MORBIDITY AND MORTALITY SITUATION IN MAKONGENI ESTATE, THIKA MUNICIPALITY

BY

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This project is submitted in partial fulfillment of the requirements
for the post-graduate diploma in population studies,
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DECLARATION

This project is may original work and has not been presented for a degree/diploma in any other university.

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ABSTRACT

The aim of the study was to investigate morbidity situations in Makongeni Estate in Thika Municipality and also estimate the mortality levels by causes of death and how they compare with the rest of the Municipality. The study was based on data from the Environmental Air Quality Assessment Project undertaken by Kenya Medical Research Institute in collaboration with Kenya Energy and Environmental Organization whose main objective is to establish whether there is an association between air quality and the health problems experienced by the residents of Makongeni Estate in Thika Municipality.

Both primary and secondary data was used in this study. Demographic, socio-economic and morbidity data was obtained through household cross-sectional survey which involved households with under 5 years old children. Mortality data was obtained through review of deaths register for the years 1 995 and 1 996 in the Thika districts' vital statistic registration office. The analytical techniques used included percentage distribution and cross-tabulation using SPSS/PC. Chi-square statistical test was used to assess the level of association.

A total of 1590 households were involved in the cross-sectional household survey. The population size of the selected households was 7,035. The average household size was 4.41 persons with alhandard deviation (SD) of 1.49. The distribution of the population by age was as follows:- 28.2% were under 5 years of age, 13.1% in the 5 - 9 years age group, 6.9% in 10-14 years. The population aged >15 years accounted for 52.8% while those aged > 55 years accounted for 0.27%. The male to female ratio was 1 : 1.12.

Analysis of the households health status indicated that 3867 episodes had been experienced during a period of one month. This yielded an incidence of 524 episodes

of illness per 1,000 person months. The mean recall period was 1 1 A±_ 8.0 days and ranged between 1 and 30 days. Out of the 3687 episodes of illness, respiratory tract illnesses constituted 64.7%, malaria 10%, gastro-intestinal 8.2% and skin diseases 2.4%. A breakdown of the respiratory tract illnesses by type indicated that common colds and coughing were the predominant presentations. The duration of the reported illnesses ranged from 1 day to 30 days. 80.4% reported a duration of 7 days or less. 13.5% reported a duration of 14 days or less while 5.6% had a duration of illness ranging between 1 5 to 30 days.

The age and gender distribution of these illnesses indicated the highest incidence among the under-5-years-old and a broad peak among females in their reproductive age and a narrower peak among males aged between 25 and 34 years. The age distribution by type of illness or affected system affected showed that 32.3% of those ill were under-5-years old and the predominant illnesses were those affecting the respiratory tract.

Review of mortality records for 1995 and 1996 showed significantly higher deaths among the under-5-years-old and those above 55 years of age. With regard to immediate underlying cause of death, diseases of the respiratory tract system and malaria accounted for 37.8% and 40.5% of deaths in Makongeni Estate and the entire Municipality, respectively. 'Excepting trauma, there were no significant differences in the distribution of causes of deaths among Makongeni Estate residents and those of the other parts of the Municipality.

In view of these findings, targeted intervention programmes coupled with a comprehensive primary health care system, would most likely result in much less morbidity and mortality for the population in the Makongeni Estate and the municipality as whole.

CHAPTER 1

INTRODUCTION

1.1 INTRODUCTION

The circumstances under which people die are closely related to the conditions under which they live. Socio-economic, environmental and demographic factors have been found to be strong determinants of population longevity and as such the extent of violence, poverty, passivity and ignorance in a population is reflected in the statistics of its causes and age of death. In general, developed countries enjoy a relatively low mortality than developing countries. Mortality differentials between urban and rural areas are apparent in many developing countries. This differentials is said to reflect the socio-economic disparities between them.

The distribution of causes of morbidity by region reflects the environmental circumstances facilitating transmission. In Kenya example Malaria is the leading cause of morbidity in the coastal belt, lake region and Rift Valley regions while diseases of the respiratory system leads in the relatively high altitudes of central and Eastern provinces. Analysis of the causes of hospitalization at national level revealed that the infectious and parasitic disease were leading with 28% of the total cases reported. Malaria contributed the highest proportion accounting for 62.7% of all the cases under the category (Table 1.1). Other leading categories were complications of pregnancy, childbirth and puerperium accounting for 20.4%, diseases of respiratory system 13.65 and injure and poisoning 6.5% (MOH, 1995).

The leading causes of death among these hospitalizations generally followed the pattern of the in-patient morbidity, with infectious and parasitic diseases predominating. In 1 995 the infectious and parasitic diseases accounted for 29.6% of all deaths reported. Respiratory diseases accounted for 14.2%
(Table 1.1).

Table 1.1. Distribution of in-patients morbidity by major categories, Kenya, 1995

Type of diseases	% contribution of discharges	% contribution of deaths
Infectious and parasitic diseases	28.04	29.60
Disease of the respiratory system	13.63	14.29
Endocrine, nutritional Metabolic and immunity disorders	3.69	12.08
Disease of the blood and blood forming organs	4.33	6.37
Disease of circulatory system	13.63	5.42
Perinatal complications	1.26	4.39
Injury and poisoning	6.51	1.26
Others	28.91	26.59

The total numbers of reported cases were 288,714 and 21,048 for in-patient discharges and deaths respectively. Source: Health Information report, Ministry of Health, 1995.

Other important causes of cT&ath were endocrine nutritional, metabolic diseases and immunity disorders with 12.08%, disease of blood and blood forming organs (6.37%) and disease of circulatory system 5.42%.

The world population policy and programme therefore put alot of emphasis in eradication of diseases as a prime means of increasing life expectancy (ICPD, 1994). To achieve this ultimate goal of population activities calls for better knowledge base

on the morbidity and mortality by causes of death. Morbidity and cause-specific mortality statistics are useful indicators for population standard of living and health problems. This study was designed to investigate the morbidity and causes of mortality in an urban residential area with the view of attempting to document the magnitudes of health problems affecting this community exposed to industrial air pollution. Attempts was made to estimate the immediate socio-economic consequences of these diseases in terms of duration of illness and numbers of days the individual is constrained form performing expected activity due to illness.

1.2 BACKGROUND INFORMATION

Thika is one of the districts in central province. It was calved from Muranga and Kiambu districts in 1994. The population of Thika district is estimated at 437,8642 (CBS, 1996). The district headquarter is in Thika municipality which is located 1°05 North of the Equator, about 40 Km North East of Nairobi. The 1 989 census estimated the population of the municipality at about 57,603 and an annual growth rate of

— y

3.32%. Based on these figures and assuming an exponential growth, the current population size is estimated at about 75,127 people. The municipality has several residential estates. Makongeni is the biggest residential area in Thika municipality. The estate is located about 2 km south-east of the Thika town centre and physically borders Thika Industrial area to the immediate north (Figure 1.1). The estate lies on a flat grounds about 1460^{ft} above sea level.

The estate is composed of 11 phases whose construction stated in 1971. The housing structure consist of single room(s) in blocks, blocks of flats and maisonettes (Figure 1.2). On the basis of the housing structure it seems possible that the residents may fall into three main socio-economic groups. Phases 4 to 8 are basically composed of single rooms in blocks and is mainly occupied by casual workers from the neighboring factories and petty traders operating in the adjacent Mandaraka municipal market. Phases 9 to 1 3 are composed of two bed rooms units and flats, majority of which are occupied by middle income group, namely civil servants, people working in the private sector and some neighboring factories personnel. The third category of the housing structure are the private bungalows found mainly in phases 10 and 13.

According to the 1989 population census, the estate had 7,563 households and a population of 21,554. This accounted for about 37% of the municipality population (CBS, 1989). Based on the overall growth rate of Thika Municipality which was 3.32%, and assuming exponfeTrtial growth, the Estate's current population size was estimated to be 27,193 in 1996.

Out of the 21,554 people, 9,722 were male while 1 1,832 were female (M:F ratio of 1 : 1.22. The population of the under 5 years was 1 6% (3,455). Majority of the residents of Makongeni Estate are in-migrant workers from the neighboring Districts. The 1989 census report gave the number of the economically active population (10 years and over) as 1 1,852.

Education:- Out of the population who had ever been to school (n = 1,667), 31 % had attained upper primary education (Std 5-8). 9.6% of these had left at that level. 49.3% had secondary school education out of which 795 (9.7%) were still in school. The male to female ratio at secondary level of education was 1.6:1. Only 1.9% had post secondary education.

Marital status:- The married population accounted for 54.6% (8,143) of the population aged more than 1 2 years (n = 14,909), while single persons accounted for 43.9%. Separated and widowed accounted for 1.04% and 0.21 % respectively. The ratio of married male to female was 1.5:1.

1.3 STATEMENT OF THE PROBLEM

Mortality remains strikingly high in many developing countries. According to world population data sheet quite a high percentage of these countries have a life expectancy below 60 years. Mortality is especially high in rural areas of these countries where the coverage of public health services is very low. Ironically, little information is available on levels of mortality and on causes of death in most places of Africa, Asia and Latin America. Vital registration is hardly complete and *official* statistics are often unreliable. This lack of information has important population policy implication.

In Kenya, census data indicate that mortality has been on decline since 1962. For example the infant mortality rete decline from 189.2 during the 1 969-79 inter-census period to 140.1 during the 1979-89 inter-census period while the crude death rates declined from 14 in 1969-79 to 10 during 1979-89 inter-census period (CBS, 1996).

Analysis of the available data at national level shows that improvement in the observed declines in infant mortality have been strongly related to malaria control, improved nutrition, provision and availability of heath services including vaccination

and immunization, and the parental care through education and the general improvement in the living conditions of the population (UN, 1 986).

However the 1993 KDHS report indicated that child survival in Kenya has not improved during the last decade. The world population data sheet of 1995 indicated that the crude death rate for Kenya has remained at 12 since mid 1980s and there has been a gradual decline in life expectancy from 58 in 1988 to 56 in 1995. Analysis of the proportionate mortality by causes of death in Kenya shows excess mortality due to infectious and parasitic diseases (UN, 1985).

From the national point of view malaria continue to take the lead in the out-patient and in-patient morbidity statistics. For example, in 1 990 national out-patient records malaria accounted for 25.14% of all the new cases. This was followed by diseases of the respiratory system with 24.36% while skin diseases and diarrhoeal accounted for 8.4% and 4.1 % respectively. A similar morbidity patterns was observed in 1 995 with malaria accounted for 29.4% and respiratory diseases 25.5% (Table 1.2).

Table 1.2 Distribution leading causes of morbidity, Kenya 1990 & 1995

Diseases	1990 Out-patient, %	1995 Out-patient, %
Malaria	^ 25.14	29.4
Respiratory diseases	24.36	25.5
Skin diseases	8.40	7.9
Diarrhoeal	4.10	4.3
Intestinal worms	4.3	4.3
Others	33.7	24.5

Source:- Health Information System, Ministry of Health, 1995

The reduction of the overall mortality rates in any given country can be met when disease and others causes of death are precisely understood and direct intervention

measures developed and implemented. This study was geared toward this end. The study aimed at investigating the morbidity patterns and causes of death in Makongeni Estate in Thika Municipality.

For over half decade now there has been public outcries in Thika Municipality, and mostly from residents of Makongeni Estate due to exposure to toxic industrial emissions. Among the health problems reported are respiratory related diseases including cough (general) and chronic cough, skin diseases and stress related problems. A retrospective study of out-patient records in Thika district hospital for the second and third quarters of 1991 indicated that 25% and 8.5% of all patients were managed for respiratory and dermatological disorders respectively (MOH, 1 992)

Though provincial and districts hospital morbidity estimates shows a similar patterns, no household morbidity survey have been carried out in the estate to describe characteristics of morbid events that are common in the community neither have mortality by causes of death been estimated. It is therefore important to ascertain the prevalence of this ill-health claims by the residents of Makongeni Estate and also estimate mortality levels and causes of mortality at the community level with a view to facilitate formulation of health policies and strategies to improve the health status of residents.

1.4 OBJECTIVES

1.4.1 General objective

The aim of the study was to investigate morbidity and mortality situations in Makongeni Estate in Thika Municipality. In addition to the above, the study also attempted to estimate the mortality levels in Makongeni by causes of death and how they compare with the rest of the municipality.

1.4.2 Specific Objectives:-

1. To describe the size, composition, residential status and socio-economic characteristics of the study population.

2. To describe the characteristics of morbidities that are common in the community.

3. To estimate the immediate consequences reported illnesses.

4. Estimate the mortality levels and causes of death by age and sex in the estate and the municipality using the vital registration data.

1.5 JUSTIFICATION

The improvements of health and the reduction of mortality is a central goal in development since a long and healthy life is the most obvious determinant of an individual's potentiality. It also facilitates other aspects of development because ill-health and volatile mortality at younger age disrupt all other development activities. High levels of morbidity underlie low work inputs, limited planning horizons and many other characteristics usually described under the rubric of under-development. As such, appropriate policy measures for lowering morbidity and consequently mortality need to be developed and implemented in order to improve life expectancy.

The principle use of morbidity and mortality statistic is description and investigation of patterns of occurrence and of the use of medical care, to the end that available resources may be most effectively directed towards the maintenance and promotion of public health. Morbidity and mortality estimates are used as indicators for the health status of any given population.

High morbidity rates implies high costs of treatments which are a burden on individual as well as on the nation. In addition to treatment costs, high morbidity have a greater economic impact since its affects productivity of working population by reducing the strength and ability to concentrate. High frequency of illness among the school going population leads to loose of learning opportunities hence reducing the expected pay-off from education investment.

Morbidity and mortality have been known to vary with age (KDHS, 1993), the most vulnerable group being the children under 5 years of age. Morbidity and mortality have also been found to vary with individual occupation, income and social class and their incidence can reveal much about population's standard of living and health care service (UN, 1986). Morbidity and mortality estimates are therefore useful in identifying populations that are at high risk and designing programs that would improve the health status of various subgroups within the population.

Little information is available on morbidity and the levels mortality by causes of death in most part of Africa, Asia and Latin America (Snow, 1992). Neither are the immediate social and economic consequences of these morbid events clearly understood. This lack of adequate information has a negative implication on population policy formulation and implementation. Based on these observations, ways of improving knowledge on the health status of people in low income countries seem to be an important research issue.

It is hoped that the study will generate information useful for local health care planning and management of illness and to greater extent to the ministry of health whose current programs are directed towards identifying and overcoming major health problems and subsequently reducing mortality.

1.6 STUDY LIMITATIONS

The cross-sectional design of this study could not establish the association between reported (self-perceived) ill-health of the residents and their environment. Although exposure to pollutants spewed by a number of factories in Thika is likely to have on effect to health of residents living near these factories, a longitudinal study design would be required to establish this association.

In addition, although the socio-economic implications of illness are diverse, this study only focused on the duration of illness as a measure of the time cost. The monetary cost, though it constitute an important economic implication of ill-health, does beyond the scope this study.

CHAPTER 2

LITERATURE REVIEW AND STUDY MODELS

2.1 LITERATURE REVIEW

The mortality rate of a population as a whole is a weighted average of the mortality rates of the subgroup within it the weights being the relative size of each subgroup. As a result therefore large differences of risk of death among members of population are related to age (Cairo, 1 982). Historically, the distribution of death by age shows a bimodal pattern, the number and proportion of death being at a peak during infancy and early childhood and declining until the eve of adolescent and low and gradually ascending during the long period of adulthood and then sharply increasing in the older age groups. This main indicator, suggesting the existence of some regulatory rules to which human mortality rigidly adheres, is manifested in the U or J-shaped age-specific mortality curve, present in both sexes and in all population (UN, 1973).

Morbidity, as a leading cause of death, have also been known to vary with age the vulnerable being the children under 5 years of age. Mirzal (1990), in the study of mortality among children in a rural community found that mortality was highest in infancy, accounting for 63% of all deaths with a trend of decreasing mortality with increasing age. The commonest causes of death was Acute Respiratory Infections (Pneumonia and measles) accounting for 49% of the deaths, followed by diarrhoeal illness (8.8%). Only 77% of all children had been taken to the health facility during the fatal illness. Studies have also shown that whereas infectious and parasitic

diseases affect the entire population, those who suffer most from malnutrition are children. Maleday (1983), found both malnutrition and infectious diseases accounted for the bulk of children under 5 years of age.

In a similar study carried out in Machakos, Omondi-Odhiambo (1990), found that infectious diseases and diseases of the respiratory system were the leading causes of death among children below 5 years. Next in prominence were the causes ascribed to congenital anomalies and perinatal conditions. Among adolescents and young adults, injury and poisoning, together with tuberculosis and other infectious and parasitic diseases, were the leading causes of death while degenerative diseases, especially diseases of the circulatory systems, neoplasm and respiratory illness, were responsible for the majority of deaths among the older population.

According to WHO guidelines, causes of death are defined as all those diseases, morbid conditions or injuries which either resulted in or contributed to death and the circumstances of the accident or violence which produced any such injuries. This definition includes all the complex processes experienced by the patient prior to death (WHO, 1975).

In terms of cause s of death, world infectious and parasitic disease bear almost exclusive responsibility for life shortening in developing countries. In a study on causes of mortality, Preston (1 980) found that when the aggregate of infectious and

parasitic diseases were hypothetically eliminated from those life tables and life expectancy was recalculated, this produced life expectancy between 65 to 75 for females, regardless of the population's initial mortality level.

Respiratory infections are the main cause of death among the under 5 years old children in Kenya. For example, 28% of the registered death in 1 977 were ascribed to this cause. Among the in-patient dues to respiratory infection, 90% were ascribed to pneumonia. Gastro-enteritis and dysentery were responsible for about 1 6 % of the deaths among under 5 years children reported by hospitals (UN, 1986). Recent studies in latin America showed that nearly 30% of deaths in the first year of life and 50% in the ages between 1-4 years are directly or indirectly due to malnutrition. Malnutrition remain a major factor underlying the high infant and child mortality in Kenya. Although its not always evident in data on causes of death, severe malnutrition in children is frequently related to increased severity of infectious diseases and to increased case fatality rates for such diseases as measles, pneumonia and diarrhoeal (UN, 1986)7*

Environmental and socio-economic factors have also been known to influence the morbidity and mortality. For example, the under five mortality rates in developing countries show a marked differentials by socio-economic characteristics of the population (DHS, 1989). In Kenya, regional variations in levels of mortality and morbidity has been found. Kenya Demographic and Health Survey, 1 993, described

under five mortality [U5MR] as 96.1 meaning that almost 10 percent of children born in Kenya do not live until their fifth birthday. The survey also showed a marked differentials between urban and rural mortality, ie. 75 and 95 for urban and rural areas respectively (KDHS, 1993). The under 5 mortality in Kenya was estimated at 98.0 for males and 83.3 for females in 1995 (CBS, 1996). Bunyasi, (1984) study on seasonality of deaths in Kenya, revealed that environmental factors were responsible for both regional and seasonal variations in pattern of death.

These variations have been associated with socio-economic status, environmental conditions and socio-cultural factors (Caldwell, 1979, UN, 1986). Study in Brazil showed that within each of the ten geographic areas included in the health survey, the chances of staying alive are strongly influenced by the level of household income (Thomas 1985). Similar findings have been recorded elsewhere. For example, in an extensive collection of International studies on the relationship between socio-class, life expectancy and overall mortality, Antovosky (1 967), came to the conclusion that the poor have consistently higher probabilities of dying at an earlier age than the more privileged groups.

Caldwell (1 981), observed that the education of parents and by far that of the mother has more pronounced effects upon child mortality than does other socio-economic status or residence. In the Kenyan context, education of mothers, which is a powerful determinant of child mortality, has continued to improve. The proportions

of those who have never been to school have continued to decline and are determined by school intake ratios occurring some 1 5-20 years before the women start their childbearing; the proportions going on to secondary school have also continued to increase (CBS, 1996). In addition, housing, as a socio-economic entity, when provided with adequate services such as water, sewage, electricity and related services contributes to security and good health and therefore leads to a decline in mortality (Merrick, 1 985).

Mortality differentials between urban and rural population have been recognized for same time. The pattern is said to reflect existing economic disparities between them, as expressed in general living conditions, including nutrition, housing and medical care; additionally, persons experiencing economic strain or life difficulties have been reported to have increased tobacco and alcohol consumption (Solie, 1992). Urban areas generally contain the largest share of the communities well educated, high income population and better medical facilities.

Persons residing in low income areas or with low family incomes have higher rates of disease prevalence and severity, and are more likely to be admitted to hospital for medical reasons and have higher mortality rates than persons with higher socio-economic status. Several other non-economic explanations of excess health risk among less privileged communities have been sited. This includes health care services, type of medical procedure perceived, and prevalence of behavioral risk

factors (Solie, 1992).

As a result therefore the morbidity and mortality rates which prevail in a population may reflect much about that populations living conditions as well as the society's investment in health and welfare. Mortality differentials among groups within a population can be said to reflect how resources and opportunities for living conditions and returns on health investments are distributed. However, the impact of health services on mortality has always been a doubtful quantity. In Kenya, district level studies have shown remarkably little relationship between the availability of health facilities and the level of mortality (CBS, 1996).

Regional morbidity differentials have been known to exist. Whereas infectious and parasitic diseases bear almost exclusive responsibility for life shortening in developing countries, degenerative diseases like heart disease, stroke, diabetes and cancer are more prevalent in developed countries. This variations is partly due to different dietary and social practices and "partly because smaller proportion of the total population in developing countries survive to late adulthood (UN, 1973).

Based on the 1993 national out-patient morbidity records, Malaria was leading followed by diseases of respiratory system and skin diseases respectively (MOH, 1993). A similar pattern was observed in 1995. In a household health interview Survey in Machakos District, focusing on recent disease symptoms and signs, illness

severity and health seeking behavior, Oranga (1 995), also found that the diseases was dominated by malaria (39.6%); respiratory tract diseases (23.1%); and gastrointestinal illnesses (10.7%).

Little information collected on the impact of morbid events on social and economic activities in developing countries shows that illness disrupts individual normal activities and therefore have a negative impact on individual productivity. Koyugi, (1 980) found that illnesses disrupts normal activities for roughly one-tenths of peoples' time in most developing countries. In another study on the effects of morbidity on productivity of textiles factory workers, Some (1992) found that on average each episode of illness resulted in 2.4 man-days loss in productivity. Of all the episodes of illness, 58.8% were attributable to infective and parasitic diseases, 10.9% to respiratory system disorders and 21.7% to other conditions. Malaria constituted 53.1 % of all episodes of illness, acute respiratory infection 10.9%, physical injuries 5.6%, gastro-enteritis illnesses 3.4% and others conditions 21.7%. For the productive man-days lost, 53.2% were attributable to malaria, 1 2.8% to ARI, 5.7% to physical injuries and 28.3% to other conditions. It was also observed that the pattern of morbidity among factory workers in Kenya is similar to that prevailing in the general population.

In Africa, the paucity of reliable mortality data stems from a lack of comprehensive records of demographic events. Overall childhood mortality is usually estimated by indirect demographic techniques applied retrospectively to census and other survey

data. In Kenya, like other developing countries, vital registration is hardly complete. Mungala (1994), in a comparative study between vital registration and active death surveillance found a marked under-reporting of deaths, particularly childhood deaths, to the civil authorities. In addition, most childhood deaths occurs at home and information on causes of death is not usually available. In some areas, cause-specific mortality has been estimated from data obtained by verbal autopsies (VA). Mirza (1990), using the verbal autopsy to determine causes of death in under 5 years found that recall period up to 29 month after death was found to be reliable.

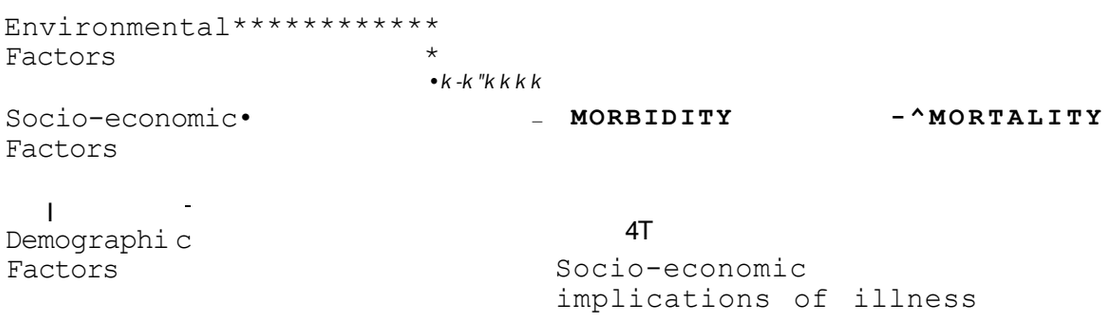
Study on the causes of death have shown that the precision of the cause(s) recorded on death register depends on the place where the death took place and the cause itself. In the case of deaths occurring in the health units, the cause indicated is theoretically more precise, for in the majority of cases it was established on the basis of a doctor's diagnosis. The same is not true for the deaths that takes place at home. Except in cases of deaths resulting from violent and accidents, its the relatives who report the apparent symptoms that results in death. This system lead to errors regarding the real cause.

However, the limitation of the verbal autopsy as a techniques for identifying causes of death has been cited. Snow (1 992), using the verbal autopsy found that common causes of death were detected by'VA with specifities greater than 80%. Sensitivity of VA technique was greater than 75% for measles, neonatal tetanus, malnutrition and trauma related deaths. However malaria, anaemia, acute respiratory tract infection were detected with sensitivities of less than 50%.

2.2 CONCEPTUAL AND OPERATIONAL MODELS

Studies have shown that environmental factors and socio-economic factors are important determinants of morbidity and mortality. Sickness may lead to growth faltering and subsequently death or to mortality directly (Mosley, 1984). Although growth faltering is referred to as malnutrition which is an inference that it is simply a consequence of dietary deficiency. It is also true that growth faltering can be due to other factors including recurrent infections.

2.2.1 Conceptual Model



Source: Mosley & Chen, 1984.

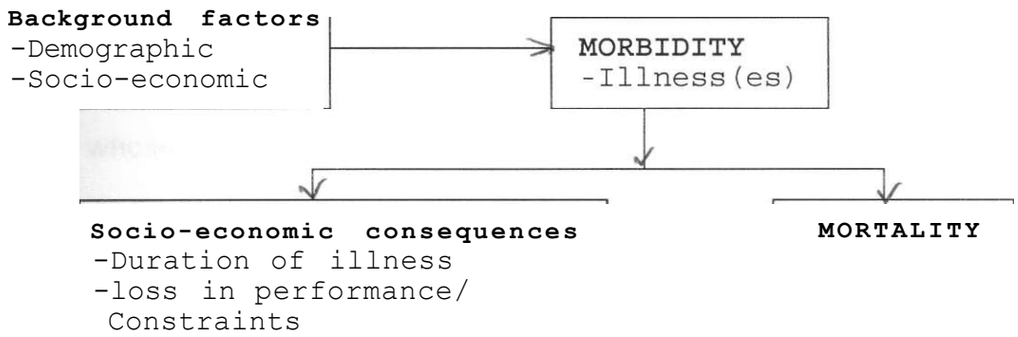
Key:- *** association falls outside the scope of this study

—-> Relationship

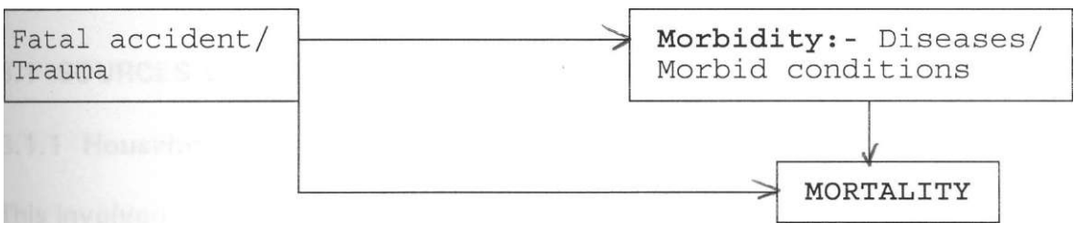
Relationship between background factors namely environmental, demographic and socio-economic factors and morbidity exist.

In addition, high morbidity is associated with high mortality. High morbidity rates have great socio-economic impact. Both opportunity and monetary costs.

2.2.2 Operational Models



Fatal injuries may results to death directly or causes injuries and therefore a morbid conditions which may subsequently lead to death.



Background Variables :-

Demographic - Age and sex characteristics of the study population.

The residential status of the study population (ie. duration of residence).

Socio-economic - Education and occupation
Housing conditions
Marital status

CHAPTER 3

SOURCES OF DATA AND METHODOLOGY

This study was based on data from the on-going environmental quality assessment project whose aim is to establish whether there is an association between air quality and health problems experienced by residents of Makongeni Estate. The demographic, socio-economic and morbidity data was obtained through household interviews using structured questionnaire administered to household mothers in each selected household. The secondary data on mortality by cause for the year 1995 and 1996 was reviewed from registers in the district vital statistic registration office in Thika.

3.1 SOURCES OF DATA

3.1.1 Household cross-sectional survey

This involved interview schedule in every household with an under 5 year old child. The preliminary activity of this component of the study involved recruitment and train of fieldworkers in data collection procedures. This was followed by listing of all households by cluster, head of household and duration of residence. Clustering of the study area was based of housing infra-structure and the geographical location.

The proportion of households with under 5 years children was estimated to be about 25%. However only 73% (1590) of the eligible households were involved in the baseline survey. The average household size was 4.41 persons with a standard deviation (SD) of 1.49.

Interviewers administered questionnaires were administered to all respondents who were mothers in the selected households. The baseline survey recorded information on demographic, socio-economic characteristics and health status of the study population. Demographic variables included age, sex, household size and relationship, residential status and duration of residence. Socio-economic indicators included marital status, literacy and education levels, occupation by job description and employment status, household expenditure and housing infrastructure. The later three variables were used as proxy variables for estimating the income and standard of living of the study population.

Morbidity data was obtained through inquires on the health status of the household members. Illnesses as perceived and reported by the respondent for the last one month, retrospectively, was therefore used as indicator for the health status of the household members. Question relating to the health status of the household members for the period preceding the survey were asked in order to establish the frequency of illness by disease presentation."The question addressed both perceived and observed ill-health in general as reported by the mother. The unit of analysis are individuals. Functional indicator measures were used to assess the time costs.

3.1.2 Mortality record review

The mortality aspect of the study was established through two years retrospective vital record review. This involved review of death register at the district vital statistics

registration office. All death recorded from both the sub-location administrative heads (sub-chief) and health institutions for the years 1995-96 were reviewed. The total number of deaths registered in Thika district in 1 995 and 1 996 were 2988 and 4189 respectively. Out of the total registered deaths in the district, 532 and 563 in 1 995 and 1996 respectively, were from Thika Municipality. Information collected included age and sex of the victim, date of death, place of death, usual residence before death, cause(s) of death and sources of information ie. whether the death was registered in a health institution or by the sub-chiefs for those person who where not under medical supervision at the time of death . In addition, occupation of the deceased person before death, though unreported in majority of the cases, was noted.

Health institution deaths returns indicates cardiac pulmonary failure as the immediate cause of death and the disease or morbid conditions that lead to the cardiac failures as the underlying cause of death. The second causes of death noted as other morbid conditions associated with the death was recorded in only 4.5% of the health institution data and 0.5% of the death the death return from the subchiefs. The two cases indicated malaria as the second cause of death.

3.2 ESTIMATION OF MORBIDITY AND MORTALITY

3.2.1 Morbidity

Morbidity was estimated using proportionate distribution of morbid events and prevalence estimates. Cross-tabulation method of analysis using SPSS-PC was used to estimate the distribution of morbidity by age, gender and socio-economic characteristics.

The immediate socio-economic consequences of the reported illness(es) was estimated using percentage distribution. Duration of illness(es) was used as an index of time cost.

3.2.2 Mortality

Mortality was estimated using age specific death rates (ASDR) in order to compare the age pattern of mortality. Population size recorded in the 1 989 population census was projected, assuming exponential growth rate of 3.32% recorded during the 1979-89 inter-census period, in order to get the population at risk in mid 1995/96. Percentage distribution was used to estimate the distribution of causes of death by age and gender. Chi-square statistical test was used to establish the level of significant in the observed differential in age and gender distribution morbidity and causes of death.

3.3 QUALITY OF DATA

3.3.1 Mortality data

In vital registration data, errors are common. Some of the reported errors or bias include the under-reporting of dead persons, especially infant and children, the inclusion of still births in the number of dead children, under-reporting children ever born and age miss-reporting of the deceased.

Under-reporting of death or miss-reporting can result in a misplacement of deaths in either earlier or later in the year the they actually occurred or transferring into or out of the age group or first year for the infants (Kpedepko, 1 982). Another problem in this data set might have been error in registration according to place of usual residence before death.

In addition to under-reporting there is also problem of misreported causes of deaths especially for deaths occurring outside medical institution setting. In this respect the two sets of data (from medical institutions and those reported by sub-chiefs) have been analyzed separately. In areas of causes of death the vital registration data suffers from errors of diagnosis of the disease that lead to death. This is especially true for the diagnosis done by the informant who is not trained in medicine.

The unavailability of modern medical facilities for the bulk of the population to less developed countries implies that many illnesses are treated either at home or by local

traditional medical practitioners. Consequently no records are kept of illness or in the event of death of the cause of death. Even in the urban areas which are served by modern medical facilities, morbidity and mortality data are likely to be available only for cases treated in hospitals and are therefore biased by selection effects.

Of the mortality records reviewed for this study 40% of deaths occurred outside hospital and information on cause of death, though indicated, may be suffering from errors of diagnosis of the disease that lead to death. Local authority use verbal autopsies to determine the most probable cause of death from the bereaved parents or relatives. This however lacks sensitivity in detecting multiple causes of death. In most cases the person report the immediate disease presentation before death.

Another problem is failure to report the true cause of death even when the informant knows the cause due to the social stigma and life (insurance) policy implications associated with some disease like HIV/Aids.

3.3.2 Morbidity data

The limitation of the morbidity data lies in the recall bias, acknowledged in some of thequestions which required the respondentto remember morbid events that occurred in the past in absent of specified period of reference. This was more so for mild illness like cold and headache which are easily forgotten once treated. In addition to recall bias, measures of self-perceived morbidity are complex conceptually and very

difficult to apply with high validity and reliability in absence of diagnosis inquires made by an independent trained personnel. Self-perceived morbidity depends upon an individual's perception of illness and therefore may vary from one respondent to the other. The degree of specificities for the reported illnesses in this study therefore would not be obtained.

CHAPTER 4

MORTALITY AND MORBIDITY IN MAKONGENI ESTATE

4.1 SOCIO-DEMOGRAPHIC PROFILE

4.1.1 Population structure

A total of 1590 households from the six cluster were involved in this study. The population size of the selected household was 7,035. The average household size was 4.41 persons with a standard deviation (SD) of 1.49. The distribution of the population by age was as follows:- 28.2% were under 5 years of age, 13.1% in the 5 - 9 years age group, 6.9% in 10-14 years. The population aged >15 years accounted for 52.8% while those aged > 55 years accounted for 0.27%. The male to female ratio was 1 : 1.12 (Table 4.1).

Table 4.1 Distribution of the study population by age and gender, Makongeni Estate

Age groups	Male	Female	Total	%
0 - 4	1,003	981	1984	28.2
5 - 9	442	476	918	13.4
10 - 14	223	264	487	6.9
15-19	92	273	365	5.2
20 - 24	105	555	660	9.4
25 - 29	381	570	951	13.5
30 - 34	520	359	879	12.5
35 - 39	317	157	474	6.7
40 - 44	153	57	210	3.0
45 - 49	49	11	60	0.9
50 - 54	18	1	19	0.3
55 +	14	5	19	0.3
Total	3,317	3,709	7,026*	99.8%

* age of 9 individuals could not be established. Source: Cross-sectional households survey, 1996.

4.1.2 Residence

52.1 % of the population were in-migrant workers from the neighboring districts while the remainders were born within Makongeni Estate. Duration of residence for the in-migrants ranged between 1 and 33 years.

4.1.3 Marital status

Analysis of the marital status for the population age > 1 5 years (n = 3637) revealed that 78.6% were married, 20.1 % were single, and 1.0% separated. The proportion of the widowed accounted for 0.32%.

4.1.4 Education

Out of the population that had left school (n = 3486), 96% had attained primary school education; 58.6% secondary education; and 4.8% post secondary education. Majority, 57.4% of those who were in school (n = 1668) were in primary school. 1881 had never been to school, out of which 95% were under 5 years old.

4.1.5 Occupation

Among those aged > 15 years and not in school, 34.8% were involved in economic activities ranging from provision of professional services to small scale business enterprises (petty trading). J-,^9% were professionally trained, 8.1% highly skilled technical and 44.5% medium to low skilled individuals. Unskilled casual laborers accounted for 10.7% while 22.4% were in trading.

Among those with regular employment (n = 1619) 40.7% were employed in the industries and 18.9% by the public sector (mainly government, parastatals and the municipality). The remainders were self employed or employed by other companies.

4.2 MORBIDITY

4.2.1 Distribution of the major causes of illnesses by age

Within one month recall period, 7035 residents reported 3687 episodes of illnesses. This was an incidence of 524 episodes of illness per 1,000 persons month. The mean recall period was 11.42 days with and standard deviation (SD) of 7.96 (1 1.42 _+_ 7.96) and ranged between 1 and 30 days. The age distribution of these illnesses indicated the highest incidence among the under-5-years-old and a broad peak among females in their reproductive age and a narrower peak among males aged between 25 and 34 years (Figure 4.1).

Out of the 3687 episodes of illness, respiratory tract illnesses constituted 64.7%, malaria 10%, gastro-intestinal 8.2% and skin diseases 2.4% (Figure 4.2). Other important illnesses included dental related problems (1.3%), fever (1.2%) and pneumonia (1.0%). A breakdown of the respiratory tract illnesses by type indicated that common colds and coughing were the predominant presentations (Figure 4.3).

Figure 4.1.
Distribution of reported illnesses by age and gender, Makongeni Estate, 1996

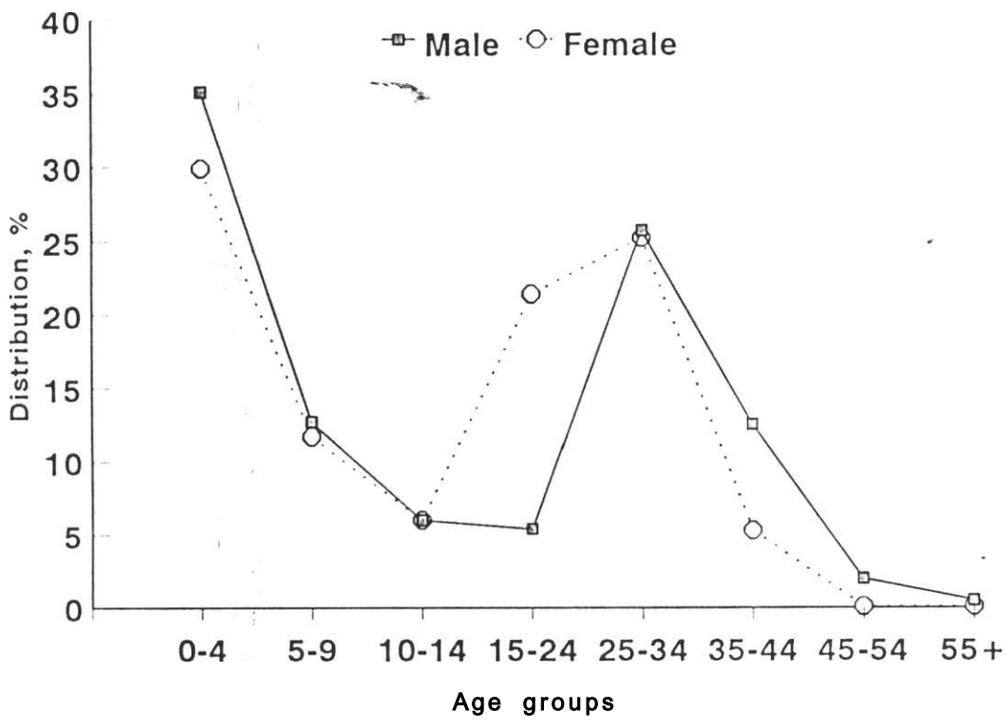
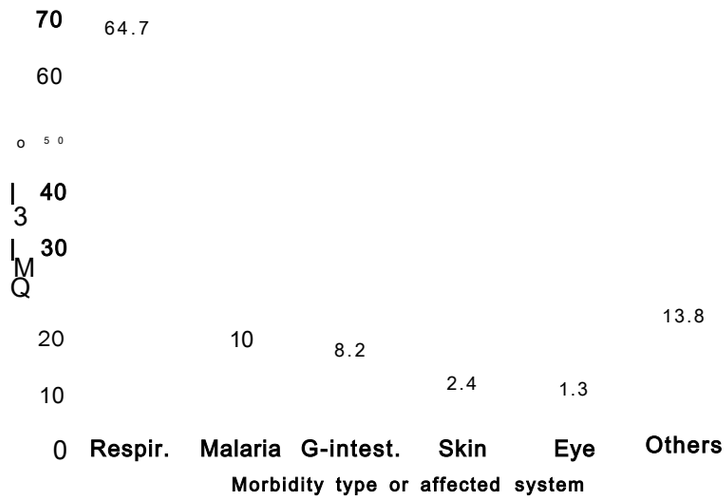
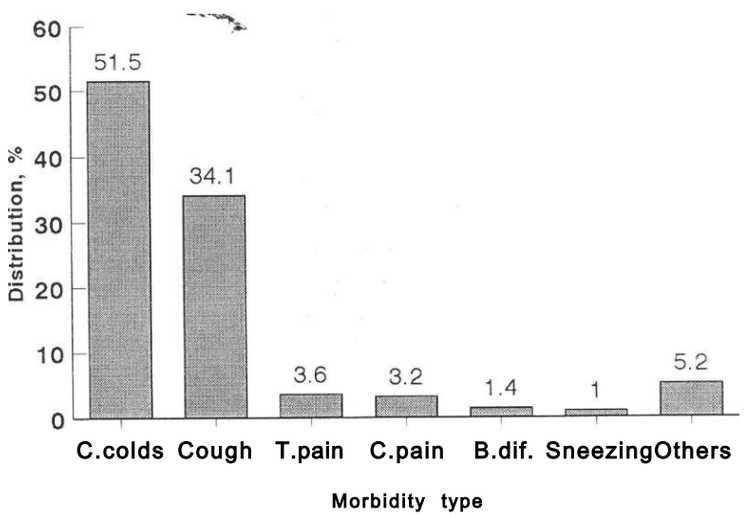


Figure 4.2: Distribution of perceived morbidity type and affected system, Makongeni Estate, 1996



Respi. = respiratory tract system
G.Int. = gastro-intestinal tract system

Figure 4.3: Distribution of respiratory morbidities, Makongeni Estate, 1996



C.colds = common colds; T.pain = tonsils and throat pain; C.pain = chest pain
B.dif. = breathing difficulties

The distribution of illnesses by age showed that 32.3% of those ill were under 5 years old and the predominant illnesses were those affecting the respiratory tract. This was followed by gastro-intestinal and malaria each with 8.7% and 6.3% respectively (Table 4.2).

Table 4.2 Distribution of the reported illnesses and system affected by age, Makongeni Estate, 1996

Age group	Respira-tory	Malaria	Gastro-intestinal	Skin	Eye	Others	
0 - 4	892 75.0%	75 6.3%	103 8.7%	43 3.6%	9 0.8%	67 5.6%	1189 32.3%
5 - 9	299 66.9%	34 7.6%	43 9.6%	14 3.1 %	7 1.6%	50 11.2%	447 12.1 %
10 - 14	132 59.5%	14 6.3%	21 9.5%	3 1.4%	7 3.2%	45 2..3%	222 6.0%
15-19	115 68.0%	17 10.1 %	11 6.5%	1 0.6%	3 1.8%	22 13.0%	169 4.6%
20 - 24	179 51.0%	47 13.4%	37 10.5%	3 0.9%	4 1.1%	81 23.1 %	351 9.5%
25 - 29	281 58.9%	66 13.8%	34 7.1 %	5 1.0%	8 1.7%	83 17.4%	477 13.0%
30 - 34	273 59.1 %	65 14.1 %	27 5.8%	14 3.0%	7 1.5%	76 16.5%	462 12.5%
35 - 39	123 58.6%	31 14.8%	15	1 0.5%	1 0.5%	39 18.6%	210 5.7%
40 - 44	68 64.8%	14 13.3%	8 7.6%	2 1.9%	1 1.0%	12 11.4%	105 2.9%
45 - 49	11 40.7%	5 18.5%	1 3.7%	1 3.7%		9 33.3%	27 0.7%
50 - 54	4 36.4%	1 9.1 %	2 18.2%	.	.	4 36.4%	11 0.3%
55 +	6 50.0%	2 16.7%	1 8.3%	.	.	3 25.0%	12 0.3%
Total	2383 64.8%	371 10.0%	303 8.2%	87 2.4%	47 1.3%	491 13.8%	3682

Source: Cross-sectional households survey, 1996

There was no significance differences in morbidity among the population aged between 5 above. However, a relatively low morbidity was reported by population aged 40 years and above. The predominant illnesses in all the age groups were those affecting the respiratory tract.

4.2.2 Distribution of the major illness by cluster

Although on the basis of the housing structure it seems possible that the residents may fall into two main socio-economic groups, analysis of the proportionate distribution of the illnesses by cluster showed a relatively uniform distribution of illness in all the cluster except for cluster 6 which had a higher prevalence of respiratory tract illnesses and a relatively lower prevalence for malaria compared to other clusters (Table 4.3).

Table 4.3 Distribution of reported illness types by cluster, Makongeni Estate, 1996

Cluster	Respi-ratory	Malaria	Gastro-intestinal	Skin	Eye	Others	Total
1	738 62.8%	128 10.9%	110 9.4%	23 2.0%	25 1.2%	151 12.9%	1175 31.9%
2	289 65.7%	35 8.0%	38 8.6%	12 2.7%	3 0.7%	63 14.3%	440 11.9%
3	178 67.7%	26 9.9%	23 8.7%	8 3.0%	1 0.4%	27 10.3%	263 7.1 %
4	119 64.0%	21 11.3%	17 9.1 %	7 3.8%	.	22 1 1.8%	186 5.0%
5	711 62.9%	148 12.1%	92 7.5%	31 2.5%	15 1.2%	169 13.8%	1226 33.3%
6	291 73.3%	14 3.4%	23 5.8%	6 1.5%	3 0.8%	60 1 5.2%	397 10.8%
Total	2386	372	303	87	47	492	3687

Source: Cross-sectional households survey, 1996.

In addition, the Chi-square test showed no relationship between the reported under 5 years old morbidity and the mother's education except for Malaria ($p < 0.05$). However, even for the case of malaria no defined trend was observed.

4.2.3 Duration of illness

The duration of the reported illnesses ranged from 1 day to 30 days. However 80 .4% reported a duration of 7 days or less. 13.5% reported a duration of 14 days or less while 5.6% had a duration of illness ranging between 1 5 to 30 days (Table 4.4).

Table 4.4 Distribution of duration of illness in days, Makongeni Estate, 1996

Duration in days	n	%
1 - 7	2,956	80.4
8 - 14	516	14.0
15-21	122	3.3
> 22	84	2.3
Total	3,678	100.0

Source: Cross-sectional households survey, 1996

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4.2.4 Immediate consequences

Out of the 3687 persons who reported morbid events within one month recall period 48.4% (1820) reported immediate consequences of the illnesses ranging from constraints from performing an expected role to other morbid conditions arising from the perceived morbidities.

Out of the persons whose data on immediate consequences were obtained, 424 (23.3%) were in school. 56.4% were reported to have lost learning opportunities for a duration ranging between 1 and 30 days. The median duration of lost learning opportunities was 5 days.

25.6% of the economically active population (n = 1619) reported that they were restrained form their occupation for a duration ranging from 1 day to 30 days. The mean duration of occupational constraints was 4.1. days with a standard deviation (SD) of 3.9.

4.3 MORTALITY

Between January, 1995 and December 1996 a total of 1095 deaths from the Thika municipality were registered 563 and 532 in 1 995 and 1 996 respectively. 307 of the total registered deaths were residents of Makongeni Estate.

In 1 995, 55.2% of the total registered deaths occurred in heath institutions while the rest (44.8%) occurred outside hospitals and details of such deaths were recorded by the local authority (sub-chiefs) as presented by the next of kin of the diseased person. In 1 996, 70.3% of all deaths occurred in health institution indicating that the majority of the deceased died while undergoing medical treatment medical care.

4.3.1 Age and sex distribution

In 1995, the absolute number of registered deaths among males was higher than that of females (M.F ratio was 1.34 :1). A similar pattern was observed in 1 996 whereby 58.6% were male (M.F. ratio was 1.43: 1). There was a significant different in gender distribution of death ($P = 0.237$). Assuming that most of the deaths were registered then male had an elevated risk of death than females.

The highest mortality in the municipality was observed among the under 5 years old. There was a decline in absolute number of deaths among the population aged 5-9 years (4.5%) and a further decline to about 2.1 % in 10-14 years age groups. This was followed by a rise in number of deaths occurring to the population aged between 15 to 24 years (6.5%) and further rise to 10.9% in age group 25-34 followed by a slight decline to 5.11 % in age group 45-54 and a shape increase in population aged

55 years arid above (Figure 4.4).

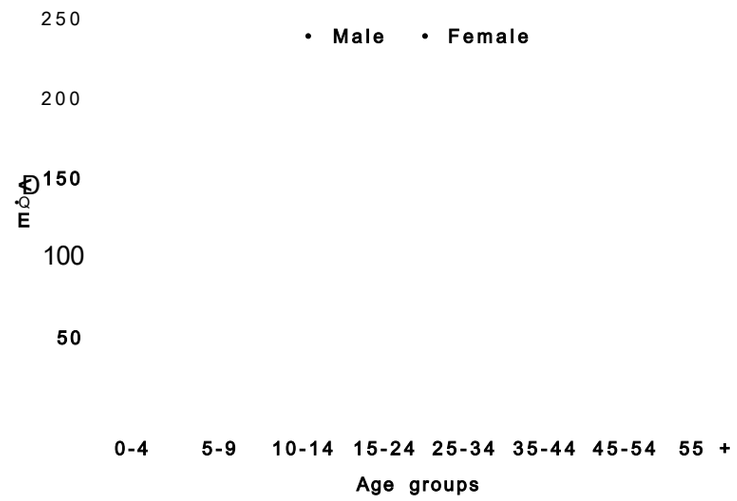
In Makongeni Estate the age and gender distribution of the absolute number of deaths was similar to that of the Municipality but there was no clear-cut gender differences. The male to female ratio was 1.34 : 1. The number of under 5 years accounted for 49.5% of all registered deaths in Makongeni as compare 43.01% for entire Municipality. The age and sex distribution of the registered deaths are shown in Figure 4.6.

4.3.2 Age-specific mortality rate

The age-specific mortality rates for the municipality shows high mortality in the early childhood, 47.42 followed by a decline of death to 6.41 in population age 5-9 years and further decline to 3.69 among population aged 10-14 years and low and gradual rise in early adulthood (Figure 4.5)

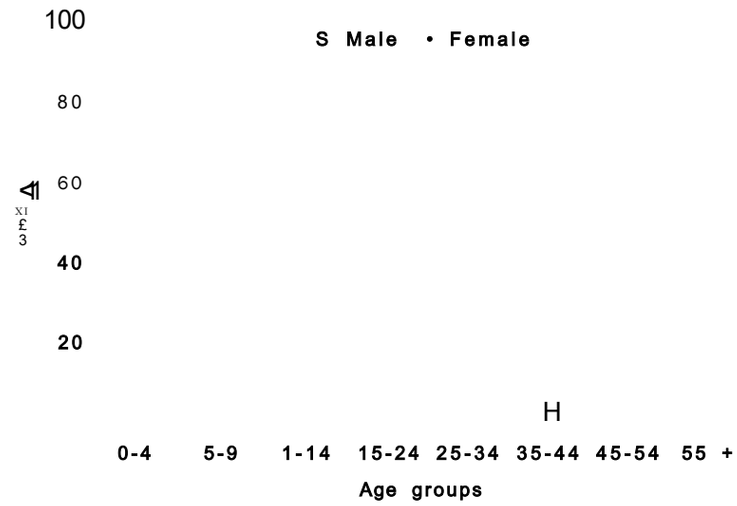
Similar age-specific mortality was observed in Makongeni Estate (Figure4.7). However there was a decline in under 5 years mortality from 47.4 in Municipality to 35.2 in Makongeni estate and a higher moriality rates among he population age 55 years and over. The findings are in conformity the bimodal pattern of death distribution by age whereby the number and proportion of death is at a peak during infancy and early childhood and declining until the eve of adolescent and low and gradually ascending during the long period of adulthood and then sharply increasing in the older age groups.

Figure 4.4.
Distribution of deaths by age and gender
Thika Municipality, 1995-96



The age of 13 males and 1 female were not known and were recorded as adults

Figure 4.5.
Distribution of deaths by age and gender
Makongeni Estate, 1995-96



Source: Vital Statistics Registration Office, Thika district.

Figure 4.6
Age-specific death rates in Thika Municipality, 1995-96

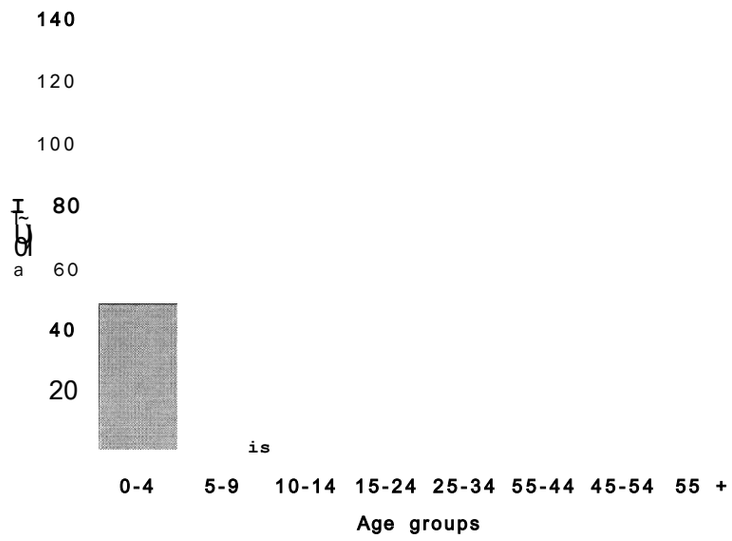
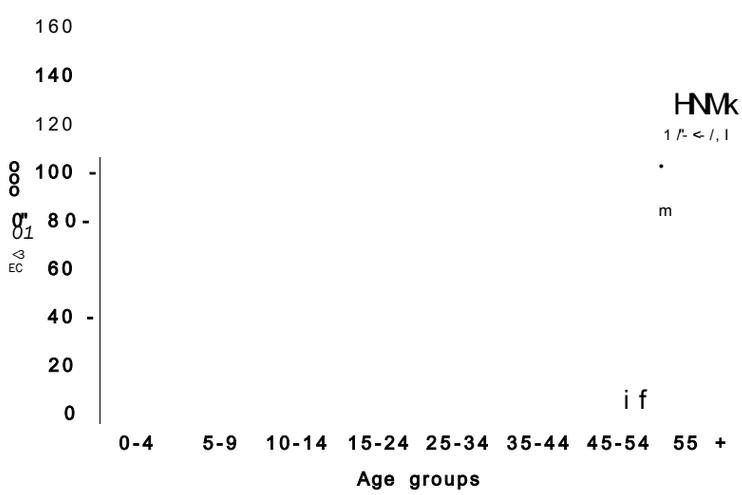


Figure 4.7
Age-specific death rates in Makongeni Estate, Thika Municipality, 1995-96



Source: Vital Statistics Registration Office, Thika district.
Rates based on 1989 census projections.

3.3.3 Causes of death

Out of the total number of death records reviewed (n = 1095), 93.6% had the immediate underlying cause of death indicated. With regard to the five major underlying causes of death namely respiratory diseases, malaria, HIV/STD, malnutrition disorders and heart related problems; respiratory diseases and malaria accounted for 20.3% and 18.4% respectively. HIV including other Sexually transmitted diseases accounted for 5.9%, Malnutrition 5.2% and cardiovascular 4.9%. The distribution of the underlying causes of death is shown in Table 4.5 below.

Table 4.5 Distribution of death by cause of death, Makongeni estate and the rest of the Municipality, 1995-96

Causes of Death	Makongeni Estate		Other residential areas within the municipality		Municipal totals	
	n	%	n	%	n	%
Respiratory	62	20.2	191	24.2	253	23.1
Malaria	54	17.6	136	17.3	190	17.4
Malnutrition	16		44	5.0	60	5.5
HIV/STD	18	5.9	35	4.4	47	4.3
Cardiovascular	15	4.9	29	3.7	50	4.6
Traumas	11	3.6	63	8.0	74	6.8
Gastro-intestinal	14	4.6	32	4.1	46	4.2
Measles	7	2.3	13	1.6	20	1.3
Others	78	25.5	207	26.3	285	26.0
Undetermined	32	10.4	38	4.7	70	6.4
Total	307	100.0	788	100.0	1,095	100

Source: Vital Statistics Registration Office, Thika district, 1995 - 96.

Others included diabetes (2.9%) and tumours each had 2.9% and 1.9% respectively. Birth complications accounted for 1.4%. Un-identified causes of death noted by sudden death were 21 (6.8%). Majority (17) were registered by the sub-chiefs. Neonatal deaths accounted for 14.8% of the total deaths registered in Thika municipality. Statistical test of proportions (P value) shows that there is no significant difference in causes of death in Makongeni and other residential areas in Thika Municipality except for trauma. Municipality reported a significantly higher proportion of trauma related deaths than Makongeni ($p < 0.005$). This means that the pattern of death by cause in Makongeni is not different from what is observed in the whole Municipality.

Respiratory disorders accounted for 25.2% of all the deaths occurring to children under 5 years while malaria and malnutrition related diseases accounted for 17.1% and 5.9% respectively (Table 4.6).

Table 4.6 Distribution otmajor causes of death by age groups, Makongeni Estate, 1995 - 96

Causes	0 - 4	5 - 9	10 - 14	15-24	25 - 34	35 - 44	45- 54	55 +
Respiratory	38 25.2%	4 3.7%	1 33.3%	2 12.5%	4 1 1.4%	2 8.7%	1 11.0%	10 17.5
Malaria	26 17.2%	2 15.4%	0	3 18.8%	7 20.0%	8 34.8%	0	7 12.3%
Malnutrition	9 6.0%	2 15.4%	0	1 6.3%	0	0	0	5 8.8%
Cardio-vascular	4 2.6%	2 15.4%	1 33.3%	1 6.3%	0	1 4.3%	1 11.1%	0
Immuno-suppression	5 3.3%	0	0	2 12.5%	4	3 13.0%	1 11.1%	0

Source: Vital Statistics Registration Office, Thika district, 1995 - 96.

It is however worthy noting that out of the 307 records deaths in Makongeni Estate, 60.3% were from health institutions while the rest 39.7% were for deaths that occurred outside hospital setting and therefore reported by the local administration. This means that about a third of the causes of death obtained were recorded as reported by the next of kin of the deceased person.

In Makongeni Estate, analysis of causes death by source of data in Makongeni estate revealed that though respiratory related disorders and malaria are the major causes of death, only 45.2% and 48.1 %, respectively were medically ascertained as the cause of death. Statistical test (chi-square distribution test) revealed unequal distribution of death by cause between the two sources of data especially for respiratory diseases, malaria, gastro-enteritis, traumas and measles (Table 4.7).

Table 4.7 Distribution of cause of death by sources of data Makongeni Estate, 1995 - 96

Causes of death	Medical health institutions	Local authorities	P Values
Respiratory	28 45.2%	34 54.8%	0.003
Malaria	26 48.1%	28 51.9%	0.023
Malnutrition	10 62.5%	6 37.5%	0.425
HIV (including STD)	11 61.1%	7 38.9%	0.469
Cardiovascular	13 86.7%	2 13.3%	0.161
Traumas	11 100%	.	0.003
Gastro-intestinal	12 85.7%	2 14.3%	0.023
Measles	1 14.3%	6 85.7%	0.006
Un-identified	31 96.9%	1 3.1%	0.0
Others	42 53.8%	36 46.2%	0.090
Total %	185 60.3%	122 29.7%	307

Source: Vital Statistics Registration Office, Thika district, 1995 - 96.

The above data indicates differences in distribution of causes of death between the two set of data. For example, only 14.3% of gastro-enteritis as a cause of death was registered by the subchiefs compared to 85.7% of the health institutions data. A similar observation was made for the heart related disorders where by 86.7% were registered in hospital as compared to 13.3% from the sub-chiefs. Similar pattern was observed at the municipality level.

These differentials may be attributed to the expected inadequate capacity of the verbal autopsies as a tool of identifying the causes of death as compared to clinical diagnosis. VA lack sensitivity in detecting multiple causes of death. For example none of the death record from sub-chiefs had indicated other conditions contributory to death as compared 3.6% from health institutions.

CHAPTER 5

SUMMARY OF FINDINGS AND RECOMMENDATIONS

5.1 SUMMARY OF FINDINGS

Analysis of the households morbidity data showed that out of the 3687 episodes of illness experienced during one month period, respiratory tract illnesses constituted 64.7%, malaria 10%, gastro-intestinal 8.2% and skin diseases 2.4%. A breakdown of the respiratory tract illnesses by type indicated that common colds and coughing were the predominant presentations. The duration of the reported illnesses ranged from 1 day to 30 days. However 80 .4% reported a duration of 7 days or less. 13.5% reported a duration of 14 days or less while 5.6% had a duration of illness ranging between 1 5 to 30 days.

The gender and age distribution of these illnesses indicated the highest incidence among the under 5 years and a broad peak among females in their reproductive age and a narrower peak among males aged between 25 and 34 years. The predominant illnesses in all age groups w.er.% those affecting the respiratory tract system.

The pattern of morbidity reported by the estate resident is similar to out-patient morbidity pattern in the public district hospitals. In 1995, 32% of all new cases in Kiambu district were managed for respiratory diseases while 13.8% were managed for malaria. The observed differences between the out-patient morbidity and the reported morbidities at the community level may be attributed to the high prevalence self medication. For instance the range of actions taken to address these illnesses included self medication (40.3%), health care service from public facilities (19.3%),

health care service from private and missionary facilities (24.0%). In 10% of the incidence nothing was done.

Studies on age-specific mortality have shown that death rates in infancy and early childhood are unacceptably high in tropical Africa. In this study, proportionate analysis of Thika municipality mortality data by age revealed that majority, 43%, were under five years of age. The highest age specific mortality in Thika municipality and Makongeni Estate was observed among the under 5 years old and those above 55 years of age.

With regard to the causes of death, respiratory tract diseases and malaria accounted for 23.1 % and 17.4%, respectively, in Thika municipality. While Traumas accounted for 6.8%, Malnutrition 5.5%, HIV/Aids 4.6% and heart related disorders 4.3%. Most of the under 5 died of respiratory diseases and malaria, each accounting for 29% (138) and 15.5% (73) respectively. Malnutrition accounted for 8.1% and gastroenteritis 5.5%.

The proportional cause contribution of deaths in Makongeni Estate closely followed that of the rest of the Municipality excepting trauma. Municipality reported a significantly higher proportion of trauma related deaths than Makongeni ($P<0.005$). Respiratory diseases and malaria accounted for 25.2% and 17.2% of the under 5 years old mortality in Makongeni Estate.

As observed in the recent mortality studies, HIV/AIDS is fatal to in infancy and early childhood due to vertical transmission and more fatal to population aged 1 5 to 45 years. Similar observation were made in this study whereby HIV/Aids accounted for about 2.2% of under 5 mortality and 1 4.1 % to population aged 1 5 - 44 years of age. The crude death rate based on these projections was estimated to be 5.8 and 7.8 in Makongeni Estate and the entire Municipality respectively.

These finding indicates significant excess of mortality due to infectious and parasitic diseases and therefore are consistent with growing body of literature linking respiratory related diseases and malaria has the most killer diseases in the tropics.

5.2 RECOMMENDATIONS

5.2.1 Research

The cross-sectional design of this study could not establish the association between reported (self-perceived) illness of the residents and their environments. Although exposure to pollutants spewed by a number factories in Thika, is likely to have an effect on the health of the residents living near these factories, a longitudinal study design would be required in order to investigate the potential health impact of the identified pollutants on human and a trend analysis of the pollutants in relation to peoples health over a period of time. This would also allowed study on the seasonality of the reported illnesses.

A major limitation in this study is the failure to do a detailed analysis the socio-economic implications of the reported morbidity partly due to the short time allocated to undertake this research paper. It is therefore worthy to investigate the opportunity and monetary costs of the reported morbidities with emphasis to the working population. """"V

5.2.2 Policy

The study found excessive morbidity and mortality due to respiratory tract diseases and malaria. The most vulnerable age group was found to be the under 5 years old. Based on this findings therefore policy programme should aim at reducing morbidity in the community and subsequently reduction on mortality especially among the under 5 years old.

In addition, analysis of the causes of death by sources of data revealed unequal distribution between the death registered in health institution and those recorded by the local authority, especially for respiratory diseases, malaria, gastro-enteritis, traumas and measles. This differences may be attributed to the expected inadequate capacity to determine the causes of death by the local authority who uses verbal autopsies (VA) to determine the most probable cause(s) of death. In view of this findings, there is need to train the sub-chiefs on VA and accurate presentation of the causes of death. There is also need to improve the death registration forms in order to give allowance for more details on the disease(s) presentations before death. These would enable medical personnel and or pathologist to draw the immediate the underlying cause(s) of death and any other contributory factors that may have lead to death.

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ANNEX

Table 6.1 Distribution of reported morbidity by type, Makongeni Estate, Thika Municipality

Reported illnesses by type and the affected systems	n	%	Incidence rate per 1,000 persons month
1 . Respiratory	2386	64.7	339.16
2. Malaria	372	10.0	52.87
3. Gastro-intestinal	303	8.2	43.07
4. Skin	87	2.4	12.37
5. Eye	47	1.3	6.68
6. Others	492	13.8	69.93
Total	3687	100	524.09

Population at risk = 7035

Source: Cross-sectional households survey, 1996

Table 6.2 Distribution of the under 5 years morbidity by mother's education, Makongeni Estate

Mother's Education	Respira-tory	Malaria	Gastro-intestinal	Skin diseases	Eye	Others	Total
None	17 60.7%	7 25.0%	1 3.6%			3 10.7%	28 2.4%
Lower primay	13 81.3%		1 6.3%	1 6.3%	.	1 6.3%	16 1.4%
Upper Primary	288 75.0%	30 7.8%	37 9.6%	7 1.8%	3 0.8%	19 4.9%	383 32.8%
Secondary	513 75.3%	35 5.1 %	52 7.6%	34 5.0%	6 0.9%	41 6.0%	681 58.1 %
Post Sec.	47 74.6%	2 3.2%	10 15.9%		.	4 6.3%	63 5.4%
Totals	878 74.8%	74 8.6%	101 8.6%	42 3.6%	9 0.8%	68 5.8%	1 172 100%

Source: Cross-sectional households survey, 1996

Table 6.3 Distribution of death by age and gender, Thika municipality, 1995-96.

Age groups	Male	Female	Totals	%
0 - 4	246	225	471	43.01 %
5 - 9	28	22	50	4.57%
10 - 14	15	8	23	2.10%
15-24	45	26	71	6.48%
25 - 34	68	51	119	10.86%
35 - 44	55	32	87	7.94%
45 - 54	38	18	56	5.11%
55 +	118	86	204	18.30%
Un-determined*	13	1	14	1.27%
Total	626	469	**1095**	**100.0%**

* Age of 14 deceased, 13 male and 1 female were not recorded but were noted as adults.

Source: Vital statistic registration office, Thika district, 1995 - 96.

Table 6.4: Distribution of death by age and gender, Makongeni Estate, Thika municipality, 1995-96.

Age groups	Male	Female	Percentage
0 - 4	73	78	49.5%
5 - 9	8	5	4.2%
10-14	2	1	1.0%
15-24	8	8	5.2%
25 - 34	17	18	11.4%
35 - 44	16	7	7.5%
45 - 54	6	3	2.9%
55 +	32	24	18.2%
Total	162	145	100%.

Source: Vital statistic registration office, Thika district, 1995 - 96.

Table 6.5 Age-specific mortality rates, Thika Municipality 1995/96

Age *group*	1989 *Population*	1995/96 population Pt = Poe^{rn}*	No. of Deaths (registered)	ASDR
0-4	8,009	9,931	471	47.4
5-9	6,287	7,796	50	6.4
10-14	5,020	6,225	23	3.7
15-24	13,717	17,009	71	4.2
25-34	14,296	17,727	119	6.7
35-44	6,431	7,975	87	10.9
45-54	2,482	3,073	56	18.2
55 +	1,327	1,646	204	123.9

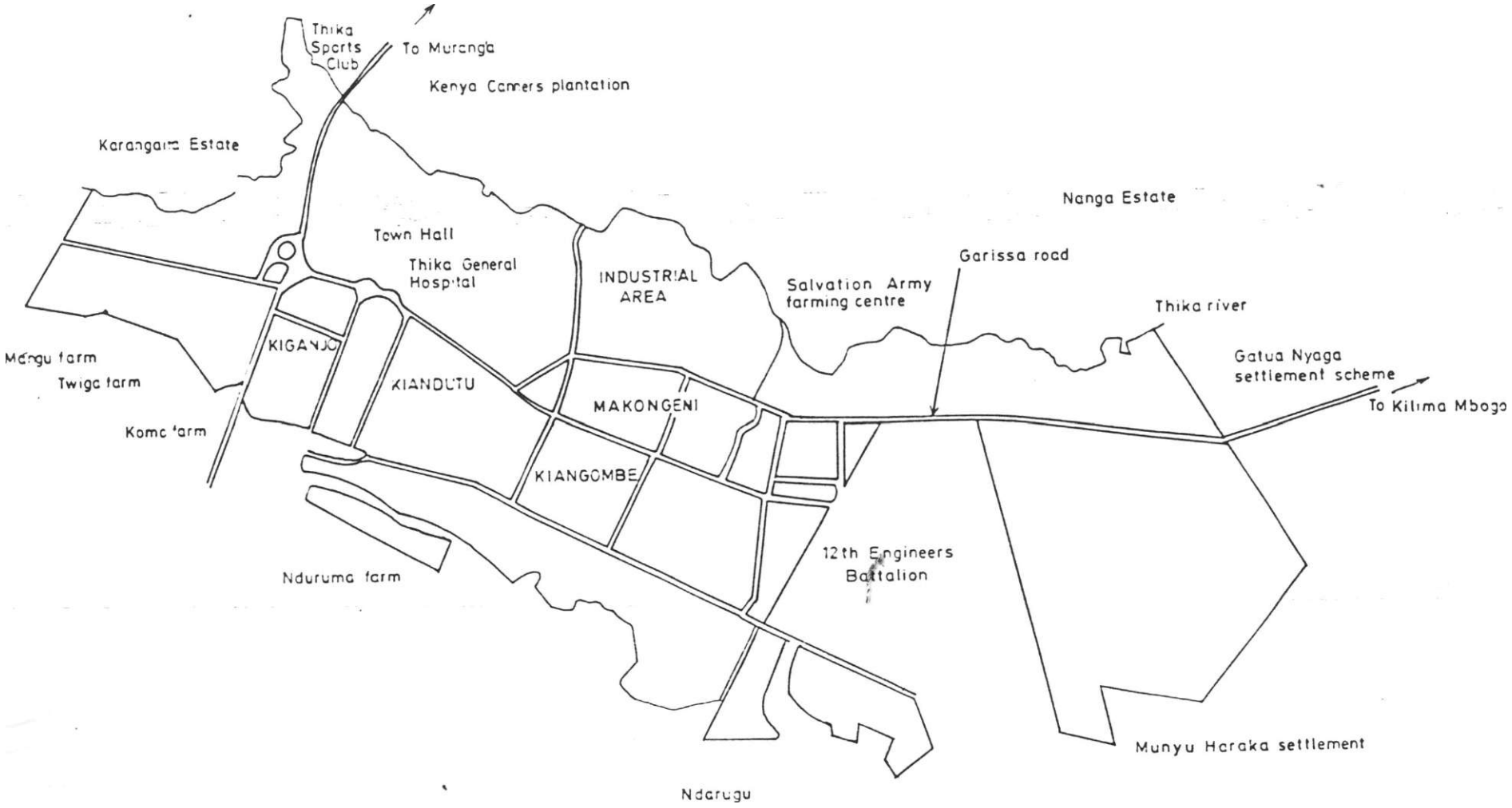
Table 6.6. Age-specific mortality rates, Makongeni estate, Thika Municipality, 1995/96

Age group	Population 1989	1995-1996 Mid -Population (Pt = Poe^{ml}*	Deaths	ASDR
0 - 4	3,455	4,287	151	35.22
5-9	2,325	2,883	13	4.51
10-14	1,446	1,793	3	1.67
15-24	5,192	6,438	16	2.49
25-34	6,778	8,405	35	4.16
35-44	1,982	346	23	9.80
45-54	335	416	9	21.63
55 +	131	163	56	343.50

Source: Vital statistic registration office, Thika district vital statistics, 1995 - 96.

* 1989 Population census was projected, assuming exponential growth at an annual growth rate (r) of 3.32% (Population census report Volume II, Central bureau of Statistics).

THIKA MUNICIPALITY



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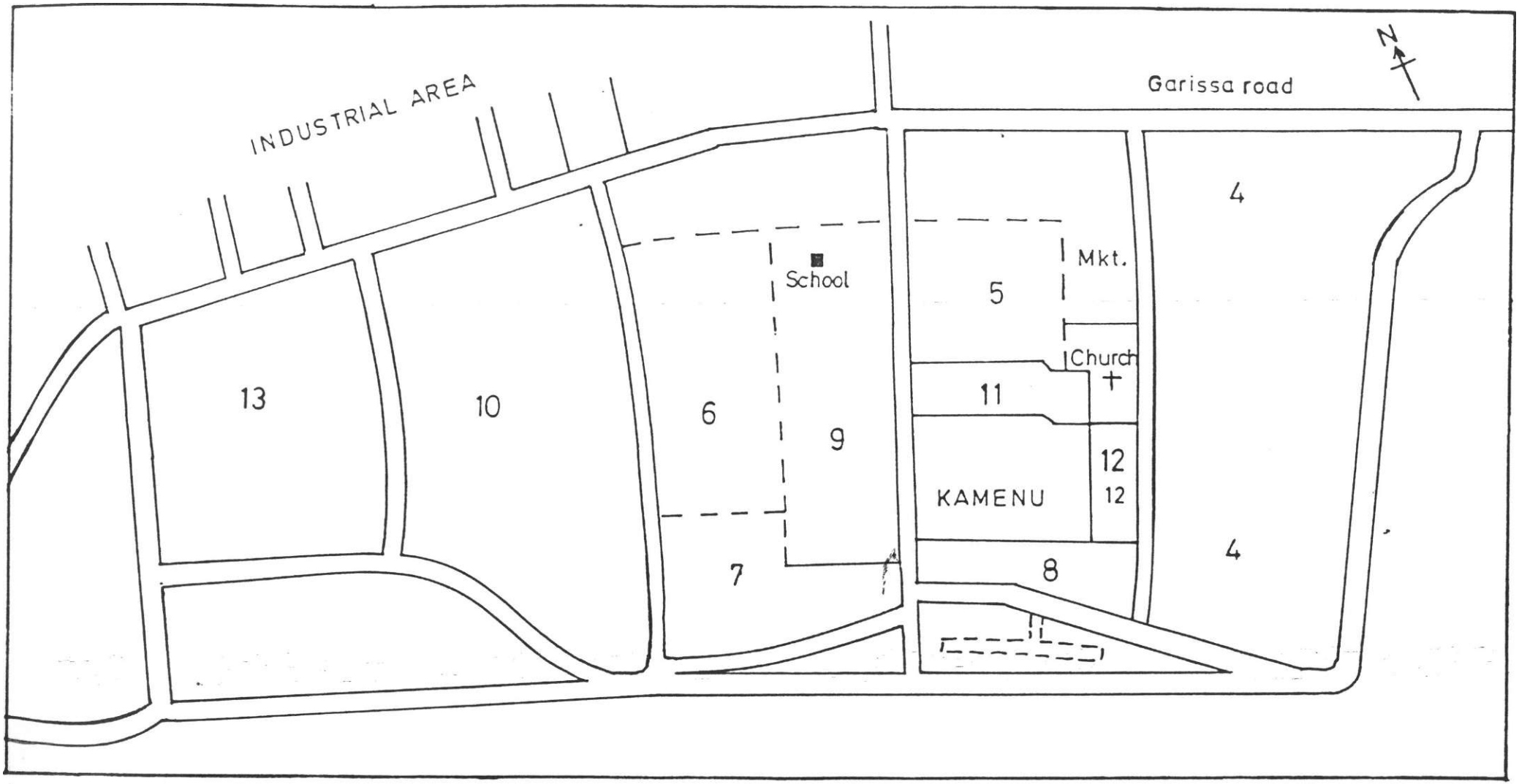

Figure 1.2 Makongeni Estate. Numbers present phases.