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HEADLAMP FIELD STUDY - CAPE TOWN

REPORT

January 1996

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HEADLAMP FIELD STUDY - CAPE TOWN REPORT

January 1996[1]

EXECUTIVE SUMMARY

Cape Town, South Africa is one of several field study sites for the Health and Environment Analysis for Decision-making Project (HEADLAMP) of WHO/UNEP. The HEADLAMP project aims to bring valid and useful information on the local and national health impacts of environmental hazards to decision-makers, environmental health professionals and the community.

With the current restructuring of health services in South Africa, a unique opportunity exists for researchers, service personnel and decision-makers to have major input into the formulation of a new health system. An integrated, action-led Health and Management Information Systems is crucial to this process of restructuring the health sector. The HEADLAMP initiative could play a useful role in the development of a Health and Management Information System for Cape Town.

This report outlines the results of the HEADLAMP field study in Cape Town, the objectives of which were as follows:

- **to identify specific environmental health problems which pose a threat to human health**
- **to describe the local decision-making process in environmental health.**
- **to test and further develop the methods for linking health and environmental data in the city**
- **to field test a proposed set of Environmental Health Indicators (EHIs).**

METHODS:

The following methods have been used to develop a situation analysis of environmental health conditions in Cape Town and to describe the policy process in the sector:

1. Literature review: Both published and unpublished literature has been reviewed, including reports of government departments at the national, provincial and municipal (local) level as well as research reports and draft proposals.
2. In-depth Interviews: In-depth interviews have been conducted with key role-players in the community and in environmental health services in Cape Town, and at the national level. Sampling was specifically designed to include both managers in the local authorities and provincial administration, and environmental health officers working in the field in low and higher income communities.
3. Focus Group Discussions: Focus group discussions have been held with groups of environmental health officers in the field and at the managerial level.

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4. Workshops: Several workshops on environmental health surveillance for Cape Town have been facilitated, with the following objectives:
   - to identify priorities for environmental health surveillance in the future, in the context of community, management, planning and evaluation needs.
   - to identify the indicators required for this environmental health surveillance in Cape Town.
   - to review existing routine surveillance in environmental health in Cape Town and discuss how this might be modified to meet current needs.

RESULTS:

1. Identification of specific local environmental health problems which pose a threat to human health:

The following is a summary of the situation analysis for Cape Town:

1.1 Demographic estimates:

There are major difficulties in deriving an accurate population estimate for Cape Town due to sampling problems in the 1991 census. This, in turn, makes it difficult to calculate population rates such as IMRs and MMRs. The estimated population for metropolitan Cape Town for 1995 is between 2.5 and 2.9 million people. The population pyramid of the province has the characteristics of a relatively mature population.

1.2 General Health Status of the Population:

- There is very little data available on morbidity for the population of Cape Town. Existing mortality data suffers from 2 major problems: under-registration and mis-classification of deaths. Between 10% and 16% of deaths in Cape Town are classified as due to 'symptoms, signs and ill-defined conditions'. This has implications for any linkage analysis.
- Infant mortality: The IMR for the metro area is 20.76 per 1000 live births (1993). IMRs vary from 13.8 for Whites to 33.9 for Blacks. There are also large variations between urban, informal and mixed areas in the province. The major causes of infant death are prematurity, ill-defined causes, diarrhoea and enteritis, congenital abnormalities and pneumonia.
- General mortality: The major causes of mortality for all ages are malignancies, ill-defined causes, heart disease, homicides and respiratory conditions. Homicides and motor vehicle accidents are the largest causes of death in the ages 15 - 44 years. There are large variations in mortality rates between different geographical areas and between different race groups in Cape Town. African informal settlements and rural areas have the highest mortality rates and White, formal settlements have the lowest rates.

1 3 Environmental health:

Services:

- All health services in Cape Town and the Province are currently being restructured. Environmental health services are provided mainly at the local authority level in the city. These services' function is mainly to monitor environmental conditions. The health sector does not have responsibility for the provision of basic services, such as water and sanitation. These services are provided by other departments, often with different programme and project agendas.

Environmental health conditions:

- There is a paucity of information on environmental conditions in the metro area. Until recently, no up to date environmental health data was available at the suburb or health district level. Data collected by local environmental health departments relates mainly to workload. Although some information on Environmental Health Indicators is collected, it is not used for planning and decision-making.
- Most of the data used in the field study was derived from adhoc surveys of environmental conditions in the Western Cape Province, South Africa.
- Major inequalities exist between race groups with regard to access to basic facilities such as water, sanitation, housing, refuse disposal and electricity, with Africans having worst access and Whites the best access in the Province. Differentials in access also exist between formal and informal settlements in the city.
- Although evidence is not available at this time, it is likely that the inequalities in access to basic facilities between race groups will be shown at the metro level on a suburb basis. This is because, historically, suburbs have been segregated according to race and, thereby, according to socio-environmental conditions.

2. The information and decision-making process using indicators:

The following issues have been identified as important regarding the use of information for decision-making in environmental health in Cape Town:

2.1 The context of environmental health services in Cape Town:

- Services provided in the city do not always reflect basic environmental health priorities as, in the past, emphasis was placed on the problems pertinent to minority, high-income groups. Integrated environmental health priorities for the city now need to be defined, with the recognition that certain areas have been neglected in the past.
- There is inequity in the distribution of environmental health officers across the city. This needs to be rectified.

2.2 Problems in the use of existing environmental health data:

A range of problems was identified including the following:

- Data collected are not related to programme objectives, but are rather used for the internal monitoring of workload volume. There is therefore scant information on the effectiveness of interventions in the sector.
- Little information is available on baseline indicators which makes the monitoring of trends difficult.
- The quality of data collected is not monitored.
- Data collection is not related to management and planning needs.

2.3 Changing the focus of data collection in the environmental health sector:

- The objectives and functions of environmental health departments need to be more clearly articulated.
- Consensus needs to be built on data collection priorities among the different local authorities in Cape Town, particularly on a core set of environmental health indicators for the city.

- The new objectives for environmental health services should emphasize basic services and the environmental health problems of poverty.
- Community activities are not given acknowledgement in the existing system and these need to be emphasized in the future.
- Data collection needs to incorporate measures of effectiveness in terms of improving health or reducing the risk of disease.

2.4 Data collection: differences between the national and local levels

This study has shown that there are clear differences regarding the perceived purpose of data collection at the national versus the local level. Environmental health managers at the national level require a minimum dataset on key performance areas to be collected. Provinces and local authorities can add to this as necessary for their own purposes. Local authorities, however, felt that the national dataset has been developed without sufficient consultation at the local and provincial levels, with the result that some of the information required at the national level is not available at the local level, or is not collected in the required format. Despite these differences, there is consensus at all levels that a basic set of environmental health indicators need to be developed.

2.5 Reforming the EH sector in Cape Town:

The following points were seen as important:

- The need to develop a rigorous consensus set of environmental health indicators for the city. These should be quantifiable and related to programme targets or objectives.
- There needs to be emphasis on the quality of data presentation to improve accessibility at all levels.
- An emphasis on quality needs to be built into the whole system of environmental health.
- Emphasis needs to placed on feedback in the system between communities and environmental health officers and between different levels of management structures at the local, provincial and national level
- There needs to be strong emphasis on re-education of environmental health personnel and on the dissemination of new ideas and ways of working in the sector.
- Intersectoral collaboration needs to be formally structured and expanded.

2.6 Progress in developing environmental health indicators for Cape Town

An environmental health indicator task group, consisting of representatives from local authorities and from academic institutions, has been set up to develop and test a set of environmental health indicators for the city. It is envisaged that this local experience of developing indicators will be used to make recommendations to the national level on the usefulness of environmental health indicators for decision-making and on the process of developing environmental health indicators at the local level.

3. Application of the methods proposed in the HEADLAMP report:

3.1 Current use of data linkage in Cape Town:

Data on health and environmental conditions are not routinely linked by local authority health and environmental health departments in the city. There are a number of

reasons for this, including the lack of valid and complete information on environmental conditions, morbidity and mortality; the curative focus of the health services and the lack of planning of health interventions.
A detailed review of existing linkage studies is included in the main body of the report.

3.2 Feasibility of data linkage for environmental health in Cape Town:

- Although numerous problems exist with denominator, numerator and exposure data for Cape Town, data linkage is possible if these are understood and if the data are manipulated accordingly.
- The fact that many formal and informal settlements in Cape Town are undergoing development, with the installation of paved roads, flush toilets, formal housing and electricity, allows for 'natural experiments', in the form of community (randomized) trials, to be undertaken. This is a unique opportunity for study of the health impacts of environmental changes in the city.

3 3 Identification of field-based examples for use in HEADLAMP training manual:
A study is reported which used routinely collected data on tuberculosis notifications to examine, using GIS methods, differentials in infectious disease across Cape Town and their relationship to socio-environmental variables. As the study has just been completed, it is impossible to comment on the usefulness of the results for environmental health decision-makers. However the results are likely to be useful in a number of ways:

* TB differentials across the city are clearly displayed and can therefore be easily fed back to lay persons at the community level and to health personnel
* the differentials indicate areas in the city that require attention with regard to TB control programmes
* the relationships shown between TB notifications and socio-environmental conditions could be used to motivate for the need for more research related to environmental conditions in the city.

4. Field tests of the proposed set of EHIs for decision-making
A table outlining the results of this section is included in the main body of the report.

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HEADLAMP FIELD STUDY - CAPE TOWN
REPORT

INTRODUCTION

With the current restructuring of health services in South Africa, a unique opportunity exists for researchers, service personnel and decision-makers to have major input into the formulation of a new system, including its organisation, the nature of service provision and planning, management and evaluation. An integrated, action-led Health and Management Information Systems (HMIS) is crucial to this process of restructuring the health sector. A National Health Information System (NHIS) committee has been convened by the Ministry of Health and tasked with the function of developing a Health and Management Information System for South Africa. Because one of the goals of the Ministry of Health is to reduce health risks in the physical environment, it is essential that the Health and Management Information System collects, analyses and presents data on environmental health indicators (EHIs). Data on the physical environment and on environmental health is particularly important in the context of the Reconstruction and Development Programme (RDP)[1], which has as one of its aims an improvement in access to basic facilities, such as water, sanitation and housing.

The HEADLAMP project aims at bringing valid and useful information on the local and national health impacts of environmental hazards to decision-makers, environmental health professionals and the community. The project aim fits easily into the terms of reference of the National Health Information System of South Africa, which are (Proceedings of the NHIS/SA Workshop. 1995):

- to develop a comprehensive National Health Information System to meet the health information needs of managers at the local, district, provincial and national levels and those of the private sector.
- to ensure that the system provides appropriate information required at the respective levels and information that leads to appropriate, information-led actions.
- to develop a training strategy for those involved in implementing the National Health Information System.
- to provide information to facilitate the monitoring of the implementation of the Reconstruction and Development Programme.

The HEADLAMP initiative could therefore be used as a 'test-run' for developing an appropriate HMIS for the environmental health sector in Cape Town. Experience at the local level in Cape Town could, in turn, inform developments at the provincial and national levels.

Within the Western Cape Province, environmental and occupational health have been identified as priority areas for programme development. Little attention has been paid

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[1] The RDP programme is a major policy and project initiative developed by the new Government of National Unity in South Africa. It has 5 major policy programmes, namely meeting basic needs, developing human resources, building the economy, democratising the state and society and implementing the RDP programme.

to date, however, to the specific information needs of the sector and to ways in which existing data on health and environmental conditions could be linked to improve decision-making. The process initiated through HEADLAMP, and involving all the major role-players in environmental health in Cape Town, has started to identify environmental health information needs in the city. This process, as well as information on prevailing health and environmental conditions, is described in this interim report.

The report has several sections. First, the methods used during the field study are described. The results of the field study are then reported, according to the 4 main aims:

- **to identify specific environmental health problems which pose a threat to human health**
- **to describe the local decision-making process in environmental health.**
- **to test and further develop the methods for linking health and environmental data in the city**
- **to field test proposed set of Environmental Health Indicators (EHIs).**

This is followed by references and appendices.

In addition to conventional population classifications such as age, gender and income, extensive reference is also made in this report to the population categories of 'white', 'black', 'indian' and 'coloured', as defined by the South African government during the apartheid era. The use of these terms should in no way be seen as sanctioning these categories. Due to South Africa's history, race is an important determinant of socio-economic status and, thereby, of living conditions and health. For this reason, these classifications are still used in data collection and analysis, with this report being no exception. The term 'African' is also used in this report and is synonymous with the classification of Black, as mentioned above.

METHODS

Several methods were used during this study:

1. Literature review:

Both published and unpublished literature was reviewed. This included reports of government departments at the national, provincial and municipal (local) level, as well as research reports and draft proposals. These data sources are acknowledged under the section 'References'.

2. Interviews:

Structured interviews were conducted with key role-players in the community and in environmental health services in Cape Town, and at the national level. Sampling was specifically designed to include both managers in the local authorities and provincial administration, and environmental health officers (EHOs) working in the field in low and higher income communities. This sampling strategy was based on the expectation that EHOs working in different contexts (management, fieldwork, low income communities etc.) might have different experiences of, and views on, the collection, analysis and use of environmental health data. The interviews were taped and then transcribed. Content analysis was performed where appropriate and a summary was made of the main issues emerging from the interviews. These issues were then fed into the

discussions in the main body of the report. A list of interviews and focus group discussions is included as Appendix 1.

3. Focus Group Discussions:

Three focus group discussions were held with groups of EHOs in the field and at the managerial level. The questions guiding these discussions were as follows:

- What sort of data collection do you undertake as an EHO?
- How much of your work time is spent on collating and writing up data?
- How useful is the data collected in your daily work? Do you use it to plan or guide your work?
- What sort of feedback do you receive on the data collected?
- How do you think that the collection of data can be improved at the local level?
- Do EHOs need specific training on the collection and analysis of EH data?

The groups were facilitated by the investigator and detailed notes were taken during the discussions. These notes were then annotated and content analysis performed. Issues arising in the discussions were also fed into the main body of this report.

4. Workshops:

A series of workshops on developing environmental health indicators for Cape Town were convened, with the following objectives:

- to identify priorities for environmental health surveillance in the future, in the context of community, management, planning and evaluation needs.
- to identify the indicators required for this environmental health surveillance in Cape Town.
- to review existing routine surveillance in environmental health in Cape Town and discuss how this might be modified to meet current needs.

A list of workshop participants is included as Appendix 2. Detailed minutes of both content and process were made during the workshops by the principal investigator. The minutes of the workshops were then analysed and issues emerging from discussions were included in this report.

RESULTS

SECTION 1. IDENTIFICATION OF SPECIFIC LOCAL ENVIRONMENTAL HEALTH PROBLEMS WHICH POSE A THREAT TO HUMAN HEALTH.

1.1 Geographical area

Cape Town is located on a peninsula on the southern tip of South Africa. The greater metropolitan area, as defined for the purposes of local government, has a population of between 2.5 and 2.9 million people (Sources: Annual Report of the Department of Health Services, Western Cape Regional Services Council 1993; Annual Report of the Medical Officer of Health, City of Cape Town, 1993/94). A map of Cape Town is included as Appendix 3.

A breakdown of the population by age and gender for the Western Cape Province is shown in the Table below. These figures can be assumed to broadly apply to the Cape Town metropolitan area.

TABLE 1: AGE AND GENDER COMPOSITION OF POPULATION - WESTERN CAPE PROVINCE (PERCENTAGE) (Source: Mazur 1995 p.4)

AGE	0-4 YEARS		5-14 YEARS		15-64 YEARS		65+ YEARS		POP. 1000s
GENDER	MALE	FEMALE	MALE	FEMALE	MALE	FEMALE	MALE	FEMALE	
W. CAPE	4.6	5.2	11.0	10.0	31.0	33.5	2.0	2.6	3567
SOUTH AFRICA	6.1	5.9	12.2	11.9	28.5	31.5	1.6	2.4	41008

The population of the province[2] has been described by Mazur (1995) as relatively mature and further maturing in relation to the other provinces, with the majority of the population being between the ages of 15 and 64 years. This point is relevant in relation to the main causes of death in the province, as will be seen later.

As a general point, it should be noted that population size data are not authoritatively available for Cape Town and various estimates of the population of districts of Cape Town are used by different institutions. These estimates are obtained from the cense of 1980, 1985 and 1991 adjusted for population growth and from housing data, TB notification rates, birth rates and information on the growth of informal settlements (Lombard - personal communication; Bradshaw et al 1995). The census data of 1991 have been shown to be particularly inaccurate in estimating the numbers of Black people in peri-urban areas. A study (van Schalkwyk - undated) which compared the Black population for the whole of South Africa with that of the Cape Peninsula (statistical region 01), based on the 1991 census, showed that there are less people than expected between 1 and 20 years of age in the Peninsula and also a preponderance of males in the older age groups (as shown by sex ratios). Reasons for these differences are unclear, but the analysis raises important questions about the completeness and accuracy of census data for those groups.

[2] Unless otherwise specified, the word 'province' refers to the Western Cape Province in this report. The country is divided into 9 such provinces.

1.2 General health status of the population:

1.2.1 Mortality:

One of the major problems impeding the use of routinely collected data on mortality for planning is related to the completeness and accuracy of this data, particularly for Blacks. Studies examining this problem (Botha et al 1985; Kielkowski et al 1989; Van der Merwe et al 1991) have identified under-registration and mis-classification of deaths as important. In particular, it was shown that approximately 20%, on average, of Black deaths (from 1979-1980) were classified as caused by symptoms, signs and ill-defined conditions. This problem was worse in metropolitan areas than in major towns or rural areas. For 1993, 'symptoms, signs and ill-defined conditions' accounted for 16.2% of deaths (no. =1227) in the Cape Town City Council (CCC) area (Annual Report of the Medical Officer of Health 1993/4, City of Cape Town) and 10.0% of deaths (no. = 827) in the Cape Metro Council (CMC) area (Annual Report of the Department of Health Services 1993. Western Cape Regional Services Council). Of the 10.0% deaths of ill-defined cause in the CMC area, 25.2% were in the Black population and 53.7% in the Coloured population.

It has also been shown that only 29.9% of ill-defined deaths in all population groups (for 1985) were certified by a medical practitioner, the majority being certified by police officers in their role as death registrars. This practice of using police officers as death registrars has since been abandoned. The proportion of deaths classified as ill-defined is considerably higher among Blacks than other population groups (Van der Merwe et al 1991). While proposals on methods of improving mortality data, and particularly death registration in the Black community, are currently being formulated (Bradshaw - personal communication; Bradshaw et al 1995.ii), attempts have been made by local authorities (LAs) in the Cape Town metropolitan area (Cape Town City Council and Cape Metro Council) to enhance the quality of their information. These include scanning mortuary registers and cemetery records (Baqwa et al 1994 and Lombard - personal communication). Under-registration of deaths is considered to be smallest in the Western Cape Province, with local authorities estimating that 80% of deaths are registered (Lombard - personal communication). This estimate needs to be verified.

i. Infant mortality rates (IMRs):

Variations in infant and child mortality have been extensively examined spatially and, in some instances, their relationship to socio-economic variables documented (Rip et al 1986; Yach 1988; Bourne et al 1989; Rip et al 1990; Power et al 1991; Pick et al 1994; Bachmann et al 1994). Rip et al's (1986) study of spatial variations in perinatal mortality in Cape Town showed clearly that perinatal mortality rates (PNMR) vary greatly across suburbs within the city and across 'race' groups. The spatial distribution of suburbs ranked according to socio-economic status[3] and PNMR showed that, apart from one area in which low socio-economic status and low PNMR prevailed, all those suburbs which exhibited PNMRs greater than 30 per 1000 live and stillbirths were of low socio-economic status. Furthermore, PNMRs were highly correlated with density of population in the areas studied. While such an ecological study cannot prove cause

[3] The socio-economic status of suburbs was rated according to 9 variables, including median head of household income, occupancy rates, proportion of household heads earning <R3000/year, shared accommodation, workers with less than Std 6 education, household heads with no car, single mothers with more than 3 children, total population density per hectare and levels of unemployment.

and effect, the technique, as the authors conclude, does enable health care planners to determine problem areas for intervention and monitor the effects of interventions. This study is a good example of health and environmental data linkage in the city.

Pick et al's (1994) study of child mortality in Cape Town from 1981-1984 (based on registered deaths) divided the city into 3 segments based on census-derived median head of household income for each local area or suburb. The child mortality rate varied from 2.75/10 000 in high income areas to 23/10 000 in low income areas. Deaths from symptoms, signs and ill-defined conditions comprised 10% of all deaths in this group, but this was not disaggregated further by race group. A more recent study on infant mortality rates in Cape Town (CMC area) for 1992 (Bachmann et al - in press) used notified births and deaths (supplemented by mortuary records) to calculate infant mortality rates. IMRs were grouped by race and geographical area. These, in turn, were grouped into 4 strata based on housing type and population density (urban; informal; mixed; rural). It was shown that the highest IMRs occurred among Coloureds in rural areas and Blacks in informal settlements. Large variations in IMR were also evident within each strata by race group and between urban, informal and rural areas for the same race group. Regarding data quality, the authors comment that birth data are likely to be fairly complete, while death notifications may be under-reported in poorer areas i.e. rural and informal areas. This is likely to produce an underestimate of IMR, and true mortality rates may be even higher than those reported. Routine disaggregation of health data for planning, resource allocation and evaluation purposes was recommended.

The sections below outline the most up to data on IMRs for the two main local authority areas in Cape Town, and for the metro area as a whole.

- Cape Metro Council Areas

TABLE 2: INFANT MORTALITY RATES PER 1000 LIVE BIRTHS BY RACIAL CATEGORY FOR 1993 IN CAPE METRO COUNCIL AREAS (Annual Report of the Dept. of Health Services 1993)

	RACE GROUP			
	White	Coloured	Black	Total
IMR	13,8	18,3	33,9	24,6

TABLE 3: INFANT MORTALITY RATES PER 1000 LIVE BIRTHS (AND 95% CONFIDENCE INTERVALS) BY PLACE OF RESIDENCE AND RACIAL CATEGORY FOR 1992 IN CAPE METRO COUNCIL AREAS (Bachmann et al 1994)

INFANT	TOTAL	URBAN	INFORMAL	MIXED	RURAL
Black	33.0 (29.5-36.8)	23.2 (10.0-49.4)	34.3 (30.7-38.6)	33.6 (15.3-68 0)	16.1 (7.4-32.9)
Coloured	17 6 (15.6-19.8)	14 5 (12.5-16.8)	22.9 (9.1-51.8)	25.8 (10.2-58.1)	32.9 (26.0-41.3)
White	9.7 (6.7-13.9)	11.5 (7.6-17.2)	-	6.7 (2.7-15.2)	4.8 (0.2-30.8)
Total	22.0 (20.3-23.8)	14 2 (12.4-16.3)	34.1 (30 5-38.2)	14.6 (9.1-22.9)	28 2 (22 6-35.0)

As can be seen, large variations in IMR exist between 'race' groups in Cape Town and between those living in urban, informal, mixed and rural areas. These inequalities are largely the product of apartheid policies which favoured certain 'race' groups for development.

- City Council Areas

The IMR for 1993 for all 'racial' categories and suburbs was 16.57 (Annual Report of the Medical Officer of Health 1993/94).

- Greater metro area:

The IMR for all 'racial' categories and all suburbs in the greater metro area for 1993 was 20.76. Infant mortality rate by gender is not routinely published, but is held in the databases of the local authorities. The Table below shows the main causes of death in infants in Cape Town for 1993.

TABLE 4 MAIN CAUSES OF DEATH IN INFANTS, CAPE TOWN, 1993 [4] (Annual Report of the Medical Officer of Health 1993/94; Annual Report of the Department of Health Services 1993)

DISEASE	NO OF DEATHS - CCC[5]	NO OF DEATHS - CMC[6]	TOTAL DEATHS	% DEATHS
prematurity	89	177	266	24.93%
other, ill-defined, unknown	82	108	190	17.81%
other diseases of early infancy	24	91	115	10.78%
diarrhoea and enteritis	11	95	106	9.93%
congenital abnormalities	57	48	105	9.84%
pneumonia (all forms)	26	76	102	9.56%
accidental	5	21	26	2.44%
other infections		23	23	2.16%
sudden death		22	22	2.06%
birth asphyxia	20		20	1.87%
all other causes of death	28	64	92	8.62%
ALL DISEASES	342	725	1067	100%

Of particular note in the Table above is the fact that ill-defined and unknown causes comprise 17.8% of all infant deaths. This implies that the completion of deaths certificates is inadequate. There are a number of possible explanations for this, including the poor training of health personnel in the completion of certificates, the substantial number of children who die outside of a health facility and coding errors. The problem of deaths labelled as due to ill-defined conditions or unknown causes is an obvious one for any linkage analysis, as will be described later.

Pneumonia and diarrhoea are still significant causes of infant mortality in Cape Town. This probably relates both to prevailing environmental conditions (see section 2) and to access to health services in the city.

ii. Maternal mortality:

The maternal mortality rate (MMR) for the metro area is not known due to the fragmentation of reporting systems. The most current data is for the area covered by the Peninsula Maternity and Neonatal Service (PMNS), which delivers approximately 57% of infants in the city. The Table below shows the MMR for the last 5 years for which data is available for this area (de Groot 1992).

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[4] Causes of death for infants are classified differently in the 2 local authorities. Data on cause of death by ICD9 code is held in the databases of these authorities, but was not examined in detail for this report.

[5] From 01/07/93 - 30/06/94

[6] From 01/01/93 - 31/12/93

TABLE 5: IMR, CAPE TOWN - PMNS AREA (Source: de Groot 1992)

	1987	1988	1989/90	1990/91	1991/92
MMR / 100 000 deliveries	28	43	24	24	31

TABLE 6: CAUSES OF MATERNAL DEATHS, 1991/92, PMNS AREA (Source: de Groot 1992)

OBSTETRIC CAUSES	NON-OBSTETRIC CAUSES
postpartum haemorrhage - 3 patients pulmonary embolism - 2 patients cerebral haemorhage eclampsia	malignant mesenchymal tumour suicide

While MMRs for Cape Town are relatively low, and compare well with the country as a whole, it can be seen from the Table above that some of these deaths are preventable. This is acknowledged in the Annual Report of the PMNS (de Groot 1992).

iii. General mortality:

Mortality by cause and by geographic area is shown in the Table below. As mentioned earlier for infant mortality, 'symptoms, signs and ill-defined causes' constitute a large proportion of deaths, as do homicides (10%) and motor vehicle accidents (MVAs) (5.6%). Although not shown here, violence and trauma are important causes of death among 15 - 44 year olds, with homicides and MVAs respectively accounting for 35.8% and 12.7% of deaths in that group in 1993/94 (Annual Report of the Medical Officer of Health 1993/1994). Details of selected causes of death by age group are shown in Appendix 5.

Mortality data by cause and Potential Years of Life Lost (PYLL) by cause for the Western Cape Province for 1990 have been analysed by Bradshaw et al (1995.l) and are shown in Appendix 6. It should be noted here that tuberculosis accounts for 6% of PYLL, while other respiratory conditions account for 9% of PYLL. Homicides account for 3.5% of PYLL.

TABLE 7: MAIN CAUSES OF DEATH - ALL AGES. CAPE TOWN, 1993[7] (Sources: Annual Report of the Medical Officer of Health 1993/94; Annual Report of the Department of Health Services 1993)

CAUSE	NO OF DEATHS - CCC	NO OF DEATHS - CMC	TOTAL NO	% TOTAL
other causes	1230	1472	2702	17.01%
malignant neoplasm	1360	1061	2421	15.24%
symptoms, signs, ill-defined	1227	827	2054	12.93%
homicide (homicide, assault, legal intervention)	628	1109	1737	10.94%
other heart disease	462	1166	1628	10.25%
ischaemic heart disease	718	837	1555	9.79%
pneumonia (respiratory disease)	290	718	1008	6.35%
MVAs	325	571	896	5.64%
cerebrovascular disease	537		537	3.38%
perinatal mortality	205	272	477	3.00%
pulmonary tuberculosis (all forms of TB)	184	267	451	3.00%
COPD[8]	247		247	1.56%
nephritis	169		169	1.06%
ALL CAUSES	7582	8300	15882	100%

1.3 Environmental health in the Western Cape and in Cape Town:

1.3.1 Agencies providing services:

i. Governmental:

State services at the local, provincial and national levels have either been restructured following the first democratic national elections of February 1994, or are currently being restructured. The organisation and functions of structures at the different levels has therefore not been finalised.

Furthermore, as Derry (1994 p27) has pointed out, a great deal of South Africa's present EH legislation is 'administrative and collective and is aimed primarily at maintaining high EH standards in well-developed areas with existing high-grade service infrastructures'. This is likely to change under the new dispensation and, indeed, many of the existing programmes are under review.

In order to show how services are currently organised and plans for their organisation in the future, this part of the report is divided into 2 sections, as follows:

- Current structures:

Services in the Cape Town metropolitan area are provided by a number of local authorities. The 2 major councils providing environmental health services are the Cape Town City Council and the Cape Metro Council, through their health departments. Other local authorities with environmental health departments include: Bellville, Brackenfell, Durbanville, Gordon's Bay, Kraaifontein, Kuil's Rivier, Parow, Somerset

[7] Bracketed items in Table 4 indicate where the cause of death catagories varied between the 2 local authorities concerned. The CMC catagory is shown in brackets.

[8] COPD - chronic obstructive pulmonary disease

West and Strand. The EH responsibilities of local authorities lie in the monitoring of the quality of:

* water
* sanitation
* sewerage
* housing

and in enforcing:

* food control
* trading controls
* pest control
* air pollution
* noise control

Staff of the former Department of National Health and Population Development are now housed within the Provincial Administration of the Western Cape (PAWC) Health Department. Their functions under the new dispensation are still under discussion and are provisionally outlined below.

- Proposed structures:

It has been accepted that, with the restructuring of the health sector, EH services will be provided as part of the comprehensive, integrated services at the community level and will be managed from the local community health centre (Finalisation of the Provincial Health Plan 1995). Community areas will, in turn, be sub-units of health districts. The district health management team will have responsibility for environmental health services at that level. The metro area will probably be divided into 10 such districts (see map in Appendix 3), although this is still under discussion. Districts management teams have not, however, been set up as yet and community-level environmental health services are currently managed by the existing local authorities, as described above. It is not yet clear which specific EH functions the community and district levels will be responsible for. It is likely that these will be the basic monitoring functions currently undertaken by EHOs, with the addition of a new cadre of staff, termed environmental health assistants (EHA) who might take responsibility for some of the low-technology functions of EHOs.

EH functions at the regional level have not yet been specified. The Draft Provincial Health Plan EH Task Group, however, has made proposals for the permanent functions of the EH sub-directorate of PAWC. These are as follows (Draft Provincial Health Plan 1995):

* monitoring of local government EH functions
* coordination of the progress of other sectors involved in health-related service provision at the appropriate level (e.g. water and housing departments)
* special provincial EH programme identification and management
* trans-boundary air pollution control
* trans-boundary water pollution control
* trans-boundary solid waste control, including recycling
* coordination of trans-boundary communicable disease control
* coordination of trans-boundary vector control
* monitoring of international airports and harbours

* maintaining environmental 'early warning' systems

The EH section of PAWC is currently being restructured to incorporate personnel from fragmented apartheid services[9]. It is not yet clear how this department will be organised and what its specific responsibilities will be in relation to data collection and analysis.

It should be noted, in terms of the functions outlined above, that the health sector in South Africa is *not* vested with the *legal responsibility* to provide water, sanitation or shelter (Draft Guidelines 1995). While this may change in the future, the current role of the city environmental health departments with regard to water, sanitation and shelter is therefore one of identifying problem areas and bringing these to the attention of the departments responsible for the provision of water, housing and engineering services in these areas. This seems to have led to the unfortunate situation in which the institutional link between environmental conditions and monitoring and providing services is, at best, fragmented and often broken. Collaboration between EH departments and other departments providing basic services is often informal (Bremer - personal communication; Derry - personal communication), rather than structured through an intersectoral forum. Under the new Provincial Health Plan it is envisaged that community and local government structures and the Reconstruction and Development Programme (RDP) process will be the major foci of intersectoral collaboration, with health committees being represented on RDP structures at the appropriate levels (Finalisation of the Provincial Health Plan 1995). Local government structures will not be in place until mid-1996 in the Western Cape and local RDP committees are only now becoming operational in many areas of the metro. It is therefore not yet clear how well these proposed inter-sectoral links will function in practice. To date, there have been no significant changes in the manner with which intersectoral functions are organised at the metro level.

- EH Personnel:

The following problems with the current provision of EH personnel were noted in the Draft Provincial Health Plan (1995):

* there are currently only 2574 EHOs registered nationally, of which 2000 are in practice. This gives a ratio of approximately 1 EHO to 20 000, which is half the suggested ratio (Derry 1994). The Table below shows the current health personnel profile in the metro area.
* EHOs are also heavily concentrated in the formal areas of the city where, it could be argued, the need is lowest.

TABLE 8: HEALTH PERSONNEL IN THE CAPE TOWN METROPOLITAN AREA (Source: Draft Provincial Health Plan 1995 p?)

	NURSES	ASSOC HEALTH PROFESSIONALS	MEDICAL PRACTITIONERS	PHARMACISTS	EHOs
NUMBER	17 227	3563	3115	1784	166

[9] Typically, under apartheid, service departments were created for each population category, resulting in duplication and fragmentation of services.

ii. Academic:

Most academic institutions in the metro are involved in research in the field of EH (as broadly defined). These institutions include:

- University of the Western Cape
- Medical Research Council of South Africa
- University of Cape Town
- University of Stellenbosch
- Cape Technikon
- Peninsula Technikon

1.3.2 Environmental health status in the metro:

Two areas are covered in this section of the report: the first is a summary of the sources of data, the quality and completeness of data, the accessibility of data and comments on whether this data is used to inform decision-making and action at the metro level and in the field. The environmental health problem areas of water, sanitation, housing, refuse disposal and access to electricity (i.e. basic facilities) are covered together, as data on these areas are derived from similar sources and share similar constraints. Comments on the air pollution data are made separately below.
The second area covered is a description of the major environmental health problems in Cape Town, using these data sources.

Sources and quality of data on basic facilities in the city:

The paucity of data on access to basic facilities on a geographical basis, and according to 'racial' categories, was commented on in a report detailing socio-economic conditions in Cape Town compiled in November 1993 (Dodson et al). The situation has not changed greatly since then for the city.

Up to date data on access to water, sanitation, refuse collection and housing in the Cape Town metro area as a whole, or by suburb, was not readily available at the time of writing this report. The most current non-survey data for the city is derived from the 1991 national census. Some of the problems with demographic and other data from this census are outlined elsewhere in this report (see Section 3.2). Even putting these problems aside, the census data is now 4 years out of date, during which time the city has been in the process of rapid urbanisation, with the concomitant rapid growth of formal and informal settlements. Therefore, due to methodological problems with the census and the fact that the data is now outdated, it was decided, for the purposes of this report, to rely on more current survey data for the province and the city. It should be noted that a recent survey of basic facilities, undertaken in 1994, is currently being analysed and the results of this survey, which will indicate household access to basic services at the suburb level, should be available in early 1996. This dataset will be extremely useful for future data linkage studies and will be available to the investigator.

Data presented in this section of the study have therefore been drawn from reports and surveys in which information has been aggregated for the Western Cape province as a whole. In some instances this data has been disaggregated into rural, urban and metropolitan areas. As the only metropolitan area in the province is the city of Cape Town, data on Western Cape metropolitan areas can be assumed to be applicable to Cape Town. Furthermore, it should be noted that between 86.5% (Draft Provincial Health Plan 1995) and 94.4% (South Africans Rich and Poor 1994) of the population in

the province reside in the metropole and in other urban areas. It is also estimated that approximately 70.6% of the provincial population resides in the Cape Town metro area (Mazur 1995). Aggregated data on the province can therefore be assumed to broadly reflect urban areas.

Data for the Cape Town metro area has therefore been drawn from the aggregate sources of data on the province as listed below:

a. Routinely collected data:

There are several sources of routinely collected data on environmental health in Cape Town:

- Data collection by local authority EH departments: Detailed data on workload, such as numbers of inspections are collected at this level. This data is not useful in assessing environmental conditions or health risk as it is not linked to specific programme objectives. In addition, data is collected on access to basic facilities in informal, unplanned settlements, but this data is not collated to measure trends or changes. A core set of EHIs for the city have not yet been developed, although it is planned, as part of this project, to develop them in the course of the next 6 months.
- Data collection by the Provincial Administration of the Western Cape (PAWC): PAWC undertakes very little of its own data collection, but rather performs the function of collating data from different areas of the province into reports for the national level. PAWC has also been involved in the co-ordination of the Basic Subsistence Facilities Monitoring surveys on an annual basis (see below).

b. Survey data:

- Basic Subsistence Facilities Monitoring (Evaluation) Programme of the National Department of Health: This programme was implemented during 1992 as the monitoring arm of National Environmental Health Services Evaluation Programme. It aims to provide a '...coherent assessment of basic needs at consumer level as well as to identify the most critical constraints in meeting those needs...' (Draft Guidelines 1995. p2). The indicators currently under discussion for inclusion in this monitoring programme at the national level are listed as Appendix 7. In the past, the sampling in these surveys was not weighted by area for population size which makes the results difficult to interpret, despite projections using established national and provincial population estimates. Also, definitions of adequate access and of location (urban, marginal urban and rural areas) were, in themselves, inadequate and often appeared to rely on the subjective judgement of the surveyor. Data quality, in general, is therefore poor.

  The sampling strategy, including sample size, has not yet been described in detail for future surveys, but will be weighted by area for population size and number of dwellings. Definitions of access have also been improved in some instances and are currently under discussion at the local level.

- Basic Facilities Survey - Cape Town: The Metro Council of Cape Town has recently undertaken a large survey of access to basic facilities in the city, which is separate from those of the National Department of Health. This data is currently in the final stages of analysis.

- Project for statistics on Living Standards and Development, South African Labour and Development Research Unit (SALDRU) - South Africans Rich and Poor: This is a national survey that was undertaken in 1993 and 1994 of 8848 households. The sampling design was a two stage, self-weighting design in which the first stage units were Census Enumeration Sub-districts and the second stage were households. The 1991 census, projected for growth, was used as a population estimate. Detailed definitions for all questionnaire items were developed and data collection, entry, management and cleaning appear to have been carefully controlled. The survey has limitations for the derivation of indices of fertility and childhood mortality (Mazur 1995). Data from the survey is still being analysed, but preliminary reports are available.

- Community Agency for Social Enquiry (CASE) survey of health inequalities: This covered 4000 households nationally in 1994 and the first report was made available in 1995. The methodology has not been examined by the author and comments on quality and completeness cannot be made at this stage.

Access to data on basic facilities:
All the datasets mentioned above, apart from the CASE survey, are in the public domain and available in an electronic format. However, there are a number of problems with accessing these sources:

- One of the major local authorities in Cape Town process data on a mainframe computer and a COBOL[10] compiler is required to read it. Transferring data from COBOL into another format has been shown to be difficult and time-consuming (Bradshaw et al 1995).
- The SALDRU survey data requires specialised software for analysis, although this software is readily available.

Current and local usage of indicators for health and environment:
As mentioned above, a core set of EHIs for Cape Town has not yet been established and routinely collected data focuses mainly on inspections. Section 2 below focuses on the process of decision-making in the EH sector in more detail.

Situation analysis of environmental health conditions in Cape Town:

i. Water:

- **Access to adequate, safe drinking water:**

The Directorate of Environmental Health in the National Department of Health has defined populations as having adequate, safe drinking water when such drinking water:
- is available within the home or which is available within 100m from the point of use;
- is adequate according to demand; and
- has a quality safe for health at the point of use (Basic Subsistence Facilities Report 1994).

[10] Common Business Oriented Language

TABLE 9: % OF POPULATION WITH ADEQUATE, SAFE DRINKING WATER IN THE HOME OR WITH REASONABLE ACCESS 1994 (Source: Basic Subsistence Facilities Report 1994. p5)[11]

AREA	% OF POPULATION WITH ADEQUATE SAFE DRINKING WATER IN THE HOME OR WITH REASONABLE ACCESS		
	RURAL	MARGINAL URBAN	URBAN
WESTERN CAPE	79.3	81.6	95.6
SOUTH AFRICA	63.3	84.7	96.1

TABLE 10: ACCESS TO ALL SOURCES OF WATER FOR WESTERN CAPE PROVINCE AND SOUTH AFRICA - PERCENTAGE (Source: South Africans Rich and Poor 1994 p.74)[12]

SOURCES OF WATER	W. CAPE - TOTAL	AFRICANS	COLOURED	INDIANS	WHITES	SOUTH AFRICA
Piped water - internal	81.4	37.3	82.6	100.0	100.0	39.4
Piped water - yard tap	11.9	31.7	14.2			19.7
Piped water - public kiosk	6.3	29.6	2.7			17.3
Other	0.5	1.4	0.5			23.6
Total	100.0	100.0	100.0	100.0	100.0	100.0
Number	886 000	152 100	401 200	1800	330900	8 523 800

As can be seen from the Tables above, more than 90% of the urban population in the Western Cape and more than 80% of the marginal urban population have access to adequate safe drinking water, with the majority of households receiving piped water internally. This compares favourably with the country as a whole. It should be noted that the data reported in the Table above for the country as a whole do not represent a weighted sample and should therefore be viewed with caution. What is striking from this data is the inequality of access between different 'race' groups in the province, with only 37.3% of Africans[13] having piped water in the home, compared to 82.6% of Coloureds and 100% of Indians and Whites. These extreme inequalities have been confirmed by other recent surveys (Hirschowitz et al 1995). As approximately 86% of Africans in the Western Cape reside in the metro area, and a further 14% reside in urban areas (Hirschowitz et al 1995), it is clear that lack of access to piped water in the home is a major environmental health risk for African metro households in the province.

ii. Housing:

In 1994, the Directorate of Environmental Health in the National Department of Health defined housing which provides overall health protection as housing in which:

- the structure provides health protection to inhabitants; and
- the sleeping space is not overcrowded (Basic Subsistence Facilities Report 1994).

This definition has now been further clarified (Draft Guidelines 1995) and is shown in the footnote below.[14]

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[11] 5847 dwellings were surveyed in the Western Cape between 1992 and 1993, comprising 14% of the national sample. The sampling methodology, however, was not outlined in detail in the report.

[12] 8848 households were sampled country-wide in 1993, based on a 2-stage, self-weighting design in which the first stage units were Census Enumerator Sub-Districts and the second stage were households. Data collection was in the form of an interviewer administered questionnaire.

[13] The term African as used n the study by Hirschowitz et al (1995) is equivalent to the apartheid categorisation of 'Black'.

[14] The percentage of the population occupying dwellings of which:

TABLE 11: TYPE OF DWELLING BY PROVINCE (PERCENTAGE) (Source: South Africans Rich and Poor 1994 p.64)

TYPE OF DWELLING	W. CAPE	SOUTH AFRICA
shack	12.2	11.0
house / part of house	69.3	54.7
traditional dwelling (hut)	0.1	10.3
maisonette	4.4	1.4
flat	7.4	4.7
hostel	3.7	5.1
outbuilding	1.2	2.3
combination of buildings	1.1	10.3
other	0.4	0.2
TOTAL	100.0	100.0
NUMBER	887 500	8 512 000

The Basic Subsistence Facilities Monitoring programme reports that 88.3% of South African urban populations have access to housing which provides overall health protection. In the Western Cape 48.7% of the rural population and 39.3% of the marginal urban population have access to adequate 'healthy' housing, based on the definition outlined above. 57.9% of marginal urban dwellings were found to be informal structures (Basic Subsistence Facilities Report 1994). Hirschowitz et al (1995) have reported that, of African households in the Western Cape Province, 52% are shacks, 39% are houses, 5% are hostels, 3% are flats and 1% are other forms of housing. Here again, the inequalities between the 'race' groups in access to adequate housing is evident when these figures are compared to those of the province as a whole.

- the structure provides protection against natural elements i.e. dwellings of which:
  - the floors are of a washable material and so conducted as to prevent the permeation of dampness into the interior of the dwelling or into the walls of the room
  - the walls are such that the exterior walls are so constructed as to prevent the permeation of wind and rain into the dewlling as well as dampness into the inner surfaces of the wall and the exterior, as well as the interior walls are so constructed to prevent the permeation of dampness into the floor or any portion of the walls above the floor area
  - the access openings in exterior walls are provided with closeable doors manufactured of an impervious material and so constructed as to prevent the permeation of rain into the interior of the building
  - the roof is manufactured of a waterproof material and so constructed as to prevent the permeation of dampness into the interior of the building, the retention of water on the surface of the roof and has a minimum height of 2.4 meters over a minimum of 50% of the floor area and 2.1m over the remainder of the floor area
  - the rooms are adequately illuminated and ventilated by means of windows with an area equal to at least 10% of the floor area, of which an area equal to at least 5% of the floor area can be opened, which are, in relation to one any other ventilation opening, so positioned as to facilitate adequate cross ventilation and of which the construction, as well as the material used in the constuction thereof, are such that, with the window in a closed position, rain will not permeate into the interior of the room
- the user ratio of sleeping space is such that the floor and airspace requirements for health are not exceeded i.e such that:
  - rooms have a minimum floor area of $6m^2$ and a minimum width of 2 meters
  - rooms have a floor space of a least $4m^2$ per person above the age of 10 years and at least $2m^2$ per person of the age of ten years and younger rooms have an airspace of at least 9.6 m^2 per person above the age of 10 \years and at least 4.8 m^2 of the age of 10 years and younger.

It should also be noted that while the revised definition of healthy housing, as outlined in the footnote below, is a useful statement of all the structural housing parameters likely to affect health, it is not a useful definition for survey purposes due to its length and complexity. A more succinct definition should be developed for future basic facilities surveys.

iii. Sanitation:

The definition used in 1994 by the Directorate of Environmental Health in the National Department of Health for adequate domestic excreta disposal facilities is access to a facility (excluding bucket facilities) which:

- is in the home or within 50m of the dwelling;
- is structurally and functionally fit for use;
- has a user ratio of not more than 15 persons per facility in the case of a water closet or chemical facility and not more than 8 persons per facility in the case of a pit latrine; and
- of which the removal and disposal of the contents are nuisance free.[15]

According to this definition, 96% of the urban population and 55.5% of the marginal urban population[16] have access to adequate excreta disposal facilities. More reliable data is available from the Project for Statistics on Living Standards and Development, and this is shown in the Tables below.

TABLE 12: PERCENTAGE OF HOUSEHOLDS WITH FLUSH TOILETS BY AREA AND RACE (Source: South Africans Rich and Poor 1994 p.81)

AREA	AFRICAN		COLOURED		INDIAN		WHITE		ALL	
	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number
W. Cape	67.6	152 100	89.0	401 200	100.0	1800	100 0	332 400	89.5	887 500
South Africa	34.2	6 085 500	88.0	658 700	99.6	228 200	99.8	1 550 100	52.1	8 522 600

[15] This definition is currently being revised.

[16] Unfortunately, the definitions used for 'urban' and 'marginal urban' populations in this study imply, ab initio, that these populations would have different access to services, as can be seen from the definitions below:

- urban populations: populations perceived locally to have access to a good standard of dwelling expressed in physical terms; safe water supply and sanitation; and other services such as health and public transport.
- marginal urban populations: populations perceived locally clearly not to fit into the provious category and who have relatively poor access to such services (Basic Subsistence Facilities Report. 1994).

TABLE 13: DISTRIBUTION OF HOUSEHOLDS BY TYPE OF TOILET BY PROVINCE AND LOCATION, AFRICAN: METROPOLITAN (PERCENTAGE) (Source: South Africans Rich and Poor 1994 p.85)

TYPE OF TOILET	W. CAPE	SOUTH AFRICA
Flush toilet	64.7	83.0
Improved pit latrine	-	0.6
Other pit latrine	-	6.4
Bucket toilet	30.3	6.9
Chemical Toilet	-	1.5
None	5.0	1.7
TOTAL	100.0	100.0
NUMBER	127 400	1 175 300

As with access to other basic facilities, it can be seen that although the Western Cape province and its metropolitan African population are considerably better off, in terms of access to adequate domestic excreta disposal facilities than South Africa as a whole, there are still striking inequalities between the 'race' groups in terms of access to flush toilets. This inequality, together with inequalities in access to a safe water supply in the home and to health care, may go some way in explaining the differentials in infant mortality rates between the different race groups in Cape Town (see earlier Table) and the status of diarrhoeal diseases as the fourth biggest killer of infants in the city (see earlier Table).

iv. Refuse Removal:

Access to effective domestic refuse removal has recently been defined at the national level as '...access to a system where refuse is disposed of / removed in such a way that no nuisance or health / environmental risk is caused' (Draft Guidelines 1995. p3). A recent survey showed that 91.2% of the urban population, but only 59.5% of the marginal urban population in the Western Cape Province have access to effective domestic refuse removal systems (Basic Subsistence Facilities Report 1994). No data was found by the author for the Cape Town metro area specifically.

v. Access to electricity:

A recent study in South Africa by the MRC looking at the interface between energy, development and public health (Electrification and Health 1995) found that, in the face of high electricity generation capacity, approximately two-thirds of homes in South Africa are not electrified. The study quantified the burden of morbidity and mortality due to the lack of access to electricity. The results of this are summarized in the Table below.

TABLE 14: POPULATION ATTRIBUTABLE RISK[17] - LACK OF ACCESS TO ELECTRIFICATION IN SOUTH AFRICA (Source: Electrification and Health. 1995 p.iii)

CAUSE	POPULATION ATTRIBUTABLE RISK
Childhood acute respiratory infection	1000
Burns	2080
Paraffin poisoning	42

[17] Population attributable risk is the number of excess cases of mortality in a population that can be attributed to a particular risk factor (Electrification and Health 1995).

In addition, it was estimated that electrification could result in a substantial reduction in all-age respiratory disease mortality and a reduction of up to 35 000 burn incidents and 5000 cases of paraffin poisoning annually in the country. For Cape Town, it was estimated that respiratory infection morbidity would be reduced by approximately 83% and the number of paraffin poisonings by 492%. At a national level, the study estimated that a total of R762 million (US$207.6 million) could be saved in the costs of treating respiratory disease, burns and paraffin poisonings if 54% of non-electrified houses switched to electricity as their sole source of energy. In addition it was noted that 60% of health clinics and 86% of schools in South Africa are not electrified, with substantial implications for development.

Large disparities exist in access to electricity across race groups and between rural and urban / metropolitan areas, as shown in theTables below:

TABLE 15: ACCESS TO ELECTRICITY FROM GRID BY PROVINCE AND RACE (PERCENTAGE)
(Source: South Africans Rich and Poor 1994 p.86)

AREA	AFRICAN		COLOURED		INDIAN		WHITE		ALL	
	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number
W. Cape	42.6	151 000	88.3	401 200	100 0	1800	100.0	332 400	84 9	886 500
South Africa	36.5	6 073 900	86.2	658 700	100.0	228 200	99.8	1 550 100	53.6	8 511 000

TABLE 16: AVAILABILITY OF ELECTRICITY FROM GRID BY LOCATION FOR SOUTH AFRICA (PERCENTAGE) (Source: South Africans Rich and Poor 1994 p.87)

LOCATION	ALL RACE GROUPS	
	PERCENT	NUMBER
Rural	28.4	4 000 800
Urban	64.0	1 898 100
Metropolitan	84.5	2 612 000
All	53.6	8 511 000

These disparities have clear implications for health, with households in rural areas and those occupied by Africans having unequal access to the benefits of electrification.

vi. Air pollution:

Sources of data:

Data on air pollution for the Cape Town metro area is collected by the air quality monitoring units of both the City and Metro Councils. This includes monitoring of the following indicators:

- oxides of nitrogen at 2 sites in the city.
- nitrogen dioxide at 2 sites in the city.
- sulphur dioxide at 10 measuring points across the city.
- atmospheric lead at 10 measuring points across the city.
- non-methane hydrocarbons and ozone (on an experimental basis).

Monthly summaries of this data are submitted to the EH departments of the councils, where they are tabled at monthly meetings. Readings which exceed the guidelines set by the National Department of Health are highlighted for oxides of nitrogen and nitrogen dioxide. In addition, these values are published on a daily basis in a local newspaper.
In 1993 guidelines for oxides of nitrogen were exceeded 73 times and those for nitrogen dioxide were exceeded 29 times. This compares favourably to Soweto, a solely Black residential area in Johannesburg in which the levels of suspended particulate matter exceeded the guidelines for 20% of the year (Electrification and Health 1995).

Access to data:
Data is stored in an ASCII format in the databases of the two councils mentioned above and is available, with permission of the Medical Officers of Health, for further analysis. Much of this data is currently being analysed for the Cape Town Brown Haze Study which aims to determine the source apportionment, visibility reduction and health impacts of brown haze and to propose control strategies (Annual Report of the Medical Officer of Health. 1993/1994).
Data on air pollution is also being collated onto a database nationally by the National Department of Health and the Department of Environmental Affairs and Tourism. Also, a collaborative project at the Council for Scientific and Industrial Research (CSIR), funded by the Department of Health, the Department of Environment and Tourism and Department of Energy and Mineral Affairs, is examining what is being monitored where and by whom in the air pollution sector. This group has been tasked with making recommendations for air monitoring in the future.

Quality and completeness of data:
Interviews with EHOs and researchers indicated the following problems with data quality and completeness:

- There is a very large 'window' in air monitoring over the Cape Flats / Khayelitsha (a large, mainly informal Black settlement area on the south-east perimeter of the city) which will need to be addressed. Existing monitors are located mainly in formal industrial and residential areas and consequently little data is available on air quality in informal settlements, some of which are located in close proximity to industrial areas. In general, more air quality monitors are required for the city as there are currently only 10 monitoring sites and a small number of mobile monitors available.
- Maintaining data integrity is difficult. Validating the equipment and the measurements is a highly specialised and time-consuming task and there are few EHOs qualified to undertake this.
- Data on indoor air pollution is not routinely collected. As a large percentage of homes do not have access to electricity (see Tables above) and use wood, paraffin or charcoal fueled appliances, indoor air pollution is a significant health hazard (also see section iv above) and is probably a greater health risk than atmospheric pollution in Cape Town.

Action on indicators at the local level:
Although air pollution guidelines have been set at the national level, local authorities cannot initiate action (such as legal warnings, prosecutions or fines) unless a specific point source can be identified. In general, the pollution limits are exceeded under

specific meteorological conditions (i.e. when there is an inversion over the city) which allows for the accumulation of pollutants in the atmosphere, sometimes over several days. Daily emissions from industrial, vehicular and domestic sources are largely constant.

While local authorities may not have a great deal of control over the output of atmospheric pollutants, they do have control at an earlier stage as they have to approve the installation of industrial fuel burning appliances and can enforce legislation regarding emissions from these appliances.

1.4 Summary:

- There are major difficulties in deriving an accurate population estimate for Cape Town due to sampling problems in the 1991 census. This, in turn, makes it difficult to calculate population rates such as IMRs and MMRs.
- There are large variations in mortality rates between different geographical areas and between different race groups in Cape Town. African informal settlements and rural areas have the highest mortality rates and White, formal settlements have the lowest rates.
- Major inequalities exist between race groups with regard to access to basic facilities, with Africans having worst access and Whites the best access in the Province.
- Although evidence is not available at this time, it is likely that the inequalities in access to basic facilities between race groups will be shown at the metro level on a suburb basis. This is because, historically, suburbs have been segregated according to race and, thereby, according to socio-environmental conditions.
- Routinely collected data in the EH sector is not useful for deriving EHIs as this data is focused on workload and not on outcome measures.

SECTION 2. THE INFORMATION AND DECISION-MAKING PROCESS USING INDICATORS:

It has been widely argued that the policy or decision-making process in the environmental sector, and elsewhere, is characterised by multiple actors competing over priorities; power asymmetry between decision-makers and those affected by environmental problems; and an incremental, rather than linear and rational, process of policy change (Walt 1994, Stephens 1995). This analysis of the policy process raises interesting questions for the development of EHIs in Cape Town. As will be seen in this section, the decision-making arena for environmental health in Cape Town is currently distinguished by debates over the appropriate level/s for policy-making, moves to incorporate historically excluded groups into the policy process and discussions on what areas fall within the environmental health arena or, more broadly, on how environmental health services should be defined in the city. These debates reflect broader issues under discussion in the health services and the country as a whole: how to effect decentralisation of decision-making while ensuring that important central policies are implemented; how to shift priorities from the needs of the priviledged few to those of the majority of the population; and how to incorporate into the policy process groups which have little history of interaction at that level. Where do environmental health indicators fit into these debates? On one level the role of indicators is to provide scientifically valid information on the health effects of environmental conditions to planners and policy-makers in a form which is accessible and useful, and to impact in that way on the policy process. On another level, the process of developing indicators, which requires the involvement of environmental health officers working in the field, local communities, decision-makers, scientists and others, can lead to increased dialogue between different players involved in formulating policy. This dialogue can be useful in focusing attention on the environmental health agenda at local, provincial and national levels. In Cape Town, as will be seen below, this process has involved examining the extent to which environmental health services meet the needs of disadvantaged communities and how different service sectors could share data to improve information on environmental health impacts.

This section of the report examines the process of policy-making using indicators in Cape Town, focusing on the perspectives of the different actors at local and national levels regarding the usefulness of indicators and the steps already taken in the city to develop a concensus set of EHIs.

2.1 The context of EH in Cape Town:

In the workshop and interviews conducted, many EHOs, both in the field and in managerial positions, indicated that EH services provided in the city do not reflect basic environmental health priorities. They emphasized that baseline studies of these priority areas need to be undertaken[18], as these have been inadequately investigated in the past. Priority until recently has been given to the investigation of problems pertinent to

[18] As mentioned earlier, a baseline study of the availability of basic facilities and services in the Cape Town metro area has already been undertaken and the results of this survey should be available within the next 2 months.

the minority high-income groups in the city. There is an urgent need now to identify EH priorities for the city as a whole, and to recognise that many geographical areas and socio-economic groups have been severely neglected in the past in terms of access to services.

A second problem is the current inequity in the distribution of EHOs across the city (which, in turn, is a reflection of the inequity across the country). Previous apartheid policies are seen as having directly contributed to poor management, inequity and lack of information in the EH sector.

2.2 Problems identified in the use of EH data / indicators:

In interview and workshop discussions with the ***local authorities*** responsible for providing EH services in the city, the following problems with the use of environmental health data were raised:

- **Relating data collection to programme objectives:**
  Statistics / data collected are used for the internal monitoring of departmental workload (e.g. number of shop inspections) rather than being driven by external needs or project objectives. The fact that data collection is not related to programme objectives makes it difficult to assess the success of interventions or to ascertain whether environmental conditions in the city are improving.

- **Measuring baselines and trends:**
  Overall trends in EH conditions are also not captured, a fact which related strongly to the current lack of baseline data. The point was raised that improvements cannot be measured unless a baseline has been recorded [19]. At the national level, guidelines are being formulated for a bi-annual survey of basic facilities to be undertaken country-wide. An EHO working in the field made the following comments on whether it would be useful to collect information on the availability of basic facilities:

  > "I would say so. Yes....it would give a greater idea of whether there had been a deterioration in the area or an improvement in the area. Whether the measures you implement to try and address shortcomings have been effective, or if you still getting into a treadmill situation where you are just trying to improve but you are going no where fast. So you have to know what to measure yourself against from one year to the next, so (well) we [know whether we] have improved over the last few years or we haven't ".

  It should also be noted that some data is produced due to statutory requirements which, once again, do not necessarily reflect priority information needs on the ground.

- **Monitoring the quality of data collected:**
  In the process of data collection, the quality of the data collected has generally not been closely examined. The quality of information collected is jeopardised in 2 ways:

[19] However, it was noted that a baseline survey of basic facilities has recently been completed for the metro area, the results of which should be available shortly.

* by the lack of objectives behind data collection, which makes it difficult to emphasise pertinent aspects of the data.
* by the fact that data is not presented in a form which is useful, relevant or accessible. This applies to all levels from management to community.

- **Data relevance:**
  It was suggested that the services need to answer the question 'What data would be useful to collect for use at different levels i.e. managerial, field, and community level etc.' as a first step to defining a basic dataset.

The following points regarding problems in the use of EH data and potential solutions were made in an interview with the ***National Department of EH*** (National Ministry of Health):

- **Monitoring the results of interventions:**
  In the past no useful information was collected on the results or interventions of EH services. Although local authorities submitted annual reports to national level, these were received 6 months after the previous year, which meant that the reports were already 'history' rather than useful information for current planning. Also, there were no uniform systems for reporting across the country.
  It has therefore been decided, by the national Ministry, that a system of integrated data is needed to determine environmental health status in the country.

- **Focus on volume rather than on the effectiveness of interventions:**
  In the past emphasis was also placed on collecting information on the number of inspections, and, if a local authority had done many inspections, it was seen as doing a lot of 'good work'. However, the result of interventions, if any, were not recorded. Furthermore, records did not routinely indicate the level of health risk posed by an environmental hazard.

  The National Ministry is now advocating the use of the HACCP (Hazardous Critical Control Point) approach in which the health risk of an environmental hazard, such as inadequate sanitation, is routinely assessed and monitored. Monitoring should indicate a decrease in risk with intervention and this allows the effectiveness of the intervention to be assessed. This approach seems, however, to have met with some resistance at the LA level. A senior EH manager at the national level commented:

  > "Especially at LA level.... there we will need to change a lot of, lets call it the politicians, because, as I said, the main reason why our colleagues at the local authority level feel very comfortable with reporting the number of inspections and the number of building plans they've examined .[is]..that looks good on paper and they can say 'gee whiz', you know these people really worked hard over this year. But what the politicians really should know is what is going on, what is the status of the little town or village or whatever - that is of very much greater importance to them."

2.3 Changing the focus of data collection in the EH sector:

- **Building consensus on data collection priorities:**
  EHOs stressed that consensus needs to be built among the different LAs and the PAWC regarding a core set of EH data that is relevant for the city. Furthermore, there also needs to be consensus regarding the overall management objectives for

EH. It was also felt that the objectives and functions of EH departments need to be more clearly articulated, both within those departments and to health and metro authorities as a whole. It was also noted that it may not be possible or necessary for radical change to be undertaken in the EH sector, given the difficulty of changing the existing structures and bureaucracy.

These statements have several implications: firstly, this view implies that change needs to take place slowly so that the different stakeholders can be brought into the process. Secondly, the collection of data on EH needs to relate to management and programme objectives so that progress on these objectives can be measured. Programme objectives should therefore be developed in advance of the data collection process.

- **Emphasizing basic services:**
  In terms of the shift in EH objectives there needs to be much more emphasis on provision of basic services. Some of these services are not the legal responsibility of the health sector at present which raises questions regarding whether the sector should attempt to broaden the scope of its activities. The point was also made that the sector needs to shift its focus to the EH problems of poverty, rather than concentrate, as they have done to a large extent in the past, on some of the traditional EH areas relating to lifestyle (such as food sampling). It was noted that this would not necessarily imply an increase in the volume of functions, but rather a change in focus. This is an important point in the context of limited resources in the EH sector. More resources might be available if the sector were to focus on basic services and if they were able to show, through the collection of data, that their interventions were reducing environmental health risk and improving health status. This point was mentioned by an EH manager at the national level:

  > "...we need to know what the result is of the interventions and by expressing the findings of the evaluation related to risk, it gives a better indication of what is going on in the country. This [change] is one of the major concerns among local authorities as they were quite comfortable in reporting number of inspections as an indicator of productivity, but there is no way that we can bring funding to that."

- **Community activities:**
  Service managers felt that EH has both quantitative and qualitative aspects, particularly in the area of community involvement. Community work is not acknowledged or measured in the current data collection. As one of the field EHOs put it:

  > "This [community work] is over and above the normal call of duty, but it wins trust in the department and shows that the department is really interested in the area. A lot of the work is done over weekends."

- **Measuring effectiveness:**
  It was strongly felt that data collection needs to incorporate measures of effectiveness. Many different services are currently performed, some due to statutory requirements, but there is little information available on their effectiveness in terms of improving health or reducing the risk of disease. This makes it difficult to select between different possible interventions. If measures of effectiveness could

be developed, they could be powerful tools in motivating for budget and in selecting between choices of intervention.

2.4 Data collection: differences between the national and the local levels

This study has shown that there are clear differences regarding the perceived purpose of data collection at the national versus the local level. These differences are outlined below:

- **National level:**
  Senior managers at the national level outlined the purposes for which data is used:
  * The Reconstruction and Development Programme (RDP) has certain data requirements for its National Information Project (NIP). The aim of the NIP is to create an information system that supports government and private sector services and decision-making for development. This Project has an important role to play in achieving co-ordination between different sectors. The NIP is trying to facilitate agreement between the different development-related sectors on core data elements to be collected nationally (including data category definitions and boundaries), so that information collection is not duplicated and information can easily be transferred. The implications of this for the EH sector are that certain core data will have to be collected at the local level in a form that is compatible with national data requirements. It is not yet clear precisely what those requirements will be.
  * Data is shared at the national level with other sectors. For example, the Ministry of Water Affairs and Forestry requires information on access to safe water in the home and has asked the EH sector to collect data on this in a particular format. There has apparently been some resistance to this from the local level as the format will involve extra work for EHOs.
  * Data collected is used for policy development e.g. to develop health policy on water and sanitation. Data items have therefore been designed to produce information which will facilitate policy development.
  * South Africa now collects data for WHO and UNICEF monitoring programmes which means certain items have to be included.

  In summary, managers at the national level saw the data that they routinely require as a minimum dataset on key performance areas, to which provinces and LAs might want add.

- **Local level:**
  In terms of the responses of LAs to data collection initiatives at the national level, the interviews supported, to some extent, the views expressed in the quote above. Concerns were expressed regarding the volumes of data required by the national level and the lack of feedback on that data. Also, some LAs felt that the data required was irrelevant at the local level.

  In response the National Department have stated that they attempt to collect as few data items as possible, but, because of the large ambit of EH services, this restriction is difficult. A senior manager commented:

"If [we] want to limit data items, what should be limited? If we limit in one area, the implication is that that is less important and therefore should we really be spending money on it? Therefore [we] have to first have proper idea of what EH services entails. Some items were removed e.g. post-mortem inspections at abattoirs, scrutinising building plans and how the time of EHOs is spent. How to limit [data collection] and then still make sense out of situation?"

"Unless [we] have reporting, [we] will never know what is going on in the sector. If you look at nursing, they have been doing it for years already, but they never complain. We didn't have similar systems for EHOs."

However, there was a clear acknowledgement at the local level of the need to move toward an action-led data collection system. It would appear, then, that historic conflicts between the national and local level over data collection are prejudicing the current relationship and, particularly, responses of the LAs to proposals from the national level. The author found that in most areas relating to data collection and processing, similar positions were expressed at the local and national levels. This implies that resistance to data collection could be minimized and the working relations between the local, provincial and national levels improved if communication between the levels was better and if historic disagreements were put aside.

- **Feedback mechanisms:**
  According to EHOs in the field, approximately one morning per month is spent transferring data from their daily diaries to the monthly charts, which are then collated by the Statistics Department at the Head Office. This was seen as a necessary and important process, even though some of the data items collected are not seen as that useful. Although timeous feedback was received from the local head office, there were complaints of very little feedback on data submitted to the national level.

  One of the responses received from national level was as follows:

  "I really don't like any remarks if a person tells me: listen I'll submit this form and now I am sitting back and waiting for something to happen. I mean there is no way that we at national level can do a local authority analysis at this detail. They have the information themselves and can do it themselves."

  It should also be stated that the formal reports produced by the local head offices for the field offices are not very accessible, particularly for local councillors to whom these reports are submitted on a monthly basis. Most of these monthly reports consist of tallies of visits done, inspections made, food sampled etc. (see sample form in Appendix 8). Medical terms are not explained in the report, neither are comparisons made with activities of the previous months. This probably makes it difficult for the councillors to assess whether the EH department under its jurisdiction is performing adequately. It would be impossible, from the information given, to assess whether the services rendered in a particular community are having any impact on health status.

2.5 Intersectoral action: case studies and comments

A case study of intersectoral action is shown below:

BOX 1: CASE STUDY OF INTERSECTORAL COLLABORATION

An EHO working for a local authority reported, recently, that a local businessman had made an application to the local authority for the establishment of a refuse recycling depot in a residential area. The businessman followed all the correct channels and the application was approved. The application was not, however, passed by the local authority to the EH department for comment before the business was started. Numerous complaints were then received by the EHOs and, on investigation, they found that the recycling depot posed a health risk. They then had to issue instructions to the owner to undertake certain modifications. This situation could have been prevented had the EH department been consulted before the business was established. This shows that a lack of liaison between different departments can have repercussions. This is where interdepartmental co-operation is important and this is dependent on departments being aware of the functions of other departments. The EHO concerned then commented:

"Where shortcomings are identified we link with and co-operate with them e.g. the housing departments. It depends to a large extent on the guys in the particular area - you either hit it off with the people in the other departments or you don't. . But even if you don't you mustn't let your job suffer because of that .... where a problem has been identified it has to be addressed. Co-operation is quite good in most areas."

Despite this example, the general consensus appeared to be that a good working relationship existed between the EH and other sectors in most areas at both the local and national levels. Collaboration is structured partly through formal committees and partly through personal contacts in the relevant departments. A manager at the national level reported that, for example, close links have been developed with the Department of Water Affairs to share data on water, particularly on water quality. The EH department withdraws the water quality data from its local reports into a separate programme that meets the requirements of the Water Department. They have also produced a standardised document for completion by field EHOs. This is sent to the provincial office and then on to the national level. The information is being used to establish a national database on water quality which will be used in developing water quality norms. It is likely that these collaborative efforts will be facilitated through the RDP programme operating at different levels of government.

2.6 Reforming the EH sector in Cape Town:

The following points were agreed as being important for the reform of the EH sector in Cape Town:

- The need to develop a rigorous consensus set of EH indicators for the city. These should be quantifiable and related to programme targets or objectives.
- There needs to be emphasis on the quality of data presentation to improve accessibility at all levels.
- An emphasis on quality needs to be built into the whole system of environmental health.
- Emphasis needs to placed on feedback in the system between communities and EHOs and between different levels of management structures at the local, provincial and national level

- There needs to be strong emphasis on re-education of EH personnel and the dissemination of new ideas and ways of management in the sector. There has to be a very pro-active approach to this, and, to some extent, the success of the other reforms mentioned above will be dependent on the success of the re-education programmes instituted.

2.7 Progress in developing Environmental Health Indicators for Cape Town

The process of developing EHIs for Cape Town will extend beyond the timeframe of this phase of the HEADLAMP project. A number of processes are currently underway, and these are outlined in this section.

- **Setting up an EHI Task Group for Cape Town:**
  It was agreed by stakeholders (services and academic institutions) that a task group should be set up to develop and test a set of EHIs, for use in planning and management in Cape Town. Specifically, this task group will:
  - review the environmental health data collection items and format used by each local authority.
  - discuss how and for what purpose EHIs will be used at different levels of the services in the metro.
  - implement a pilot study to examine the usefulness of indicators in improving decision-making for environmental health.

  Although the Task Group does not have a mandate to become directly involved in the debates between the national and provincial health authorities regarding EH information systems (see section 2.4), the Task Group will be able to:
  - develop and test a set of EHIs in Cape Town and to then use this experience to make recommendations on the use and usefulness of EHIs for decision-making.
  - inform the national level of the HEADLAMP initiative in Cape Town and how this might provide useful information for the development and use of EHIs at the local level both in Cape Town and elsewhere.

- **Sources of Data:**
  The EHI Task Group will use data available at the local level as the reliability and validity of this data is easier to investigate than that of data available at the national level. Also, it is likely that the differences between information systems at the local level are far fewer than the differences between the local and national levels as smaller local authorities in the Cape Town areas have tended to use the same systems as the larger authorities. The systems used by the different local authorities need to be assessed in terms of what data is collected, how it is analysed, how it is presented and what the information is then used for. This will be one of the functions of the Task Group.

  In addition, the following points are important with regard to data sources:
  - Data that is linked to specific disease processes or is easily quantifiable tends to be more accurately collected e.g. data on the mass of condemned foodstuffs which have been destroyed. Items such as the number of

routine house or shop visits are less likely to be accurately recalled and captured.
- Currently, monitoring and reporting is focused on the formal sector e.g. shops, factories while the informal sector is somewhat neglected, despite posing certain EH risks.

- **Involving environmental health officers on the ground:**
  The Task Group decided that, rather than continuing to review the existing documentation on EH data collection, it would be more useful to take the discussion regarding the validity and reliability of routinely collected EH data to EHOs on the ground. A number of important questions were identified regarding each currently collected item of routine data:
  - is there raw data (e.g. in the form of site reports) available on this issue?
  - how accurate is the available data?
  - how useful is this routinely collected data to EHOs working on the ground?
  - is there useful feedback and / or follow-up on routinely collected and submitted data?

  It was decided that these questions would be addressed through a series of small group discussions with EHOs in each municipality. These discussions will be facilitated by members of the Task Group.

2.8 Summary:

- Large volumes of data are currently collected on different aspects of EH in Cape Town, but this data focuses on workload (outputs) rather than on improvements in EH conditions (outcomes) or the effectiveness or quality of the service.
- Data collection is generally not related to specific programme objectives. Much of the EH data is collected due to legislative requirements.
- There is resistance at the local level to collecting data required by the national EH department.
- EH services in the city need to shift towards addressing the priority needs of historically underserved areas.
- Consensus needs to be reached on data collection priorities for the city which relate to the provision of basic services.
- Feedback mechanisms need to be improved so that useful information reaches the appropriate levels, including the local communities.
- An EHI Task Group has been constituted in Cape Town to develop and test EHIs for use in management and planning in the city.

SECTION 3. APPLICATION OF THE METHODS PROPOSED IN THE HEADLAMP REPORT

3.1 Current use of data linkage in Cape Town:

Data on health and environmental conditions are not routinely linked by local authority health and environmental health departments. There are a number of reasons for this:

- valid and complete information on environmental conditions has not, until recently, been available for many areas of the city, particularly low-income, informal settlements[20]. Most of the data collected by EH departments relates to workload and not to prevailing environmental conditions.
- health services have focused primarily on curative, hospital-based care and not on the provision of basic services which are the responsibility of other sectors. Linking data on health and environmental conditions was therefore not seen as a priority.
- health service planning and resource use has not been based on an systematic evaluation of the major causes of ill-health in the city followed by an assessment of effective interventions and the setting of programme objectives. Planning has rather focused on maintaining existing (curative) facilities. This has meant that planners had no need to link health status to environmental conditions.
- there is very little data available on morbidity, apart from the incidence of notifiable diseases and various adhoc surveys. Health services do not routinely collect data on diagnoses or outcomes.
- there are many problems regarding the analysis of mortality data for the city, as outlined earlier.

The following section examines any current use of data linkage for the environmental health problems identified in section 1 and makes comments on the feasibility of data linkage where none currently exists. It should be noted that most linkage analyses to date have been research studies. These have generally not had direct service implications and have not fed into the decision-making process for EH.

- **water:**
  An extensive database on births (including birth defects) and deaths, and morbidity from general practice in Cape Town was set up by the University of Cape Town in 1987 for use in the epidemiological surveillance of the health effects of potential changes in drinking water quality in the area. The aim of the monitoring system was to detect any changes in mortality patterns, birth defect rates and morbidity with the introduction of recycled water into the drinking water system of the city. This database, apart from surveillance of birth defects, has not been maintained as the plan to introduce recycled water was not carried out and it was also felt that the maintenance of such a database was the responsibility of the Department of Health. In terms of data linkage, the project undertook investigations into the effect of hardness of water on coronary heart disease in South Africa and into the effect of trilomethane levels on carcinoma rates (Bourne et al 1987; Bourne et al 1990). The

[20] As mentioned earlier, a baseline study of the availability of basic facilities and services in the Cape Town metro area has been completed and the results of this survey should be available within the next 2 months.

study did not, however, examine the extent to which intra-urban variations in mortality could be explained by differences in access to a safe household water supply. Importantly, the study did show that, despite the limitations in the quality and completeness of births and deaths data for the city, useful epidemiological surveillance and ecological analysis can be undertaken.

- **housing**
  A study of the links between housing conditions and health is currently ongoing in the National Urbanisation and Health Research Programme of the Medical Research Council of South Africa. Results of the study are not yet available.

- **sanitation and refuse removal**
  The author is not aware of any linkage studies on health and sanitation and refuse data in Cape Town.

electricity

A recently completed study examined the interface between energy, development and public health in South Africa (Electrification and Health 1995). Details of the findings have already been outlined. The study quantified the health benefits of electrification, both in terms of population morbidity and mortality and in terms of costs associated with the treatment of energy-related illness and injury. The study used the risk assessment method to establish the population attributable risk for energy related ill health in South Africa. The relative risk of disease for those exposed to the risk factors examined in the study (e.g. indoor air pollution, burns and paraffin poisoning) compared to those not exposed was derived from both local and international ecological and cross-sectional studies. The population prevalence of the diseases studied was derived from analysis of mortality records in South Africa and findings elsewhere.

The study also showed that electrification cannot be separated from other development issues, particularly water supply, housing, education and health care for a number of reasons. Amongst these reasons was the fact that electricity uptake has been shown to be extremely poor in areas with an inadequate water supply and the fact that poorly insulated homes are energy inefficient. This, in turn, forces supplementary electricity generation.

Comments:

* The study provides an extremely useful analysis of the health and economic benefits of electrification. The researchers have reported that the national electricity supply commission are examining the policy implications of the study (Lerer - personal communication).
* The study does not appear to examine in detail the limitations of the data used for deriving population attributable risks.
* The risk assessment method is not useful for explaining variations in mortality at the local level.

Feasibility of data linkage:

* Approximately 250 000 households are being electrified in South Africa annually, most of these being informal settlements. As this electrification programme is incremental, the opportunity exists to perform a 'natural

experiment' in the form of a community (randomised) trial of the effects of household electrification on mortality (and morbidity). The feasibility of such a study needs to be explored in Cape Town.

* Data on the percentage of electrified households in the metro is not routinely collected in the health sector. Links need to be made with the Department of Energy and the Electricity Supply Commission to facilitate data sharing. This data could then be included in an index of socio-environmental deprivation for an ecological analysis of the determinants of mortality in the city.

- **air pollution**
  Air pollution appears to be receiving increasing attention in Cape Town. Specifically the Cape Town Brown Haze Study aims to examine the health impacts of brown haze and to propose control strategies. Most of the existing information on the health effects of air pollution, both indoor and atmospheric, is based on cross-sectional studies (see Von Schimding et al 1991, for example). As mentioned earlier, these studies have shown that the fuel used by the household has a large impact on the presence of acute respiratory symptoms in children. The impact of indoor air pollution would appear to be more important than atmospheric air pollution in areas where fuels other than electricity are used in poorly ventilated homes. Few studies on respiratory illness in children or adults have, however, measured indoor air pollution using valid and reliable methods (Ravenscroft - personal communication).

  Feasibility of data linkage:

  * Measuring indoor (and atmospheric) air pollution requires sophisticated equipment and training if valid and reliable results are to be obtained. This is probably not feasible in Cape Town at this time.

- **specific health issues**:
  Studies of problems such as lead levels in children (Von Schimding et al 1991; Deveaux et al 1986) and diarrhoeal disease (Vundule 1994) have been undertaken in the city. These studies do not generally relate data spatially across the city to create differentials in exposure and outcome for the factors of interest.

- **studies examining geographic variations in mortality:**
  Geographic variations in infant and childhood mortality in relation to socio-economic variables such as mean head of household income, housing density, levels of education, levels of unemployment etc. (Rip et al 1986; Pick et al 1994; Bachmann et al 1994- see section 1 above). No published studies were found linking all cause mortality for adults to socio-environmental variables in Cape Town. Furthermore, the environmental variables used in the studies reviewed were very limited (e.g. housing density) and possibly do not capture those factors which have the greatest impact on health, such as access to water and sanitation.

3.2 Feasibility of data linkage for environmental health in Cape Town:

Detailed comments on the feasibility of linkage for specific environmental health problems are outlined above. In this section, more general comments on the process of achieving data linkage are made:

- **denominator data**
  The problems of developing an accurate demographic estimate for Cape Town have already been discussed. Until the results of the 1996 census become available (in 1998), the population estimates of various agencies could be used. To undertake an ecological analysis of the determinants of mortality at suburb level, population estimates for these smaller areas also need to be developed. Ideally, the population of Cape Town, as counted in census 1991 and adjusted for undercount, should be divided into race groups and each group 'grown' according to the national annual population growth rate for that group. The estimated population could then be distributed across suburbs, or enumerator sub-districts (ESDs), using the original suburban distribution of 1991 as a weighting. Alternatively the same process could be undertaken separately for each suburb. Inaccuracies in estimation become more serious at the suburb level, however, where smaller numbers are involved and where extensive migration of population may have occurred (Bradshaw et al 1995; van Schalkwyk - undated). Population estimates currently used by the health sector in Cape Town give estimates only down to suburb or health district (this may consist of several suburbs) level. Estimates for ESDs are not available from this source.

- **mortality and morbidity data**
  Ecological studies and those using GIS require mortality and morbidity data that can be geolocated, preferably by residential address. Mortality data collected by local authorities in Cape Town is geolocated by residential address and this should facilitate any study investigating patterns and determinants of mortality in the city. Morbidity data, such as notifications of infectious diseases, are generally geolocated by health district. Morbidity rates can therefore be calculated for health districts, but not for ESDs. This becomes problematic when undertaking an ecological analysis of the factors affecting variations in rates where the exposure data is available by ESD and the various ESDs forming a district have very different levels of exposure. The question then is how to determine the levels of exposure at district level. This may involve a complex process of weighting the data. This particular problem was experienced in a recent study of the variation in TB notification rates across Cape Town (du Toit - personal communication; du Toit. 1995). GIS may be of use in dealing with this issue.

- **exposure data**
  There are a number of problems with the existing sources of exposure data, from both the census 1991 and adhoc surveys. However, with the completion of the Basic Facilities Survey in Cape Town, detailed and up-to-date data by suburb on environmental conditions will soon become available. This dataset is crucial to undertaking any study of determinants of variations in mortality or morbidity and will be made available to the author in an electronic format (SAS).

- **'natural experiments'**
  As mentioned earlier, the fact that many formal and informal settlements in Cape Town are undergoing development with the installation of paved roads, flush toilets, formal housing and electricity, allows for 'natural experiments', in the form of community trials, to be undertaken. This is a unique opportunity for study of the health impacts of environmental changes, but requires that development planners

and researchers work closely in managing interventions. This has not been the case in the past.

- **service involvement**

In section 2 of the report, the existing process of decision-making using environmental health data was outlined. Managers and fieldworkers in EH services in the city identified the following needs:

* increased linkage of health and environmental data
* information on the effectiveness of interventions undertaken by EH services, both in terms of international experience, and in the field
* information on the quality of services offered
* improved feedback of information to data collectors, communities and LAs
* greater involvement of EHOs at the field level in decision-making process for EH in their area
* increased collaboration with other sectors. EHOs were seen by some as development officers rather than inspectors.

In general, both managers and field staff were enthusiastic regarding both the feasibility and usefulness of data linkage for EH in Cape Town.

3.3 Identification of field-based examples for use in the HEADLAMP training manual

du Toit, C. 'A GIS based project looking at tuberculosis differentials within the Cape Metropolitan area using the latest existing data'. Unpublished Honours Thesis. Department of Environmental and Geographical Science. University of Cape Town. September 1995.

Aims:

* to create a product which shows tuberculosis differentials in relation to socio-economic and environmental variables within the Cape Metropolitan area.
* to make the results available to assist in the allocation of resources, within the Government of National Unity's new Reconstruction and Development Programme, in an attempt to decrease rates of tuberculosis within the Cape Metropolitan Area.

Objectives:

* to utilise the latest data available of tuberculosis notification numbers for each health district (1994)
* to compare tuberculosis rates with socio-economic and environmental variables for each health district
* to combine health data from different organisations in order to map the TB rates for the entire Cape Metropolitan area
* to carry out spatial analysis using GIS packages
* to show how this information could be used for resource allocations

Methods:

* data on TB notifications and the population for each health district was acquired from the relevant LAs, and TB notification rates calculated for each health district
* socio-economic and environmental data was acquired by suburb for the 1991 census
* a coverage map of the Cape Metropolitan area was acquired from a GIS package at the CCC
* analysis of the data was undertaken using ARCINFO and ARCVIEW
* identification numbers for each health district in the metro area were given to the coverage. Data files on TB notification rates, socio-economic and environmental variables were joined so that data could be mapped onto the coverage of the metro area
* since the component suburbs of each health district had varied population numbers, socio-economic and environmental data could not be directly summed and averaged to its respective health district. Weighted averages were calculated according to the ratio of suburb population (from the 1991 census) to total health district population (from the LAs)
* ARCVIEW was utilised to identify trends between TB rates and the chosen variables

Results:

* large differentials in TB notification rates were found across the health districts of the metro area
* as the overcrowding percentage for an area increases, there is an associated increase in TB notification rates
* a positive relationship was observed between areas with high TB rates and areas with high levels of unemployment
* no relationship was found between TB rates and the percentage of flats and cluster houses in a health district

Limitations:

* it would be more useful and accurate to user smaller study units, but TB data is not available at this level
* as census data is not reported by health districts, this data needs to be aggregated, using weighted averages, to make comparisons between districts. Some degree of accuracy and information is always lost in the process
* boundaries of the different LAs and health districts are not always clear to the researcher. Also the boundaries of the 1991 census and the health districts do not coincide accurately
* population projections for the health districts may be accurate. They are, however, likely to be overestimates, with the real rate of TB notifications therefore being higher than reported here

The study above is a good example of the use of routinely collected data to examine, using GIS methods, differentials in infectious disease across a city and their relationship to socio-environmental variables. As the study has just been completed, it is impossible to comment on the usefulness of the results for EH decision-makers. However the results are likely to be useful in a number of ways:

* TB differentials across the city are clearly displayed and can therefore be easily fed back to lay persons at the community council level and to health personnel
* the differentials indicate areas in the city that require attention with regard to TB control programmes

the relationships shown between TB notifications and socio-environmental conditions could be used to motivate for the need for more research related to environmental conditions

SECTION 4. FIELD TESTS OF THE PROPOSED SET OF EHIs FOR DECISION-MAKING

TABLE: MATRIX OF SELECTED ENVIRONMENTAL HEALTH INDICATORS AND SUSTAINABLE DEVELOPMENT INDICATORS RELATED TO HEALTH

INDICATORS	IN USE Yes/No	EASY TO COLLECT Yes/No	MAJOR EFFORT TO COLLECT Yes/No
Life expectancy at birth	NO	NO	YES
Infant mortality rate (per 1000 live births)	+- YES	YES	NO
Childhood mortality rate	+- YES	YES	NO
Maternal mortality rate (per 1000 live births)	YES	YES	NO
Potential Years of Life Lost (by cause)	NO	+- YES	NO
Percentage of population with access to sufficient quantity of safe drinking water	+- YES	YES	NO
Percentage of the population with access to hygienic excreta disposal facilities	+- YES	YES	NO
Percentage of people served by public garbage removal service	NO	YES	NO
Percentage of people exposed to high concentrations of health damaging air pollution (outdoor)	NO	NO	YES
Percentage of people exposed to high concentrations of health damaging air pollution (indoors)	NO	NO	YES
Percentage of people without access to adequate food supply	YES	+-YES	NO
Percentage of households electrified	NO	+- YES	NO
Percentage of households with income below the Minimal Living Level	NO	+- YES	NO
Percentage of newborn weighing at least 2500g at birth	YES	YES	NO
Percentage population covered by primary health care	+- YES	+- YES	
Percentage of the eligible population that has been fully immunized according to national immunization policies	YES	YES	NO
Level of female education	NO	+- YES	NO
Incidence of acute enteric infections	NO	NO	YES
Prevalence of intestinal helminths among children (age 2 to 15)	NO	NO	YES
Tuberculosis notification rate (per 10 000 population)	+- YES	YES	NO
Adult literacy rate by gender	YES	+- YES	NO
Percentage Gross National Product spent on health	YES	NO	YES
Percentage of national health expenditure devoted to primary health care, health centres and regional hospitals	+- YES	NO	YES

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APPENDIX 1: List of interviews and focus group discussions

1. Interviews:

- J. Slingers - EHO, Belhar area, Cape Metro Council
- A. Reid - EHO, Belville area, Cape Metro Council
- G. Ravenscroft - Air Pollution Officer, Scientific Services Branch, City of Cape Town
- J. Nel - Deputy Director, Directorate: Environmental Health, Department of Health, Pretoria
- Dr M Tatley - Deputy Chief Director, Health Services, Cape Metro Council
- C. Derry - Lecturer, Department of Public Health, Life Sciences Faculty, Cape Technikon

2. Focus Group Discussions:

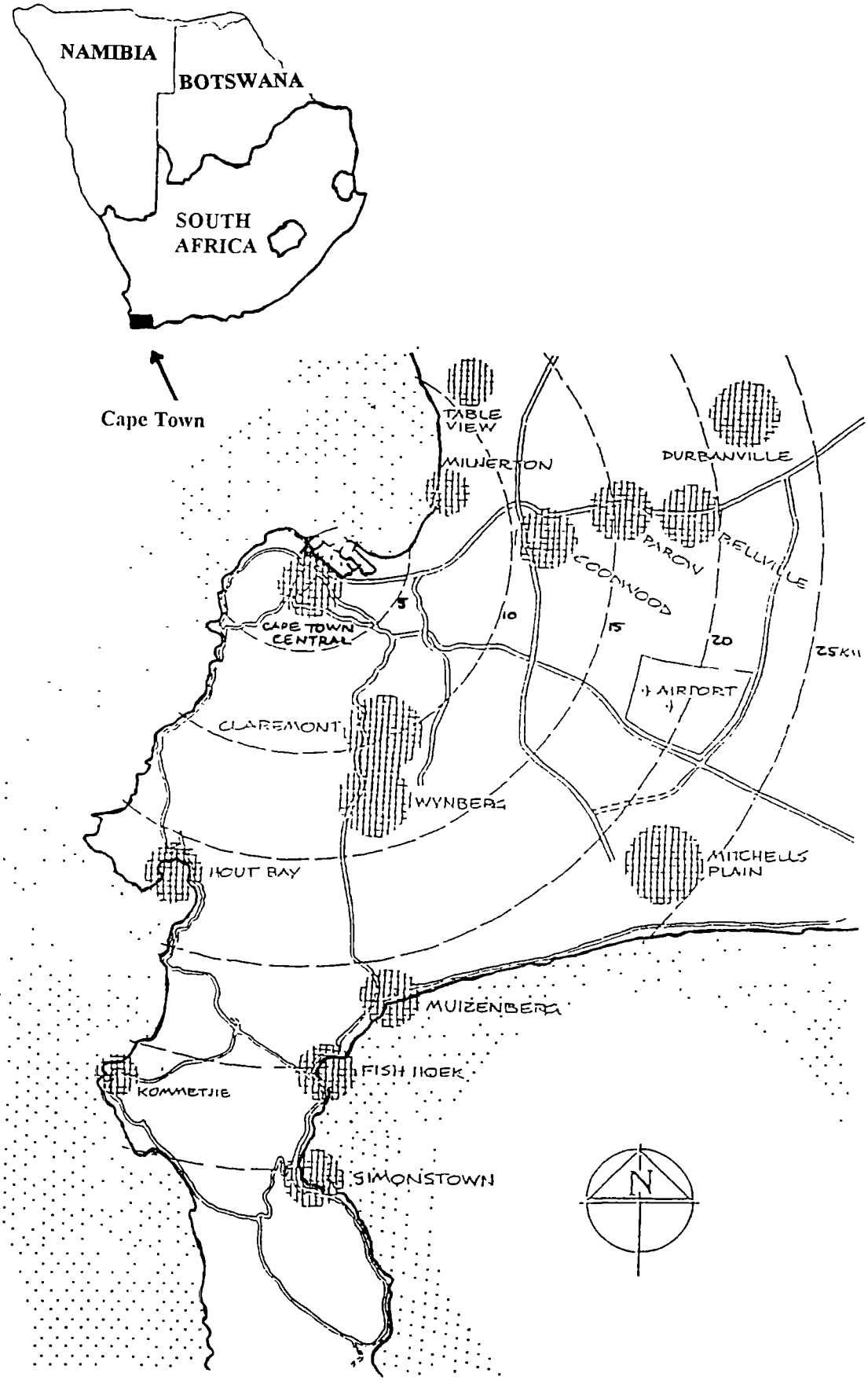
- EHOs - Khayelitsha and Crossroads areas - Cape Metro Council
- senior environmental health managers - Cape Metro Council
- senior environmental health managers - City of Cape Town

APPENDIX 2: List of participants for workshop on Environmental Health Indicators for Cape Town - 6 October 1995

NAME	POSTAL ADDRESS	TELEPHONE NUMBER	FAX NO.
Ian Gildenhuys	CMC P.O. Box 1073 Cape Town 8000	021-725729	021-720698
Chris Derry	Cape Technikon P.O. Box 652 Cape Town 8000	021-4603195	021-4603193
Jeanne Brand	Kraaifontein Municipality P.O. box 25 Kraaifontein	021-9881151	021-9871711
Emmarenthia van Breda	Kraaifontein Municipality P.O. Box 25 Kraaifontein	021-9881151	021-9871711
Edwin September	Kuils River Municipality	021-9033111	021-9038225
John Slingers	14 Rosemary Road Belhar 7490	021-9527640	021-9527648
Nicci Strauss	MRC P.O. Box 19070 Tygerberg 7505	021-9380223	021-9380342
Joe Mokhoele	CMC 38 Wale Street Cape Town 8001	021-347174	
Bertie Leedo	CMC 38 Wale Street Cape Town 8001	021-9388155	021-9388118
J C Volschenk	Brackenfell Municipality P O. Box 35	021-9815571	021-9813485
B.A. September	Strand Municipality P.O Box 3	024-8536333	024-8538197
Simon Goudie	Environmental Advisory Unit UCT Private Bag Rondebosch 7700	021-6502872	021-6503791
Bernie Hesse	Cape Metro Council 38 Wale Street	021-4872708	021-4872560
J F. du Toit	CCC P.O Box 2815 Cape Town 8000	021-4005982	021-211980
R.I Dick	Cape Town City Engineers' Dept. Scientific Services Br P.O. Box 1694 Cape Town	021-6379090	021-6385083

	8000		
W J. Lubbe	CCC P O. Box 2815 Cape Town 8000	021-7621202	021-7628027
J.C Schaffers	CCC P.O. Box 2815 Cape Town 8000	021-6375830	021-6376505
A.P. Muller	CCC P.O. Box 2815 Cape Town 8000	021-4003080	021-211980
J.R. Seager	MRC P.O. Box 19070 Tygerberg 7505	021-9380417	021-9380342
T. Lombard	CMC P.O. Box 1073 Cape Town 8000	021-4872716	021-4872560
Johan Hunter	PAWC Private Bag X19 Bellville 7535	021-211124	021-4185685

APPENDIX 3: MAP OF THE GREATER METROPOLITAN AREA OF THE CITY OF CAPE TOWN, WESTERN CAPE PROVINCE, SOUTH AFRICA



APPENDIX 4: DEATHS, POPULATION AND CRUDE DEATH RATE BY SUBURB - CAPE TOWN 1993 (Sources: Annual Report of the Department of Health Services, Western Cape Regional Services Council 1993; Annual Report of the Medical Officer of Health, City of Cape Town, 1993/94)

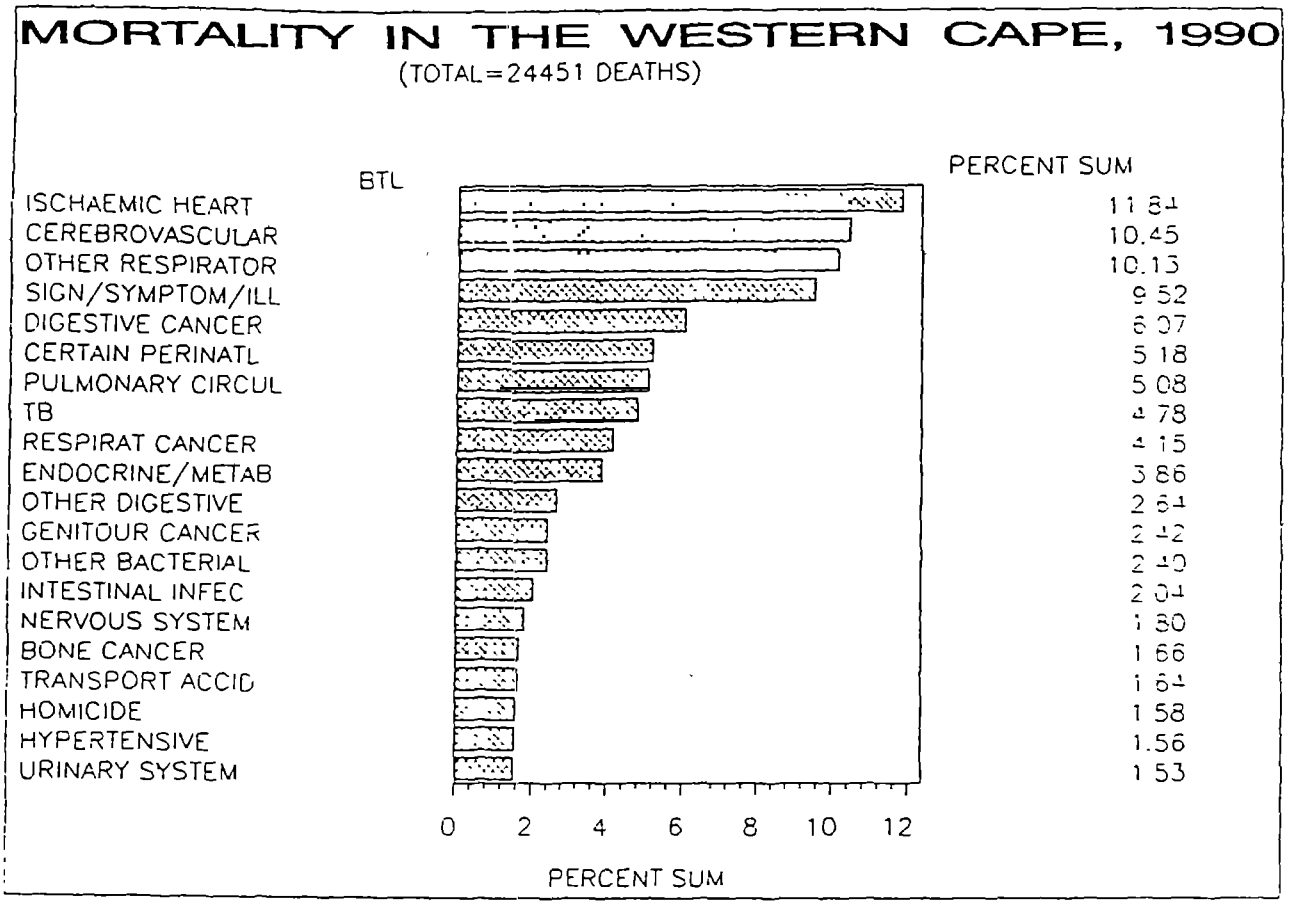
	NO OF DEATHS	POPULATION	CRUDE DEATH RATE
AREA			
Atlantis	137	53310	2.57
Belhar	248	50100	4.95
Bellville	360	109000	3.30
Bishop Lavis	233	33510	6.95
Bloubergstrand	14	1750	8.00
Brown's Farm	70	26400	2.65
Colorado	1	1200	0 83
Constantia	107	22940	4.66
Cravenby	8	4380	1.83
Crossroads	183	43000	4 26
Driftsands	0	2000	0.00
Durbanville	163	26300	6.20
Elsies River	569	81720	6.96
Fish Hoek	151	14300	10 56
Goodwood	278	42520	6 54
Grassy Park	409	57130	7.16
Hout Bay	54	12740	4.24
Hout Bay Harbour	22	4750	4.63
K.T.C.	54	25000	2.16
Kasselvlei			
Khayelitsha Town 1	737	190000	3.88
Khayelitsha Town 2 & 3	310	93500	3.32
Kommetjie	12	2100	5.71
Lansdowne	0	11	0.00
Llundudno	5	930	5 38
Lower Crossroads	0	5000	0 00
Mamre	24	5000	4.80
Mandalay	21	5330	3 94
Matroosfontein	53	5170	10.25
Melkbosstrand	36	5140	7.00
Milnerton	252	53290	4 73
Nooitgedacht		5400	0.00
Noordhoek	25	2390	10.46
Nyanga	545	85000	6.41
Ocean View	80	14880	5.38
Ottery East	11	1630	6.75
Parow	357	49430	7.22
Philedelphia	5	270	18 52
Pinelands	249	11370	21.90
Proteaville	134	?	-
Ravensmead	203	27300	7 44
Rural Central	100	15990	6 25
Rural North	40	14700	2.72
Rural South	0	4340	0.00
Ruyterwacht	57	6480	8.80
Scarborough	1	620	1.61
Simon's Town	41	7110	5.77
Site C	259	52000	4.98
Sunnydale	5	3490	1.43
Uitsig	83	13480	6.16
Weltevreden Valley		6000	0.00
Wetton	0	320	0.00
Zeekoevlei	5	1530	3 27
TOTAL - CMC areas	6711	1301251	5.16

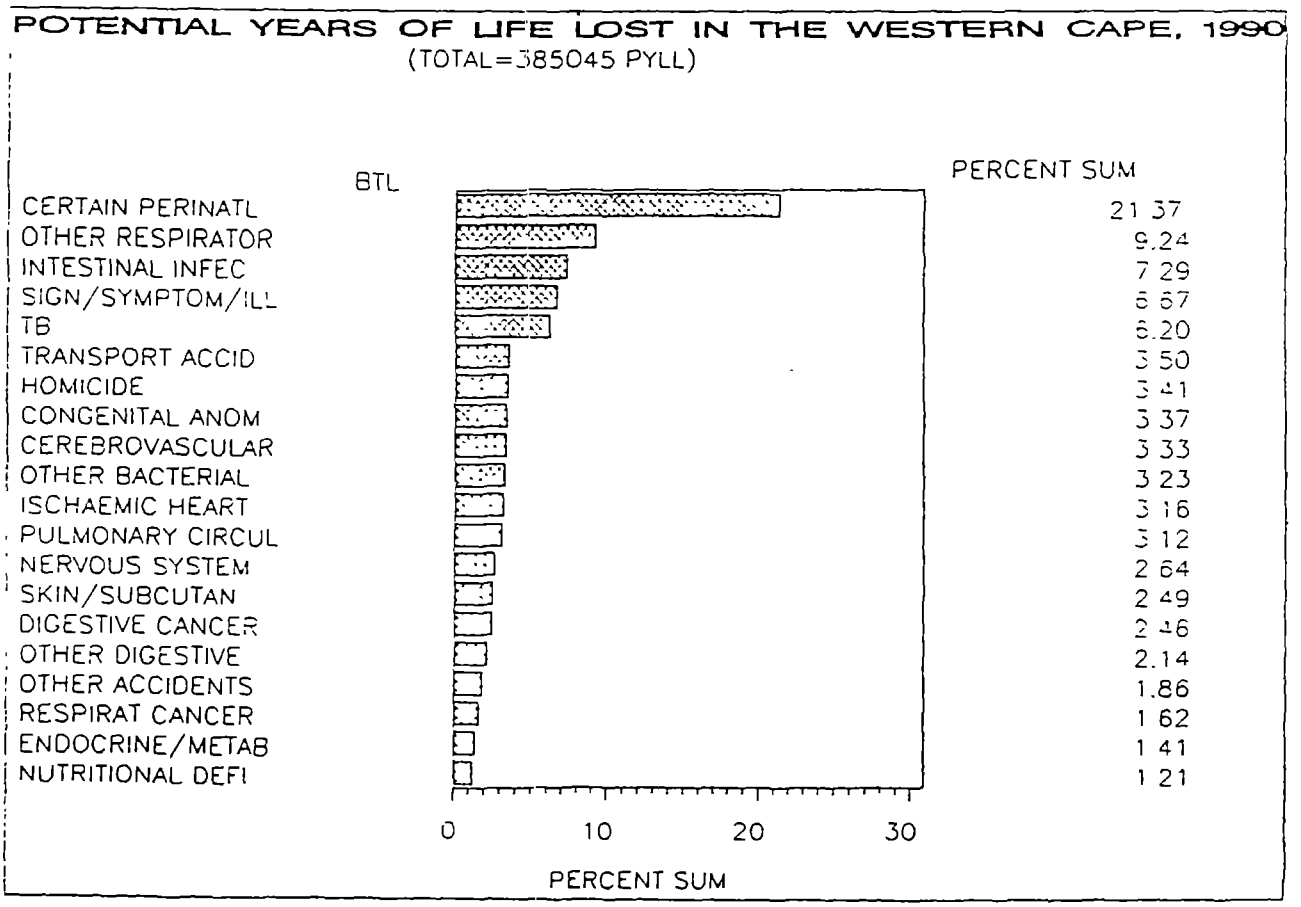
Kensington	221	31412	7.04
Central	370	45295	8.17
Atlantic	353	46555	7.58
Salt river	248	37722	6.57
Maitland	241	32675	7.38
Langa	386	71355	5.41
Wynberg	553	74457	7.43
Retreat	284	46693	6.08
Lavender Hill	124	18930	6.55
Parkwood	119	17667	6.74
Lansdowne	252	40383	6.24
Claremont	502	79464	6.32
Gugelethu	733	124984	5.86
Mulzenberg	124	13877	8.94
Silvertown	641	99697	6.43
Heideveld/Manenberg	524	90863	5.77
Hanover Park	269	36597	7.35
Bonteheuwel	532	84554	6.29
Westridge	163	68147	2.39
Lentgeur	237	58051	4.08
Rocklands	101	42907	2.35
Beacon Valley	281	56790	4.95
Tafelsig	125	30287	4.13
Strandfontein	71	12630	5.62
not stated	108		
TOTAL - CCC areas	7562	1261992	5.99
TOTAL - greater metro	14273	2563243	5.57

APPENDIX 5: Selected causes of death by age group - 1993/94 (Source: Annual Report of the Medical Officer of Health 1993/94. Volume 2. p9)

I.C.D NO.	CAUSE OF DEATH	<1 yr	1-4 yrs	5-14 yrs	15-44 yrs	45-64 yrs	65 plus	Total
002	Typhoid Fever	-		-		-	1	1
004 5 8 9 558 8 8	Dysentery and Gastro Enteritis	11	2		1	1	3	18
011 018	Tuberculosis, Pulmonary	1	1	-	72	78	34	184
010, 012-017	Tuberculosis Other Forms	-	1		4	1	2	8
036	Meningococcal Infections	1	2	1		-	1	5
038	Septicaemia	4	1	-	10	43	76	134
055	Measles	-			-	1	-	1
070	Viral Hepatitis					1	1	2
084	Malaria		-		1		-	1
	Other Infections and parasitic diseases	1		-		1		2
	AIDS	2	-	-	21	10	-	33
140-208	Malignant neoplasms	2	6	7	113	583	669	1380
235-238	Neoplasms of uncertain behaviour				1	-	1	2
250	Diabetes Mellitus	-	-	-	4	47	70	121
251 259	Disease of other endocrine glands		-		1	2	1	4
260-269	Nutritional deficiencies	1			1			2
270-279	Other metabolic and immunity disorders	1	1		2		3	7
280-289	Diseases of blood and blood forming organs			-	-	3	1	4
290-299	Organic psychotic condition			-	-	2	5	7
303	Alcohol dependence syndrome	-		-	2	1	3	6
320-326	Inflammatory disease of the central nervous system	7	-	-	1	6	5	19
330-337	Hereditary and degenerative diseases of the central nervous system			1	2	5	13	21
340-359	Other disorders of central nervous system		1	1	17	10	10	39
393-398	Heart disease Rheumatic			1	6	10	3	20
401-405	Hypertensive disease				1	37	69	107
410-414	Heart disease degenerative				41	288	389	718
415-417	Diseases of pulmonary circulation	1			9	40	56	106
420-429	Heart disease other	3	1	1	28	126	300	462
430-438	Cerebrovascular disease				28	167	342	537
440-448	Diseases of arteries				1	9	24	34
451-458	Diseases of veins and lymphatics, and other diseases of circulatory system		-	-	3	1	3	7
460-465 470-478	Other diseases of respiratory system	1			7	19	27	54
480-486	Pneumonia	27	4	3	28	61	169	290
487	Influenza	-		-	-		1	1
490-491 466	Bronchitis	2	1		1	2	1	7
492	Emphysema			-	3	38	41	80
493	Asthma			1	10	22	16	49
496	Chronic obstructive airways disease				5	47	50	102
531 535	Ulcer of stomach and duodenum		-		2	7	9	18
550-553 560	Intestinal obstruction and hernia						3	3
562-570 572 579 587	Other diseases of digestive system			-	10	27	35	72
571 809	Cirrhosis of liver				7	24	11	42
580-589	Nephritis		2	1	16	62	88	169
590-608	Other diseases of genito-urinary system		-	-		1	3	4
710-719	Arthropathies disorders			-	6	2		8
725-729	Rheumatism excluding the back						2	2
740-759	Congenital anomalies	55	7	2	2			66
760-779	Perinatal mortality	138	1					139
780-796	Symptoms and ill defined conditions	1	-	-	11	20	32	64
797	Senility		-		-		692	692
798-799	Sudden death cause unknown	76	2	1	63	154	155	471
800-807	Railway accidents	-	1	2	33	14	3	53
810-829	Motor vehicle accidents	-	16	26	196 127	67	32	329
870-879	Misadventures to patients during surgical and medical procedures	1		-	4	8	-	13
880-888	Accidental falls	1		-	16	10	5	31
890-899	Accidents caused by fire and flames	3	2	1	47	3	1	57
900-909	Accidents due to natural and environmental factors				-	3	-	3
910	Accidental drowning	-	7	3	11	6	2	29
911	Accidental suffocation	-	-		1	1	3	5
	All other accidents		2		3	2	2	9
950-959 979	Suicide	-		-	58	24	9	91
960-969	Homicide	2	2	20	626 358	66	10	629
970-978	Legal intervention	-		-	3		-	3
980-989 999	Injury undetermined whether accidentally or purposely inflicted	-	-		18	4	-	22
	Other causes	-	-	-	5	3	2	10
	TOTAL	342	82	71	1466	2160	3481	7582

APPENDIX 6: (Source: Bradshaw et al 1995.I)





APPENDIX 7: Draft Guidelines on National EHIs (Source: Draft Guidelines 1995 p.3-5)

INDICATOR	INDICATOR DEFINITION
IN- AND OUTDOOR HOUSING ENVIRONMENT	
THE PERCENTAGE OF THE POPULATION OCCUPYING DWELLINGS WHICH DO NOT CAUSE A HEALTH RISK DUE TO THE EFFECTS OF STORM WATER	THE PERCENTAGE OF THE POPULATION OCCUPYING DWELLINGS NOT SUBJECTED TO FREQUENT FLOODING AND WHERE THERE SEEMS TO BE NO POSSIBILITY FOR STORM WATER TO STAGNATE NEXT TO THE DWELLING OR IN THE CLOSE PROXIMITY OF THE DWELLING
THE PERCENTAGE OF THE POPULATION OCCUPYING DWELLINGS OF WHICH THE IN- AND OUTDOOR ENVIRONMENT IS CLEAN AND NOT CONDUCIVE TO NUISANCES, HEALTH RISKS OR VECTOR ACTIVITIES	THE PERCENTAGE OF THE POPULATION OCCUPYING DWELLINGS WHERE THE INDOOR HYGIENE CONDITIONS DO NOT CREATE A HEALTH RISK OR NUISANCE AND THE OUTDOOR ENVIRONMENT IS FREE OF WEED, RUBBLE, DEBRIS AND VECTOR HABITATIONS
THE PERCENTAGE OF THE POPULATION WITH ACCESS TO HYGIENICALLY HANDLED DOMESTIC FOOD	THE PERCENTAGE OF THE POPULATION OCCUPYING DWELLINGS WHERE FOOD IS STORED IN A SAFE MANNER, BASIC FACILITIES ARE AVAILABLE FOR THE SAFE PREPARATION OF FOOD AND AT LEAST ONE MEMBER OF THE HOUSEHOLD HAS A BASIC KNOWLEDGE OF HYGIENIC FOOD PREPARATION
THE PERCENTAGE OF THE POPULATION WITH ACCESS TO SUFFICIENT ENERGY SOURCES FOR DOMESTIC FOOD PREPARATION	THE PERCENTAGE OF THE POPULATION WITH ACCESS TO SUFFICIENT ENERGY SOURCES WHEN NEEDED FOR THE THOROUGH COOKING OF DOMESTIC FOOD
THE PERCENTAGE OF THE POPULATION UTILIZING ENERGY SOURCES FOR DOMESTIC FOOD PREPARATION WHICH ARE NOT CONTRIBUTING TO INDOOR AIR POLLUTION	THE PERCENTAGE OF THE POPULATION NOT UTILIZING ANY FOSSIL FUEL SOURCES (eg. WOOD, COAL DUNG etc) FOR DOMESTIC FOOD PREPARATION INSIDE THE DWELLING
PERSONAL HYGIENE.	
THE PERCENTAGE OF THE POPULATION WITH ACCESS TO SUITABLE WASHING FACILITIES IN THE DWELLING OR WITHIN A CONVENIENT DISTANCE FROM THE DWELLING	THE PERCENTAGE OF THE POPULATION WITH SUITABLE WASHING FACILITIES FOR PERSONAL HYGIENE AVAILABLE IN THE DWELLING OR WITHIN 50 m FROM THE DWELLING i.e. WASHING FACILITIES WHICH: - COMPRISES OF AT LEAST A BATH OR SHOWER, RENDERS PRIVACY TO THE USER, AND WHERE WATER IS AVAILABLE AT THE FACILITY WHEN NEEDED

INDICATOR	INDICATOR DEFINITION
DOMESTIC DRINKING WATER	
THE PERCENTAGE OF THE POPULATION WITH ACCESS TO ADEQUATE, SAFE DRINKING WATER IN THE DWELLING OR WITHIN A CONVENIENT DISTANCE FROM THE DWELLING	THE PERCENTAGE OF THE POPULATION WITH ACCESS TO - A MINIMUM OF 25 LITRES OF DRINKING WATER PER CAPITA PER DAY WHICH IS - AVAILABLE WHEN NEEDED, - IN THE DWELLING OR WITHIN 200 m FROM THE DWELLING, AND OF A QUALITY FALLING WITHIN THE PARAMETERS OF THE CRITERIA FOR DRINKING WATER (i.e. MICROBIOLOGICAL, BIOLOGICAL, INORGANIC, RADIOACTIVE, ORGANIC AND AESTHETICS AS SET OUT IN THE DRAFT GUIDE WATER QUALITY CRITERIA FOR SA OF THE DEPARTMENT OF HEALTH
DOMESTIC LATRINE FACILITIES	
THE PERCENTAGE OF THE POPULATION WITH ACCESS TO EFFECTIVE LATRINE FACILITIES IN THE DWELLING OR WITHIN A CONVENIENT DISTANCE FROM THE DWELLING	THE PERCENTAGE OF THE POPULATION WITH LATRINE FACILITIES WITHIN THE DWELLING OR WITHIN 50 m FROM THE DWELLING, WHICH IS ACCEPTABLE TO THE USER, PROVIDES PRIVACY TO THE USER, HAS A USER RATIO WHICH WILL ALLOW CONTINUOUS EFFECTIVE FUNCTIONING OF THE FACILITY, - IS EFFECTIVE IN PREVENTING HUMAN, ANIMAL OR VECTOR CONTACT WITH EXCRETA (i.e. WHICH IS HYGIENIC, STRUCTURALLY AND FUNCTIONALLY EFFECTIVE AND OF WHICH EXCRETA REMOVAL/DISPOSAL DOES NOT CAUSE A NUISANCE OR HEALTH-/ ENVIRONMENTAL RISK), AND IS - ACTUALLY BEING USED BY THE HOUSEHOLD
DRINKING WATER & LATRINE FACILITIES	
THE PERCENTAGE OF THE POPULATION WITH ACCESS TO BOTH ADEQUATE, SAFE DRINKING WATER AND EFFECTIVE LATRINE FACILITIES IN THE DWELLING OR WITHIN A CONVENIENT DISTANCE FROM THE DWELLING	SEE EXPLANATORY
DOMESTIC WASTE WATER DISPOSAL	
THE PERCENTAGE OF THE POPULATION OCCUPYING DWELLINGS WITH EFFECTIVE WASTE WATER DISPOSAL SYSTEMS	THE PERCENTAGE OF THE POPULATION OCCUPYING DWELLINGS WHERE DOMESTIC WASTE WATER DERIVED FROM WASTE-UP FACILITIES (i.e. PERSONAL, CLOTHING, DISHES) CAN BE DISPOSED OF IN A MANNER WHICH DOES NOT CAUSE A NUISANCE OR HEALTH/ ENVIRONMENTAL RISK
DOMESTIC REFUSE DISPOSAL	
THE PERCENTAGE OF THE POPULATION WITH EFFECTIVE DOMESTIC REFUSE REMOVAL SYSTEMS	THE PERCENTAGE OF THE POPULATION WITH ACCESS TO A SYSTEM WHERE REFUSE IS DISPOSED OF/REMOVED IN SUCH A WAY THAT NO NUISANCE OR HEALTH/ ENVIRONMENTAL RISK IS CAUSED
HEALTH EDUCATION	

APPENDIX 8: Sample EH data collection form - CMC

H/I _____ MONTH:

AREA:

	NUMBER OF PREMISES	INVESTIGATIONS		FORMAL ACTION
		ROUTINE	COMPLAINTS	
1. FOOD HANDLING PREMISES				
1.1 Accommodation Establishments and Hotels				
1.2 Bakers				
1.3 Butchers				
1.4 Fishmongers				
1.5 Food Factories				
1.6 General Dealer				
1.7 Hawkers				
1.8 Home Industries				
1.9 Markets and Street Stalls				
1.10 Restaurants/Cafes				
1.11 Food Conveying Vehicles				
2. FOOD SAMPLING				
2.1 Chemical				
2.2 Bacteriological				
2.3 Surface Swabs				
3. COMMERCIAL AND INDUSTRIAL PREMISES (NON-FOOD)				
3.1 Hairdressers/Barbers				
3.2 Factories				
3.3 Shops				
3.4 Offensive Trades				
4. BUILDING OPERATIONS AND LAND USE				
4.1 Plans Scrutinised				
4.2 Building Sites				
4.3 Building Completion				
4.4 Artificial Ventilation				
4.5 Sub-divisions and Rezonings				
5. HOUSING				
5.1 Formal Housing				
5.2 Informal Housing and Vagrants				
6. SURFACE SANITATION				
6.1 Disposal Sites				
6.2 Sewage Treatment Works				
6.3 Refuse Removal				
6.4 Dumping and Littering				
6.5 Fouling of Vacant Land				
6.6 On-site Disposal Systems				
6.7 Blockages				
6.8 Effluent Sampling				

	NUMBER OF PREMISES	INVESTIGATIONS		FORMAL ACTION
		ROUTINE	COMPLAINTS	
7. WATER SUPPLIES				
7.1 Samples Domestic				
7.2 General Investigations				
8. PUBLIC AMENITIES				
8.1 Camping and Recreation Grounds				
8.2 Toilets and Ablution Facilities				
8.3 Railway Stations and Bus Termini				
8.4 Samples Recreational Waters				
8.5 Creches and Schools				
8.6 Homes for the Aged				
9. ANIMAL KEEPING				
9.1 Domestic Animals				
9.2 Horses				
9.3 Poultry Domestic				
9.4 Pigeons and Other Birds				
9.5 Dairy Farms				
9.6 Poultry Farms				
9.7 Pig Farms				
9.8 Feedlots				
9.9 Other (Specify)				
10. VECTOR CONTROL				
10.1 Bedbugs				
10.2 Cockroaches				
10.3 Flies				
10.4 Mosquitoes				
10.5 Rodents				
10.6 Other				
11. POLLUTION CONTROL				
11.1 Smoke				
11.2 Dust				
11.3 Odours				
11.4 Water				
11.5 Noise				
12. NOTIFIABLE CONDITIONS				
13. FOODSTUFFS CONDEMNED				
14. KILOMETRES TRAVELLED				
15. COMMENTS				

COMPLETED BY: (PRINT NAME): _____ DATE: _____

HAD 504(R)