Mapping
for primary health care

District maps, clinic catchment areas & community mapping in the Eastern Cape Province

The EQUITY Project

strengthening equitable access to quality health services for all South Africans

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In each of the former regions, the nursing staff, environmental health officers (EHOs) and members of Community Health Committees (CHCs) in catchment areas made suggestions and contributed local knowledge of the communities.

Staff of regional offices also usually participated and helped to reinforce the importance of mapping as a tool, both to assess accessibility of services and to improve community involvement and use of services.

A further impetus to mapping which must be acknowledged was the baseline survey for the EQUITY Project and subsequent definition of "a catchment area map displayed on the wall" as an indicator for primary health care (PHC) in the Eastern Cape Province.

Xoli Mahlalela (MSH/EQUITY Project Research and Evaluation) assisted the training process for mapping on many occasions, especially in the former Regions C, D and E.

Carol Booth typed sections of the document when they first appeared as trip reports and Cathleen Fourie typed the draft document when compiled.

Dr Yoichi Horikoshi provided the Global Information Systems (GIS) maps and the charts.

1. See maps for change from regions to district councils.

Contents

Preface

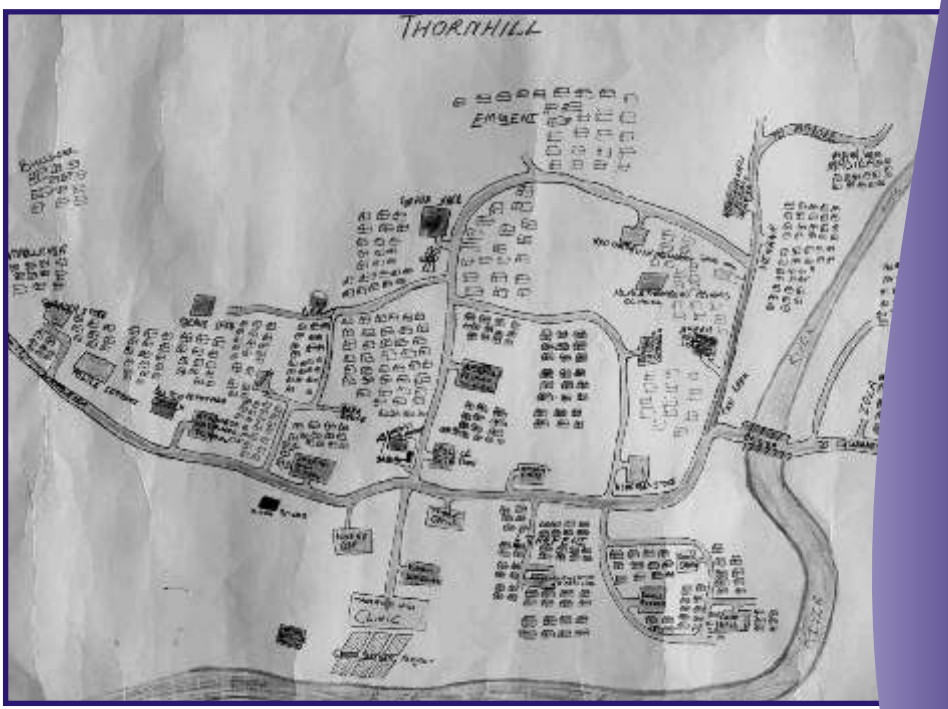
The first publication of *Mapping for Primary Health Care* appeared in January 1999 and followed almost three years of workshops in all parts of the Eastern Cape Province . Material and lessons learnt from these workshops form much of the contents thus making it a detailed case study. In August 1999 mapping was also described in the Case Study Series of the EQUITY Project. It was, however, felt that complete rewriting of this booklet for a second edition might unfortunately destroy this feeling of a description of techniques based on real in-the-field experience. This printing thus largely represents an historical document for the whole of the Eastern Cape Province. It documents the process of orienting staff in hundreds of small clinics and in new health districts to the population and communities within their catchment areas.

> "These maps are a picture of the world as seen by health workers and the communities they serve. Far more than cartographic portrayal, they capture features and dimensions often missing from a "real" map."

This was at a critical time in the establishment of a PHC approach in the new democratic South Africa. Previously, clinics were largely disease-oriented-dealing chiefly with the ill who came to their doors. The concept of a clinic determining its own catchment population and thus defining everyone who should be considered in comprehensive health services was relatively new. (South Africa had been excluded from the PHC activities of the World Health Organization (WHO) and UNICEF until 1994). With knowledge of the catchment population, the new information system could also be used to establish local coverage rates.

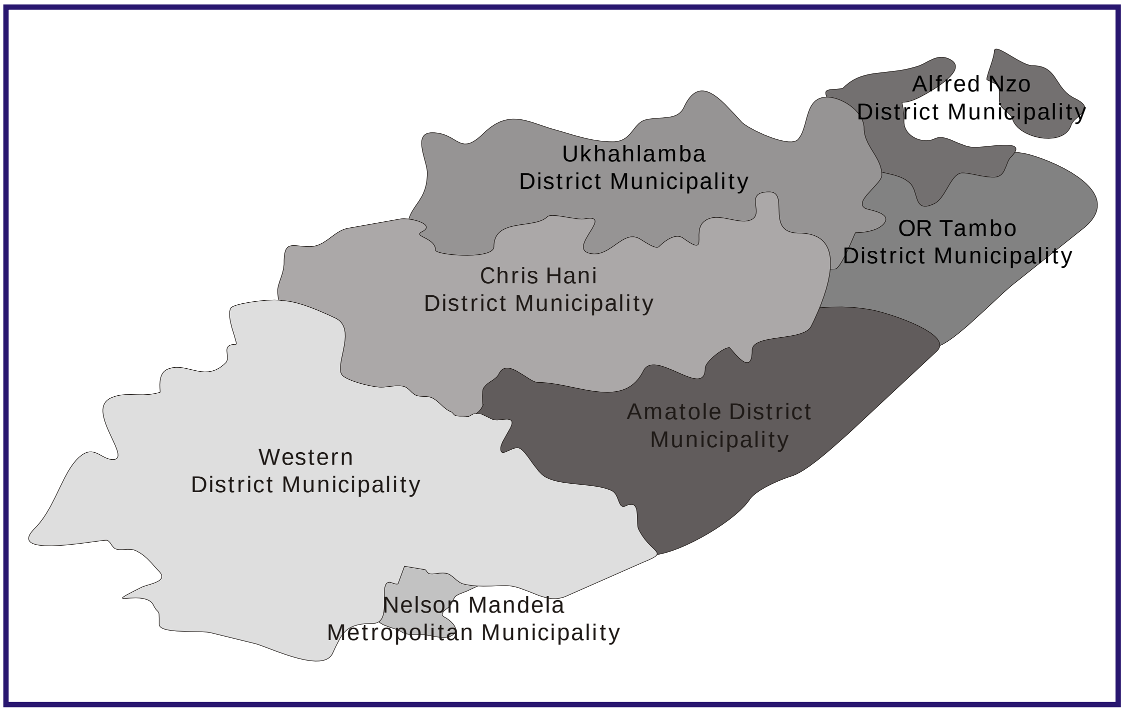
Much of the original document is being retained for its historical value; names have not been changed, but new maps of the district council areas, which replaced the original five regions A, B, C, D & E, are now included. The local service areas' new names (previously health districts) are also provided in these additional maps.

Besides the addition of new maps

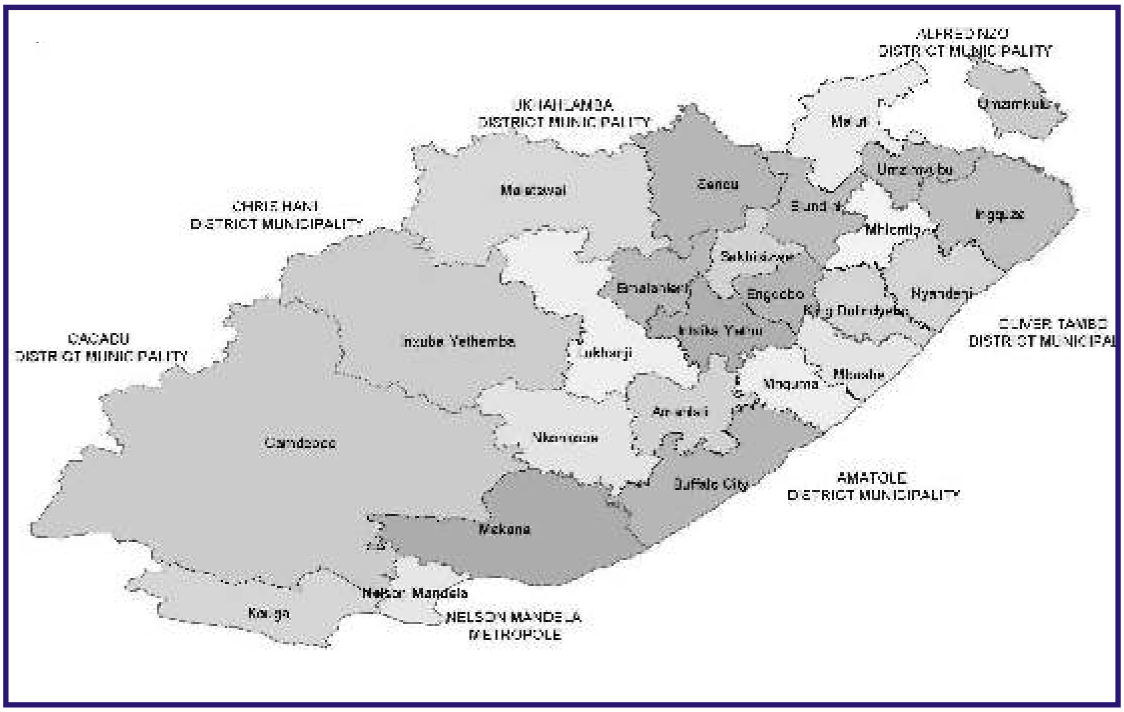


Thornhill Clinic catchment area, Queenstown District

showing the new (or old local) names, there have been very few changes in the main document up to page 57, except for the additional sections on HIV/AIDS, tuberculosis (TB) outbreaks. The guidelines starting on page 58 have few additions.



Map of the Eastern Cape Regions



Map of the Eastern Cape Health Districts

Acronyms

AIDS	Acquired Immune Deficiency Syndrome
AMREF	African Medical and Research Foundation
CHC	Community Health Committee
CHW	Community Health Worker
DHMT	District Health Management Team
DOH	Department of Health
DOTS	Directly Observed Treatment Short-Course
EHO	environmental health officer
GIS	Geographical Information System
HAST	HIV/AIDS, STI's and TB
HBC	home-based care
HIV	Human Immunodeficiency Virus
MSH	Management Sciences for Health
NGO	non-governmental organisation
PHC	primary health care
SANTA	South African National Tuberculosis Association
STI	sexually transmitted infections
TB	tuberculosis
TBA	traditional birth attendant
TLC	Transitional Local Council
USAID	United States Agency for International Development
WHO	World Health Organization

1. Background

Mapping of catchment areas is not a new idea. In 1980, the WHO published a book *On Being in Charge: A Guide for Middle-level Management in Primary Health Care (Reference 1.)* where they define catchment as:

> "When the term (catchment area) is applied to a health unit, it means the area from which patients come to the health service. In the case of regional or district hospital the catchment area is the whole region or district; for a health centre it would be the villages around the health centre, and for a small post or aid-post it might be only one village."

This book also mentions the possible overlap of catchment areas and the importance of the concept to identify the area of responsibility of the health unit: to offer complete health care to all the people in the communities. In discussion of the use of maps, the book mentions learning about the different types of communities and their environment.

Within Africa, the need for defining catchment areas for PHC has also received attention. The African Medical and Research Foundation (AMREF)'s book *Health Information for Primary Health Care (Reference 3.)* in 1991 and the author Ties Boerma has most of a chapter on *Data analysis* (page 31) devoted first to methods of defining catchment areas and their catchment population and then how to use this information for making use of data. He describes difficulties with over lapping boundaries and problems of different services attracting different patients from different areas. Determining population requires knowledge of growth rates and population movement (immigration or emigration). This book, written for district health services, provides useful information on estimating target population for different services, ie the denominator for pregnant woman or children under age one may be different from the population using the facility for curative care or mental problems or trauma.

> "Staff knowledge of the target population is initially important in the development of a community orientation in support of comprehensive care and a health promotion approach."

One of the early publications on District Health Care (Amonoo-Lartson 1985) had a subheading *"where is health care provided and where do people come from to use it?"* Under this heading it dealt largely with the district hospitals and it describes work in Malawi in 1969 when analysis of records of where people came from (every tenth attendant) found that 47% came from within 1.6km, 79% from within 8km, 91% from within 16km. The authors point out that this concentric circle model does not tell the whole story but that population density and routes and modes of travel are also important.

Even within South Africa, but more recently (1997), a book *Towards Well-functioning Health Districts in South Africa (Reference 6.)* by Gilson, Balfour and Goosen has a section (page 25) on *Coherent geographical boundaries* as an indicator. They suggest the percentage of health facility staff who know their target population – as a short and long term indicator. They state:

> "Staff knowledge of the target population is initially important in the development of a community orientation in support of comprehensive care and a health promotion approach. It enables a focus on population needs, for example health care performance that is reflective of the population and coverage rates."

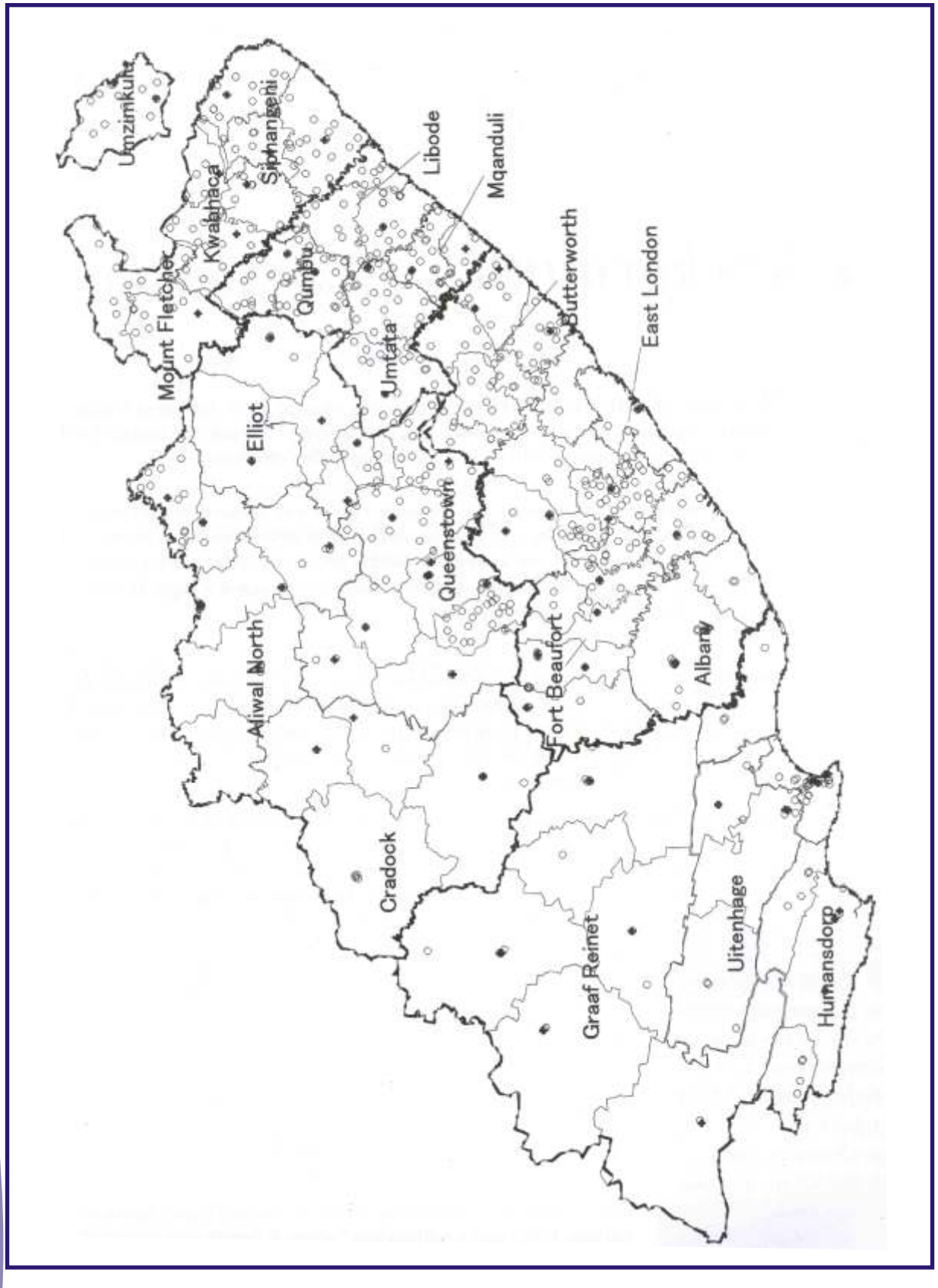
The global, African and South African health services are now all aware of the need to determine catchment areas of health units, especially of clinics.

> "The types of map which are very important in the Eastern Cape are the ones concerned with the patient care and community support functions of health facilities."

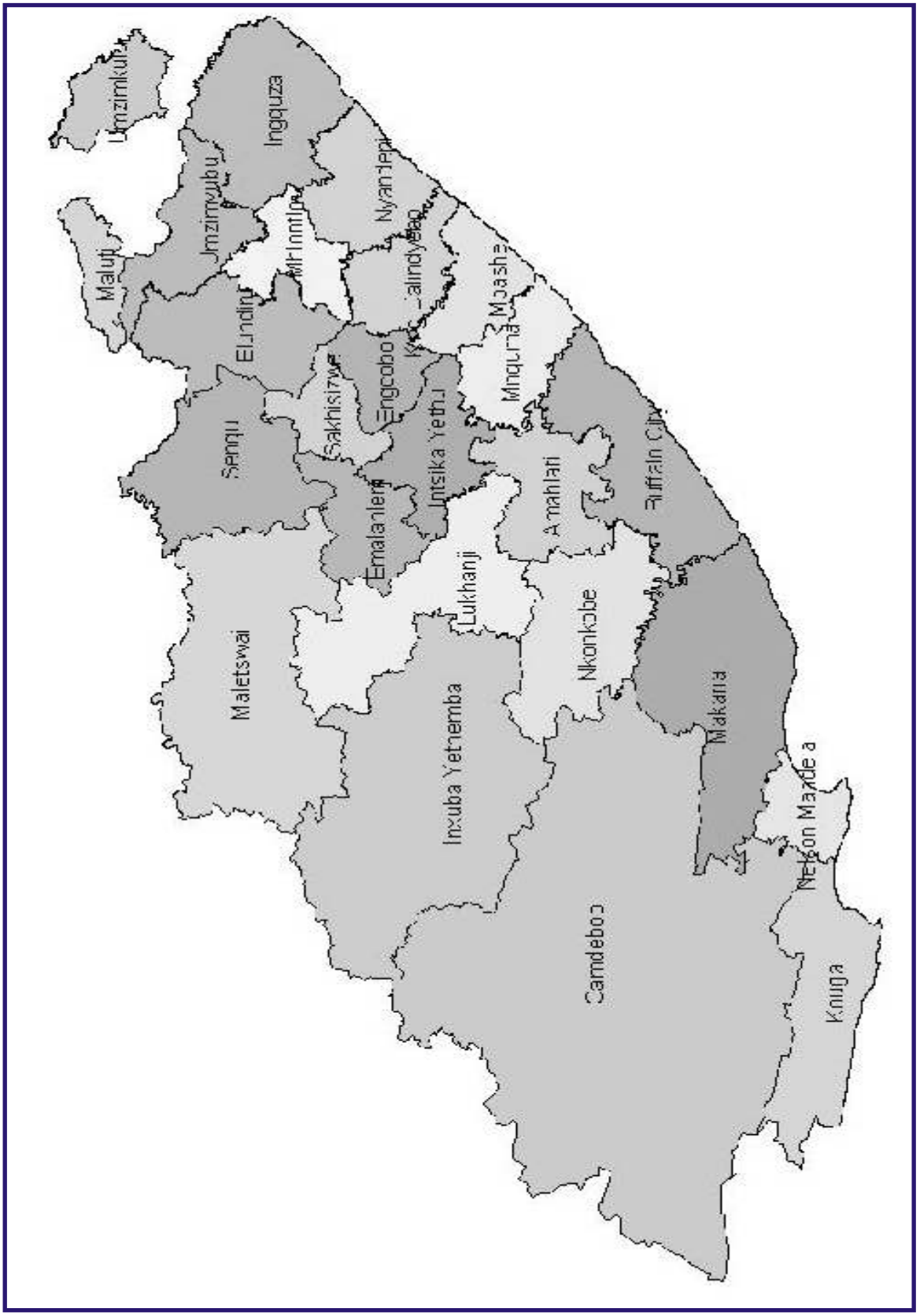
The mapping of hospital catchment areas has also received attention. For example, Diesfeld in his study in East Africa *(Reference 5.)* considered attractiveness of hospitals (staff, equipment, reputation), their topographical accessibility, and the population density around the hospital as important factors which determine the hospital catchment area. Akhtar in Zambia *(Reference 1.)* used measures of attractiveness (eg, number of doctors), accessibility (distance from next hospital, road network), and patient turnover (inpatients and outpatients). Although this MSH document is more confined to clinics and does not consider hospitals, the ideas of attractiveness, accessibility and population density are also important for determining clinic catchment areas especially in urban areas where there may be many clinics, some with only certain services and staff, and where accessibility may depend on taxi routes, and where population density is greater in informal settlements.

The concept of mapping health services coverage of an entire health region or district is now well known in South Africa through the maps prepared by several provinces for a series of books on health care resources sponsored by the Health Systems Trust. For example, *Health Care in the Free State, Implications for Planning 1996 (Reference 7.)*, and a similar book from KwaZulu-Natal both have GIS maps of every region showing clinics and Health Centres with 5km and 10km radii around them. They also include mobile clinics or service points and from these maps it is easy to see the areas not covered. However, this cartographic designation of coverage does not give a full picture of "where clients come from", and which facility people consider "our health care provider" - the true catchment of a health facility.

In the Eastern Cape Province there is a certain continuity of the PHC catchment areas concept on different scales. Starting from the provincial map there is next a map showing the regions – the "catchment area" of the regional health offices then the map showing district (the catchment area of the district health offices and the geographical



The 1999 Eastern Cape Province Regions and Health Districts with Magisterial boundaries

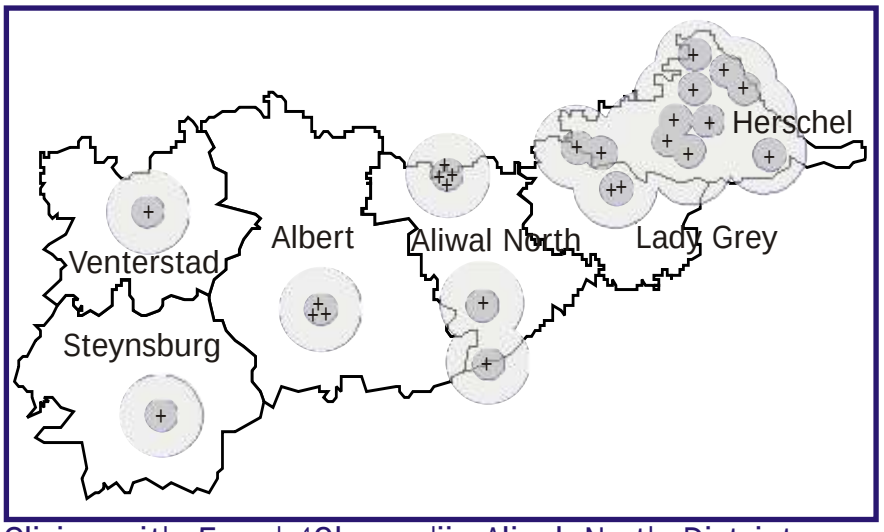


The Eastern Cape Province Regions and Health Districts with Magisterial boundaries

boundaries of the district health systems) then maps of sub-districts (former magisterial districts). All of these on different scales would show the location of various health facilities and management offices. Lower down the continuum are actual health facility catchment area maps for hospitals, health centres, clinics and mobile stops. Below these would be community maps. (See also change from region to district council and from health districts to local service areas as shown in the maps on the previous two pages.)

The types of map which are very important in the Eastern Cape are the ones concerned with the patient care and community support functions of health facilities. A clinic catchment area map shows where the population is, who have access to the services and where the communities are which need support in improving their own health. A hospital catchment area shows where the population live who need access, through referral, to a higher level of care and where the health centre and clinics are which need support. Community hospital catchment areas in turn relate to Regional or Provincial specialist hospitals.

It was with this background that a decision was made to record the Eastern Cape experience of mapping which is based on activities within an entire province. These differ from other descriptions in being concerned not only with the geographic distribution of clients, but also with attitude change, PHC orientation, and with increasing the ability of a variety of health workers to work in harmony with community members.



Clinics with 5 and 10km radii, Aliwal North District

The pattern of clinic coverage for the population in the former Herschel Magisterial District is typical of the former Transkei administration under which it fell. Each of the two hospitals has a number of clinics which they have to administer but the clinics are smaller in size and staffing than the clinics in the former Cape Province which administered the rest of the Aliwal North Health District. The square kilometers (km) of the average catchment area of a clinic in Herschel is consequently very low – 131km^2 which represents a radius of about 6.5km. In another map (shown on page 39) the calculated catchment population of a clinic in Herschel is 8 620.

2. Introduction

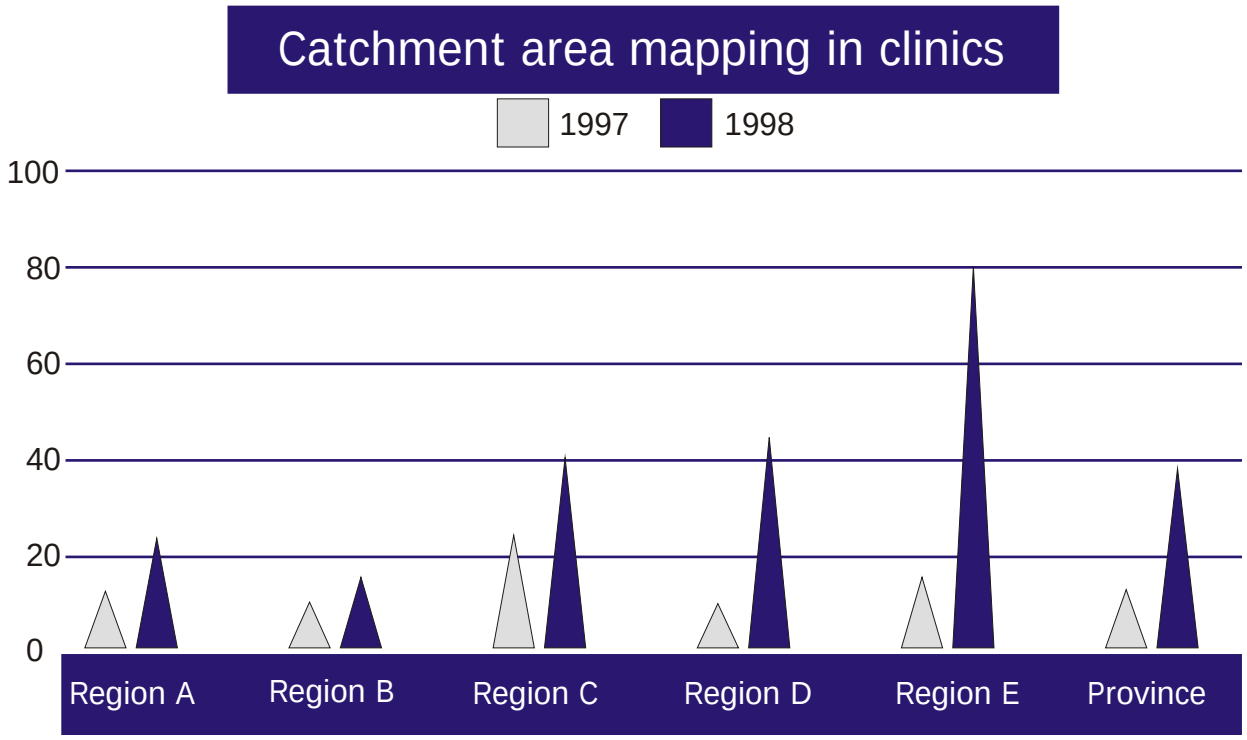
One of the essential principles of PHC is that clinic services are population based – they are oriented to an entire community or group of communities whose population can be determined. It is this population which constitutes the focus of all health activities, be they promotive, preventive, curative or rehabilitative. It is within this known area that the health of every individual in every one of life's stages is of concern and it is on this basis that progress can be measured in terms of rates, ie numbers per population. It is also with this so-called “catchment area” that some of the other basic principles of PHC can be realised: community involvement, self reliance, intersectoral coordination or collaboration, and improved environmental and social conditions for health.

When the EQUITY PHC project, funded by USAID, developed its Strategic Plan with the Eastern Cape Province, one of the first project objectives was “population distribution in catchment areas mapped for all health facilities”. An indicator developed for measuring the achievement of this objective was “the existence of a map of the catchment area displayed on the wall of each clinic”. A baseline survey conducted in late 1997 found that only 13% of 84 clinics investigated had a catchment area map. A target was then set in 1998 to increase this by 15% per year to be sustained by 90%. The implication was that clinic staff would be trained in mapping their catchment areas to define the population served by each clinic.

To set about this training a module was developed for the first trial in Libode District where it was planned that EHOs would take a leading role, backed up by the clinic nurses and CHC members. This module was designed to enable health staff to map a clinic catchment area comprising several communities, and also to map different communities in detail, recording items such as sources of water and constructed latrines, houses, etc. In subsequent training exercises in other regions it was found more useful to separate the two types of mapping: clinic catchment area, and community maps, and thus the first module was later divided into two modules each having been enriched by comments gleaned from the field experiences.

“Running through the practical process of training is the growing realization that mapping does more than provide a picture on the wall. It opens the eyes of the health staff to the concept of 'accessible to all'.”

As each training exercise in the five regions of the Eastern Cape Province uncovered new facets to training, they are outlined in the following chapters to give a feeling of these experiences. Running through the practical process of training is the growing realization that mapping does more than provide a picture on the wall. It opens the eyes of the health staff to the concept of 'accessible to all', it enables a new team to be formed comprising both local health workers and local community members.



As can be seen from the variety of clinics visited for mapping, the Province has a wide spectrum of human ecology from isolated villages of extended homesteads separated from each other by mountains and rivers, to first world cities surrounded by densely populated areas of third world informal dwellings, to small groups of labourers homes on barren commercial sheep farms. In all these situations it is the knowledge possessed by the clinic of which communities it serves that will help to set the stage for effective PHC.

3. Development of the first mapping guidelines

This guide attempts to do five things:

- to provide an introduction on why maps are needed
- to provide guidance on mapping the health care points of an entire district or sub-district
- to map the catchment area of the clinic
- to map a single community in detail
- to determine the population within a catchment area to provide a denominator for working out important rates essential for monitoring, evaluation and planning of health services. At the outset it was emphasised that the clinic area map would be the basis for estimating a catchment population – but this could only be estimated, as the census figures had not been released.

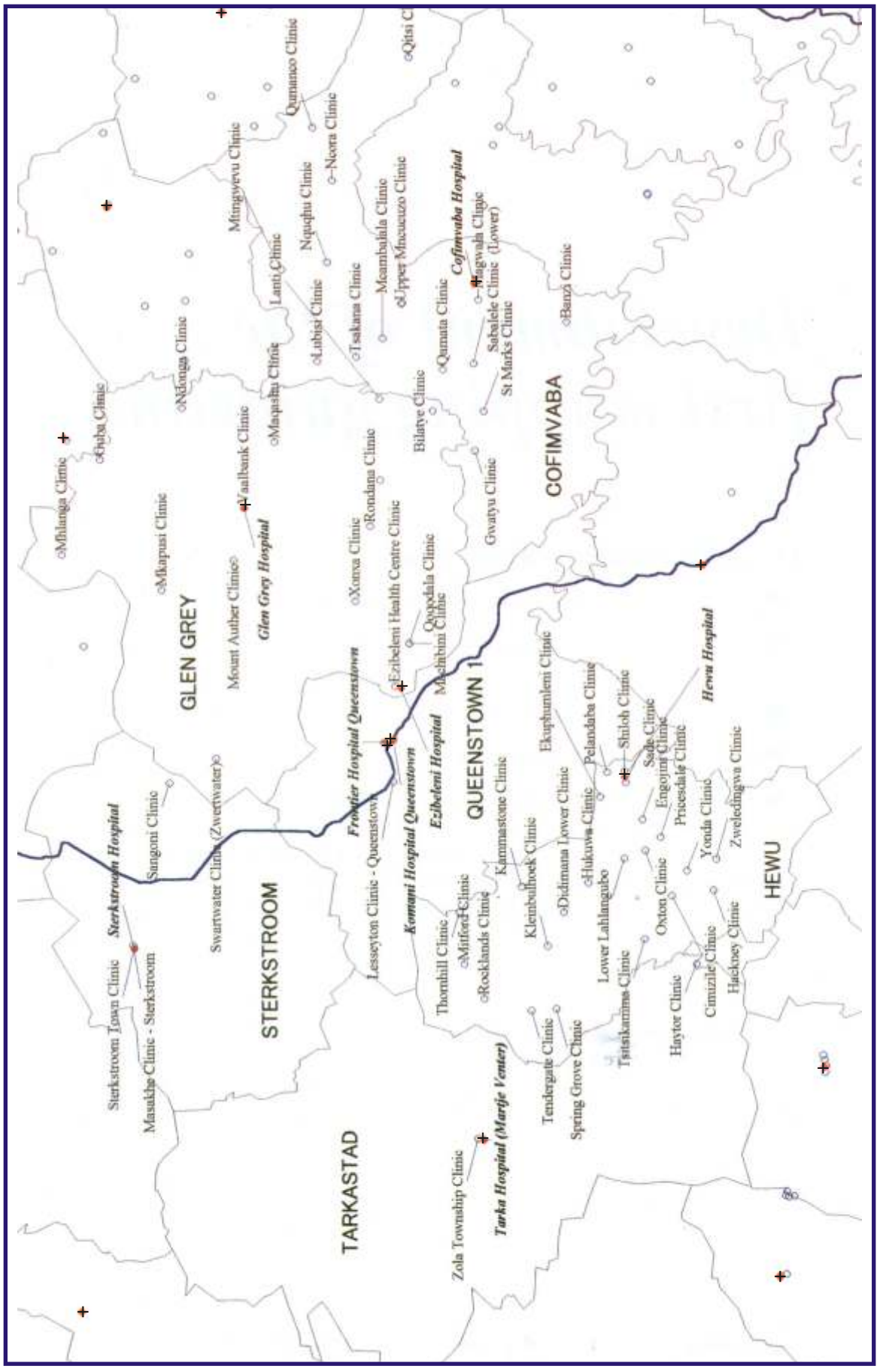
Why maps?

It was emphasised that the existence of a map on a clinic wall is evidence of determination to know where the communities are, which could reach the clinic more easily and this in turn would start thinking of the whole population, including those who do not use the clinic. It helps clinic staff visualise the difficulty of patient return visits and illustrates those communities most in need of outreach and development of self-reliant services. A clinic could thus become population oriented and community oriented which are fundamental to true PHC. If the process is participatory it could also lead to community involvement and the clinic becoming more community-based.

Mapping health care points in a district or sub-district

Mapping the health care points in a district or sub-district is an exercise that involves the District Health Management Team (DHMT). It brings out the purpose of mapping on a wider scale and enables individual clinics to realise that they are part of the district health system. The module discusses the purpose of the district health map in showing the distribution of health facilities to indicate areas of responsibility, to identify areas beyond easy access or areas of overlap and to improve planning for accessibility in terms of referral. Steps in the process of establishing a suitable scale map were listed and it was suggested that 5km and 10km circles be drawn round each facility. This process has often been done using GIS but the resulting maps are sometimes not suitable for the detail required, and the actual identifying of where facilities are on an existing 1:50,000 district map is a useful exercise for the DHMT.

It is also suggested that at district level a table of distances between the hospitals, health centre and clinics be made and copies given to all clinics.



The Queenstown Health Districts showing clinics and hospitals (marked with crosses).

Table of distances by road in kilometers									
Distance From: To:	District Hospital	CHC 1	CHC 2	Clinic 1	Clinic 2	Clinic 3	SANTA TB	Mobile Stop 1	Mobile Stop 2
District Hospital		47	28	7	63	41	3	73	65
CHC I	47		42	33					
CHC 2	28			42					
Clinic 1	7				56				
Clinic 2	63					22	58		
Clinic 3	41						38	32	24
SANTA TB	3							70	67
Mobile Stop 1	65								8
Mobile Stop 2	73								

*In the table above, CHC = Community Health Centre

Figures are from an example of one district

This mapping of the district health facilities also gives EHOs and the DHMT an idea of areas with good access to clinics and those which are unserved. Can a district map of health care points help to determine populations without easy access to health services? If the district map has been well documented, with all health facilities plotted on it and 5km radius circles drawn round each, then it will be very helpful. If it has the mountains, roads and rivers with bridges (if not usually dry!) and if there is also a population density map and it shows the villages in former Transkei/Ciskei then it is even more helpful. Maps showing water availability (community water supply map) and electricity (ESKOM) are also useful if they are available. When all this information is used it is possible to start identifying areas where it would be necessary to provide new health services, whether by mobile clinic, static clinic or health centre.

Mapping a clinic catchment area

The first step was to determine what is known by the clinic staff and CHC members about where patients came from. A form, shown on page 13, provides a list of community or locality names, their distance from the clinic, the approximate number of

homesteads and the existence of some basic services such as water and electricity. A note was also written to explain what was required in each column of the form.

Although experienced clinic staff and community members could be expected to have a good idea of where patients came from, it cannot be assumed that every clinic has staff who have been working there for long periods. In some parts of the province staff are assigned, on rotation, from the district hospital to work in clinics. They often do not have adequate local knowledge to complete this form. Thus, a method to derive patient origin information and use it for mapping was also developed.

This method of determining the catchment area uses addresses of patients taken from the clinic registers. Reviewing a month of attendance gives a quantitative picture of the proportion of patients coming from each locality. This is done by tallying patients against each new name of a locality as someone reads from the register. The list of localities which provide over 90% of the attendances would then indicate the area from which most people came. Localities with very few attendances could then be discussed: were they too remote, did the population also have access to another health facility which they use more often? This requires communication between facilities, comparing catchment information from each.

Notes And Definitions

These notes refer to the form for mapping a clinic catchment area on the facing page.

1. Name: Indicate the name of the health facility.

2. Authority: for example local government, provincial, district council, non-governmental organisation (NGO), Private.

3. Tick type of health facility visited for mapping: clinic, health centre, mobile clinic stop, subdistrict community hospital (a hospital in a magisterial district which is not designated as the district hospital), district hospital.

4. Persons providing information: write position of all those who helped define the catchment area for example chief professional nurse and professional nurse.

5. Locality: name each locality on a separate line. This could be a village, an area, a suburb, a block, or a township.

6. Indicate approximate proportion of total patients: on five-point scale of clinic patients who came from each locality, for example most, very many, many, few, very few or 5, 4, 3, 2, 1.

7. Distance in kms: estimated (along a road a taxi fare might give an estimate of distance).

8. Time taken and method: for example one hour walking or 10 minutes by taxi.

9. Estimated number of homesteads in the locality. (Village leaders might know more accurately if they have done a census).

10. Estimated population: give approximate guess. This will be rewritten when the census is published.

11. Source water: for example river, spring, dam or pond, borehole.

12. Electricity: Write yes, if available; no, if none.

13. Useful information: for example bus stop, taxi rank, name of chief or chairperson resident committee, community health worker's (CHWs) name, whether near to another clinic or hospital.

Form for mapping a clinic catchment area

1) Name of health unit _____

2) Authority _____

3) Clinic ☐ Health Centre ☐ Mobile Clinic Stop ☐ Sub-district Community Hospital ☐
District Hospital ☐

Region: _____ Health District: _____

Magisterial District: _____

Date: _____ Surveyed and mapped by EHO: _____

4) Persons Providing Information (positions) _____

_____

_____

5) Locality name	6) Approximate proportion of total patients	7) Distance (km)	8) Time taken and method	9) Estimated # of homestead	10) Estimated population	11) Water source	12) Electricity		13) Useful information
							Yes	No	

These two methods formed the first steps to be taken by a clinic to create its "catchment area map".

Then the list of communities obtained from the two methods have to be identified and located in relation to each other and to important features such as roads, mountains and rivers. This is most easily done by going to a high area and getting knowledgeable inhabitants to point out the communities – or to actually drive down these roads. While doing these two steps a sketch map is made on rough paper. The sketch is later used to draw the map on a more suitable large sheet of paper or card and using felt pens of different colours. The clinic, schools, churches, and shops can be shown prominently.

"Localities with very few attendances could then be discussed: were they too remote, did the population also have access to another health facility which they use more often? This requires communication between facilities, comparing catchment information from each."

Community mapping

At the same time the Project was invited to prepare a training workshop for EHOs to learn about mapping of catchment areas and communities in a sub-district. This would bring EHOs into a working relationship with the clinic staff and they could also learn about community mapping to assist them in planning environmental improvement with community involvement. The Department of Water and Forestry offered funds and transport. A brief guide to community mapping enlisting the participation of the local health committee was added.

This would involve community members in portraying their own village through large area sketches often drawn on the ground using sticks, stones, coloured powder, etc, showing details of houses locating families in special need, public buildings such as schools and churches and environmental features. EHOs would guide the process and capture the detailed map on paper or even photographically. Thus in the first original training module district maps, clinic catchment area maps and community maps were covered.

4. The history of early training in mapping clinic catchment areas in the Eastern Cape Province

Following the baseline survey for the MSH/EQUITY Project which had found that only 13% of clinics had a catchment area map it fell largely on the MSH/EQUITY Regional Coordinators to arrange for technical assistance in the form of a workshop facilitator for training in mapping. These training efforts occurred over several months and each one was slightly different in presentation and the number of participants attending varied greatly.

The MSH/EQUITY Regional Coordinators would also arrange through the regional office for participants to attend from different districts as well as some from the regional office. A suitable venue would be arranged and also some clinics would be selected for the practical work. The costs were borne by the ECDOH through the EQUITY Project.

Mapping in Libode Health District
Port St. Johns Sub-district, Region D (Nyandeni)

In August 1997 the Acting Director of Environmental Health had arranged for a mapping workshop to take place in Tombo, the pilot area for community involvement in PHC in Port St Johns Sub-district. Fifteen EHOs (three from Port St Johns and 12 from Region D) were requested to participate. The workshop was scheduled for four days, and is therefore described in fair detail to show regional, and community "entry" steps, processes and achievements.

The Acting Director first introduced the three MSH facilitators to the Acting Regional Director and the EHOs. Then followed a brief description of the steps in mapping a clinic catchment area. The discussion brought out the importance of mapping homesteads and not houses in a community and the need for some standard way of depicting features such as roads, rivers, churches, schools, shops, homesteads, and clinics. The EHO also wanted a list of items, relevant to their work, to be checked when visiting a clinic, eg, water supply, sanitation, waste disposal, communication, existence of health committee. These items were added to the module as shown on the next page.

Additional information from clinic

Date: _____

Tick box if correct ☑

SECURITY ☐ Good ☐ Poor

MAINTENANCE

Roof	☐ Good	☐ Poor
Doors	☐ Good	☐ Poor
Windows	☐ Good	☐ Poor
Plumbing	☐ Good	☐ Poor
Electricity	☐ Good	☐ Poor

CLINIC WATER SUPPLY

Source: ☐ River ☐ Spring ☐ Borehole ☐ Dam/pond ☐ Well ☐ Roof rain ☐ Tanker

Purification: ☐ Storage ☐ Filtration ☐ Sedimentation ☐ Chlorination ☐ None

Delivery: ☐ Pipe/tap ☐ Bucket ☐ Tanker ☐ Other

Time needed to get water: ☐ More than one hour ☐ 10 Minutes ☐ Tap in clinic

CLINIC WASTE DISPOSAL

Human wet waste: ☐ Pit latrine ☐ VIP latrine ☐ Flush/ septic tank ☐ Flush/ sewer ☐ Chemical ☐ "Bush" ☐ Bucket

Staff: number toilets: ..... Patients: number toilets: .....

Dry waste: ☐ Burying ☐ Pit ☐ Incinerate ☐ Other: .....

Medical waste: ☐ Pit ☐ Pit latrine ☐ Incinerate ☐ Pit ☐ Other: .....

ELECTRICITY: ☐ Yes ☐ No

RADIOPHONE: ☐ Yes ☐ No ☐ Not working

TELEPHONE: ☐ Yes ☐ No Number: .....

VEHICLE: ☐ Yes ☐ No ☐ Not working Kind and registration number: .....

COMMUNITY/VILLAGE/CLINIC COMMITTEE: ☐ Yes ☐ No

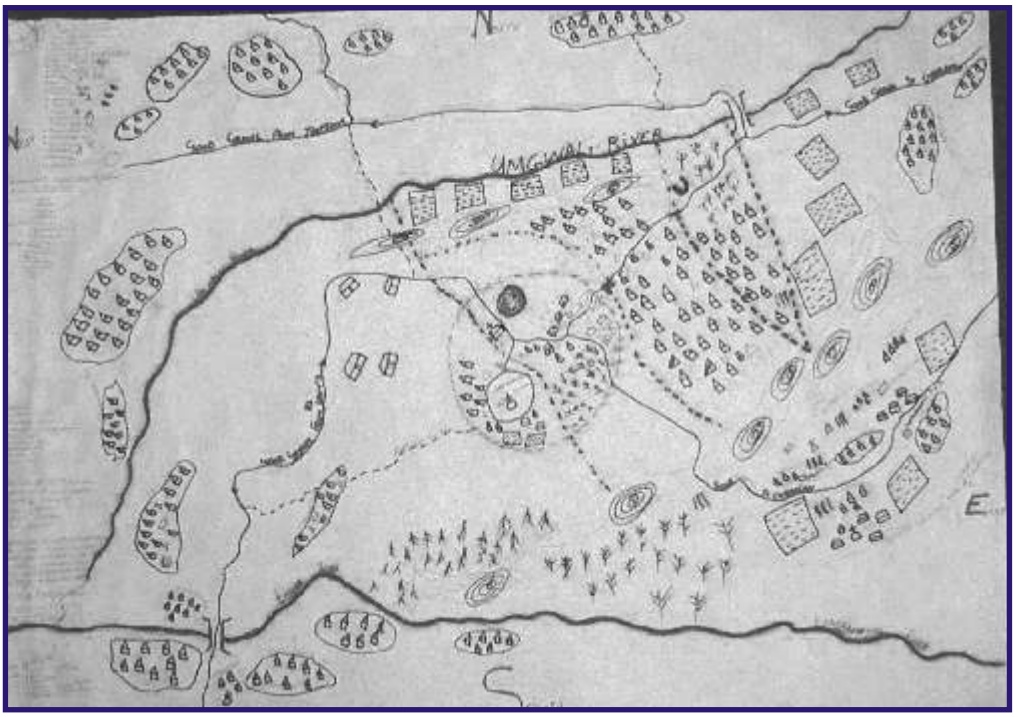
How often it meets ..... Date of last meeting: .....

Number of community members: ..... Number of clinic members: .....

Total men: ..... Total women: .....

COMMUNICABLE DISEASES

Number in last six months	Number in last week
Measles	Ringworm (tinea) .....
Acute Flaccid Paralysis	Scabies .....
Rabies dog bite	STI .....
Whooping cough	Tapeworm .....
Neonatal tetanus	Roundworm .....
Hepatitis	Pneumonia .....
Typhoid	Diarrhoea .....
Shigella dysentry	Bilharzia .....
Salmonellosis	Other conditions in last 3 months:
HIV/AIDS	Paraffin poisoning .....
	Injuries .....



Map of the Clarkebury Clinic catchment area

Following a meeting of all categories of staff at the sub-district hospital at Isilimelo when the role of EHOs had been explained, a team at Tombo and local committees were formed. The group assembled at Tombo clinics, 18km from Port St Johns on the road to Umtata. Tombo had been selected as a pilot area and one of the EHOs provided a brief account of the work already done. Using a questionnaire the EHO had visited schools and homes and started to involve communities in self assessment. In Tombo sub-location a headman had counted households and also created a list of sub-location headmen. The schools, shops and springs had been identified. After this introductory explanation the EHOs were divided into four groups who dispersed in different directions with community guides to map the homesteads of the localities or villages around the clinic.

> “Community mapping involves local people to enable them to recognise problems and to make their own decisions about priority environmental actions and to forge closer links between health staff and community health committee.”

The nursing staff with a facilitator filled in the form with the names of localities known to be using the clinic. Distances were difficult to estimate, especially over mountains and deep valleys, and time and mode of travel was found more useful than kilometers. Homestead numbers had been established by the Chiefs of seven of the 11 listed localities. Estimated population was based on the local guess of 8-10 people per homestead. Two areas had '93 census estimates available. This gave an approximate catchment population for Tombo Clinic of 14 000. The total population for the magisterial district was estimated at 69 000 (the 1996 census counted 68 139 for the magisterial district), served by six clinics, a health centre and a sub-district hospital. Only one area of the

11 localities had electricity and one had poles waiting for supply. There were two taxi routes and the area was bounded by two rivers and bisected by the tar road from Umtata to Port St Johns on the sea to the south east. These main features would help to orient the map.

Next, the clinic nurses helped with the tallying of patient addresses in the register for the last month. The figures for each locality were converted into percentages of the total month attendances. This confirmed the nurses estimates for some of the villages but they had grossly underestimated the use made of the clinic by Tombo village in which they were situated. They thought being an "educated village", people would prefer private practitioners, but a total of 19% of clients came from Tombo itself. (Tombo now has a new Health Centre and a Development Centre).

Assessment of the clinic environment showed a dilapidated building with no telephone, radio out of order, no water, an unsatisfactory pit latrine, and only a pit for dry and hospital waste. Common conditions were intestinal worms, scabies, and urinary bilharzia for which there where no drugs. The community mapping exercise had identified problems of water supplies, lack of toilets (people waiting for the government to provide them) and pigs roaming around the area.

On the second day another clinic (Ludalasi) was visited and one group of the EHOs took charge of the whole procedure working with the nurses. They identified seven localities with four of them contributing over 80% of attendances. They checked the picture by doing a rapid questioning of address of the large number of mothers attending a child welfare session. The EHOs also carried out the clinic environment assessment which they suggested and this showed a very poor environment with no latrine for the patients who have to use the bushes. Bilharzia and worms were also identified as problems. The EHOs then wrote down the names of the seven localities mentioned, took a sheet of paper, placed the clinic in the middle, north on top, south at bottom, east on right, west on left and then went outside with the local teacher. Together, they stood on an elevated place and were shown where all the place names were and they then sketched a map of the catchment area.

"Mapping of clinic catchment areas should involve clinic staff, EHOs and community members and it can assist in obtaining a community orientation for their clinic with greater understanding of the causes of the problems seen at the clinic."

Meanwhile, the other EHOs had mapped another community with small shop, church and where a village cleanup had been done to put "loitering" pigs into styes. The area has rabies which the dogs get from the wild cats and although the stock inspector can immunize dogs, people do not like it as "it makes dogs poor hunters". The mapping exercise was also producing as much qualitative information as a moving focus group discussion. Further communities were mapped around Tombo and the number of homesteads counted, eg, Nokuzama location with 120 homesteads, 960 people, electricity being installed, 15 latrines, 10 springs. In two areas only 11% of homes had pit latrines.

On the third day there was a “reflection” period when the two processes were reviewed: catchment area mapping for the clinic and community mapping for environmental assessment. After this the team split into two and went in different directions to map Qandu Clinic and Kohlo Clinic. To reach the former, one group had to pass and call in at Isilimela Hospital 18km from Tombo on a gravel road. Qandu Clinic is situated near to a new large unopened clinic with staff quarters - luxurious compared to the sorry state of Qandu. After the same process of obtaining a list of names of areas from which patients came, the team moved to a school on a nearby hill from where the teachers, the nurse and the clinic watchman could identify all the distant communities which were then drawn on a sketch map.

The final session of the workshop was held in the regional office of the DOH in Umtata and the problems and achievements of this basic training exercise were reviewed.

A Xhosa village

Mapping of clinic catchment areas should involve clinic staff, EHOs and community members and it can assist in obtaining a community orientation for their clinic with greater understanding of the causes of the problems seen at the clinic. The catchment population can be estimated so that coverage rates can be calculated: eg, percentage of children under one fully immunised by one year.

Community mapping involves local people to enable them to recognise problems and to make their own decisions about priority environmental actions and to forge closer links between health staff and CHC.

It was agreed that improved guidelines should be developed on the processes used. Requests were made for existing district and provincial maps in a useful scale (1:100,000) and aerial photographs were also desired. There was a need for bigger sheets of paper, clipboards and coloured pens. The activities of walking round peoples homes and discussing with many people, produced many other suggestions for improvement of health eg, a bilharzia control programme, toilets for patients as well as staff, better distribution of drugs and greater involvement of EHO in a multi sectoral/NGO development approach to village environmental improvement.

Lessons Learned

- The small towns of this province are growing very rapidly and becoming extended with informal settlements. Catchment maps should probably be checked and extended yearly using the local names these settlements acquire.

- If the township is not too large and roads are possible it is advisable to drive around with some local inhabitant to guide the tour. The clinic form can then be filled in, and it makes more sense once the densely populated areas have been seen.

- Getting addresses of clinic attenders is not always possible as there are many methods of keeping records. This experience led to the idea of keeping an entry record for one month, by recording the address when recording the patient's consultation.

- It is possible to piggy back on some other activity eg a household survey as in this case, with the clinic catchment area determined as a bonus.

Mapping in the Albany District, Region C (Makana)

In this district mapping training was done in three separate episodes, all different in approach.

Marselle, Alexandria Magisterial District

The purposes of mapping the small township around this Western District Council clinic were twofold: 500 homes had to be selected at random for a survey of the community, and a catchment area map was also needed for the clinic to define its population.

There were 17 participants in the community survey, mostly members of the CHC, community health workers and a regional officer. Four MSH staff and two clinic sisters facilitated. After introductions, the community health workers gave a very spirited talk on sexually transmitted diseases, AIDS and the use of condoms to the community committee members. This novel ice breaker paved the way for an explanation of the need to establish the number of houses and verify an existing ESKOM - Electricity Board map of plots, in order to draw a random sample. The participants were divided into five groups to visit different sections of Marselle and an adjacent area called Klipfontein and an informal shack area “for coloured people”. They were to determine which plots on the map had houses and where additional shacks were erected, since only the formal houses had numbers.

The clinic had no registers from which patient addresses could be extracted and files were kept alphabetically by name so no review of client origin was possible. However, the nurses completed the catchment area form as it appeared that the majority of patients came from the township of Marselle in which the clinic was situated and about 10% came from the more distant 'coloured' shack area. A very small minority came from other areas on the adjacent coast or were farm labourers on nearby commercial pineapple and chicory farms.

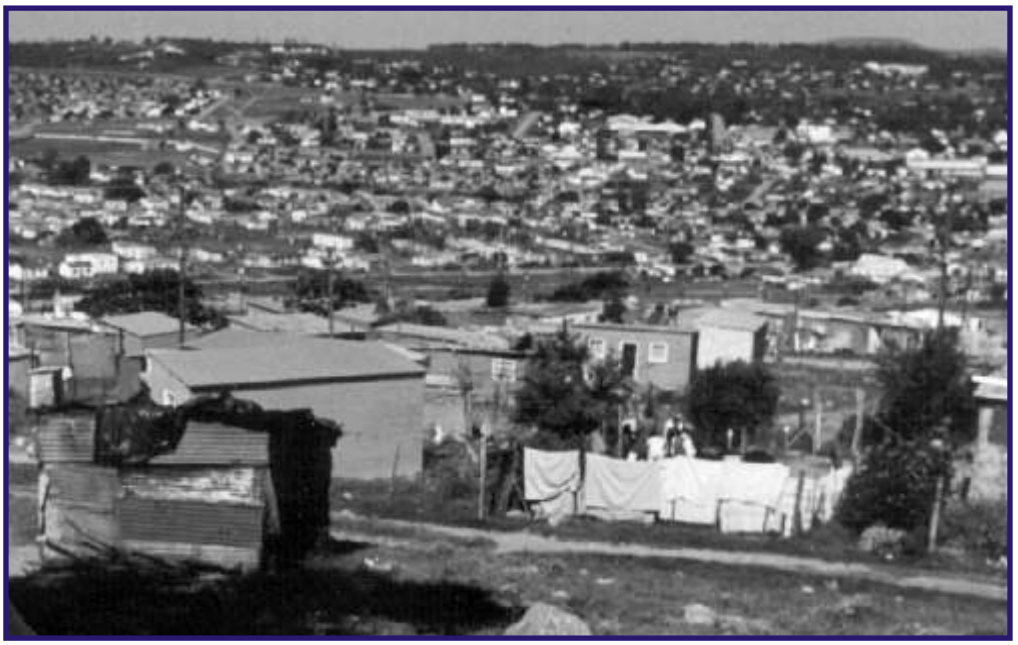
In the meanwhile the household survey training had commenced with a facilitator discussing each item of information to be obtained on the survey form. Another conducted a role play on entering a home to interview a housewife. The mapping facilitator drove around the township to get a better picture of the housing areas the outlying shack areas were not on the township map of plots and streets and many plots now had additional houses on them.

This exercise of driving around the whole urban/peri-urban area proved to be very informative and should have been done first because it highlighted the difficulties of sampling in a rapidly-growing township where existing plot maps made by town engineers or ESKOM can rapidly become inaccurate and not show all the outlying informal areas. Also some plots marked on the map do not yet have houses. Locality names - as the people know them - are also not necessarily the names on an official map.

The random sample was chosen, the survey completed and the catchment area of the clinic establishment marked on the map.

Catchment area mapping in Grahamstown

In October 1997 the Albany DHMT developed a PHCaction plan with one of the objectives to determine catchment areas of all health facilities. A team of nurses from Provincial, Transitional Local Council (TLC) and Western District Council discussed mapping methods with an MSH facilitator. It was decided that a month review of clinic attenders would be obtained by daily recording at the initial registration. The results were analysed as percentages from each locality. Grahamstown clinics were able to use the TLC map of Grahamstown which shows all the streets, blocks and housing areas. Each clinic outlined its catchment area



Informal housing in the Grahamstown District

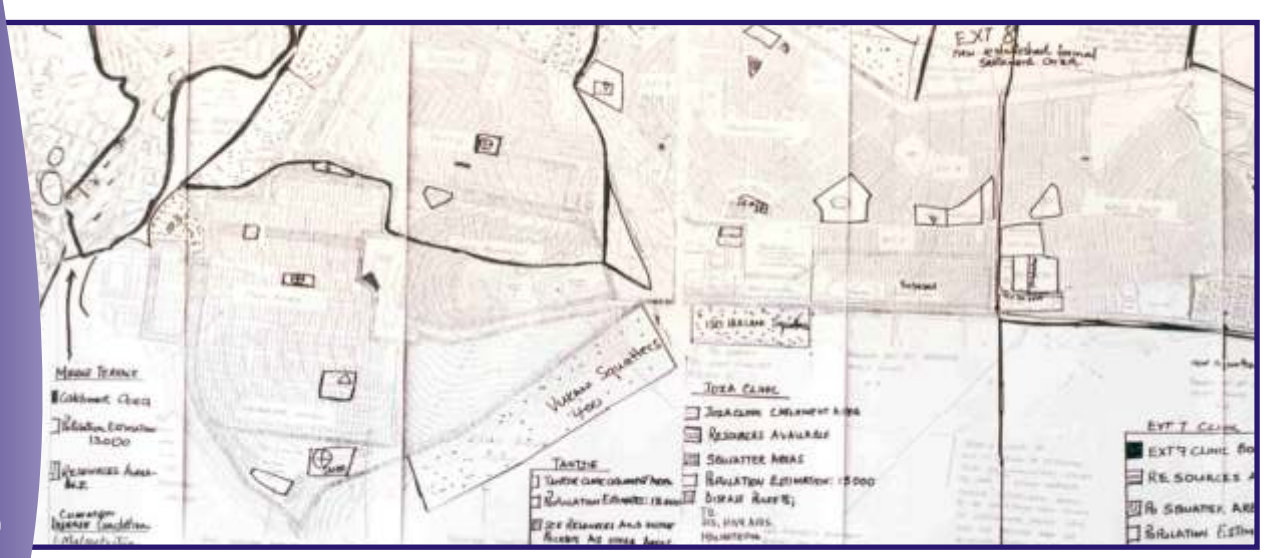
Albany District was the first district to put this activity on their action plan. They were fortunate in having good urban maps available. They used one method to capture patient addresses, obtained by keeping an entry register for a month. The attractiveness of clinics is changing as they add new services in the march towards provision of a comprehensive package of PHC. This will require periodic revision of catchment areas.

If more clinics start to use the "tick register" which enables tallying of service provided it will be easy to determine addresses of patients as there is a column for "address". Even Grahamstown, a relatively small city, has been having new residential (RDP housing, or shacks) areas appearing every six months. This is another reason for revising catchment area maps.

in a different colour on the master map for the city. One individual clinic, the day hospital, on its map added on items which were thought important such as taxi routes, truck stops, community halls, churches.

The family planning clinic in the centre of town had difficulty in defining its areas as it provided a single service used by women from a very large area - even wider than Grahamstown. This illustrates the variability of catchment depending on type of service offered.

Many of the TLC clinics formerly providing only promotive and preventive service are now also starting to provide curative services and some are amalgamating physically with provincial clinics. This will require new appraisal of their catchment areas as they now attract wider range of clients, perhaps from closer settlements. Thus, within a single clinic providing multiple services, the catchment may vary with the particular type of service in question.



A new map of Grahamstown clinics showing informal settlements

The Coastal Health Services of Albany District (Ndlambe)

The four Port Alfred clinics listed 30 localities from which patients came. Eighteen of these, especially the more distant ones, provided very few patients - for example the occasional people who came to Port Alfred on holiday or in transit, as it lies on an important road. Only those areas providing more than five percent of the total patients were considered important parts of the catchment areas – they were often marginal areas overlapping with some other clinic catchments.

Map showing catchment area of Port Alfred and Nkwenkwezi

Dundee Village

Mapping Dundee clinic catchment area, Region E (Alfred Nzo District Council)

The 26 participants in this training workshop included EHOs from all Region E districts, professional nurses from the local clinic as well as 12 members of the Dundee Health Committee. The regional EHO and regional Information Officer also attended. The Dundee clinic had only a small thatched rondavel available for such a meeting and at the same time it was cold and raining. The day started with an explanation of the purpose of mapping both the clinic catchment area and for more detailed community mapping. These where described from the point of view of benefits for clinic staff, environmental staff and the communities.

> “Not all EHOs were convinced that mapping was part of their job descriptions until the regional EHO assured them that it was. So a deadline was agreed upon - by June 1998 all clinics would have a map!”

The form to elicit the clinic staff and community committee members assessment of the catchment areas was completed with few problems and provided information on 13 named localities (villages or tribal authority areas). These were ranked approximately according to the proportion of patients considered to be coming from them. Distances were measured in taxi fares or walking time – many localities were on the main tarred road but some were high in the mountains or over mountains. The estimated number of homesteads were provided by the elderly members of the clinic committee and there was argument as to whether the average number of people per homestead was five to six or eight to ten. Except for the Dundee local area with water taps, all areas relied on unprotected springs for water.

The next exercise of extracting addresses of patients from the register was completed with much animated assistance from the committee members. Of course patients’ names were not mentioned, as this was confidential, but when an attendance from a particular

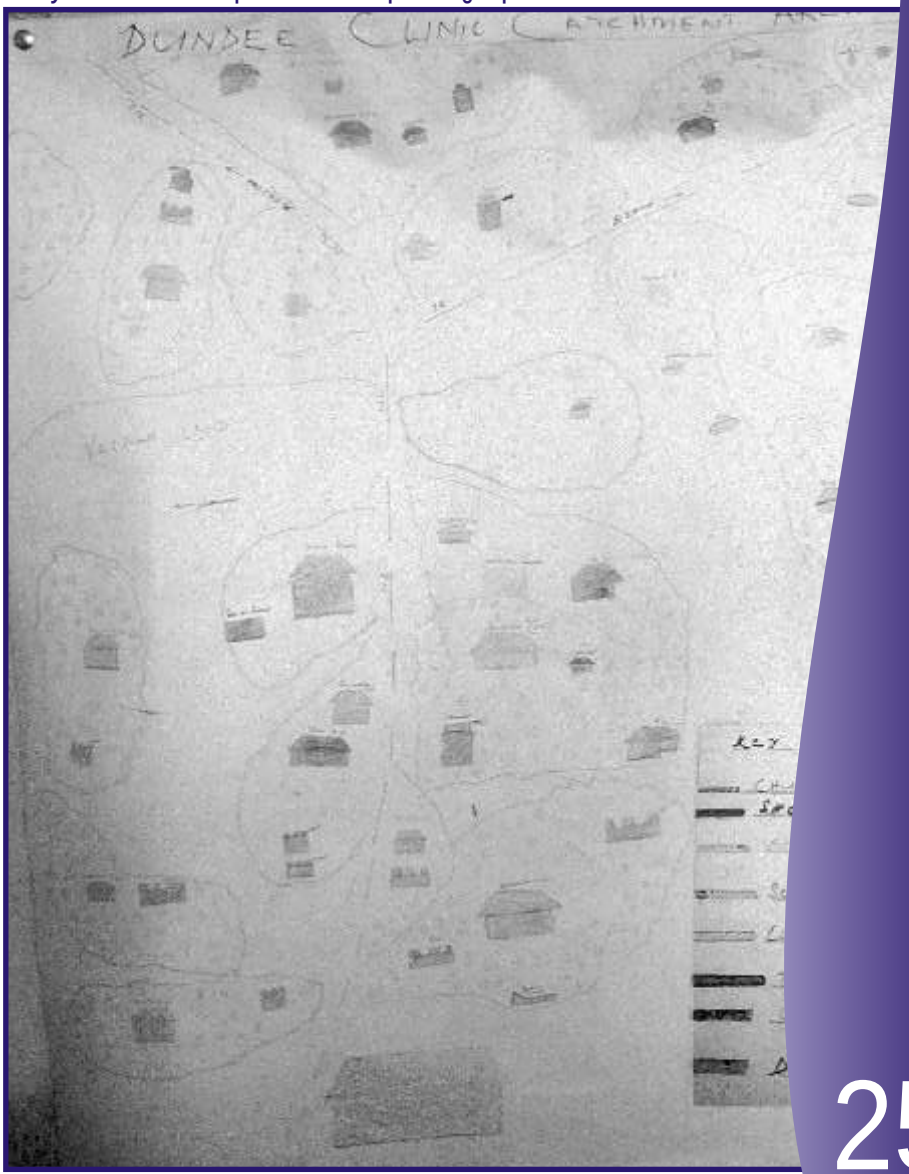
village was read out, the correct area on a large sheet of paper was pointed out - their help was necessary as many locality names sounded very similar to an outsider. Sixteen localities were identified corresponding almost exactly to the names on the first form.

On the second day the clinic environment form was completed and then it was necessary to transform the list of communities into a map. As the EHOs had come in vehicles, the participants were divided into three teams who then drove short distances up and down the N2, stopping and asking people where the villages were. On return each team drew a map. All three were adequate as they showed where all the named localities were in relation to landmarks such as the N2 road.

Based on the tentative population figures obtained on the previous day some calculations were made of HIV-positive persons (12% of adults age 15-49), children to be immunized each year (three percent of population), pregnant women needing ante-natal care (three percent of population). The problem of calculating the population estimates when census figures become available were discussed. For example Betswana was not very far from Dundee clinic but

Participants in a mapping workshop

Below is the first draft of a map, roughly drawn with crayon on newsprint and photographed on the clinic wall



provided relatively few patients. This was because it is nearer to Mt Ayliff where most patients go. Therefore only a small proportion of its population should be included in the Dundee catchment area. Similarly, to the North, a small proportion of the Brook's Nek population near Kokstad would be included in the Dundee catchment area because most inhabitants seek care in Kokstad.

Within two days the material in the guidelines had been covered and three very similar maps produced. All agreed it had been a pleasant experience working together with the committee members. The problem then arose of how to get all clinics in the Region to have a map and go through this working-together and attitude-changing exercise. Transport needs to be available. Not all EHO were convinced that mapping was part of their job descriptions until the regional EHO assured them that it was. So a deadline was agreed upon – by June 1998 all clinics would have a map!

Examples of Rates that can be calculated:

Percentage expected pregnancies (3% pop) who attend antenatal clinic at least three times

Percentage expected births (2.5% pop) in hospital, in clinics, at home

Percentage expected postnatals (2.5% pop) seen

Percentage babies fully immunized (2.5% pop) in first year of life

Percentage expected HIV-positives (16% x 0.45 pop) who have been counselled

Percentage expected TB (0.5% x 0.6 pop) cases who have been identified by sputa

Percentage Children in second year of life (2.5% pop) weighed more than four times

Mapping catchment areas in the districts of Region A (Nelson Mandela Metropole)

By April 1998 the need for all clinics to have maps of their catchment areas had become clear to the Province and it became the first activity on the Provincial Strategy for 1998/99. District Health Managers realised that the possession of a map was a symbol of understanding the need to focus on the catchment population and without a map it would be difficult to calculate this population. It was now also known that mapping was a training exercise which brought together nursing staff and EHOs as well as involving the clinics and CHCs.

Uitenhage District (now part of the Nelson Mandela Metropole)

The next request came from the Uitenhage District Health Manager, himself an EHO by profession. Uitenhage, one of the four districts of the Western Region (Region A) has a large urban population with a big vehicle manufacturing industry. A workshop had been arranged and 20 participants expected, but on the day 60 turned up coming from three of the region's districts as well as from the regional office. Both Provincial and TLC staff were present, a very necessary feature in an urban situation in Region A where clinics are still not integrated in function.

For this workshop the original guidelines were revised into two modules – the first on developing a 'Clinic Catchment Area Map' and the second on 'Community Mapping' aimed especially at EHOs and CHCs. After first describing some rural and urban experiences and bringing out the differences. Module One was presented and the use of the map for determining population when census figures were known was discussed. With the catchment population known it was possible to establish rates of coverage and then a clinic could really measure its effect on various conditions and service coverage of the community.

When Module Two was outlined, the discussion and emphasis was on the contribution of the EHO and the committee and their linkage with the clinics. Unexpectedly the social workers present asked many of the pertinent questions – they realised the potential for mapping the distribution of old age pensions, disability grants and other social issues such as violence and substance abuse.

Kwa-Nobuhle, a large urban township with four clinics and the Laetitia Bam Health Centre had a detailed map of all the numbered plots and roads. The participants were divided into five groups of about 12 each and assigned to visit the five health units for two hours. It was realised that this was too short a time but at least having an excellent prepared municipal map was a bonus. Unfortunately there were no members of the CHCs present. In Clinic One in "Area 4" the staff present were able to fill in all the information on the tabular form. At first there was a tendency to say just "Area 4" but then on probing they were able to add 'yes' some also come from "Area 3" and so the list lengthened. There was no easy way to extract from a register the addresses of patients – however on family files there were the street names and plot numbers which could be identified on the municipal blueprint maps of Kwa-

Lessons Learned

- Training with a practical component is hardly possible with more than 20 participants.
- Other disciplines such as Social Workers can benefit from training.
- Clinics and the laboratories examining TB sputa could map the positive cases. (No names as confidential.)
- Involvement of councillors could help as they are concerned with services accessibility and population served.
- Not all urban areas can be visited without four wheel-drive!

Nobuhle. Another method suggested was a "front door entry" record kept for a month by the clerk who issues the files. (The address of each patient would be noted by the clerk who issued patient records.)

One group then drove around to visualise the areas mentioned – during which a staff member in the vehicle recorded names for the catchment area which had not been listed – some additional shack areas in the hills beyond the boundary of Kwa-Nobuhle were pointed out. There were numbers painted on shacks built on the allocated plots and apparently councillors had already been doing a census and could provide the population figure.

At the end of the afternoon the four other groups met at Laetitia Bam Health Centre to compare notes and there was consensus that each clinic could now draw up its actual catchment area by modifying the blueprint map appropriately.

The District Manager agreed to set up a large district health services map in the district office displaying 5km and 10km radii circles around each health facility, and he also promised to provide a blueprint map of Kwa-Nobuhle with plot numbers and streets to each clinic. He was interested in plotting cases of notifiable diseases, especially tuberculosis so that areas could be identified for intensified action and follow-up.

Graaff-Reinet District (Camdeboo)

Graaff-Reinet district requested training in mapping clinic catchment areas soon after the training in the adjacent health district of Uitenhage. Participants came from two of the other sub-districts (Pearston and Somerset-East) and the Acting District Manager and Information Officer also attended. The form to be completed as the initial stage had been faxed to the district office but only Umasizakhe township clinic had completed it and also brought a blueprint map of the township. This clinic had a "tick-register" which provided the address of every attender. The two tools to be used in determining catchment area were discussed and each group of

Health Services for farms in rural areas around Graaff-Reinet

The District Council (Cacadu) Clinic in the town was visited. They need a large scale map to cover all farms within a 50km radius around Graaff-Reinet because within this area farms are visited by two mobile clinics based at the town clinic. The two professional nurses visit different farms on four days a week and on Fridays they work in the base clinic to see patients brought in by farmers (who come to fetch their children from school for the weekend). On one day a sister visits six to ten farms, makes perhaps three stops per farm (farmhouse, labourers quarters) and sees about 40 patients. Game farms and farm schools are also visited. Although within the 50km radius 157 farms are visited every six weeks. This district council also runs urban clinics in Jansenville, Willowmore and Rietbron and runs mobile clinics for Somerset East, Pearston, Jansenville, Willowmore and Aberdeen. The sister-in-charge in the council headquarters in Graaff-Reinet will be responsible for seeing that these urban clinics define their catchment areas. It was suggested that the council needs a large map on which to plot all the stopping points and could even indicate the patient load at each with different coloured pins.

staff were then requested to return to their clinic and extract the addresses and number of patients from each locality. The Pearston staff and Somerset-East staff went with the facilitator to Umasizakhe where in a short time over 900 attendances were analysed – coming from areas similar to the ones included on the first form. Most patients came from the TLC mapped area of Umasizakhe but when locality names were used it was possible to see which segments of the township provided most; immediately around the clinic and another more densely populated area.

The Graaff-Reinet Clinic

Participants extracting attendances by address from the Umasizakhe Clinic register

When all participants returned to the venue it was clear that other clinics also served patients from Umasizakhe but they did not specify locality within the township – perhaps areas nearer to their own, more immediate catchment area. It was decided all town clinics should extract according to street, block or local authority names and not only give a broad name referring to a whole township.

It was suggested by some participants that there were wards with known boundaries, each having a councillor and that in future councillors might be interested in the mapping exercise.

Umasizakhe Clinic is now developing new services as it is in the process of becoming comprehensive having previously only provided promotive/preventive services. This means that the whole exercise will have to be repeated in a few months time as the attractiveness of the clinic will be enhanced. It also explains why other clinics with curative services have been receiving patients from this township.

The last part of the exercise at Umasizakhe was the drive around the township to identify the areas contributing most patients. There were obvious differences between types and age of buildings; shacks, rented four-room elite

homes, single room RDP homes, older four-room areas, semi-detached homes. They all represented slightly different communities with different histories all within the one township. It was again suggested that councillors could be involved in more detailed community environment mapping.

The 1:2000-scale of the map and the visual appraisal of the extent of the township showed that in these urban areas, if circles were to be drawn around clinics to show geographical accessibility, a 2km radius could be appropriate or even 1.5km if the population density is very great.

Another clinic in Graaff-Reinet is actually two clinics in one building intended to be a health centre. The building belongs to the Province and one half is for curative services with a doctor attending for short periods and the other half rented by the local authority, provides preventative/promotive services. There is a locked door separating the two clinics. It was suggested that each half (or clinic) completes the exercise of ascertaining their catchment areas and that they compare them. The coloured township largely serviced by this double clinic (which is at the furthest end) is also divided into identifiable communities - the rich even separated from the poorer by a vacant strip. There is also a rocky area with shacks populated by recent arrivals from the surrounding farms.

The exercise of mapping catchment areas of clinics can bring out factors of attractiveness. Why do patients move from one area close to a clinic to go to another clinic? It may be because of the range of services offered and their quality. It might be the length of the queue.

In a small town it is useful to have one map showing all catchment areas in addition to each clinic having its own with relevant detail added.

Humansdorp (Kouga)

Eleven staff members of the District Health and Welfare Management Team, Jeffreysbay TLC, Western District Council and Humansdorp Development Services met at the District Health Office in Humansdorp to discuss mapping.

During the discussion several points were made:

- In a small town such as Humansdorp it is difficult to obtain printed district maps of a suitable scale which will show surrounding farms.

- Would a municipal engineers department map be satisfactory as a clinic catchment map? It was suggested that this map be adapted and show evidence of a real effort on the part of the health staff. The process of validating the map still needs the two “tools” to be used. Corrections can be written in after a tour of the area. Indicated shack areas, where the town plan is inaccurate, and other useful information can be marked in. Extend the map if necessary.

- The social workers asked about use of the map for their work - some examples provided were mapping pension grants, chronic illness, income generating activities, NGO offices.

- The Western District Council wanted to know the relevance of mapping for mobile clinics. The visiting points could be added to the district health map. The council could keep another route map indicating stopping points, distances (and time taken) between points and whether visited six weekly or monthly. In this area there are some large fruit farms with big labour forces and community maps of these farms could supplement the large map. They could note seasonal fluctuation in population of farms. In the small community maps they could mark "Directly Observed Treatment Short-course (DOTS)" TB supporters.

"Participatory community mapping of, for example, informal shack settlements could be used to involve communities in assessment of their problems which could lead on to analysis of what to do and then to action."

- Participatory community mapping of, for example, informal shack settlements could be used to involve communities in assessment of their problems which could lead on to analysis of what to do and then to action – the "triple A cycle" for development. A transect walk through a small town and its periphery would be very instructive for councillors and other community leaders. It could be done, for example, by walking on a straight line from the town hall and shopping area, through the elite large plot housing area, the middle income area to the shack area on the periphery without proper roads or street lighting and water.

Kwanamzano Clinic in the township of that name was visited and a municipal map was obtained. One of the staff knew the names of various areas in the township and on tour of the township showed the map was not accurate. There were areas of shacks which needed to be sketched in and also a large area beyond the official map was now densely populated. Some areas planned on the map for orderly development were now occupied by shacks.

Other areas from which patients came were small communities along the coast or towns further inland. It was emphasised that population numbers could double seasonally eg, at Christmas or Easter or when there were seasonal fishing or farming activities. This clinic would require two maps: first the existing township map to be amended with other information added – schools, churches, traditional healers – to make it a real clinic map showing the clinic knows its communities. Second a large scale map is needed showing the outlying areas together with the proportion of patients coming from them seasonally.

An aerial photograph of Hankey in the Humansdorp district

Masekhane Clinic in Centerton township in Hankey was visited on the following day and the Western District Council staff had already completed the mapping form following the training. In addition they had acquired a large aerial photograph of the whole town and adjacent area – as well as a TLC map of Centerton township and a map of Hankey district. They had categorised the 12 areas, from which they knew patients came, as most, many, few or very few. Centerton was the area from which most came. Those areas providing many were neighbouring townships (new RPD, "coloured" and shack). The few and very few were areas as far away as Jeffreysbay - however they provided large numbers of migrant labourers when needed by seasonal fruitfarm activities. The aerial photograph showed up the shack areas "Plakkerskamp" and "Extension 4". The district map was useful for showing the district areas.

The usual tour by vehicle round Hankey and a view from a hill made it easier to understand relationships and distances and barriers (hill, river) between areas. The clinic staff had been quite right – they did need three maps. It was suggested that the TLC map of Centerton become a "community map" with as much relevant detail added as possible – the schools, the new developments, the crèches. The aerial map should be enlarged – either by sketching or by photocopying and then the catchment area drawn to include all the townships identified. They should also keep the district map and mark the percentage of patients coming from these more remote areas with the seasonal variation.

One last suggestion was made after the tour of the town took a team over the river to the Western area. Here was a small more circumscribed poor area needing to develop but develop with its own energy – could participatory mapping by the community be the spark which releases this energy?

Many clinics could profitably have two or three maps – a local catchment area, a community map of one high interest development area, a large scale map of nearby district centres.

The mapping exercise is a time for discussion between different authorities – it could assist the process of integration for a comprehensive service.

Port Elizabeth (Nelson Mandela Metro)

In Port Elizabeth a group of 30 nurses and CHWs had assembled at Dora Nginza Hospital to learn about mapping catchment areas. Municipal maps of Zwide with all "erven" marked were available. It had been suggested that clinic attenders' addresses obtained from a computer record but the computer was out of action, so only the form in the first module could be reviewed. Some of the points made were that other clinics eg, Linten Grange Clinic received patients from Zwide. This could perhaps be explained by the attractiveness of the clinic in terms of its kind considerate staff, good reputation and relatively short queues. Although Zwides map looked very easy to understand one of the CHWs said that there were now many shacks in the areas which were blank on the map. Community mapping was needed in these areas in order to modify the existing map.

Even if a city map is available with plots marked community mapping is necessary to fill in the details relevant to health and the clinics' work.

Large urban townships or sections often have subdivisions and the local names should be marked on the map – they may overlap into other clinic catchment areas and it is by using these names that this can be ascertained.

This map shows the catchment area of the Tshangana Clinic in the Port Elizabeth District

Catchment area mapping, Queenstown District, Region B (Lukhanji)

Qoqodala Clinic

Region B requested training in mapping in June 1998 and arranged for a two-day workshop in Qoqodala about 25km from Queenstown on the main road to Dordrecht. The venue was the church hall adjacent to the enormous Catholic church in the centre of the basin surrounded by a ring of mountains with villages at their base. Twenty-two participants had come to learn about catchment area mapping; EHO, nurses and the Chairman of the local health committee. They came from Queenstown Regional office, Stormberg District Council, TLC and District office and from Glen Grey Hospital, Hewu, Lady Frere, Cofimvaba and of course the local Qoqodala Clinic.

The process, now becoming more routine, followed the two modules which were distributed. The district health map was discussed first and it was decided that there should also be sub-district maps. After this the clinic catchment area was discussed. The community committee chairman proved to be the most valuable resource person for filling in the form listing communities served. 'Distance' raised discussion – was it kilometer, time, mode of transport, taxi fare? Discussion around taxis suggested that if asked they could in fact provide accurate measurements of distance in kilometer. 'Tick registers' were obtained from the clinic and three groups used them very successfully to extract the number of patients coming from different localities. In one hour 338 patients addresses were analysed coming from 35 localities – 29 of these had also been identified on the form.

A Qoqodala home with a solar-powered telephone

The names of villages apparently fell along four directions – up and down the Dordrecht road and along two gravel roads which went off at right angles to this main road – roughly N, S, E & W. The drive to the east went towards a place called “Agnes Rest” which was over the ridge of the mountain on the boundary. On going over this ridge a whole new valley came into view; again encircled by mountains and with numerous villages. One large village had a satellite clinic manned by a professional nurse from Glen Grey Hospital. The distance from Qoqodala Clinic to the ridge marking the edge of the Qoqodala valley was 6 km and the valley had a population of about 15 700 according to the chairman. From the entry to Agnes Rest to its furthest ridge was another 10 km, ie many of this group of villages which were also using Qoqodala Clinic in addition to the satellite

were about 10-12km distant. The Agnes Rest community had insisted on the establishment of this satellite clinic in spite of the district office being against it. On this journey one of the EHOs had been making a map and adding the names of the villages identified.

When the other groups returned, their maps were aligned to give a picture of all the thirty identified communities. By travelling along these roads it was clear the catchment area extended far beyond the valley originally visible over ridges – into other areas and even areas overlapping with other clinics. This situation will require careful population calculation.

On the second day of the training, discussion first centred around the problem of obtaining a reasonable estimate of the catchment population for determining coverage rates of services. The Regional Information Office would be able to get the census figures and help to calculate which population to include completely and for which villages to allocate a proportion of their population as they overlapped with other clinics.

The second module on community mapping was discussed and then each group selected one village in which to do community mapping -- this being a participatory exercise with community members.

Esixeko village in Agnes Rest was one village chosen and by discussion with a village leader and driving slowly to different parts of the village much more than just a map was obtained. The social history of the village (the name was "derived from the visit of an English Princess who visited a century ago and rested here") its water resources and their use, its agriculture, the schools and their facilities, the problems of diarrhoea, lack of telephones and electricity, the need for a bigger clinic with a maternity service, the absentee workers

A participant sketches the villages around the valley at Agnes Rest

Points of Interest

- Never forget to involve the community committee members the older the wiser the more knowledge of the area.
- Catchment areas can extend in unexpected directions depending on accessibility and on the attractiveness and even history of a particular clinic. Qoqodala originally was a Catholic clinic adjacent to the church.
- Mapping can get a variety of people out into the communities as a group – regional and district staff talking together in the vehicle and meeting village leaders.

and the lack of jobs, the taxi and bus service and their changes; all of this was obtained in the short space of 1.5 hours. Not only the nurses and the EHO but the higher level staff from the regional office were impressed with the wealth of information provided and the rapport established between the team members and the village leadership.

In the standard "Way Forward" session at the end of the training one nurse commented on the fact that having worked together on mapping they now saw how they could help each other to the benefit of the population.

Sterkspruit (Herschel District) Sunduza Clinic (Natlethswai)

Sunduza Clinic was the venue for training in mapping of PHC supervisors and EHOs from the three health districts of Cradock, Aliwal North and Elliot. It proved to be a good choice as there was an exceptionally active and knowledgeable CHC. The communities had even constructed the nurses home and clinic and had recently restored a broken door. Completing the form with details of villages served was assisted by the committee members who knew that some areas such as Sunduza were divided into four areas each with a name. The committee was asked what aspects they would like to include in community mapping of five selected communities. Their choice after discussion was:

Sunduza Clinic

- homes with toilets (latrines) and with good ventilation such as windows;
- water supply – why are some taps dry and are the springs and other sources in good order?
- vegetable gardens and fruit trees;
- they wanted teenage pregnancies mapped but the group compromised by mapping teenagers (male and female) and children under five;
- the facilitators decided on the fifth activity;
- a transect map from the clinic.

This exercise produced very good results, for example, the one village chosen for toilet mapping had 176 houses with toilets and only 32 without 15% lacking toilets. The explanation for not achieving 100% was that some areas were too rocky to dig a pit. Only seven homes had poor ventilation.

The fruit and garden map was also well done by one team and it showed a high proportion of homes had gardens, some with many varieties of

vegetables. There were also many fruit trees – peaches and apricots.

The demographic map group found 18 homes with 25 under fives and three homes had three or four children under five. There were 24 male teenagers and 19 females mostly doing nothing in their school holiday – but a few were seen helping with building, minding small children or herding. This opened a discussion with the committee on providing more sports fields and also on setting up community condom distribution.

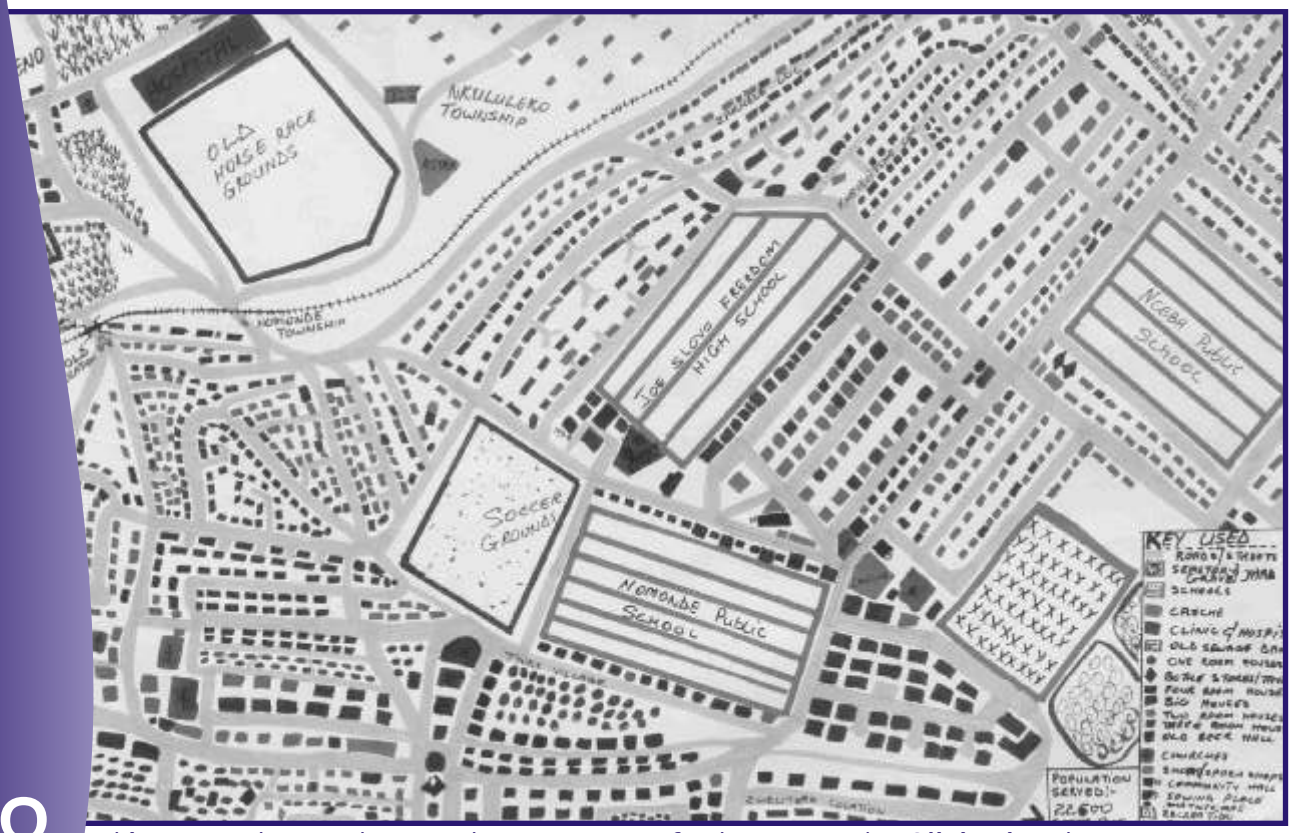
The transect was clear as it covered a slope down from the clinic on the hill to the valley below with an irrigation scheme and then up a hill on the other side of the river. Nurses and EHOs from Cradock agreed it would be a useful urban exercise to show differences in overcrowding, adequacy of housing, rubbish disposal and differing socio-economic status.

Two of the issues which the participants wanted mapped were water supply (top) and teenagers and children under five (bottom).

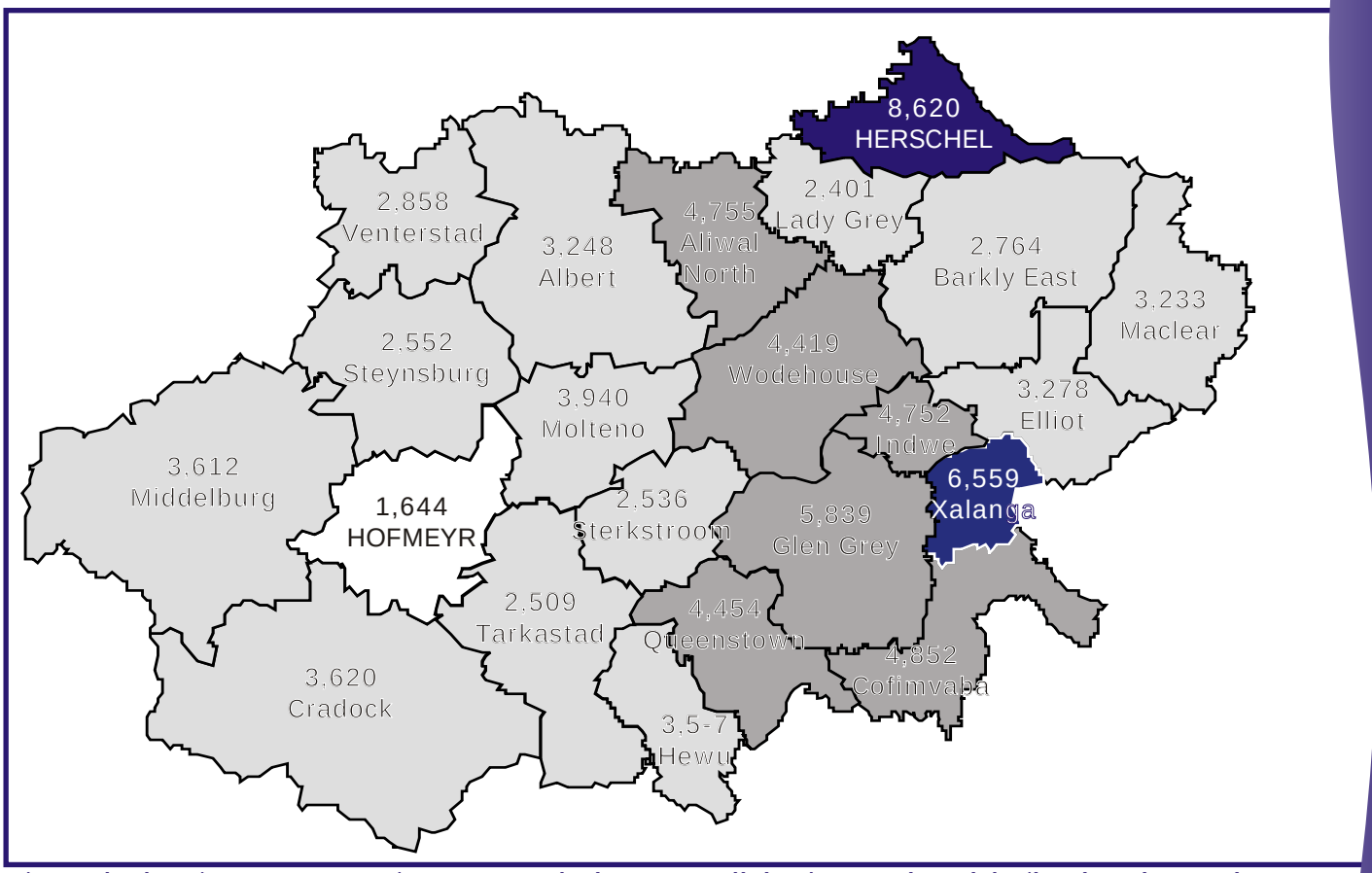
Sunduza village

In the one day several aspects of community mapping were demonstrated and the exercise had involved the community who acted as guides and informants – it was a semi-participatory training exercise as the maps were not actually created by the community.

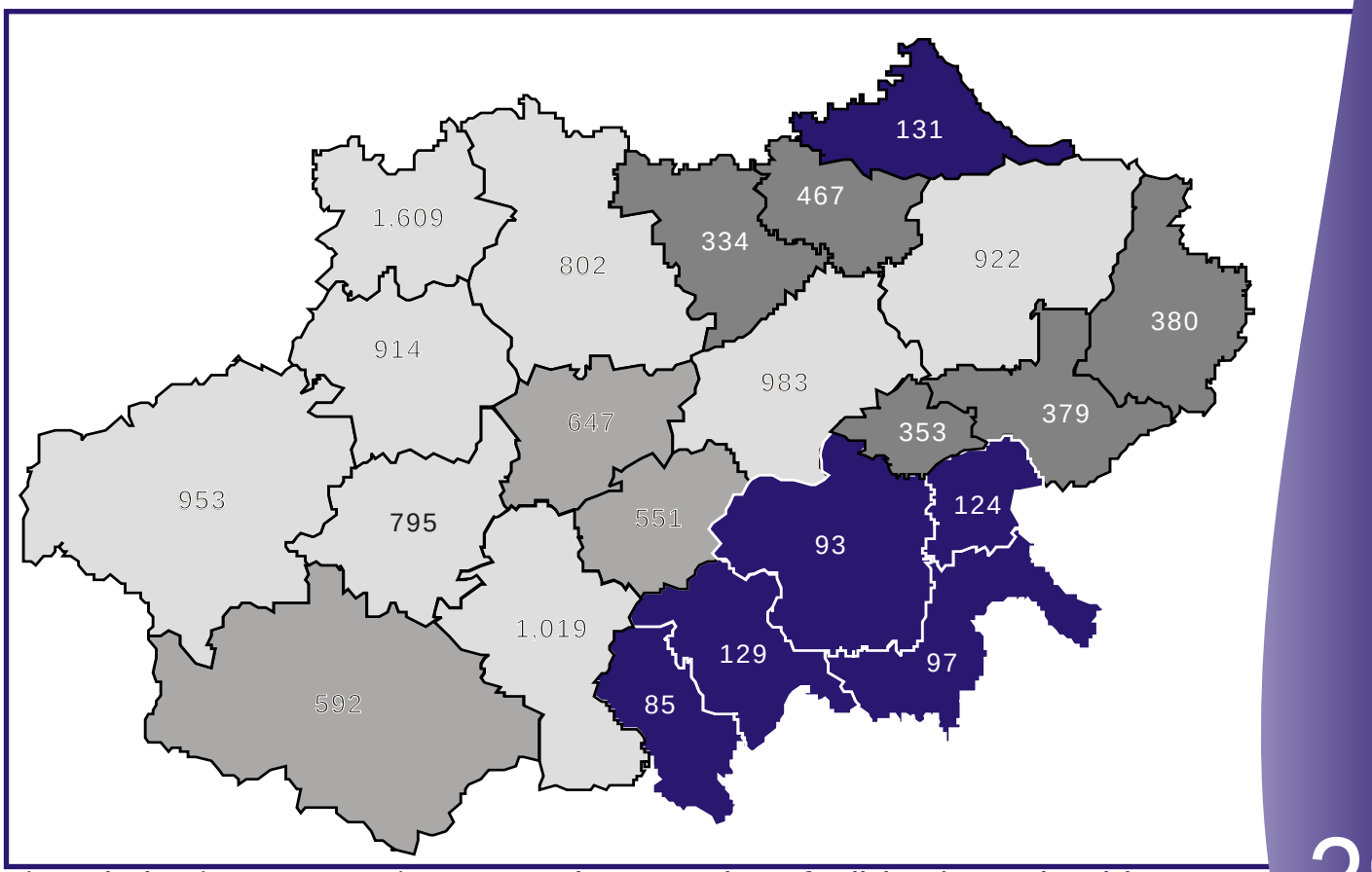
Participants mapping the clinic catchment area for Sunduza Clinic



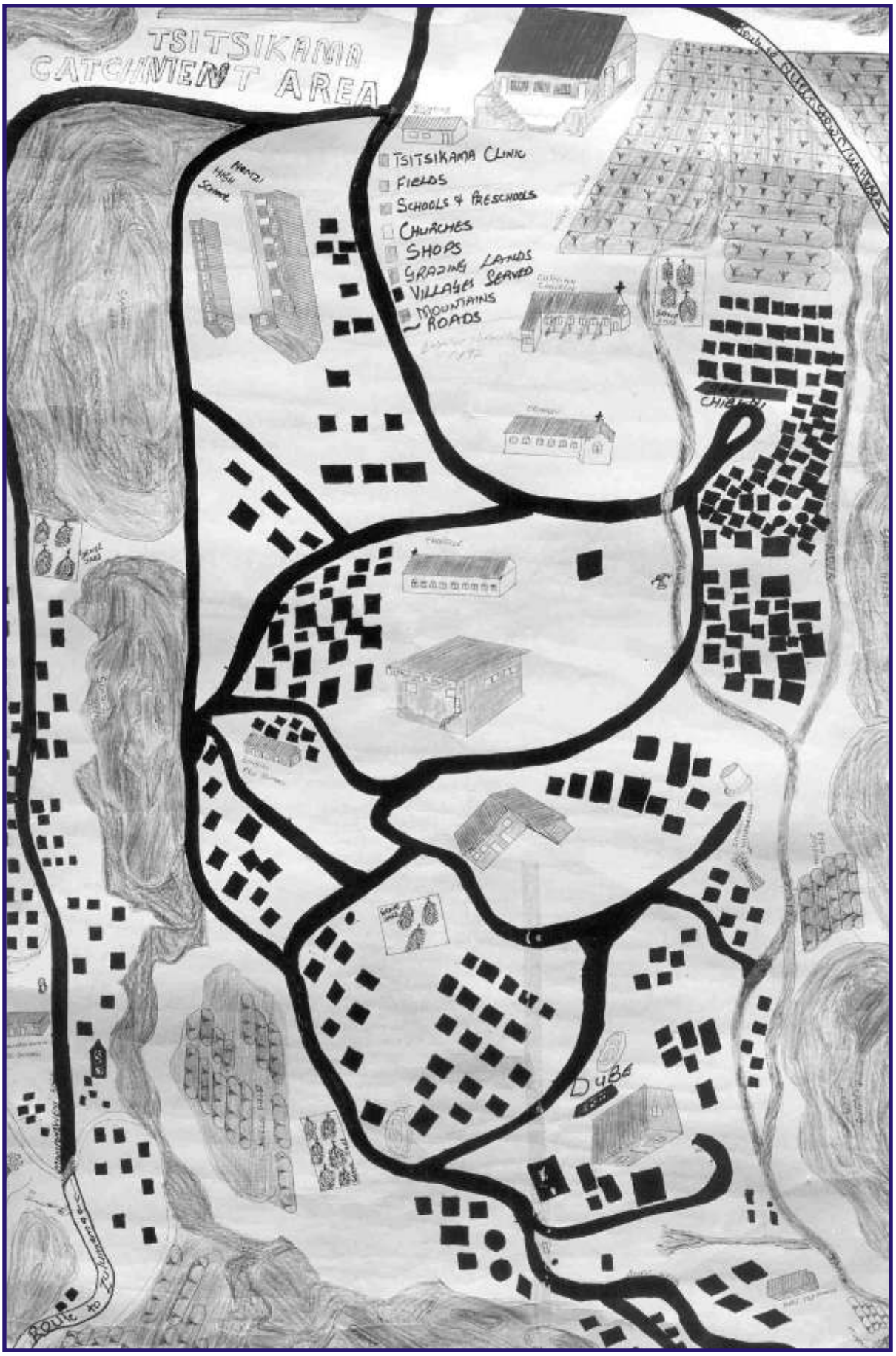
This map shows the catchment area of the Nomonde Clinic in the Queenstown District



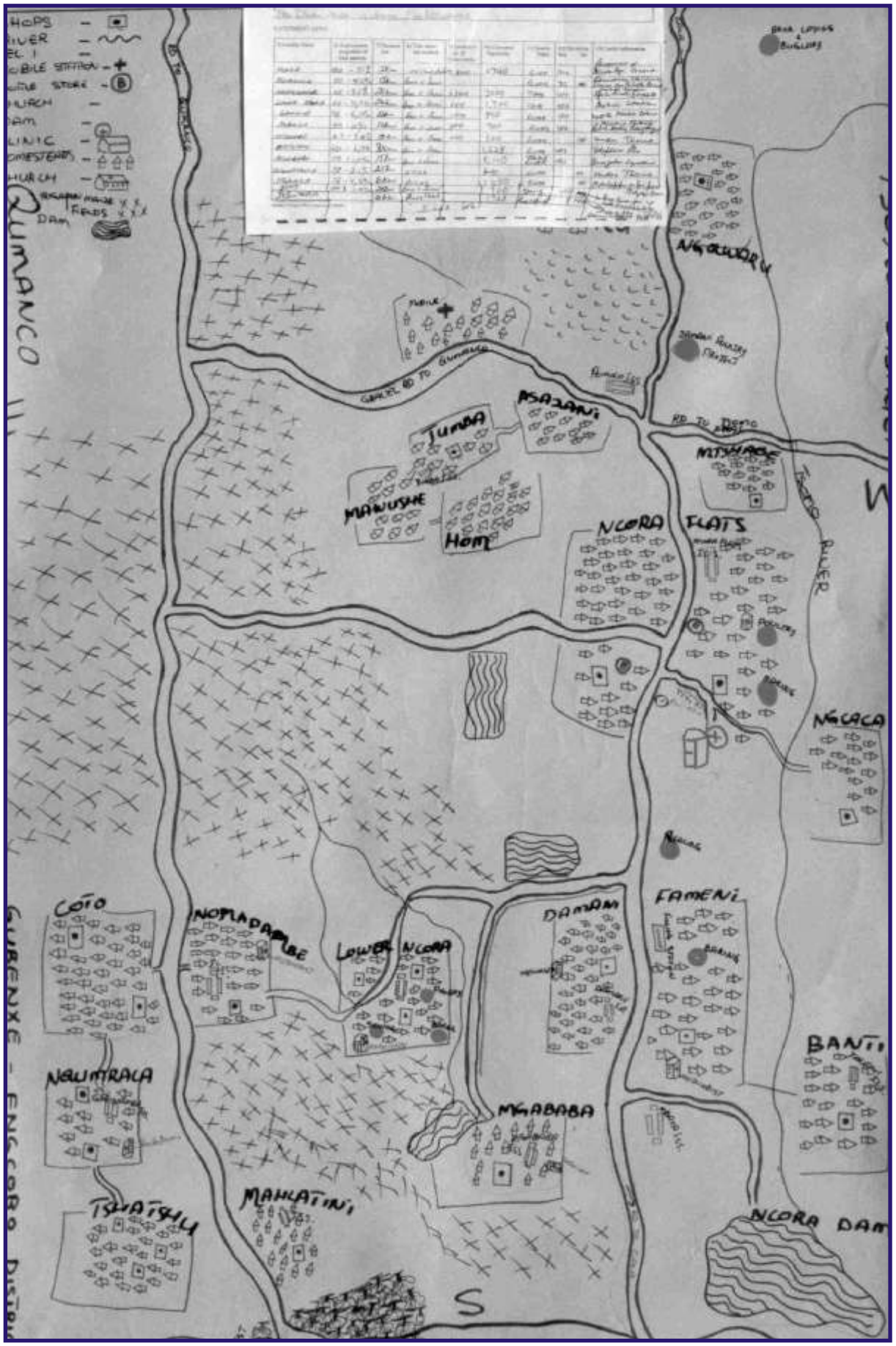
The calculated average catchment population per clinic by magisterial district in Region B



The calculated average catchment area in square km of clinics by magisterial district in Region B



This striking map shows the catchment area of the Tsitsikama Clinic



The map for the Ncora Clinic in the Queenstown District

5. Mapping of community-based health and welfare workers and other human resources

Clinics can map important information essential to establishing equitable distribution of two major interventions, for TB and for chronic illness. These are to ensure access to DOTS supporters, to home-based care (HBC) support and to other human resources available through non-governmental and community-based organisations.

DOTS Supporters

By mapping where trained DOTS supporters live clinics are able to tell any newly diagnosed TB patient that it will be possible to arrange daily treatment by the DOTS supporters nearest to their home. Daily visits to the clinic will thus not be needed except for those patients not admitted to hospital but getting streptomycin injections. It will also be possible for patients discharged from hospital needing daily tablets to be connected immediately to a conveniently-situated DOTS supporter.

Such a map on the clinic wall will show DOTS supporters not TB cases because this might infringe confidentiality as people would then identify TB homes and possibly also gossip about the relationship between TB and HIV.

If the clinic knows the localities and villages where TB cases live it will also be easy to see which areas have no nearby DOTS supporters. This should then lead to a drive to find someone to train for DOTS for that area.

HBC Supporters

In some areas DOTS supporters are also trained as HBC supporters who then provide skills, support and materials to home carers within a home who provide daily care to a seriously ill person. Many of these persons have AIDS and are becoming bedridden or need terminal care. Some are ill children in the care of their grandmother, some are orphans living by themselves, some are patients with other conditions eg, a stroke. HBC supporters (not necessarily DOTS supporters) might have up to 10 homes to visit often and quite far apart. The zone covered by each HBC supporter could be outlined as an area. Using a colour code it might be acceptable to mark individual cases on the map – as long as this does not lead to stigmatization – however many cases would be due to HIV/AIDS so confidentiality is always a point to consider.

Mapping human resources: leadership, different authorities and agencies

In setting up the health districts it was assumed that there would be functional integration of health care delivery by different authorities. This would ensure a rational efficient system for the user, with shared resources without duplication. Many health districts have however still not achieved functional integration between the many authorities and agencies present. Hospitals are of different sorts – provincial first level and referral, private, government-aided, specialized hospitals (mental and tuberculosis), clinics are operated by small municipalities, provincial health department and district councils which might also operate some clinics or mobile clinics. There might thus be in a health district, offices for the district health manager (provincial), another for the municipality health desk, and another for the District Council. Further demarcation for local administration might be that of traditional tribal authorities with the chiefs headquarters. SANCO, a civil organisation, might be involved in health. These health-related structures can be mapped as outlined areas (the wards under chiefs) or as municipal boundaries. They can also be enhanced with a series of pins indicating offices.

Within the catchment area of a clinic or hospital there might be many resources for health and for illness. Some examples are traditional healers and surgeons – many of whom are trained in some aspects of care. It is useful for the clinic to know where they live so that they can be invited for meetings and training. Some might be on the community health committee related to the clinic and when trained can participate in mobilizing or referring children or pregnant mothers for immunization. Some might be performing the circumcision of boys and now need training and education according to the new legislation.

Health promoting schools have teachers and members of their school governing bodies who are valuable resources for health of the school going population. Such schools could be on the map.

There are many NGO and CBO offices in a health district and these can usefully be shown on a clinic map – there could be, for example, a hospice, SANTA, AIDS care centres, a church-based organisation, organisations for disabilities, the aged, feeding schemes, orphans, chronic disease – even taxi organisations which help with transport.

If there is a HIV/AIDS/STI/TB (HAST) sub-committee of the District PHC committee then they will have many addresses of the partners working on HAST. This sort of map should be available in every clinic as it will show where patients could be referred. A list of telephone numbers on the side of the map also helps.

6. Mapping other medical conditions

Certain conditions cluster and this indicates an area which needs special attention. The area might be quite big eg a village or a ward and then the number of cases of a certain condition can be indicated by a dot of a particular colour. For example schistosomiasis, (where ponds, dams, rivers should also be included), diarrhoea with dehydration, scabies, severe malnutrition can all be mapped. In urban areas it might be possible to get more accurate placing by plotting per street or locally named area. The reasons for any clustering should be sought – environment – water source, poverty, housing and overcrowding. Perhaps transmission is occurring in a preschool or a school but these should also be on the map.

Outbreaks

It is especially useful to map outbreaks. Nowadays even one case of suspected measles or polio can be regarded as a potential outbreak. It needs to be mapped so that follow up investigation and prevention can be initiated. Cholera outbreaks need every case to be mapped. Remember John Snow and map the water supply. It is useful to keep the map even when the outbreak is over – there might be recurrences in a years time!

Mapping in high HIV/STI transmission areas

High transmission areas for HIV/STI have been described in many countries besides South Africa (and especially the Eastern Cape Province).

Areas of possible high transmission are first identified by analysis of the health information systems evidence on STI, the presence of high density informal settlements, the existence of movement of people (truckstops, railstops, border crossing, taxi ranks and routes) poverty in juxtaposition of wealth and new industry.

In setting up a HTA there is a chain of processes starting with identifying a possible area of increased transmission and then with the aid of a number of key informants determining where people think new sexual partners are found. After this comes a verification process where these identified sites are visited and confirmed by local observation and further interviews. These sites, which have usually been found to be shebeens, bars, taverns, liquor stores, church halls, school grounds, certain streets, bus stops, taxi ranks and truck stops, are then drawn on a map. As the HTA interventions start, further information is added to the map eg, condom distribution centres, peer group educators addresses, most useful sites for group education, bars with cooperative management. The use of this map is chiefly in identifying areas where condom distribution sites are needed, where group work is most active and where the

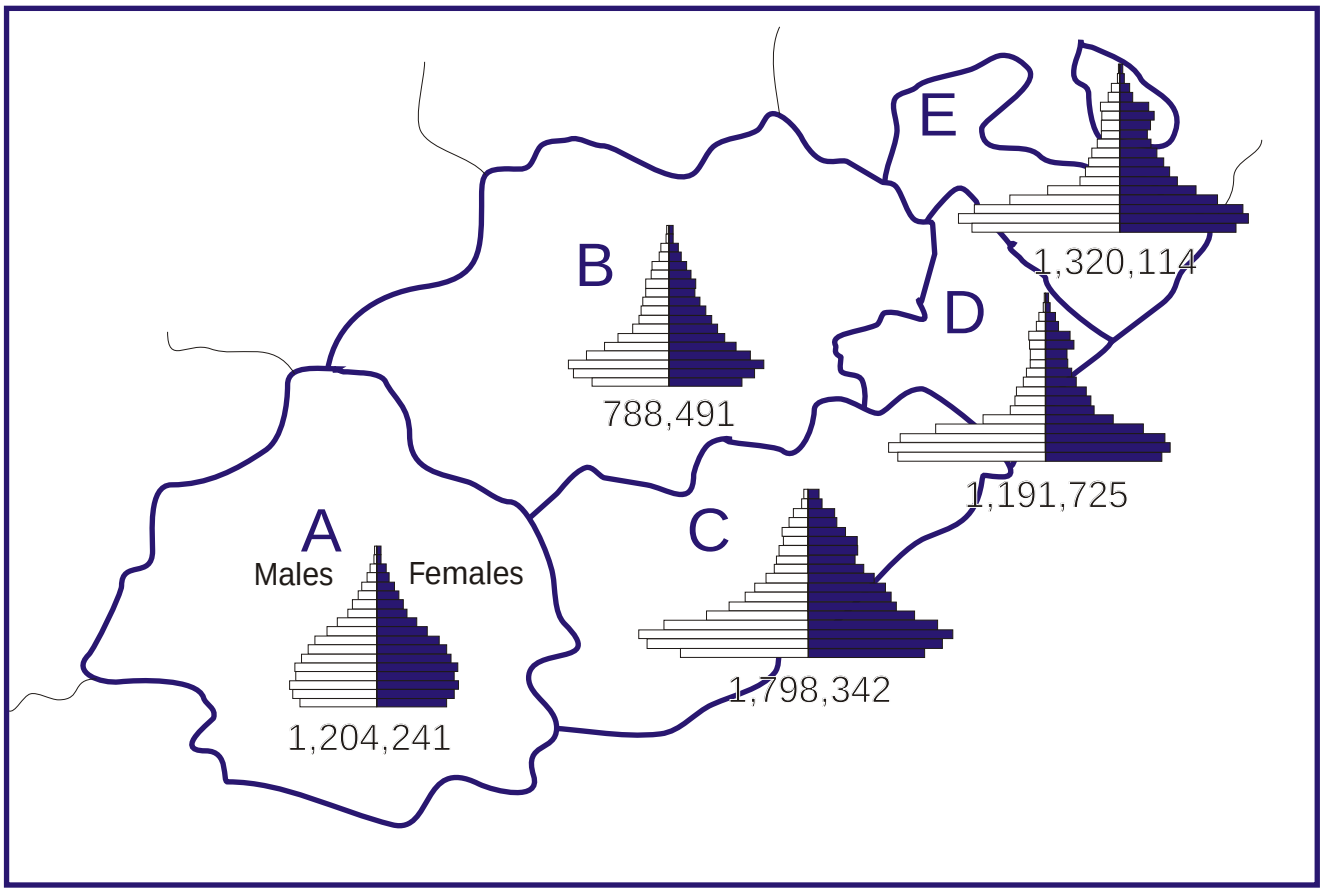
greatest number of new sexual partners are found. If these are adjacent to or include large companies employing many men then it would suggest preventive work should also start with a work-based HIV/AIDS/STI programme.

7. Catchment population and its use

In the early years of the 90s decade when health services of part of the Eastern Cape Province were still administered by the Department of National Health and Population Development based in Port Elizabeth, maps were used to show graphically the difference between "races" and magisterial districts of certain PHC indicators. Excluding the Transkei and Ciskei there were 41 magisterial districts and 37 local authorities which included five Rural Services Councils. The local authorities had population figures used for calculation of rates and certain assumptions were made eg:

Fertile females	25% of total population
Children 0 - under 5 yrs	15% of total population
Children 1 - under 5 yrs	12% of total population
Children 0 - under 15 yrs	25% of total population for Asians, Whites & Coloureds and 40% of total population for Blacks

Now race is no longer distinguished except in Port Elizabeth although it was a proxy for socio-economic status or degree of disadvantage or deprivation. The assumptions about percentage of population in each of the age groups are also probably not very accurate as shown by the latest advance census figures which imply a lower level of fertility than was used for previous estimates. When clinic catchment areas are determined on a map it should be possible to obtain an approximate population from the census tracts which fit most closely to the area. Assumptions and approximations will be needed. As has been shown in the description of training sessions in different areas it often happens that some villages or localities are on the periphery of the main catchment area and that only a proportion of population of such an area should be included in the clinic catchment population, if patients are also using another clinic.



This maps above shows population size and demographic pattern by age and sex for the region

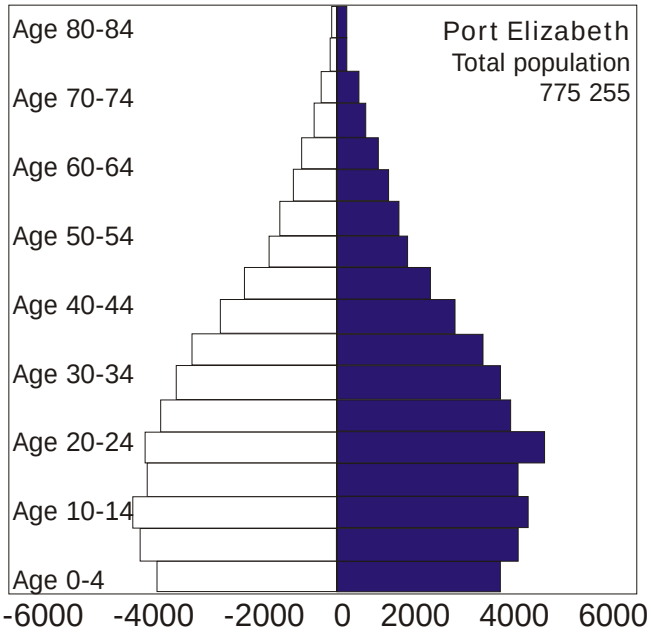
Region A which is more urbanised (two big cities, many small towns and a low density population on large sheep farms) has a developed country-type population structure with very few children.

Regions D and E have developing country-type demographic profiles with more children and few old people (except grandmothers). The absence of adult men (due to migrant labour) is also striking.

Regions B and C have some intermediate characteristics but both have very few small children.

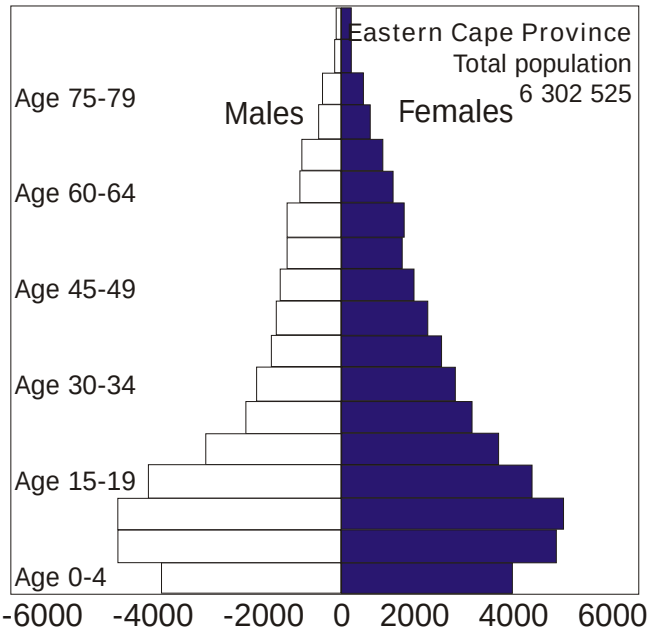
These demographic differences will affect the numbers and composition and patients attending clinics. Old people and small children have more problems getting to clinics but have a higher need for medical care.

Even within one catchment area demographic knowledge will be useful for a nurse to understand the needs of her population.



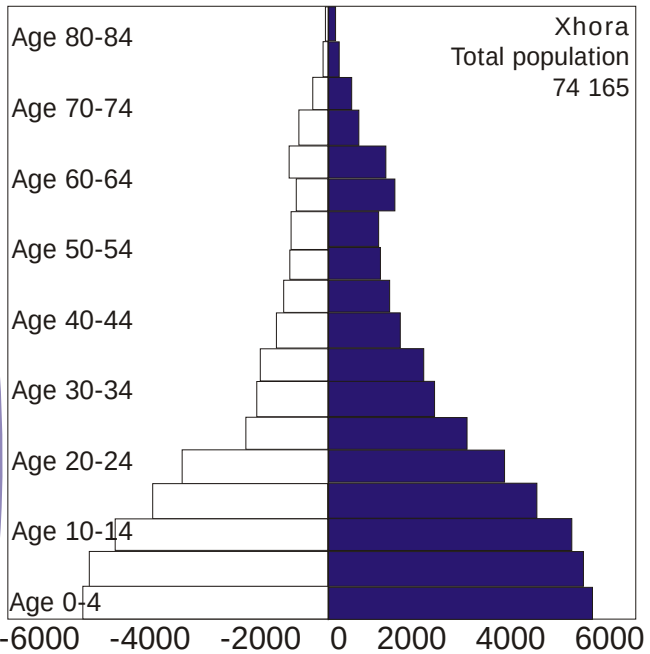
PORT ELIZABETH

0-4 years	15-19 male	15-19 female	15-44 male	15-44 female
8.7%	4.7%	4.9%	25.1%	27.1%



EASTERN CAPE PROVINCE

0-4 Years	15-19 male	15-19 female	15-44 male	15-44 female
12.1%	5.6%	6.0%	19.0%	23.4%



XHORA MAGISTERIAL DISTRICT REGION D

0-4 years	15-19 male	15-19 female	15-44 male	15-44 female
16.5%	5.5%	6.3%	13.9%	20.8%

The graphs above show three examples of demographic profile differences

NOTE:

- the small percentage of children under five years of age in Port Elizabeth and the large percentage in Xhora
- there are more female than male adolescents in Xhora but almost equal percentages in Port Elizabeth (perhaps male adolescents leave rural areas to attend schools in town)
- there are more women than men especially in the rural area.

For measurement of crude birth rate:

$$\frac{\text{Total number of live births during last year}}{\text{Total population mid-year}} \times 1\,000$$

It would be necessary to enumerate all births in a whole magisterial district or a whole health district. However for the small population in a clinic catchment area eg, 10,000-20,000 it is more useful to estimate the expected number of births to establish indicators such as coverage.

The percentages per year and formulae which can be used in Eastern Cape are:

Estimated number of pregnancies in a catchment area:

population x 04- (0.15 x % population using contraceptives)

Consider the number of pregnancies as 4% of the population minus (0.15 x % of population using contraceptives). Thus, if 12% of population is using contraceptive (120/1000 population) then expected pregnancies is 2.2% of population.

Percentage expected pregnancies in catchment who attend antenatal clinic at least three times:

$$\frac{\text{Number of pregnancies who attended three times}}{\text{3\% of catchment population}} \times 100$$

Three percent is used as an approximation because a very large percentage of women are on contraceptives (usually injectable).

Percentage expected births in the catchment area which take place in hospital, health centre or clinic:

$$\frac{\text{Total births in health facilities}}{\text{3\% of catchment population}} \times 100$$

Percentage expected delivered women who have postnatal examinations:

$$\frac{\text{Number of postnatal examinations}}{\text{2.5\% of catchment population}} \times 100$$

It is assumed 0.5% of pregnancies do not result in live births.

Percentage babies in the catchment area who are fully immunized in first year of life:

$$\frac{\text{Number of babies fully immunised by one year}}{\text{2.4\% of catchment population}} \times 100$$

Assuming the target population is 10,000 ie 250 infants born but 12 die before one year. (That is IMR of 50.)

Percentage expected HIV positives who had positive HIV tests and were counselled:

$$\frac{\text{Number positive HIV tests done and counselled}}{\text{16\% of 15-49 year olds (42\% population)}} \times 100$$

Only the reproductively active population (15-49) are considered and 16% of them are expected to be positive – but they only form 42% of the total population, 16% of 42% is 6.7% of total population.

Percentage expected TB cases who have been identified by sputa:

The incidence rate of Pulmonary Tuberculosis in the area could be as high as 500 per 100,000 population. The average rate in Eastern Cape Province is 350 per 100,000. In a catchment population of 10,000 one would expect 35 cases. The formula is thus:

$$\frac{\text{Number of sputum positive cases per year}}{\text{350 X catchment population } 100{,}000} \times 100$$

Percentage reproductively active women receiving family planning per year:

$$\frac{\text{Number of women receiving family planning per year}}{\text{23\% of catchment population}} \times 100$$

(In all parts of the province the percentage of women in the 15-45 year age group is greater than the percentage of men in that age group). Use the magisterial district population from the 1996 census to determine the percentage of women aged 15-45 to give the most accurate estimate.

8. Urban clinic catchment areas

Most of the clinics in the area of the former Cape Province were situated in cities or small towns. They were either administered by the Province which provided curative services in its hospitals, day hospitals and clinics or by the local authority which provided only promotive and preventive services. Some provincial clinics provided only family planning as a vertical service. Sexually transmitted diseases were often referred to the district surgeons. The fragmented system meant that few clinics were providing a comprehensive service – some of these being run by the district council health services which provided mostly rural mobile clinics but also provided a few static urban clinics in the small Karoo towns. Within urban settings the black populations were previously segregated, within many of the hospitals or they had to attend curative clinics and day hospitals situated in the predominantly white-owned central part of the town. The more densely populated and larger "black" areas of the town were often kilometres away – perhaps over a hill and in the areas with local government clinics with no curative services.

> "Sometimes areas on the map which have no plot sub-divisions are now densely occupied by shacks. Thus, in urban areas it is important to drive around the area and mark these features on the printed map."

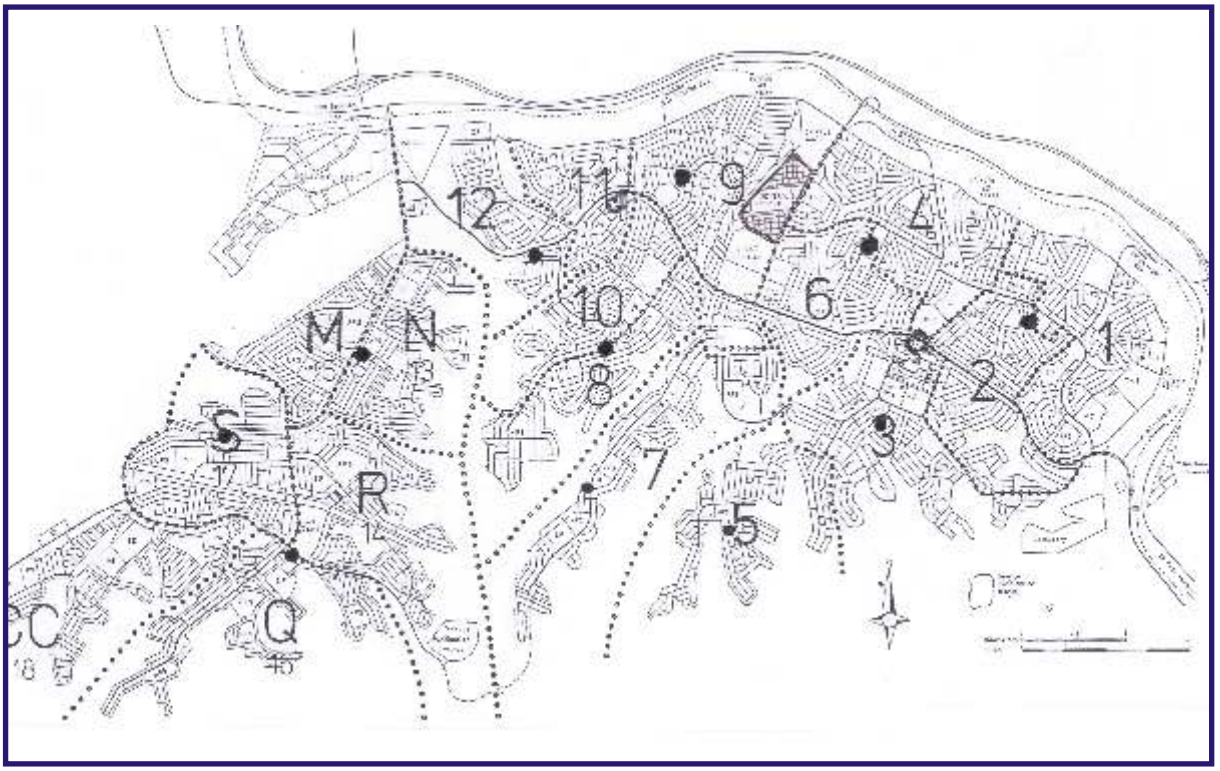
The black population therefore usually had only local authority preventive/promotive clinics which did not care for the sick. Consequently, they had to make their way to the hospital out-patients department or provincial clinics/day hospitals in the more central part of the town. Most towns and cities have good maps of streets and erven (plots) usually numbered. These have been planned in blocks or areas and usually with sites allocated for clinics, churches and schools.

Mapping clinic catchment areas in urban areas in three regions of the province started with the advantage of a prepared detailed map (eg, 1:15000 for a small town and 1:2000 for a location). The disadvantage is that the catchment for a given clinic is only for the specific services it provides and people have to go elsewhere for the other essential services. Thus, people may be functionally a part of the catchment of several clinics. The two tools: the form to capture local staff and community members knowledge, and the extraction of patient addresses to see where they came from, can both be used in urban areas. It will come as no surprise to find that clinics in the more central area providing curative care also claim the black township as their catchment areas. There will be considerable overlap and so it is useful to map all clinics in the town/city and see to what extent they overlap. Circles of 2km are more useful for urban areas to show accessibility. With a dense population the queues are longer and patients go elsewhere showing that a clinic is "socially inaccessible". Working out catchment population with lots of movement between clinics becomes difficult. Taking the addresses of township children coming for immunization in one of these

preventative/promotive clinics might indicate which areas children come from and when the census figures are available it might be possible to get an idea of catchment population of children in these areas.

A large section of housing on a town engineers map might in practice be made of several communities which have a name. There are often visible differences in age of buildings, origin of funds and different home plans (1 room, 2 room, 4 room, etc) and materials used for construction. There will be different historical reasons for the names. These names and areas should be marked on the clinic map. Sometimes areas on the map which have no plot sub-divisions are now densely occupied by shacks. Thus, in urban areas an important stage of mapping a catchment area is to drive around the area and mark these features on the printed (or blueprint) map.

A clinic catchment area map to be acceptable as a tool for ensuring community orientation should preferably be hand drawn showing that the clinic staff have really gone through the necessary process of finding where patients come from. However, in urban areas with an existing map showing plot numbers and streets it can be used as a basis for constructing a community-oriented map. The names of localities can be printed in and they can be shaded with different colours to indicate different population density or economic level. Important data can be added with symbols (church, womens groups, CHW homes, shops, truck stops, taxi ranks, schools (primary, secondary and size) preschools, NGO offices etc). At the side of the map an analysis of percentage of attenders from each area can be added as a small table. Nearby clinics should also be shown with their catchment area to indicate areas of overlap.



This map shows Mdantsane clinics and catchment area

9. Commercial farms and district council maps

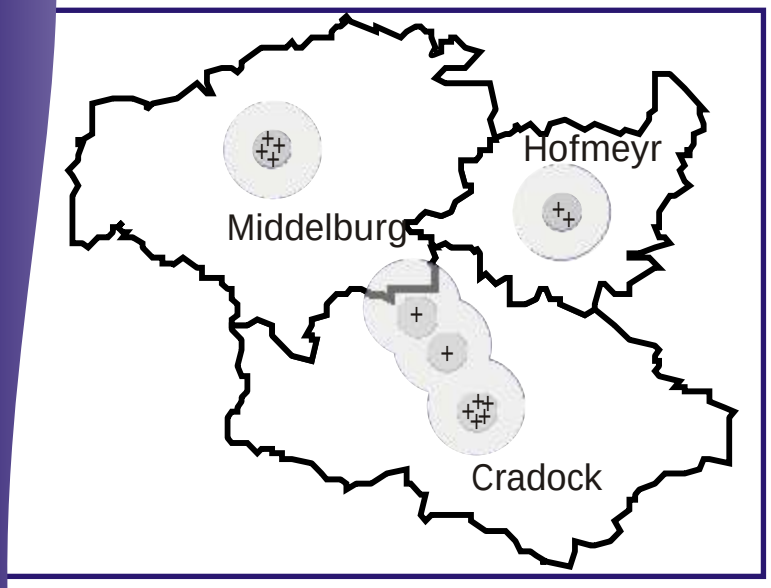
The Eastern Cape Province has 63.4% of its population classified as non-urban in the 1996 census. There are approximately four million non-urban people living in several very different types of community. In the areas which were part of the former Cape Province they live mostly on farms and are the farm labourers working for a commercial farmer. Populations of farms vary with fewer on large sheep farms than on dairy farms or those cultivating crops. In the former Transkei and Ciskei areas of Regions B, C, D and E communities can be scattered usually on the tops of hills and varying greatly in size – and it is in these regions where most of the non-urban or rural population live. In these areas without district council mobile clinics the rural villages are visited by a team based at a hospital or health centre.

> “By including the farming process in the community map – pineapple fields, packing areas, milk sheds, shearing areas and workshops – some idea can be gained of the possible occupational hazards a small community might have.”

As was seen in mapping in Region A the District Councils may have boundaries which do not coincide with the regional boundaries. In Region A the Western District Council covers part of Region A but also covers some magisterial districts which fall in Region C, eg, Albany, Alexandria and Bathurst. These councils have mobile clinics which cover rural farms and very small communities and farm schools. In the Eastern Cape Province only four of the six district council areas provide health services as the two areas which are in Regions D and E only cover other development sectors.

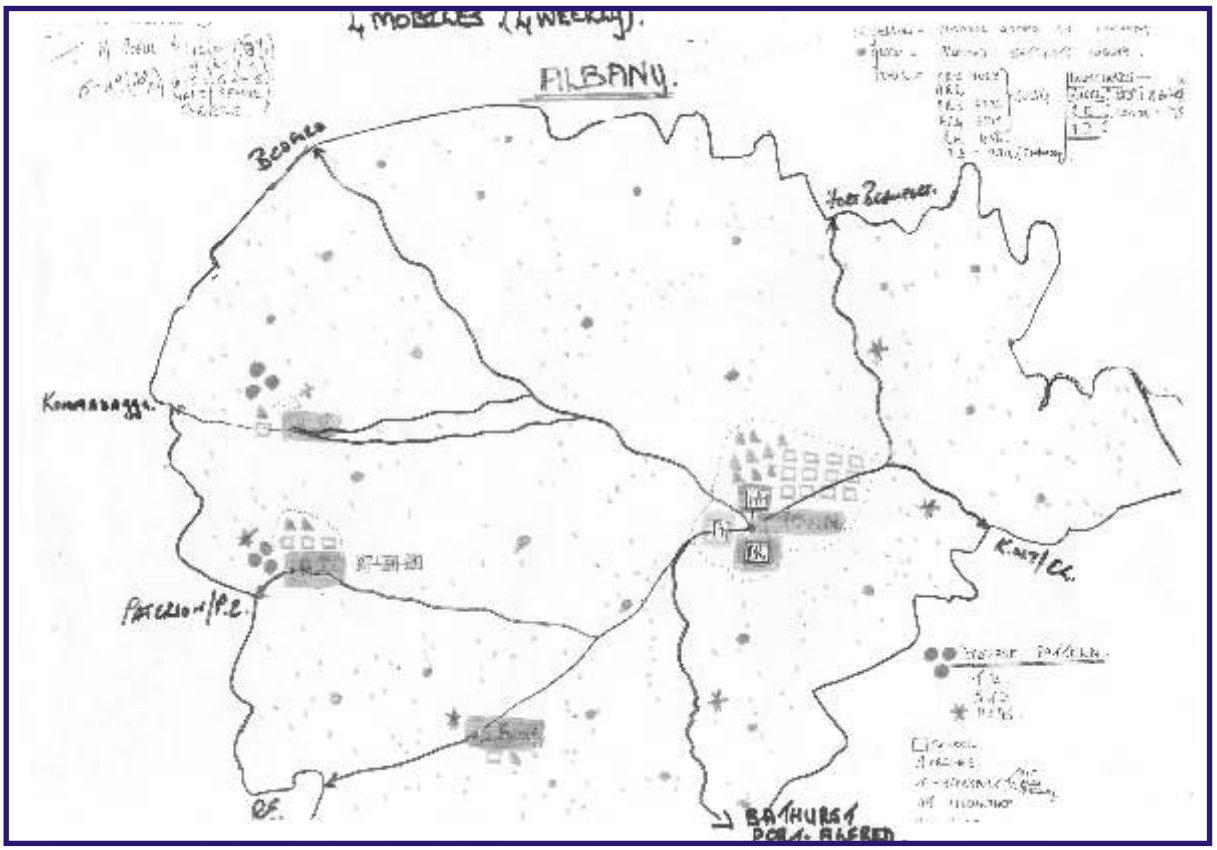
By including the farming processes in the community map – pineapple fields, packing areas, milk sheds, shearing areas and workshops – some idea can be gained of the possible occupational hazards a small community might have. The health services are brought to the commercial farms by mobile clinics which have a series of stops to see patients and also to provide promotive and preventative care. It is these stops which can be mapped on a district or route map. For larger communities a community map would be useful – showing the layout of farm labourers' homes in relation to the farm buildings, the water supply and the access roads. A map might actually be needed to cover several adjacent farms where patients might come to a central point – although often the mobile clinic makes several stops.

In Tsitsikama for example the mobile clinic has 46 stops in 11 localities varying from one stop in Sanddrif with a dense population to nine in Robenhoek. Distances between stops in one locality being about 6km. Each community has its own demographics features and community mapping would be relatively easy and most informative.



The type of farm – sheep, dairy, pineapple, chicory, game – could be indicated. Schools should also be shown. The frequency of visits (four weekly, six weekly) could be shown using different colour pins. The points on circuits for different mobile teams could also be distinguished.

Clinics in the Cradock District with 5 and 10km radii shown. This map demonstrates the fact that in a sheep farming area most of the population, and therefore most clinics, are in the towns. The large farms have few labourers so most of the district is sparsely populated and the labourers can only have accessible health care by a mobile clinic.



This map shows the stopping points (in light grey spots) of the Western District Council mobile clinic

10. Discussion and conclusions

The two modules which had evolved from the initial training workshops – even though still imperfect and not yet providing accurate catchment population – were a very useful training medium. They have now been amalgamated again into one module as shown in the Annex.

> "The MSH regional co-ordinators have come to play a useful role in continuing to motivate clinic staff to complete their maps and to hold them to the commitments made...."

The activities described have brought together nursing staff, environmental health staff and community committee members as well as bringing closer together, in one community situation, members of regional and district management teams. Provincial, TLC and rural District Council staff have worked together and begun to think in terms of serving the whole population and not only the clinic attenders.

Although one of the tools used was the analysis of clinic attenders, this led to further identification of communities and a realization of how large a population there was, and, inevitably to thinking of those who didn't attend.

One of the issues which arose out of the training sessions was observed in Region D where great emphasis was put on community mapping as part of a pilot project to involve EHOs in community planning for water and sanitation projects. This overshadowed the focus on clinic catchment area. The two approaches had originally been done together so it was decided to separate the guidelines into two modules.

The original second module's orientation was left ambiguous. Community mapping could be done more rapidly by an EHO with guidance from community members but it would still be the EHO's map. On the other hand, a more extended participatory type of mapping was really aimed at but the type of training needed demands experienced field workers more likely to be found in development oriented NGOs. Some health workers previously working with the National Progressive Primary Health Care Network were more exposed to this type of training in their work with community health workers. The literature on Rapid Rural Participatory Appraisals and activities has included community mapping as one method of involving communities in their own problem assessment and solving. In this province it is the inter-relationship between health and water and sanitation which has demanded this approach. Therefore the projects between EHOs and Department of Water and Forestry had training from an NGO.

Two descriptions of mapping using participatory methods were used as reference material in the original module 2. They come from a workshop held in Bulwer, Natal *(Reference 4.)* And from the Uganda CBHC Association *(Reference 10.).*

How to move from a single training session to region-wide activity was a problem. EHOs mentioned lack of transport as a reason they could not take the initiative to enable every clinic to have its map. The solution appeared to lie in the "Way Forward" session at the end of the training. In this session the participants try to reach consensus and this is often guided by what the regional and district team members think is reasonable and possible. The MSH regional co-ordinators have come to play a useful role in continuing to motivate clinic staff to complete their maps and to hold them to the commitments made although when a group says "we will all have maps up in the next three months" this is ambitious – the expected rate of achievement appears too slow. The next MSH clinic survey will show if the training has in fact enabled clinics to develop their own maps, and if there have also been spinoffs of increased links between nurses and EHOs, and increased community involvement in health.

This map shows the catchment area for the Cimezile Clinic in Region B. Note the interesting use of multiple perspectives to indicate mountains and valleys

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A. A field guide to mapping for Primary Health Care

Eastern Cape Province

A1. Introduction

The existence of a map on a clinic wall which shows where the communities are which the clinic serves is evidence of a PHC approach. It means the clinic is considering the whole population it serves and is not just waiting for the sick to arrive. A map shows distance and some features of the environment – its presence on the wall indicates concern for the mother who has to walk with a baby on her back. Depicting different villages and localities and their names shows understanding of socio-cultural and economic variations and this is the beginning of understanding factors underlying health. A clinic with a map is concerned about the health of all and not just the diseases of the few who reach its doors.

These guidelines show how to develop two important PHC tools – a map of the catchment area and estimation of the population living in that area. The process of mapping has however many uses and it can be done on several scales – the first being the health district or sub-district, the second the clinic catchment and lastly community mapping (which is of special relevance for EHOs).

Estimation of the population within a catchment area is an even more important step as it provides a denominator for working out the important rates essential for monitoring, evaluation and planning of the health services being provided.

Proof of really being able to work with each community comes when the health workers (nurses and EHOs) are able to involve and facilitate community members to produce community maps to be used for the communities own purposes, such as determining the position and distribution of services eg, piped water, mobile clinic stops, community telephones, preschools, DOT supporters.

Different types of health facilities with different staff and skills will have different types of catchment population. For example, a district hospital will have a catchment area for referred surgical patients coming from all sub-district areas.

Catchment areas of clinics often overlap and patients might use either of two or more clinics more or less equidistant from them. On occasion it is a road or a river with no bridge which decides where patients go. This can create problems in determining the true catchment population.

These issues are all described in these guidelines: especially for nurses to map the catchment area of a clinic and mainly for EHOs mapping, or helping local people to map their community. The guidelines are however, best used by a group consisting of clinic staff, EHOs, CHW and CHC members.

A2. Mapping the health care points in a district or sub-district

The following steps are needed:

1. Meeting of DHMT

2. Discuss the purpose of the mapping:

   - to show the distribution of health facilities throughout the district and outline the area of responsibility of each health care facility for the care and coverage of specific communities;
   - to identify areas outside easy reach of health facilities;
   - to orient service providers to the conditions and areas where people live in order to ensure full coverage of all people with essential health services;
   - to improve the planning of health care access and facilitate optimal referrals and use of all health resources in the district;
   - to plan, rationalize and augment health services to reach all equitably.

3. Obtain a list of all clinics, mobile clinic stopping points, health centres, sub-district community hospitals and the district hospital, private health facilities, prison clinics, college clinics, NGO hospital or clinics.

4. Obtain the largest scale map of the district (eg, 1:250,000; 1:100,000 or 1:50,000) and also municipal maps (scale 1:25,000 or 1:10,000).

5. Mark all health care points on the map using different colours or symbols to indicate the different types of facility. A colour code could also be used to show provincial, local government, district council or private health care points.

6. Draw 5km and 10km circles around each using a compass.

7. Indicate on the map the distances between each clinic and the distances to the District Health Office and the District Hospital. Also put these distances in a table (see example on page 71).

A3. Mapping a catchment area of a clinic

STEP 1

Organize a meeting of the clinic team; including clinic staff, CHC, EHO, and CHWs. Invite members of the DHMT if possible.

STEP 2

Discuss the purpose of the mapping:

- to gain information about the communities, their environment and use of services;
- to locate on a map features which are related to health of the community;
- to determine all the communities from which patients come to the clinic;
- to estimate the population served by the clinic and then to determine coverage rates of services eg, percentage of infants fully immunized each year;
- to understand the geographical and other factors which make access to the clinic difficult;
- to use the information in future work eg, in investigation of outbreaks or participation in community activities.

STEP 3

Ensure that the meeting includes persons who would be able to describe where most patients came from – who know the names of communities and localities.

Materials used for mapping

STEP 4

Read the sheet of notes and definitions (see page 73) before starting to fill in the form.

STEP 5

List all localities on the form and complete all columns (see example on page 72).

STEP 6

When the clinic is not very busy eg, over the lunch hour – extract the names of localities and number of patients attending from each area during the last complete month. Count the total and count the number attending for each locality and work out percentage of total who come from each place (see example on page 75). Two months is better and even better would be extraction from one dry month and one wet month. Two people should work together – one reading out address of each patient while the other ticks it off. When community members are present be careful not to mention patients names but only addresses.

STEP 7

List the names of localities thought to contribute most patients on the form and the names of localities from which large numbers of patients (or greater percentage) actually came. These constitute the greater part of the catchment area.

STEP 8

Try to identify these on any printed large scale map you have already obtained.

STEP 9

If the area is hilly, walk to high area with knowledgeable local people (eg, the clinic watchman, a teacher, or a nurse) and get them to point out where the localities are situated. If there is a central road drive up and down it to determine where villages (localities) are.

STEP 10

Draw these on a map with the clinic in the middle, north at the top, east on right, west on left and south at the bottom. Put in roads and indicate directions – from where to where. Put in names of localities and schools, shops, roads and other identified places (see examples).

STEP 11

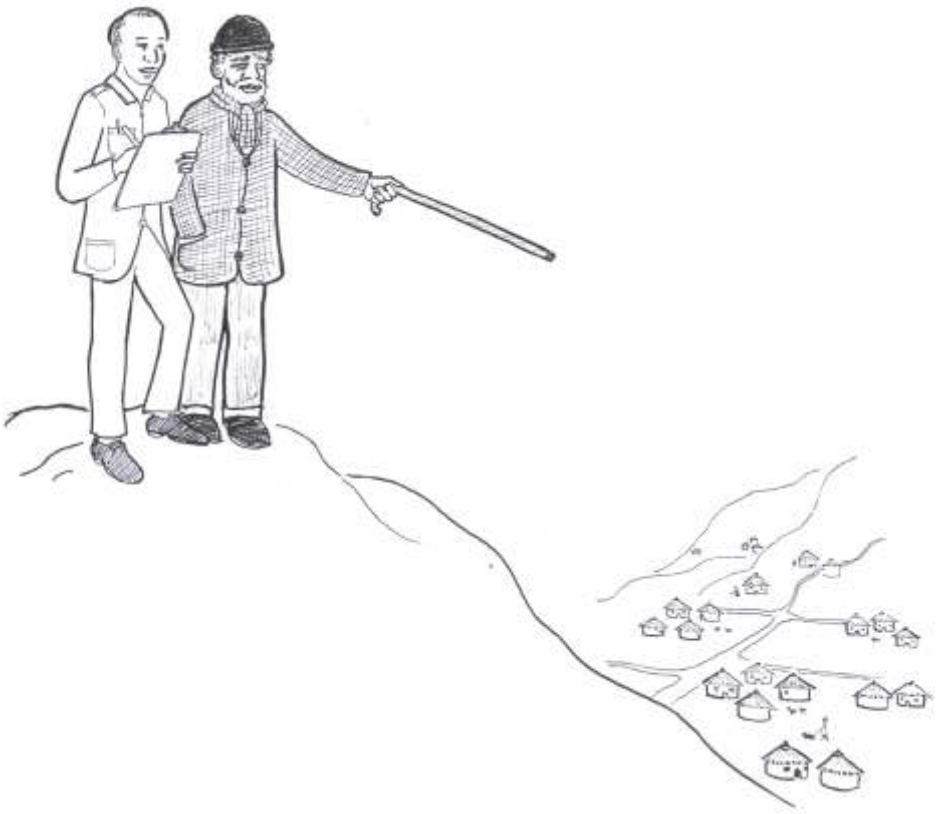
Later on when census maps and the population census are available – draw the catchment area again more to scale and write the population for each village.

STEP 12

Discuss your map with clinic staff and with the community/clinic committee. You might want to sketch in corrections, changes, then when you feel you have the entire area portrayed on the map, sketch a "final version" incorporating all the corrections and modifications.

STEP 13

Make sure you fix the map on the wall in a permanent place in the clinic.



Additional Steps for an Urban Area

STEP 14

In an urban area the clinic often has a catchment area which includes high density formal areas, low density upper economic areas, informal settlements, and perhaps nearby farms or settlements along roads leading to the town.

STEP 15

An additional step after listing the names on the form and extracting addresses from the register (if available) is to drive around the town and obtain an idea of its layout in relation to informal settlements.

STEP 16

Many urban areas have printed municipal maps. Sketch in your clinic catchment area using a coloured pencil. As an urban area often has several clinics sketch in the catchment area for each using a different colour. Fill in the map in different colours showing taxi routes, churches, shops, sports fields and the local names of different areas.

A4. Uses of the catchment area map

The following is a list of information which can be derived from the map of the clinic catchment area and this also provides indications of the uses of this information.

Population density

If the map is to scale, the surface area can be determined in square kilometers. If population is known, population density can be determined (people per sq km or household/sq km). Even without this precise knowledge, the catchment area can be shaded to emphasize areas of dense population such as an informal settlement compared to a wealthy low density area. High population density increases transmission of many illnesses. It leads to overcrowding and transmission of tuberculosis, skin diseases and infections eg, common colds and meningitis. Overcrowding also affects behaviour and relationships, and sexually transmitted diseases, drug addiction and gang formation may become a problem.

Community identification

All the names of communities, localities, residential areas, and villages should be given on the map. At a glance the address of a patient and the distance they have travelled can be seen. The percentage of patients coming from each locality can be determined. Are differences due to distance, physical barriers, or are there other health facilities which people prefer? Roads, bus routes and distances can be shown.

Has every community a committee, do they have a councillor, how are they governed? Are there CHWs, traditional birth attendants, traditional healers, active community groups?

Socio-cultural-economic differences

Health problems might differ in different parts of the catchment area if there are marked differences in economic status. The poor will need a different spectrum of health education from the rich who will have more education, better nutrition and a more satisfactory home environment. The poor overcrowded areas having more acute and disabling health problems will need more home visits and more interaction with social workers. The rich may also present with a different set of problems eg, heart disease, hypertension.

Disease patterns

If the map is large and detailed enough particular problems can be shown (by pins, or small stick-on coloured markers). Tuberculosis, typhoid, dysentery, kwashiorkor, and chronic illness can be mapped. This is useful for follow-up visits, and might show clustering of cases of the same illness which needs investigation as to the cause in order to start preventive action.

This map should be in a private room eg, the office of the senior professional nurse (if possible) and the colour code should be kept confidential so visitors cannot see which homes have TB or HIV/AIDS cases.

A5. Mapping a community using participatory methods

Introduction

EHOs working in rural areas are now acting as facilitators for a process which enables communities to appraise their needs and their resources for development. One of the ways of appraisal or assessment is by mapping, and there are several ways maps can be constructed.

Modified participatory mapping

EHOs may in some cases do a modified participatory mapping in which they obtain assistance from the community to walk around with them and to explain the layout of their community and provide the names of homestead owners. The EHO however does the mapping using a clip board and sheet of paper or sits at the table with a large piece of paper and coloured pens and community members give instructions. The end result is the EHO's map of a community – but not the communities map! This process is however much quicker than real participatory mapping and can be done in a few hours. It can obtain a lot of information on resources – water sources, latrines, schools, electricity, distances, roads.

- Participatory community mapping in the true sense is done by the community members themselves – it is their map and decisions on development that arise from it are their decisions. This is a much slower process – at least a day and uses simpler materials eg, the floor of a classroom, chalk or a flat area of ground. Everyone participates and the EHO stands by and may ask questions to stimulate community members to describe in more detail. Mostly he admires the extent of local talent and expert knowledge. When community members have, themselves, counted the number of houses and the number of latrines and gone around and seen where the faeces is washed into the water source, they are more likely to ask for the EHO's expert advice on constructing latrines and then to work out the cost of construction themselves.

Participatory mapping of a community

Two references are provided for further discussion:

- Towards Partnership in Development – a handbook of Participatory Rural Appraisal which was based on a training workshop held in Bulwer, Natal 1993.

- Participating Rural Appraisal in Uganda a resource manual Uganda CBHC Association by Ben Osuga and D M Mutamda (1993).

Types of maps

Many things can be mapped – social maps can show homesteads, economic information, populations, relationships, resource maps can show crops planted, soil, rivers, roads, and use. Behavioural maps in Tanzania mapped areas for high risk sexual behaviour (eg, bars, night clubs, truck stops). Participatory Rural Appraisal has been described in many locally produced manuals and newsletters from development projects around the world and in South Africa.

There are several types of maps which can be made:

Social and resource map

- Discuss the need to map and how it can be used by the community.
- Decide how the map will be made eg, on the ground with stick and stones or other things (eg, bottle tops) to represent houses or in a classroom with big pieces of paper on the floor (provide paper and suitable large pens).
- Involve the participants in these decisions.
- Decide on the area to be mapped and what must be included (houses, shops, women's groups, fields, latrines, water supply number of people).
- Use minimal facilitation as the villagers must do the map themselves.

- Use the process and the map to discuss issues as they emerge eg, distance to water, lack of latrines, gathering places such as schools and churches, use of fields for different crops.

- Make sure you make a copy on paper of the map on the ground or floor.

Transect map

The idea of a transect walk to produce a transect map was first used in agriculture. Walking in a straight line from the village on a hill down to the valley below would show soil type, vegetation, water and use made now and in the past of these resources.

Walking with a group of old and young people would result in conversation and valuable exchange of ideas. This idea could be used to provide useful information related to health. An urban transect in most South African towns will show the relics of apartheid with its segregated sections often now representing socio-economic stratification. Different human activities can be indicated on this transect – shopping and hawker areas, taxi ranks, building types and age can be indicated.

Within one township there can also be differences in environment, in socio-economic status, in activities. The "coloured" township of Graaff-Reinet, for example, had many different sections where differences were evident – well-built homes on large plots, smaller municipal houses still with asbestos roofing, new small RDP houses, shack areas again showing differences depending on whether for newly arrived or older established families.

The value of transect walk and map is in the process chatting to people who walk with the nurse or who are met on the way, and becoming aware of problem areas – bucket toilets, heaps of rubbish, a contaminated stream, a shebeen area.

In this type of map the community look at land use and the steps are:

- Explanation of a transect where one walks from the centre to the periphery of a village – uphill and downhill and over a river if necessary.

- Gather a group of interested, knowledgeable people, including children and old people.

- Walk from the centre in a more or less straight line to the outer limit of the village.

- Have a literate member of the group make a map on paper as you go. Indicate gradients eg, a hill.

- Make sure all items of interest are added type of housing, age of houses, fences, fields and what is grown and why, animals, social activities in different areas.

- Again at the end make a copy and start a discussion to reflect on what was revealed.

Annex 1

Table of distances by road in kilometers									
Distance From: To:	District Hospital	CHC 1	CHC 2	Clinic 1	Clinic 2	Clinic 3	SANTA TB	Mobile Stop 1	Mobile Stop 2
District Hospital		47	28	7	63	41	3	73	65
CHC 1	47			42	33				
CHC 2	28			42					
Clinic 1	7				56				
Clinic 2	63					22	58		
Clinic 3	41						38	32	24
SANTA TB	3							70	67
Mobile Stop 1	65								8
Mobile Stop 2	73								

*In the table above, CHC = Community Health Centre

Figures are from an example of one district

Annex 2

Form for mapping a clinic catchment area

1) Name of health unit _____

2) Authority _____

3) Clinic ☐ Health Centre ☐ Mobile Clinic Stop ☐ Sub-district Community Hospital ☐
District Hospital ☐

Region: _____ Health District: _____

Magisterial District: _____

Date: _____ Surveyed and mapped by EHO: _____

4) Persons Providing Information (positions) _____

_____

_____

5) Locality name	6) Approximate proportion of total patients	7) Distance (km)	8) Time taken and method	9) Estimated # of homestead	10) Estimated population	11) Water source	12) Electricity		13) Useful information
							Yes	No	

Notes And Definitions

These notes refer to the form for mapping a clinic catchment area on the facing page.

1. Name: Indicate the name of the health facility.

2. Authority: for example local government, provincial, district council, NGO, Private.

3. Tick type of health facility visited for mapping: clinic, health centre, mobile clinic stop, subdistrict community hospital (a hospital in a magisterial district which is not designated as the district hospital), district hospital.

4. Persons providing information: write position of all those who helped define the catchment area for example chief professional nurse and professional nurse.

5. Locality: name each locality on a separate line. This could be a village, an area, a suburb, a block, or a township.

6. Indicate approximate proportion of total patients: on five-point scale of clinic patients who came from each locality, for example most, very many, many, few, very few or 5, 4, 3, 2, 1.

7. Distance in kms: estimated (along a road a taxi fare might give an estimate of distance).

8. Time taken and method: for example one hour walking or 10 minutes by taxi.

9. Estimated number of homesteads in the locality. (Village leaders might know more accurately if they have done a census).

10. Estimated population: give approximate guess. This will be rewritten when the census is published.

11. Source water: for example river, spring, dam or pond, borehole.

12. Electricity: Write yes, if available; no, if none.

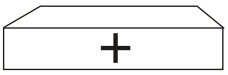
13. Useful information: for example bus stop, taxi rank, name of chief or chairperson resident committee, CHWs name, whether near to another clinic or hospital.

Annex 3

Symbols used in mapping

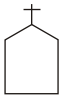
Clinic + name

Hospital + name



Mobile clinic stop + name

Church + name + denomination



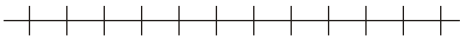
Tarred Road

Good gravel road

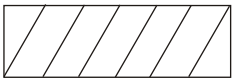
Poor gravel road or track

River, preferably in blue + name

Railway (indicate from where to where using arrow)

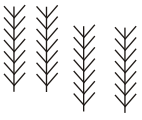


Homestead (large)



Homestead

Forest



School + name + level of education

Graveyard

Dipping tank

Dam

Spring

Shop

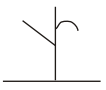
Hotel

Police

Telephone

Windmill

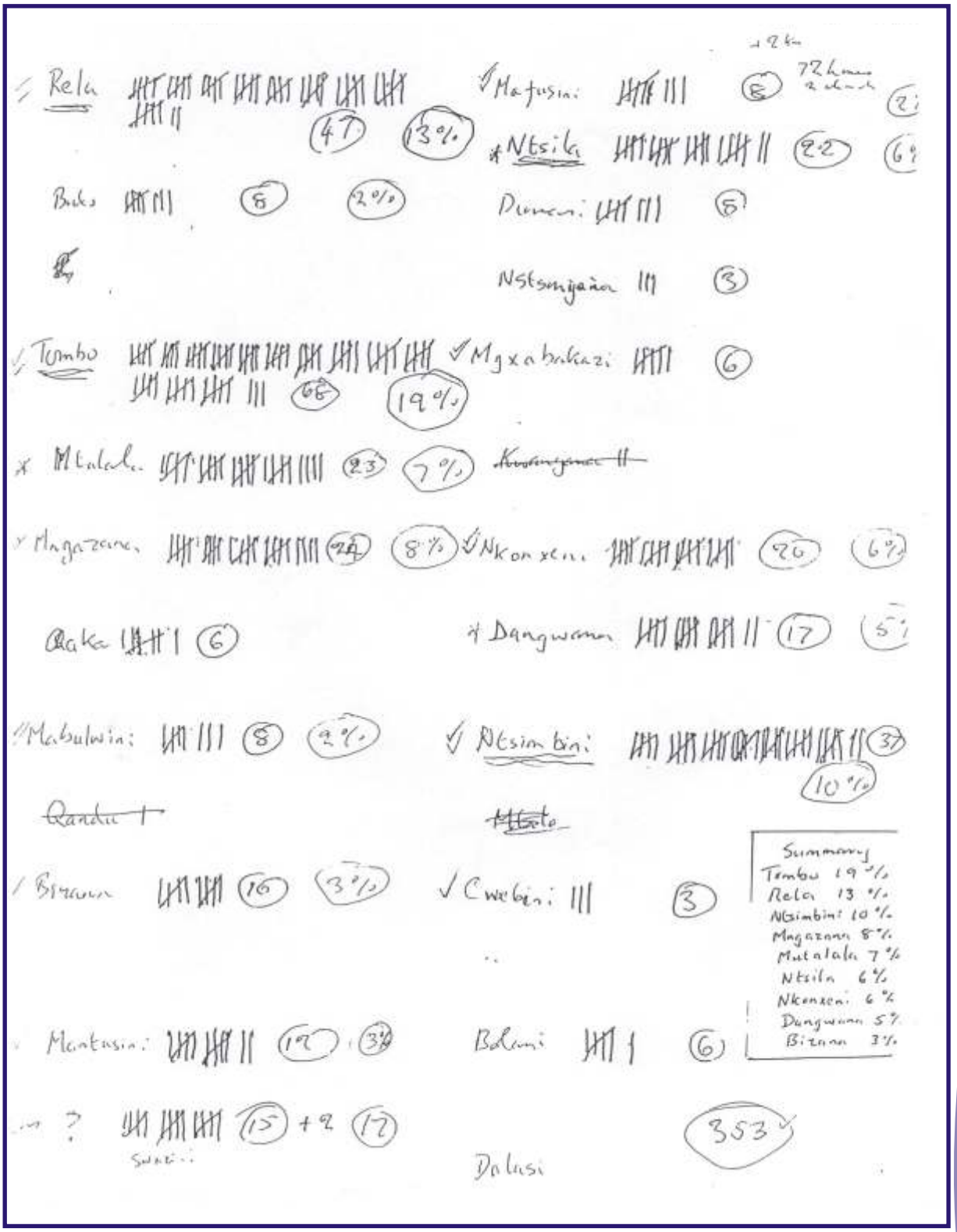
Borehole



Note: Put the clinic in the middle of the map and indicate N (north) at top, S (south) at bottom, E (east) on the right and W (west) on the left of the map

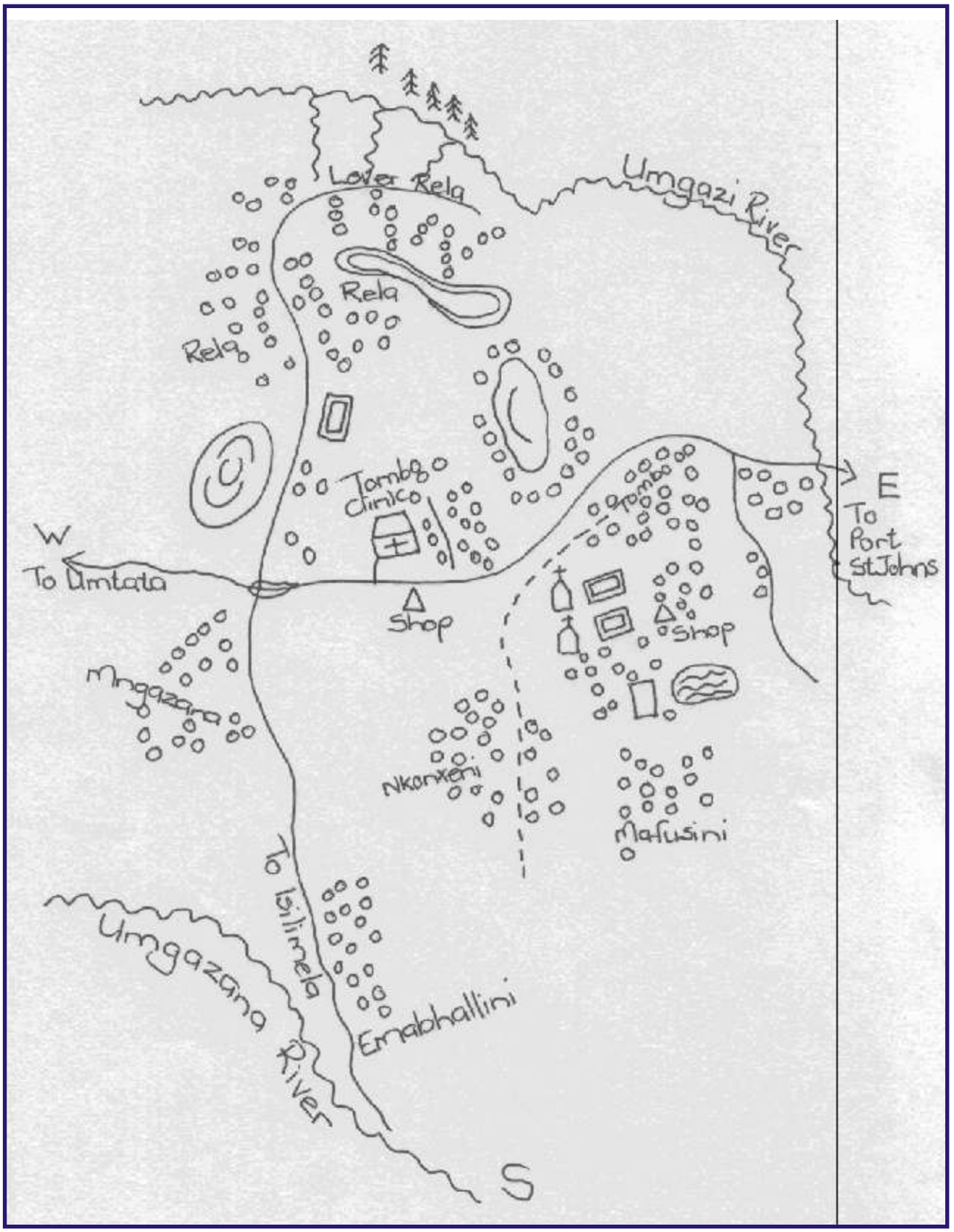
Annex 4

Tombo Clinic: Addresses of 350 attendants



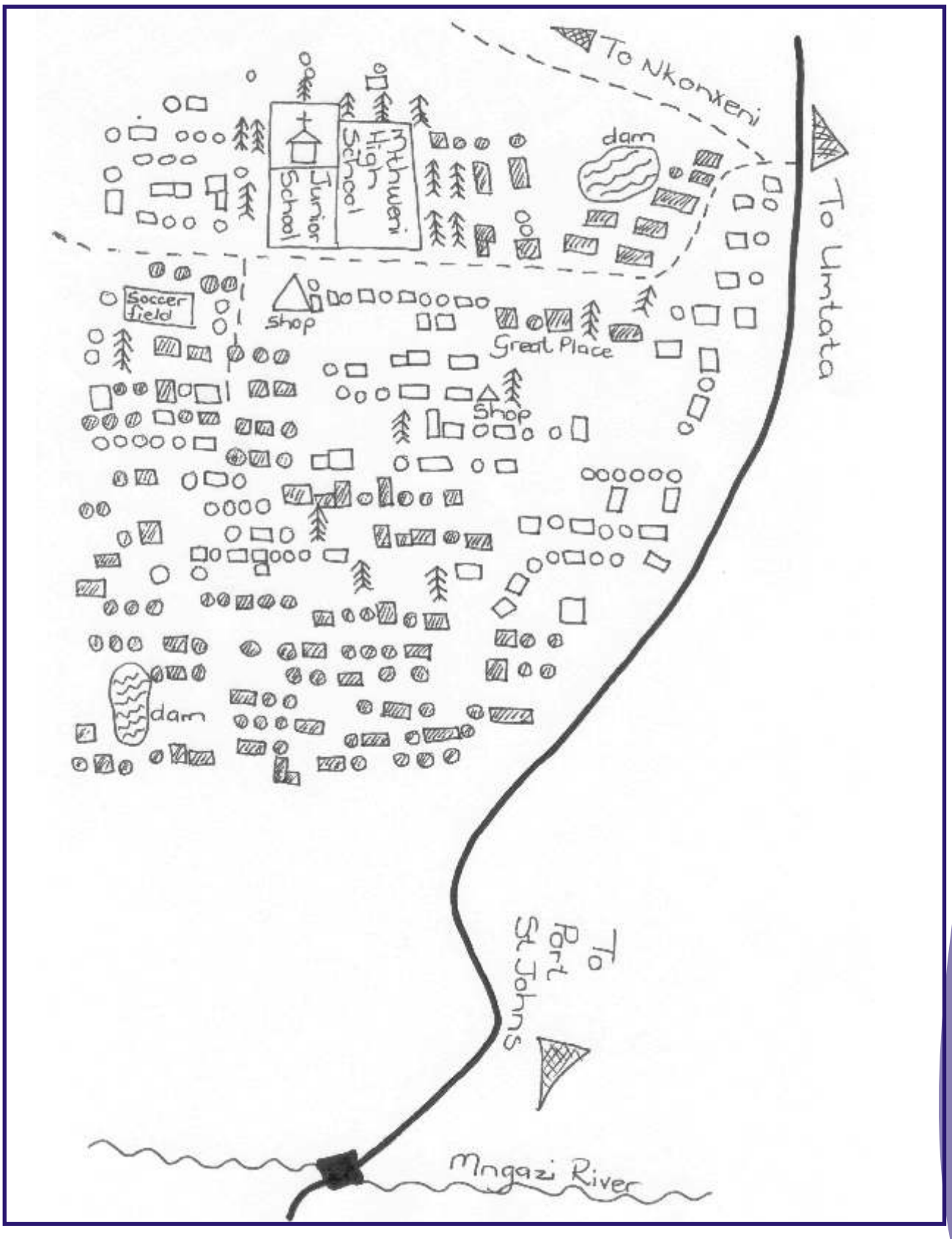
Annex 5

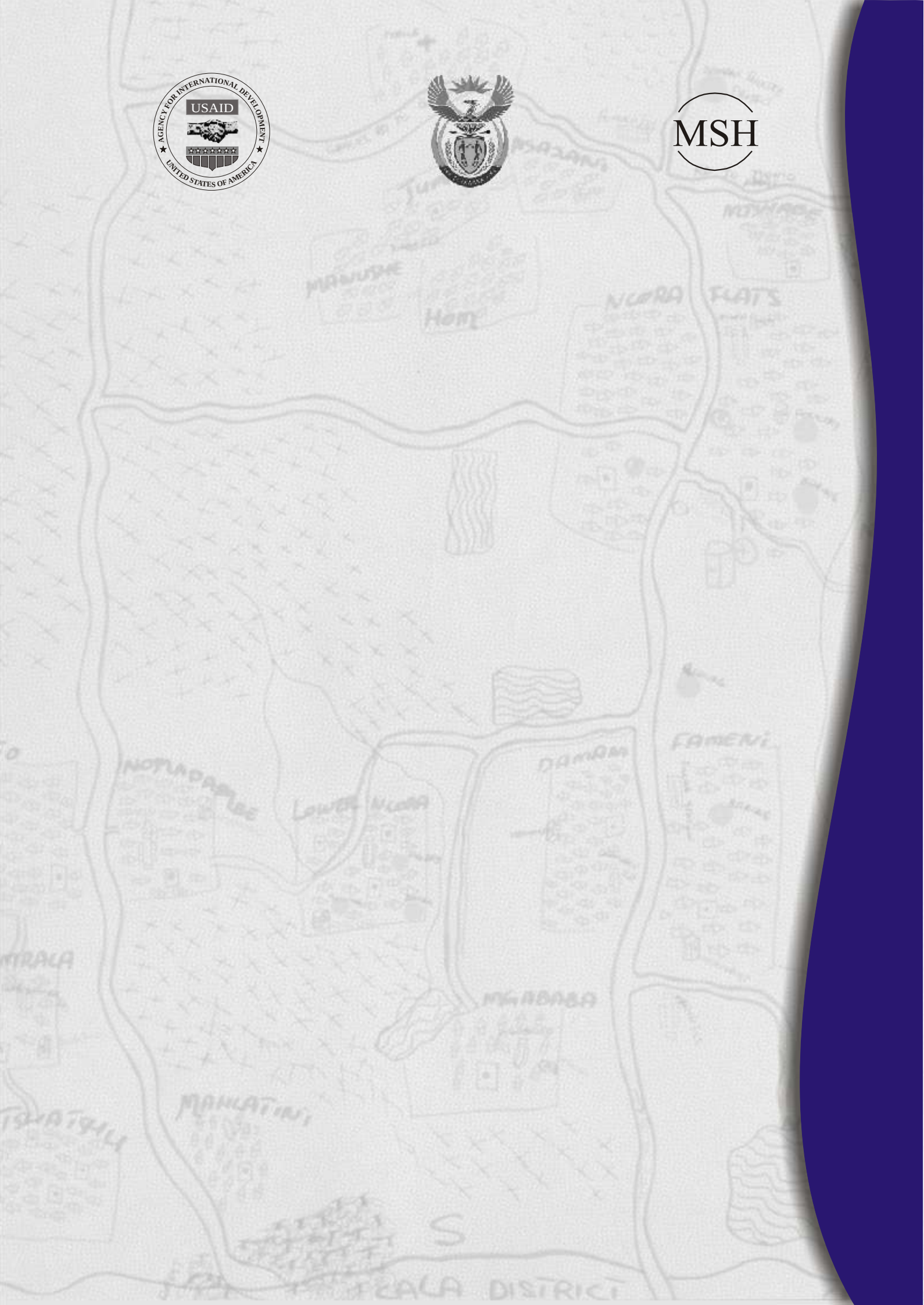
Preparatory sketch for Tombo Clinic map



Annex 6

Preparatory sketch of Tombo sublocation

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