which health started to deteriorate leading eventually to death had to be probed. In this way it was anticipated that the field workers could find causes of death by disease entities like measles or tetanus instead of only symptoms just prior to death like convulsions, vomiting, etc.

The repertory grid was piloted in Kibwezi and Ngandani. While much time was spent in the exact translation of the key questions used to elicit the 10 households, the main innovation was to introduce a "dry run" of the grids. This was set up as a game in which the respondent had to first identify five or six different types of locally grown beans or grams presented by the interviewer. These became grid objects. As these were very familiar to the local people, it was therefore easier for the interviewer to explain the mechanics of the triad sort and give help and example with less subsequent "contamination" of the technique when applied to the households.

The field piloting was extremely valuable both in respect of improving the survey instruments and improving the technique and confidence of the field workers. The schedules were altered in several ways, some ambiguities cleared up, and the whole schedule was retyped and reprinted during the first week-end of fieldwork.

2.8 Evaluation of Methodology and Field Management

Since two of the principal investigators had been involved in the KIS, the area was physically well-known and many of the field difficulties anticipated. Again, many questions in the survey had been asked before during the KIS so both the anticipated responses and the likely duration of the interview were known, enabling a realistic scheduling of field work. Having the two experienced nutrition field workers on the team was invaluable:

in addition to ensuring consistent and accurate recording of anthropometric data, these ladies were extremely valuable in supervising the younger, inexperienced field workers and in promoting good rapport with the mothers who were often of the same age group.

Logistically, the survey suffered from the normal problems of poor communication, both with headquarters staff and within Kibwezi. Vehicles were put under great strain, particularly in Muthingini Sub-location. Most CHWs organized the order of home visits in a logical way, but in some areas the distances between households were forbidding. Often, walking was the only way through. In the worst case, three days were taken to complete a single cluster in Nooka.

Occasionally a household devoid of adult respondents or missing some under-fives or mothers was encountered. This entailed scheduling a revisit which was time-consuming but necessary. Generally, the CHWs had informed all the heads of household ahead of the survey team so the problem of revisiting did not reach unmanageable levels.

Only two refusals were given out of 250 households visited so the targeted number of households was almost reached. Since there was an average of 1.75 children under five per household, as in the KIS, the projected numbers for measurement of nutritional status were exceeded.

During the training period the need for precision and probing of vague answers were emphasized. This was strongly enforced during the early field- work phase when all the principal investigators were in the field. Each evening, the questionnaires were scanned for errors or inconsistencies and corrections made. This precision was well maintained throughout the survey, although the intensity of supervision fell necessarily with the return abroad of one of the investigators. Later returns showed more errors than earlier ones, although most were not serious.

The RG technique worked extremely well. Each of the 25 CHWs successfully found 10 households and 12 constructs. Several had difficulties at first understanding the operation of the triad sort, but with the use of the "dry run" with the beans and grams the interviewer was able to demonstrate in detail without suggesting anything to do with health risk or households. Thus, when the households were selected, the constructs were usually produced very quickly by the CHWs. The average time to complete a grid, including the example with the beans, was just over an hour, and the longest time taken 1.5 hours. A maximum of four grids per day were conducted.

In general, methodology provided no major field problems and, apart from the physical diffulties of getting to most of the households, the fieldwork progressed smoothly. One field worker dropped out after three weeks, but the additional work was easily absorbed by the others. Data coverage and precision were

satisfactory, although more probing would have been desirable, particularly with the demographic, water collection and verbal autopsy sections where respondents sometimes gave vague or incomplete information. However, given the extremely difficult working environment, the survey team performed extremely well.

2.9 References

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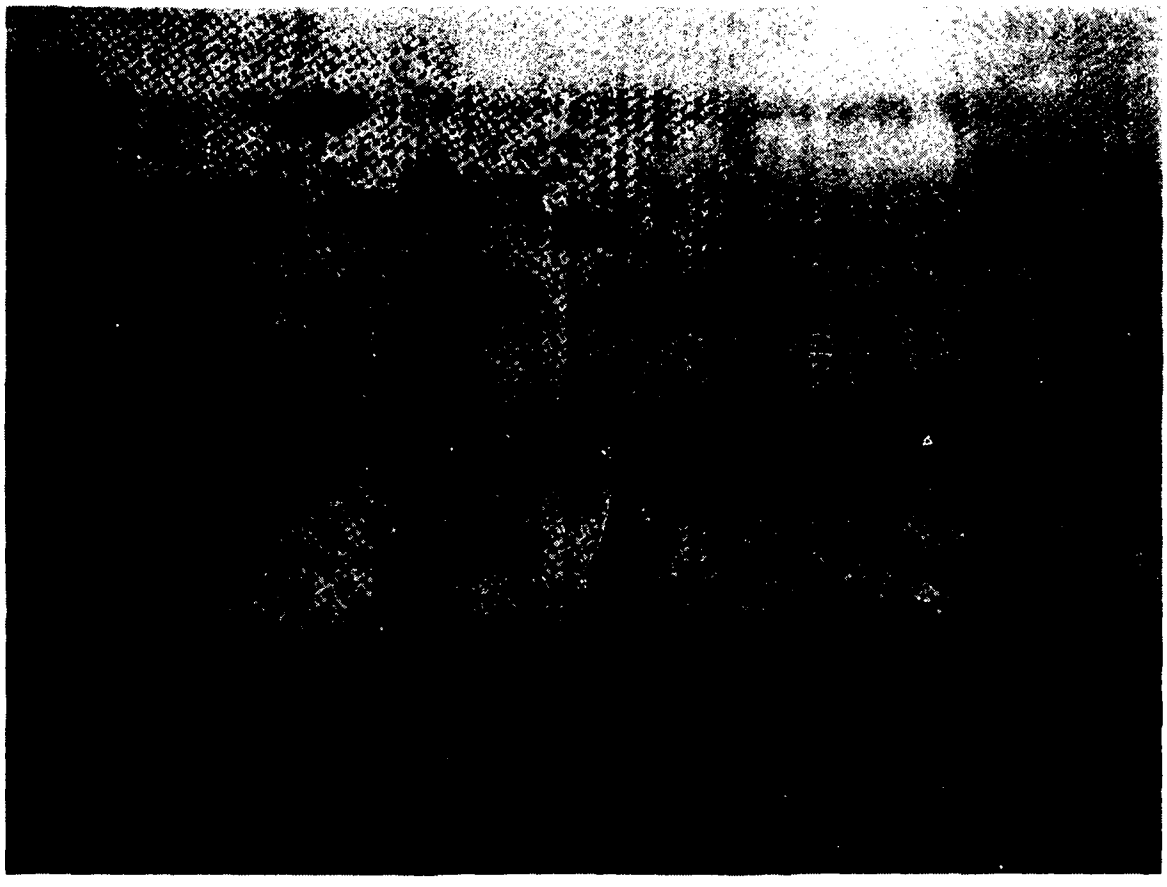
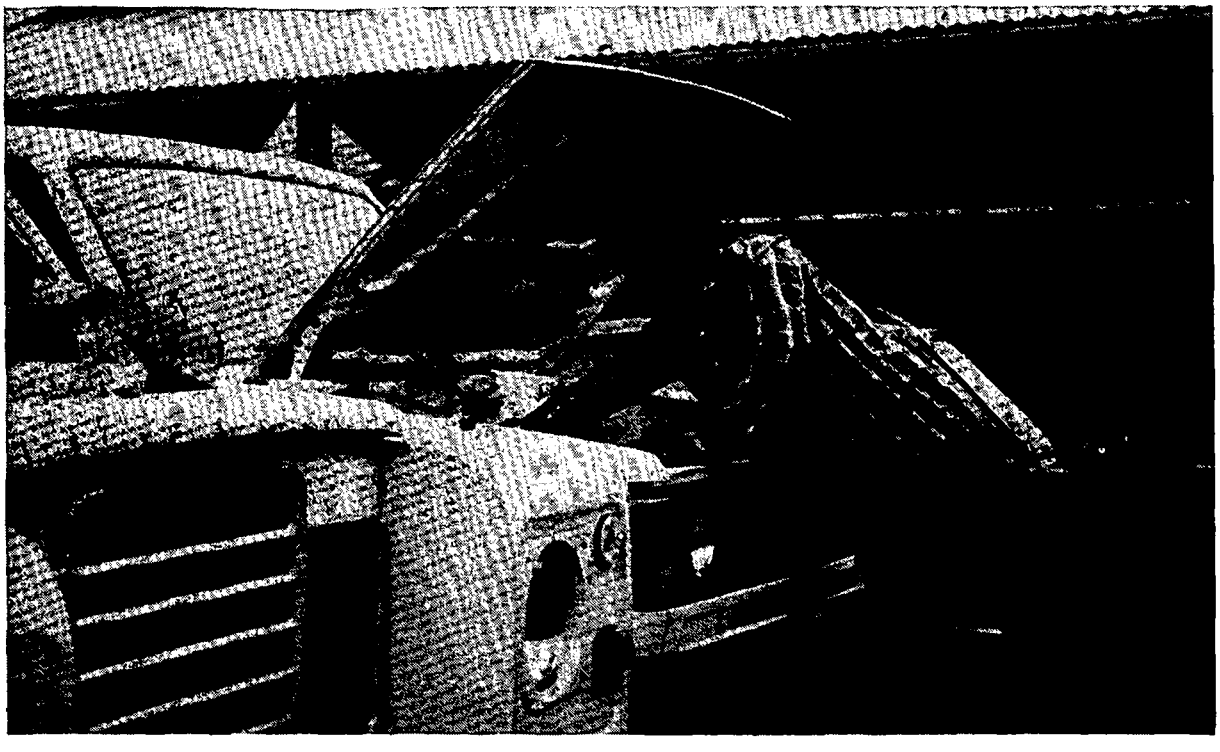


Collecting Water: time, distance and stress

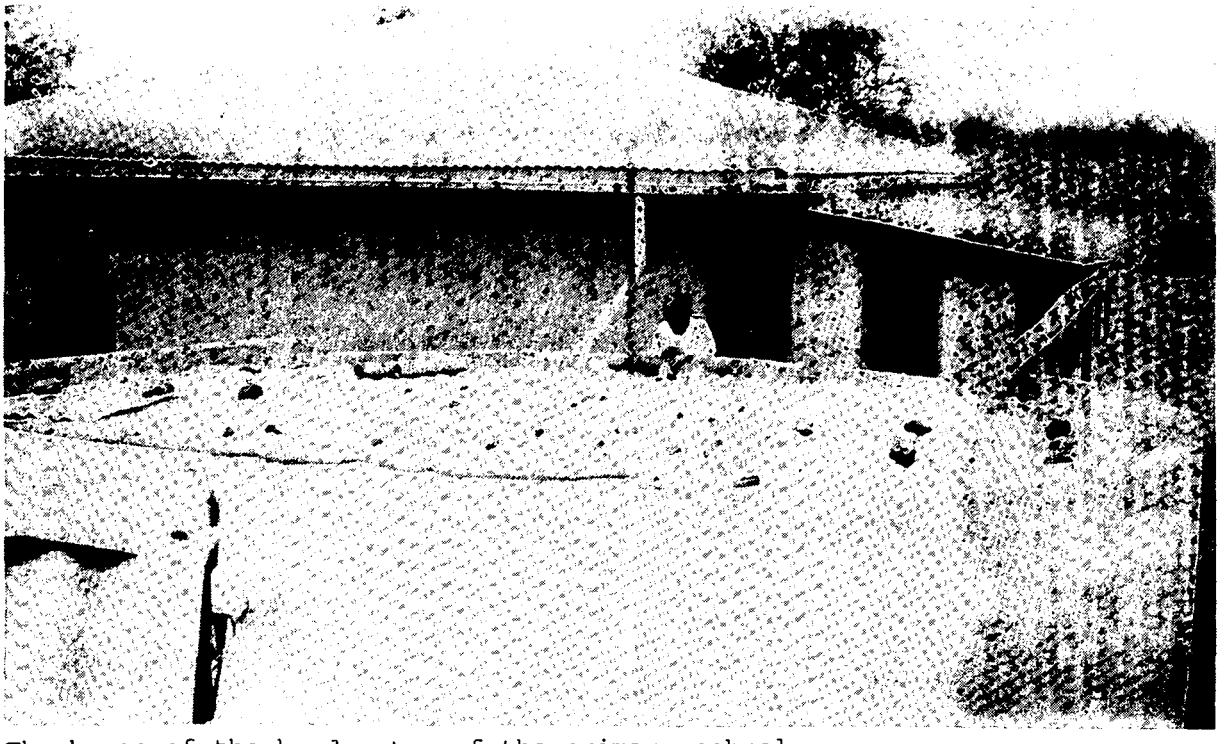
'Data Cleaning' at the end of the day



Reliable transport was essential

Two extremes in high and low risk households in the same environment

The house of a farmer



The house of the headmaster of the primary school

3. DATA ANALYSIS

3.1 Introduction

Data collection was completed early in April 1986. All forms were checked for errors and omissions by one of the investigators plus two data/statistical assistants, one at AMREF and one at MRC. Pre-calculations were performed on the nutritional status variables, plus two of the socio-economic variables and the data were entered into compatible computers at MRC and AMREF.

Most data entry and analysis were done using the MICROSTAT package. The repertory grids were analysed using original programmes. Data entry and screening for entry errors took around one month and data analysis a further three weeks.

The results are reported firstly in terms of the distribution of the demographic variable, allowed by risk indicators, risk-related factors and repertory grids.

3.2 Demographic distribution

A total of 2135 persons were registered in the 248 households of the survey. The age-sex distribution of the total sample was similar to that found during the KIS with 59% of the population aged 15 or under and greater proportions of females than males in the 20-39 age group.

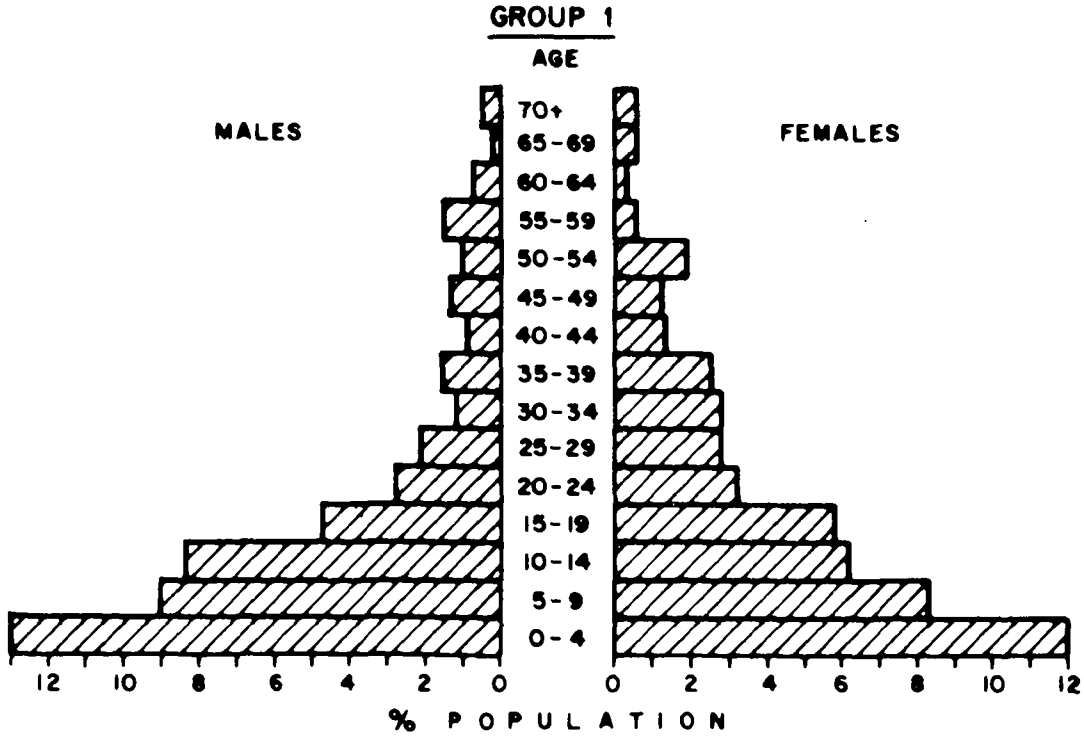
Comparison of the demography within the two groups reveals some interesting differences. Figure 3.1 shows the age-sex distribution in Group 1 ("low risk") and Group 2 ("high risk") households hereafter to be referred to as Group 1 and 2. At this stage we refer to Group 1 to be the low risk group and Group 2 the high risk group. Verification of this assumption is made in the next section.

In both diagrams, approximately 25% of the population are under-five years but a higher proportion of the Group 2 population are aged under-15. The high risk households have very small numbers of males or females in the 20-29 age cohorts, amounting to only 7.6% of the total population compared with 10.9% in corresponding cohorts in Group 1. The high risk households are therefore characterized by extreme economic dependency within households with over 60% of the population under 16 years and very small numbers in the most economically active age cohorts.

There is some evidence that the Group 2 households have experienced in terms of impaired fertility or increased child mortality during the drought and famine of 1983-85. Figure 3.2 shows a plot of the numbers of children in each group by year of birth from 1980 to 1986.

It appears that lower birth rates (or higher mortality rates) have been characteristic of the 1983-85 famine in the Group 2 households. Either biological factors suppressing fertility

FIG. 3.1. AGE-SEX DISTRIBUTIONS: GROUP 1 AND GROUP 2 HOUSEHOLDS.



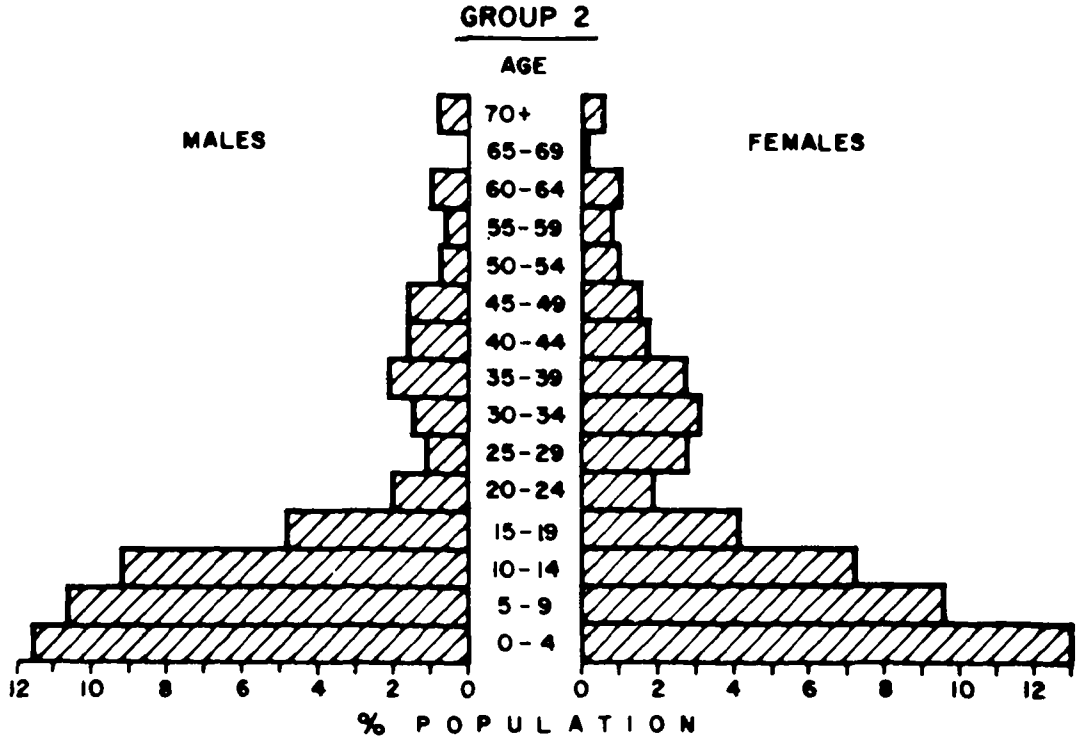
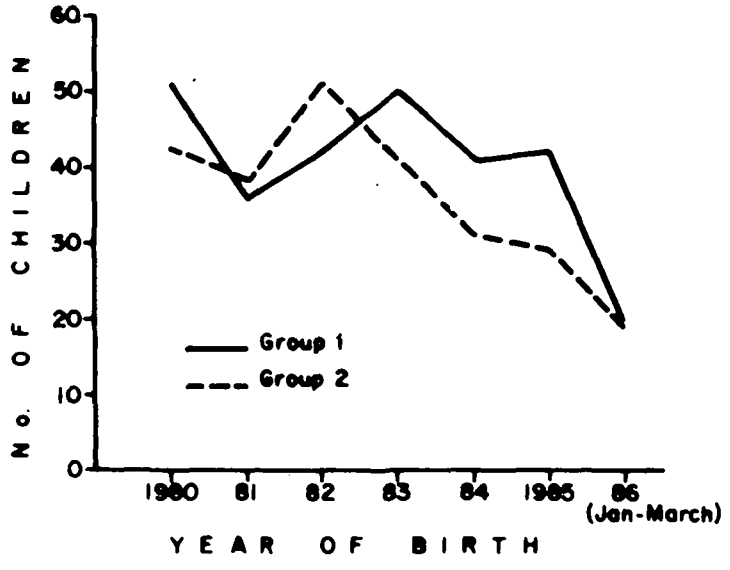


FIG. 3.2. YEAR OF BIRTH: GROUP 1 AND GROUP 2 CHILDREN



through poor nutrition, or the greater absence of males, normally present, but seeking work in towns during the drought may be responsible for the differences observed. Our data suggest the beginning of a "baby boom" in 1986, for already 20 children had been born in Group 1 households and 19 in Group 2 by the completion of the survey, a three month total which represents 69% of total births during 1985.

The third aspect of demography which differentiates the two groups is household size. Group 1 households tend to be larger with a mean of 8.99 and a standard deviation of 2.9 compared with 8.23 and 2.34 in the Group 2 households. These differences are significant on a two-tail t-test at the 95% probability level. The results are a further demonstration of the absence of many adults in the 20-29 age group in the Group 2 households rather than any other factor.

There are grounds for expecting Group 2 households to have proportionately more female heads, if economic stress forces men to seek wage employment outside the community. The data does not show this to be a clear demographic difference however, for 35% of Group 1 and 31% of Group 2 households have female heads. Median age of the heads of household are also similar, 42 for Group 1 and 44 for Group 2.

Although the two-group sample cannot be considered to be representative of the demography of the whole area, comparison with the larger, randomly-sampled KIS shows few differences except in household size, where an average of 7.3 was recorded. 58% of the KIS population was 15 and just under 30% of households had a female head.

3.3 Health risk indicators

In this sub-section we consider the distribution of anthropometric values, variations in child morbidity and chronic disability in adults and children, child mortality information and vaccination status of the under-fives.

3.3.1 Nutritional status

The most important health risk indicator was identified as the nutritional status of children as revealed by anthropometry. A total of 431 children whose month and year of birth were known were weighed and measured. From these figures their height for age (H/A), weight for age (W/A) and weight for height (W/H) scores were evaluated as percentages of the NCHS medians. Tables 3.1 and 3.2 show the differences in distributions between Group 1 and Group 2.

The immediate and most important finding from these tables is that there are strong and significant differences between the two groups with regard to the child nutrition variables. This represents the important finding that CHWs are very well able to

distinguish high-risk and low-risk households, at least in terms of nutritional status of children.

Table 3.1

Nutritional Status:
% Children below cut-off levels by risk group

	% < 90% H/A	% < 80% W/A	% < 80% W/H	N
Group 1	13.8	19.0	0.9	232
Group 2	31.2	40.1	3.5	199

Table 3.2

Mean values of child nutrition variables

	H/A		W/A		W/H		N
Group 1	94.5	5.3	88.7	12.6	99.2	9.78	232
Group 2	92.2	5.43	82.7	12.8	96.4	9.65	199
Significance	P < 0.001		P < 0.001		P < 0.01		

The differences between the two groups principally reflects the long-term nutritional effect represented by the prevalence of stunting. The average H/A values are significantly higher in Group 1 and the proportions below the 90% cut-off indicating slight stunting significantly less than in Group 2.

A higher proportion of Group 2 children had low body weight for their age (W/A), although this seems to be mainly because of their relatively short stature rather than acute malnutrition. Very few children in either group were even slightly wasted.

Table 3.3 Height for age by age group

Age (Months)	Group 1 Mean	Group 1 S D	Group 1 n	Group 2 Mean	Group 2 S D	Group 2 n	t	p
0 - 6	97.4	4.9	35	95.1	4.8	27	1.85	*
7 - 12	94.1	3.8	21	93.1	3.2	15	0.68	NS
13 -	93.6	6.2	45	91.9	5.5	33	0.96	NS
25 -	94.3	5.4	41	89.3	5.3	32	3.97	***
37 -	93.4	5.2	50	92.3	4.8	47	1.07	NS
	94.8	4.7	40	92.5	5.8	45	2.02	*

Table 3.4

Weight for age by age group

Age	Group 1 Mean	S D	n	Group 2 Mean	S D	n	t	p
0 - 6	98.8	15.1	35	93.3	17.2	27	1.32	NS
7 - 12	89.3	10.2	21	80.2	10.1	15	2.65	**
13 - 24	86.4	12.4	45	80.6	13.0	33	1.98	*
25 - 36	89.3	12.2	41	79.4	12.2	32	3.44	***
37 - 48	84.6	8.2	50	81.2	9.7	47	1.86	*
49+	86.8	12.3	40	82.6	11.0	45	1.65	NS

Table 3.5

Weight for height by age group

Age	Group 1 Mean	S D	n	Group 2 Mean	S D	n	t	p
0 - 6	106.9	10.6	35	106.4	13.5	27	0.16	NS
7 - 12	103.6	8.5	21	95.5	8.6	15	2.80	**
13 - 24	97.4	10.9	45	92.7	9.3	33	2.05	*
25 - 36	97.6	8.0	41	94.0	9.0	32	1.78	*
37 - 48	97.0	7.0	50	96.4	7.2	47	0.42	NS
49+	96.7	9.5	40	95.7	6.9	45	0.55	NS

NS = not significant * = $p < 0.05$ ** = $p < 0.01$ *** = $p < 0.001$

More information can be obtained from the anthropometric data by sub-dividing the sample into age sets and making inter-group comparisons. Tables 3.3-3.5 pick out the main areas of difference in child nutrition between the two groups. Children born in the low-risk group are rather longer than those in the high-risk group, but otherwise the W/A and W/H are essentially the same. A remarkable divergence seems to occur between 7-12 months when the W/H of the high risk children drops dramatically, suggestive of poor or delayed weaning or higher morbidity in that cohort. The low-risk group maintains its W/H over 100%. The difference in W/A and W/H continue into the next 13-24 month cohort, although a substantial fall in Group 1 W/H is also evident.

The 25-36 month cohort shows the differences between the two groups at a maximum, as the high-risk group has significantly lower values on all three measures. The difference in H/A is particularly large for this cohort, possibly showing the differential effects of the 1983-85 famine on these children. When the famine began to take a serious grip in late 1983 these children were either breastfeeding or the mothers were in their

third trimester. Children in adjacent cohorts do not seem to show such large relative differences and the explanation of why the 25-36 month cohorts should show such a wide difference is not possible from the data at hand.

In the two oldest cohorts, some significant differences are apparent but without a clear pattern, except that the nutritional levels are consistently higher in the group 1 children.

In conclusion, stunting can be seen as the main child nutrition problem and clear differences between the groups in H/A can be seen. At a time of relatively plentiful food, very little wasting is evident, although the difference in means between the two groups is statistically significant and 7-12 month cohort shows a clear difference. The proportion below the 80% W/H cut-off for Group 2 is much less than for the KIS equivalent, conducted in October 1983 when the famine was taking a strong grip. Height for age is therefore the best of the three measures to incorporate as a risk indicator, for it reflects the longer term nutritional history of the child.

A straight-forward comparison of the two groups shows clearly that the "high risk" group identified by the CHWs has much poorer levels of child nutrition than the low risk group. Thus the CHW perception of relative risk provides a clear separation between the two groups when child nutrition is taken as the indicator.

3.3.2 Morbidity and chronic disability

In this section we look at health problems to assess differences between the two groups of households. Mothers were asked to recall any common health problems present amongst the children under five during the week prior to the survey. They were specifically asked wahether any child had had diarrhoea, fever, cough, running nose or eye infection during the previous week.

The preceding one week was taken as the period of recall as different types of ailments would be best remembered. Two week periods are usually taken for recalls of one disease entity only, e.g., diarrhoeal diseases. Reliability of diarrhoeal recall over two weeks as compared with longitudinal daily household observation has been found to be high (WHO,). As this study was concerned with the mothers recall of at least 5 different ailments in all her children under the age of five, a one week recall was considered to be more reliable.

Table 3.6

Presence of specific childhood ailments by type of household

Ailment	Group 1 %	Group 2 %
Running nose	60.5	54.1
Cough	48.5	47.6
Fever	43.6	41.9
Diarrhoea	25.8	17.7
Eye infection	8.8	5.7
Any other disease	22.6	29.1

(multiple symptoms were often reported)

Over-reporting of ailments by the mothers could be a bias if ailments present in the earlier weeks before are memorized together with the ones during the requested one week prior to interview. Even the presence of the interview team, in particular during a first visit, could make the mother exaggerate health problems just to please them or in the hope that medicine may be supplied later on. To measure this potential bias all households with children in two clusters were visited twice with a week interval and presence of sick children in the week prior to the first visit compared with presence of sick children in the week after the first visit. For both weeks, in each of the clusters, no substantial differences were found.

Table 3.6 shows the percentage of households with one or more children suffering from ailments during the week prior to interview. Between one fifth and one quarter of the households had at least one child with diarrhoea, an apparently high figure considering the survey was conducted in the middle of a dry season. Seasonal influences do play a part in diarrhoeal incidence with peaks usually occurring during and after the rainy season. This seasonality has been described in annual reports of hospitals in different parts of Kenya although the community survey over two years in another part of Machakos District could not establish a clear seasonal pattern (Leeuwenburg, 1984).

Table 3.7

Ailment Frequencies among children during one week by risk group

Ailment	Group 1 No.	Group 1 %	Group 2 No.	Group 2 %
diarrhoea episodes	30	12.1	24	12.1
fever	77	33.2	79	39.2
cough	94	40.5	101	50.7
running nose	128	55.2	104	52.3
eye infection	13	5.6	7	3.5
any other disease	34	14.2	44	22.1

multiple complaints were often reported

Table 3.8

Type of ailments reported in 431 children

Ailment	No.
Running nose	233
Cough	195
Fever	156
Diarrhoea	62
Eye infection	20
Any other	78

(multiple symptoms were often reported)

Table 3.7 also shows that 12.1% children in low risk households and 12.1% in high risk households as well suffered from diarrhoea in the previous week. If an average duration of 3 days for a diarrhoeal episode is assumed, this results in an attack rate of 3.6 episodes per child per year, as compared to 2.7 in Machakos north (Leeuwenburg, 1984). A number of other symptoms are even more frequent than diarrhoea: fever, running noses and coughs. Table 3.8) More than half of the children had a running nose and almost half half had a cough with considerable overlap between the two during that week, illustrating a high proportion of children being at risk of developing a lower respiratory tract infections. In the KIS more than one year previously, mothers were asked what they ranked as the most common disease of children. Diarrhoea came out as the most common. Clearly symptoms as running nose, cough and fever are seen as part and parcel of daily life and not perceived of as disease. Mortality from diar rhoea was appreciated as a common cause of death while the links between running nose, cough, and death due to pneumonia was less clearly realized. Surveys in Kenya have shown, however, that

mortality due to acute respiratory infections is of equal magnitude to that due to diarrhoea.
Children with disease symptoms were present in almost all high and low risk households studied and commonly more than one child suffering within one household was observed. If the mother perceives some potentially serious conditions to be unimportant or if she has too many pressing household duties to perform, affected children may be ignored until the presenting conditions become serious.

Results from Tables 3.6 and 3.7 do not show any clear difference in morbidity patterns between the two types of households. This may reflect similar levels of transmission and pressure of infectious diseases, in the low and high risk households.

Chronic disability

Both the Kibwezi Integrated Survey and the present study defined chronic disability as those households having a school-aged child or adult present at home who are unable to participate in the daily activities like going to school, working in the field or elsewhere, doing household activities, etc. In the random sample of the KIS at least one chronically disabled person was present in 20% of the households and chronic disability was identified as a particular problem of women of child-bearing age.

Table 3.9
Frequency of chronic disabled persons above the age of 5 years among low and high risk households

	Group 1 households		Group 2 households	
disabled persons in household	No.	%	No.	%
None	102	82.3	86	69.4
One	18	14.5	27	21.8
More than one	4	3.2	11	8.9

chi square 6.4 $p < 0.05$

Table 3.9 shows that 22 households among the low risk households and 38 among the high risk households do have one or more disabled persons. This difference is highly significant ($P<0.001$) showing again the ability of CHWs to differentiate households. Households with more than one disabled person were more often reported in high risk households illustrating additional stress on those households.

Having identified chronic disability as a risk indicator differentiating the two types of households very clearly, Table 3.11 describes the characteristics of the disabled persons themselves.

Table 3.10

Frequency of chronic disabled persons by age, sex and risk

Age	Group 1 No. persons	Group 1 No. disabled	Group 1 %	Group 2 No. persons	Group 2 No. disabled	Group 2 %	chi
5-14 years	471	10 m2 f8	2.1	464	13 m7 f6	2.8	
15 and above	390	15 m7 f8	3.8	309	37 m20 f17	12.0	15.4

Seventy-five disabled persons were identified with a male-female distribution roughly similar to the study population. Disabled adults in the above-15 years age group are particularly associated with Group 2 households, while for the school-age children this does not seem to be the case. In conclusion we may say that adult chronic disability is a strong indicator for households at risk.

An attempt was made to classify the disabilities. A grouping which a CHW would easily understand was sought. By doing this, it is possible during refresher sessions to alert the CHW as to which chronic conditions are present, what type of action is needed to alleviate or prevent them, and how chronic disability can predict risk. The following ailments or conditions shown in Table 3.11 were present.

Table 3.11:

Frequencies of reported ailments in 75 chronic disabled persons

	School age child	Adult male	Adult female	Total
general malaise	4	-	5	9
chest problems	3	1	9	13
tuberculosis	-	6	1	7
physical handicap only	4	5	2	11
mental with or without physical handicap	3	5	1	9
chronic fevers	3	1	2	6
chronic eye problems including blindness	1	2	1	4
polio	2	1	-	3
polio epilepsy	-	1	1	2
skin conditions	-	2	-	2
elephantiasis	-	-	1	1
leprosy	-	-	1	2
chronic diarrhoea	1	-	1	2
major operation	-	-	1	2
bilharzia	2	-	-	2
heart disease	1	-	-	1

Vague complaints, like general malaise, chest problems and chronic fever, from a medical point of view, form a large proportion of the ailments. The KIS also found a high number of vague complaints which at first sight would need further medical examination for proper diagnosis.

For a number of ailments, it is possible that appropriate physical and mental rehabilitation could alleviate the condition, but costs and efforts needed would obviously exceed the family means available.

Early detection as soon as high risk households are identified by a CHW could alleviate ailments such as TB, polio, blindness, leprosy and others.

3.3.3 Vaccination status

No attempt was made to identify the vaccination status of households as a unit. Instead, the vaccination status of children living in low-risk households was compared with those living in high risk households.

Table 3.12

Vaccination status of children between 12 and 60 months of age by type of household

Vaccination status	Group 1 N=179		Group 2 N=159		
	No.	%	No	%	P
BCG scar seen	162	90.5	132	83.2	N.S
Vaccination card present	120	67.0	101	63.5	N.S
Total Children with card fully vaccinated	111	90.5	80	83.2	**
Total children fully vaccinated	111	62.0	80	50.3	**

Table 3.13

Vaccination status of children between 13 and 24 months of age by type of household

	Group 1 N=46		Group 2 N=35	
	No	%	No.	%
Vaccination card present	39	84.8	27	77.1
Fully vaccinated according to card	35	89.7	20	74.1

Table 3.12 shows the vaccination status of all children between 12 and 60 months of age present in the high- and low-risk households. Coverage in both groups is very high. Comparison with estimated national figures is possible for the one year old children. Table 3.13 shows a coverage rate for fully immunized one year old children of 74.1% for the high risk households and 89.7% for the low risk households. UNICEF estimated the coverage for Kenya around 55% in the 1981-1983 period, (UNICEF, 1986). For low risk households in particular, the coverage is above the national average, suggesting that in areas where CHWs are working

and reliable regular MCH services are present, either by mobile or static clinics, impact on vaccination coverage can clearly be seen. One role of CHWs in Kibwezi has been to inform the community when a mobile clinic will be held and to stimulate regular attendance.

The vaccination status of children 1-5 years is still quite different between high- and low-risk households as table 3.12 shows. In the high risk households there are a smaller proportion of children with a BCG scar visible as well as a smaller proportion of children with a vaccination card present than in the low risk households. A much more smaller proportion of children in the high risk households are fully vaccinated. It could be that continuation of attendance until the children are fully vaccinated is better maintained in the low risk households. A comparison of the drop-out rate, the difference in percentage between the DPT 1 coverage and the DPT 3 coverage, between the different types of households could throw more light on this.

Table 3.14

Vaccination drop out rate in different type of households

Type of vaccination	Group 1	Group 2	
DPT 1	146	109	
DPT 3	130	83	
Decrease in %	11.0	23.7	chi 6.63 p < 0.01

Table 3.14 shows the drop out rate in the high- and low-risk households. The drop out rate is significantly higher among children in high risk households. This could be explained by the lower female educational levels in the high risk households and the more competing pressures of other essential activities for the mother which lead to a decrease in motivation to reattend vaccination facilities. This is considered further in the next chapter.

In conclusion we can say that differentiating the households by means of the vaccination status of the 1-5 years children is valid.

3.3.4 Mortality and Verbal Autopsies

Childhood mortality data collected during large cross-sectional surveys and based on recall by mothers have been questioned as being imprecise and lacking reliability (Stanfield 1984). However, in this study, with the careful probing technique used by mature women of the same area, it was envisaged that reliable information could be obtained.

Table 3.15

Mortality by age group and causes of death among under-fives through mother's recall

Age group	No	Cause	No
Perinatal period	2	Prolonged labour	2
1-6 months	0	Measles	2
7-12 months	1	Malnutrition	1
13-60 months	5	Burns	1
		Malaria	1
Total	8*	Diarrhoea	1
		Total	8*

* all deaths in high risk households

Table 3.15 shows the age of death of those recalled by the mothers as having died over the previous 12 months. Two still births and 6 child deaths were recalled over the year. The total deaths over the previous five years were 9 and 18 for the low- and high-risk groups respectively (figure 3.3). Five year recall figures are expected to be roughly 5 times higher than the recent one year figures. The figures found suggest that memory or willingness to report about more distant events is decreased over time.

FIGURE 3.3

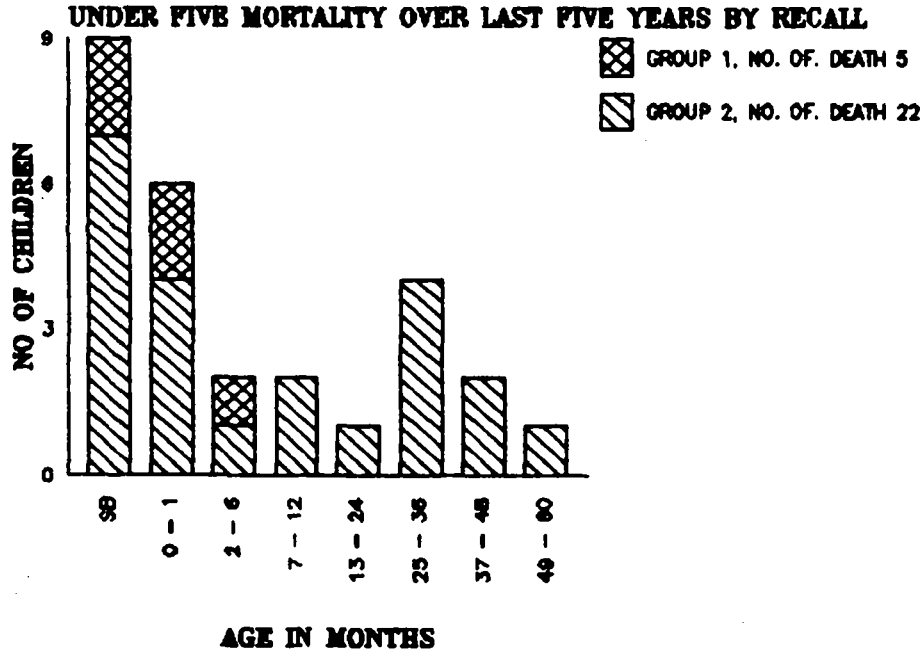


Figure 3.3 shows the number of still births and child deaths over the previous five years for the different household groups. 81.5% are in the high risk households and 18.5% in the low risk households. As table 3.15 shows, all still births and child deaths recalled over the previous year occurred in the high risk households. As there is no reason to believe that reporting was any different in the two types of households, the figures strongly suggest increased mortality in the high risk households. Admittedly, the low figures in both 1 year and 5 years recall periods do not allow a statistical comparison, but the clear differences do show a trend on which the above conclusion can be based. The five children in the age group 1-5 years who were remembered to have died during the one year period were all in the high risk households.

Figure 3.3 shows that 15 out of 27 deaths occurred around time of delivery and during the first month of life, again, in particular in the high risk households. This corresponds with the period of highest vulnerability. The impact of CHWs on maternal and infant care is limited, as can also be seen from the cause of death. The figure shows causes of death which are all within the preventive scope of CHW activities as long as backing up with mobile clinics and early appropriate referrals to the health centre or hospital are made.

3.4 Socio-economic Factors

In this section, the two groups are compared on the socio-economic factors assembled from Form C of the questionnaire. Each variable is measured on a household basis and covers 124 households in each group. Significant differences between the groups are assessed by a difference of means test or chi-square test, whichever is appropriate.

The data all appear in table 3.16.

Table 3.16

Socio-economic variables :

Aspect	Variable	Group 1 Mean	Group 1 %	Group 1 SD	Group 2 Mean	Group 2 %	Group 2 SD	a = chi square b=t-test for difference of means
Water	Consumption per week (litres per adult equivalent)	83.8		679	50.2		25.2	b:p < 0.001
	Average round trip time (mins.)	140.5		139.0	139.6		122.5	b: NS
Agriculture	% growing cash crops		17			12		a: NS
	Average no. of cows	12.4		19.2	1.6		3.3	b: p < 0.001
	Average no. of goats equivalents	151.2		182.1	27.4		40.5	b: p < 0.001
Employment and dependency	Children-to-adults ratio	1.51		1.11	1.66		1.22	b: p < 0.05
	% households with employed member		30			19		a: p < 0.1
	% households with member employed in town		55			31		a: p < 0.001
	% households receiving monthly remittance		44			16		a: p < 0.001
Compound characteristics	% with latrine		95			67		a: p < 0.001
	% with functioning latrine		87			49		a: p < 0.001
	% households with cement floor		40			2		a: p < 0.001
	% households with mabati roof		72			24		a: p < 0.001
	% households with plastered walls		43			4		a: p < 0.001
	% households with radio		76			27		a: p < 0.001
	% households with working radio		63			20		a: p < 0.001

A clear difference between the groups can be seen for nearly all the variables tested, with the high risk households much poorer materially than the low risk ones.

With regard to water, average consumption* is significantly higher in the Group 1 households although trip length, as measured by the average time taken for a return trip, is very similar to the Group 2 figure.

This similarity may be deceptive, however, since the total time spent per family and the mode of transport are not taken into account. Mechanical means are more common with the low risk households and trip frequency is also less.

Livestock holdings are much greater in the low risk households, particularly with regard to cows. Only 33 out of the 124 high-risk households possessed more than one cow, compared to 101 of the low risk household. Total animal holdings - "goat equivalents" - were calculated as in the KIS, using the prevailing price of a goat compared with the prices of other stock to assemble an index of total animal wealth. Again, strong differences between the two groups of households are apparent. The median goat equivalent of the low-risk households is 80, compared to under 20 for the high-risk group.

Cash crops show no statistically significant differences although a higher proportion of Group 1 households grow them. In both cases, the proportions are much lower than the 60% reporting cash crops in the KIS, indicative both of the recent decline in the popularity of cotton as a cash crop and the different sampling designs of the two studies, KIS including areas like Yumbuni, Ngandani and Makindu where cash cropping is almost universal.

The demographic dependency within the Group 2 households is higher, with 1.66 children per adult compared to 1.51 in the Group 1 households. There is better access to money through employment in the low risk households: higher proportions of them have family members either employed in the area or working outside. Regular remittances from outside are a much more common source of income also. In an emergency, therefore, the low-risk households are much more likely to be able to mobilize resources.

Compound characteristics show the physical differences between the two groups. Nearly all low-risk households have a functioning latrine; hardly any high-risk households have cement floors or plastered walls and the presence of a mabati roof is three times more common in Group 1 households. The existence of a radio, one of the first major acquisitions, and one which may play a relevant role in improving knowledge of language, health and agriculture, is much more common in the low-risk households.

As a small statistical footnote to these comparisons, it can be seen that most of the continuously measured variables have distributions which are skewed to the right and therefore the

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*Consumption rates were calculated as in the KIS with total water collected in one week is divided by the number of adults in the household, weighting each child under 15 as 0.75 of an adult.

application of a t-test is not strictly valid. A square-root transformation of water consumption, cows and goat-equivalent variables provide better approximates to normal distributions and the difference of means tests were still significant. The number of cows owned was still highly skewed, but a simple test of "cows - no cows" between the two groups yielded a highly significant Chi-square value.

In summary, separation of the two groups can be seen in all areas tested, the differences being particularly clear with the construction materials of the households and the household amenities. To discover whether these differences are, indeed, reflective of the CHW perceptions, we turn now to an analysis of the repertory grid data.

3.5 Repertory Grids

The grid data were collated and some simple descriptive techniques applied. The main objectives were to simply identify the ways in which CHWs viewed the concept of risk when applied to ten of their households and to compare these concepts with the risk factors used in the questionnaire.

A simple tabulation of the various stated constructs provides a major overview of the CHWs perceptions.

The 25 CHWs provided a total of 72 different constructs separating the households during the triad sort. Five particular constructs - "has latrine", "many cows", "big shamba*", "mabati** roof" and "good farmer" - were mentioned by over half of the CHWs. Six particular spheres of perception were apparent, the most important being farming-related constructs and those pertaining to compound quality. Table 3.17 shows the relative importance of the six groups mentioned.

Table 3.17 Major groups of construct

	No. Constructs	Total Frequency	% Grand Total
Farming	14	91	30.3
Compound quality	17	86	28.7
Health and family characteristics	13	50	16.7
Non-farm wealth and income	12	38	12.7
Personal characteristics	9	18	6.0
Water-related	6	17	5.7
Total	72	300	100

The main areas used by the CHWs to separate out the households are farming-related and compound-related features. Although appearing quite frequently, the more directly-attributable health-related variables are not so commonly used as constructs.

Tables 3.18 (a) through 3.18 (f) show the frequency of each construct mentioned within the six major groups. Only the first-mentioned pole of the construct is given in each case, the second pole being the simple opposite.

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* Shamba = farm
** Mabati = galvanised iron sheets

Table 3.18 RG constructs by general type

Table 3.18 (a) Farming

Construct	Frequency
Many cows	20
Big shamba	19
Good farmer	14
Food available	9
Good/bad/stony land	7
Terraced shamba	5
Uses ox-plough	4
Has fruit trees	4
Uses tractor for ploughing	3
Has animals	1
Has goats	1
Has chickens	1
Has vegetable garden	1
Grows beans	1
Grows cotton	1

Table 3.18 (b)

Compound quality

Construct	Frequency
Has latrine	22
Has mabati roof	16
Clean compound	10
Paths made, bush cleared round house	8
Permanent, well-constructed buildings	6
Has dish rack	5
Has shade trees	5
Has a roof tank	3
Has fenced compound	2
Has granary	2
House has ceiling	1
Keeps utensils neatly	1
Brick house	1
Has rubbish pit	1
Has separate animal pens	1
Has a cat	1
Located near main road	1

Table 3.18 (c) Non-farm wealth and income

Construct	Frequency
Owns shop or business	11
Employed	8
Can provide school fees	4
Can educate children	2
Money available	3
Owns motor car	2
Owns bicycle	2
Sells charcoal	2
Brews beer	1
Works at unskilled job	1
Owns posho mill	1
Lacks family support	1

Table 3.18 (d)

Health and family characteristics

Construct	Frequency
Often sick	12
Healthy children	8
Many children	6
Children in secondary school	5
Polygamist	5
Large family	4
Family has chronically sick member(s)	3
Goes to hospital when sick	2
Attends mobile clinic	1
Has unmarried daughters with children	1
TB in family	1
Has small children	1
No spacing between children	1

Table 3.18 (e)

Personal characteristics

Construct	Frequency
Accepts CHW advice	7
Drunkard	2
Works hard	2
Smartly dressed	2
Well behaved	1
In jail	1
Has community spirit	1
Welcoming nature	1
Educated	1

Table 3.18 (f)

Water-related

Construct	Frequency
Far from water, water shortage	7
Has mechanical means of carrying water	7
Has piped water supply	1
Boils water	1
Stores water in clay pots	1

The ability of RG techniques to elicit wide-ranging information is seen. The constructs elicited are many and varied and contain a mixture of "concensus" constructs mentioned by many CHWs and individual "one-off" constructs, which give added breadth to the data.

While the constructs have been classified into the six groups described, some can clearly apply in more than one category. "Good farmer", for example could appear as a personal characteristic as well as a farming attribute and "has a roof tank" is water-related as well as a compound characteristic.

The farming constructs separate the households mainly on perceptions of land or livestock quantity and the quality of the farmer himself/herself. Many constructs here are sequentially related. Thus "food available" suggests a successful farmer ("good farmer or "big shamba") and a particular attribute of a good farmer might be "has fruit trees" or "uses ox-plough" or "terraced shamba". RG techniques commonly elicit a mixture of nested general and specific constructs such as these.

Much distinction between the households was made on the quality of the compounds. Presence or absence of a latrine was the most commonly elicited construct of all, only three CHWs failing to use this as a distinguishing quality. Mabati roofs were also commonly noted and several constructs involve aspects of cleanliness and tidiness associated with the compounds.

While farming-related constructs often distinguish relatively rich and relatively poor households, more explicit reference to wealth and income is found in the third major grouping of constructs where "owns shop or business" was a distinguishing characteristic of heads of households in 11 of the 25 grids. Since a further 8 mentioned wage employment, the perceived importance of non-farm income is fairly high. Other constructs in this group refer to the general availability of money or to particular forms of income generation.

Health and family characteristics provide the most direct means of separating the households in terms of health risk. The two constructs "often sick" and "healthy children", usually mutually exclusive in a given grid, serve as direct means of splitting high-risk and low-risk although, as will be seen later, this division between the two groups is not so clear-cut as might be expected. Several constructs mentioned may be risk indicators

themselves, e.g. "TB in family", "chronically-sick family members", "no spacing between children". The remainder distinguish households mainly according to aspects of size and composition.

Personal characteristics provide a small but interesting group of constructs which say as much about the CHWs themselves as about the households. Very important to the CHWs' sense of achievement is whether or not advice is accepted, and this was used as a distinguishing tool by 7 of the CHWs.

The final set of constructs relate to water collection and use. Given the fact that water supply is seen almost unanimously as the major problem in Kibwezi, it is not surprising that CHWs often used access to water to separate the households. The twin problems of distance from water and the means of transport, both identified as major problems in the KIS, are reflected in the two main constructs of this group.

During the conduct of the RG, the triads were drawn at random. Occasionally, three households from the same group appeared.* During piloting, it was decided not only to allow a triad sort to be performed within the Group 1 and Group 2 households, but also to ensure that at least one sort of this nature occurred for each group in each grid. The idea was to elicit more specialized constructs which would provide finer distinctions between the households within the same group.

In practice, the "within group" triad sorts provided a mixture of common and less common constructs. "Mabati roofs" appeared five times as a "within group" construct and was used in both groups. More individual constructs were elicited within the "high risk" Group 2 where "in jail", "near main road", "TB in family" and "has chickens" appeared.

The ability to distinguish the two groups of households in terms of the constructs is reflected in the degree of separation achieved. Most of the constructs elicited can easily be seen to have desirable or undesirable qualities. Thus, we would expect low-risk households to be at the positive end of the "latrine", "mabati roof", "good farmer" and "healthy children" constructs, while high risk households might be expected to be associated with "often sick", "lacks family support" or "drunkard".

Some constructs are, however, neutral, in that we may not allocate them a <u>priori</u> as risk factors. Thus "large family" or "many children" may not be helpful in deciding whether the household is more prone to risk. This type of construct was, however, rather infrequently elicited.

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*Statistically, this is expected once in twelve selections (5/10 x 4/9 x 3/8)

Table 3.19 shows the separation of the eight most frequently occurring constructs in terms of the values (1 or 0) scored by those in the two groups.

Table 3.19 Scoring of major constructs in Group 1 and 2

Construct	No. of CHWs using	Scores Group 1	Group 2
Has latrine	(22)	97	44
Many cows	(20)	84	18
Big shamba	(19)	78	25
Has mabati roof	(16)	61	16
Good farmer	(14)	62	13
Often sick	(12)	13	48
Owns shop/business	(11)	24	2
Clean compound	(10)	44	18

The separation is apparent for all eight constructs, but some are more clearly split than others. Thus, for example, "many cows" seems to be a better construct than "latrine" by which to distinguish the two groups as 40% of the high risk households and 88% of the low risk ones were "allocated" latrines by the CHWs, compared with 18% and 84% respectively for the "many cows" construct.

Allocating the score +1 to households which have a positive value for a desirable attribute and -1 if a negative value, and vice-versa with undesirable attributes, a set of household scores can be built up for each cluster to indicate how well the two groups have been distinguished.

Since we have also seen that some clusters can "contain" others (e.g., "good farmer" - "has fruit trees"), some measure of overlap within the 12 constructs given by local CHW is also desirable. The most applicable technique for showing the minimum dimensionality in the set of constructs is multidimensional scaling, but it is rather complex and unnecessarily lengthy for present purposes. Instead, a measure of similarity between any two constructs can be easily computed. This index, the phi-coefficient, is related to the chi-square value, being computationally equivalent to $\sqrt{\frac{\chi^2}{n}}$

When comparing the score of one household over two constructs there are four possible combinations of values: 1-1, 0-0, 1-0 or 0-1. Comparing the two constructs over 10 households means that 10 pairs of values must be allocated. This can be simply done using a contingency table as shown.

		Construct "a" 1	Construct "a" 0	
Construct "b"	1	a	b	a + b
	0	c	d	c + d
		a+c	b+d	N

Given this arrangement, phi is calculated by:

$$\frac{ad - bc}{\sqrt{(a+b)\ (c+d)\ (a+c)\ (b+d)}}$$

Thus, two constructs with identical scores over the households would have cell a = d = 5 and cell b = c = 0. The phi value would be equal to 1. If the constructs scored exactly opposite to each other, cell b = c = 5 and cell a = d = 0 and phi = -1. These give the limits to the statistic, with all other situations in between. Although less precise, the phi coefficient is analogous in bounds and interpretation to the more common coefficient of correlation.

Table 3.20 shows the distribution of the scores of Group 1 and Group 2 households as described above together with the average phi coefficient when all possible pairs of constructs are compared, taking the absolute value of the coefficients.

Table 3.20

Separation of scores for households by cluster

Cluster	Score		Average
	Group 1	Group 2	Phi
Utithi 1	8.8	-5.6	0.57
Utithi 2	4.4	-7.8	0.38
Utithi 3	8.6	-5.8	0.45
Mangelete 1	8.0	-8.8	0.52
Mangelete 2	9.2	-3.0	0.41
Mangelete 3	7.6	-9.2	0.55
Mangelete 4	4.4	-5.2	0.35
Muthingini 1	6.0	-2.4	0.34
Muthingini 2	5.8	-5.0	0.38
Muthingini 3	4.4	-9.0	0.36
Muthingini 4	4.8	-6.8	0.51
Muthingini 5	7.6	-4.0	0.47
Kathekani 1	6.6	-2.6	0.38
Kathekani 2	7.2	-6.8	0.45
Kai 1	4.4	-2.8	0.33
Kai 2	6.0	-5.2	0.40
Kai 3	7.4	-8.2	0.52
Kai 4	2.4	-.4	0.28
Kisingo 1	5.0	-9.0	0.50
Kisingo 2	7.4	-5.6	0.48
Kisingo 3	6.4	-2.4	0.32
Kisingo 4	3.2	-2.4	0.42
Kaunguni 1	9.2	-2.4	0.40
Kaunguni 2	6.6	-7.8	0.47
Kaunguni 3	8.2	-6.6	0.48

Each CHW has achieved the expected separation of the two groups and, in most cases, the scores reflect a high degree of separation. Where the separation of the groups is not so great (e.g. in Kai 4 or in Kisingo 4), this seems to reflect the existence of one or two households in which a particular attribute is very strongly felt by the CHWs although the other constructs elicited tend to place it in the opposite group. Near-maximum separation is seen in Utithi 1, Mangelete 1 and 3, Kathekani 2, Kai 3 and Kaunguni 2 and 3, where the CHWs have very clearly split the two groups. These clusters also record high average phi-values, suggesting that the constructs being used to separate the households are quite strongly inter-related. In Mangelete 3, for example, the CHW has "good farmer", "means of taking patient to hospital", "food always available", "money for school fees", "smart" and "has latrine" as identically-distributed constructs, the Group 1 households scoring "1" each time and the Group 2 ones zero.

In conclusion, the repertory grid has elicited a wide range of perceptual information which reveals the ways CHWs conceptualize the problem of risk amongst the communities in which they work.

The initial separation of the five "high risk" households and five "low risk" ones is amplified by the types of constructs which the CHWs use to separate households belonging to one group from households belonging to the other. The socio-economic risk-related factors used in the household survey separate the two groups very well and are logical, relevant and correspond in many ways to the constructs used by the CHWs to separate the households.

3.6 References

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4. INTERRELATIONSHIPS

4.1 Introduction

In this chapter we consider the inter-relationship of the socio-economic variables with the health risk indicators and with the repertory grid findings. As with the KIS, two levels of analysis are possible, the individual and the household. This is particularly important for the nutrition variables, for individual measurements of 431 children were taken in 209 of the 248 households. Applications of most socio-economic characteristics can only be made at the household levels, therefore it is necessary to devise the means of allocating a child nutrition index to each household. This is described below.

While the socio-economic variables and repertory grid constructs have been discussed separately, they represent two ways of approaching the same problem and their juxtaposition, especially in the areas of direct overlap, is important. We begin, however, by looking at the individual level, at the relationship between the nutritional status of the children and some characteristics of their mothers.

4.2 Child Nutrition and Mother's Characteristics

At an individual level, a child's exposure to ill-health is intimately tied up with the knowledge and practice of the mother. With nutrition, there may also be a genetic component. In the high risk households where child nutrition is relatively poor, we have seen that the physical environment in which the child lives is also poorer. The mother can modify the physical environment in a positive or negative way: positively by maximizing whatever resources are at hand and by protecting the child as much as possible from health hazards, and, negatively, a mother may not make the best use of the means available to her or be unable, for whatever reason, to protect the child from exposure to health hazards.

In a cross-sectional survey such as this one, we cannot monitor individual actions of the mother which may be to the benefit or detriment of the child's health. Instead, the surrogate measure of mother's education is employed. It can be hypothesized that the better educated the mother, the more likely she is to be able to modify the home environment in a positive way for the child, and, therefore, the less health risk there will be. Mothers education should then be related positively to nutritional status and vaccination status of the children and negatively to childhood mortality.

The age of the mother may also be related to child nutrition levels. Apart from the higher risk pregnancy groups (the relatively old and relatively young), the older the mother, the more experience she probably has and, therefore, the better the child will be cared for. A positive relationship between mother's age and child nutrition levels is hypothesized.

Anthropometric values may depend on genetic as well as environmental factors and, indeed, when assessing the nutritional status of children, the physical build of the mother should be taken into account, particularly with young babies. A test of the relationship between mother's physique and the child nutritional variables is therefore included.

Mothers Education

Dealing firstly with education, mothers were divided into four groups: 1) No education; 2) Partial primary education (Standard 1-6); 3) Full primary education (Standard 7 or 8) and 4) Secondary education (Form 1-6). The mothers of 18 children were unregistered so the number of available cases was reduced to 413. Table 4.1 shows the average H/A, W/A and W/H of the children, classified by education level of the mother, irrespective of group of household.

Table 4.1

Child nutrition by mothers' education

	H/A	W/A	W/H	n
No education	93.4	85.6	97.5	138
Some primary	92.7	84.2	97.5	163
Full primary	94.9	89.1	99.6	75
Secondary	95.6	91.2	99.9	37

An analysis of variance over the four groups showed significant differences in H/A and W/A at the $p=0.01$ level, but no overall difference in the W/H distribution.

Table 4.2 shows the results of analysis of variance tests between each possible pair of groups for the three indices.

Table 4.2

Analysis of variance of nutritional status by mothers education (F-values and significance levels).

	No education			Some Primary			Full Primary		
No education									
	H/A	W/A	W/H						
Some primary	.98 NS	.90 NS	.99 NS	-					
				H/A	W/A	W/H			
Full primary	4.4*	3.3 NS	2.1 NS	8.2 **	7.0 **	2.3 NS			
							H/A	W/A	W/H
Secondary	6.0*	6.1 *	1.7 *	8.8 **	9.9 **	1.9 NS	.72 NS	.74 NS	.03 NS

NS = not significant * = significant at $p < 0.05$
** = significant at $p < 0.01$

The influence of mothers education on child nutrition levels is confirmed by these results. In particular, the important cut-off is between those who have completed primary education and those who have not. There is little difference between the no education - some primary groups and the full primary - secondary groups as can be seen from Table 4.1. Again H/A and W/A contain all the significant differences: stunting rather than wasting is strongly related to the level of mothers education.

When the children were allocated to only two groups - none or some primary education and full primary and secondary - the inter-group differences were maximized, with H/A and W/A being significantly different in an analysis of variance test at the $p < 0.001$ level and W/H significantly different at $p < 0.05$, showing a little evidence that wasting as well as stunting may be a function of mothers education.

As might be expected, the distribution of mothers according to education differs markedly between the groups as Table 4.3 shows.

Table 4.3

Mothers education by household group

	Group 1	Group 2
No education	53	85
Some primary	79	84
Full primary	61	14
Secondary	33	4

chi square = 56.6 $p < 0.001$

Thus, 90% of mothers in the high-risk group have not completed primary school compared to 58% of mothers in the low-risk group. Mother's education is therefore highly related to child nutrition levels, particularly H/A and W/A, and is also a distinguishing feature of the two groups.

Age of mothers

Mothers age, a continuously measured variable, was correlated against the three nutritional measures. Negative but insignificant coefficients were found for all three measures. Since younger women tend to have had more access to education than older ones, this negative relationship may simply reflect differences in education. The correlation analysis was therefore repeated within each of the four education categories described above. This time, positive relationships were found in 7 cases out of the 12 but, again, these were all statistically insignificant. The conclusion is therefore that the age of the mother is unrelated to the child's nutrition level.

Mothers physique

To test any genetic associations between mothers and children, the mothers were weighed and measured during the fieldwork. Quetelets Index (W/HxH), a measure of total body fat, was calculated from this data and, together with mothers height, correlated with the three nutritional variables. Since some mothers were not present during the interviews and others were excluded because of pregnancy, the usable cases were reduced to 207 mothers over 372 children.

Table 4.4 shows the correlation coefficients between the two sets of variables.

Table 4.4

Mothers physique and child nutrition: correlations

	Height	Quetelet Index
H/A	.196***	.143**
W/A	.175***	.216***
W/H	.03	.123*

Significance levels * = $p < 0.05$, ** = $p < 0.01$, *** = $p < 0.001$.

Mothers physique is clearly related to H/A and W/A but less so to W/H. The taller or fatter the mother, the taller or heavier the child is likely to be.

Dividing the children into those over six months and those up to six months sheds more light on these relationships. Up to six months, mothers height is strongly related to H/A, but not W/A; it is also significantly negatively related to W/H; For the older children, mothers height is significantly related to both H/A and W/A, but is unrelated to W/H. The mothers Quetelet Index is positively related to all these measures for both age groups suggesting that fatter women have longer, heavier and fatter children and that the relationship is fairly constant with age.

There is, therefore, a genetic component to the anthropometric measures obtained. It is possible to remove this component statistically from the nutrition measures and note whether there is still a difference between the two groups of households. This is simply achieved by regressing the nutrition measure on the mothers physique variable and comparing the distribution of residuals between the two groups. Since mothers height and H/A are consistently related, the experiment was conducted using these two variables. A linear regression line fitted through these data produced a set of residuals which were then compared between Group 1 and Group 2 giving the following figures:

	Group 1	Group 2
Mean	0.8264	-0.9679
S.D.	5.2597	5.1461
n	171	143

Thus, the H/A values of Group 1, even allowing for mother's height, are above average, while those of Group 2 are below. The difference of means is almost significant at the $p < 0.001$ level which agrees with the differences in the H/A distribution without the effect of mothers height taken into account.

As with the education variable, there are consistent differences in the stature and body fat of the two groups of mothers, as shown in Table 4.5.

Table 4.5

Mothers height and Quetelet Index

	Height		Quetelet Index		
	Mean	SD	Mean	SD	n
Group 1	157.0	6.5	2.1038	0.2802	113
Group 2	155.5	6.0	1.9741	0.2398	95
t-test for difference of means	1.72(NS)		3.59***		

Mothers in Group 1 are, on average, slightly taller than those in Group 2 although the difference is not significant. They have, however, significantly more body fat than the high-risk household mothers, an indication of much better adult nutrition in the Group 1 households.

Comparing the physique - nutrition correlations within groups, some differences emerge as shown in Table 4.6.

Table 4.6

Correlation of mothers physique - child nutrition within groups

	Mothers Height		Quetelet Index	
Children	Group 1	Group 2	Group 1	Group 2
H/A	0.229***	0.109	0.082	0.119
W/A	0.218***	0.071	0.089	0.27***
W/H	0.041	-0.021	-0.004	0.216***

With Group 1, mother's height is significantly correlated with the H/A and W/A of the children, but not with W/H, while the Quetelet Index is not related strongly to any of the measures. Within Group 2 an opposite situation prevails: mother's height apparently plays little part in determining H/A, W/A or W/H, while the mother's Quetelet Index is strongly related to W/A and W/H.

Thus, it appears that in high-risk households the children's stature is not related to that of the mother but, where a mother has low body fat, so do the children, suggesting that a shortage of food affects the whole family.

Within the low-risk group, the children's height for age depends somewhat on the stature of the mother, but there is no relationship between the mother's body fat and the W/H of the children.

4.3 Household-level analysis: child nutrition

In order to relate the socio-economic variables, as a larger group, to the child nutrition variables, a method of giving each household with a child a nutrition index had firstly to be devised. In the KIS, a simple averaging of each anthropometric measure was used. In the present study, a good deal of within-household variation in these values was seen, leading to the suggestion that simple averaging would underestimate the extent of under-nutrition. It seemed sensible also to exclude babies under six months from the calculation on the grounds that wholly breastfed babies will be, to a large extent, immune to any health risks brought about by their socio-economic environment.

With these considerations in mind, the following method was used to calculate H/A, W/A and W/H values by household:

- households with no children over six months and under 5 years were excluded.
- If a household had two or more children in the 6 months - 5 years age group their values were averaged if:
  1) Both children were over the accepted cut-off points, i.e., 90% of H/A and 80% for W/A and W/H and:
  2) The difference between the highest and lowest value was under 5%.
- If either of these conditions was not met, the lowest value was selected as representative of the household.
- A household with only one child in the 6 months-5 years age group was represented by the anthropometric values of that child.

Using this format, 181 of 248 households were assigned a value of H/A, W/A and W/H. 19 households had more than one mother with children present.

Apart from the set of variables described in Table 3. some extra items were added to the socio-economic factors. Most important was the calculation of what was called in KIS the "multiple stress index" (MSI), a combination of several of the most important variables thought to represent stress.

In the present study a MSI was recalculated in much the same way as in the KIS. It consisted of 9 variables, most of which were first adjusted for additive compatibility. The MSI for each household was calculated by simple adding of the 9 variables after adjustment. The variables used and the manner of adjustment were as follows:

1) Water consumption : Z - transformation

2) Trip time to water : Z - transformation, each value multiplied by -1

3) Cash crop : 1 if cash crops grown, = 0 otherwise

4) Goat equivalents : Z - transformation

5) Children/adults ratio : Z - transformation, each value multiplied by -1

6) Member of household employed : = 1 if yes, = 0 if none

7) Remittances : = 1 if household receives monthly remittances, = 0 otherwise

8) Chronic disability (1) : -1 if chronically disabled adult, = 0 otherwise

9) Chronic disability (2) : -1 if chronically disabled child, = 0 otherwise

These nine variables when summed give the MSI. The higher the value, the less stress is likely to be present, and vice-versa. The index is normally distributed over the 248 households with a mean of 0.351. The Group 1 MSI had a mean of 1.465 with a standard deviation of 2.6, compared with figures of -0.763 and 1.727 for Group 2.

The education of the mothers education was recalculated by household. Where more than one mother was present, the highest level of education was taken as the household index. The four levels used in the previous section were the values chosen. After the first correlation analysis, two further indices were constructed and these are described below.

Although many of the socio-economic variables are measured on the nominal or ordinal scale (e.g. presence or absence of cash crop) they were all included in the correlation matrix with the nutrition variables, for the coefficients give a clue as to the direction of the relationships. Since we already know that most socio-economic and child nutrition variables differ significantly between the two groups, we should find significant correlations

between them irrespective of groups, even with the dichotomous or polychotomous variables.

Table 4.7 shows the correlations between the child nutrition and socio-economic variables with significant coefficients marked in the usual way. Square-root transformations were made on the two livestock holding variables and water consumption to make these more linearly related to the three dependent variables.

Table 4.7

Correlations between child nutrition and socio-economic variables

Socio-economic variables	Child Nutrition Measures		
	H/A	W/A	W/H
Water consumption (*)	.121	.073	.035
Trip length	-.011	.044	.109
Cash crops	.068	.013	-.03
Cows (*)	.233**	.279***	.183*
Goat equivalents (*)	.215**	.269***	.174*
Children/adults	-.05	.039	.05
Employment	.06	.054	.099
Employment outside	.081	.099	.046
Remittances	.013	.048	.058
Latrine	.148 *	.147*	.019
Cement floor	.199**	.229**	.087
Mabati roof	.204**	.145*	-.026
Plastered walls	.14	.153*	.038
Radio	.171*	.102	-.073
MSI	.18*	.126	.069
Mothers education	.182*	.118	.017

N=181, all significance levels based on two-tailed F-test
(*) square root transformation used to linearise data

The table shows that, in terms of being able to give accurate predictions of the nutritional variables, the socio-economic measures are not closely-enough related. However, as expected, there are significant correlations between a number of variables. Livestock holdings and building characteristics are most strongly associated with the nutritional variables.

H/A is significantly related to the livestock holdings, to four of the five compound characteristics and to the MSI and mothers education. The general interpretation is that these correlated variables represent a general wealth factor which translates to better long-term nutritional status through food security. The demographic pressure within households as represented by the children/adult ratio has no correlation with H/A, nor with the other two variables, and such pressure must therefore be over-ridden by other factors.

W/A, being, itself, highly correlated with H/A shares a similar set of correlations with the socio-economic variables. Weight for height is significantly associated only with the two livestock holdings variables, although most of the associations are in the expected direction.

The multiple stress index (MSI) is positively correlated with all three nutritional variables but the coefficients are all low and the index cannot therefore account for much of the variance in these. While separating well between the two groups of households, therefore, the MSI cannot, by itself, explain the variations in the anthropometric measures.

Two simple alternative stress indices were compiled from the variables contributing most to the correlation matrix: BSCORE, was calculated as an index of compound amenity and SCORE as this plus livestock holdings and mothers education.

The five compound amenity variables had the following limits:

CHOO = 0 if no latrine, =1 if latrine and not used or incomplete, = 2 if latrine used

FLOOR = 1 if cement floor, = 0 otherwise

ROOF = 1 if mabati or tile, = 0 otherwise

WALLS = 1 if plastered, = 0 if rough

RADIO = 0 if no radio, = 1 if radio but not working, = 2 if working

BSCORE was a simple sum of these five variables for each household, with limits of 0-7.

The variable SCORE added two more indices to BSCORE as follows:

COWS = 0 if no cows, = 1 if at least one cow

MASED = 0 if no education of mother in household, = 1 if some primary, = 2 if full primary, = 3 if secondary.

Thus, the limits of SCORE are 0-11, giving a more continuous distribution than the nominal categories of the individual variables. Median values of BSCORE and SCORE for Group 1 households were 5 and 8 respectively compared with 2 and 3 in Group 2.

Table 4.8 shows the correlation of the two compound indices with H/A, W/A and W/H over the 181 households with nutritional status variables.

Table 4.8

Correlations between BSCORE, SCORE and Nutritional Variables

	H/A	W/A	W/H
BSCORE	.247***	.209***	-.009
SCORE	.264***	.227***	.038

These simplified multiple stress indices are more highly associated with H/A and W/A than the more complex MSI which did not take compound amenities into account. W/H, again, shows little association with these variables.

To summarize this section, the child-specific anthropometric measures were recalculated using the rules stated to give a household child nutrition value for each measure. MSI and mothers education were calculated also at the household level and added to the set of socio-economic variables. These were then produced in a correlation matrix with the child nutrition variables and the associations described. While no very strong correlations were evident, most socio-economic variables were related to child nutrition in the direction specified, particularly to H/A and W/A. The MSI was significantly related to H/A, but not to the other variables. A simple summing of several of the categorical variables produced the alternative stress indices, BSCORE and SCORE and these were found to have strong associations with H/A and W/A.

4.4 Other risk factors

Mortality and mother's education

It has been suggested that the more educated the mother is, the faster she will react when health deteriorates and the better she will know how to take action to prevent deaths. Table 4.9 compares for each educational level, the mothers who lost a child during the last five years with those who did not.

Table 4.9

Frequency of mothers who had a child loss over the last five years by mothers level of education

	Child loss No.	Total No.	%
No education	7	138	5.1
Some primary	10	163	6.1
Full primary	3	75	4.0
Secondary	2	37	5.4

Within the limits imposed by the small number of cases, it can be seen that no clear relationship emerges between the mother's education and child loss. This suggests that the ability to respond to an acute or chronic childhood ailment is limited. Prevention of mortality in an area where infectious diseases are abundant in all households, as we have seen, depends much on early recognition and appropriate treatment. For the latter, the accessibility to proper health facilities is still a limiting factor for many households. The complete prevention of diseases is another aspect of mortality prevention. Immunization is one of the more successful tools in this field and it is assumed that the mother's education is related positively to the completed vaccination status of her children above one year.

Vaccination status and mother's education

Table 4.10 compares the vaccination status of children above one year with mothers education.

Table 4.10

Vaccination status of children above the age of one year by educational level of mothers

Vaccination status	No formal	Children with mothers having at least some primary education
	No.	No.
Fully	53	130
Partially or not	66	84

chi square 7.47 $p < 0.01$

In Table 3.12 it was shown that most of the children above 1 year in both risk groups attended, at least once, a vaccination session hence having a card or an incomplete vaccination status. To finalize the vaccination schedule is a different matter. In the low risk households a rather higher completed vaccination status was found. The drop-out rate for reattending was particularly high among the high-risk children (Table 3.14). The mother's education, at least some formal years of schooling, is strongly associated the completion of vaccination schedule ($p < 0.01$). This suggests that the presence of some primary education may make mothers more amenable to health education efforts to maintain clinic attendance for completing the vaccination schedule of their children.

Other cutoff points between the different levels of mother's education e.g. no education and some primary education versus full primary education and above, did not show any association with completeness of children's vaccination status.

Morbidity and mother's education

The morbidity pattern in the different types of households has been shown to be quite diverse (Table 3.6, 3.7). As mother's education is strongly related to the type of household, it is therefore concluded that no relationship is likely between the morbidity pattern among children and mother's education.

Mortality and household variables

A possible relation was shown between the occurrence of recent child mortality and the high risk households but not clearly with the mother's education. It is relevant to see if other household characteristics, such as the two household indices, are related to the mortality pattern. In that way the score could be used as a marker of increased risk enabling the CHW to identify such a household at an early stage and take appropriate action to prevent mortality.

Table 4.11 compares the households where an underfive death has occurred over the last five years with the household SCORE.

Table 4.11

Household scores for households with underfive deaths over the last 5 years

	SCORE	
	Mean	s.d.
Household with underfive death	3.86	2.4
Group 1 households	7.4	2.2
Group 2 households	3.4	2.3

As can be seen from table 4.11 the mortality households with a recent death scored very low or compared with the mean found for all households. The figures suggests that household scores are a tool for CHWs not only for identifying high risk households for health indicators such as nutritional - and vaccination status, but also for mortality as an outcome per se.

4.5 Repertory Grids and Questionnaire Survey

Under the general heading of interrelationships, it is appropriate to consider the results gained from application of the repertory grids with those from the conventional socio-economic questionnaire survey.

The twin application of the methods was considered because of the need to measure CHW risk perception as well as the conditions envisaged by the investigators as having a bearing upon the risk indicators.

The results given in the previous chapter suggest that the factors produced by these two approaches have many common elements. The grid methodology, allowing an unconstrained flow of ideas, obviously gives a wide range of risk-related variables, but the conventional approach permits a more direct relating of risk indicators to socio-economic variables. Several of the most commonly-used grid constructs have direct matches with the socio-economic variables measured by the questionnaire, for example, latrines, mabati roofs, employment characteristics and livestock holdings. Some idea of the accuracy of CHW perception can be gained where a construct and a questionnaire variable are the same or similar. Table 4.12 shows three commonly-mentioned constructs, the proportions of the attributes allocated to Group 1 and Group 2 households by the CHW compared with the proportions actually measured in the field.

Table 4.12

Commonly-mentioned constructs and equivalent survey results

	Repertory Grid		Questionnaire Survey	
	Group 1	Group 2	Group 1	Group 2
% with functioning latrine	88%	40%	87%	49%
% with mabati roof	76%	20%	72%	24%
% with "cows" or many cows/% with at least one cow	84%	18%	77%	44%

CHW perceptions of the households having latrines and mabati roofs is very exact, suggesting a high degree of familiarity with the households selected, as has been assumed at the outset. Comparison of the cattle holdings is a little more difficult since it is a continuous variable while the construct was sometimes "many cows - few cows" and sometimes simply "cows- no cows".

Several other constructs refer to items measured directly by the survey but comparison must be restricted to the households of the CHWs using these construct, and cannot be applied to the entire sample.

The repertory grids have suggested several risk factors not measured in the questionnaire survey. Farm-related features are important to health risk in CHW perception and variables measuring land holdings and quality are suggested. These present practical field difficulties, as do the attributes of the farmers themselves, an important method of distinguishing the households during the grids. Many compound attributes are common to both approaches, but the grids have suggested other possible measurable features such as the existence of paths, general compound cleanliness, shade trees, dish racks and granaries.

While these features emanate from the grids and have implications for the risk-related factors, an opposite flow of information is also possible with implications for improving CHW perception of risk. For example, none of the 25 CHWs, male or female, produced mothers education as a separating construct and yet the foregoing analysis has shown this to be an important feature associated with child nutrition and vaccination status. Similarly, some constructs are fairly neutral with respect to nutritional status. "Large family", "many children", etc. are not very good predictors of health risk by themselves, nor, given the high proportions of Group 2 households involved, is the presence or absence of a latrine.

Another area where conflicting signals were received from the household survey and from the grid concerned morbidity. The questionnaire returns suggested similar levels of morbidity between the two household groups, thereby implying that simple morbidity level was a poor indicator of risk. On the other hand, "often sick" (12 CHWs) and "healthy children" (8 CHWs) were commonly used in the grids to separate out the groups, suggesting that the CHWs thought that the groups showed different morbidity levels.

It is not possible to resolve this contradition without further investigation, but two possibilities are apparent: either the household survey needed also to measure duration and severity of the ailments reported, whereby an inter-group difference might have emerged, or the CHWs perception of differing morbidity was recognizing only the more serious ailments, possibly including chronic disabilities and mortality, in which case the results are not contradictory.

The application of two separate methods of elicitation of health risks is complimentary rather than contradictory. Results suggest that the application of RG techniques give a rapid, comprehensive and accurate representation of CHW perception whilst the conventional household questionnaire provides accurate measurement of a smaller selection of risk-related variables.

It can be suggested that, where comprehensive knowledge of the socio-economic, physical and cultural environment is lacking, an initial RG approach will yield relevant and comprehensive information on which a conventional household survey can be based if necessary. In the present study, experience in the area led to the simultaneous application of the methods but the results suggest that prior application of RGs can suggest the most appropriate variables to measure during a household survey.

On the other hand, the use of RGs as a single approach has potential in rapid rural monitoring of health and socio-economic status. Compared to conventional approach, RGs are relatively easy to organise, cheap, fast and provide a wide range of material. RGs produce qualitative information from low-bias elicitation methods and it can be argued that this information may be more valuable in settings such as the present study than the "hard" data produced at great expense and difficulty by conventional methods.

5. CONCLUSIONS AND RECOMMENDATIONS

5.1 Summary

The Kibwezi Health Risk Survey sought to identify community perceptions of health risk factors, to measure risk indicators amongst two groups of households, one group identified by the CHWs as vulnerable to risk and the other one not, and to relate

the risk factors to the risk indicators on an individual and household basis.

The community perceptions of health risk were seen through the eyes of 25 CHWs in 8 sub-locations of Kibwezi Division using repertory grid analysis, a technique which seeks to maximise respondent initiative and minimise interviewer and instrument bias.

Health risk was represented by the nutritional status of children under five years, child morbidity, mortality and vaccination status. These indicators were measured in 248 households along with a set of socio-economic factors, assumed to be related to health risk, drawn up by the investigators. The 248 households comprised the two groups initially selected by the CHWs as being prone to health risk in times of drought, famine or epidemic, or relatively free of such risks. Both groups comprised 124 households.

The results showed a clear separation of the groups in all three areas: CHW perception of risk factors, health risk indicators (excepting morbidity) and socio-economic factors.

Amongst the risk indicators, the prevalence of stunting showed very significant differences between the two groups with stunting concentrated in the high risk households. Wasting was uncommon in either group. Morbidity levels, based on a one-week recall of common ailments, showed little difference between the two groups. Child mortality, while low and possibly under-reported, was strongly associated with the high-risk group. Chronic disablement was also much more common in Group 2 both at a household and individual level. Vaccination coverage was very high in both groups but with a higher drop-out rate in Group 2.

The low-risk households were better-off in terms of most of the socio-economic variables measured. They had higher per capita water consumption, better houses with more facilities and more access to money through employment or cash crops. Demographically, the high-risk households tended to be slightly smaller, had higher proportions of under-fifteens and very low proportions of males or females in the 20-29 years age cohort.

The repertory grids showed that the CHWs perceived different kinds of factors to be associated with health risk, but these could be classified into six general categories - farm-related, compound characteristics, non-farm wealth, health-related, personal characteristics and water-related, most constructs falling in the first two categories. The CHWs successfully separated the households into two district groups by use of the constructs, many of which matched the socio-economic variables on the household questionnaire.

Interrelation of these three components suggested that many of the risk factors identified by the household questionnaire and the repertory grid are related to the risk indicators. The

factors on which the distinction is based are easily identifiable and are valid predictors of health outcomes.

Stunting of children, at an individual level, shows variations which correspond with the level of mother's education, particularly noticeable between children of mothers who have completed primary school and those whose mothers have not.

Stunting and wasting of children are partly related to mothers' physique but, even removing this influence, there was still a significant difference in the extent of stunting between the two groups. Vaccination status was significantly poorer amongst children whose mothers had had no education at all but mortality did not seem to correspond to variations in mother's education.

At the household level, livestock holdings were strongly related to all three nutritional status measures and compound characteristics to stunting. The multiple stress index, calculated in the same way as in the KIS to take into account the main socio-economic variables, was related significantly to stunting alone. Additional, simple stress indices were calculated and showed higher correlations with H/A and W/A.

The repertory grids produced health risk factors which were largely compatible with the socio-economic variables proposed by the investigators. The CHWs identified building characteristics and farming characteristics as the most important ways of distinguishing high-risk and low-risk households. They failed to pick up mother's education as an important factor however. While the household questionnaire did not identify morbidity levels as clearly different between the two groups of households, this was seen as an important distinguishing characteristic by the CHWs. The resolution of this contradiction seems to be in terms of differing definitions of morbidity.

Perhaps the main conclusion of the study is that the Kibwezi CHWs are well able to distinguish high and low-risk households. The ways in which this distinction is made are logical and based on a sound knowledge of their community.

The household survey suggests that poor nutritional status (particularly manifested in stunting) and a high level of chronic disability are the most sensitive indicators of health risk in the study households. Mortality seems to be a valid outcome as well but relatively few deaths were recorded so reliability is limited.

Morbidity patterns measured by prevalence of common conditions are equally spread between low and high risk households within the same environment in Kibwezi.

Establishing an increased surveillance in particular for the high risk households and concentration on the improvement of nutritional status and the prevention and management of chronic

disabilities can therefore be seen as priorities for the CBHC programme.

In general, the study has shown the validity and importance of the health risk approach in primary health care, emphasising the extent of differentiation in health status amongst an apparently homogenous rural population. The study has shown that a risk approach does not necessarily need to be made at individual level but can use households as level of measurement of risk factors predicting health outcomes. Such an approach would facilitate the CHWs effectiveness in health care activities.

It is also suggested that further monitoring of this study population at regular intervals will shed more light on some of the dynamics involved in the health risks approach and that the CHWs should form an integral part of such activities.

Since the main conclusions of the study impinge directly on the CHW scheme, the study concludes by making a set of recommendations regarding CHW activities.

5.2 Recommendations

Perhaps the most significant finding of this study is that Community Health Workers (CHWs) are able to distinguish between "high risk" households and those considered to be "low risk". This is confirmed by the fact that for several health risk indicators there was a clear difference between the two groups that the CHWs had separated out at the beginning of the grid exercise. Based on these findings the following recommendations are presented:

1) In each of the programme areas (the 8 sub-locations) there should be enough CHWs trained to give each CHW approximately 30 households to care for. This could give better meaning to the CHWs' role as a motivator.

2) An index made up from 6-8 quantifiable stress factors, at household level should be compiled by the CHWs. This may be done through the initial household visits during which each CHW would score each home to determine their level of risk. The ranking of households would be based on the total score per household after each factor had been scored.

3) Since sub-locations varied in the relative importance of the various stress factors, the index may be modified (e.g. omitting some variables or giving a greater weighting to others) according to local conditions as decided by the CHWs.

4) The CHWs motivation activities will then give priority to those households at higher risk. Households categorized as "high risk" should be visited more often than households categorized as "low risk". Frequency of

visits should be at least once a month, or more often if feasible. CHWs activities should comprise the full range of promotional activities including early detection of household members at risk, appropriate remedies and referral if necessary.

5) Since the risk factors identified during this study, and also those identified during the KIS, do have a high predictive value, the CHWs activities must be focused around those factors which are most solvable by the community.

6) The training of CHWs should concentrate more on multi-sectoral approaches since many of the factors identified as risk indicators are not directly linked to health e.g. agriculture, water, animal-raising, house construction, education, etc.

7) Additional skills necessary for the above-mentioned tasks could be included in the on-going CHW monthly refresher training sessions, to enable CHWs to monitor changes over time.

8) CHWs should intensify their motivational activities particularly in households with children 7 months and above to monitor the child's changes in nutritional status (e.g. height for age).

9) CHWs should continue to motivate mothers to bring children for immunization and particularly follow-up mothers to ensure that children are fully immunized against all 6 major communicable diseases by the age of 12 months.

10) There is a need to educate mothers with regard to weaning. The 7 to 12 months old cohort showed weight for height well below the required standard in the high risk group in the study. This may be a result of weaning practices.

11) Households having chronically disabled persons should be regarded as high risk households. CHWs activities must be geared towards ways and means of compensating for disability in a household. This compensation should come from the community in the form of assisting the particular household in carrying out those activities which are causing problems as a result of disability.

12) While there were no significant relationship between the dependency ratio and the nutrition variables, there is a need for more emphasis on family planning in the training of CHWs. The dependency ratios from the study indicate population growth that cannot be supported indefinitely by semi-arid environment.

13) The idea of simplified quantifying of stress as an indicator of health risk at household level should be disseminated to other community based health care programmes in the country.

APPENDIX 1 HOUSEHOLD QUESTIONNAIRES

FORM A TS...11.15 a.m.

KIBWEZI HEALTH RISK PERCEPTION PROJECT TF.....

REPERTORY GRID

Name of Respondent:...James Muli. M/F Years Service (IF CHW) ...2.5

No: ....12... Position ...CHW.... Age ..28.... Education Level ..STD VII.....

CONSTRUCTS	HOUSEHOLD GROUP A				HOUSEHOLD GROUP B				
	MUTUA	KILONZO	MULI	MARY	NGAU	MUSAU	KINEU	JANE	KATHEKA	KYALO
1.										
2.										
3.										
4.										
5.										
6.										
7.										
8.										
9.										
10.										
11.										
12										

STAGE 1: The CHW gives personal information and the names of five households he perceives to be low risk Group A) and five high risk (Group B). The names are written along the top of the grid and also copied individually onto index cards.

FORM A TS..11.15 a.m.....

KIBWEZI HEALTH RISK PERCEPTION PROJECT TF.....

REPERTORY GRID

Name of Respondent:..James Muli.. M/F Years Service (IF CHW) ...2.5

No: ...12.... Position ..CHW..... Age ..28.... Education Level ...TD VII.....

CONSTRUCTS	HOUSEHOLD GROUP A					HOUSEHOLD GROUP B				
	MUTUA	KILONZO	MULI	MARY	NGAU	MUSAU	KIMEU	JANE	KATHEKA	KYALO
1. Many cows - few cows		1*			1*		0*			
2. Big shamba - small shamba			1*					0*	1*	
3.										
4.										
5.										
6.										
7.										
8.										
9.										
10.										
11.										
12.										

STAGE 2: Three cards are selected at random - Kilonzo, Ngau and Kimeu. The CHW states that Kilonzo and Ngau have many cows and Kimeu has few cows. Two "1"s and a "0" are entered appropriately each with an asterisk to show that these are the three households which have elicited the "many cows" - "few cows" construct.

The cards are replace and reshuffled and three redrawn - Muli, Jane and Katheka. The CHW decides that Muli and Katheka have big shambas whilst Jane has a small one. This second construct is entered in the same way as the first.

FORM A TS..11.15 a.m.....

KIBWEZI HEALTH RISK PERCEPTION PROJECT TF.....

REPERTORY GRID

Name of Respondent:..James Muli.. M/F Years Service (IF CHW) ...2.5

No: ...12.... Position ..CHW..... Age ..28.... Education Level ...TD VII.....

CONSTRUCTS	HOUSEHOLD GROUP A					HOUSEHOLD GROUP B				
	MUTUA	KILONZO	MULI	MARY	NGAU	MUSAU	KINEU	JANE	KATHEKA	KYALO
1. Many cows - few cows		1*			1*		0*			
2. Big shamba - small shamba			1*					0*	1*	
3. Accepts CHW advice - doesn't accept advice		1*		1*		0*				
4. Latrine - no latrine	1*							0*		0*
5. Many children - few			1*			1*	0*			
6. Has a duka - doesn't have	0*	1*		0*						
7. Uses donkey to fetch water - doesn't					1*		0*	0*		
8. Dirty compound - clean		0*				0*			1*	
9. Lazy - hard working							0*	1*		1*
10. Mabati roof - not mabati	1*		1*			0*				
11. Children in secondary school - not	1*						0*	0*		
12. Food shortage often - no shortage		0*				1*			0*	

STAGE 3: Twelve constructs have been entered in the grid in the manner explained in Stage 2. Notice that a "1" can be either a positive or a negative attribute, depending on the first pole of the construct mentioned. Construct 6 has been elicited within Group A households only and construct 9 within the Group B households.

FORM A TS..11.15 a.m.....

KIBWEZI HEALTH RISK PERCEPTION PROJECT TF...12.20 p.m.

REPERTORY GRID

Name of Respondent:..James Muli.. M/F Years Service (IF CHW) ...2.5

No: ...12.... Position ..CHW..... Age ..28.... Education Level ...TD VII.....

CONSTRUCTS	HOUSEHOLD GROUP A					HOUSEHOLD GROUP B				
	MUTUA	KILONZO	MULI	MARY	NGAU	MUSAU	KIMEU	JANE	KATHEKA	KYALO
1. Many cows - few cows	1	1*	1	0	1*	0	0*	0	0	0
2. Big shamba - small shamba	1	1	1*	0	1	0	1	0*	1*	0
3. Accepts CHW advice - doesn't accept advice	1	1*	1	1*	1	0*	0	0	0	1
4. Latrine - no latrine	1*	1	1	1	1	1	0	0*	0	0*
5. Many children - few	1	0	1*	0	1	1*	0*	0	1	0
6. Has a duka - doesn't have	0*	1*	0	0*	1	0	0	0	0	0
7. Uses donkey to fetch water - doesn't	0	1	0	0	1*	0	0*	0*	0	0
8. Dirty compound - clean	0	0*	0	0	0	0*	1	1	1*	0
9. Lazy - hard working	0	0	0	0	0	1	0*	1*	0	1*
10. Mabati roof - not mabati	1*	1	1*	1	1	0*	0	0	0	0
11. Children in secondary school - not	1*	1	1	0	0	0	0*	0*	0	0
12. Food shortage often - no shortage	0	0*	0	0	0	1*	0	1	0*	1

STAGE 4: The completed grid. The CHW has allocated each remaining household to one or other pole of each of the twelve constructs. Separation of the two groups of households is apparent in several constructs (e.g., dirty/clean compounds, mabati roof - no mabati roof). Running an eye down the columns shows similarities and differences between the households (e.g., Kilonzo and Ngau are perceived to be very similar, as are Kimeu and Katheka). The process (including the trial run with the beans) has taken one hour and five minutes.

FORM B

KIBWEZI HEALTH RISK SURVEY

HOUSEHOLD DEMOGRAPHIC RECORDS

CLUSTER NO:.....

HOUSEHOLD NO:.....

Please tell me the names of all the people who usually sleep in this compound
KWA NDAIYA NDAVYE MASYITWA MA ANDU ONTHE ALA MAKOMAA MUSYII KII

							CODING		
	Name	P/A	Relation to HH	Date of birth	Sex	Highest Level of Education	A	S	ED
1.			HH						
2.									
3.									
4.									
5.									
6.									
7.									
8.									
9.									
10.									
11.									
12.									

FORM C

KIBWEZI HEALTH RISK SURVEY

RISK INDICATORS

CLUSTER NO:.....

HOUSEHOLD NO:.....

1. Which people collect water in this household?
   NI ANDU MEVA ALA MAUTAA KIWU WA MUSYI UU?

Name ISYITA	Sex MUKA/MUUME	Trips per week NI MAVINDA MEANA ATA KWA KYUMWA?	Litres per trip MITUNGI YAANA ATA KWA ITHI IMWE?	Method of transport NZIA YA KUETE
-------	----------	----------	----------	----------
-------	----------	----------	----------	----------
-------	----------	----------	----------	----------
-------	----------	----------	----------	----------
-------	----------	----------	----------	----------

CODING	
TOTAL	----------
A.E.	----------
Litres/A.E./Week	----------

2. Dry season source ..... well, river, etc.)
   KITHO IVINDA YA THANO

3. How long does it take to make a return trip?
   NITA MASAA MAENA ATA ALA MUKUAA KWA KUTHI NA KUSYOKA .....

CODING	
Check Y/N?	
..... Min.	

4. Do you grow any crops only for sale (none used in the household?) If so, which crops?
NIUVANDAA MIMEA YA MUTHEMBA MUNA (ILA ITATUMIAWA MUSYI) ETHIWA NIWO, NI MIMEA IIKU?

1) ..... 2) .....

3) ..... 4) .....

5. Which animals do you own?
MWINA INDO SYIVA?

		CODING Price Ratio
Goats ..... MBUI	(Number) (UTALO NAMBA)	1.0 x =
Sheep ..... MALONDU		x =
Cows ..... NG'OMBE		x =
Chickens ..... NGUKU		x =
Oxen ..... NG'OMBE SYA MULAU		x =
		G.E.=

6a. Is there anybody in this household who works elsewhere and comes back every evening?
NIVETHIWA VE MUNDU WA MUSYI UU UTHUKUMAA VANDU NA AYINUKA?
Yes/No (If Yes, specify) .....

6b. Do you have any close relatives who work in town? (husband, son, daugher)
WI ANDU MENYU METHUKUMAA TOWN (MUUME WAKU, KIMWANA KYAKU, MWIITU WAKU?)

Y/N (If Yes, specify) .....

Do they help you by sending money? Y/N
NIMATETHESYAA KWA KUTUMA MBESA?

Every month? Y/N
KILA MWEI

Several times a year Y/N
MAVINDA KWA MWAKA

Once a year Y/N
IMWE KWA MWAKA

Only in emergency Y/N
ILA VE MBANGA

Never Y/N
VAI IVINDA ONA IMWE

7. Is there a latrine? Yes/No
VE KYOO

8. Observations
KUSYIISYA

Is the latrine used? KYOO NIKITUMIAWA?	Yes/No
Is there a cement floor? VE NYUMBA YA SIMITI?	Yes/No
Is there a mabati roof? VE NYUMBA YA MAVATI?	Yes/No
Are the walls plastered? UKUTA WI PLASTA?	Yes/No
Is there a radio? VE KAMEME	Yes/No
Does it work? NIKATHUKUMAA	Yes/No

9. Additional risk indicators

[Use supplementary sheet if provided]

FORM D

KIBWEZI HEALTH RISK SURVEY

MORBIDITY / MORTALITY

CLUSTER NO: .....

HOUSEHOLD NO:.....

1. During the past week has any child under five years in the household suffered from any of the following diseases:
KUMA KYUMWA KITHELU, VE KANA KA UKUU WA ITHEO WA MIAKA ITANO MUSYI KANAWAIE UWAU?

Name				
Diarrhoea KWIITUA				
Fever NDETEMA				
Coughing KUKOOA				
Running nose IKUA				
Eye infection METHO				
Other illness (specify) UWAU UNGI (WETA)				

2. Is there any adult in the household who can never do their normal duties because of weakness or sickness?
NIVETHIWA VE UMWE NTHINI WA NYUMBA INO ULA UTATONYA KUTHUKUMA MAWIA AA NUNDU WA WONZU KANA UWAU?

Yes/No

3. Is there any child of school age who often misses school because of weakness or sickness?
NIVETHIWA VE KANA KA UKUU WA KUTHI SUKULU, KETHIWA KAENDAA KANA KATAENDAA NUNDU WA WONZU WA MWI KANA UWAU?

Yes/No

(If "yes" to either question 2 or question 3, go to Form E)

4. Has any child in this household died during the last five years? (or since ..... give local event in 1981 which is well known)
VE KANA KAKUKAKWIIE KUMA IVINDA YA MIAKA ITANO? (KANA KUMA ..... NENGANE IVINDA YA 1981 ILA ISIIKIWE)

Yes/No

If yes, how old was the child when it died?
II, KANA KU KAKWIE KAI UKUU MWAU?

(If child was under 5 years old, pass respondent on to nutrition fieldwork)
ETHIWAKANA KAI ITHEO WA MIAKA 5 MANYITHYA 'NUTRITION FIELD WORKER'

If 'No' to question 4, thank the respondent and finish interview checking that:

- You have asked all the questions
- Everyone who normally lives in the household has been included in Form B
- All your writing is clear and any mistakes have been corrected.

FORM E

KIBWEZI HEALTH RISK SURVEY

CHRONIC DISABILITY

(This form is only completed if respondent has answered "YES" to Form D, Question 2 or 3)

Cluster No:.....

Household No:.....

Name of Person ISYITWA	Age UKUU	Sex MUUME/MUKA	Nature of illness NI UWAU MWAU	Sick for how long UWAITE KUMA INDII
.....	.....	.....	.....	.....
.....	.....	.....	.....	.....
.....	.....	.....	.....	.....
.....	.....	.....	.....	.....
.....	.....	.....	.....	.....

FORM F (1)

KIBWEZI HEALTH RISK SURVEY

Anthropometry and Vaccination Status

CLUSTER NO:.....

1) Children under 5

	Name	Sex	HH No.	Mothers No.	Scar	Age (Y/M)	Height	Weight	CODING W/H W/A H/A
1.									
2.									
3.									
4.									
5.									
6.									
7.									
8.									
9.									
10.									
11.									
12.									
13.									
14.									
15.									
16.									

VACCINATION RECORDS

CLUSTER NO:.....

	Record Card	BCG	DPT1	DPT2	DPT3	POL1	POL2	POL3	MSLS	COMPLETE	C O D I N G
1.											
2.											
3.											
4.											
5.											
6.											
7.											
8.											
9.											
10.											
11.											
12.											
13.											
14.											
15.											
16.											

FORM F (2)

KIBWEZI HEALTH RISK SURVEY

Anthropometry: Mothers

CLUSTER NO:.....

All women born between 1936 and 1971 (from Form B)
who gave birth since 1981.

	Name of Woman	HH No.	Woman's No.	Year of birth	No. of live births since 1981	No of stillbirths since 1981	Height	Weight
1.								
2.								
3.								
4.								
5.								
6.								
7.								
8.								
9.								
10.								
11.								
12.								
13.								
14.								
15.								
16.								

- If no livebirths or no stillbirths, no height and weight need to be taken

- Put asterix (*) above weight if woman is pregnant

FORM G

KIBWEZI HEALTH RISK SURVEY

Verbal Autopsy

To be completed if positive response to Form D, Question 4.

Interviewer should be careful probing to answer the following questions but without upsetting the matter or "filling in answers" during the interview.

1. What was the exact age of the child at death?

2. What were the symptoms at the beginning of the illness which led to the child's death

3. What did the parents (or other senior family members think the child died from).

4. What was the outcome of any pregnancies of the mother during the past 2 years.

TO BE COMPLETED AFTER FINISHING INTERVIEW

Cluster No:.....

HH No: .....

Child's Name: .....

1. Age of child at death ..... (Years, months or days, if under 1 month)

2. Check of symptoms at onset of disease

rash .... accident (specify) .....

convulsions ..... fever alone ....

acute watery diarrhoea ..... other (specify) .....

cough and fever .....

bloody diarrhoea .....

Did the child have have measles during the last three months of life? Yes/No

3. For children who died before one month

Exact Age:

a) Directly after birth .....

b) Same day .....

c) Next day .....

d) 3 days - 7 days .....

e) After 1 week .....

Did the child cry after birth Yes/No

Did the child suck the breast normally? Yes/No

Did the child stop breastfeeding when the disease began? Yes/No

Did the child develop spasms and stiffness? Yes/No

Who delivered the child? .....

4. History of mother's pregnancies over last two years:

.....
.....
.....
.....
.....
.....
.....
.....
.....
.....

5. Mother's opinion on cause of death .....

6. Other family members opinion .....

7. Interview's opinion .....

CODE

M.L.C.D. .....

FORM H

Initial:.....
Date:.....

KIBWEZI HEALTH RISK SURVEY

MORBIDITY

REVISIT AFTER 1 WEEK

CLUSTER NO:.....

Since the visit 1 week ago, has any child under five years in the household suffered from a disease?

Yes/No

Who was(were) the child (children):

	HH No.	Name	Major complaint as stated by mother	Diarrhoea	Fever	Coughing	Running nose	Eye infection	Other illness (specify)
1.									
2.									
3.									
4.									
5.									
6.									
7.									
8.									
9.									
10.									
11.									
12.									
13.									
14.									
15.									
16.									
17.									

APPENDIX 2:

Example of operation repertory grid.

The example is given in four stages to show how constructs evolve from a triad sort and how the grid is completed. The example and name of the CHW are imaginary but the results are typical of those emanating from execution of the grid methodology.