THE ESTIMATION OF NUPTIALITY USING CENSUS DATA FOR KENYA

BY

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DECLARATION

This Thesis is my original work and has not been presented for a degree in any other University.

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ABSTRACT

This study set to estimate Nuptiality for Kenya using census data. The discussion is conducted at two levels, first at macro (national) level to examine the appropriateness of applying four alternative methods of refining estimates of Nuptiality. Second, at micro (regional) level to determine the regional patterns of Nuptiality.

The interest stems from the relationship between Nuptiality and fertility. In societies in which control of marital fertility is absent or minimal, the pattern of age at first marriage (timing) and the proportions who ever marry (incidence) are the most important determinants of the overall fertility level. The prime aim of the study has been to facilitate understanding of the Nuptiality process in Kenya. By doing so, it is hoped that we may also gain further insight into its relationship with fertility.

The main objective is to investigate the timing and incidence of Nuptiality using census data, at national and regional levels. To achieve this, the study is divided into six parts. The first is a general presentation of the problem. The second, presents the various methods for data evaluation and adjustment, as well as the estimation of Nuptiality. The third, is a detailed evaluation of the data quality and adjustments. The fourth, examines the Nuptiality situation at macro level, based on the 1969 and 1979 census data. The fifth, estimates regional Nuptiality levels, basing on SMAM method alone, utilizing the 1979 census data for Kenya's 41 districts. The final, gives an overview of the findings, conclusions and recommendations both for research and policy.

Some methodological problems arise in the application of some of the methods to estimate Nuptiality from census data. Thus indiscriminate application of the methods should be cautioned against. The quality of data has greatly reduced the reliability of the derived estimates.

Major conclusions drawn from the study are that Nuptiality timing is early for females and relatively late for males in Kenya. Most regions conform to these two patterns. The incidence of marriage is very high for both sexes. However, from this study it is not possible to make any definite assessment of the future course of marriage behaviour. It can, however be safely concluded that there is a growing trend towards single life or towards postponing legal marriage (especially on the part of females). This points to the observation that it is likely unions without a marriage certificate and the incidence of single parenthood will increase. Given Kenya's present fertility levels, policy measures should involve the increase in the timing and a decrease in the incidence of marriage.

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CHAPTER ONE

GENERAL INTRODUCTION

1.0 INTRODUCTION

In demography the study of Nuptiality essentially involves the statistical analysis of marriage variables by period or cohort approach (IUSSP, 1974). In the absence of adequate and reliable marriage statistics, information collected on marital status in successive censuses permits the estimation of Nuptiality as indicated by some of the techniques suggested by Hajnal (1953), Agarwala (1962), Sadiq (1965) and Malaker (1978).

Demographers, sociologists and Economists among others, have for long been concerned with the measurement of marriage variables such as the age at first marriage, proportions marrying at given ages, rates and chances of marriage, remarriage, divorce/separation and widowhood. Among the methods used to estimate Nuptiality timing and incidence using census data are:-

i) Hajnal's (1953), Singulate mean age at marriage (SMAM) which estimates the timing and incidence by utilizing proportions single in a census.

ii) Agarwala's (1962) Mean age at marriage in a decade synthetic cohort and Sadiq's (1965) adoption for a 5-year synthetic cohort. This is a modification of SMAM which assumes that, a census represents the marital experience of a cohort as it passes through life. It involves the construction of a hypothetical cohort of proportions single exposed to marriage rates between two censuses (10-years apart) or for a 5-year period.

iii) Van de Walle's (1968) mean age at marriage in a stable population, which is a further refinement of SMAM and Synthetic cohorts as it guards against the effect of age misreporting on the resultant estimate.

iv) The Nuptiality Table is the most refined technique deviced to estimate Nuptiality (Malaker, 1978). The Net Nuptiality Table as opposed to the Gross Nuptiality Table considers the effect of mortality aside from marriage as a form of decrement of the single population.

In Kenya, marriage statistics are very defective (incomplete in coverage and content and unreliability of age reporting). Data from surveys such as the National Demographic Survey (NDS) 1977 and the Kenya Fertility Survey (KFS) 1977/78, may be more accurate but are restricted to the female population and small sample sizes, thus hamper generalization due to diversity of Nuptiality characteristics. The census information co. ected on marital status form an invaluable source of Nuptiality data in Kenya. The 1962 and earlier Censuses are less reliable than the 1969 and 1979, because of the coverage, method of collection and variables used. Thus data from the latest two censuses of 1969 and 1979 will be utilized to provide estimates of Nuptiality for Kenya after making necessary adjustments for possible sources of errors.

The importance of this study, can be noted in the contribution of the methodology towards refinement in the estimation of Nuptiality timing and incidence per se, and more so, between these variables and other demographic processes (fertility, mortality and migration). This has significant implications on the implementation of development strategies adopted in Kenya.

1.1 STATEMENT OF THE PROBLEM

The main focus of this study is to present estimates of Nuptiality from alternative methods of refining the estimates of Nuptiality using the 1969 and 1979 census data for Kenya. It partly discusses the results to determine the applicability of such methods using census data for Kenya to estimate Nuptiality at macro (national) level. Attempt is made to analyse Nuptiality at micro (regional) level.

This interest has been awakened due to widely documented studies on the significance of reliable Nuptiality estimates and the availability of data and methodology (Malaker, 1978). The study of Nuptiality remains relatively unexplored with respect to most statistically less developed countries, in particular African countries, such as Kenya. This lack of research may be attributed to:-

i) relative paucity and poor quality of appropriate data when compared with Western countries.

ii) the technicality and assumptions implicit in most methods of Nuptiality estimation do not befit data and conditions such as found in these countries.

iii) the relatively more direct relevance of studies of fertility and mortality to policy issues.

With regard to Kenya this gap in knowledge on Nuptiality estimates, has partially been abridged by World Fertility Survey (WFS) information on Kenya (WFS, 1978 ; KFS, 1977/78 Vol.1 and 11). However, this survey applied restrictive procedures to estimate Nuptiality, that is, the Singulate Median and Mean Age at Marriage. Earlier estimates utilizing census data for 1962 and 1969 and data from the NDS, applied similar methodology. No research has attempted a refinement in the estimation of Nuptiality by systematically applying alternative methods to census nor survey data at either macro or micro levels. Nuptiality estimates for 1979, have been published in a recent volume (CBS, Kenya Census, 1979, Vol.11) but these are also based on SMAM. Those for 1962 and 1969 were ethnic based and subject to incomplete coverage in addition to methodological limitations. Their reliability is further reduced by the use of data, unadjusted for errors on misreporting of age and marital status (CBS, Kenya Census, 1969, Vol.1V). Though the KFS estimates catered for regional variation in Nuptiality timing, these were based on a sample of 8093 women and unrealistically truncated the youngest age at marriage at age 15 years.

As evident from widely documented studies elsewhere, it is suggested that, in order to fully understand Nuptiality timing in the demographic as well as social and economic context, a refinement in its estimates is of paramount importance (Hajnal 1953; Agarwala, 1962; Sadiq, 1965; Afzal et al, 1974; Trussell, 1976; Malaker 1978).

The 1969 and 1979 censuses provide useful data, which this study utilizes to estimate Nuptiality for Kenya. Noting the possible effects of errors of misreporting in age and marital status on the resulting estimates, due adjustments for these errors has been made. The 1969 census, was collected on 100 percent urban response and 10 percent rural sample, using a de facto approach. The 1979 census applied a similar approach. The 1969 data are available for the population by 10 and 5-year age groups, sex and marital status, at national level and by ethnic groupings. Those for 1979 are classified by 5-year age groups (except for the 12-14 age group), sex and marital status (single, married, widowed, divorced/separated and not stated category. These are available at district, provincial and national levels. Owing to these inconsistencies among others, direct comparability of estimates is hampered at micro level. As such the study more specifically entails the achievement of the following objectives:-

1.2 OBJECTIVES

The fundamental objective of this study is methodological. The idea is to outline the principles and assumptions of specific methods suggested for estimating Nuptiality and to test the applicability of such methods for estimation of Nuptiality for Kenya.

The specific objectives are as follows:-

a) to present alternative methods of refining Nuptiality estimates using census data.

b) to examine the quality of the 1969 and 1979 census data and make due adjustments.

c) to apply the methods presented using census data at macro (1969 and 1979) and micro (1979) levels.

d) to make recommendations for further research and/or policy implications.

1.3 THE STUDY AREA

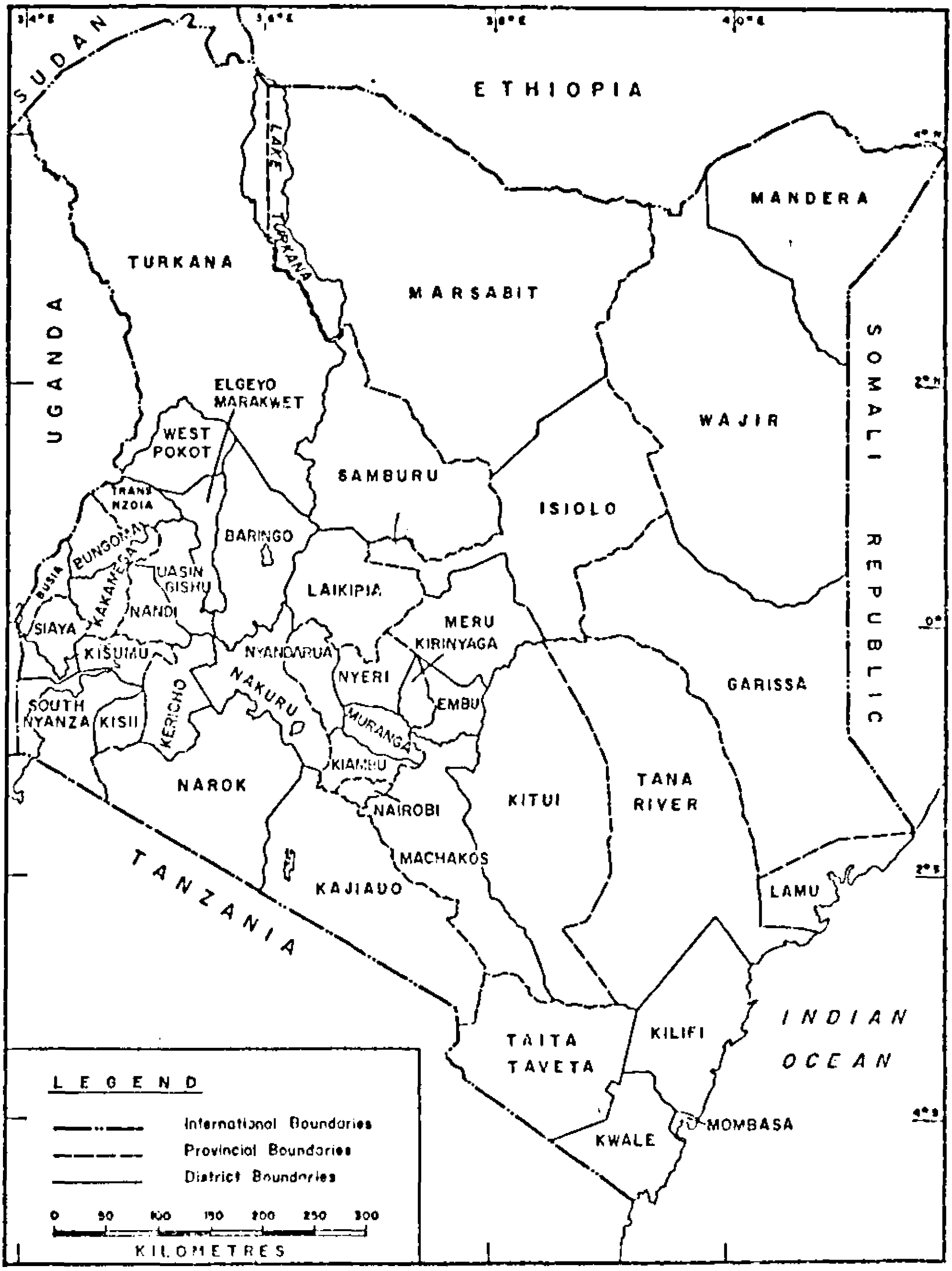
Kenya, is situated on the Eastern Coast of Africa. As shown on Map 1, it lies astride the equator, between latitudes 4°21' North and 4°28' South, and Longitudes 34° and 42° East. It borders Uganda to the West, Somalia to the East, Ethiopia to the North, Sudan to the North West, and Tanzania to the South. The Indian Ocean lies South East. The country has a total area of 582,646 square kilometres.

Administratively, Kenya is divided into 8 provinces, which are further divided into 41 districts, with Nairobi retaining its status as both a province and a district. Map 1 shows these administrative boundaries. No changes were made in boundaries of provinces and districts between 1969 and 1979. This facilitates comparison of demographic dynamics with 1969 census at these levels where data permit.

Kenya is marked by diversity in physical features (altitude, soils etc.), economic facilities (education, health, industry, agriculture, transport and communication) and cultural practices among its ethnic groups. The area of study also exhibits diversity in population distribution.

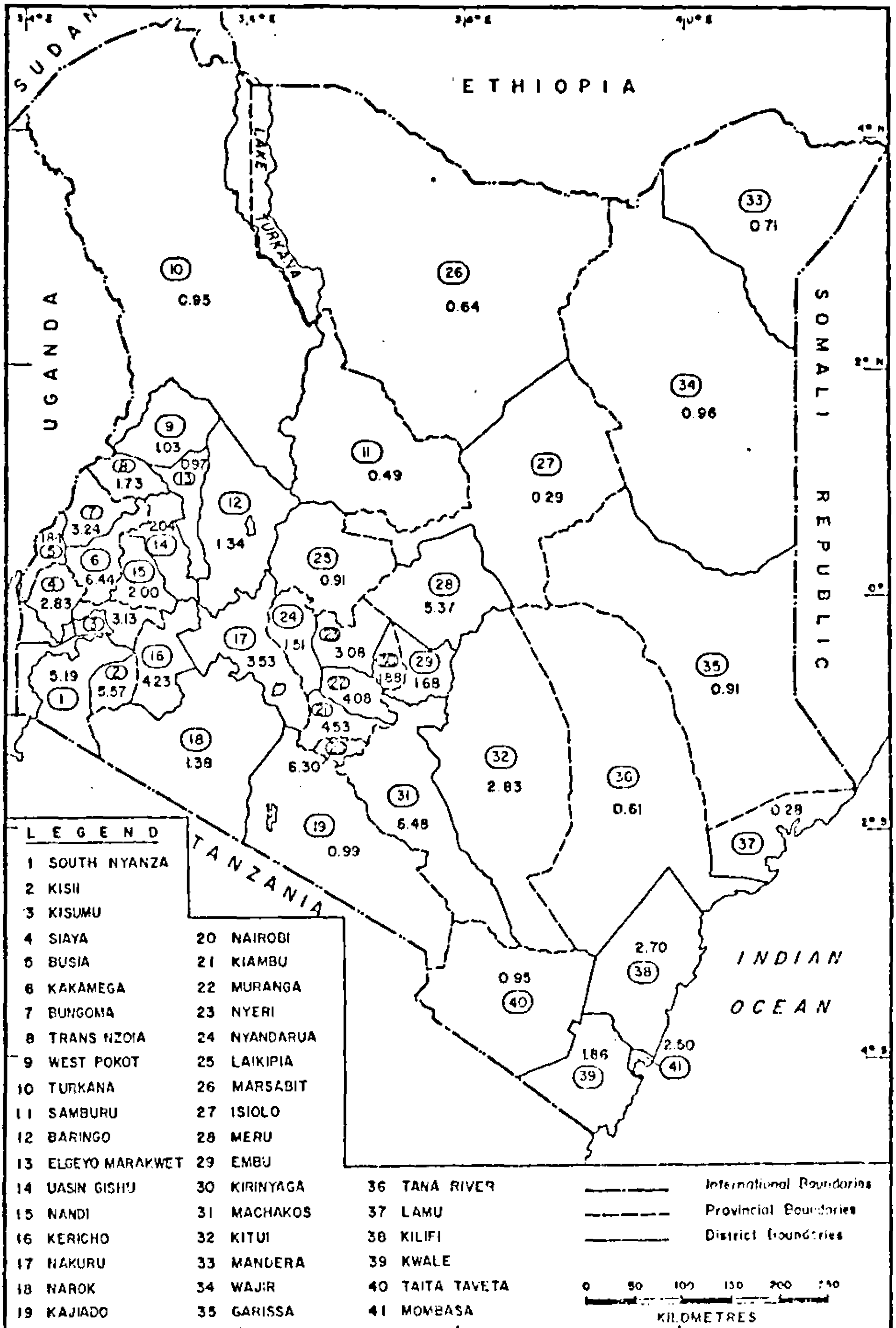
The demographic situation is highly skewed as evident from Map 2 and Map 3 for both sexes. In 1969 the total population was 10,942,705 of which 5,482,381 were males and 5,460,324 were females (CBS, Kenya Census, 1969 Vol.1V). In 1979, the population rose to a total of 15,327,061, with 7,607,113 for males and 7,719,948 for females (CBS, Kenya Census, 1979, Vol.1). However, on correction for gross underenumeration for some districts, the figure rose to 16,141,359 with 8,016,271 for males and 8,125,088 for females (CBS, Kenya Census, 1979, Vol.11). This indicated a rapid increase in population over the intercensal period. In 1969, 66.2 percent of the population was living in densily populated areas of the Lake Victoria Basin, East and West of the Rift Highlands and the Coastal Belt. By 1979 this had increased by 1 percent. As evident from Map 2 and Map 3, the northern part of the line running along West Pokot, Baringo, Laikipia, Meru, Kitui to Kilifi is sparsely populated. Southwards, the concentration is distributed according to agricultural land potential, which is governed mainly by the rainfall. The most notable districts with high population densities include, Kakamega, Bungoma, Busia, Kisii, Kisumu, South Nyanza, Siaya, Kericho, Nairobi, Kiambu, Murang'a, Meru, Machakos and Mombasa.

MAP I ADMINISTRATIVE BOUNDARIES : KENYA 1979



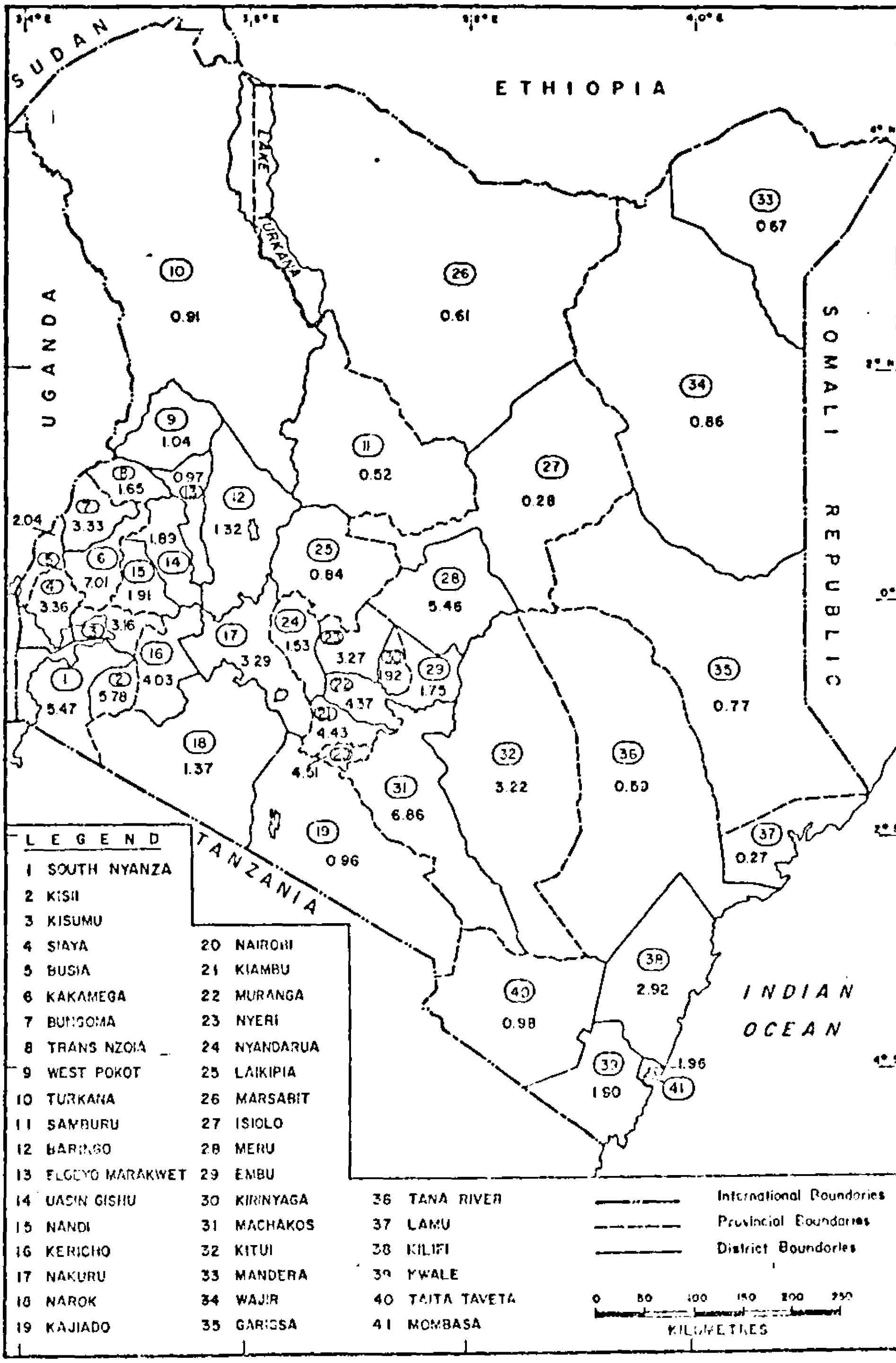
Source: National Atlas of Kenya, 1970

MAP 2 MALE PERCENTAGE OF POPULATION DISTRIBUTION : KENYA 1979



Source: 1979 Census

MAP 3 FEMALE PERCENTAGE OF POPULATION DISTRIBUTION : KENYA 1979



Source: 1979 Census

Given this uneven pattern of population distribution, a national pattern of Nuptiality can not be representative of the true situation in Kenya, if based on macro level data. Need arises to consider regional (district) patterns at micro level, from which generalization can be made of the overall situation.

1.4 LITERATURE REVIEW

Considerable attention has been given to the quantification of Nuptiality timing and incidence. This section reviews some of the literature on the methodological development in Nuptiality estimation and their applications in various countries. It in particular considers literature on Nuptiality estimation using Hajnal's (1953) SMAM; Agarwala's (1962) and Sadiq's (1965) Synthetic Cohort Model, Van de Walle's (1968) stable population approach and the Nuptiality Table.

At global level, several authors have employed varying methods in their estimation of Nuptiality. These range from the crude marriage rates, age-sex specific marriage rates, summary measures as median and mean age at marriage and their subsequent modifications, to the most refined device the Nuptiality Table, among others (Bogue, 1969). The methodological advancement has not only aimed at refining Nuptiality estimates but also at compensating for the absence or deficiency in marriage statistics as is the case for most statistically less developed countries, where censuses, remain the only valuable source of data for Nuptiality studies in such countries. Most pioneer researchers attempted to estimate Nuptiality using one census (Kumar, 1967). Presently most techniques apply two censuses. Whereas, most techniques have been deviced basing on Western experiences and data, their adoption and modification has largely been based on data and the demographic phenomena as observed in developing countries (Hajnal, 1953 - Appendix 1).

Hajnal (1953), a British demographer deviced the Singulate mean age at marriage (SMAM) to estimate Nuptiality timing. His procedure utilizes data on proportions single in a census and gives the mean age at first marriage for males or females. His findings revealed that the declining trend in age at marriage is faster for females than males in North-Western Europe. A similar trend is established for proportions single in all the countries considered. In a later study on European marriage patterns, Hajnal identified three Nuptiality patterns (Dixon, 1978) based on timing and incidence as follows:-

i) the 'European' pattern with a high age at marriage (late timing) ranging from 27.4 to 31.4 years for males and 25.8 to 28.4 years for females. The proportions of persons who never marry was found to be very high (high incidence of non-marriage).

ii) the 'Eastern European' pattern with earlier marriages ranging from 24.1 to 24.9 years for males and 20.3 to 21.5 for females. The incidence of non-marriage also being lower.

iii) the 'non-European' pattern with relatively lower ages at marriage (earlier timing) than the Eastern pattern, ranging from 18.6 to 20.8 years for males and 12.7 to 16.7 years for females and equally lower proportions remaining single (higher incidence of marriage).

Sadiq (1965) on studies in Pakistan utilized SMAM and its modification 'Synthetic Cohort' to analyse changes in patterns of marriage. Findings based on time and regional differentials reveal an upward trend in female pattern, with higher SMAM values for males than females (from 13 years in 1921 to 15.5 years in 1961 for females and a 1.6 years rise for males).

Anomalies in 1931 and 1961, were attributed to marriage restriction Acts which were widely resisted. Sadiq explains variations in regional patterns of marriage by social-cultural factors, industrialization, urbanization and literacy. Urban-rural differentials in which the rural had earlier timing and higher incidences were attributed to the fatalistic and traditional mindedness of the rural people. Age at marriage increased for all religious groups, the lowest and largest changes being among Muslims and Hindus respectively. While Christians showed the highest age at Marriage Mean Value. He further argues that, the assumption of linearity in marriages over a five-year interval age-group does not hold where most persons tend to marry in the early part of the age-group (a weakness of SMAM).

Similarly, Lesthaeghe (1971) argues that SMAM gives unsatisfactory information on estimates of Nuptiality, since it does not allow for the specification of age at which Nuptiality schedule commences nor the tempo at which it proceeds. Information from Population Reports (1979, Vol.7(6)) points out, that the importance of SMAM as an index of family size is declining because of increased deliberate use of modern methods of birth control. However, its value will persist for several decades to come because of the current number of young people of marriagable age in the developing nations.

Reddy et al; (1977), in his studies on ethnic differentials in marriage timing in Canada, using SMAM, concludes that differentials were due to specific norms derived from cultural heritage as opposed to the usual social-economic conditions. He notes that, the incidence of first marriage is highest in the 20-24 age group for both sexes and hence the given proportions married in the age group 15-19, 25-34 and 65 and above reflect the incidence of early, late and non-marriage respectively.

Dixon (1978) shows that Hajnal's classification of marriage patterns according to timing and incidence of Nuptiality still holds fairly well for countries of Europe, North Africa, Middle East, South and South-East Asia. However, from earlier studies (Dixon, 1978) on the timing and degree of Nuptiality in 57 countries, she found no correlation between age at marriage and proportions single as expected on theoretical grounds, except at age-group 40-44. Dixon, further shows that marriage patterns are changing away from early and universal in the non-Western World as a result of a decline in arranged marriages. She notes that of the three factors:- availability of mates, feasibility and desirability of marriage, feasibility and desirability of account for the greatest variation in Nuptiality pattern.

Malaker (1978) proposed a slightly different classification of marriage patterns basing on variations in SMAM over India's 14 states. He suggests four patterns in which no geographic pattern was established as follows:-

i) Very early marriage pattern (4 states) with very high SMAM (timing) and proportions married (incidence).

ii) Early marriage pattern (6 states) with high SMAM and proportions married.

iii) Slightly late marriage pattern (3 states) with medium SMAM values and proportions married.

iv) Late marriage (1 state) with low values of SMAM and proportions married.

Malaker compared several methods of Nuptiality estimation and found that SMAM overstated the marriage timing in India for both sexes (by one year for males and half a year for females). Similar observations were made on SMAM when applied to data from Tunisia (United Nations, Manual X, 1983).

Kabir (1980) demonstrates the importance of SMAM in the relationship between Nuptiality and fertility in England and Wales during the demographic transition. He observes differentials over time and regions. Studies in Japan reveal high estimates of SMAM as reflecting the postponement in marriage as a multiphasic response rather than a result of conscious effort to control family size.

Karim's (1980) studies in Pakistan reveal that SMAM shows strong evidence of changing age at marriage, though limited by the assumption of unchanging marriage patterns in the recent past. Smith P.C. et al (1983) found divergent patterns in the timing of first marriage (17-23 years) despite homogenous patterns of universal marriage (95 percent married by age 50) in all the 10 countries of Asia and the pacific for females only. Variations are attributed to the importance and persistence of cultural variations as observed by other authors. He too noted that SMAM's assumption of constant pattern over time was violated because census marriage structure are synthetic in character and describe indeterminate periods before the censuses. He further argues that a systematic bias in age at marriage arising from response and random heaping errors tends to over or understate Nuptiality timing.

Stycos (1983) on timing of Spanish marriages,.Rindfuss, et al (1983) on timing of entry into motherhood in Asia, Caldwell et al (1983) on Causes of marriage changes in South India are recent applications of SMAM that attribute variations in Nuptiality timing to cultural and tribal customs. These observations are akin to Van de Walle's (1968) earlier studies in Tropical Africa.

Caldwell, et al (1984) recent studies on Chinese Nuptiality reveals a rise in timing from 18.2 years in 1940 to 19.8 in 1960, at a rate of 0.7 years per annum, then to 23.1 years in 1980. Similarly, he attributed this rise to the cultural revolution and the minimum legal age at marriage in 1982 (23 years). He contends that, half the population marries early (50 percent married by age 23) and marriage is universal (99.85 percent married by age 50). Caldwell points out an increase in urban-rural differential from one year in 1940 to three years in 1982.

In Kenya, estimates (using SMAM) from 1962, 1969 and 1979 censuses, the NDS (1977) and KFS (1977/78, Vol.1 and 11) indicate that marriage is early and universal but rising in timing. The KFS reveals that a strong inverse relationship exists between marital status, age at marriage and cumulative fertility though childbearing is not confined to marriage. The survey also indicates that contraceptive use varies with marital status. Several other studies in examining the importance of age at marriage to fertility suggest an early and universal pattern of Nuptiality in Kenya (Muinde, 1979; Mosley et al, 1982; Ahawo, 1982; UN-ECA, 1983). Trends show a rise in female SMAM value from 18.4 years in 1962 to 20 years in 1978 and 20.24 in 1979. Differentials are explained strongly by regional, educational and ethnic factors and modestly by urban-rural, which contradicts studies elsewhere on such differentials (KFS, Vol.1 1977/78). Estimates for SMAM are also published for ethnic groups from the 1969 census data, where the Pokomo-Riverine tribe had the lowest values for both sexes (21.1 for males and 16.3 for females) and the Gabbra males and Kikuyu females registered the highest values in Nuptiality timing. The latest publication (CBS, Kenya Census 1979 Vol.11) reveals that SMAM has risen over the past decade for both sexes.

From the foregoing review on Kenya, it is evident that no systematic studies have been carried out to refine estimates of Nuptiality nor has SMAM been applied to the latest census (1979) at micro level.

Therefore, this study attempts to refine estimates of Nuptiality for Kenya using 1969 and 1979 census data at macro level and derive SMAM estimates at micro level using 1979 district census data on marital status.

"The essence of the technique adopted by John Hajnal is to assume that a census represents the marital experience of a cohort as it passes through life. This assumption is perhaps adequate for comparing groups with persistent differences in age at marriage on the assumption that short-term differences in each are minor as against major differences among them. But, as Hajnal also points out, it is theoretically indefensible in instances where age patterns of marriage are changing to assume that the cross-sectional marital status data in a census represents experience of a cohort actually experienced by it in the course of its time." (Agarwala, 1962). Hence construction of a hypothetical cohort of proportions single exposed to marriage rates between two censuses is necessary, before SMAM can be computed.

The construction can be for a 5-year synthetic cohort (Sadiq, 1965) or for a 'decade synthetic cohort' (Agarwala, 1962). Agarwala (1969) studied marriage patterns in some ECAFE countries using this approach and found variations in mean age at marriage for the 'decade synthetic' cohort as follows:-

For females	18 years	(3 countries)
	18-23 years	(13 countries)
	23 years	(3 countries)
For males	23 years	(4 countries)
	23-26 years	(10 countries)
	27 years	(5 countries)

Basing on these groupings, he established three marriage patterns (early, normal and late). Furthermore, he observed that marriage probabilities and frequencies showed increasing trends of age and variations by urban-rural and ethnic factors. United Nations (Manual X, 1983) application of the method to data for Tunisia finds that Hajnal's SMAM overstates the timing. It is noted that similar estimates may result from the two procedures (SMAM and Decade Synthetic Cohort) if marriage were universal with no violent fluctuations in marriage rates in the recent past and when migration and mortality by marital status are negligible. Sadiq (1965) applied the Synthetic Cohort method using a shorter interval (5-year) for Pakistan. He, too noted the divergence in the estimates of Nuptiality timing compared to Hajnal's SMAM, due to the unrealistic assumption of constancy in marriage rates over a recent past. This study, entails the construction of Synthetic Cohorts for both 5-year and 10-year period using 1969 and 1979 censuses data at macro level, as a step towards refinement of Nuptiality estimates for Kenya.

While demographers have found Hajnal's original SMAM and its modification (Synthetic Cohort approach) useful and readily calculated from tabulated census data, Trussell (1976) notes "Because of bias of unknown sign and extent introduced by age misreporting when calculating the singulate mean age at marriage in the usual manner, Van de Walle has suggested a fairly robust estimator based on stable population structure." In Van de Walle's (1968) procedure no individual evaluation of age is required, rendering the estimator free of bias arising from age mis-statement. Various demographers have argued that Van de Walle's mean age at marriage in a stable population estimates the SMAM and the Synthetic Cohort mean age at marriage (Trussell, 1976). Malaker (1978) applied both SMAM and Van de Walle's methods using India's census data and found that SMAM overstated Nuptiality timing although the data validated the application of the latter. Van de Walle (1968) noted that Nuptiality timing varied over regions in Tropical Africa (13.2 years in Nigeria to 19.2 in Congo) for females. Since the method depends on the choice of stable population, comparability with other procedures is unreliable. Other studies applying the technique to estimate Nuptiality include, Trussell (1976) who made a comparative analysis of the three procedures (SMAM, Synthetic Cohort and Stable Population). This study undertakes to estimate Nuptiality at macro level utilizing Van de Walle's approach as yet a further refinement in Nuptiality estimates.

The Nuptiality Table is among the oldest and most refined devices used to study marriage timing and incidence patterns as noted by several researchers (Kumar, 1967; Malaker, 1978). Its historical development and formulae date back to Kuczyski's 1938 works (Malaker, 1978). Several works such as by Grabill (1945), Mertens (1965), Kumar (1967), Afzal, et al, (1974), Laing, et al, (1977), Malaker (1978) are among other significant developments of the technique. The construction of Nuptiality Tables follows the Life Table approach, where marriage is treated as the only form of decrement, a Gross Nuptiality Table (GNT) results, if in addition, mortality is considered, it is referred to as the Net Nuptiality Table (NNT). The tables give such information as, mean age at marriage, chance and rate of marriage at any given age in a population (Kumar, 1967). The GNT is more useful in comparative studies, while the NNT, in studies of replacement level through projections for married persons as potential users of contraception (Afzal et al, 1974; Grabill, 1969).

Afzal's (1974) findings from the construction of NNT for both sexes in Pakistan shows that marriage probabilities are greater for females in younger ages, but the reverse occurs at older ages. This indicates a concentration of marriages in younger age for females. Sex differences are also observed in percentages of first marriages at a particular age and over, in expected years to marriage (at both males record 19.39 and females 14.19 years). Comparing SMAM estimates by Sadiq (1965) for Pakistan (23.5 and 17.6 for males and females) and the mean age at marriage from Afzal's (1974) NNT (25 and 19 years for males and females respectively) there seems to be a rise in marriage timing between 1965 and 1974. The average years of life after marrying are estimated at 30.4 and 33.69 for males and females. Afzal, points out that errors of age reporting and coverage limit the reliability of estimates from NNT. SMAM estimates for 1974 were not available for direct comparison.

Laing et al., (1977) analysed first marriage decrement Tables for Canada and noted changes in pattern through increasing age at marriage and a narrowing of sex differences in estimates. He cites important methodological problems involved in the application of Life Table technique to marriage as arising from assumptions made. For example, in Nuptiality, not all persons marry as characteristic of Life Tables where all persons are mortal. Therefore a skewed uni-modal curve results instead of the characteristic 'U'shape curve. Furthermore, the arbitrary truncation of age at marriage for the upper and lower limits may ignore small but significant proportions of marriages.

Malaker (1978) observed a young pattern in age at marriage (early timing) for both sexes, with females probabilities of marriage hitting a maximum much earlier and having sharper peaks than males. These observations,are akin to those of Afzal's (1974) in Pakistan. Malaker's studies further reveal a changing age pattern for females in particular from very early during the 1920's to slightly late during the 1960's. He concludes that marriage is universal (high prospects of eventual marriage) and that a significant number of marriages for females occur below age 20. No research has yet been undertaken to construct Nuptiality Tables (Gross and Net) for Kenya using census data for 1969 and 1979 at macro level as this study has carried out.

From the above review no study has systematically applied several alternative techniques to estimate Nuptiality for Kenya using census data at either macro or micro levels. The study, therefore, applies four techniques of estimating Nuptiality in an attempt not only to determine the effect of methodology on Nuptiality estimates, but also to refine such estimates for Kenya. Such a study is of paramount importance, as no one type of procedure yields accurate and reliable estimates as implicit in their assumptions. A further attempt is made to provide regional Nuptiality estimates for all the 41 districts in Kenya using the 1979 census data basing on SMAM technique. This is a major step not only towards understanding Nuptiality dynamics per se, but of Nuptiality vis-a-vis other demographic processes, in particular of fertility.

1.5 THEORETICAL FRAMEWORK

"Marital status constitutes a demographic characteristic which involves biological, social, economic, legal,cultural and in many cases religious aspects." (U.N.-ECA, 1983). Marital status is commonly divided into four categories (single, married, widowed, separated/divorced), though in countries as Latin America Consensual unions (living together) form other different status. Demographers prefer to work under two categories; the never-married (single) and the ever-married (married, widowed, divorced and separated). Marital status is a net function of Nuptiality, widowhood, divorce and separation.

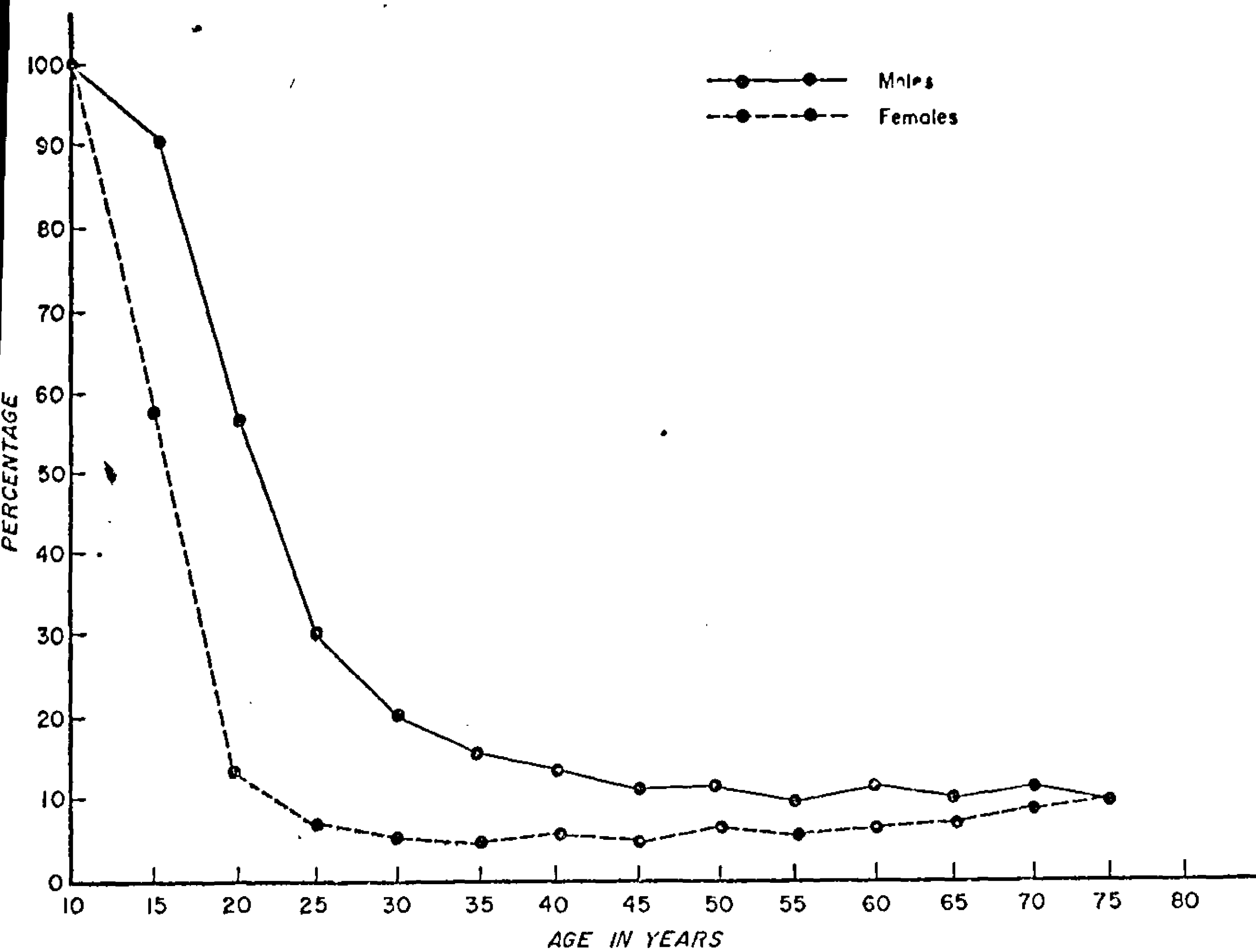
Each of these three processes has a rate of timing, incidence and prevalence. The present study focuses on the estimation of Nuptiality timing and incidence and not the comparative prevalence of the statuses that result from their joint action in marital status composition.

In this study, we proceed from the theoretical formulation that 'Nuptiality patterns vary in their timing and incidence in any given society.' These characteristics (timing and incidence) constitute significant aspects in the mechanisms for regulating reproductive behaviour, though childbearing is not in practice limited to marital unions, but rather are seen as socially approved institutions for precreation. Demographers consider marriage and its dissolution as vital processes, thus, the age at which a population marries (timing) and the proportion of the population that marries and the extent of marriage dissolution (death or divorce) are of specific interest. Marriage is a universal phenomena as it occurs in any given society.

As the literature review suggests, marriage varies in its timing and incidence. There are several factors associated with such variation, which include;

methods of estimation, age, sex, education, region residence, ethnicity, cultural and customary, socio-economic and psychological factors, among others. Ruth Dixon (1971) proposed that availability of mates, feasibility of marriage and desirability of marriage do account for variation in Nuptiality timing and degree. In her explanation of cross-cultural variations in timing (age at marriage) and incidence (proportions ever marrying), she found no relationship between the two variables except at older ages (over 40). Several other researchers have shown that the relationship between marriage timing and incidence holds and have therefore proceeded to suggest marriage patterns (Malaker, 1978). Below is an example of the relationship between these two variables (figure 1.1).

Fig. 1.1 THE TIMING AND INCIDENCE OF MARRIAGE BY SEX (UGANDA, 1969)



Source: Kpedekpo, G.M.K (1982), pp 133, Figure 8.2

The above graph clearly shows that Nuptiality timing and incidence vary by age and sex. The general shape of the Nuptiality curve (schedule) tends to be standard, though distinct for various populations in the timing and incidence (Coale A.J.,1971). Bogue (1969) suggested that a typical age-sex marriage pattern is three-fold.

i) the proportion marrying rises very swiftly between ages 18 and 22 for females and 20 to 25 for males.

ii) then it declines slowly as some marriages are dissolved and proportions divorced increases.

iii) increasing mortality at ages beyond 50 tends to create a rapid rise in proportions widowed.

From the above pattern, he argued that:

i) children and adolescents tend to be single.

ii) young adults and adults tend to be married.

iii) females tend to marry earlier than males.

Demographers often seek measurement of Nuptiality in an effort to derive plausible estimates of its timing and incidence. The well-known problems of age mis-reporting and uncertainty about the time when marriage starts have hindered achievement of this objective in the past for most African countries. However, presently, several techniques are available which directly consider such limitations in data and attempt to refine Nuptiality estimates for African countries. These include; SMAM, Synthetic Cohort, Stable Population and Nuptiality Tables. As ev ident from the literature review, estimates of Nuptiality for Kenya are crude and scattered from censuses (1962, 1969 and 1979) at macro level and surveys (NDS, KFS). To understand better the characteristics of Nuptiality patterns for Kenya, need arises to utilize some of the alternative methods of estimation.

The exact age at first marriage (timing) may vary substancially by method of estimation, over regions, time, sex, and from one nation to another. The measurement of Nuptiality timing entails estimation of the average age at first marriage. If marriage was exclusively a physiological function, one would expect this average age at first marriage to gravitate around menarchial age (for females). In this study, holding all other factors constant, it is conceptualized that marriage timing varies by method of estimation and over regions.

The incidence of marriage, too varies from population to population, over time and regions, by age, sex and method of estimation. It is the percentage of the population that marries at least once during their life cycle (proportions ever marrying). For females relatively few tend to marry for the first time beyond age 45 or 50. Thus the proportion married by this age may be taken as an estimate of the proportion ever marrying (incidence). However, since a certain percentage of population never-marries, the proportion ever-marrying is, therefore, best estimated by the proportions never marrying at age group 45-49 subtracted from 100. The reason being that data for older ages (>50) may represent patterns of ever marrying for older generations, while data for younger ages (<45) may refer to cohorts still getting married. In this study the incidence is estimated using the various techniques and for the different regions in Kenya. The classification is as follows (Bogue, 1969):

i) 95 percent ever married - high incidence

ii) 90-95 ever married - intermediate or normal incidence

iii) <90 percent ever married - low incidence of marriage.

The relationship between the timing and incidence of marriage is generally given as:

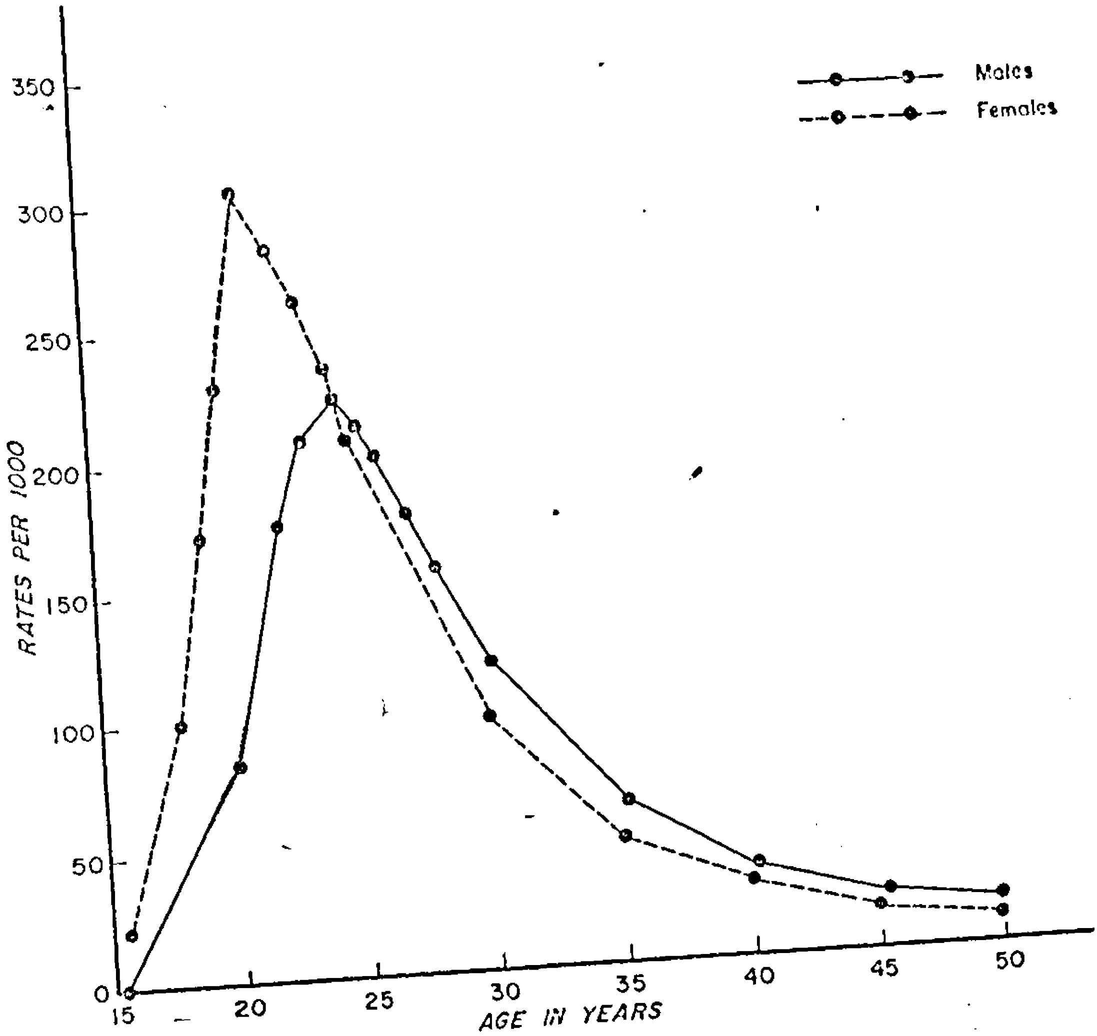
i) early marriage timing - high incidence of marriage.

ii) late marriage - low marriage incidence.

Again this relationship is general but distinct (unique) for each nation, over regions, time, and for method of estimation. The latter tends to hold for the more industrialized nations while the former for the less industrialized, in particular African nations. These two characteristics, pair up, to give rise to different patterns of marriage (early, normal, late).

In general marriage patterns also vary by sex, in that males tend to marry about 5 years older than their counterparts. Males also tend to characterize a lower marriage incidence than females. The incidence varies from age 10, and reaches a maximum at age 30 or 35. At the maximum, at least 20 percent more females are married than males. The diagram below represents such relationships (Figure 1.2).

Fig.1.2. FIRST MARRIAGE RATES BY SEX AND AGE (ENGLAND AND WALES, 1961



Source: Kpedekpo, G.M.K. (1982), pp 130, Figure 8.1

In general females (brides) have an earlier and sharper peak, while males a later and broader peak of marriage rates.

The study is basically methodological and descriptive. An attempt is made to comprehensively assess methodological contribution to the variation in Nuptiality estimates for Kenya by applying four alternative methods of estimating at macro level. These methods have been selected on the basis of refining the estimates on timing and incidence. In each method the implicit assumption are directly tested to establish the validity of its application, using the 1969 and 1979 census data. The study also sets to establish regional patterns of Nuptiality basing on SMAM (Hajnal 1953) utilizing the 1979 census data for the 41 districts. This is in view of the noted regional diversity in the country's demographic characteristics among others.

From the theoretical formulation that 'Nuptiality patterns vary in their Timing and Incidence in any given Society', the following hypotheses are conceptualized:

i) The Timing of Nuptiality tends to vary by method of estimation, over regions, age and sex.

ii) The Incidence of Nuptiality tends to vary by method of estimation, over regions, age and sex.

iii) The Timing of Nuptiality is correlated to its Incidence.

The following are the operational hypotheses:-

1) Age at Marriage is likely to be higher for period (SMAM, Stable Population) than for cohort (Synthetic Cohort and Nuptiality Tables) Methods.

2) Age at Marriage varies substantially over the 41 administrative districts in Kenya.

3) The Incidence of Marriage is likely to vary from SMAM, Synthetic Cohorts, Stable Population and Nuptiality Tables.

4) The Incidence of Marriage varies highly over the 41 administrative districts in Kenya.

5) Adults are more likely to be married than children and adolescents.

6) Female tend to marry earlier than males.

7) Females have a higher Incidence of Marriage than males.

8) Marriage Timing and Incidence are highly correlated.

9) Early Marriage Timing implies a high Marriage Incidence.

10. Late Marriage Timing implies a low marriage Incidence.

The hypotheses implicit in the methods are directly tested through their application.

1.6 OPERATIONAL DEFINITIONS

This section defines terms used in the theoretical formulation of the study.

NUPTIALITY

Nuptiality can be defined as the subject of formation and dissolution of sexual unions, more sepecifically the frequency, characteristics and dissolution of marriage unions. In this study, Nuptiality is used as a synonym for marriage and understood as a process of passing from single to the ever married status, irrespective of the form of marriage. The pattern, refers to the sum total of the timing of entry in to marital union, the incidence and frequency at which it occurs in a population. Timing, refers to the change in the status from single to married and it involves the estimation of the average age at first marriage. Incidence, is the frequency of/change in the proportions ever marrying. It is estimated as a complement of proportions never married by age 50. This is because few women marry for the first time after age 45 or 50, and a certain percentage of the population never marries. The data for ages below 45 may refer to cohorts still getting married, while that for ages above 50, may refer to patterns of ever marrying for older generations.

MARRIAGE

This may be defined "as a culturally approved relationship of one man and one woman (monogamy), of one man and two or more women (polygyny) or of one woman and two or more men (polyandry), in which there is cultural endorsement of sexual intercourse between the marital partners of opposite sex and generally the expectation that children will be born of the relationship." (Malaker, 1978).

MARITAL STATUS

Refers to the legal, religious or customary status of an individual in relation to marriage. The usual classifications include single, married, widowed, divorced or separated and not stated.

In the Kenyan censuses martial status was defined as:-

SINGLE: persons who have never married.

MARRIED: persons living together as man and wife whether or not they have been through any civil, religious or customary ceremonies.

<u>WIDOWED</u>: persons whose spouses have died but have not remarried.

<u>DIVORCED</u>: persons who have finally agreed to part by securing civil, religious or customary endorsement and are therefore eligible for marriage.

<u>SEPARATED</u>: persons who have temporarily agreed to part pending divorce action or reconciliation.

<u>NOT STATED</u>: Unknown

All the above definitions were as recommended by the United Nations.

The above categories of marital status are frequently divided into two for demographic analysis.

<u>NEVER-MARRIED</u>: persons who have never entered marriage before (irrespective of the marriage form).

EVER-MARRIED: persons of the married, widowed, divorced, separated categories. It is a complement of never-married.

CONSENSUAL UNIONS: According to the Population Reference Bureau's, Population Handbook (1980), Consensual Unions were defined as cohabitation by an unmarried couple for an extended period of time. Though stable in some cases, in official statistics people living in such unions are considered to be unmarried and their children technically illegitimate.

1.7 THE SIGNIFICANCE OF THE STUDY

This study is undertaken in recognition of the demographic, social, economic and psychological significances of Nuptiality studies (Grabill, 1969; IUSSP, 1974; Laing, et al., 1977; Malaker, 1978; Kpedekpo, 1982; U.N.-ECA, 1983). Such significance cannot be divorced of statistical analysis.

Trussell (1976) contends that "Demographers have long found the analysis of Nuptiality rewarding, primarily because of the influence of age at marriage on fertility." Though declining in significance with the advent of the pill, decisions on age at marriage will for decades to come determine the pace of population growth in developing nations. Delayed marriage, reduces the rate of population growth as it often means a shorter period of reproductive life exposed to pregnancy possibility and also longer intervals between generations (Population Reports, Vol,7(6), 1979). The United Nations, Economic Commission for Africa on African Population Studies (No.5, 1983) report indicates that the relationship between age at marriage and fertility is very high (girls are expected to get pregnant soon after marriage ceremonies).

Sociological importance of the study stems from observations that high age at marriage often leads to more stable marriages because women enter marriage with greater emotional and physical maturity to meet the challenges of the new life. A high age at marriage also reduces divorce and dissolution of unions as duration of marriage is an effective determinant of first new birth intervals. However, illegitimacy and single parenthood increases.

The economic significance touches on policy issues such as demand for housing for the married, through projection of marriage rates. Policies on population control will find regional patterns of Nuptiality of great importance to fertility differentials in relation to, setting of legal minimum ages at marriage for both sexes, those encouraging postponement of marriage such as education (school attendence) and the labour force participation especially for females (Malaker, 1978). The Nuptiality Table is significant as a demographic model for in depth understanding of marriage characteristics and patterns.

The regional patterns are directly related to the 'district focus for rural development' strategy in Kenya, as these form the basis of a fuller understanding of demographic factors in more comprehensive and realistic policy formulation in a general integrated approach.

1.8 SCOPE AND LIMITATIONS OF THE STUDY

1.8.1 SCOPE

The estimation of Nuptiality for Kenya constitutes the estimation of its timing and incidence. Nuptiality as a vital process affects fertility tremendously and mortality and migration to a lesser degree. It involves biological, social, economic, legal, cultural and religious aspects.

The timing and incidence of marriage constitute significant aspects in mechanisms for regulating reproductive behaviour. Analysis of fertility differentials often have to utilize marital patterns and differences in timing and incidence. Therefore, both descriptive and analytical interest in the study of marriage and fertility must focus more on estimation of these variables (age at first marriage and proportions ever marrying).

It is in this respect, that the study undertakes to estimate Nuptiality for Kenya using data from the two latest decennial censuses (1969 and 1979). Four alternative procedures are applied in an attempt to refine these estimates. Finally, estimates for the 41 districts are derived using SMAM procedure, basing on the 1979 census data, to determine regional patterns in Nuptiality estimates for Kenya.

Nuptiality timing (age at first marriage) forms an important basis for fertility studies, where entry into first marriage can be used as a rough indicator of the start of a woman's exposure to the risk of childbearing (though cultural differences prevail in the definition of marriage). It also determines the mean length of exposure to the risk of childbearing. Nuptiality timing, also relates indirectly to fertility through such variables as education. It's estimation using Life Table models is significant in fertility projections, manpower potential, school enrolment requirements, housing, food and types of goods and services to be produced. Thus, the four procedures (SMAM, Synthetic Cohort, Stable Population and Nuptiality Table) are applied in search of accurate information on levels and trends of Nuptiality. This is essential for planners and policy makers, among others. The incidence of Nuptiality is closely tied up with its timing in the determination of the overall Nuptiality patterns.

1.8.2 LIMITATIONS

The estimation of marriage variables is hampered in most statistically less developed nations by the well-known problems of age misreporting, uncertainty about the time when marriage starts and marital status misreporting. The lack of a standard definitions for marital statuses further limits the scope for comparative analysis.

In Kenya as is the case with most African countries, marriage statistics are incomplete and hence unreliable for estimation of Nuptiality at macro levels. Thus census data remains the most valuable source of marital information in Kenya. The use of census data, gives rise to a serious limitation in that, lack of a probe question to establish current status of a person may lead to erroneous estimates of the timing and incidence of marriage.

The study is methodological and thus does not entail a comprehensive survey of factors that may give rise to variations in Nuptiality estimates, except by method of estimation and over regions. The conceptual framework is thus restricted to these factors.

1.9 OUTLINE OF THE STUDY

The first of the six chapters in this study, gives a general introduction to the study. This includes an introduction, statement of the problem, objectives of the study, the study area, literature review, theoretical framework, operational definitions, significance, scope and limitations of the study, and an outline of the study.

The second, deals with presentation of methodology applied in the study. This constitutes an introduction, data sources, scope and limitations, methods of data evaluation and adjustments and for Nuptiality estimation giving their formulae and assumptions, then a summary to the chapter.

The third, focuses on the evaluation of the quality of census data. It gives an introduction, brief review of marital data in Kenya, Sources and effects of errors in Nuptiality data, Evaluation of marital data - patterns of errors in the censuses at macro (1969 and 1979) and micro (1979) levels, an adjustment for age and marital status misreporting and a summary.

The fourth, entails the presentation and discussion of Nuptiality estimates at national level, basing on the four methods. It consists of an introduction; estimation using SMAM; Synthetic Cohorts; Stable Population; and Nuptiality Tables; a discussion of these alternative estimates at national level and a summary.

The fifth chapter, constitutes the estimation of Nuptiality at regional level. It gives an introduction, estimates from SMAM using 1979 census data for the 41 districts, a descriptive classification of the regional patterns of Nuptiality and a summary.

The last chapter, gives the study's overall summary, conclusions and recommendations. This is followed by the bibliography and appendices.

CHAPTER TWO

2. METHODOLOGY FOR DATA EVALUATION, ADJUSTMENT AND ESTIMATION OF NUPTIALITY

2.0 INTRODUCTION

The timing (age at first marriage) and incidence (proportions marrying) of marriage are perhaps the most important predictor variables of the level of marital fertility. As such the estimation of age at first marriage is rewarding as it leads to investigation of the proportion of reproductive period during which a women is exposed to the risk of childbearing. The types of marriages and marital statuses, also have a significant bearing upon the completed family size.

The timing of marriage and its incidence differs among nations, regions and sexes over a given period or given point in time. It is, therefore useful to derive reliable estimates of these variables, before any meaningful variations and/or relationships with marital fertility can be drawn. However, the methods of estimation are usually sensitive to the biases arising from age and marital status mis-reporting. Such data as found in the less developing countries are not free of these errors.

This chapter, consists of a presentation of the data sources, scope and limitations; several methods for data evaluation, adjustment and four methods for Nuptiality estimation; then a summary. It aims to fulfil the first objective of the study. The four methods for estimation of marriage timing and incidence utilize _ data for 1969 and 1979 censuses for Kenya. These include; Hajnal's (1953) SMAM; Agarwala's (1962) and Sadiq's (1965) Synthetic Cohort approach; Van de Walle's (1968) estimator based on Stable Population; and the Nuptiality Tables (Gross and Net) following Malaker's (1978) approach. These methods are alternative measures of Nuptiality timing and incidence as they vary in the degree of refinement of the estimates. The Nuptiality Table is considered the most refined model applied in such estimations and other useful functions are readily derived from these tables for both the study of Nuptiality as well as fertility.

2.1 DATA SOURCES

There are several sources of Nuptiality data. These include marriage registration statistics, sample surveys and censuses, among others. Censuses form the most valuable source of marriage data in Kenya for the following reasons:-

i) Marriage registration, in Kenya is relatively incomplete, as not all areas of the country are covered. Even within particular areas not all forms of marriage that may be prevalent are registered (concensual and polygamous unions tend to be underestimated). The 21 days notice within which a marriage should be registered is not adhered to in most areas.

ii) There is a tendency to misreport age and dates at marriage during registration and surveys. In addition, discrepancy often occurs between the reporting of the time and place of occurance of a marriage event, vis-a-vis, the time and place of its registration. As such, data of this nature may yield very misleading estimates of marriage timing and incidence.

iii) Sample surveys are often restricted in sample size, selection bias and non-response errors as characterized in the Kenya's NDS (1977) and KFS (1977/78). This greatly hampers the level of generalization.

For the censuses, the information is relatively more recent (1979), however, these are also beset by errors of varying nature.

In this study, only census data for Kenya are utilized to derive estimates of Nuptiality timing and incidence. At the national level, the marital information from the two latest decennial censuses (1969 and 1979) for Kenya are applied. In the case of Nuptiality Tables, mortality information is from the census estimates. The information is classified by age and sex. At regional level, similar information is required by age and sex on marital statuses from the 1979 census of Kenya. This covers all the 41 administrative districts for Kenya. Data from the 1962 census, NDS (1977) survey and KFS (1977/78) survey, are utilized for comparison at national level.

2.2 DATA SCOPE AND LIMITATIONS

2.2.1 SCOPE

The data are available for the population classified by quinquennial age-groups, sex and marital status (single, married, widowed, divorced/separated and not stated). The age ranges covered are 0-70 (1969) and 0-75 (1979). The data for 1969 were collected on a de facto basis on 100 percent response in all urban areas, and only 10 percent sample response in rural areas. For the same census, questions on marital status were asked for those aged 12 and above only. The data were tabulated by 5-year age-groups up to age 40 and then by 10-year intervals up to age 70. These were published at national level for each sex (CBS, Kenya Census Vol.111, 1969 Tables 6). Data for 1969 on marital statuses also exists by ethnic groups (though not published). Similar data are available from 1962 census on racial basis.

The 1979 data were collected on a de facto basis as that for 1969. Though unpublished, the data are available at Central Bureau of Statistics (CBS) at district, provincial and national levels (Table 14). There is consistency in the classification of marital status as recommended by the United Nations in the 1969 and 1979 censuses. The 1979 data were tabulated by 5-year age interval, except the age-bracket 12-14. Other data are from the NDS (1977), KFS (1977/78) on female proportions single by age and sex. Mortality rates are borrowed from the census estimates for 1969-1979 by Nyokangi (1984).

2.2.2 LIMITATIONS

Marriage statistics are incomplete and hence unreliable for Nuptiality estimation at macro level. The KFS data is sampled for females only. Thus census data are the most complete and valuable source of marital status information in Kenya.

Owing to similaries in methods of collection for the 1969 (de facto.) and 1979 (de facto) censuses, direct comparability of estimates is not hampered at national level. The study will, however, undertake a regional analysis based on 1979 district level data only. These are relatively recent, complete in coverage and relevant to development strategies adopted in the country. Such data were not tabulated by region for 1969 Census but by ethnic groups. Another limitation of data relates to time series analysis. The data are restrictive in that only intercensal variations at national level are possible. This is because of the short period for which information by census is available (1962-1979) and the inconsistency in the coverage for earlier censuses. The 1962 census excluded North Eastern Province, the 1969 were based on only 10 percent rural response.

Further limitations arise from possible effects of errors and bias in misreporting of age and marital status. These include under or over statement of age, misreporting, misclassification of marital status which together grossly affect resulting estimates to varying degrees. Appropriate techniques have been applied to adjust for such errors to improve the accuracy and paucity of estimates. Gross underenumeration in the 1979 census for some districts such as Siaya, though corrected for (CBS, Kenya Census, 1979 Vol.11) it may still have impact on the marital status distribution. That is,the correction was not inclusive of reporting of marital status age-wise.

2.3 METHODS OF EVALUATION OF MARITAL DATA

This section presents some techniques used for appraisal of the quality of marital data from the censuses. These are; the single year of age population distribution, five-year total population distribution, sex-ratios by 5-year age-groups, Myers' and Whipple's summary indices and the United Nations Age-Sex Accuracy Index. In addition, the proportions single for 1962, NDS (1977) and KFS (1977/78) and age and marital status 'unknown' are used to evaluate the consistency in marital status reporting age-wise in the 1969 and 1979 censuses. The 1979 data for total population were corrected and graduated for underenumeration and age-reporting (CBS, Kenya Census, 1979, Vol.11 p.122).

The single year age distribution of the population is a very useful measure of age misreporting. This is because it shows obvious irregularities of preferences or avoidance for certain age terminal digits. However, it is difficult to draw a summary of the detailed features. Moreover, it does not indicate the magnitude (but direction) of the bias. This method has been applied to 1969 and 1979 data at national levels for both sexes. The age range considered are 5-55. And at regional level, using 1979 (41 districts) for ages 0-60.

The distribution of population by 5-year age-group and sex, has been used to examine possible omissions or age misplacements at national level only. The age range considered is 10-55. Again the relative magnitude of error is not given.

The sex-ratios are useful in testing the accuracy of reporting by sex and roughly indicate the reliability of census data. The overall ratios are given for both 1969 and 1979. These are measured against the ideal value of 100 for a country. A value less than 100 indicates relative underenumeration of males, one over 100, shows the reverse. For 5-year age-groups the ratios are computed from age-range 10-14 to 50-55 at macro level only. On the whole these, help identify the pattern of under or over enumeration age-wise.

The Myers' Index, is an overall summary measure of the extent to which there is digital preference and/or avoidance in census age data. However, it caters for each of the 10 digits (0-9) as opposed to the Whipple's 2 digits (0,5). The Index requires population distribution in single years of age. It assumes, that there is a gradual decline in the numbers from one age to another, because of the effect of mortality. It further assumes that if the distribution of population by ages ending in any of the 10 digits (0-9) is approximately 10 percent, of the total blended population, then there is no terminal digital preference or avoidance. A sum over 10 percent of the blended population, shows that there is digital preference, below 10 percent, implies digital avoidance. However, the Index is restricted to detecting only errors of digital preference and/or avoidance. The computational procedure for this study, truncates the age limits at 10 and 60.

Theoretically, the value of Myers' Index should vary from 0-180 or 0-90 (divided by 2). A value of 0, indicates that there is no terminal digit preference and/or avoidance, and the blended total population therefore approximates 10 percent. The extreme value 180 or 90, shows a very high preference and/or avoidance for each of the 10 digits. The Index values are calculated at national and regional levels for both sexes.

The Whipple's Index, measure the extent of digital preference and applies where the population is in single years of age. This index is limited to measurement of age heaping at terminal digits 0 and 5 only. It is also arbitrarily restricted to the age range 23-62 years for the denominator and 25-60 for the numerator. Thus it suffers a shortcoming as heaping occurs at other digits other than 0 and 5. Similarly, the omission of ages below 23 (at which most mistatement occurs) is unrealistic. The index varies between 100, representing no heaping, to 500, implying the entire population had age terminating in either 0 or 5. The scale for interpretation is given as below (Shryock and Siegel, 1976).

DATA QUALITY	INDEX
Highly Accurate	<105
Fairly Accurate	105-109.9
Approximate	110-124.9
Rough	125-174.9
Very rough	175+

Formula = $\dfrac{[\text{Population age ending in 0 or 5}]}{[\frac{1}{5}\ \text{Population in age range 23-62}]}$

The Index is calculated for 1969 and 1979 at national level and 1979 at regional for both sexes.

The United Nations proposed an Age-sex Accuracy Index which is another summary measure, of the irregularity of the change in the expected Sex and Age ratios (Shryock and Siegel, 1976). The Index measures the amount of shifting of respondents across conventional age group boundaries. The Index should, however, be interpreted with caution because, the changes in Age-ratios and Sex-ratios can be due to irregularities of demographic events, such as, epidemics, military acts and war, even if the population is closed to migration. These events are not taken into account during the computation of the Index. The Index may thus, be distorted in various age groups, and a historic evaluation of the population is primary, in order to avoid misinterpretation of irregularities, which affect the overall Index. The joint ratio score does not measure underenumeration of persons by age, but the net misreporting only. However, the U.N. Index is a useful measure, as it shows the order of magnitude of error and the general accuracy of age reporting by sex in the censuses. It is also valuable where data for single year is lacking. The calculation utilizes data in 5-year age-groups from age 0 to 75.

The age and sex-ratios are computed using the formulae below:

$$\text{Age-ratio} = \frac{{}_5P_x}{\frac{1}{2}({}_5P_{x-5} + {}_5P_{x+5})}$$

$$\text{Sex-ratio} = \left[\frac{\text{male population}}{\text{female population}}\right]100$$

The scale for the Index ranges as follows:

DATA	INDEX
Accurate	<20
Inaccurate	20-40
Highly inaccurate	>40

The Index has been calculated at national and regional level.

The proportions of single status population by 5-year age group, have been used to show the patterns of age reporting by marital status. The distribution was not tabulated by single year of age.

These proportions reveal the omissions and/or misplacement of marital status age-wise. These percentages for 1969 and 1979 (at macro level) have been compared to those for female population from the 1962 census, NDS (1977) and KFS (1977/78), to evaluate the consistency of reporting marital status age-wise.

Age and marital status unknown (not stated) is very important in the evaluation of the quality of census data. The higher the proportions of 'unknown' marital status and of age, the more likely that the data are unreliable. These are related, for example marital status may not be stated where age is not stated. Similarly, age may not be stated when marital status is unknown. The more serious correlation would be unknown marital status arising from unknown age (in the light of this study). This may grossly understate the proportions single or married. These unknown ages and marital status categories are used to evaluate completeness of reporting at both national and regional levels.

Marital distribution for 1969 and 1979 was not evenly tabulated by 5-year age grouping (CBS, Kenya Census 1969 Vol.111 Table 6; 1979 Table 14). The 1969 data were tabulated by 5-year age grouping from 0-40 and by 10-year from 40-70. Those for 1979 were by 5-year age grouping except the first (12-14) group. Appropriate techniques have been applied (Sprague Multipliers) to adjust into 5-year intervals for the total population, single, married and unknown statuses (1969). For 1979, it is reasonable to assume that although the earliest age-group applies to these aged 12 and above, for ease of comparison with the 1969 estimates at national level, and due to errors arising from age over-statement by the relatively young and married persons, that this age-group refers to the 10-14. However, for consistency, the population at ages 10 and 11 have been added to that for 12-14 to give a complete 5-year age-group.

2.4 METHODS FOR DATA ADJUSTMENTS

On evaluation of the quality of census data for age misreporting, digital preference errors and marital status misreporting, appropriate adjustments are necessary, as errors do arise. Attempt is made to adjust for the most prevalent errors (age digital preferences) by use of the Moving Average Method (Kpedekpo, 1982).

The Moving Average, is the most appropriate for graduating data with significant digital preference. Though, it is noted that, the incidence may be reduced by regrouping of single year age data into 5-year or other groups, in this study most preferences were for 0 and 5. The use of 5-year grouping is not a sufficient guard against the effect of such errors. Besides age heaping errors are unbiased as they are likely to cancel in either direction. The more serious errors, tend to be of the biased nature, such as age-shifting. However, these (from the evaluation) tend to be less prevalent over ages above 15. Thus graduation has been attempted for digital preference errors only and for marital status misclassification.

The Moving Average method has some shortcomings. One, the data at the beginning and end of the series are lost. Two, artificial patterns may be introduced, that were not originally present in the data. Three, the technique is strongly affected by extreme values (this can be overcome by use of weighted moving average). Fourth, as with other techniques, a historic background to the data is required to ascertain the influence of past mortality, fertility and migration changes on the age structure.

Graduation of data, does not cover all the regions, but has been carried out for total and single status at national and regional level in North Eastern Province only (Wajir, Mandera, Garissa) for both sexes. The Moving Average applies data for 5-year age-groups. The formula is given as (Kpedekpo, 1982):-

$$S_o = \frac{-P_{-2}+4P_{-1}+10P_o+4P_1-P_2}{16}$$

where:

S_o - Smoothed population

P_s - Enumerated population in the preceeding (P_{-2},P_{-1}) and the subsequent (P_1,P_2) age groups.

The adjusted values are applied in the calculation of SMAM to determine if any differences arise in the results.

Adjustment for marital status misclassification has been attempted by use of two assumptions.

i) the unknown marital status, has an equal chance of being included in either the single, married, widowed or divorced statuses.

ii) the unknown marital status belongs to those of the married status.

The results of the two assumptions on the SMAM values, will determine which assumption is true (marital status was correctly reported or not). The proportions single for the selected assumption will then be used in further calculation, using other methods. Where, the proportions single tend to increase with age (above age 50), some misreporting on the part of those divorced or separated (as being single) may be prevalent. To correct for such misreporting, the average of the two adjoining age-groups has been taken to give a smooth pattern of proportion single by age. However, note should be taken that these discrepancies could be due to real (true) changes in marriage patterns. Adjustment for age 'not stated' has not been carried out as most unknown ages tend to belong to the very early (<10) ages or very late (>50) ages. These ages fall outside the age-range bracket for first marriages as considered in this study.

In addition, the corrected and graduated total population for Kenya 1979 census, by age and sex are presented (CBS, Kenya Census 1979 Vol.11 pp.122 Table A.5). These totals are applied in the computation of proportions single, to see if any appreciable differences arise.

2.5 METHODS FOR NUPTIALITY ESTIMATION

This section presents four of the techniques used to estimate Nuptiality from census data. Data for the analysis are derived from marital information by age and sex from the 1969 and 1979 censuses of Kenya. The problems and risks involved in subjecting such marital data to rigorous methods, in view of the patterns of response errors (age misreporting) have been well documented (Brass et al.,1968; Kumar, 1967; Malaker, 1978). As such the assumptions, usefulness and data requirements for each technique applied are clearly outlined in the following sub-sections. These are indirect measures of estimating marriage timing and incidence.

2.5.1 HAJNAL'S (1953) SINGULATE MEAN AGE AT FIRST MARRIAGE (SMAM)

This method introduced by Hajnal (1953), is an indirect summary measure of marriage timing and incidence of a population. It is based on proportions single in a single census. The technique is useful as it gives a general overview of marriage timing and is readily computed from census information. However, it is sensitive to biases in age reporting and in classification of marital status. It is also vulnerable where marriage patterns have been changing in the recent past.

However, it is limited to the following assumptions.

ASSUMPTIONS:

1) Marriage patterns have been stable in the recent past (proportions single in a single census are representative of the performance of a true cohort over time).

2) There are no first marriages before age 10 and after age 50 (everyone is married by age 50).

3) Mortality is nil before age 50 and the differentials by marital status are negligible.

4) Migration (in and out) is negligible.

5) Population distribution by age and marital status is relatively accurate.

DATA REQUIREMENTS

1) The population aged from 10 to 55 by 5-year age groups and by sex for each census (1969 and 1979) graduated and ungraduated for age heaping.

2) The population single, married and not stated marital status, for 10-55, by 5-year age groups and sex (and graduated for single status).

COMPUTATIONAL PROCEDURES:

To test the above assumptions several cases are considered in the computation of SMAM (U.N. - Manual X, 1983).

CASE 1 - IGNORING THE UNKNOWN MARITAL STATUS

i) Consider 10-14 as the earliest age group within which marriage occurs.

ii) Consider 12-14 as the earliest age group within which marriage occurs.

iii) Consider 15-19 as the earliest age group within which marriage occurs.

CASE 11 - CONSIDERING THE UNKNOWN AS EVER-MARRIED

Consider all the three age groups as above (10-14, 12-14,15-19).

The two cases above directly test assumptions 3,4 and 5. Assumption 1 is tested in part by the use of the proportions single pertaining to 1969 and 1979 periods.

STEP 1 - Calculate the proportions single for each 5-year age group and sex including 50-54.

i.e $\frac{S_x}{P_x} = U(i)$ where S_x - number single in age group x

P_x - total population in the same age group.

STEP 2 - Calculate person-years lived in the single state.

$RS_2 = RS_1 +$ (lower limit at which marriage occurs).

$RS_1 =$ Sum of all proportions single (excluding the 50-54 age group, multiplied by the length of the age groups).

STEP 3 - Estimate the proportions who ever marry.

RM = 1.00-RN

RN = Proportions remaining single at age 50 (given as the average of the last two age groups).

i.e. $$\frac{S^{45-49} + S^{50-54}}{2} = \frac{U(7) + U(8)}{2}$$

STEP 4 - Calculate the number of person-years lived by the proportion single by age 50.

i.e. $RS_3 = 50(RN)$

STEP 5 - Calculate SMAM

$$SMAM = \frac{[RS_2 - RS_3]}{RM}$$

2.5.2 SYNTHETIC (HYPOTHETICAL) COHORT METHOD

This method considers hypothetical cohorts. The need arises because of the assumptions made in the computation of SMAM by Hajnal's original method. That is, that proportions single in a cross-section of the population, such as in one census, represents the experience of a birth cohort. From observations made on proportions single between 1969 and 1979 (both sexes) there seems to be a clear indication of changes in marriage patterns (CBS, Kenya Census, 1979 Vol.11 Table 2.5 pp.24B). To test this assumption further, a need to consider marriage rates over the intercensal period by constructing synthetic cohorts is paramount. (Hajnal, 1953; Agarwala, 1962; Sadiq, 1965).

CASE 1 - Construction of a hypothetical cohort for the decade (10 years) 1969-1979 as applied by Agarwala (1962), in India.

CASE 11 - Construction of a hypothetical cohort for the mid-intercensal period 5-years between 1969 and 1979 as applied by Sadiq (1965) in Pakistan.

2.5.2.1 CASE 1 - Considering a 10-year Synthetic Cohort (Agarwala, 1962)

ASSUMPTIONS

Same as those for 5-year Synthetic Cohort except that the proportions apply to a 10-year marriage experience.

DATA REQUIREMENTS

Same as those for the 5-year Synthetic Cohort.

COMPUTATION PROCEDURE

STEP 1 - Calculate the proportions single in 1969 and 1979 Censuses for each sex.

STEP 2 - Calculate the probabilities of remaining single for persons aged x to x+10 in 1969 for the next 10-years (Ratio of proportions single in 1969 and 1979).

i.e. $_5S'_x = \frac{_5S_{x+10}^{1979}}{_5S_x^{1969}}$ e.g. $_5S'_{30} = \frac{_5S_{30}^{1979}}{_5S_{20}^{1969}}$

or

$_5U'_x = \frac{U(i,2)_{1979}}{U(i-2,1)_{1969}}$ e.g. $U'(5,3) = \frac{U(5,2)}{U(3,1)}$

STEP 3 - Apply probabilities in step 2 to a cohort of 1000 persons to get proportions single in the decade synthetic cohort (having 10-year marriage experience).

e.g.

(i) U(1,4) = .5[U(1,1) + U(1,2)]

(ii) U(2,4) = .5[U(2,1) + U(2,2)]

(iii) U(3,4) = U(1,4) X U(3,3) - The rest of the values are derived from (iii).

STEP 4 - Calculate SMAM in the usual manner.

(i) Compute RS_1 and RS_2

(ii) Compute RN and RM

(iii) Compute RS_3

(iv) SMAM Value = $[(RS_2-RS_3)/RM]$

2.5.2.2. CASE 11 - Considering a 5-year Hypothetical Cohort (Sadiq, 1965)

ASSUMPTIONS:

1) Differential mortality by marital status is negligible.
2) Net migration is negligible
3) Everyone is married by age 50 (marriage is universal).
4) Assume that an average number of persons marry at the middle of an age-group (e.g. at 17 for age-group 15-19).

DATA REQUIREMENTS

1) The population aged 10-50 years of age by 5-year age-group and sex for the two successive decennial censuses (1969 and 1979).
2) The population by single status for the same age-range and by sex in the two censuses.

COMPUTATIONAL PROCEDURE

STEP 1 - Calculate the proportions single for 1969 and 1979 by age and sex. $U(i) = \frac{S_x}{P_x}$

STEP 2 - Calculate the proprotions single between 1969 and 1979 by age and sex.

i.e. $_5S_x(1974) = [\ _5S_x(1969) + \ _5S_x(1979)]/2$

or $U(i,3) = \frac{[U(i,1) + U(i,2)]}{2}$

STEP 3 - Calculate the probabilities of remaining single for persons aged x to x+5 in 1974 for the next 5 -years. (Ratio of proportions single in 1979 and 1974).

i.e. $_5S'_x(1974) = \frac{_5S^{1979}_{x+5}}{_5S^{1974}_x}$ /

$= \frac{U(i,2)}{U(i-1,3)}$ e.g. $U(4,4) = \frac{U(4,2)^{1979}}{U(3,3)^{1974}}$

STEP 4 - Apply the probabilities in Step 3 to a cohort of 1000 persons to get the proportions single in the hypothetical cohort (having only 5[1]-year marriage experience).

i.e. $U(i,5) = U(i,4) \times U(i-1,5)$

$U(2,5) = U(2,4) \times U(1,5)$

STEP 5 - Calculate SMAM as in method 1 (Step 2 through 5).

i.e. i) Calculate RS_1 and RS_2

ii) Calculate RN and RM

iii) Calculate RS_3

iv) Calculate SMAM

2.5.3 VAN DE WALLE'S (1968) STABLE POPULATION METHOD

The application of Hajnal's SMAM assumes among others that, marriage patterns are stable over time. This has been shown to be untrue over the 10-year period (1969-1979) as the proportions single for both sexes (especially females) have been changing (CBS, 1979 Census, Vol.11 pp.24B Table 2.5). Thus it is theoretically wrong to consider these proportions as refering to a cohort going through life. Both Method 1 and 11 assume that the population distribution by age and marital status is reliable. However, as evident from other studies (CBS, Kenya Census 1969 Vol.1V and 1979 Census Vol.11) data are very inaccurate. Thus the validity of estimates from the two methods is not established unless data are free of error of age mis-reporting.

An alternative method, proposed by Van de Walle (1968), suggests that if the data on marital status reported by age were discarded, and instead, only total marital distribution in a population used, then fairly reliable estimates of mean age at marriage can be derived. This is because the marital status are less likely to be misreported per se than age-wise. The technique is based on a stable population model and measures mean age at marriage that is largely free of error and bias, that would arise from age misreporting. The method is superior to Hajnal's (1953) and Trussell (1976) has proved its robustness.

ASSUMPTIONS

1) Marriage is universal, all first marriages take place at an age $\bar{a}$, (however modifications are possible where a fraction of the population does not marry at all).

N.B. This assumption is valid for Kenya as there are very few cases of permanent celibacy, and no first marriages take place after age 50 (CBS, KFS, 1977/78).

2) The age distribution of the population by marital status is inaccurate and thus uses only a count of the total population number that is single and the proportion never marrying, in the calculation of $\bar{a}$.

3) The population is stable

i) Constant ASFR

ii) Constant ASMR

iii) No in or out migration

4) The choice of a stable population is accurate and representative of the true population age distribution.

DATA REQUIREMENTS

1) Total population count for males and females in each census (1969 and 1979).

2) Total number of single status population by sex for each census.

3) The proportion never marrying (can be taken as the average for ages 45-49 and 50 to 54 for both Censuses).

4) The choice of the stable population parameters is based on knowledge of:

i) reported age distribution in each census.

ii) intercensal annual growth rates (rate of natural increase between 1962-1969 and 1969-1979).

iii) crude birth and death rates in each of the census population.

These are used to identify a stable age distribution by sex.

COMPUTATIONAL PROCEDURES:

Stable Population Estimation

1) Calculate the proportionate age distribution of the population by 5-year age groups (0-40).

2) Cumulate the proportions for the age range up to age 40.

3) Compute the intercensal rate of increase for 1962-1969 and 1969-1979, the crude birth and death rates, life expectation at birth, for each sex in the two censuses.

4) Use the cumulated proportions and the values in Step 3 to select an appropriate age distribution from the West Models of Stable Population (UN, Manual lV, 1967, Annex 11). To avoid extreme errors due to age mis-statement, the Stable Populations with proportions less than 35, that will match with that of the actual population will be selected [C(30)]. /

Since the cumulated age distribution stops just short of the highly preferred ages ending in digits 0 or 5, it is possible that a systematic downward bias may result.

STEP 1 - Obtain the values of proportionate age distribution of the recorded population for both sexes 1969 and 1979.

STEP 2 - Cumulate the proportions [C(x)] up to age 45 for each sex and census.

STEP 3 - From Table 11 (UN-Manual 1V, 1967 Annex 11) of the West Model Stable Populations, select parameters of stable population for each sex basing on C(x) values on one hand and the intercensal growth rate for the decade preceeding the census (1962-1969 and 1969-1979).

i) For each C(x) identify the population such that the value of C(x) lies just above or below the reported C(x).

ii) Construct a model population having a growth rate of r=.033 for 1969 and r=.039 for 1979.

i.e. by interpolating between columns of r values (e.g. .03 and .035 for .033) from the different mortality levels (e.g. level 9 and 13). These mortality levels are selected in a manner such that the observed values of C(x) are bracketed between the corresponding C(x) value in the stable population.

EXAMPLE

.0136 lies between .01 and .015. To interpolate for the C(x) values at different mortality levels given .7150 lies between .6928 and .7298, then C(x) values are weighted as follows:

$$\frac{.015-.0136}{.015-.01} = \frac{.0014}{.005} = .28 \qquad (1-.28=.72)$$

$$.72(.7298) + .28(.6928) = .7191$$

where each of the 8 indixes of the age distribution C(x) is combined with the same observed r=.033, they define several different populations within the set of model stable population table. The birth and death rates (stable population) are also interpolated for.

STEP 4 - The procedure of selecting a single best estimate of age distribution depends on the nature of errors. However, if the columns are an odd number, then the middle is selected, for an even number, the average of the two middle columns is taken.

STEP 5 - By substracting the successive C(x) values the stable age distribution is obtained in 5-year age groups.

STEP 6 - Calculate the total proportions single for the 1969 and 1979 censuses for both sexes.

STEP 7 - Derive the proportions never marrying by age 50 for both populations (average of the 45-49 and 50-54 age-groups).

STEP 8 - Given:

i) the stable age distribution

ii) total proportions single

iii) proportions never marrying

then the mean age at marriage for the stable population is obtained by simple interpolation using the formula below:-

$$\int_{a}^{\bar{a}} C(x)da = \frac{S-s_u}{1-s_u}$$

where $\bar{a}$ mean age at first marriage in the stable population

u age at which chances of marrying for the first time are negligible.

s_u proportions single at age u

$C(a)da$ proportions of stable population at age a to a+da.

S overall proportions single in the population (by sex).

2.5.4 THE NUPTIALITY TABLE

This section, deals with estimation of age at first marriage using the Life Table technique. The cause of decrement (force of attrition) is marriage and/or mortality. Where marriage is the only attrition force for decrement of the single population the Life Table is refered to as a Gross Nuptiality Table (GNT). Where mortality is introduced as an additional force of attrition, then the table is called a

Net Nuptiality Table (NNT). These tables have been constructed following Malaker's (1978) approach. The tables are abridged as they refer to Nuptiality in terms of five-year age groups.

In the construction of Nuptiality Tables, the Nuptiality rate (n_x) is used to refer to the probability of marriage (analogous to the probability of surviving or dying in the ordinary Life Table function). The Marriage rate (M_x) refers to a central rate (analogous to death rate used in ordinary Life Tables). The same relationship exists between the n_x and M_x as between death and mortality rate. i.e.

$$_5n_x = \frac{2n\ _nM_x}{2+n\ _nM_x} \qquad \text{where } n=5$$

The GNT, is useful for comparative purposes (between nations of different mortality) of Nuptiality, as it neutralizes mortality effect. The NNT is a more useful model, as it accounts for mortality. The NNT is used to study and project reproductive behaviour with more precision.

2.5.4.1 CONSTRUCTION OF GROSS NUPTIALITY TABLE (GNT)

The GNT refers to marriage as the only attrition force for decrement of the single population.

ASSUMPTIONS

1) Mortality differentials by marital status is negligible (no account of mortality made).

2) Migration (in and out) is negligible

3) Marriage is linearly distributed over the 5-year age interval.

4) First marriages occur within the age range of 10-50.

5) The radix of the GNT is 100,000 (i.e. l_{10} = 100,000)

6) People marry according to a predetermined schedule which remains fixed.

7) A cohort contains members of one sex only.

DATA REQUIREMENTS

1) The population by 5-year age groups, sex for 1969 and 1979 censuses.

2) The population single by 5-year age groups, sex for 1969 and 1979 censuses.

(These are used to compute Age-sex Specific marriage rates - ASMR). These rates are normally calculated from a combination of registration data (numerator) and estimates of the single population from census returns (denominator). But when registration data are not available and are in 5-year age groups, the estimation of ASMR by single years of age have to be ascertained by other analytical procedures.

COMPUTATIONAL PROCEDURES FOR OBTAINING THE COLUMNS IN GNT

STEP 1 - Compute the proportions single in the two successive censuses.

STEP 2 - Construct proportions single in the decade synthetic cohort following the procedure by Agarwala (1962).

STEP 3 - Convert the 5-year proportions single into proportions single at exact age (i.e. ${}_5S_x$ into S_x) using Sprague Multipliers and Linear interpolation.

STEP 4 - Because the multipliers simply redistribute the proportions single within the 5 -year age interval and does not account for deficiencies in the 5 -year age group that arise from age misreporting - the S_x from Step 3 are thus further smoothed for any irregularities using graphic graduation (read off S_x values at intervals of 5 -years of age e.g. S_{10}, S_{15}, S_{20} etc.).

STEP 5 - Calculate the probabilities of marrying

$_5n_x$ using the formula by Agarwala (1962).

$$\frac{S_x - S_{x+5}}{S_x} = \frac{1 - S_{x+5}}{S_x}$$

STEP 6 - Smooth these probabilities ($_5n_x$) further using a freehand graph technique.

STEP 7 - <u>Derivation of GNT Column Values and Definitions</u>

<u>COLUMNS</u>

1 - x age in years

2 - $_5n_x$ probability that a single person at age x will marry during the next 5 years (Nuptiality rate). It refers to the notion of risk and expresses the impact of primary Nuptiality independent or divorced of mortality effect. It relates

to the marriage rate (central rate) by:

$$_5n_x = \frac{2n\ _nM_x}{2+n\ _nM_x}$$

However, the method used here as by Agarwala gives the Nuptiality rate as:-

Formula $_5n_x = 1 - \frac{S_{x+5}}{S_x}$

3 - l_x Number of single (never married) at exact age x (surviving the risk of Nuptiality). The radix (beginning of of the Nuptiality Span) is 100,000 (l_{10}).

Formula

$$l_{x+5} = l_x(1 - {_5n_x})$$

4 - $_5N_x$ Number of first marriages in the age group x to x+5.

Formula

$$_5N_x = l_x \cdot {_5n_x}$$

5 $_5L_x$ Number of person years lived as single in the age group x to x+5 (person-years spent in single status).

Formula

$$_5L_x = \frac{5}{2}(l_x + l_{x+5})$$

6 - T_x Total number of single person-years lived after age x. (its value for age x+5 is simply the summation of the values in the column $_5L_x$ for age x+5 and all above ages).

Formula

$$T_x = \sum_{i=\frac{x}{5}}^{\infty} {}_5L_{5i}$$

7 - e^o_x Average number of years of single life remaining before marriage to a single person at age x (Average expectancy of remaining single).

Formula

$$e^o_x = \frac{T_x}{l_x}$$

The GNT is useful in comparative studies of Nuptiality patterns among nations with varying mortality patterns. This is because it primarily shows Nuptiality impact (discounting that of Mortality). However, it is limited to among others the fact that, the sum of marriages is not equal to the radix (as in the Life Table) i.e. l_{10} = 100,000. This is because not all females or males attaining age 10 marry. Moreover, the entire distribution of marriages is measured by proportions of females/males who marry by age 50. This is not true as a small fraction is still single by age 50(not all are married as in the Life Table where all persons are mortal).

ESTIMATION OF MEAN AGE AT MARRIAGE FROM GNT

The mean age at first marriage can also be estimated from the GNT tables following Sadiq's (1965) method.

$$\text{Mean} = a_{10} + \mathring{e}_{10}$$

where a_{10} is the youngest age at which marriage occurs (in our case assumed to be 10)

and $\mathring{e}_{10}$ is the average number of years of single life remaining before marriage at age 10 (column 7).

2.5.4.2 CONSTRUCTION OF NET NUPTIALITY TABLES (NNT)

When mortality is taken as an additional form of attrition force to marriage (two decrement factors) the table is refered to as Net Nuptiality Table (NNT). Thus it is a Multiple Decrement Table.

ASSUMPTIONS

1) Mortality differentials by marital status is significant (account for mortality).

2) Migration (in and out) is negligible .

3) Marriage is linearly distributed over the 5-year age interval.

4) First marriages occur within the age-range 10-50 years.

5) The radix of the NNT is 100,000 (l'_o = 100,000).

6) People die and marry at each age according to a predetermined schedule which does not change.

8) The cohort contains members of one sex only.

DATA REQUIREMENTS

1) The population by 5-year age-groups and sex for two successive censuses.

2) The single population by 5-year age-groups and sex for the same censuses.

(These two sets are used to calculate the Age-sex Specific Marriage rates - ASMR).

3) The Age-sex Specific Death rates (ASDR) for the relevant intercensal period.

(These have been borrowed from Nyokangi J.J. (1984) in which he used the Bennett and Horiuchi Method).

These data together give the basic functions for constructing a NNT (Age/Sex Specific Marriage Probabilities and Age/Sex Specific Death Probabilities). Lacking the reliable data for the ASSMR as is often the case in developing nations, approximations of Age/Sex Specific first marriage probabilities are made using Malaker's (1978) approach.

CONSTRUCTION PROCEDURE FOR THE NNT

STEP 1-6 Repeat as carried out for the GNT

STEP 7 Compute the Age-Sex Specific death rates (borrowed for males and females from relevant sources).

STEP 8 Convert the ASDR into probabilities of death using the formula:

$$_5q_x = \frac{2n\ _nM_x}{2+n\ _nM_x} \qquad \text{where } n=5$$

$$= \frac{10\ _5M_x}{2+5\ _5M_x}$$

STEP 9 Convert the probabilities of marriage $_5n_x$ into $_5n'_x$ the net probabilities of marriage using the formula:

$$_5n'_x = {_5n_x}\left(1-\frac{_5q_x}{2}\right)$$

STEP 10 Convert the probabilities of death $_5q_x$ into $_5q'_x$ the Net probabilities of death using the formula:

$$_5q'_x = {_5q_x}\left(1-\frac{_5n_x}{2}\right)$$

STEP 11 DERIVATION OF NNT COLUMNS AND DEFINITIONS

COLUMN

1 X = Age in years

2 $_5n'_x$ = Net probability that a single person at age x will marry during the next 5-years.

Formula

$$_5n'_x = {}_5n_x \left[1 - \frac{_5q_x}{2} \right]$$

3 $_5q'_x$ =Net probability that a single person at age x will die during the next 5-years.

Formula

$$_5q'_x = {}_5q_x \left[1 - \frac{_5n_x}{2} \right]$$

4 $1'_x$ = Number of persons single and alive at age x. (out of the previous single survivors) also known as Net Nuptiality Survivors.

Formula

$$1'_{x+5} = (1'_x - {}_5N'_x - {}_5d'_x)$$

5. $_5d'_x$ = Number of single persons dying

Formula

$$_5d'_x = 1'_x \cdot {}_5q'_x$$

6 $_5N'_x$ = Number of first marriages in the age group x to x+5.

Formula

$$_5N'_x = l'_x \cdot {}_5q'_x$$

7. $_5L'_x$ = Number of person-years lived as single and alive in the age group x to x+5.

Formula

$$_5L'_x = \frac{5}{2}\left(l'_x + l'_{x+5}\right)$$

8. T'_x = Number of person-years lived as single and alive at age x and all later ages.

Formula

$$T'_x = \sum_{i=\frac{x}{5}}^{\infty} {}_5L'_{5i}$$

9. $e^{o\prime}_x$ = Average number of years of single life remaining before marriage or death to a single person at age x

Formula

$$e^{o\prime}_x = \frac{T'_x}{l'_x}$$

<u>N.B.</u> The prime (') denotes functions for NNT.

CALCULATION OF MEAN AGE AT FIRST MARRIAGE FROM NNT

The procedure is basically the same as that outlined for GNT.

2.6 SUMMARY

In this chapter, several methods of evaluation of census data were presented. The moving average technique was presented for smoothing of data. The last section, presented four alternative methods of refining estimates of Nuptiality timing (the mean age at first marriage) from census data.

The presentations entail basic assumptions, advantages and disadvantages of the methods, data requirements, by each, as well as computational procedures involved in each.

The evaluation methods are not a full proof means of evaluation, but rather a means of comprehensive appraisal of the data quality. Those for estimation are alternative methods for estimating Nuptiality timing and incidence. However, the assumptions implicit in each are a guide as to which method best fits a given set of data. Nevertheless, the Nuptiality Tables (NNT) are considered to be the most refined device for estimation of Nuptiality parameters.

CHAPTER THREE

3. EVALUATION OF THE QUALITY OF CENSUS DATA

3.0 INTRODUCTION

Accurate information on levels and trends of any demographic characteristic is essential for planners and policy makers among other users. The level of accuracy and prediction of Nuptiality timing and incidence is based on the quality of data.

Extensive efforts have therefore been directed towards the accurate recording of marriage information in most countries especially by the World Fertility Survey (WFS). However, several problems still persist, particularly for the less developed countries where, the definition of marriage (whether formal, cohabiting, visiting or consensual) differs, and age has no traditional significance.

In this study, data from the two latest censuses (1969 and 1979) are utilized, as these are relatively more complete and befit generalization at the national level. The data also enables a regional analysis to be carried out.

Since the prime purpose of the study is to assess the significance of methodology in deriving plausible estimates of Nuptiality, this chapter is devoted to the evaluation of the quality of census data to be used, in order to divorce the influence of errors that may be present, on the resultant estimates. The evaluation entails an examination of the accuracy of age and marital status reporting, in the two censuses at the national level and, regional level for 1979 only . This will help to determine the extent to which errors appear in the censuses and their possible effect on Nuptiality estimates. This will also establish the reliability of the estimates and thus caution against would be misleading interpretations of Nuptiality timing and incidence. This meets the second objective of the study.

The chapter, includes a presentation of a brief review of the history of Nuptiality data in Kenya; a discussion of possible sources of errors in the data; application of methods used in evaluation of Nuptiality data; a discussion of patterns of error in the censuses at both national and regional levels; an adjustment for errors present and the summary.

3.1 A BRIEF REVIEW OF MARITAL DATA IN KENYA

Prior to independence, most censuses (1921, 1926, 1931, 1948) enumerated the non-African population only, or used different schedules if the African population was enumerated and are of no significance to this study. However, some information on marital status was secured in the 1948 census. The 1962 census was the first to enumerate both the African and non-African population simultaneously. But, this was held prior to the re-alignment of district and provincial boundaries. Thus, the regional data are not comparable with the 1979 regional data. Moreover, the North-Eastern Province was excluded (CBS Kenya Census 1962 Vol.lV). Data on marital status in 1962, like that of 1948, was racial based and biased to widespread ignorance of person's exact ages and, are of limited relevance to the present study.

The 1969 census, taken in August, 1969, was different from the previous censuses as the population was enumerated on a de facto basis. Questions on marital status were dispensed to 100 percent urban and only 10 percent rural response (CBS, Kenya Census 1969, Vol.lV). These were posed to all the respondents irrespective of age; however, during the editing, children under the age of thirteen years were classified as single (CBS, Kenya Census 1969 Vol. lV - Appendix A). Data were also tabulated by age, sex and marital status for all ethnic groups and at national level (CBS, Kenya Census, 1969 Vol.lll, Table 6).

The most recent census taken on the 24th and 25th August, 1979, provides another useful source of marital data. A 'de facto' approach was used to secure this information (CBS, Kenya Census 1979, Vol.1). Questions on marital status were posed to persons aged twelve years and over. The information was tabulated by age, sex and marital status for districts, provinces and at the national level (CBS, Kenya Census 1979, Table 14).

The two latest censuses (1969 and 1979) complied with a recommendation by the United Nations of a 10-year spacing of censuses. In both, marriage was defined to include all forms as recognized by religious, legal, customary laws or the less formal unions which entail living together permanently in a stable sexual relationship (CBS, Kenya Census 1969, Vol.1V; 1979 Census Vol.1). The classification of marital status was also as recommended by the United Nations.

The tabulation of marital distribution by age, however, varied for the two censuses. The 1969 was tabulated by 5-year age grouping from age 0 to age 40, and by 10-year from age 40 to age 70. The 1979, on the other hand, was tabulated as 12-14 for the younger age-groups, and by 5-year from age 15 to age 75. For both censuses the divorced and separated persons were grouped together.

Other sources of marriage information in Kenya include marriage statistics from the registration of marriages (available at district registration offices). These are incomplete in coverage for both area and marriage events, such as concensual and polygamous unions, which are prevalent in Kenya. These events are either omitted or under-enumerated. Other errors arise from the discrepancy between time and place of occurance vis-a-vis registration which leads to distortion of the marital distribution. Sample surveys in Kenya (NDS, 1977; KFS, 1977/78) form another source of marriage data. These may constitute a relatively more reliable data source, but are limited to sample size, selection and non-response bias, omission of some forms of marriage (though to a lesser degree than in registration) and the misreporting of age and data at marriage. Moreover, these surveys contain information on females only. Hence this is of lesser importance to Nuptiality study at National level, because of the limited degree of generalization. The registration statistics and survey data are therefore important sources of independent information for comparison with that of census data. These may enable one to evaluate the paucity of Nuptiality levels and trends in Kenya.

3.2 SOURCES AND EFFECTS OF ERROR IN NUPTIALITY DATA

Various types of errors may affect marital distribution of a population, causing serious distortion of marital data and estimates derived from such data. The major sources of error in census marital data include the following.

The definition of marriage, which differs among different communities. This ranges from formal marriage ceremonies to informal ones such as cohabitation, concensual union (in Latin America) and Visiting unions, where marriage remains tentative for some years, for example prior to bearing a certain number of children, or pending other ceremonies. In some communities, marriage is permanent, meaning no cases of separation or divorce may arise. These variations in definitions may lead to distorted estimates of marriage rates and timing.

Polygyny, leads to the displacement of marital status. For example, where one man has five wives, if one wife dies, then the man is still reported as married, whereas, if the man dies then five women are reported as widowed. A problem therefore arises in determining the number of first marriages by sex and in the analysis of marital status, which in turn, affects proportions single or married. Secondly, polygyny distorts the reconstruction of marriage histories and tends to overstate the prevalence of divorce and widowhood categories over the past periods. Thirdly, more males are reported as married in older ages than of females, because the death of one wife does not change the man's status, thus giving a false impression of the level of marriages and trends.

Thirdly, . numerical age has no traditional value in Africa. Thus it is not easy for accurate information on age to be collected in such communities. The enumerator often uses a calender of historical events to estimate the age of a respondent. Sometimes, external clues, such as appearance, sexual maturation, marital status and parity are used. This may lead to bias of age digital preference, (ages ending in 0,5 or 2) and also cause concentration in frequency of the single in older ages, giving misleading age patterns of marriage. Because of this problem on age reporting, Van de Walle (1968) has proposed a method for estimating SMAM using only proportions single (as marital status is relatively more accurately reported) in the entire population. Trussell (1976), has confirmed the robustness of Van de Walle's estimator.

Fourthly incomplete coverage of the population, by area (due to security or accessibility problems) and within a specific area (omission of persons due to migration, military or employment outside the region).

Fifthly, inaccuracy in the information given by the respondents may cause errors. Age misreporting (Net and Gross) may result from; ignorance of the correct age, digital preference (a tendency to state age in figures ending in certain preferred digits); tendency to exaggerate length of life at advanced ages (males above 40 years of age); a possible subconscious aversion to certain numbers; and misreporting arising from motives of an economic, social, political or purely personal character.

Sixth, errors arise from the enumerator in asking questions and recording of responses. These may be a result of carelessness in recording and through lack of a probe question to ascertain past and current marital status. This can be serious because most persons separated or divorced may be identified as never having been married - causing a bias in frequencies of marital status or identified as being married.

Lastly, errors may come about during the processing of the data collected.

Any of the above mentioned errors can seriously reduce the usefulness of census information on marital distribution, though their effects vary. For example, bias in the reporting of age per se may reduce the accuracy of estimates on Nuptiality timing. These errors are also interdependent and as such it is difficult to demonstrate the relative contribution of any. For example, misreporting of marital status may be influenced by a person's age, and at the same time, misreporting of age may be influenced by the person's marital status.

The most prevalent types of errors in Nuptiality data are age and marital status misreporting, and age digital preference. Age misreporting consists of Net and Gross age mis-statement. Gross age mis-statement refers to the total over and under-statement of age reported to be age x yet the person is not aged x. Net refers to the number reported at age x minus the true number of persons at that age. Age heaping is an unbiased error as cancelling occurs in either direction, it is the tendency to state age, in figures ending in certain preferred or avoided digits. The effect of age misreporting and marital status misreporting can be noted in the heaping of persons at certain ages ending in 0 and 5 (commonly); and in the large differences between male and female population at certain ages; and in adjacent age-groups of the same sex; in the transferences of ages over three years from one age-group to another (age shifting) leading to misplacement of marriages age-wise and bias in the distribution of marital data by age group and large numbers of age 'not stated'. On the other hand, misreporting of marital status affects proportions single (Malaker, 1978) and appreciably influences the analysis of Nuptiality timing and incidence.

In Kenya, where marriage tends to be early and universal, and strong cultural taboos on permanency of marriage and remarriage exist (KFS, 1977/78), there would be little incentive for persons to misreport marital status as influenced by age (for example to state as single when they are aged 30 or 40). However, marital status per se may be misreported due to other factors such as lack of a probe question to ascertain present status; or for other reasons such as economic, social, political or personal. Prevalence of of polygyny and the definition of marriage may also contribute to the misreporting of marital status. Similarly misreporting of age as influenced by marital status may be caused by interviewer's prior judgement and/or the existence of a legal minimum age at marriage (Laws of Kenya, Cap. 150). Thus in Kenya, one would expect few cases of misreporting of marital status as influenced by age or of age as influenced by marital status.

According to the analytical report of the 1969 census of Kenya, no relationship was drawn between marital status and age misreporting (CBS, Kenya Census 1969 Vol.lV). However, misreporting of age and of marital status per se may tend to dominate the nature of errors in the two censuses. Hence, the study specifically evaluates the pattern of age misreporting (digital preference and net mis-statement) and of marital status (mis-placement or omission) as these may influence the basic data (proportions single).

The practice of polygyny, is widespread in Kenya (KFS, 1977/78). This together with the customary nature of African marriages (Van de Walle, 1968) may create a problem in the analysis of marriage rates and lead to under estimation of timing and incidence in Nuptiality (due to omissions). In most traditional communities in Kenya, marriage is a lengthy process which may last 1-5 years depending on the customs. As a result most marriages may be omitted. Concensual or visiting unions are not very prevalent in

Kenya, because of the customary laws and taboos that govern marriage.

3.3 THE PATTERN OF ERROR IN THE CENSUSES

This sub-section evaluates the quality of age and marital status reporting in the two censuses at national level and for 1979 at the regional level too. The results, follow the application of the evaluation techniques discussed in Chapter Two.

Several studies on Kenyan census data have shown that errors arising from misreporting of age are of a great magnitude (CBS, Kenya census 1969 Vol.1V and 1979, Vol.11; Ronoh, 1982; Mwobobia, 1982; Kibet, 1981). These are mostly errors of age digital preference, net misreporting and estimation errors. Few studies have gone into analysis of marital distribution data. The results from each method are presented and discussed.

3.3.1 THE PATTERN OF ERROR AT NATIONAL LEVEL (1969 and 1979)

The single year age distribution (Figure 3.1 and 3.2 for both sexes indicates obvious age heaping at certain terminal digits in both censuses. The saw-edged pattern reveals that heaping at terminal digits o and 5 was most prevalent, followed by digits 2 and 8.

For 1969, the preference is obvious at ages 10, 12, 18, 20, 25, 30, 35, 40, 45 and 50. The 1979 curve, is less pronounced for older ages above 30 and more pronounced for ages 10, 12, and 20. In both censuses the pattern at age 15, shows that some distortion exists. This may be because of the minimum legal age at marriage, for females at age 16 and males age 18 (Laws of Kenya, Cap. 150). This also explains the heaping at age 18 which is also the legal voting age and the heaping at age 12. Other reasons could be, genuine ignorance of a person's exact age or transference of person to older ages. For both periods age 11 was the most rejected. There was no marked improvement in the age reporting pattern over the 10-year period.

The Myer's index, measures the extent of preference and/or avoidance for all the 10 terminal digits (0 to 9). The values have been computed for the age range 0 to 60 (Table 3.1 - Column 3 and 4). The 1969 values for females (20.98) and males (18.78) as compared to those for 1979 for females (14.73) and males (10.73), show a slight improvement though the magnitude of age digital preference and avoidance is still very high. Females tend to exhibit higher preference than males. General observation of the individual indices for each terminal digit (Appendix Table 1) reveals that for both sexes (1969) the most prefered digits were 0,8 and 5, and the most avoided were 1,3 and 7 respectively. For 1979 (Appendix Table 1) only 0 and 5 were prefered by males, but females prefered 9 and 8 in addition. Avoidance was for 1, 3 and 4. In both censuses, males tend to prefer terminal digit 5 more, while females prefered 0. This pattern of age digital preference points towards the observation that the use of 5-year age groups intervals of population distribution by marital status may distort the whole marital distribution, leading to incorrect estimates of marriage rates by age.

TABLE 3.1: Values of the UN, Myers' and Whipple's Indices By Sex and Region: Kenya 1969 and 1979

Index / Sex / Region	WHIPPLE'S		MYERS'			UNITED NATIONS		
	Males	Females	Males	Females	Sex Ratio	Age-Ratio Scores		Joint Score
						Males	Females	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
KENYA 1969	157.52	158.66	18.78	20.98	6.89	5.12	7.33	33.12
1979	141.44	149.84	10.73	14.73	5.36	4.45	4.17	24.70
DISTRICTS 1979								
Nairobi	135.13	139.75	13.33	12.63	33.65	13.43	10.00	124.37
Nyeri	150.18	166.65	11.89	16.46	7.42	11.67	6.50	40.43
Kiambu	135.37	151.10	9.48	14.24	7.05	6.60	3.72	31.47
Kirinyaga	150.85	171.53	13.14	19.71	8.07	8.64	9.89	42.74
Murang'a	138.80	155.03	10.38	14.71	7.96	8.66	5.15	37.69
Nyandarua	139.16	144.16	9.28	13.97	9.64	9.05	8.50	46.47
Busia	117.73	126.68	7.50	12.21	7.88	6.79	6.46	36.89
Bungoma	112.05	109.85	4.75	5.24	5.75	4.93	5.38	27.56
Kakamega	118.33	119.57	7.34	8.76	7.47	7.47	4.67	34.55
South Nyanza	133.32	134.20	15.54	12.33	12.23	7.59	5.18	49.46
Siaya	171.67	122.62	9.09	11.02	11.06	9.68	5.11	47.97
Kisumu	131.59	130.14	9.42	11.34	9.47	5.00	4.42	37.83
Kisii	141.13	161.14	11.25	19.08	8.94	8.42	6.05	41.29
Taita Taveta	135.37	142.12	10.03	15.22	5.86	8.36	5.35	31.29
Mombasa	151.53	155.44	15.23	15.34	12.52	8.15	7.25	52.96
Kilifi	146.91	160.28	16.29	25.23	10.86	8.07	6.88	47.5
Lamu	183.20	234.19	21.33	34.26	19.76	13.81	29.06	102.15
Tana River	167.78	165.34	19.51	29.13	17.52	4.12	15.32	72.08
Kwale	174.20	188.84	21.52	30.10	9.47	6.85	6.36	41.6
Wajir	262.19	280.84	48.03	54.50	12.30	42.35	47.26	126.5
Mandera	265.28	290.33	47.92	56.08	13.69	38.39	49.95	129.4
Garissa	237.33	265.84	43.16	49.90	26.55	25.05	36.41	141.1
Meru	157.29	176.65	15.85	22.09	7.42	5.15	5.79	33.2
Marsabit	185.25	216.21	28.18	36.55	10.42	16.86	25.74	73.8
Machakos	125.00	128.42	9.07	17.43	9.44	15.62	12.81	56.7
Kitui	138.70	143.65	9.73	15.33	9.99	13.72	18.49	62.1
Isiolo	166.56	191.94	21.33	28.39	20.30	12.05	26.74	99.6
Embu	149.23	165.82	12.09	18.28	9.42	8.94	7.38	44.5
West Pokot	155.08	116.18	17.71	23.67	6.90	7.18	6.46	34.3
Uasin Gishu	127.32	139.38	7.71	11.42	10.74	6.98	4.04	43.2
Turkana	182.50	179.57	29.74	30.38	10.92	5.59	6.79	49.1
Trans Nzoia	123.22	121.60	7.28	8.07	11.76	4.75	5.02	45.0
Samburu	187.97	206.86	28.47	29.96	10.14	8.64	6.89	45.9
Narok	143.02	159.59	14.58	22.72	11.16	6.29	6.09	45.8
Nandi	123.55	132.77	7.85	11.34	9.66	7.34	6.79	43.1
Nakuru	135.32	141.39	10.29	12.82	9.13	6.26	5.79	39.4
Laikipia	140.51	146.11	10.91	14.38	10.04	8.35	6.37	44.8
Kericho	130.89	140.94	9.80	14.97	8.04	7.66	4.80	36.5
Kajiado	156.22	172.41	15.60	23.55	8.87	4.09	5.53	36.
Elgeyo Marakwet	150.65	157.39	15.52	19.68	7.09	6.38	4.11	31.
Baringo	144.67	157.32	16.74	21.90	5.94	4.97	3.85	26.

TABLE 3.2 : Proportions Single for Females in 1962, 1969, 1979 Censuses, NDS (1977) and KFS(1977/78) Surveys and for Males - 1969 and 1979 Censuses.

Source / Sex / Age Group	Census 1962 Female	Census 1969 Female	NDS 1977 Female	KFS 1977/78 Female	Census 1979 Female	Census 1969 Male	Census 1979 Male
10-14	-	97.90	-	-	98.30	99.00	99.3
15-19	55	63.60	71	72	71.20	95.60	97.4
20-24	13	18.40	22	21	24.50	71.80	72.0
25-29	5	6.40	6	4	9.30	32.10	32.1
30-34	3	3.80	3	1	4.90	13.50	13.1
35-39	2	3.20	2	1	3.40	9.00	8.5
40-44	2	2.80	1	1	2.70	6.70	5.8
45-49	2	2.80	1	1	2.20	6.50	5.2
50-54	-	2.80	-	-	2.10	5.80	4.8

Source: CBS, KFS, 1977/78, Vol.1, pp.71 Table 4.2; 1979 Census Table 14 (Unpublished).

TABLE 3.3: Age and Marital Status Not Stated by Sex and Region (1969 and 1979) Kenya

Sex / Region	Marital Status Not Stated		AGE - NOT STATED									
			Uknown Marital Status		Single		Married		Widowed		Divorced	
	Male (1)	Female (2)	Male (3)	Female (4)	Male (5)	Female (6)	Male (7)	Female (8)	Male (9)	Female (10)	Male (11)	Female (12)
TOTAL 1969	.69	.62										
TOTAL 1979	.17	.17	19.55	6.46	39.49	35.10	37.95	41.80	1.89	14.35	1.11	2.29
Nairobi	.14	.19	28.48	24.72	37.09	45.53	33.63	24.88	0.62	3.58	0.18	1.30
Nyeri	.11	.10	30.31	8.46	34.56	36.05	30.88	33.23	3.40	20.38	0.85	1.88
Kiambu	.10	.12	19.91	6.06	38.24	33.88	37.78	31.68	3.17	25.07	0.90	3.31
Kirinyaga	.11	.12	22.17	4.37	42.08	33.19	30.77	33.19	3.62	27.07	1.36	2.18
Muranga	.17	.17	12.37	3.53	39.56	32.41	42.71	42.24	3.38	19.17	1.98	2.65
Nyandarua	.06	.06	21.05	5.56	56.39	51.85	21.05	27.78	1.50	12.96	0.00	1.85
Busia	.09	.12	40.91	13.18	27.27	20.16	25.76	41.09	5.30	24.81	0.76	0.78
Bungoma	.09	.11	26.07	9.90	31.13	25.00	37.74	30.73	2.33	28.65	2.72	5.73
Kakamega	.15	.16	18.90	4.52	44.02	40.20	32.97	38.59	3.11	14.87	1.00	1.81
South Nyanza	.12	.14	16.35	4.00	42.24	32.09	39.62	50.55	0.94	11.91	0.84	1.45
Siaya	.14	.13	4.42	1.47	50.57	27.87	41.60	51.63	1.99	17.98	1.42	1.05
Kisumu	.21	.22	11.69	2.85	42.40	38.32	43.57	44.96	1.17	12.57	1.17	1.30
Kisii	.14	.22	18.67	13.12	36.93	30.32	42.67	42.17	1.33	13.12	0.40	1.27
Taita Taveta	.26	.24	26.47	4.76	46.08	37.14	21.57	38.10	2.94	19.05	2.94	0.95
Mombasa	.95	.91	9.48	8.84	23.71	32.93	64.44	41.77	0.56	7.93	1.81	8.54
Kilifi	.12	.12	16.12	3.33	28.21	20.44	54.41	61.11	1.01	12.67	0.25	2.44
Lamu	.12	.18	26.32	31.25	36.84	31.25	36.84	31.25	0.00	0.00	0.00	6.25
Tana River	.10	.06	31.43	8.00	37.14	48.00	28.57	24.00	2.86	20.00	0.00	0.00
Kwale	.46	.43	22.51	6.83	30.74	26.09	41.99	43.48	1.30	13.04	3.46	10.56
Wajir	.10	.10	25.45	5.88	20.00	17.65	50.91	70.59	1.82	5.88	1.82	0.00
Mandera	.07	.06	27.45	0.00	29.41	27.27	43.14	52.27	0.00	18.18	0.00	2.27
Garissa	.12	.11	37.04	7.50	29.63	32.50	33.33	47.50	0.00	7.50	0.00	5.00
Meru	.13	.13	19.53	4.92	47.24	39.28	29.65	41.03	2.25	11.69	1.33	3.08
Marsabit	.09	.09	26.19	17.39	7.52	8.70	64.29	26.09	0.00	47.83	0.00	0.00

TABLE 3.3 (Cont.)

Sex / Region	Marital Status Not Stated		AGE NOT STATED									
			Unknown Marital Status		Single		Married		Widowed		Divorced	
	Male (1)	Female (2)	Male (3)	Female (4)	Male (5)	Female (6)	Male (7)	Female (8)	Male (9)	Female (10)	Male (11)	Female (12)
Machakos	.13	.15	14.86	2.73	54.97	49.79	26.91	32.39	2.12	13.09	1.14	1.99
Kitui	.10	.08	20.47	2.69	35.43	22.31	39.63	52.15	3.41	21.51	1.05	1.34
Isiolo	.16	.14	27.27	6.25	39.39	31.25	24.24	43.75	9.09	18.75	0.00	0.00
Embu	.11	.12	25.40	5.24	37.04	34.03	34.39	43.98	2.65	14.14	0.53	2.62
West Pokot	.32	.22	34.78	16.67	45.96	34.09	17.39	35.61	0.62	11.36	1.24	2.72
Uasin Gishu	.12	.13	30.84	9.38	43.93	53.75	22.90	27.50	1.40	8.13	0.93	1.25
Turkana	.17	.15	43.62	4.00	36.17	54.00	19.15	26.00	1.06	12.00	0.00	4.00
Trans Nzoia	.15	.13	26.74	8.21	38.89	35.71	32.29	43.93	0.35	10.00	1.74	2.14
Samburu	.16	.08	58.18	12.00	21.82	48.00	20.00	28.00	0.00	12.00	0.00	0.00
Narok	.22	.16	27.78	7.02	35.42	35.96	36.81	42.98	0.00	11.40	0.00	2.63
Nandi	.15	.15	26.18	5.56	34.18	33.84	36.36	44.44	0.73	13.64	2.55	2.53
Nakuru	.25	.21	23.46	7.40	32.36	35.52	41.91	42.28	1.13	11.84	1.13	2.96
Laikipia	.10	.12	24.18	7.46	31.87	26.87	42.86	46.27	1.10	17.91	0.00	1.49
Kericho	.12	.16	18.90	10.02	30.90	26.38	46.90	49.58	2.21	11.69	1.10	2.34
Kajiado	.36	.26	25.65	8.00	31.41	33.60	41.36	42.40	0.52	12.80	1.05	3.20
Elgeyo Marakwet	.09	.16	24.72	8.14	39.33	29.07	26.97	38.37	7.87	17.44	1.12	6.98
Baringo	.14	.19	16.81	3.03	30.97	31.82	46.90	45.45	5.31	18.94	0.00	0.76

The Whipple's Index, is another summary measure of age heaping at ages ending in digits 0 and 5 only (Table 3.1 - Column 1 and 2). The values for both 1969 and 1979 are as follows: 1969 males - 157.52 and females - 158.66; for 1979 males - 141.44 and females - 149.84. When measured against the proposed scale for evaluating data quality, the values indicate the data to be rough, with an insignificant improvement in 1979, in the reporting of age ending in digits 0 and 5. Females are found to exhibit a relatively greater degree of age digital preference.

The UN Age-sex Accuracy Index, measures net age misreporting (Table 3.1 - Column 5-8). The value of Sex score for the two years are 6.89 (1969) and 5.36 (1979). This indicates a drop in the proportions of males or an increase in that for females. The Age-ratio scores for 1969 were 5.12 (males) and 7.33 (females) as compared to 4.45 (males)and 4.17 (females) for 1979. The Joint Scores were 33.12 (1969) and 24.70 (1979). There seems to be some improvement in the overall index for the country, but account need to be taken of the changes behind the Sex and Age-ratios. The Joint values indicate that data are inaccurate, when measured against the desired value of less than 20, for an accurately enumerated population.

Age misreporting can also be traced by examining the sex-ratios for each age group (figure 3.4) for both years. The expected overall sex ratio for a country is 100. For 1969 this ratio was 100.4 (indicating a slight overnumeration of males) while for 1979 was 98.5 (suggested an under-enumeration of males). Very low or high ratios point towards transferences to the neighbouring age groups. For example low ratios for age groups 25-29 (1969) show an under-statement of ages of young males, causing an inflation in the age group 10-14 or an overstatement by older males (who want to appear older), causing a deficit in the early twenties and an inflation at 45-49 (105.3). The same argument applies to the 35-39 age groups for 1979. A more acceptable reason seems to be the tendency of young married girls (over 10-years) to overstate their ages, thereby inflating the early twenties (20-24) and causing a deficit in the adult females (who may want to appear younger) this inflates the 25-35 and a deficit in the 45-49 age groups. This pattern of age misreporting is common to most African countries (Brass et al, 1968). Some divergence is evident, when the two patterns (1969 and 1979) of sex-ratios are compared.

The distribution of population by 5-year age groups gives a further insight into the possible omissions and/or misplacements of ages (figures 3.5 and 3.6). For 1969, the proportion of females reported in the age groups 20-29 and 30-39 are somewhat higher than for females. This gap, could be due to mortality effect or omission of males (either affected by migration, employment in outside areas, presence of armed forces or prisons in the regions). For 1979, the gap noted for ages 35-39 may be a result of age misreporting or omission (undercount) of males in group 30-34 upwards and from 40-44 downwards for females. On the whole the 1979 distribution seems to suffer less from distortions due to age transfers than the 1969 data.

The proportions single are a very useful indicator of age misreporting by marital status, or of marital status alone. The proportions single are shown in figures 3.7 and 3.8. To measure the consistency of age reporting by marital status between the two censuses (1969 and 1979) for females, the 1962 census, NDS (1977) and KFS (1977/78) have been used (Table 3.2). The patterns follow the expected age distribution (Bogue, 1969) and it appears that there is a systematic pattern of marital status reporting age-wise for all the five graphs for females (figure 3.7). The age pattern falls steeply between age 15 and 20 for all censuses and surveys though less steep for 10-15 age group and less steep for 20-25, then gradual thereafter. There is also an indication of a slight increase in the proportions single over time for older ages and a significant increase for the age group 15-19 is noted for females. The 1979 curve takes the outermost shape, showing an increase in proportions single over time. However, there seems to be an insignificant change in the proportions for males over the 10-year period (figure 3.8). These changes in proportions single could be representative of true changes in marriage pattern or misreporting of marital status, particularly in 1969 census - errors during the editing in the classification of marital status or in the coverage of concensual unions. A comparison of censuses with surveys (for females) shows some consistency in reporting of marital status age-wise, though the proportions are lower in both surveys as from age 30. This may reflect the poor quality of age reporting in the censuses for older ages or in the coverage by the surveys. For females, the proportions single seem to be relatively more accurately reported, implying age misreporting may be independent of marital status as marital status was more accurately reported. Figure 3.8, shows that the male proportions single fall gradually up to age 25, then steeply between 30-34 and gradual for the rest of the age-range. The relative increase in the proportions single for the age-range 10-20 may be due to misreporting on the part of young adult males. The decline for the range over age 25, may be due to overstatement of ages of male adults in the age range 20-25 as mentioned earlier.

Age and marital status 'not stated' are also important indicators of the quality of data. These are given in Table 3.3 for both 1969 and 1979 censuses by sex and status. There seems to be an improvement in the reporting of marital status as evident from the columns 1 and 2 for 1969 (.69 and .62) for males and females as compared to those for 1979 (.17) for both sexes. The percentage, 'unknown' declined significantly. Age 'not stated' for those in the single and married status is quite substantial as compared to those of the widowed or divorced status for both sexes. These causes underestimation or overestimation of the proportions single and/or married hence yielding misleading patterns when applied in the analysis of Nuptiality.

3.3.2 THE PATTERN OF ERROR IN THE 1979 CENSUS AT REGIONAL LEVEL

The general pattern of error seems to be extreme in all districts of the Northern Province (Wajir, Mandera, Garissa) and part of Eastern (Marsabit, Isiolo), Coast (Lamu) and Rift Valley (Turkana). On the other hand all districts in Western Province (Bungoma, Busia, Kakamega) exhibit a relatively lesser degree of error, when evaluated for all methods applied. Thus the pattern of error is varied over these 41 regions and warrants individual evaluation of each district rather than generalization, if meaningful interpretation of the marriage timing and incidence is sought.

The single year age distribution for Nairobi (figure 3.3.1) shows that heaping was prevalent at ages ending with 0 particularly at 20 and 30 for both sexes. Misreporting is obvious at ages 15, and 20. Over age 20 males tend to predominate females. For the summary indices (Table 3.1 - Column 1-4), the Myers' Index yielded values of 13.33 (males) and 12.62 (females) against the ideal value of 0. Males prefered 0,5 and 2 over 6, 4 and 7, while females 0, 5 and 8 to 4, 3 and 6 (Appendix - Table 2 and 3) The Whipple's Index confirms the preference for terminal digits 0 and 5 with 139.75 (females) and

135.13 (males). Both values indicate that data are rough. The UN Index 124.37 (Joint ratio score) shows the data to be highly inaccurate against the desired (<20) value for accuracy (Table 3.1 - Column 8). The Sex ratio of 33.65 and Age-ratios of 13.43 (males) and 10.00 (females) are very high. These could explain in part the high value of the Joint Score. The proportions single (figure 3.9.1 Males) show a gradual decline over 12-20, steep over 20-25, gradual over 25-35 and above, with about 90 percent being ever-married by age 30. For females the decline is gradual over 12-15, steep over 15-20, gradual over 20-35 and above, with about 90 percent ever-married by age 40. The proportions of Age and marital status 'not stated' are high for those of the single and married status especially for single females, and shows poor reporting of female status (marital) by age (Table 3.3).

For Nyeri district, the single year age population distribution shows high preference for terminal digits 0 and 5 and misreporting at age 15. (figure 3.3.2). Females tend to predominate males above age 20· The Myers' values of 11.89 (males) and 16.46 (females) show that the data are poor and, both sexes prefer 0,5 and 8 to 1,3 and 4 (Appendix - Tables 2 and 3). Whipple's values 150.18 (males) and 166.65 (females) too reveal that the data are rough (Table 3.1 - Colum 1-4).

The UN Index (Table 3.1 - Column 5-8) indicates the quality of data is inaccurate with a Joint Score of 40.43. The proportions single (figure 3.9.2) decline gradually over 12-20 (males)and 12-15 (females), steep over 20-35 (males) and 15-25 (females), steeper over 15-20 (females) then gradual above 30 (males) and 25 (females). About 90 percent are ever-married by age 35 (males) and 30 (females). Age 'not stated' is relatively high for the single and married status and the 'not stated' category (Table 3.3). The total marital status 'not stated' is not very high (0.11 and .10 for males and females). The widowed females too have a relatively high proportion of unknown ages (Table 3.3).

Kiambu region, has a less pronounced pattern of heaping and females are less than males over age 20 (figures 3.3.3). Myers' Index values of 9.48 (males) and 14.24 (females) show high preferences and avoidance in the age reporting. The preferences are for 0, 5 and 2 over 1, 3 and 4 (males) and 0, 5 and 6 over 1, 3 and 4 (females). The Whipple's values of 135.37 (males) and 151.10 (females) also show rough quality data (Table 3.1 - Column 1-4). The UN Joint Score of 31.47 implies that the data are inaccurate (Table 3.1 - Column 5-8). The proportions single reveal that (figure 3.9.3) by age 35 and 30 for males and females respectively; approximately ninety percent of the population has ever married, with steep declines in proportions single over 20-25 (males) and 12-25 (females). The 'Unknown' marital status in not very significant in size, though high proportions of the single and married status have their ages unknown (Table 3.3.).

Kirinyaga, too has a less pronounced pattern of heaping (figure 3.3.4) with females predominating males above age 20. The Myers' Index of 13.14 (males) and 19.71 (females) show preference for 0,5 and 8 over 3, 1 and 4 and for 0, 5 and 7 over 3, 1 and 2 for males and females respectively. The Whipple's Index, indicates that the quality of data is rough 150.85 (males) and 171.53 (females)-Table 3.1 - Column 1-4 . The UN Index Joint Score of 42.74 implies that the data are highly inaccurate. Proportions single (figure 3.9.4) are less than 10 percent by age 35 (males and 25 (females) with steep declines over 15-25 (males) and 12-20 (females). The marital status not stated is akin to that of previous regions in the Central Province. The males who were single had a large percentage of age not stated (Table 3.3).

Muranga district, has a marked pattern of heaping at terminal digits o and 5, with females being more than males above age 18 (figure 3.3.5). The Myers' Index of 10.38 (males) and 14.71 (females) (Table 3.1 - Column 3-4) implies preference for 0, 5 and 6 by both sexes over 1, 3 and 4. The Whipple's Index confirms the rough data quality with values of 138.80 (males) and 155.03 (females). The UN Index value (Table 3.1 - Column 5-8) of 37.69, also shows data to be inaccurate. The proportions single (figure 3.9.5) suggest that 90 percent of the population has ever-married by age 35 (males) and 25 (females) with high marriage rates over ages 20-25 (males) and 15-20 (females). Age 'unknown' and marital status 'not stated' are significant, especially for the married status (Table 3.3).

Nyandarua district, exhibits a less pronounced saw edged pattern with females exceeding males above age 20 (figure 3.3.6). The Myers' Index (Table 3.1 Column 3-4) yielded values of 9.28 (males) and 13.97 (females) indicating poor quality of data. Both sexes prefered 0, 5 and 6 at the expense of 1, 3 and 4. The Whipple's Index values (Table 3.1 Column 1-2) 139.16 (males) and 144.16 (females) show that the data are rough. The UN Joint Score of 46.47, signifies highly inaccurate age reporting for this region (figure 3.1 - Columns 5-8). The proportions single (figure 3.9.6) decline to less than 10 percent by age 35 (males) and 30 (females) with highest rates over 20-25 (males) and 15-20 (females). Those of 'unknown' status are relatively few, however, the 'unknown' age is high (56.39 and 51.85) with no age 'unknown' for the divorced males (Tables 3.3).

Busia district has a less marked pattern (figure 3.3.7) with males having a downward shift at age 15 and an upward shift for females. The Myers' values (Table 3.1 - Column 3 and 4) of 7.5 (males) and 12.12 (females) show poor data quality, with preference for 7, 0, 5 and 9 over 3,2,6,1 and 4 for males, and 0,9,7,8 and 5 over same digits for females. The Whipple's values are much lower compared to others showing that there was less preference for digits 0 and 5. The value 117.73 (males) implies data are approximate while 126.68 (females) indicates data to be rough (Table 3.1 - Column 1,2). The UN Index (Table 3.1 - Column 5-8) of 36.89 (Joint Score) indicates that data for Busia are inaccurate. The proportions single (figure 3.9.7) fall to less than 10 percent by ages 30 (males) and 20 (females), with steep declines over 15-25 (males and 12-20 (females). The proportion of unknown marital status is low, but very high for males with unknown age (40.91), and for the married females (41.09) with unknown age (Table 3.3).

Bungoma region, seems to have the relatively most accurate data on both age reporting per se and of marital status age-wise. The pattern for single year of age distribution is approximately smooth (figure 3.3.8) with females exceeding males above age 20, and moderate kinks at age 10 and 25. The Myers' values (Table 3.1 - Column 1-4) of 4.75 (males) and 5.24 (females) show fair age reporting. The Whipple's value of 112.05 (males) and 109.85 (females) indicate approximately accurate data. The UN Index value of 27.26 indicates that data are inaccurate, for net census error. The proportions single (figure 3.9.8) decline rapidly to less than 10 percent by ages 30 (males) and 25 (females) with the highest rates over the ranges 20-25 (males) and 15-20 (females). The unknown marital status (Table 3.3) gives low proportions, for age 'unknown', these are high for the single and married males and females. Those for widowed females are also high (28.65). The correlation for unknown marital status and age (26.07) is also high.

Kakamega district has a similar pattern though a little more pronounced than for Bungoma (figure 3.3.9) and much misreporting is evident at age 15. Females tend to exceeed males above age 16. Myers' values of 7.34 (males) and 8.76 (females) shows poor quality data with preferences being varied for the sexes. Males prefer 7,5,3, 0 and 9 over 1,8,4, 2 and 6, while females 0,7,9, 5 and 6 over 8,4,1, 2 and 3. As can be seen, no clear trace of particular prefered terminal digits can be made (Appendix - Tables 2 and 3). Whipple's values confirms this (lower values) as compared to regions with obvious preferences for terminal 0 and 5. The values of 118.33 (males) and 119.57 (females) show that data are approximate (Table 3.1 - Column 1, 2). The UN Joint Score of 34.55 reveals the data to be inaccurate for errors of age reporting (Table 3.1 - Column 5-8). The proportions single (figure 3.9.9) fall to below 10 percent by age 30 (males) and 25 (females) with steep declines over 20-25 (males) and 12-20 (females). The 'unknown' marital status is higher than for the other two regions in the province. Similarly the proportions for age 'unknown' are high for single males and females (Table 3.3). This indicates that marriage ages may be higher than expected, due to the misplacement of marital status age-wise.

In Nyanza Province, South Nyanza district exhibits great preferences for terminal digits 0 and 5 (figure 3.3.10) and females exceed males above age 20. The Myers' values of 15.54 (males) and 12.33 (females) imply a poor data quality. The preferences range from 0, 5 and 6 (males) 0,7,9 and 5 (females) over 3,1 and 4 by both sexes. The Whipple's values indicate that the data are rough (Table 3.1 - Column 3,4) with values of 133.32 (males) and 134.2 (females). The UN Joint Score reveals that data are highly defective (49.46). The proportions single (figure 3.9.10) indicate a rapid decline over 20-25 (males) and 12-20 (females). Less than 10 percent are single by age 35 (males) and 25 (females). The 'unknown' marital status is relatively low, but high proportions of the married females (50-55) had their ages 'unknown' similar to single males (42.24).

Siaya district suffered age reporting error, as marked by the ragged patterns, (figure 3.3.11) with significant divergence between the sexes. The drop in numbers between age group 12-15 and 15-20, may be due to understatement on the part of those aged 15-25. Females exceed males above age 20. The Myers' values (Table 3.1 - Column 3,4) of 9.09 (males) and 11.02 (females) stem from preferences by both sexes for digits 0,7,5 over 1, 3 and 8 (males) and 3,2 and 8 (females). The Whipple's values, 171.67 (males) and 122.62 (females) show that data are rough (Table 3.1 - Column 1,2). The UN Index 47.97 implies that data are highly inaccurate (Table 3.1 - Column 5-8). The proportions single (figure 3.9.11) show steep declines over ages 20-25 (males) and 12-20 (females) with approximately 10 percent being single by age

35 (males) and about 5 percent by age 25 (females). The 'unknown' marital status (Table 3.3) is not very high. However, for unknown age, the proportions are significant for single males (50.57) and married males (41.60) and females (51.63).

For Kisumu district, the pattern is partly influenced by the urban sector, thus misreporting at age 15, may be due to a downward shift by males and upward by females (figure 3.3.12). The Myers' values of 9.42 (males) and 11.34 (females) show poor quality of age reporting, with high preferences for 0, 5 and 7 over 3, 1 and 4 (males) and for 0,7 and 9 over 3, 4 and 1 (females). The Whipple's values also indicate rough quality of data with 131.59 (males) and 130.14 (females). The UN Joint Score of 37.83 (Table 3.1 - Column 5-8) confirms that age reporting is inaccurate with a high sex ratio. The proportions single (figure 3.9.12) indicate that by age 30 about 90 percent males are ever-married, and by age 25 (females) 95 percent are ever-married, with highest rates being over ages 20-25 (males) and 12-20 (females).
The 'unknown' marital status (Table 3.3) is relatively higher for both sexes than for Siaya and South Nyanza. Hence the age 'unknown' for the marital statuses is relatively lower (40 percent) for both single and married males and females.

Kisii district, has a very sharp and significant preference pattern (figure 3.3.13) for digits 0 and 5. Females tend to predominate males above age 16. The Myers' values of 11.25 (males) and 19.08 (females) show preferences for terminal digits 0,5 and 8 (males) and 0, 8 and 5 (females) over 3, 1 and 4 by both sexes (Appendix Table 2 and 3). The Whipple's Index confirms the roughness of the data with high values of 141.13 (males) and 161.14 (females). The UN Index (Table 3.1 - Column 5-8) of 41.29 implies that the data are highly inaccurate (though close to 40 inaccurate). The proportions single (figure 3.9.13) indicate that about 90 percent are ever-married by age 30 (males) and 25 (females). The age and marital status 'unknown' are high though lower than for other regions in the province except for females (Table 3.3). The proportions are high for married than for single status.

Taita Taveta region, does not have a marked pattern of heaping (figure 3.3.14) though, males in the age group 15-20 tend to understate their ages to 10-15 age group, while females in the early twenties are pushed to the late teens. The Myers values (Table 3.1 Column 3-4) of 10.03 (males and 15.22 (females) show that preference was for terminal digits 5, 0, and 9 over 1,3 and 4 in different orders by both sexes (Appendix tables 2 and 3). Whipple's values of 135.37

(males) and 142.12 (females) reveals that data are rough (Table 3.1 - Column 1-2). The UN Index of 31.29 too indicates data to be inaccurate with low sex and age ratios (Table 3.1 - Column 5-8). The proportions single (figure 3.9.14) show that about 90 percent are ever-married by age 40 (males) and 30 (females) with high marriage rates over 20-25 (males) and 12-20 (females). The 'unknown' marital status (Table 3.3) are relatively high (.26 and .24) for males and females respectively. The 'unknown' age is high for the single males and females and married females.

Mombasa urban sector also has some effect on the sex ratio and accuracy of data. The region manifests a marked preference pattern (figure 3.3.15). The summary indices suggest rough data quality for both Myers (15.23 and 15.34) and Whipple's (151.33 and 155.44) for males and females respectively (Table 3.1 Columns 1-4). The UN Index of 52.96 suggests, too that the data are highly inaccurate, with high sex ratios. The proportion single (figure 3.9.15) indicate that over 90 percent are ever-married by age 35 (males) and 30 (females) with high frequencies over ages 20-25 (males) and 12-20 (females). The 'unknown' marital status is very high for both sexes (Table 3.3) .95 and .91. The 'unknown' age for married males is extremely high (64.44) but lower for the females (41.77). On the contrary widowed males have very low proportions of 'unknown' age (.56).

Kilifi district, exhibits a significant gap between male and female age patterns (figure 3.3.16). The males tend to predominate females above age 16, and misreporting at age 15 is evident by both sexes. The Myers' values of 16.29 (males) shows preference for 0,5, and 9 over 1, 3 and 4, and for females 25.23 for 0,5 and 9 over 6,4 and 3 (Appendix Tables 2 and 3). The Whipple's value 146.91 (males) and 160.28 (females) indicate data to be rough (Table 3.1 Column 1, 2). The UN Value of 47.53 also points towards similar observations (highly inaccurate) with high sex ratios (Table 3.1 - Column 5-8). The proportions single (figure 3.9.16) show that over 90 percent are ever-married by age 35 (males) and 20 (females) with high frequencies over 15-25 (males) and 12-15 (females). This also indicates that females marry at very early ages. The proportions of 'unknown' age is high for married males (54.41) and females (61.11) and quite low for divorced males (Table 3.3).

Lamu district, seems to have the worst age reporting as shown by the highly marked preference pattern (figure 3.3.17). Significant misreporting is obvious at age 15, causing heaping at age 12 and 18. The Myers' values of 21.33 (males) and 34.16 (females) indicates preference for only 0 and 5 over 1,3, 4 (males) and over 4,3, and 7 (females).

Whipple's values of 183.20 (males) and 234.19 (females) confirm the preferences and shows data to be very rough (Table 3.1 - Column 1-2). The UN Joint Score of 102.15 with very high sex ratios and age ratios reveals that data are highly inaccurate. This may be due to ignorance and/or non-importance of age in the traditional communities. The proportions single (figure 3.9.17) show that significant marriages occur over ages 15-25 (males) and 12-20 (females) with over 90 percent having ever-married by age 35 (males) and 25 (females). The age 'unknown' proportions are spread over the married, single and unknown statuses. It is interesting to note that for both sexes all ages were reported (stated) for those widowed and divorced males (Table 3.3).

Tana River too has a marked pattern of age heaping, though less pronounced than for Lamu (figure 3.3.18). The Myers' values 19.51 (males) and 29.13 (females) point towards preference for terminal digits 0,5 and 7 over 1, 3 and 4 (males) and for 0, 5 and 8 over 4,3 and 1 (females). The Whipple's values of 167.78 (males) and 165.34 (females) reveal that the data are rough (Table 3.1 - Column 1-2). The UN Index also shows data to be highly inaccurate with a Joint Score of 72.00 (Table 3.1 - Column 5-8). The proportions single (figure 3.9.18) point towards early marriages for females (age 20) and males (age 30). The rates being highest over 20-25 (males) and 12-20 (females). The 'unknown' age precentages are high for the single females (48) and males 37.14) with all persons who were divorced having stated their ages (Table 3.3).

Kwale district, has high preference pattern by both sexes for digit 0 (figure 3.3.19) and misreporting at age 15. Males exceed females above age 16. Myers' values of 21.52 (males) and 30.10 (females) show high preferences for terminal digits 0,5 and 9 for both over 1,3 and 4 (Appendix tables 2 and 3). Whipple's confirms this with 174.20 (males) and 188.84 (females) indicating rough and very rough data (Table 3.1 - Column 1,2). The UN value of 41.82 is close to 40, index for inaccurate, with high sex ratios. The proportions single decline to (figure 3.9.19) less than 10 percent by age 35 (males) and 25 (females) with rapid decline over ages 12-25 (males) and 12-15 (females). The proportions of 'unknown' marital status (Table 3.3) are relatively high (.46 and .43) with similarly high figures for married males and females of 'unknown' ages (41.99 and 43.48).

The whole of North Eastern Province (Wajir, Mandera, Garissa) exhibit the extreme patterns of preference as seen from the graphs (figure 3.3.20, 3.3.21, 3.3.22) with similar age misreporting at age 15 (heaping occurs at 12, 16, 18). Females tend to exceed males above age 16 for all three regions. The Myers values for Wajir, Mandera, and Garissa are as follows; 48.0 and 54.50; 47.92 and 56.08; and 43.16 and 49.90, for males and females respectively. All values show preference for 0,5 and 8 only, at the expense of 1,9 and 3 for males in Garissa and Mandera, and over 1, 3 and 4 for females in Wajir and Garissa (Appendix tables 2 and 3). The Whipple' values for the three regions 262.19 (males) and 280.84 (females) in Wajir; 265.28 and 290.33 in Mandera; and 237.33 and 265.84 for Garissa; all these indicate very rough data quality (Table 3.1 Column 1,2). The UN Index also points towards highly inaccurate data with values of 126.51 (Wajir), 129.41 (Mandera) and 141.11 (Garissa) all have high sex-ratios (Table 3.1 - Column 5-8). The proportions single (figures 3.9.20; 3.9.21; 3.9.22) indicate that less than 5 percent are single by age 25 (females) and 35 (males). Most marriages occur over the age-range 20-25 (males) and 12-20 (females). The 'unknown' marital status proportions are low. However, 'unknown' age is high for the married males (51,43,33) and females (71,52,48) for Wajir, Mandera and Garissa respectively. For Mandera no age was unstated for unknown marital status (females), widowed and divorced males (Table 3.3). The same applies to Garissa and for females (divorced) in Wajir. This may point towards the observation that most ages were estimated by the enumerator during the compiling and editing stages.

All districts in Eastern province indicate high preferences, though varied. Meru shows pronounced age heaping (figure 3.3.23). The Myers' values of 15.85 (males) and 22.09 (females) manifests preference for 0,5 and 8 over 1,3 and 4 for both sexes. The Whipple's values of 157.29 (males) and 176.65 (females) show that the data are rough (Table 3.1 - Column 1-2). The UN value of 33.20, suggests that data are inaccurate. The proportions single (figure 3.9.23) fall to less than 10 percent by age 35 (males) and 25 (females) with fast declines over the age range 20-25 (males) and 15-20 (females). The proportion of 'unknown' age are relatively higher for single males and married females (Table 3.3).

Marsabit, has a marked pattern of age heaping (figure 3.3.24). Myers' values of 28.18 (males) and 36.55 (females) are very high compared to the ideal value of 0, indicating preference for 0,5 and 8 by both sexes, at the expense of 1,3 and 4. The Whipple's index confirms the preference with values of 185.25 (males) and 216.2 (females), suggesting very rough data. The UN value of 73.88, with high Sex and Age Ratio Scores (Table 3.1 - Column 5-8) imply data are highly inaccurate. The proportions single (figure 3.9.24) show most marriages as having occurred by ages 40 (males) and 25 (females). The 'unknown' age and marital status (Table 3.3) are relatively low, except for married males (64.29) and widowed males and divorced males and females had no 'unknown' age recorded.

Machakos, has a fairly relatively better age reporting in the province (figure 3.3.25). Females tend to predominate males above age 20. Myers' values 9.07 (males) and 7.43 (females) show varied preferences for 0,9,5 and 2 over 4,3,8 and 6 (Appendix Tables 2 and 3). The Whipple's 125 (males) and 128.42 (females) show data to be approximately accurate and rough respectively. The UN value suggests data are highly inaccurate (56.75), though this could be a result of imbalance in sex and age ratios (Table 3.1 - Column 5-8). The proportions single (figure 3.9.25) indicate that by age 40 (males) and 25 (females) less than 10 percent are of single status with high marriage rates over 20-25 (males) and 15-20 (females). The 'unknown' age is high for the single males (54.97) and females (49.79).

Kitui, has a similar age heaping and misreporting as the previous region (figure 3.3.26). Females predomiante males above age 20. The Myers' 9.73 (males) and 15.33 (females) (Table 3.1)implies preference for 0,5,9 over 1,2,3 for males and over 6,2,7 for females (Appendix table 2 and 3). The Whipple's values of 138.7 (males) and 143.65 (females) show rough quality data. The UN value too, 62.18, manifests data to be highly inaccurate (Table 3.1 - Column 5-8). The proportions single (figure 3.9.26) suggest early marriage patterns with less than 10 percent being single by age 35 (males) and 25 (females) with rapid declines over 15-25 (males) and 12-20 (females). The 'unknown' age is high for married females (52.15) and lower than 40 for males (Table 3.3).

Isiolo, has a more rough pattern with high preference for terminal digit 0 over all ages (figure 3.3.27). The Myers' index confirms this with values of 21.33 (males) and 28.39 (females). Preferences are for 0,5 and 8 over 1, 7 and 4 (males) and over 4,3 and 7 (females). The Whipple's index shows that data are rough and very rough for given values of 166.56 (males) and 191.94 (females) respectively.

The UN Index (Table 3.1 - Column 5-8) value of 99.69 manifest highly inaccurate data. The proportions single (figure 3.9.27) show that by ages 35 (males) and 25 (females) over 90 percent have ever-married, with high frequencies over 20-25 (males) and 12-20 (females). The 'unknown' age for the statuses is high for the married females (43.75) and single males (39.39) with all persons having reported age for the divorced status (Table 3.3).

Embu, district, has relatively less heaping (figure 3.3.28). Myers' 12.09 (males) and 18.28 (females) values suggest preferences were for 0,5 and 9 only over 3, 1 and 4. The Whipple's values 149.23 (males) and 165.82 (females) show data are rough. The UN Joint Score 44.58, indicates highly inaccurate data (Table 3.1 - Columns 5-8). The proportions single (figure 3.9.28) decline to less than 10 percent by age 30 (males) and 25 (females) with rapid declines over 20-25 (males) and 15-20 (females). The age 'unknown' is relatively high for married females and single males (Table 3.3).

The Rift Valley Province has thirteen districts, each with a diverse geographic, economic, social demographic settings. West Pokot, manifests a saw-edged pattern, with similar misreporting at age 15 as previously observed (figure 3.3.29). The Myers' values 177 (males) and 23.67 (females) shows marked preference for 0,5 and 8 over 3,7 and 1. The Whipple's reveals that data are rough - 155.08 (males) and 166.18 (females). Misreporting of age, is light as indicated by the UN Joint Score of 34.34 (inaccurate). The proportions single (figure 3.9.29) declines to less than 10 percent by age 35 (males) and to less than 5 percent by age 25 (females), with significant drops over ages 20-25 (males) and 12-20 (females). The 'unknown' marital status is relatively high, as compared to other districts in the province and the country at large (Table 3.3). The 'unknown' age for single males is high (45.96) and low for widowed males.

Uasin Gishu, has a less pronounced pattern of age heaping (figure 3.3.30). Myers' values of 7.71 (males) and 11.42 (females) indicates preference for 0, 5 and 9 over 1,3 and 4 (males) and for 0,9 and 5 over 3, 1 and 6 (females). The Whipple's values (Table 3.1 - Column 1,2) of 127.32 (males) and 139.38 (females) show data to be rough. The UN value of 43.24 indicates a highly inaccurate data. The proportions single (figure 3.9.30) drop to less than 10 percent by age 35 (males) and 25 (females) with high drops over 20-25 (males) and 12- 15 (females). The 'unknown' age proportions (Table 3.3) are relatively high for single females (53.75) and males (43.93) and low for divorced males.

Turkana, manifests high preferences and avoidances (figure 3.3.31). The Myers' values of 29.74 (males) and 30.38 (females) point towards this observation (table 3.1 - Column 3 and 4). Analysis reveals, preferences are for 0,5 and 8 by both over 1,3 and 4 (males) and 3, 7 and 1 for females (Appendix tables 2 and 3). The Whipple's further confirms the preference for 0 and 5 with high values of 182.5 (males) and 179.57 (females) and thus data are very rough. The UN Index implies highly inaccurate data (49.14). The proportions single (figue 3.9.31) are affected by high overstatement of males in older ages, thus by age 45 (males) and 30 (females) less than 10 percent are single, having rapidly declined over 20-30 (males) and 12-20 (females). The proportions of 'unknown' age are high for single females (54.00) and for 'unknown' marital status (43.62). No persons had age 'unknown' for divorced males.

Trans-Nzoia region, exhibits a relatively more uniform decline of population over the ages (figure 3.3.32). Males tend to exceed females above age 25, and misreporting is evident at age 15. The Myers' 7.28 (males) and 8.07 (females) show fair age reporting

(Table 3.1 - Column 3-4) with preferences for 0,5 and 7 over 4, 1 and 8 (males) and for 0,7 and 9 over 2,4 and 6 (females). Whipple's 123.22 (males) and 121.68 (females) both show data to be approximately accurate. The UN Joint Score of 45.05 shows that data are highly inaccurate for net census error, though bias arising from Sex ratio imbalance is a possible explanation. This is because Trans Nzoia is mainly a settlement scheme. The proportions single (figure 3.9.32) decline to 10 percent by age 35 (males) and 25 (females) with steep declines over 15-25 (males) and 12-20 (females). The 'unknown' age is relatively high for married females and very low for widowed males (Table 3.3).

Samburu district has very poor quality of data as seen from the saw edged pattern (figure 3.3.33). Misreporting is very high above age 40. The Myers' values of 28.47 (males) and 29.96 (females) show that the preference was for terminal digits 0, 5 and 8 to 6, 1 and 7 (males) and over 4,3 and 1 (females). The Whipple's values indicate very rough data with 187.97 (males) and 206.86 (females). The UN Index too shows data to be highly inaccurate with a value of 45.95. The proportions single (figure 3.9.33) imply that about 90 percent had ever-married by age 35 (males) and 25 (females) with high rates over 20-30 (males) and 12-20 (females). The 'unknown' age ratios are high for 'unknown' marital status (males). All persons stated their ages for the widowed males and divorced males and females.

Narok has a less pronounced pattern (figure 3.3.34) especially in the later years, with heavy misreporting at age 15. The Myers' Summary Index 14.58 (males) and 22.73 (females) shows that the data are of poor quality. Preference range from 0,5 and 8 over 1,3 and 7 (males) and 0,8 and 9 over 3,7 and 1 (females). The Whipple's values (Table 3.1 - Column 1-2) of 143.02 (males) and 159.59 (females) yield rough data quality. The UN value for the Joint Score, 45.80, indicates that data are highly inaccurate, though again, the high sex ratios may play a role. The proportions single (figure 3.9.34)decline to 10 percent by age (40 (males) and 35 (females). High rates are recorded over 20-25 (males) and 12-15 (females). The 'unknown' marital status for males is relatively high. Proportions of age 'unknown' are relatively high for married females (43). However, no age was unstated for widowed males and divorced females (Table 3.3).

Nandi district has a similar pattern as that of Narok (figure 3.3.35). The Myers' values of 7.85 (males) is fair and 11.34 (females) shows poor quality data. Preferences range from 0,5 9 to 1,3.6 (males) and 0,9,5 to 3,2,1 (females). The Whipple's values indicate approximately accurate data for males (123.55) and rough for females (132.77). The UN Joint Score value of 43.11, states that data are highly inaccurate (Table 3.1 - Column 5-8). Military reasons in the region may play a role in the imbalance of the sex ratios. The proportions single (figure 3.9.35) shows that over 95 percent had ever-married by age 35 (males) and 25 (females), with significant rates over 15-25 (males) and 12-20 (females). The proportions of age 'unknown' is relatively high for the married females and males but low for widowed males (Table 3.3).

Nakuru district, manifests the influence of an urban sector (that is in the divergence between the sexes. The pattern is as ragged as that for Mombasa, and Kisumu regions (figure 3.3.36). Myers' Index of 10.29 (males) and 12.82 (females) points towards poor age reporting with preferences for 0,5 and 2 over 4, 3 and 6 (males) and for 0,5 and 9 over 3, 1 and 4 (females). The Whipple's values of 135.32 (males) and 141.39 (females) yield rough data quality. The UN Index of 39.44 also indicates data to be inaccurate (presence of a military base may have contributed to the low sex ratios). The proportions single (figure 3.9.36) decline to less than 10 percent by ages 35 (males) and 30 (females) mostly over 15-20 (males) and 12-20 (females). The 'unknown' proportions of marital status is not very high (.25 and .21) with 'unknown' age being higher for those of married than of single status (Table 3.3)

Laikipia region is akin to Nakuru in age heaping pattern (figure 3.3.37) save a few marked heapings at age 30 and 40 (females). The Myers' Summary Index of 10.91 (males) and 14.38 (females) shows that preferences were for 0,5, and 9 by both sexes in avoidance of 4,3 and 7 (males) and 3,4 and 2 for females (Appendix table 2 and 3). The Whipple's values (Table 3.1 - Column 1-2) of 140.5 (males) and 146.11 (females) imply that data are of rough quality. The UN values (Table 3.1 - Column 5-8) of 44.84 signifies that data are inaccurate, though again sex imbalance may be attributed to the settlement scheme. The proportions single (figure 3.9.37) fall to less than 10 percent by age 35 (males) and 25 (females) with rapid falls over 20-25 (males) and 12-20 (females). The proportions of 'unknown' age (Table 3.3) is relatively high (over 40) for married males and females and none for divorced males.

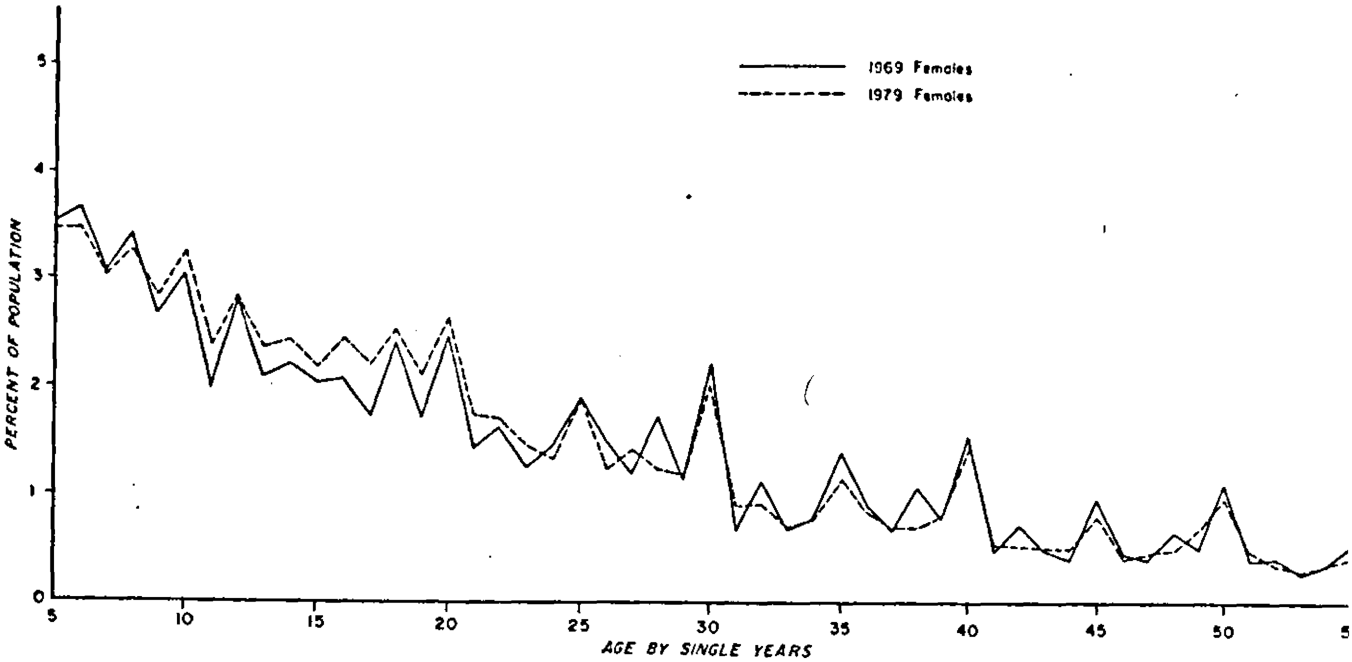
Kericho, too exhibits similar preference patterns (figure 3.3.38). The Myers' Index values of 9.80 (males) and 14.97 (females) imply preferences for terminal digits 0,8 and 5 at the expense of 3, 1 and 4 (males) and for 0,8 and 1 at that of 3, 1 and 6 (females). The Whipple's values (Table 3.1 - Column 1-2) show that data are rough - 130.89 (males) and 140.94 (females). The UN Index of 36.58 confirms that age reporting was inaccurate (Table 3.1 - Column 5-8) with low Sex ratios. The proportions single (figure 3.9.38) indicate that over 90 percent had ever-married by age 30 (males) and 25 (females) with high rates over 15-25 (males) and 12-20 (females). The married males and females (Table 3.3) have higher proportions of age 'unknown' than those of single status.

Kajiado district (figure 3.3.39) manifests high preferences especially by females, at age 18, 20 and 40. Male preferences predominate above age 40. The Myers' Index of 15.60 (males) and 23.55 (females) show data to be poor. Preferences were for 0,5 and 8 over 1,3 and 4 (males) and over 4,3 and 1 (females). The Whipple's (Table 3.1 Column 1-2) values of 156.22 (males) and 172.41 (females) signify the data to be rough. The proportions single (figure 3.9.39) indicate late marriage timing for males as 90 percent and ever-married by age 40 (males) and 25 (females). High rates were observed over ages 20-30 (males) and 12-15 (females). The proportions of 'unknown' marital status (.36 and .26) are relatively high with 'unknown' age being higher for the married than single status (Table 3.3) The ratios are low for widowed males.

Elgeyo Marakwet, has a slight edge over Kajiado (figure 3.3.40) in terms of digital preference. The Myers' Index reveals (Table 3.1 - Column 3-4) that data are poor - 15.52 (males) and 19.68 (females). High preferences are manifested for 0,5 and 8 by both sexes at the expense of 1, 3 and 4 (males) and 1,3 and 7 for females (Appendix tables 2 and 3). The Whipple's values (Table 3.1 - Column 1-2) of 150.65 (males) and 157.39 (females) imply rough data. The UN Index (Table 3.1 - Column 5-8) yields a value of 31.76 showing inaccurate age reporting. The proportions single drop to less than 10 percent (figure 3.9.40) by ages 35 (males) and 25 (females with high rates over 20-25 (males) and 15-20 (females). The 'unknown' marital status (Table 3.3) is lower for males (.09) than females (.16) with no significant proportions for 'unknown' age, except for single males (39.33) and married females (38.37).

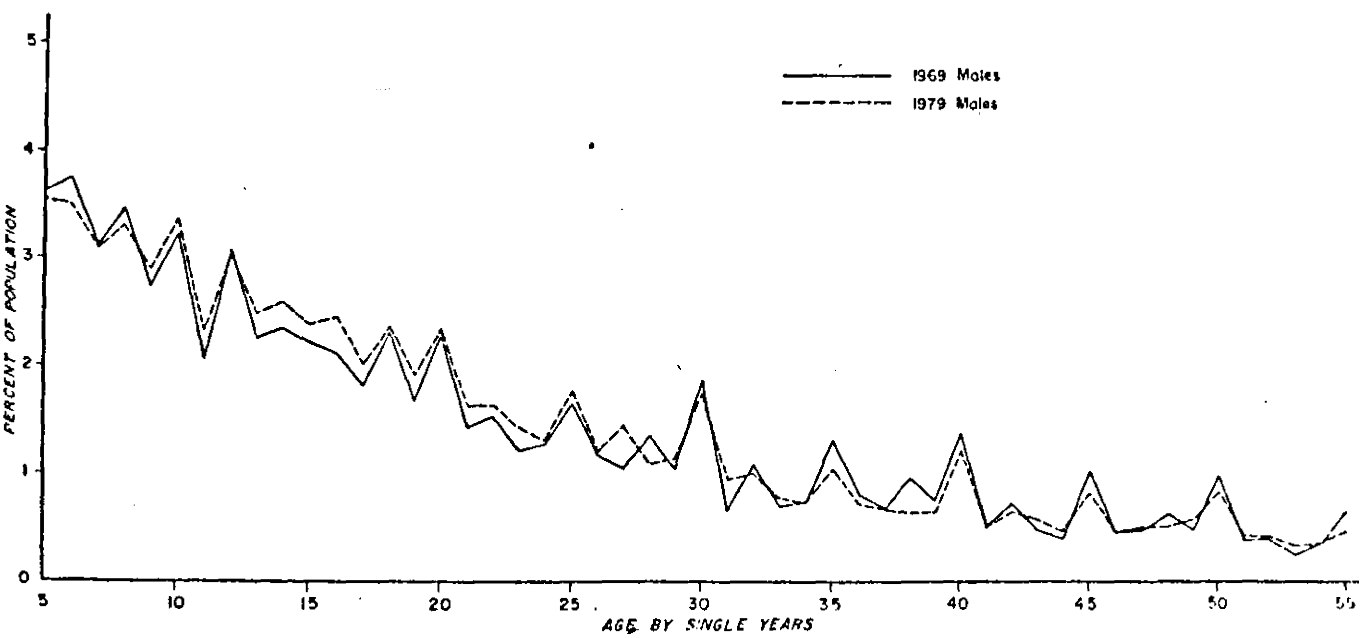
Baringo district had relatively fair age reporting though preferences were high (figure 3.3.41). Myers' Summary Index (Table 3.1 - Column 3-4) of 16.74 (males) and 21.90 (females) shows high preferences for 0,8 and 5 over 3, 1 and 6 for males and over 3, 1 and 7 for females (Appendix tables 2 and 3). The Whipple's values of 144.67 (males) and 157.32 (females) support this view and the data are of rough quality (Table 3.1 - Column 1-2). The UN Index 26.64 points towards the observation that the data were inaccurate, though this value is close to the ideal (<20) for accurate age reporting (Table 3.1 Column 5-8). The proportions single (figure 3.9.41) indicate that less than 10 percent of the single population was still single by age 35 (males) and less than 5 percent by age 25 (females). Rapid declines were noted over 15-25 (males) and 12-20 (females). The proportions of 'unknown' age are relatively higher for married than single status persons, with all divorced males having stated their ages (Table 3.3).

Fig 3.1 PERCENTAGE DISTRIBUTION OF POPULATION BY SINGLE YEAR OF AGE (5-55) FEMALES : KENYA 1969 AND 1979 CENSUS



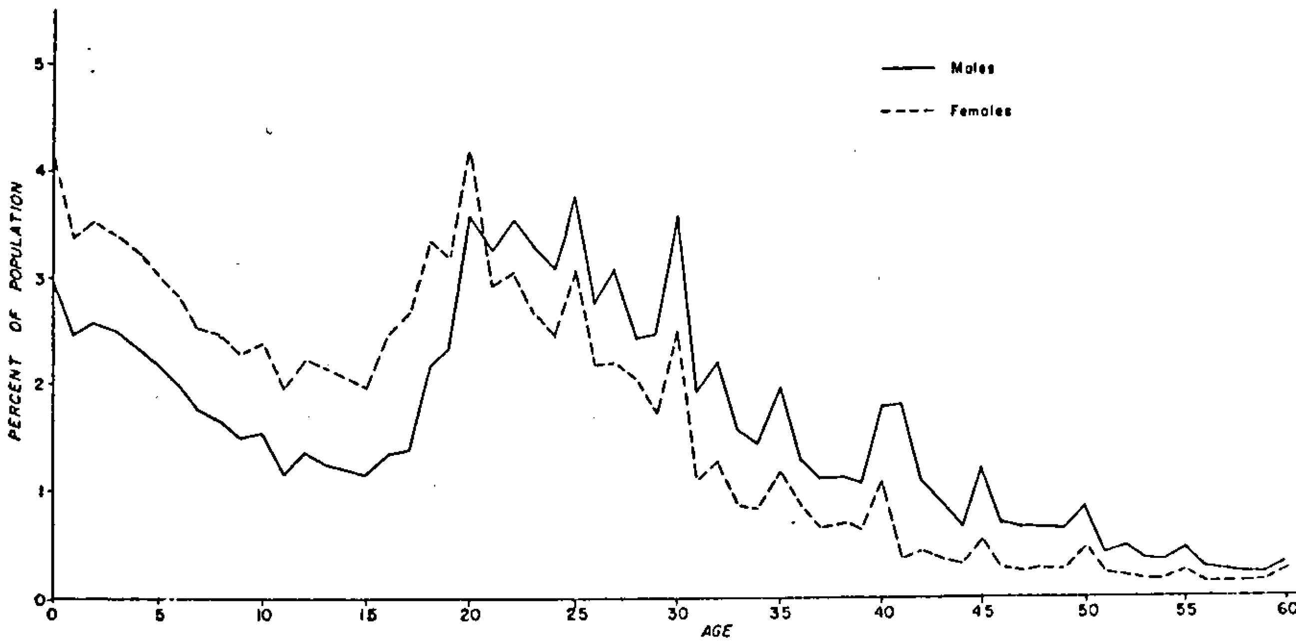
Source: 1969 Census Vol IV pp. 2 Table 1.2
1979 Census Vol. I pp. 180 Table 3

Fig. 3.2 PERCENTAGE DISTRIBUTION OF POPULATION BY SINGLE YEAR OF AGE (5-55) MALES : KENYA 1969 AND 1979 CENSUS



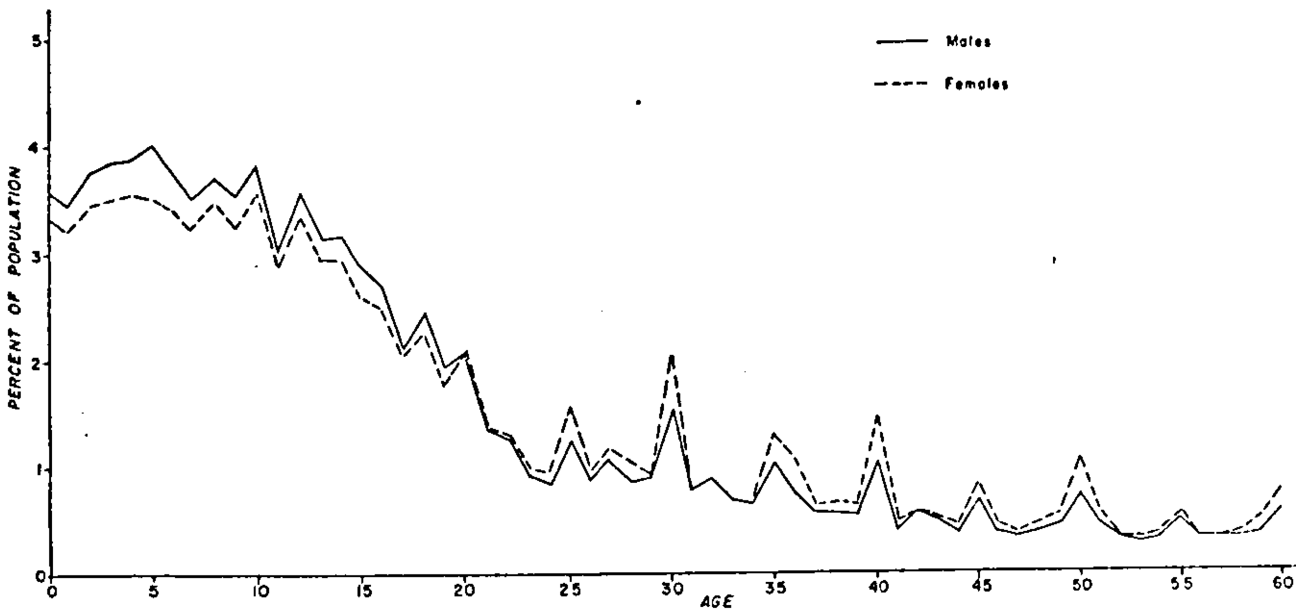
Source: 1969 Census Vol. IV pp. 2 Table 1.2
1979 Census Vol. I pp. 180 Table 3

Fig. 33.1 PERCENTAGE DISTRIBUTION OF POPULATION BY SINGLE YEAR OF AGE (0—60) AND SEX—KENYA 1979 CENSUS (NAIROBI)



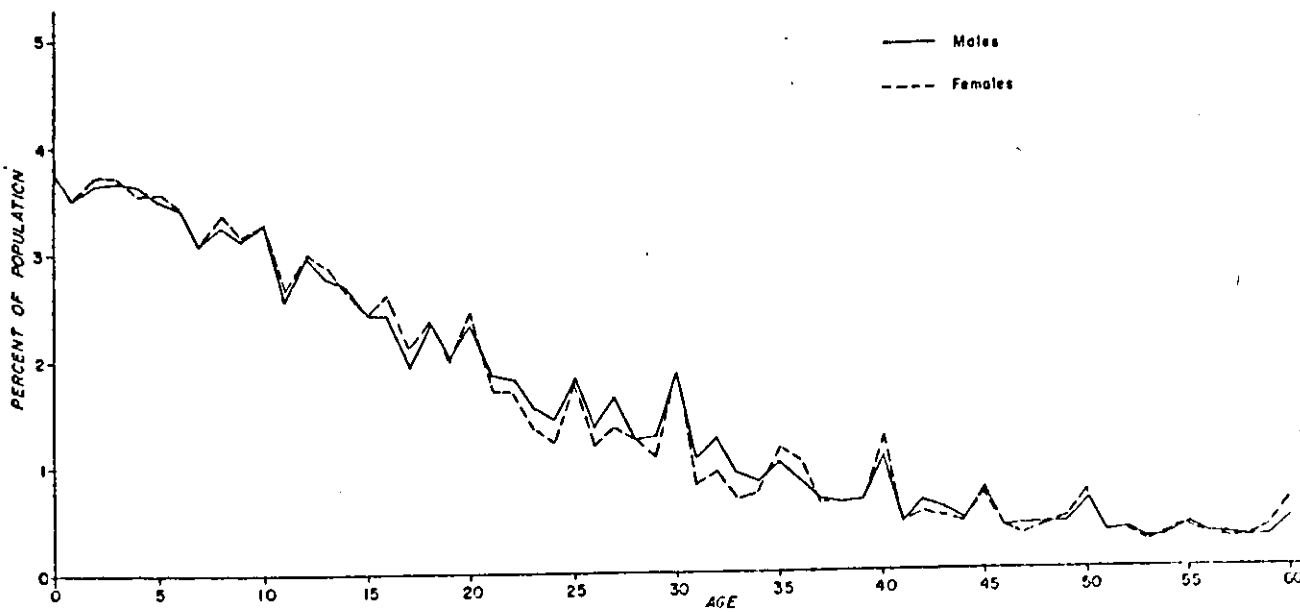
Source: CBS, Kenya Census, 1979 Vol. I Table 3

Fig 3.3.2 PERCENTAGE DISTRIBUTION OF POPULATION BY SINGLE YEAR OF AGE (0–60) AND SEX–KENYA 1979 CENSUS (NYERI)



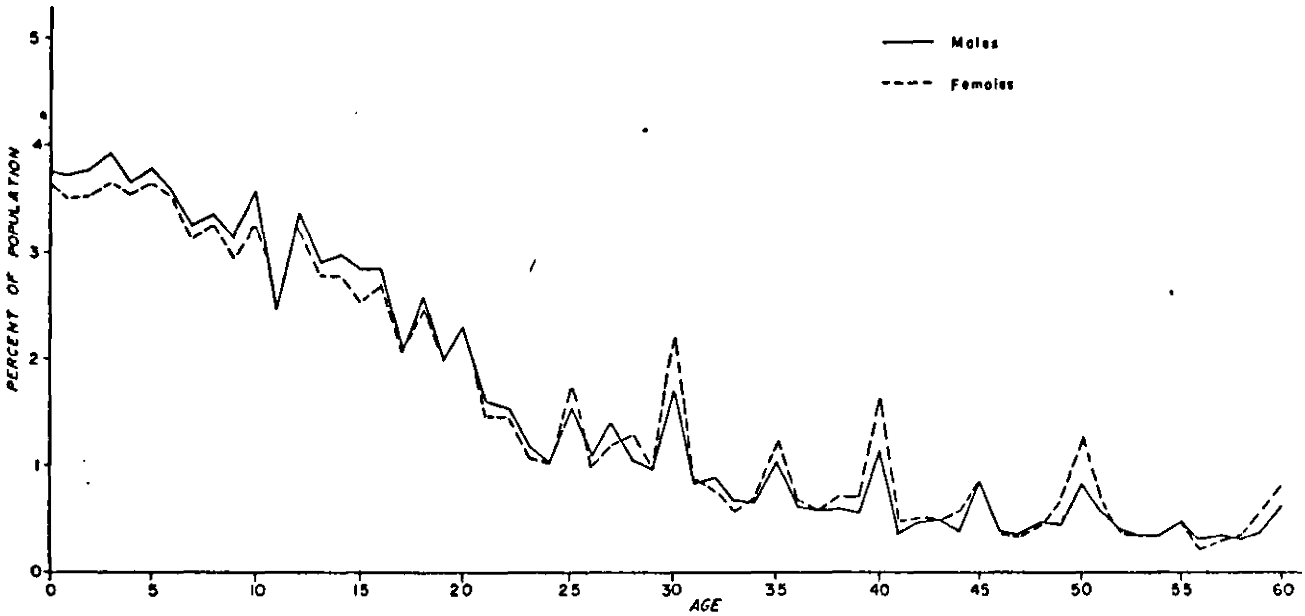
Source: CBS, Kenya Census, 1979 Vol I Table 3

Fig. 3.3.3 PERCENTAGE DISTRIBUTION OF POPULATION BY SINGLE YEAR OF AGE (0–60) AND SEX : KENYA 1979 CENSUS (KIAMBU)



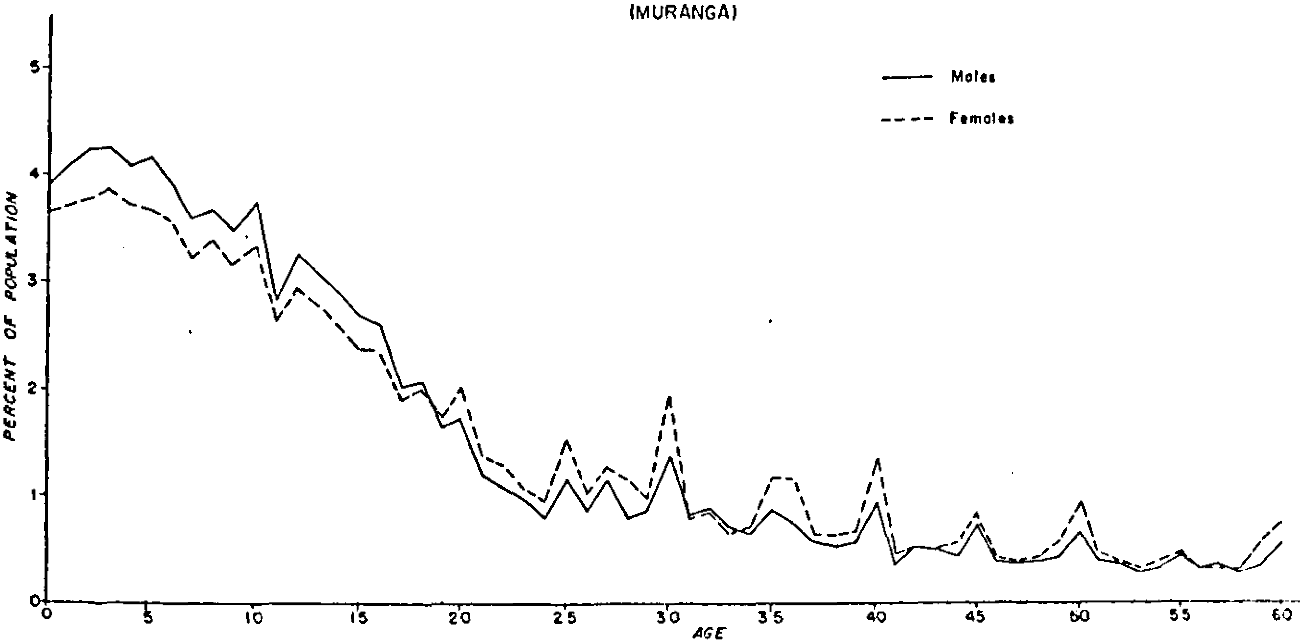
Source: CBS, Kenya Census, 1979 Vol. I Table 3

Fig. 3.3.4. PERCENTAGE DISTRIBUTION OF POPULATION BY SINGLE YEAR OF AGE (0-60) AND SEX : KENYA 1979 CENSUS (KIRINYAGA)



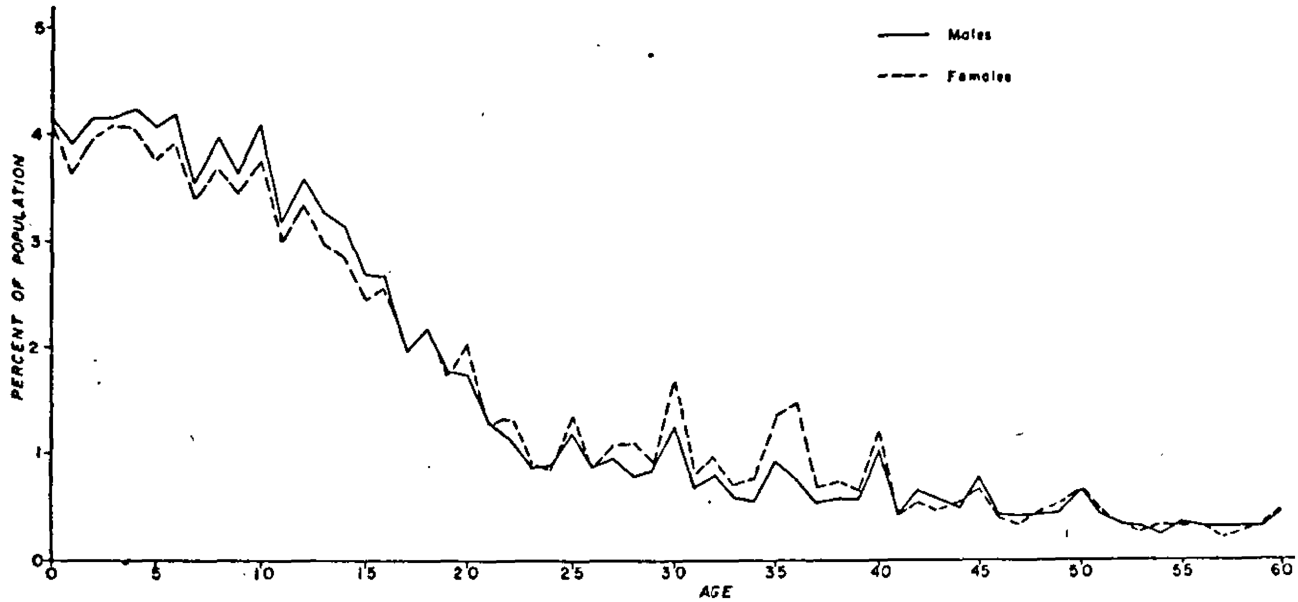
Source: CBS, Kenya Census, 1979 Vol. I Table 3

Fig. 3.3.5 PERCENTAGE DISTRIBUTION OF POPULATION BY SINGLE YEAR OF AGE (0-60) AND SEX : KENYA 1979 CENSUS (MURANGA)



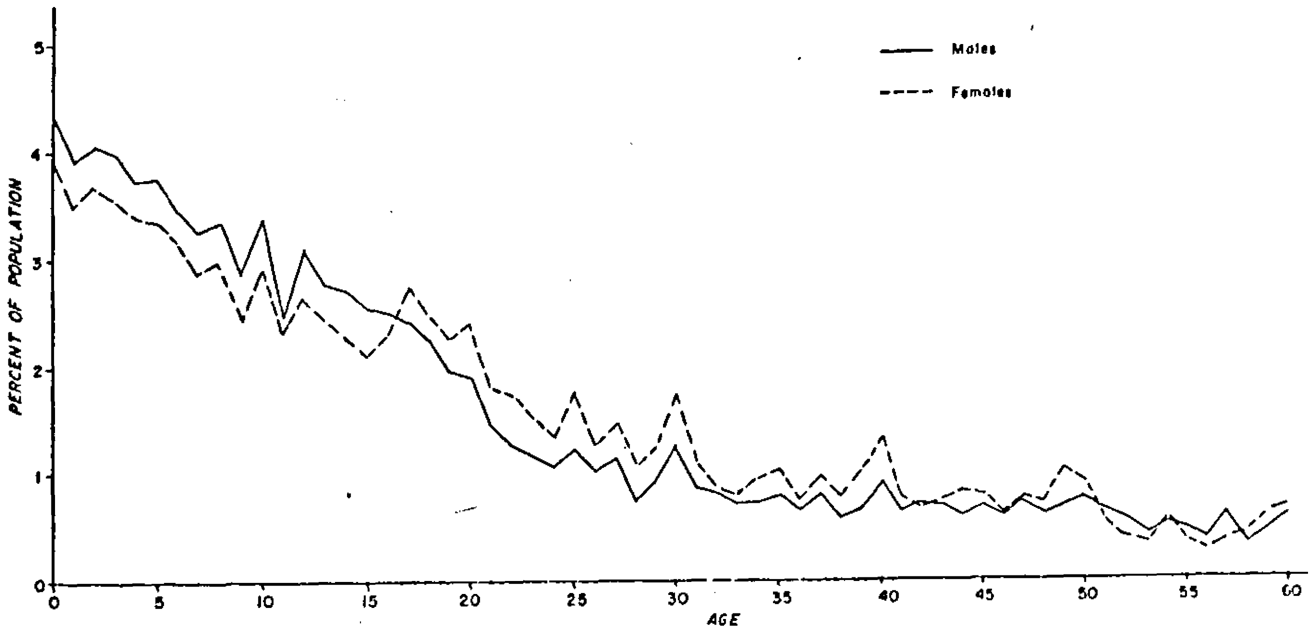
Source: CBS, Kenya Census, 1979, Vol. I Table 3

Fig 3.3.6 PERCENTAGE DISTRIBUTION OF POPULATION BY SINGLE YEAR OF AGE (0-60) AND SEX : KENYA 1979 CENSUS (NYANDARUA)



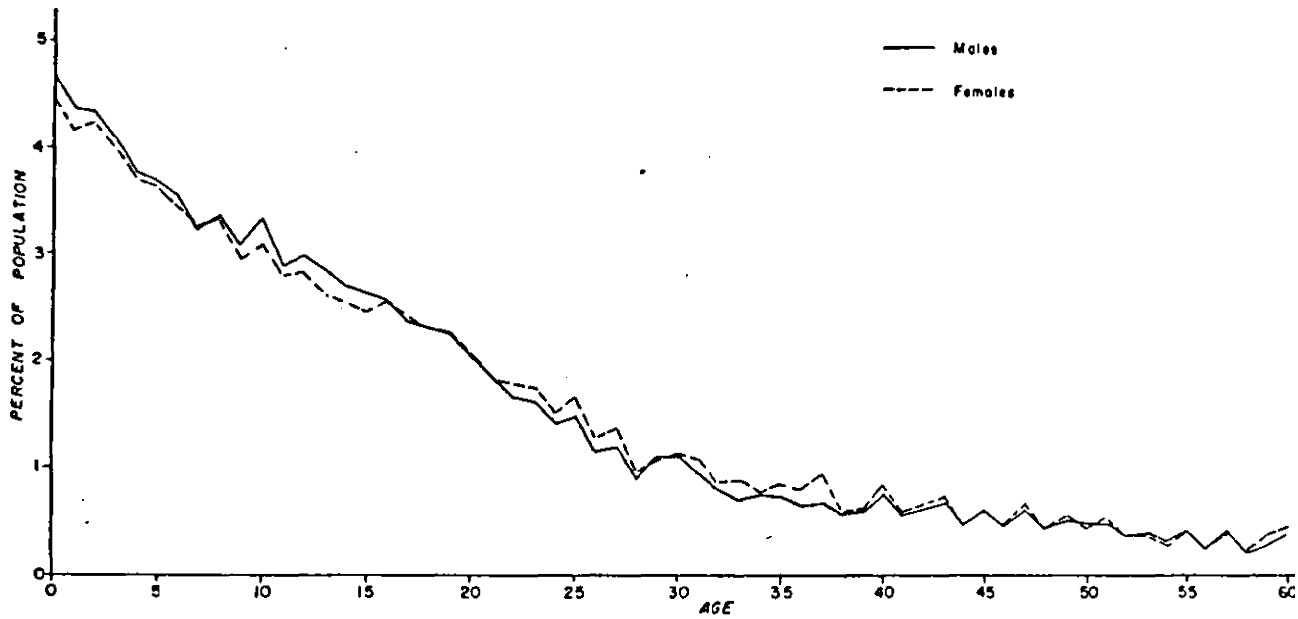
Source: CBS, Kenya Census, 1979, Vol. I Table 3

Fig. 3.3.7 PERCENTAGE DISTRIBUTION OF POPULATION BY SINGLE YEAR OF AGE (0-60) AND SEX : KENYA 1979 CENSUS (BUSIA)



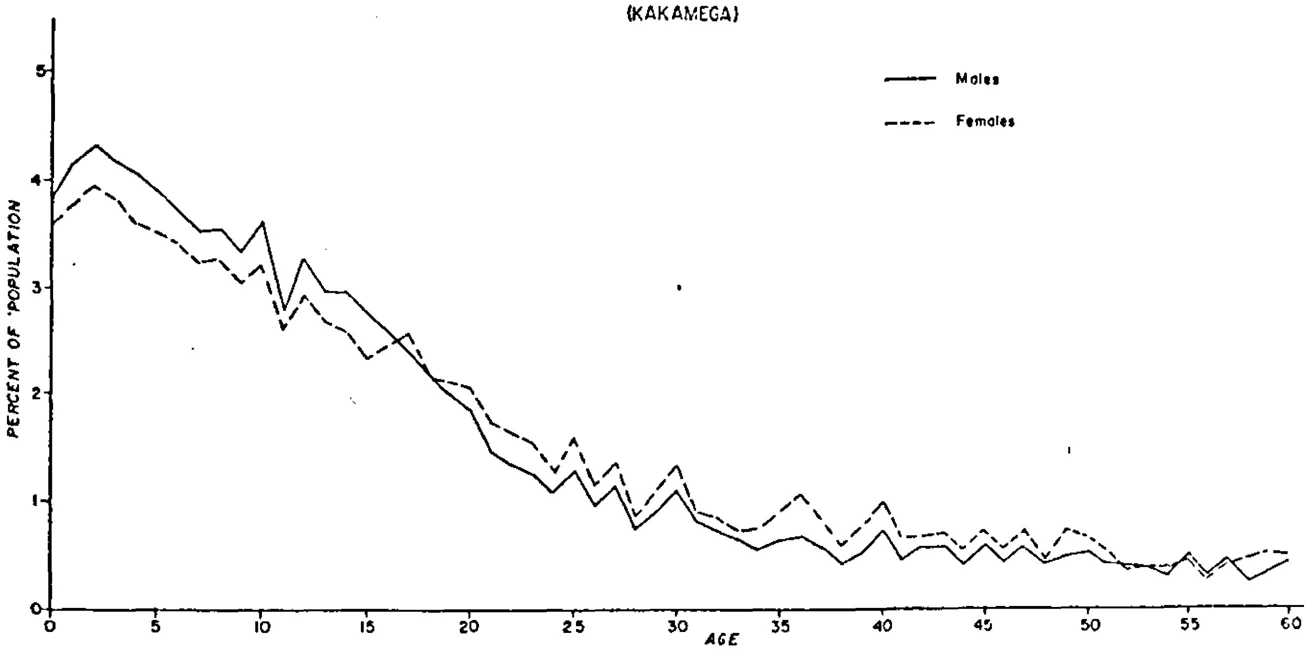
Source: CBS, Kenya Census, 1979, Vol. I Table 3

Fig. 3.3.8 PERCENTAGE DISTRIBUTION OF POPULATION BY SINGLE YEAR OF AGE (0-60) AND SEX : KENYA 1979 CENSUS (BUNGOMA)



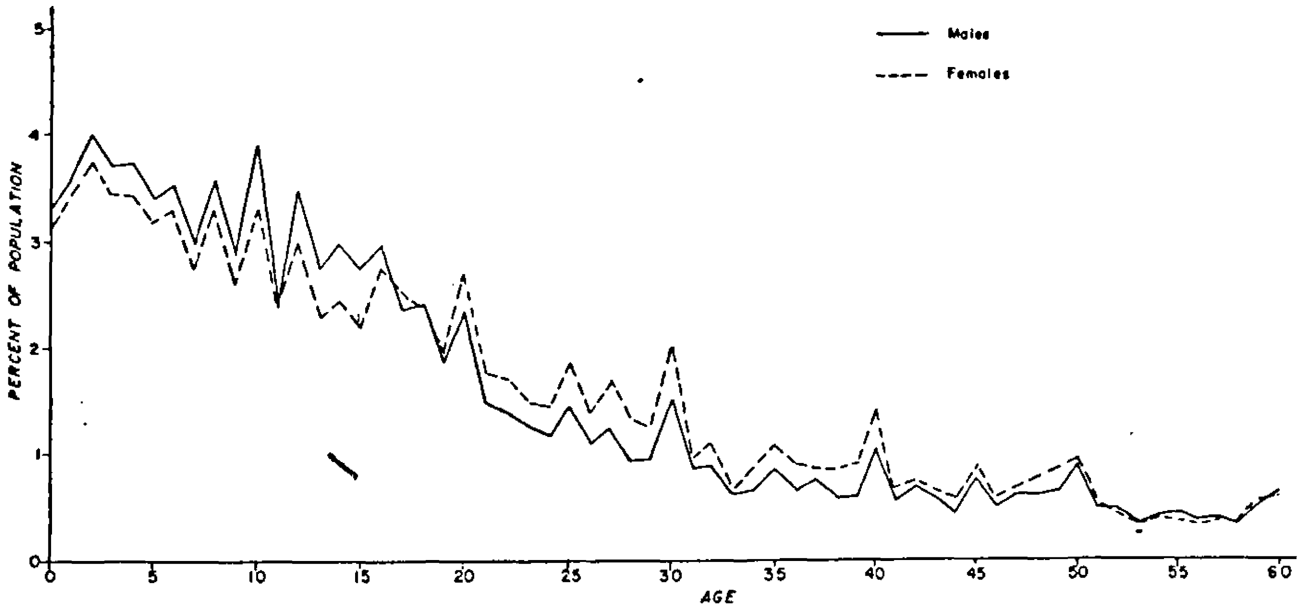
Source: CBS, Kenya Census, 1979, Vol. I Table 3

Fig. 3.3.9 PERCENTAGE DISTRIBUTION OF POPULATION BY SINGLE YEAR OF AGE (0-60) AND SEX : KENYA 1979 CENSUS (KAKAMEGA)



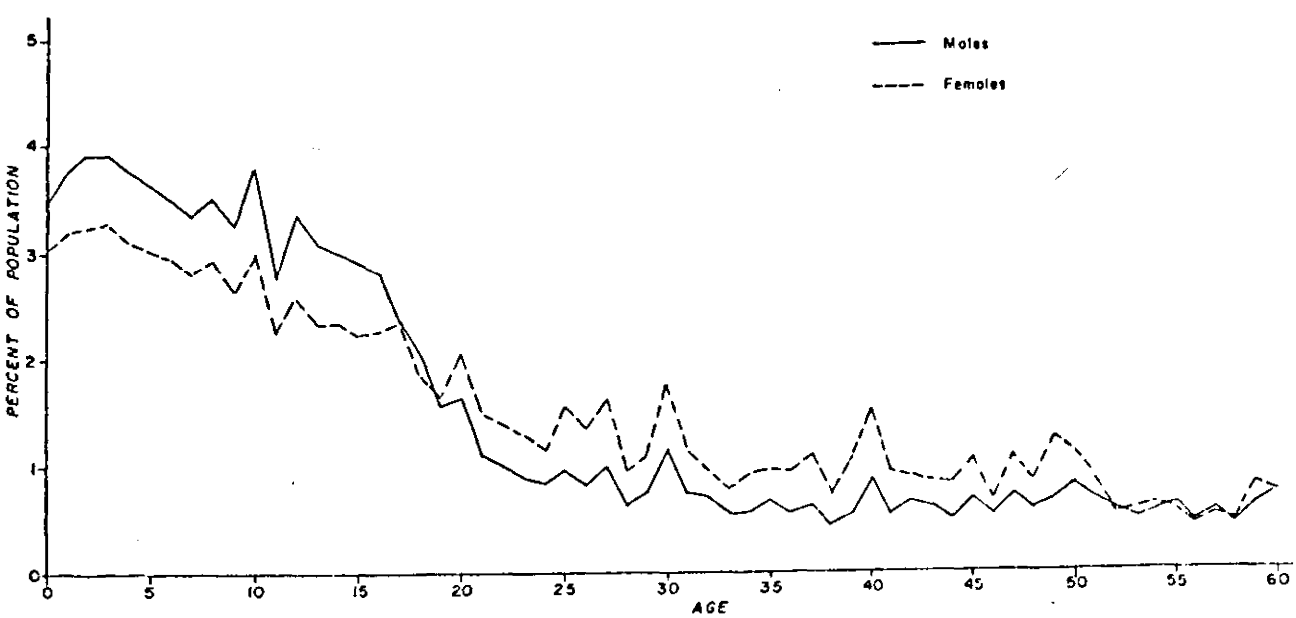
Source: CBS, Kenya Census, 1979, Vol. I Table 3

Fig. 3.3.10 PERCENTAGE DISTRIBUTION OF POPULATION BY SINGLE YEAR OF AGE (0-60) AND SEX : KENYA 1979 CENSUS (SOUTH NYANZA)



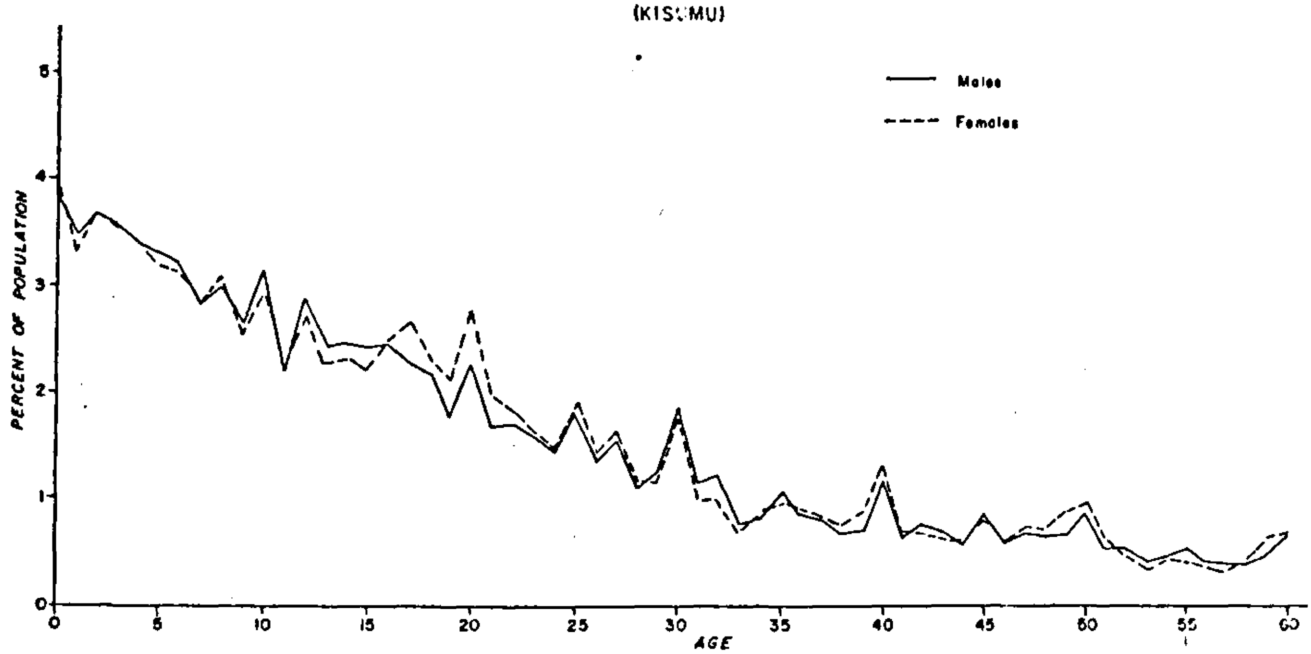
Source : CBS, Kenya Census, 1979, Vol.I Table 3

Fig. 3.3.11 PERCENTAGE DISTRIBUTION OF POPULATION BY SINGLE YEAR OF AGE (0-60) AND SEX : KENYA 1979 CENSUS (SIAYA)



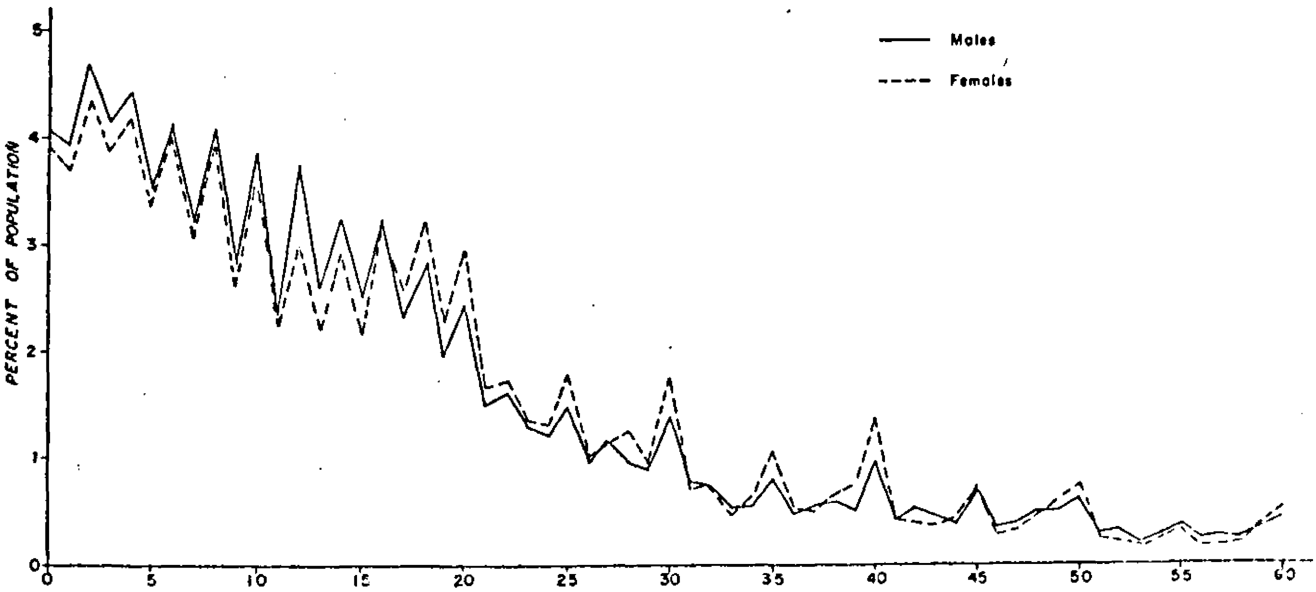
Source : CBS, Kenya Census, 1979, Vol.I Table 3

Fig 3.3.12 PERCENTAGE DISTRIBUTION OF POPULATION BY SINGLE YEAR OF AGE (0-60) AND SEX : KENYA 1979 CENSUS (KISUMU)



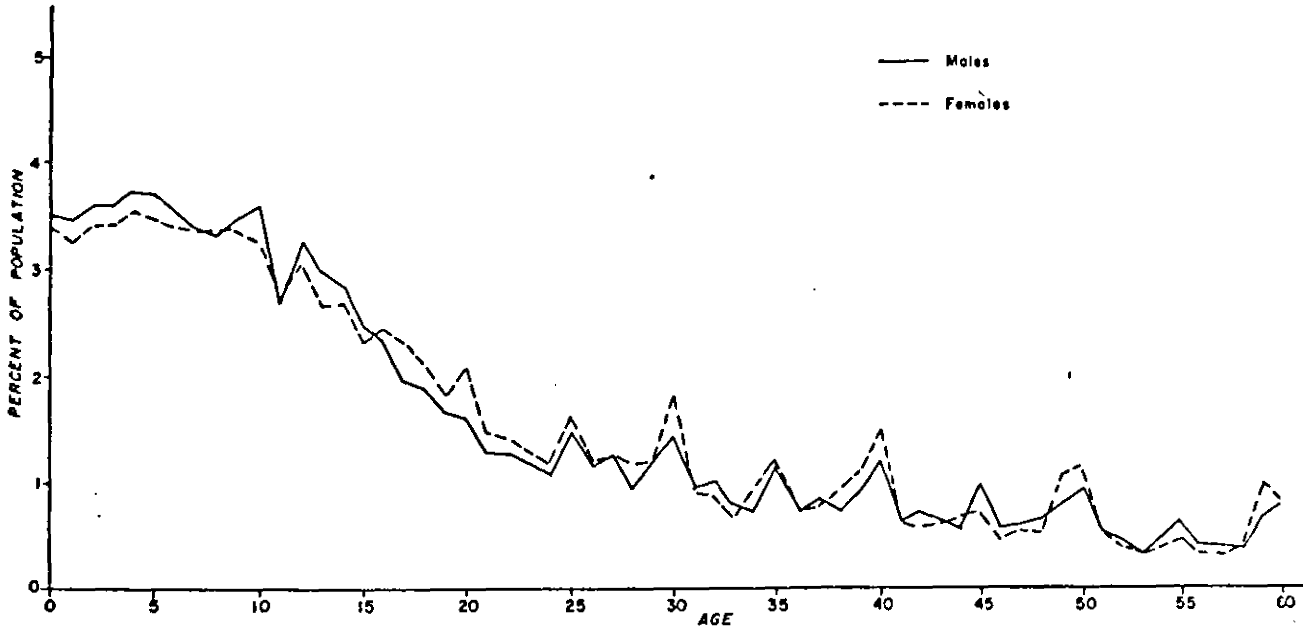
Source: CBS, Kenya Census, 1979, Vol.I Table 3

Fig. 3.3.13 PERCENTAGE DISTRIBUTION OF POPULATION BY SINGLE YEAR OF AGE (0-60) AND SEX : KENYA1979 CENSUS (KISII)



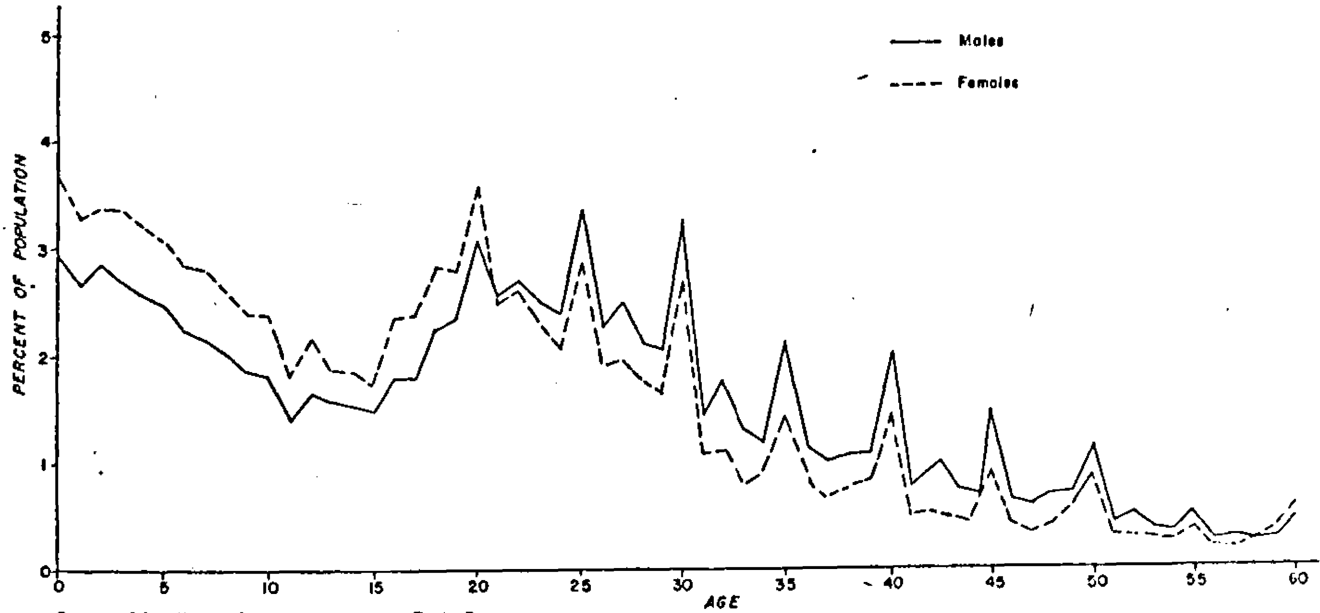
Source : CBS, Kenyan Census, 1979, Vol. I Table 3

Fig. 3.3.14 PERCENTAGE DISTRIBUTION OF POPULATION BY SINGLE YEAR OF AGE (0-60) AND SEX : KENYA 1979 CENSUS (TAITA TAVETA)



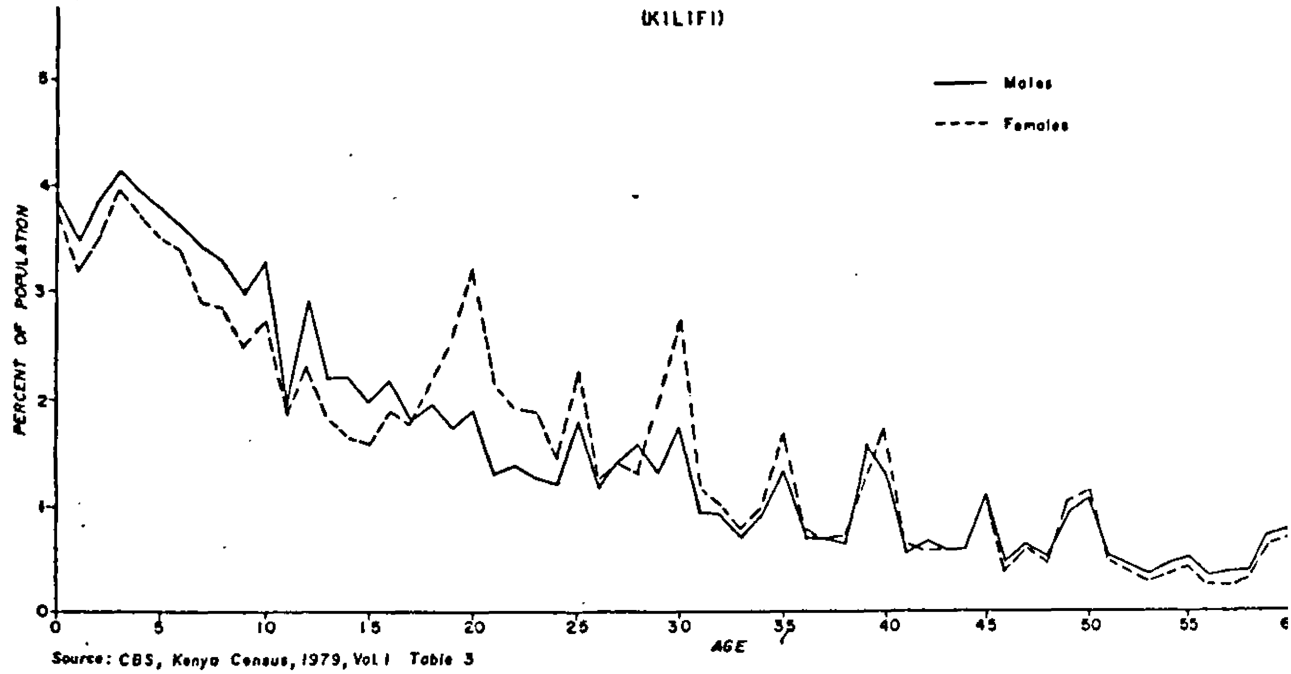
Source: CBS, Kenya Census, 1979, Vol. I Table 3

Fig. 3.3.15 PERCENTAGE DISTRIBUTION OF POPULATION BY SINGLE YEAR AGE (0-60) AND SEX : KENYA 1979 CENSUS (MOMBASA)



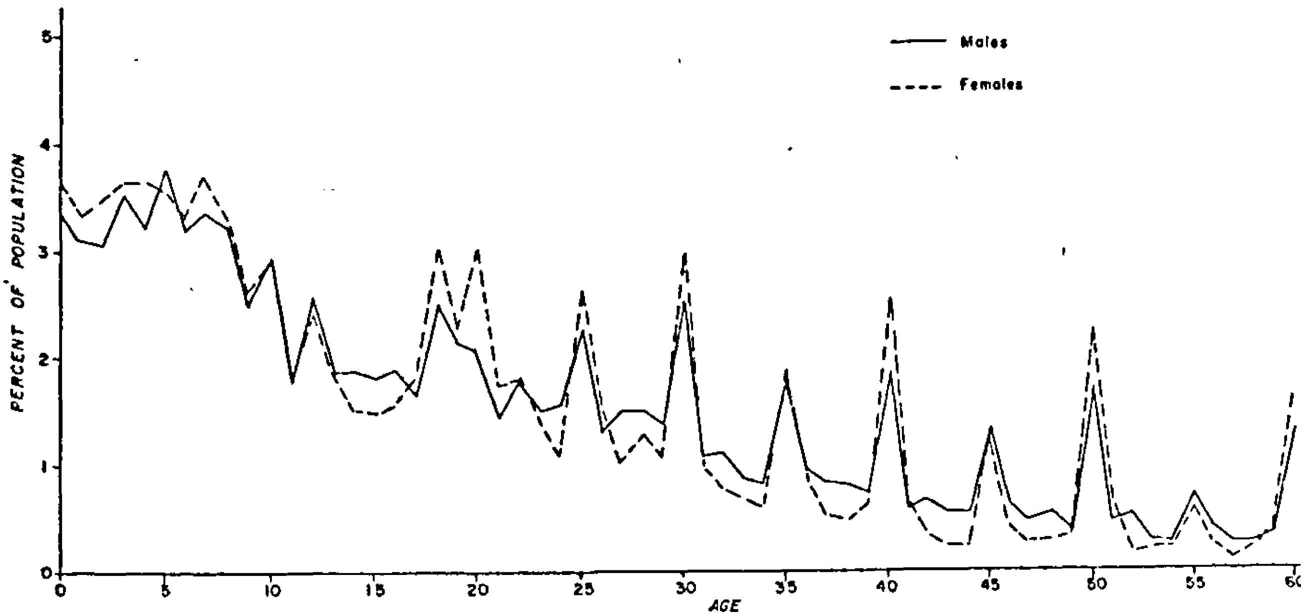
Source: CBS, Kenya Census, 1979, Vol. I Table 3

Fig. 3.3.16 PERCENTAGE DISTRIBUTION OF POPULATION BY SINGLE YEAR OF AGE (0-60) AND SEX : KENYA 1979 CENSUS (KILIFI)



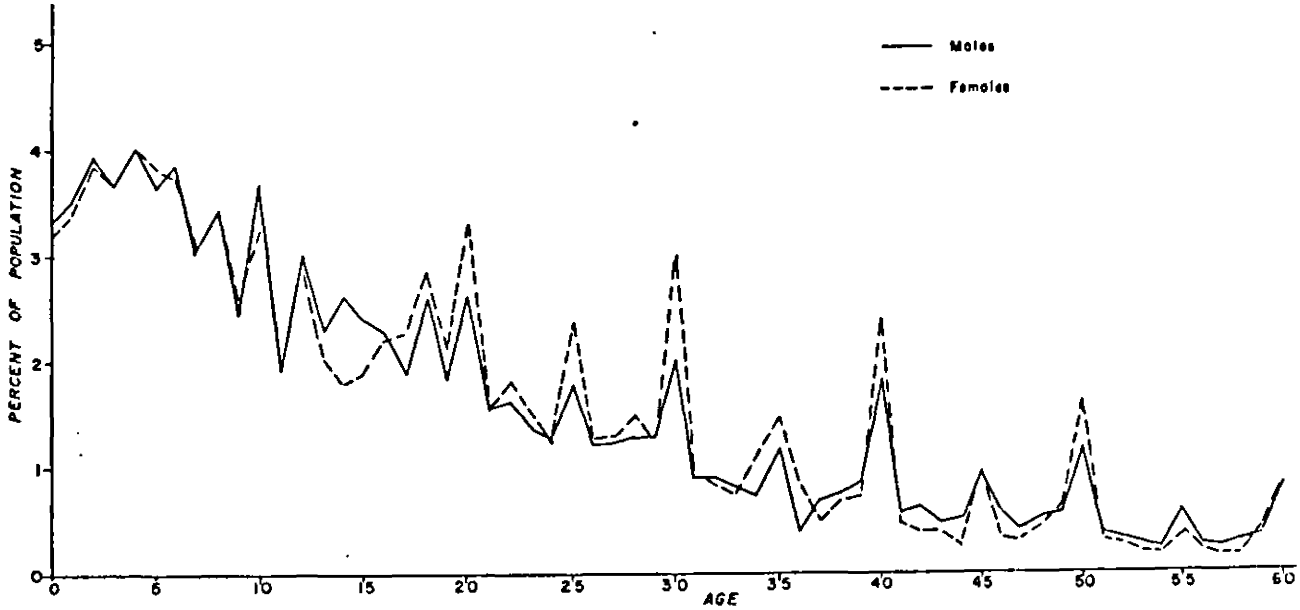
Source: CBS, Kenya Census, 1979, Vol I Table 3

Fig. 3.3.17 PERCENTAGE DISTRIBUTION OF POPULATION BY SINGLE YEAR OF AGE (0-60) AND SEX : KENYA 1979 CENSUS (LAMU)



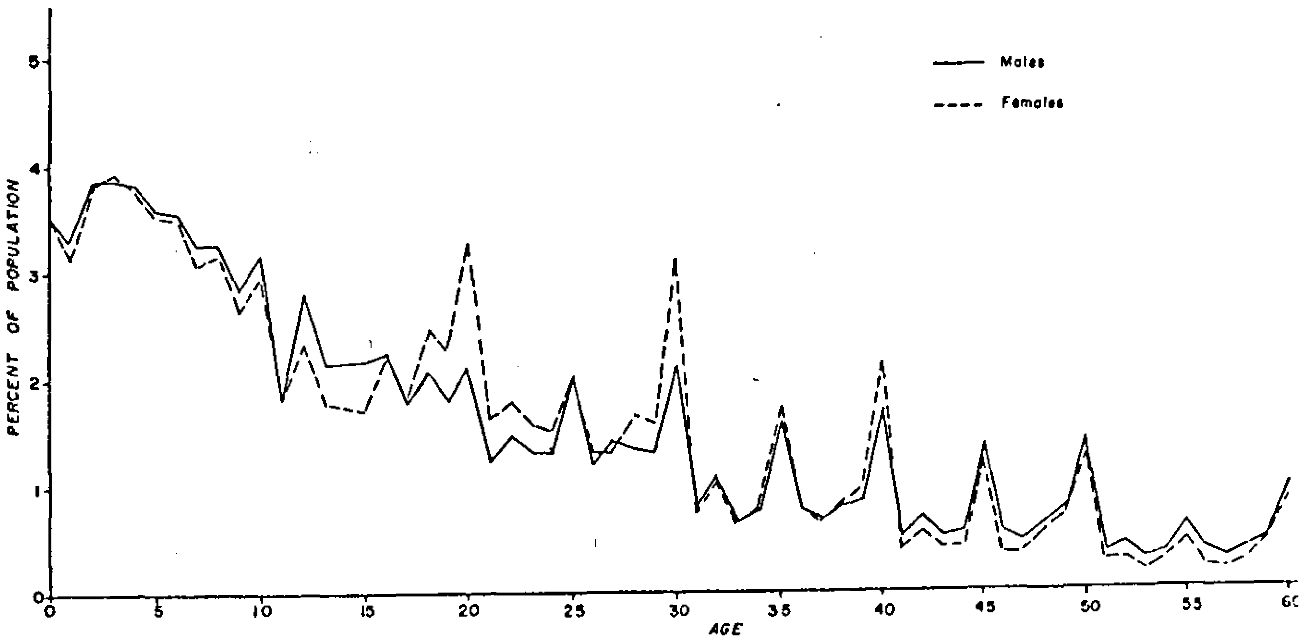
Source: Kenya Census, 1979, Vol I Table 3

Fig. 3.3.18 PERCENTAGE DISTRIBUTION OF POPULATION BY SINGLE YEAR OF AGE (0-60) AND SEX : KENYA 1979 CENSUS (TANA RIVER)



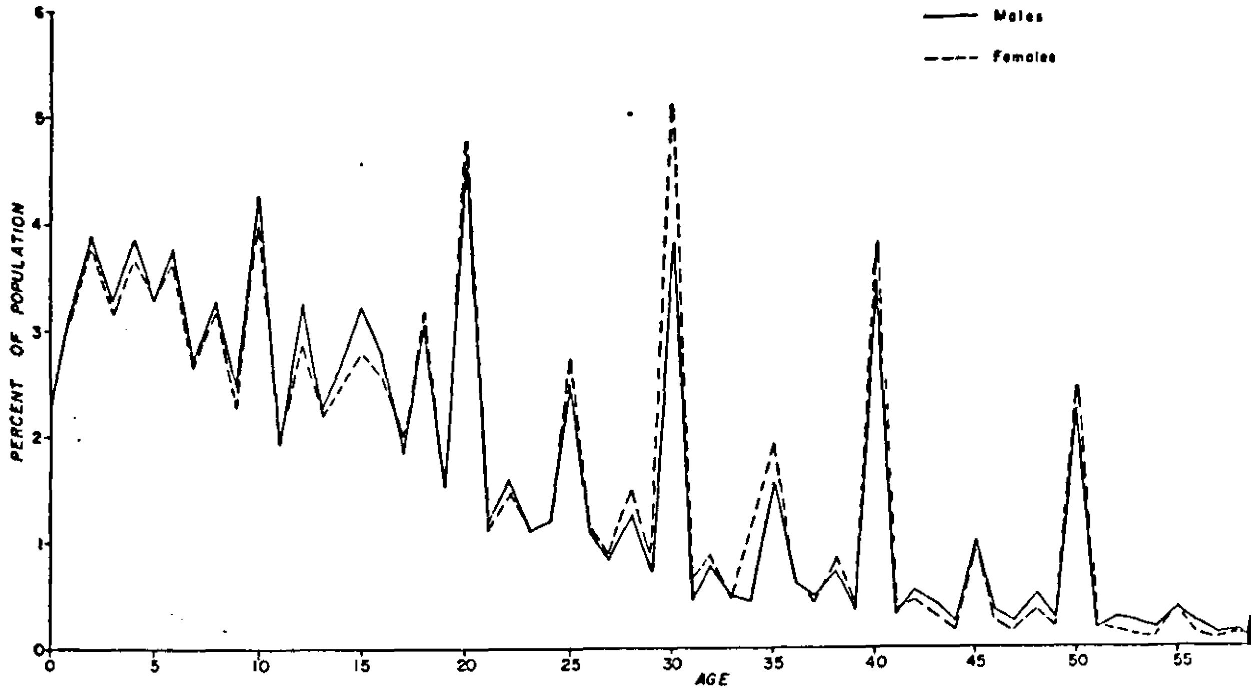
Source: CBS, Kenya Census, 1979, Vol. I Table 3

Fig. 3.3.19 PERCENTAGE DISTRIBUTION OF POPULATION BY SINGLE YEAR OF AGE (0-60) AND SEX : KENYA 1979 CENSUS (KWALE)



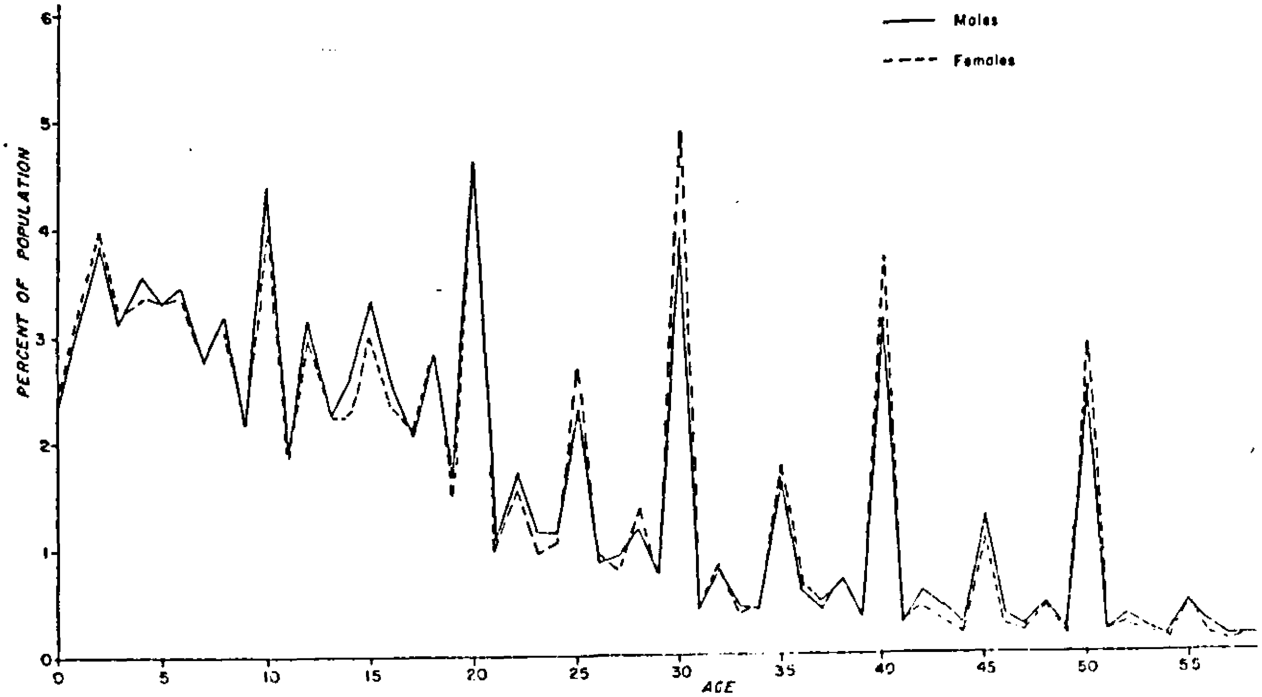
Source: CBS, Kenya Census, 1979, Vol. I Table 3

Fig. 3.3.20 PERCENTAGE DISTRIBUTION OF POPULATION BY SINGLE YEAR OF AGE (0-60) AND SEX : KENYA 1979 CENSUS (WAJIR)



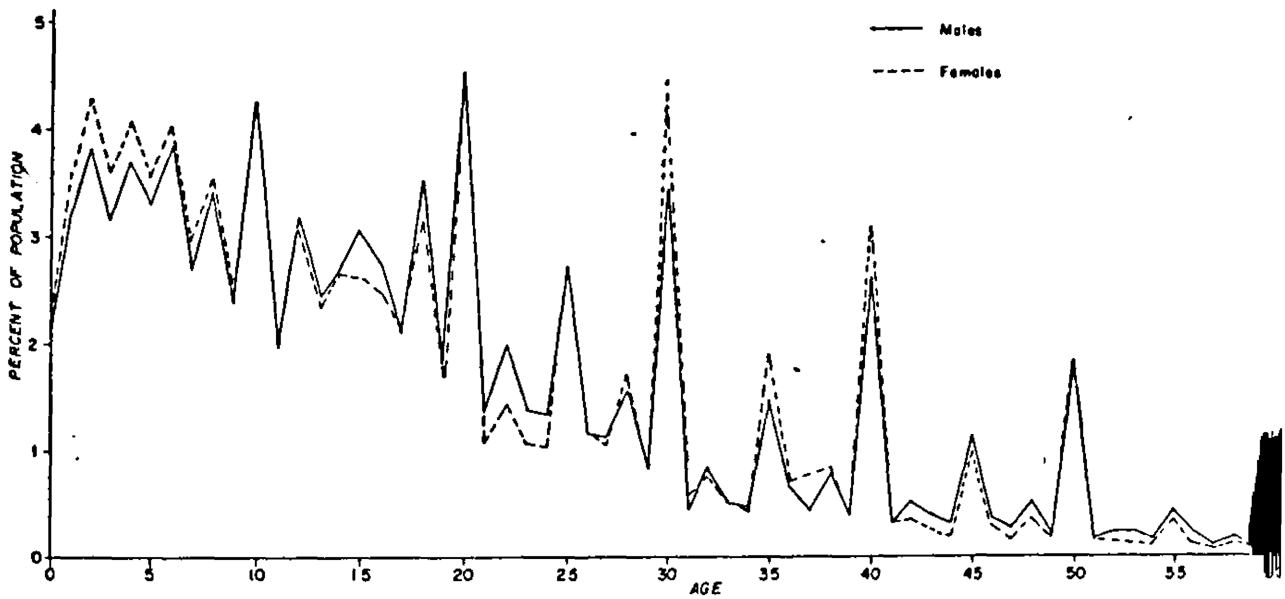
Source : CBS, Kenya Census, 1979, Vol. I Table 3

Fig. 3.3.21 PERCENTAGE DISTRIBUTION OF POPULATION BY SINGLE YEAR OF AGE (0-60) AND SEX : KENYA 1979 CENSUS (MANDERA)



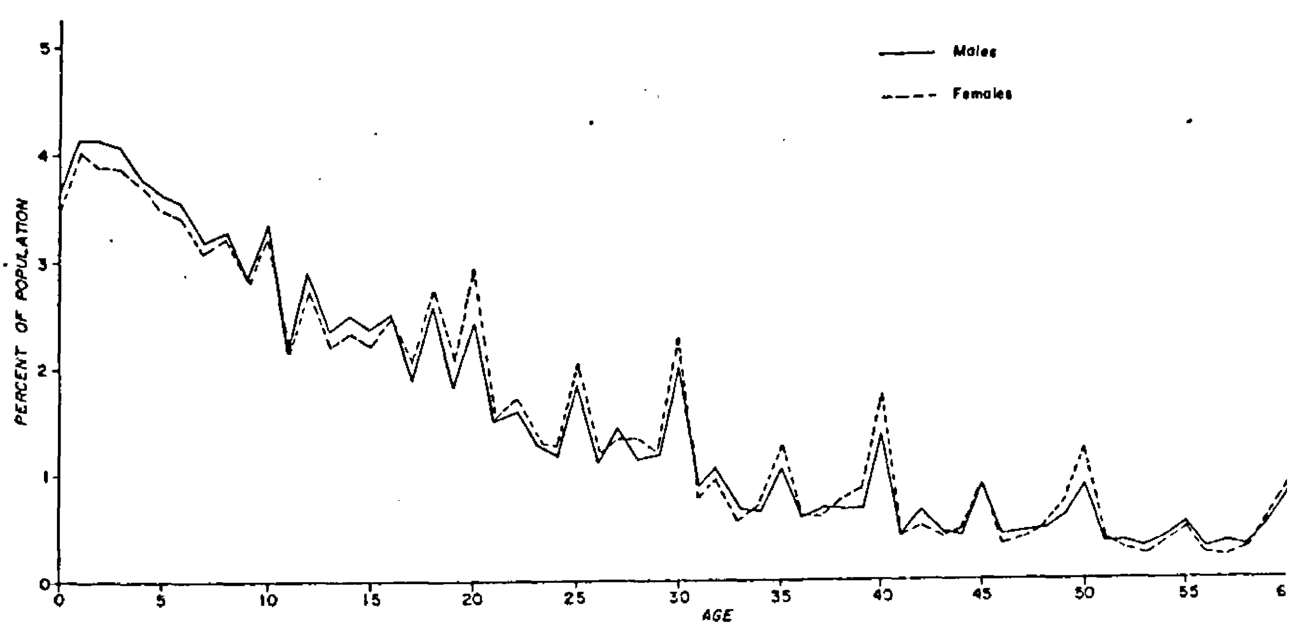
Source: CBS, Kenya Census, 1979, Vol. I Table 3

Fig. 3.3.22 PERCENTAGE DISTRIBUTION OF POPULATION BY SINGLE YEAR OF AGE (0-60) AND SEX : KENYA 1979 CENSUS (GARISSA)



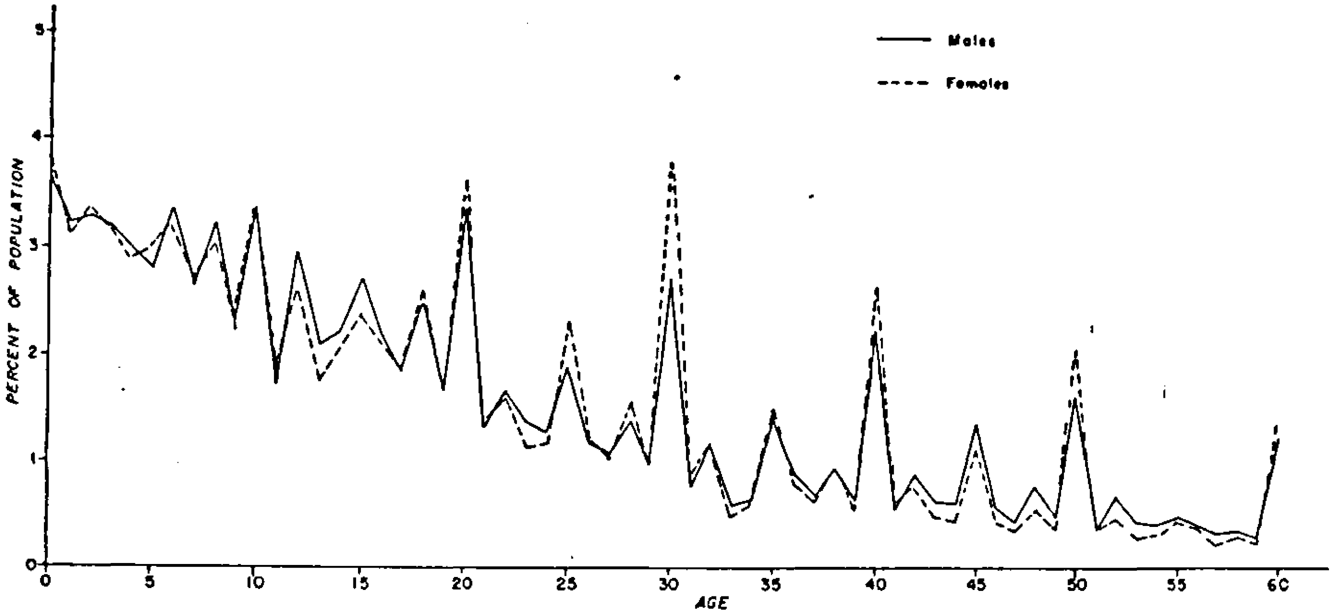
Source: CBS, Kenya Census, 1979, Vol. I Table 3

Fig.3.3.23 PERCENTAGE DISTRIBUTION OF POPULATION BY SINGLE YEAR OF AGE(0—60) AND SEX—KENYA 1979 CENSUS (MERU)



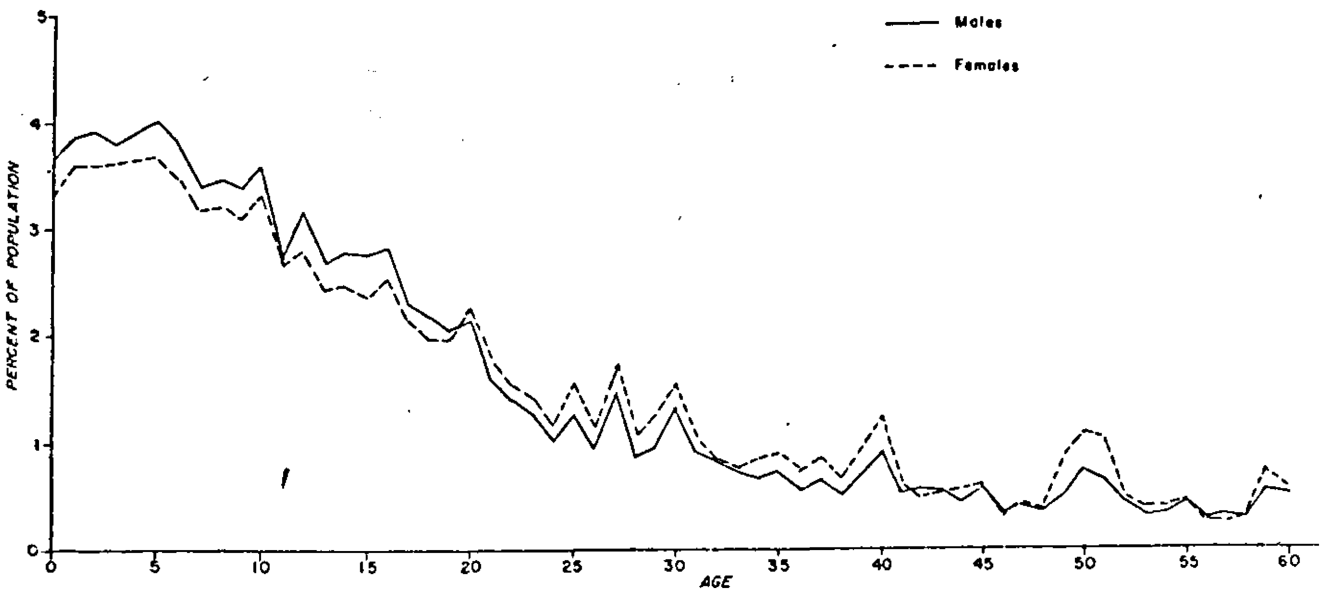
Source: CBS, Kenya Census, 1979 Vol. I Table 3

Fig.3.24 PERCENTAGE DISTRIBUTION OF POPULATION BY SINGLE YEAR OF AGE(0—60) AND SEX—KENYA 1979 CENSUS (MARSABIT)



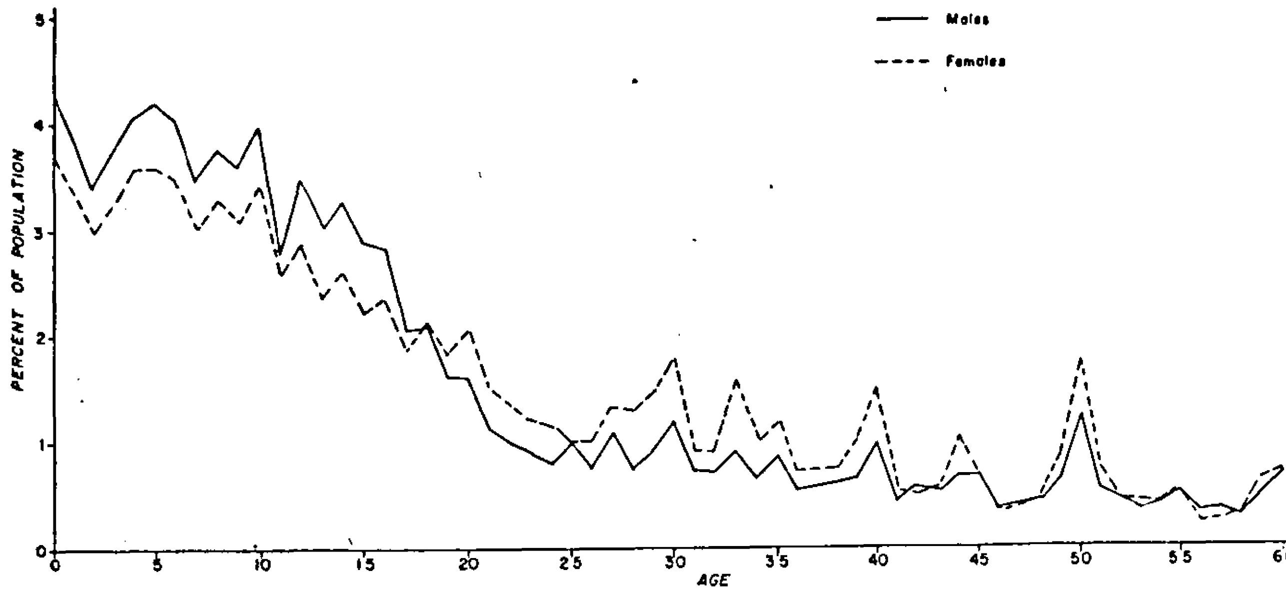
Source: CBS, Kenya Census, 1979, Vol.I Table 3

Fig.3.25 PERCENTAGE DISTRIBUTION OF POPULATION BY SINGLE YEAR OF AGE(0—60) AND SEX—KENYA 1979 CENSUS (MACHAKOS)



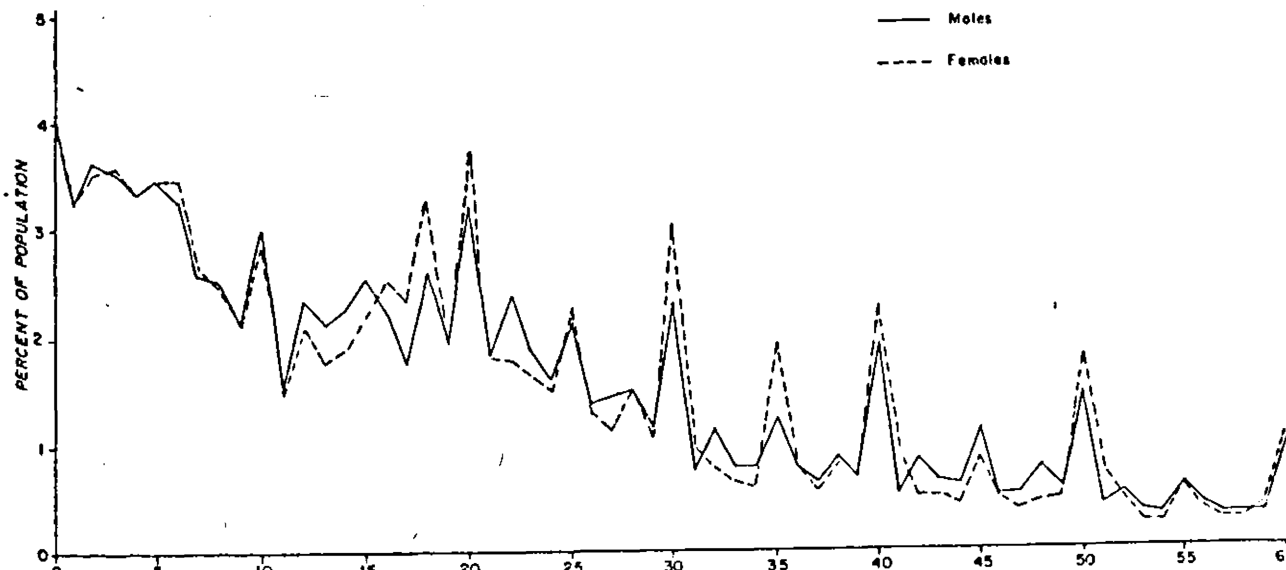
Source. CBS, Kenya Census, 1979 Vol. I Table 3

Fig 3.26 PERCENTAGE DISTRIBUTION OF POPULATION BY SINGLE YEAR OF AGE(0—60) AND SEX—KENYA 1979 CENSUS (KITUI)



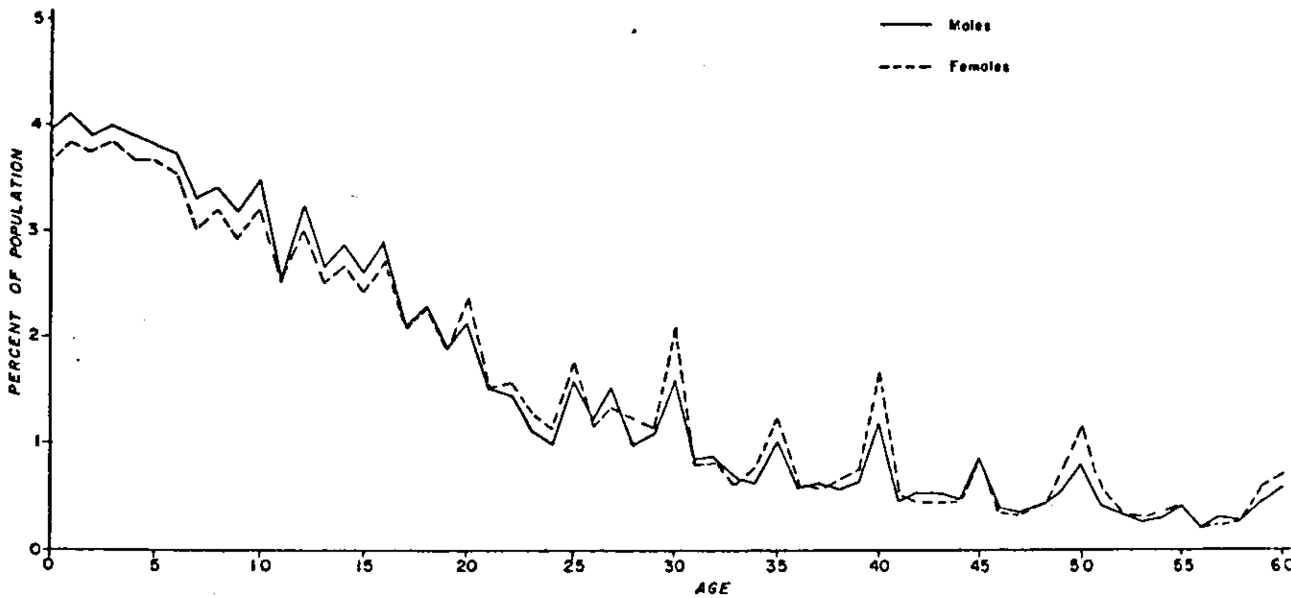
Source: CBS, Kenya Census, 1979 Vol. I Table 3

Fig. 3.3.27 PERCENTAGE DISTRIBUTION OF POPULATION BY SINGLE YEAR OF AGE (0-60) AND SEX : KENYA 1979 CENSUS (ISIOLO)



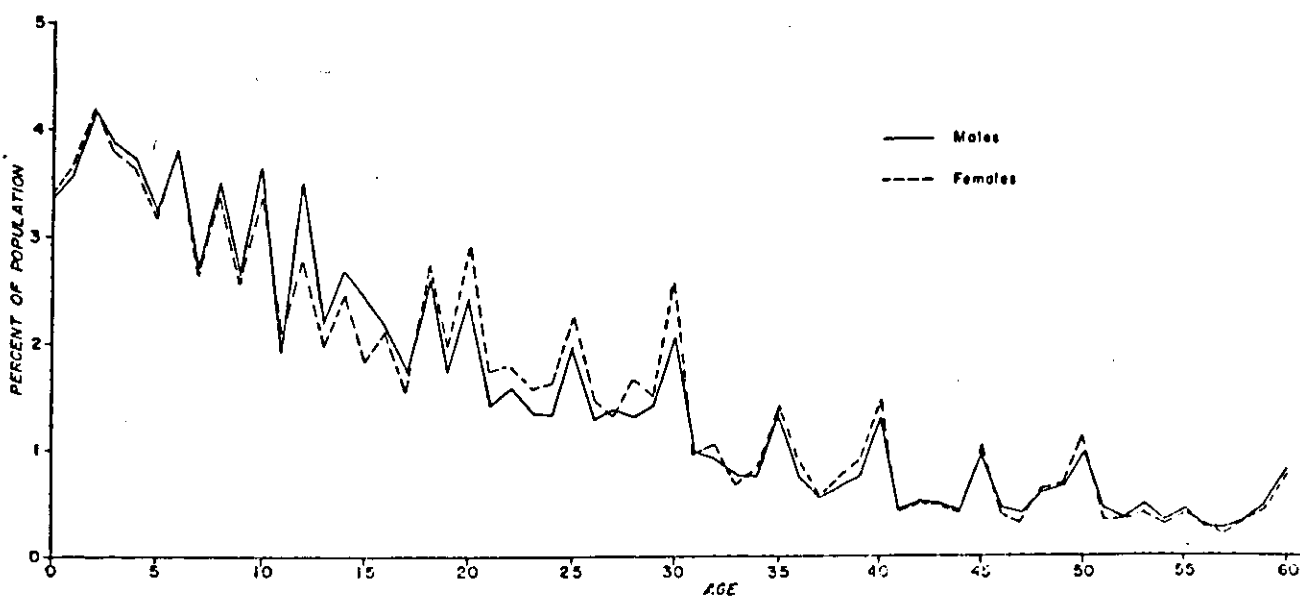
Source: CBS, Kenya Census, 1979, Vol. I Table 3

Fig. 3.3.28 PERCENTAGE DISTRIBUTION OF POPULATION BY SINGLE YEAR OF AGE (0-60) AND SEX . KENYA 1979 CENSUS (EMBU)



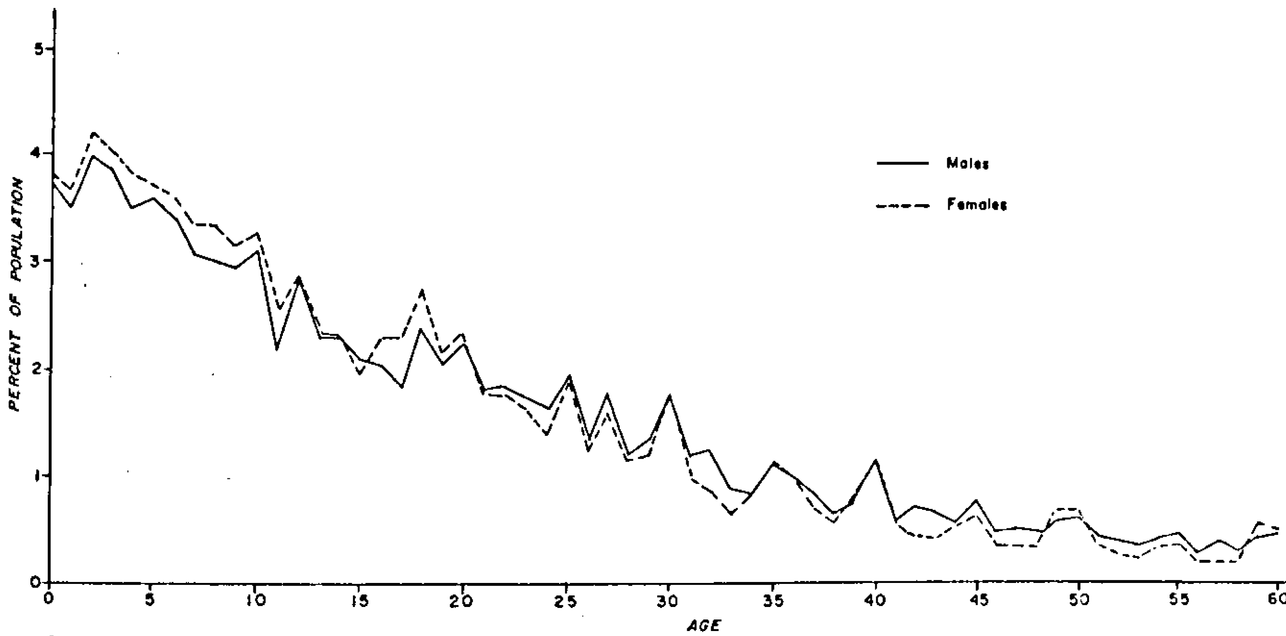
Source: CBS, Kenya Census, 1979, Vol. I Table 3

Fig. 3.3.29 PERCENTAGE DISTRIBUTION POPULATION BY SINGLE YEAR OF AGE (0-60) AND SEX : KENYA 1979 CENSUS (WEST POKOT)



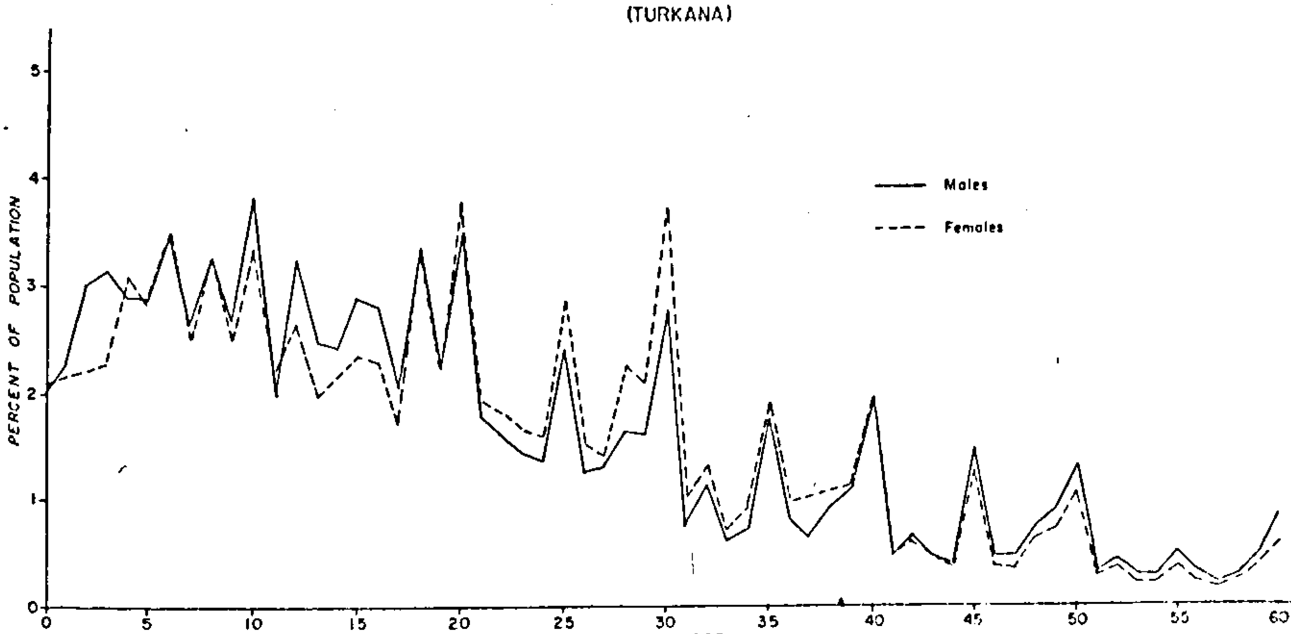
Source: CBS, Kenya Census, 1979, Vol I Table 3

Fig 3.3.30 PERCENTAGE DISTRIBUTION OF POPULATION BY SINGLE YEAR OF AGE (0-60) AND SEX : KENYA 1979 CENSUS (UASIN GISHU)



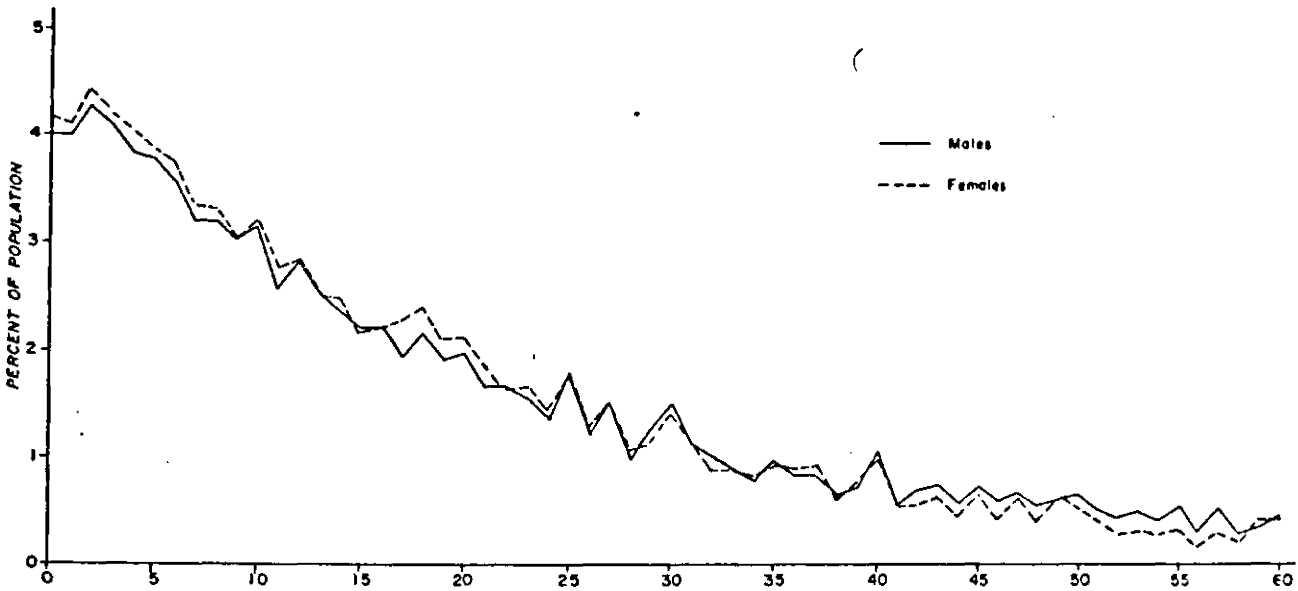
Source: CBS, Kenya Census, 1979, Vol. I Table 3

Fig. 3.3.31 PERCENTAGE DISTRIBUTION OF POPULATION BY SINGLE YEAR OF AGE (0-60) AND SEX : KENYA 1979 CENSUS (TURKANA)



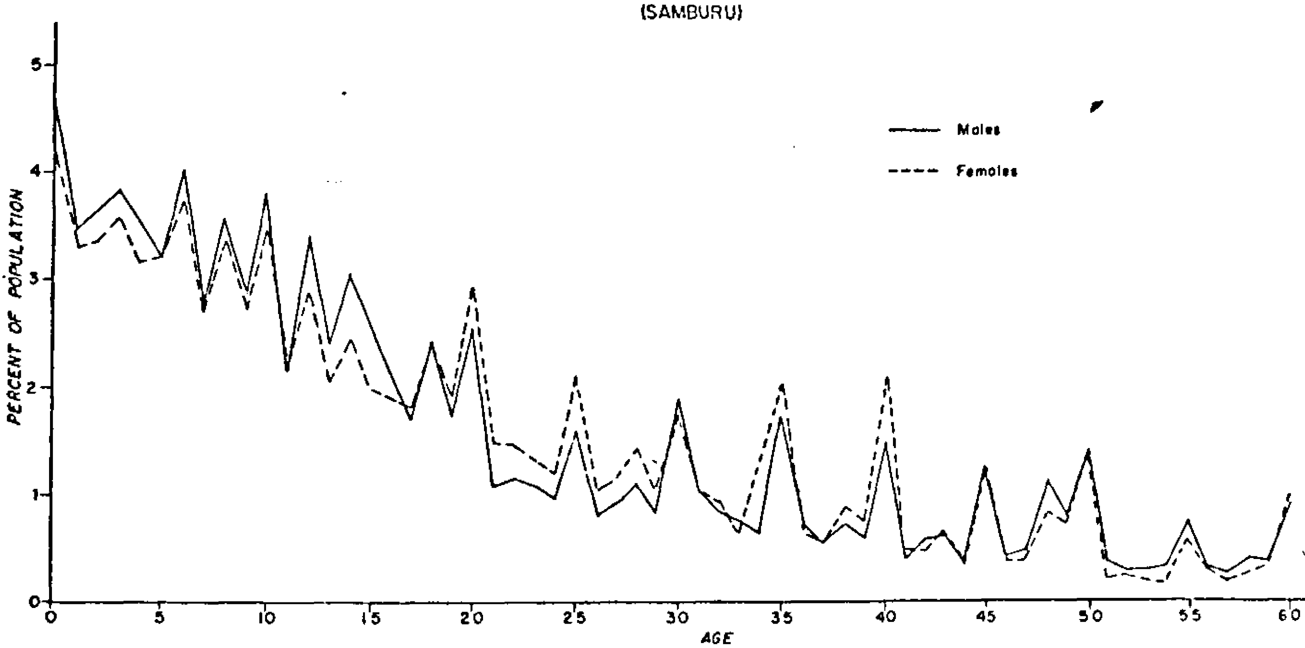
Source: CBS, Kenya Census, 1979, Vol I Table 3

Fig.3.3.32 PERCENTAGE DISTRIBUTION OF POPULATION BY SINGLE YEAR OF AGE (0-60) AND SEX : KENYA 1979 CENSUS (TRANS NZOIA)



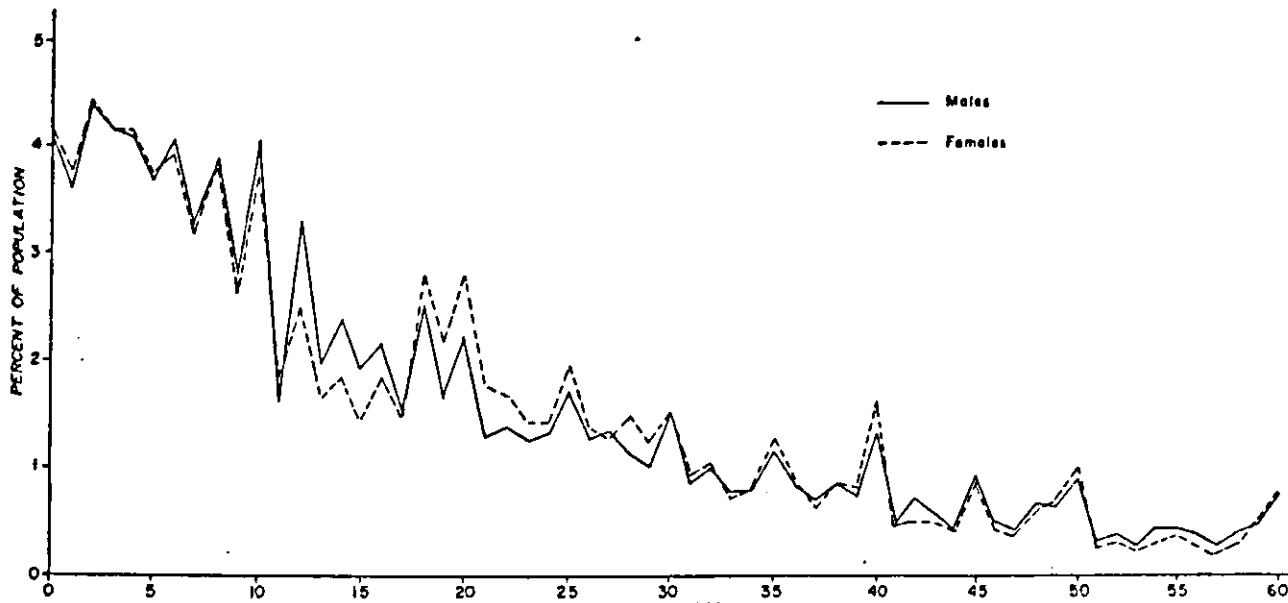
Source: CBS, Kenya Census, 1979, Vol. I Table 3

Fig. 3.3.33 PERCENTAGE DISTRIBUTION OF POPULATION BY SINGLE YEAR OF AGE (0-60) AND SEX : KENYA 1979 CENSUS (SAMBURU)



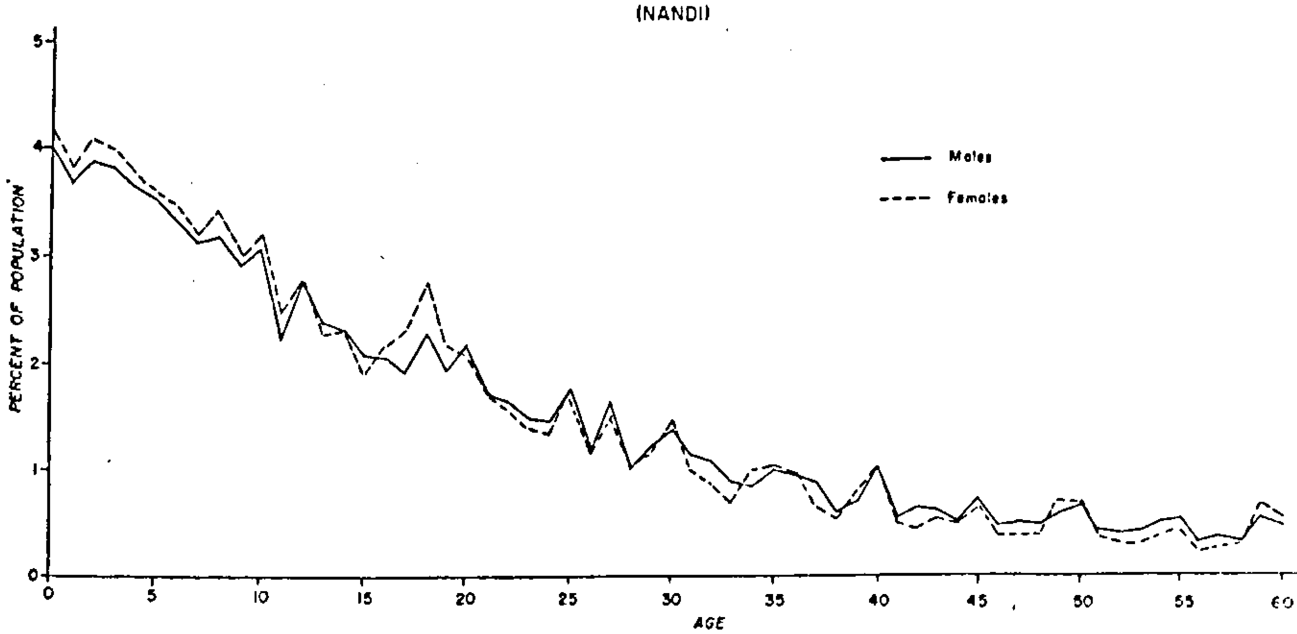
Source: CBS, Kenya Census, 1979, Vol. I Table 3

Fig.3.34 PERCENTAGE DISTRIBUTION OF POPULATION BY SINGLE YEAR OF AGE(0—60) AND SEX—KENYA 1979 CENSUS (NAROK)



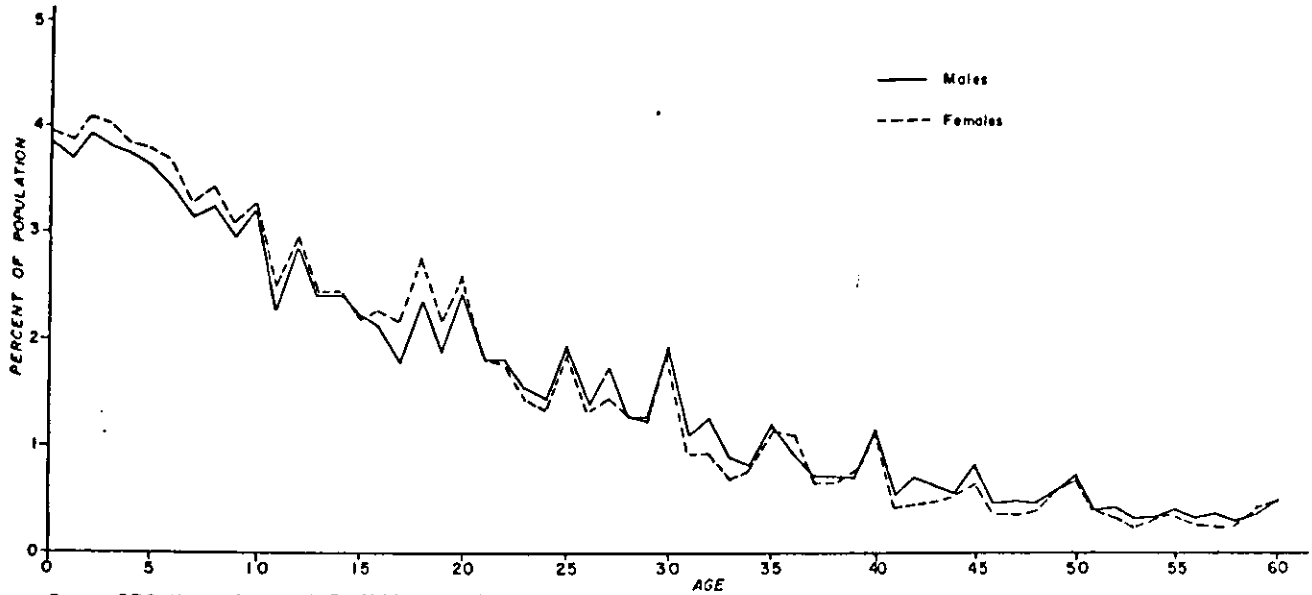
Source: CBS, Kenya Census, 1979 Vol.I Table 3

Fig.3.35 PERCENTAGE DISTRIBUTION OF POPULATION BY SINGLE YEAR OF AGE(0—60) AND SEX—KENYA 1979 CENSUS (NANDI)



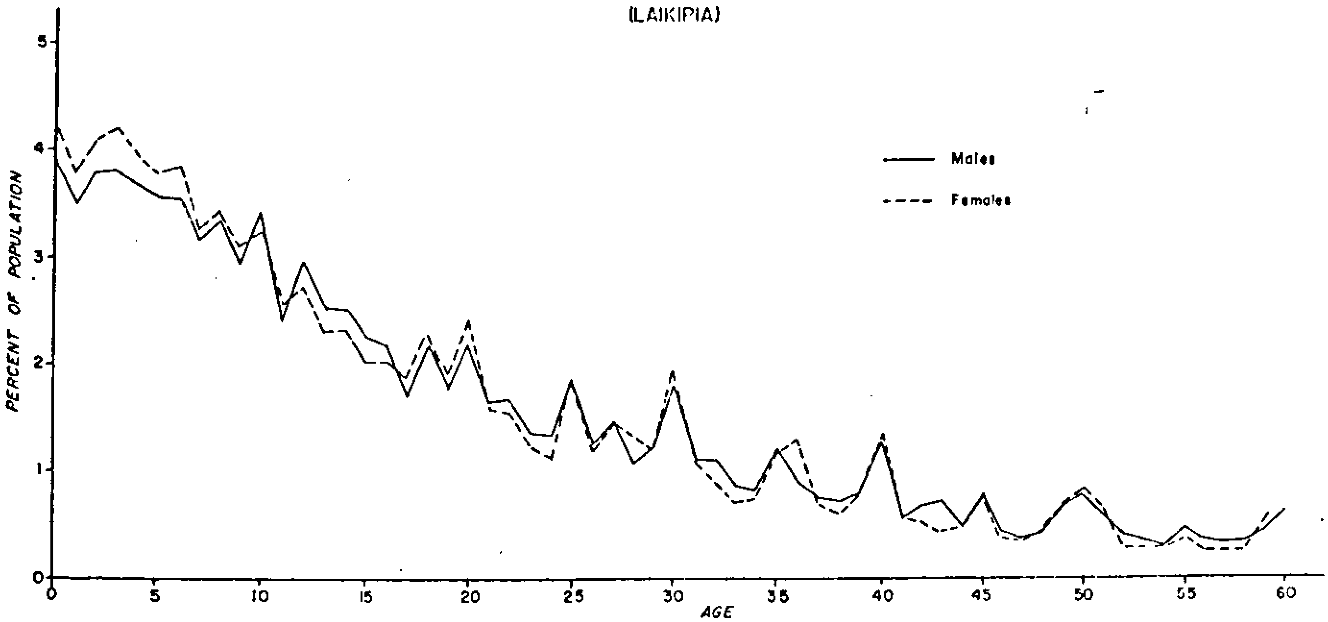
Source: CBS, Kenya Census, 1979 Vol.I Table 3

Fig 3.36 PERCENTAGE DISTRIBUTION OF POPULATION BY SINGLE YEAR OF AGE (0—60) AND SEX—KENYA 1979 CENSUS (NAKURU)



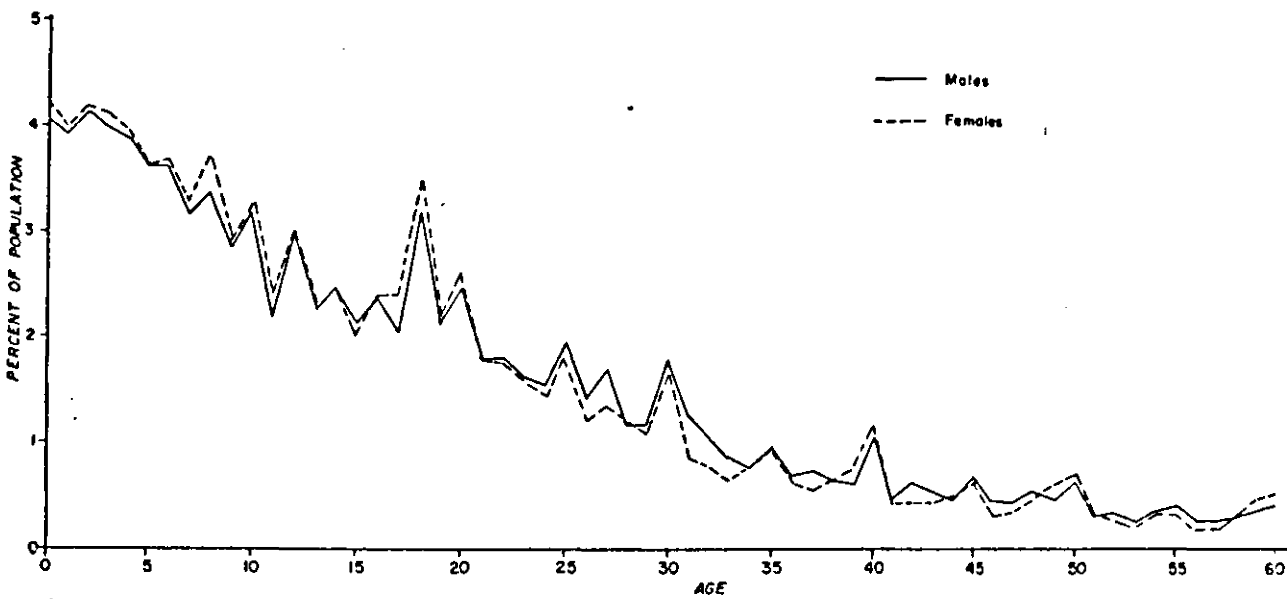
Source: CBS, Kenya Census, 1979 Vol. I Table 3

Fig.3.37 PERCENTAGE DISTRIBUTION OF POPULATION BY SINGLE YEAR OF AGE (0—60) AND SEX—KENYA 1979 CENSUS (LAIKIPIA)



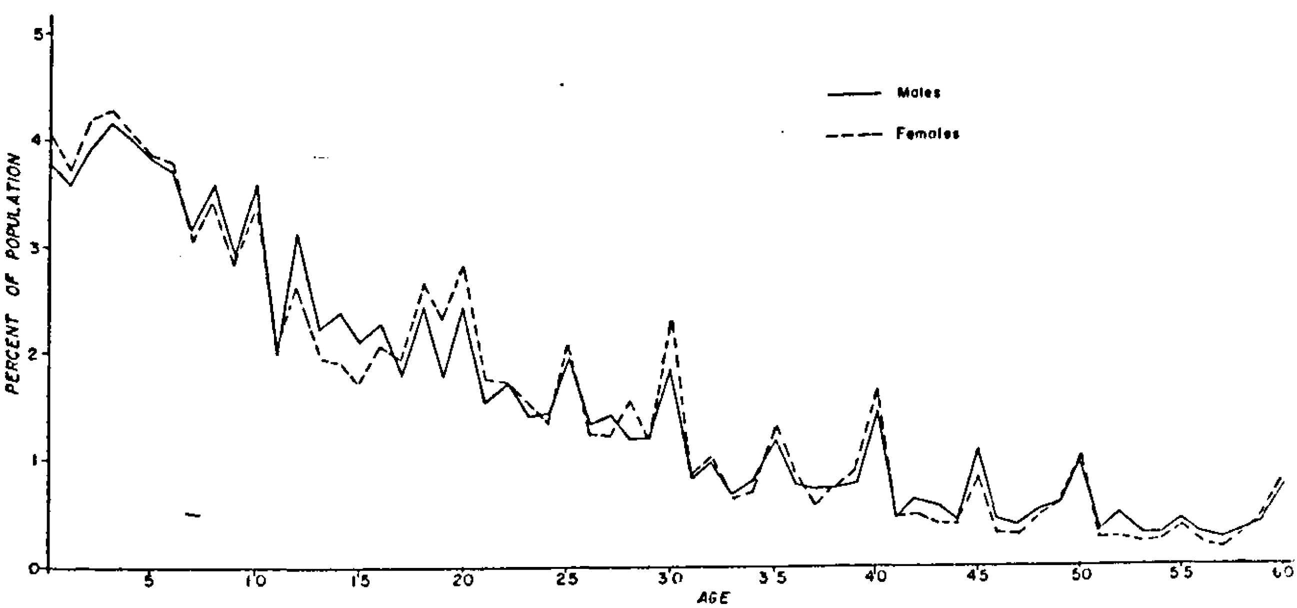
Source: CBS, Kenya Census, 1979 Vol. I Table 3

Fig 3.3.38 PERCENTAGE DISTRIBUTION OF POPULATION BY SINGLE YEAR OF AGE (0-60) AND SEX : KENYA 1979 CENSUS (KERICHO)



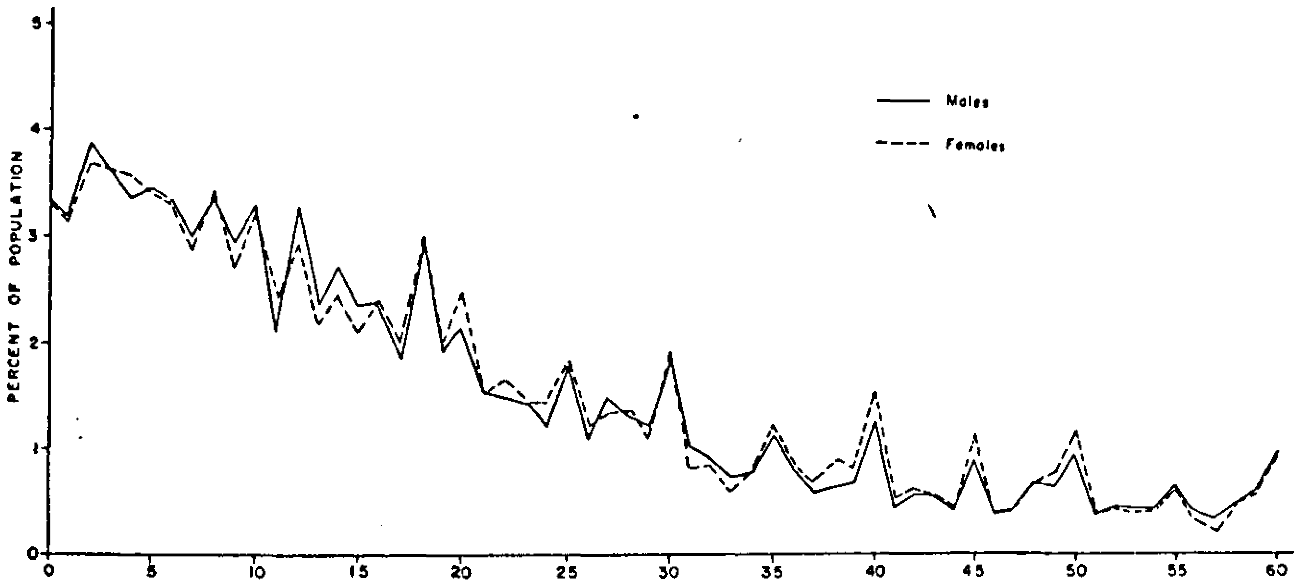
Source: CBS, Kenyan Census, 1979, Vol. I Table 3

Fig. 3.3.39 PERCENTAGE DISTRIBUTION OF POPULATION BY SINGLE YEAR OF AGE (0-60) AND SEX : KENYA 1979 CENSUS (KAJIADO)



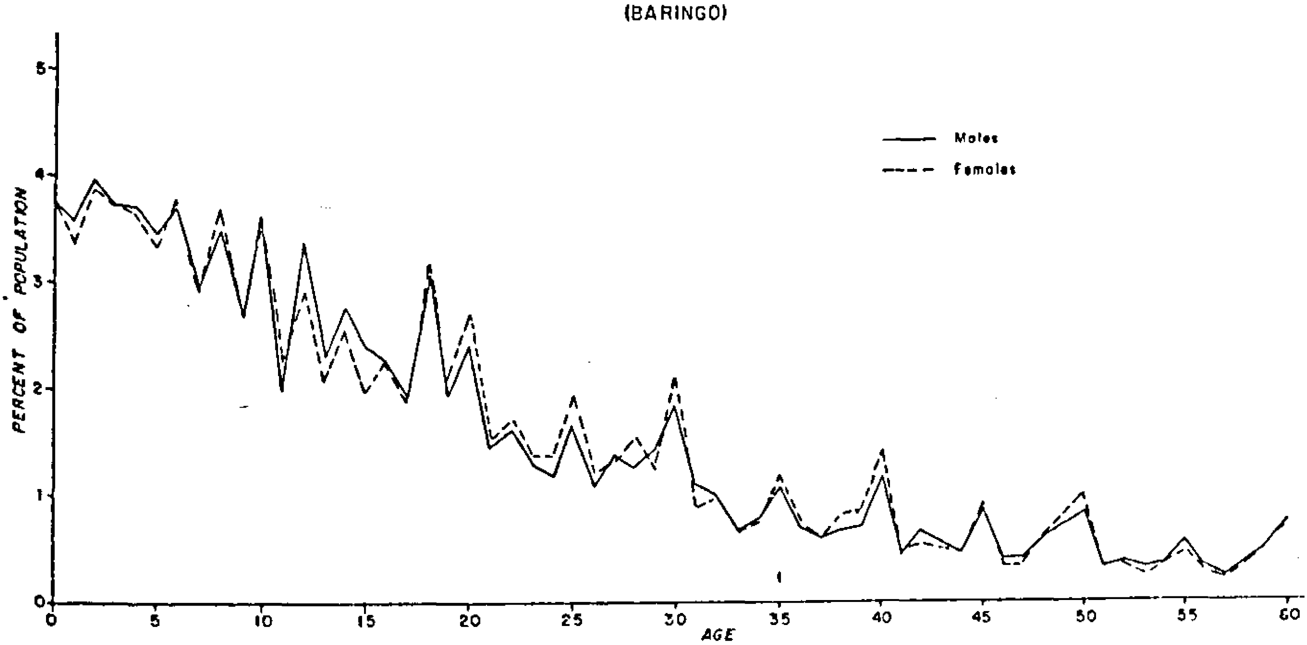
Source: CBS, Kenya Census, 1979, Vol. I Table 3

Fig 3.3.40 PERCENTAGE DISTRIBUTION OF POPULATION BY SINGLE YEAR OF AGE (0-60) AND SEX : KENYA 1979 CENSUS (ELGEYO MARAKWET)



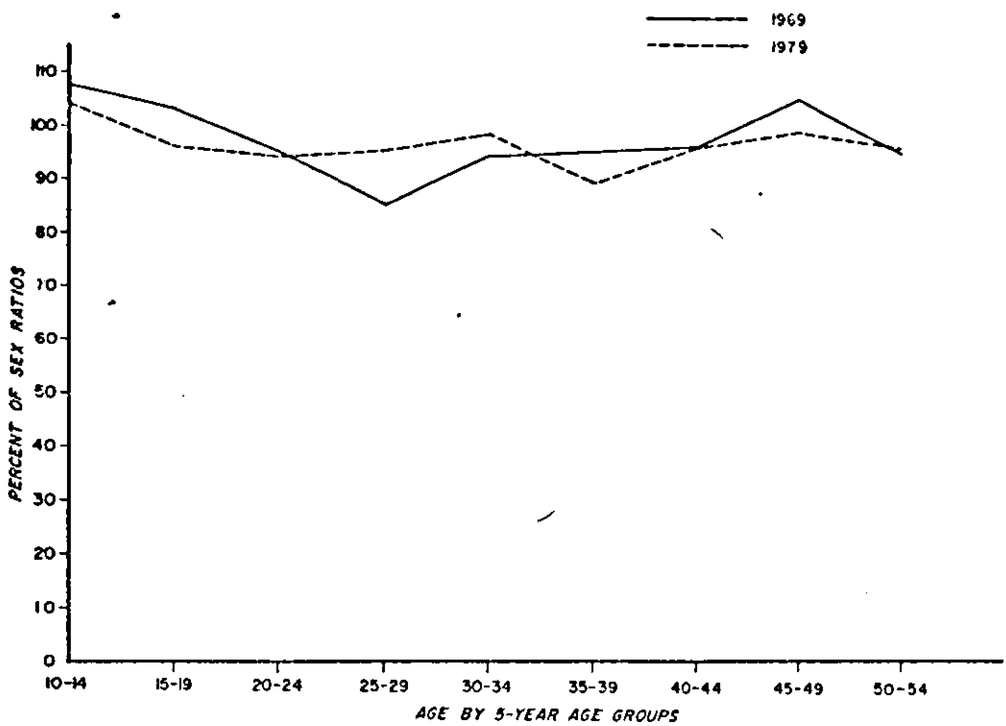
Source: CBS, Kenya Census, 1979, Vol. I Table 3

Fig. 3.3.41 PERCENTAGE DISTRIBUTION OF POPULATION BY SINGLE YEAR OF AGE (0-60) AND SEX : KENYA 1979 CENSUS (BARINGO)



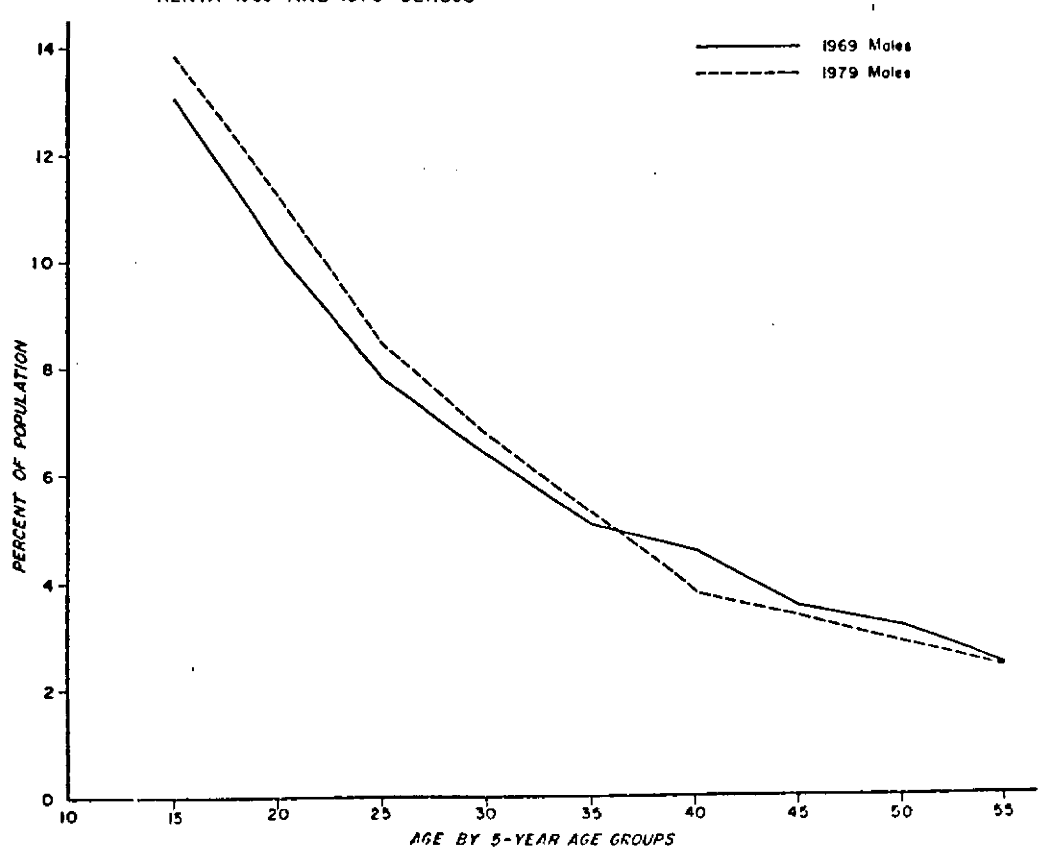
Source: CBS, Kenya Census, 1979, Vol I Table 3

Fig. 3.4 SEX-RATIOS BY 5-YEAR AGE GROUPS (10-55) KENYA 1969 AND 1979 CENSUS



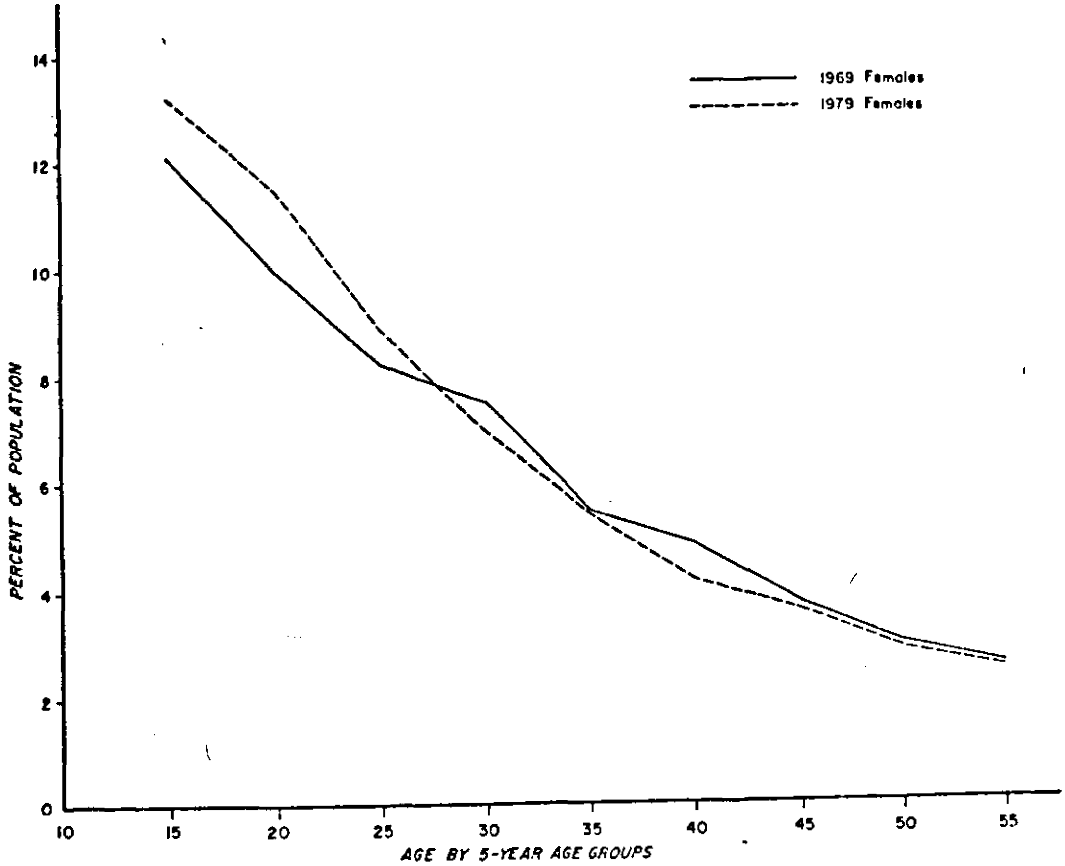
Source: Kenya Census, 1969 Vol. IV, pp 4 Table 1.3
Kenya Census, 1979 Vol. I pp 180 Table 3

Fig. 3.5 PERCENTAGE DISTRIBUTION OF POPULATION BY 5-YEAR AGE GROUPS (10-55) MALES, KENYA 1969 AND 1979 CENSUS



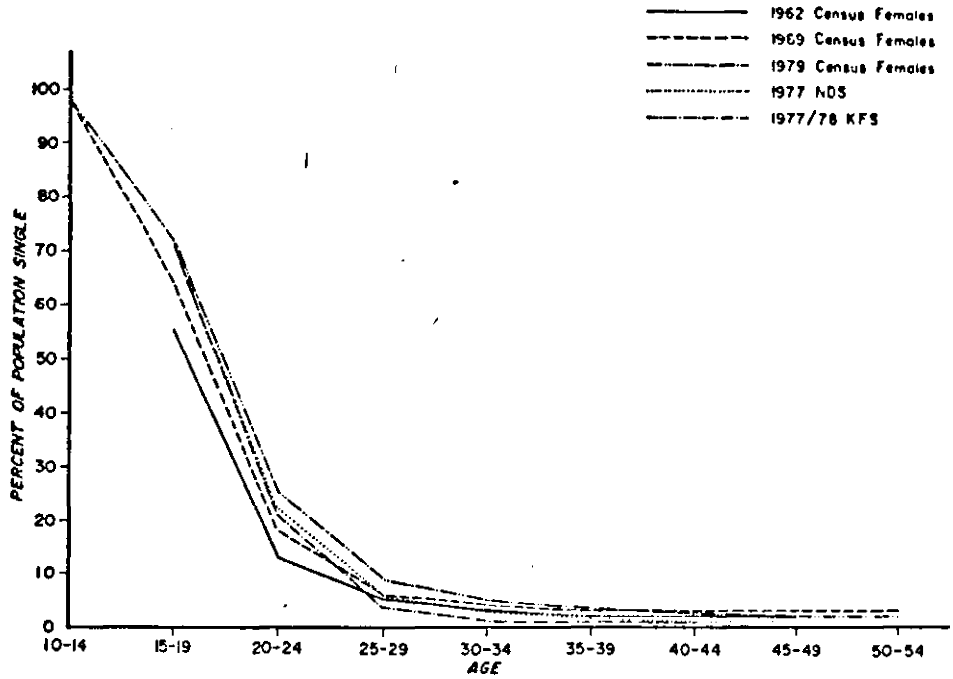
Source: Kenya Census, 1969 Vol IV pp. 2 Table 1.2
Kenya Census, 1979 Vol. I pp 180 Table 3

Fig. 3.6 PERCENTAGE DISTRIBUTION OF POPULATION BY 5-YEAR AGE-GROUPS (10-55) FEMALES, KENYA 1969 AND 1979 CENSUSES



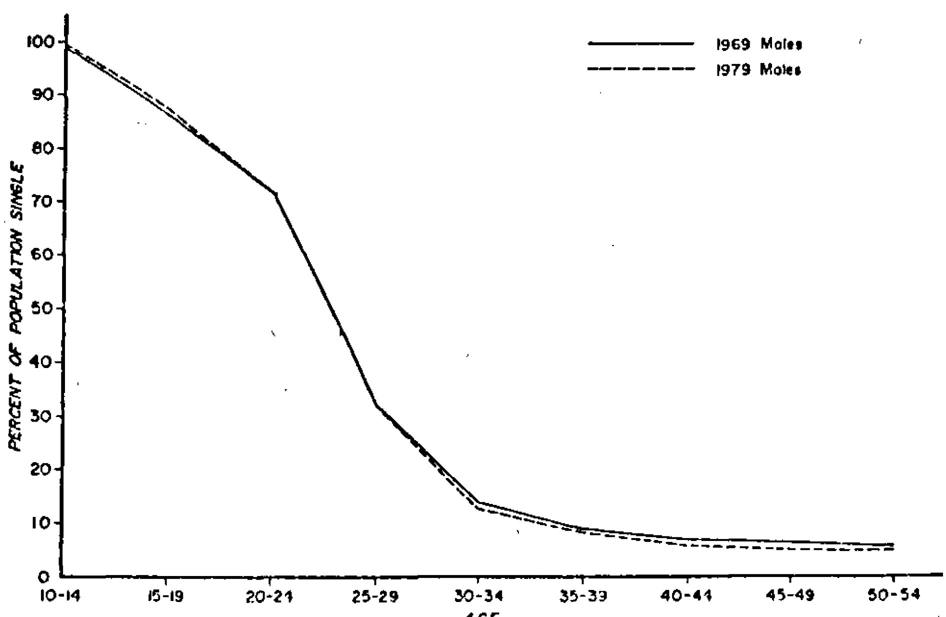
Source: Kenya Census, 1969 Vol. IV, pp 2 Table 12
Kenya Census, 1979 Vol. I, pp 180 Table 3

Fig. 3.7 PROPORTIONS SINGLE BY 5-YEAR AGE GROUPS (10-55) FEMALES, : KENYA 1962, 1969 AND 1979, NDS, 1977, KFS, 1977/1978



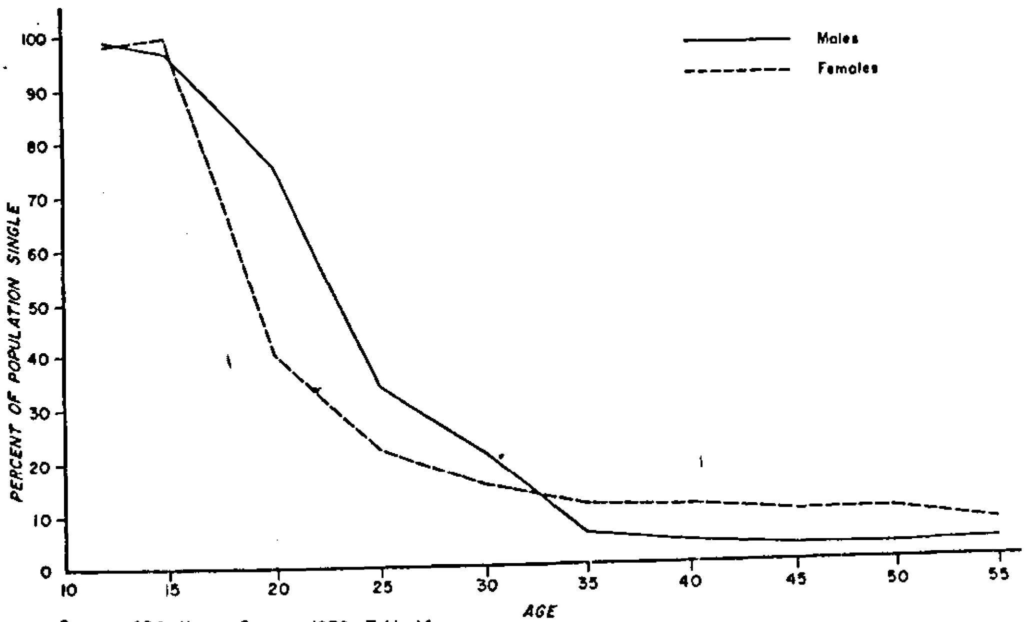
Source: CBS, KFS, 1977/1978, Vol. I, pp. 71 Table 4.2 and Census, 1979 Table 14

Fig. 3.8 PROPORTIONS SINGLE BY 5-YEAR AGE GROUPS (10-55) MALES : KENYA CENSUS 1969 AND 1979



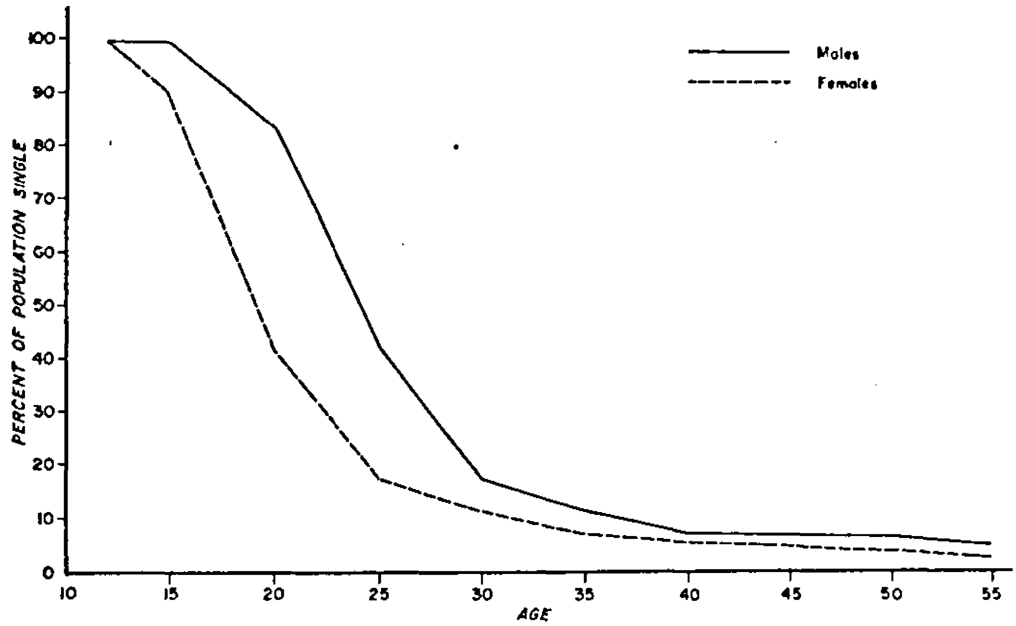
Source : CBS, Kenya Census 1969 Vol. III pp. 73 Table 6
1979 Table 14

Fig. 3.9.1 PERCENTAGE OF THE POPULATION SINGLE BY 5-YEAR AGE GROUPS AND SEX : KENYA 1979 CENSUS (NAIROBI)



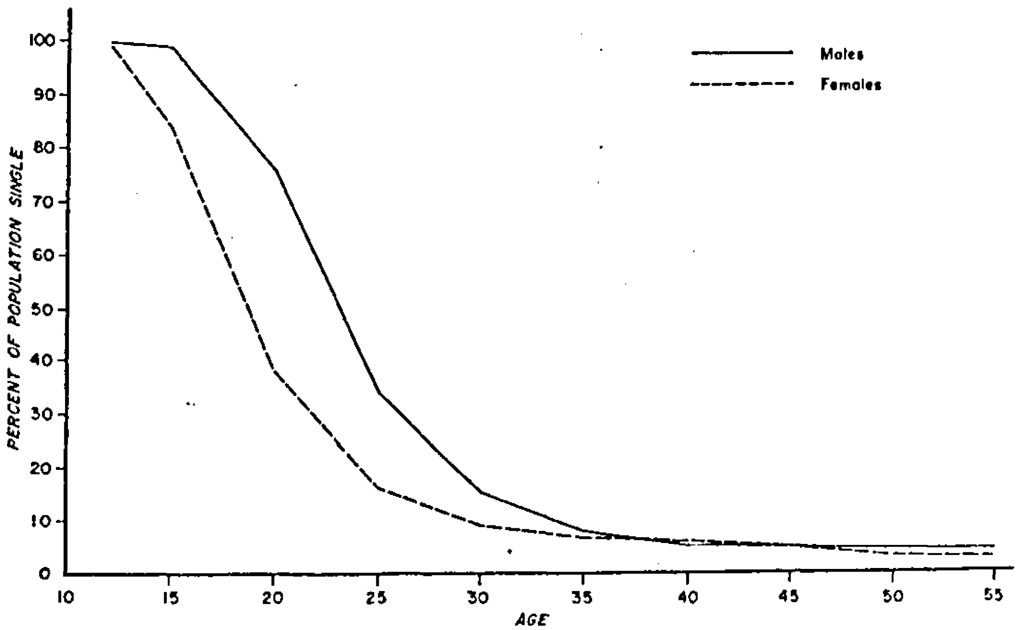
Source: CBS, Kenya Census, 1979, Table 14

Fig. 3.9.2 PERCENTAGE OF THE POPULATION SINGLE BY 5-YEAR AGE GROUPS AND SEX : KENYA 1979 CENSUS (NYERI)



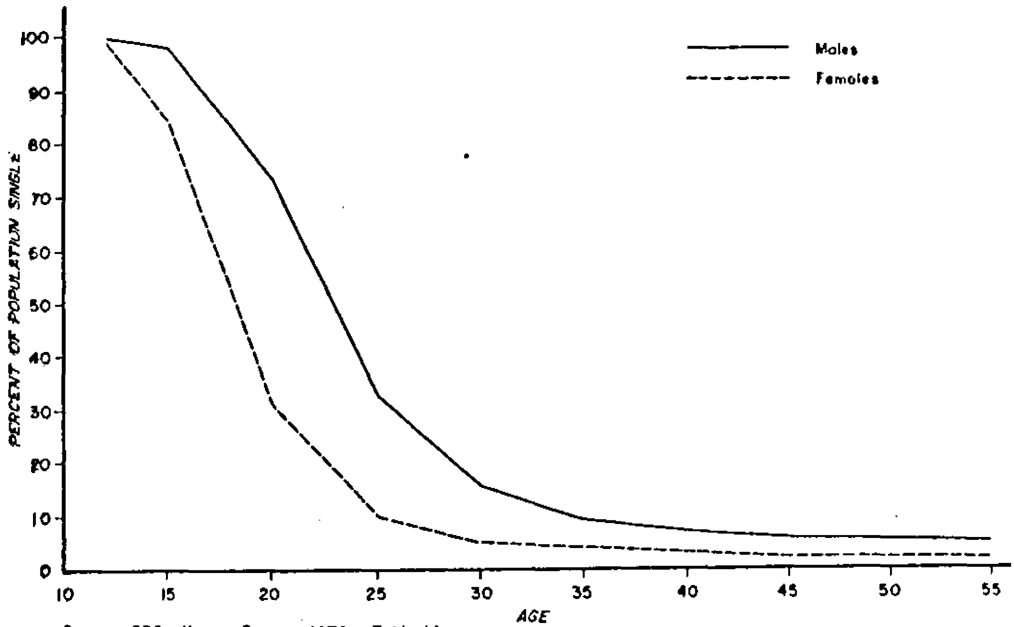
Source: CBS, Kenya Census, 1979, Table 14

Fig. 3.9.3 PERCENTAGE OF THE POPULATION SINGLE BY 5-YEAR AGE GROUPS AND SEX : KENYA 1979 CENSUS (KIAMBU)



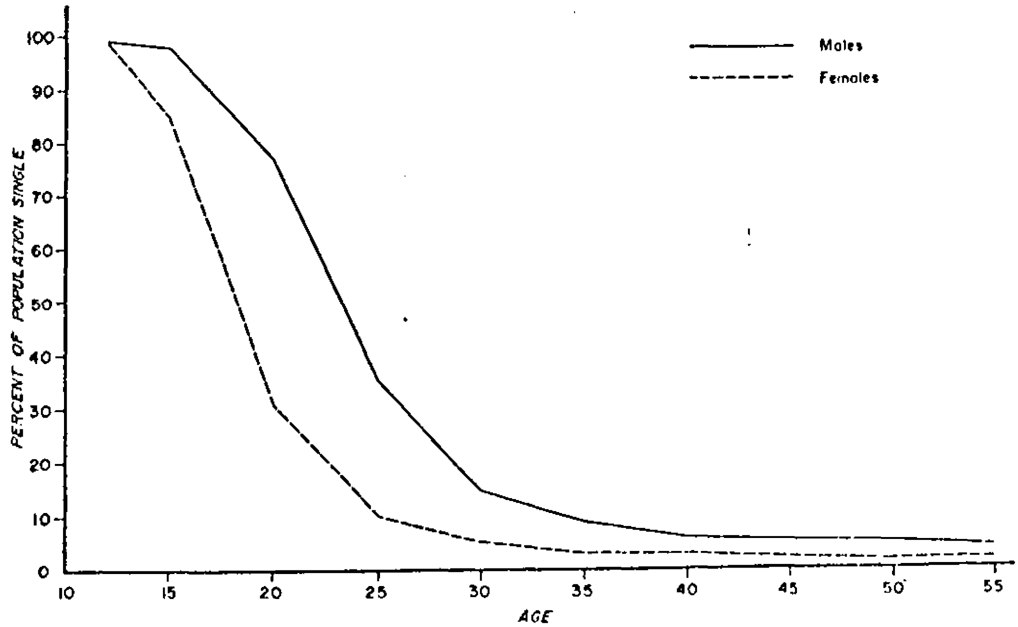
Source: CBS, Kenya Census, 1979, Table 14

Fig 3.9.4 PERCENTAGE OF THE POPULATION SINGLE BY 5-YEAR AGE GROUPS AND SEX : KENYA 1979 CENSUS (KIRINYAGA)



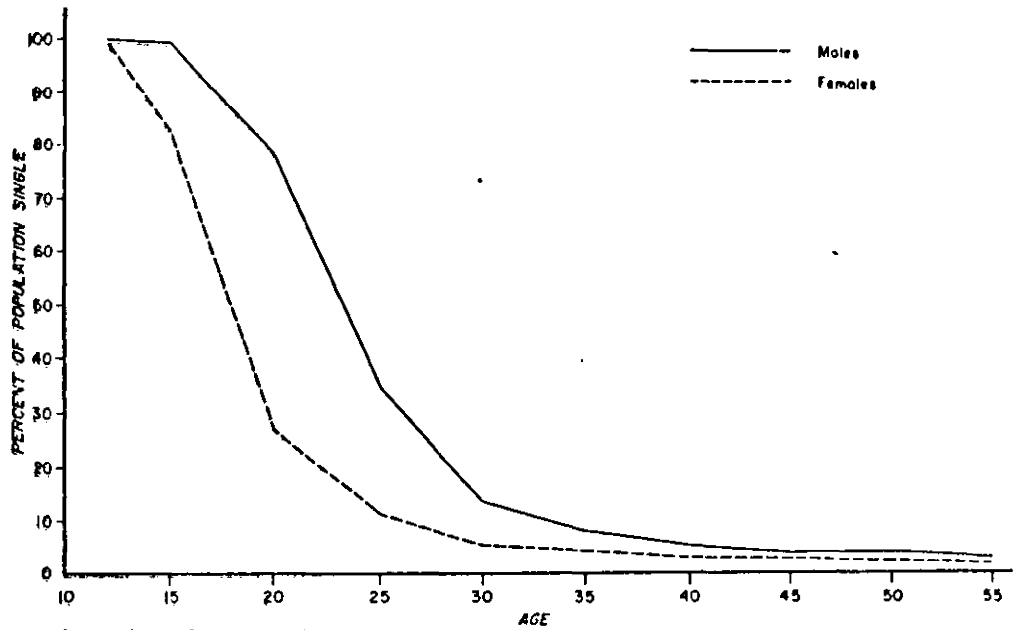
Source: CBS, Kenya Census, 1979, Table 14

Fig. 3.9.5 PERCENTAGE OF THE POPULATION SINGLE BY 5-YEAR AGE GROUPS AND SEX : KENYA 1979 CENSUS (MURANGA)



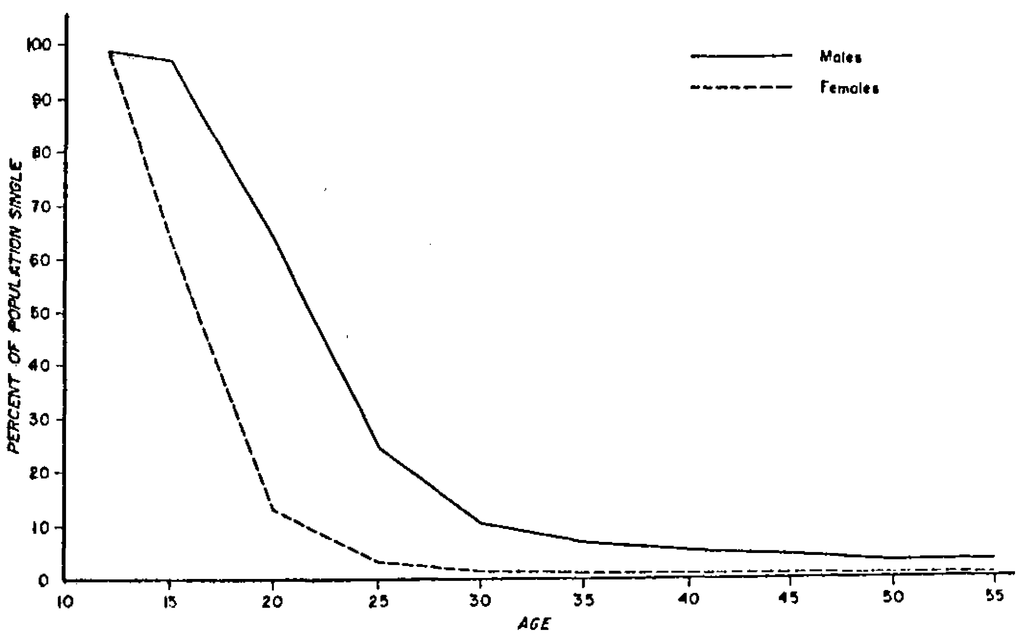
Source: CBS, Kenya Census, 1979, Table 14

Fig. 3.9.6 PERCENTAGE OF THE POPULATION SINGLE BY 5-YEAR AGE GROUPS AND SEX ; KENYA 1979 CENSUS (NYANDARUA)



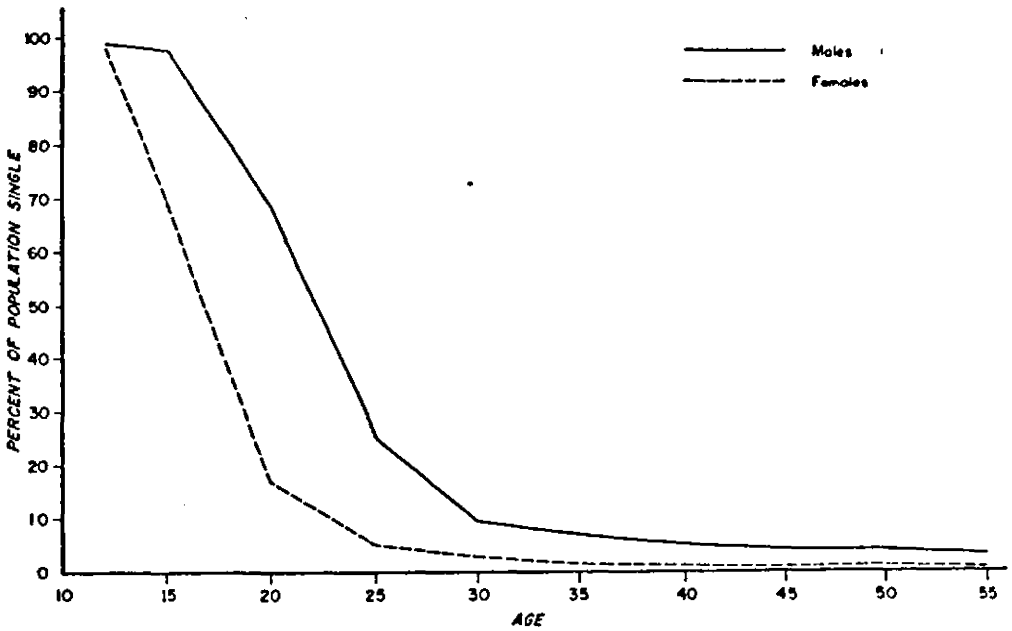
Source: Kenya Census, 1979, Table 14

Fig. 3.9.7 PERCENTAGE OF THE POPULATION SINGLE BY 5-YEAR AGE GROUPS AND SEX ; KENYA 1979 CENSUS (BUSIA)



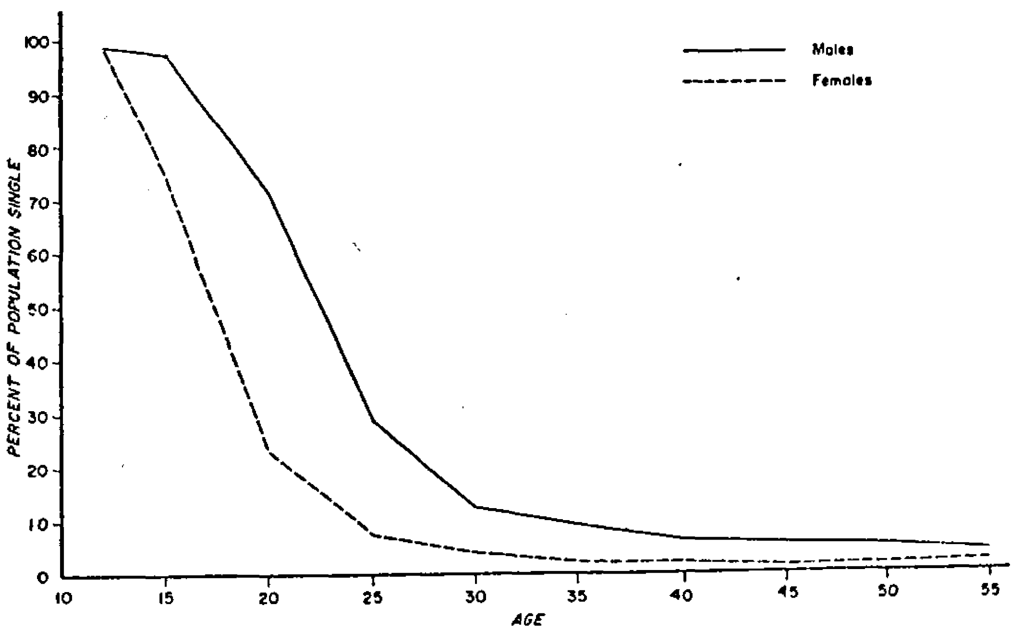
Source: CBS, Kenya Census, 1979, Table 14

Fig 3.9.8 PERCENTAGE OF THE POPULATION SINGLE BY 5-YEAR AGE GROUPS AND SEX : KENYA 1979 CENSUS (BUNGOMA)



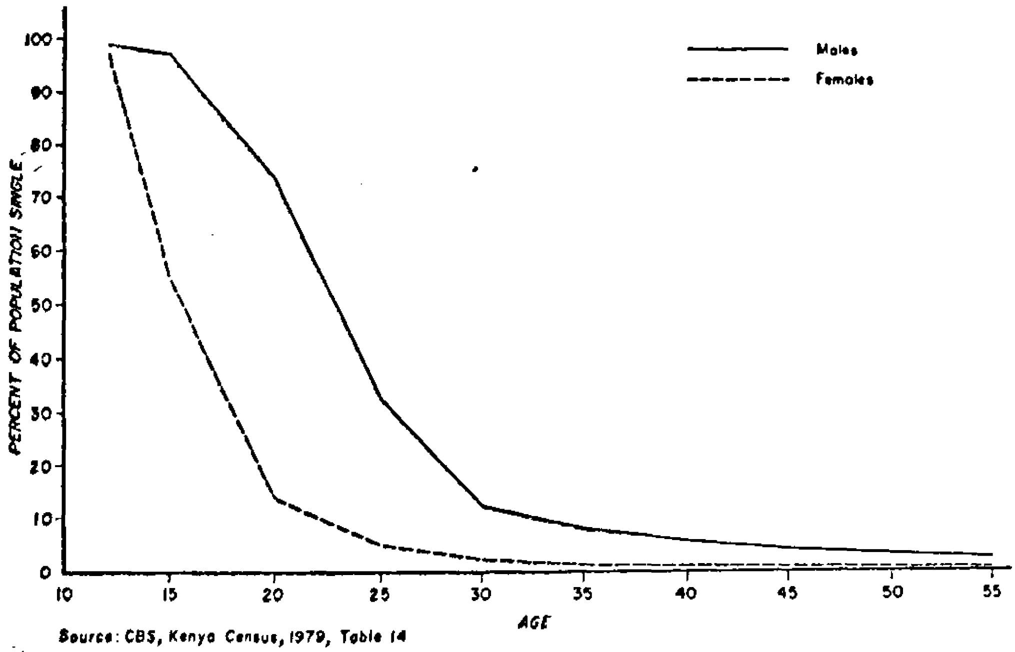
Source: CBS, Kenya Census, 1979, Table

Fig. 3.9.9 PERCENTAGE OF THE POPULATION SINGLE BY 5-YEAR AGE GROUPS AND SEX : KENYA 1979 CENSUS (KAKAMEGA)



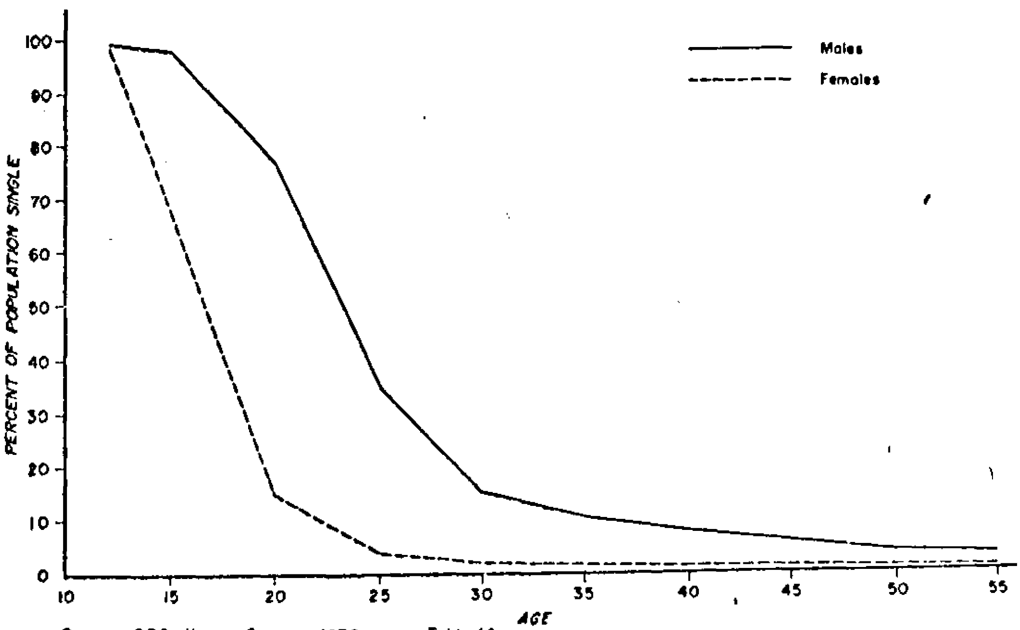
Source: CBS, Kenya Census, 1979, Table 14

Fig.3.9.10 PERCENTAGE OF THE POPULATION SINGLE BY 5-YEAR AGE GROUPS AND SEX : KENYA 1979 CENSUS (SOUTH NYANZA)



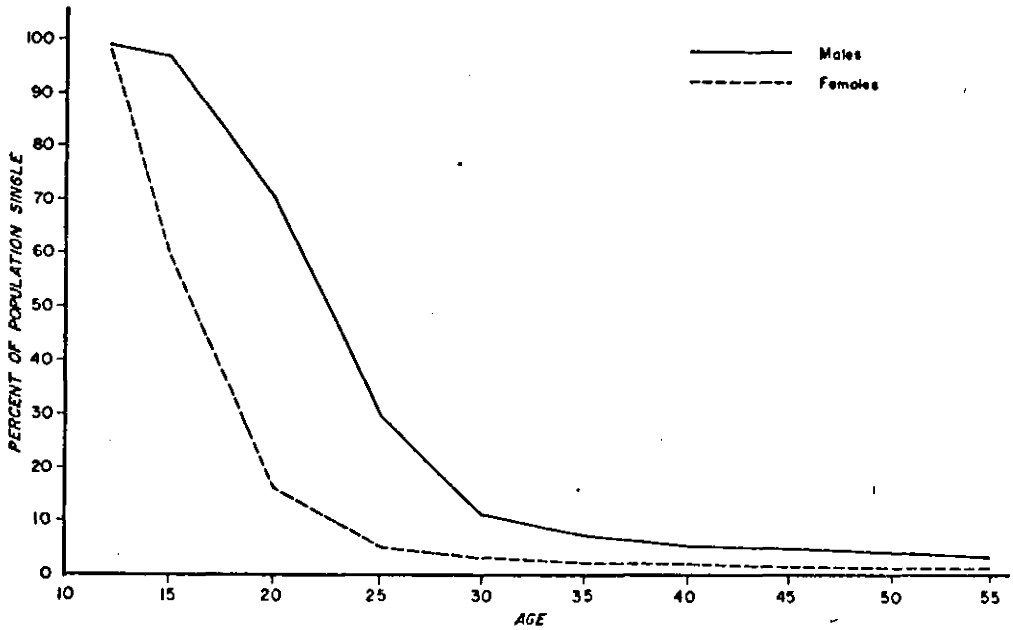
Source: CBS, Kenya Census, 1979, Table 14

Fig. 3.9.11 PERCENTAGE OF THE POPULATION SINGLE BY 5-YEAR AGE GROUPS AND SEX : KENYA 1979 CENSUS (SIAYA)



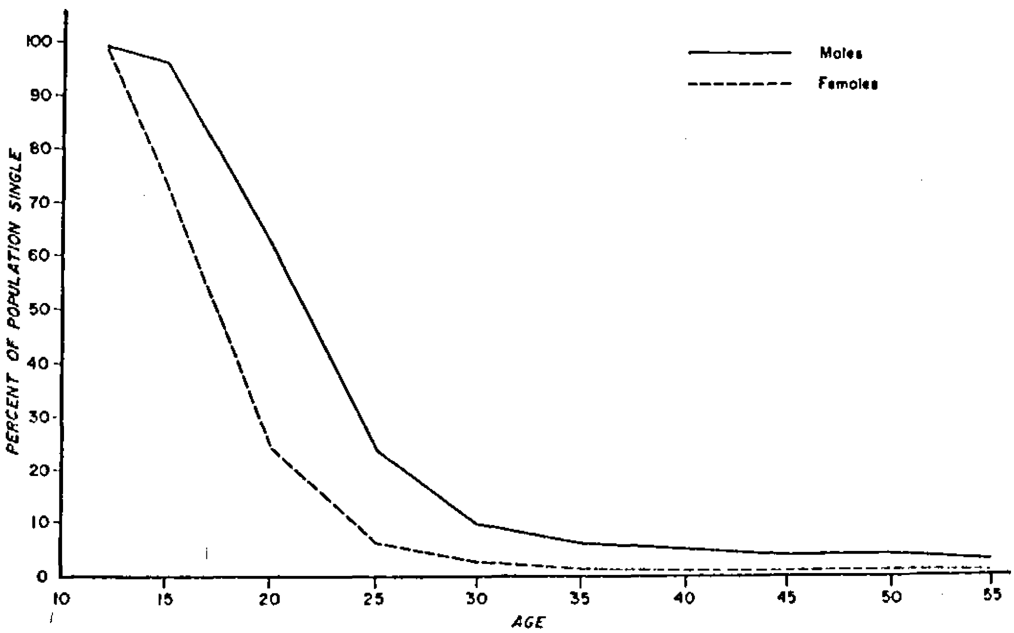
Source: CBS, Kenya Census, 1979, Table 14

Fig. 3.9.12 PERCENTAGE OF THE POPULATION SINGLE BY 5-YEAR AGE GROUP AND SEX : KENYA 1979 CENSUS (KISUMU)



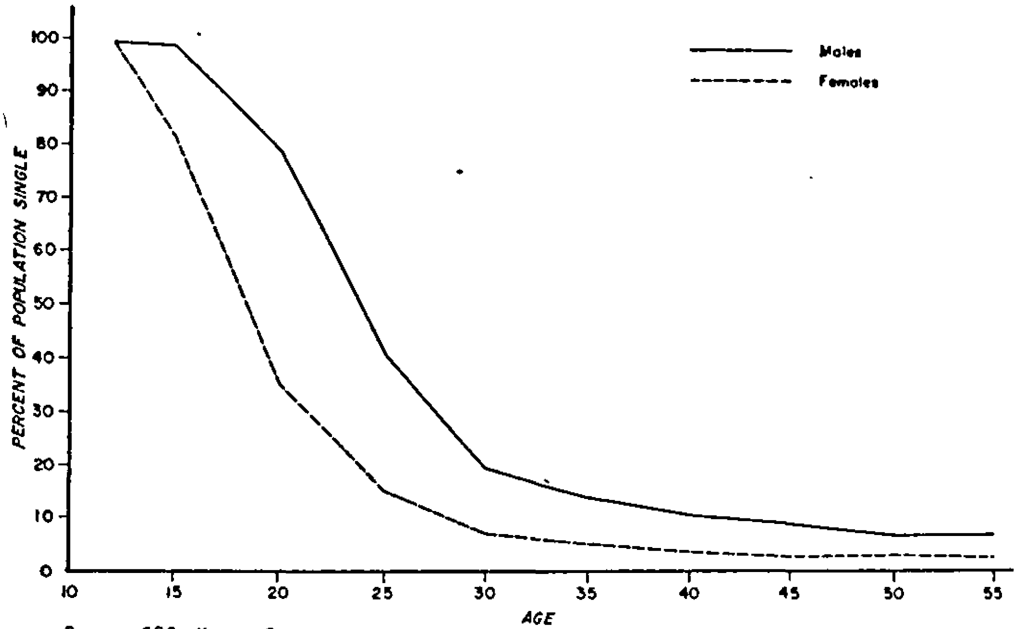
Source: CBS, Kenya Census, 1979, Table 14

Fig. 3.9.13 PERCENTAGE OF THE POPULATION SINGLE BY 5-YEAR AGE GROUPS AND SEX : KENYA 1979 CENSUS (KISII)



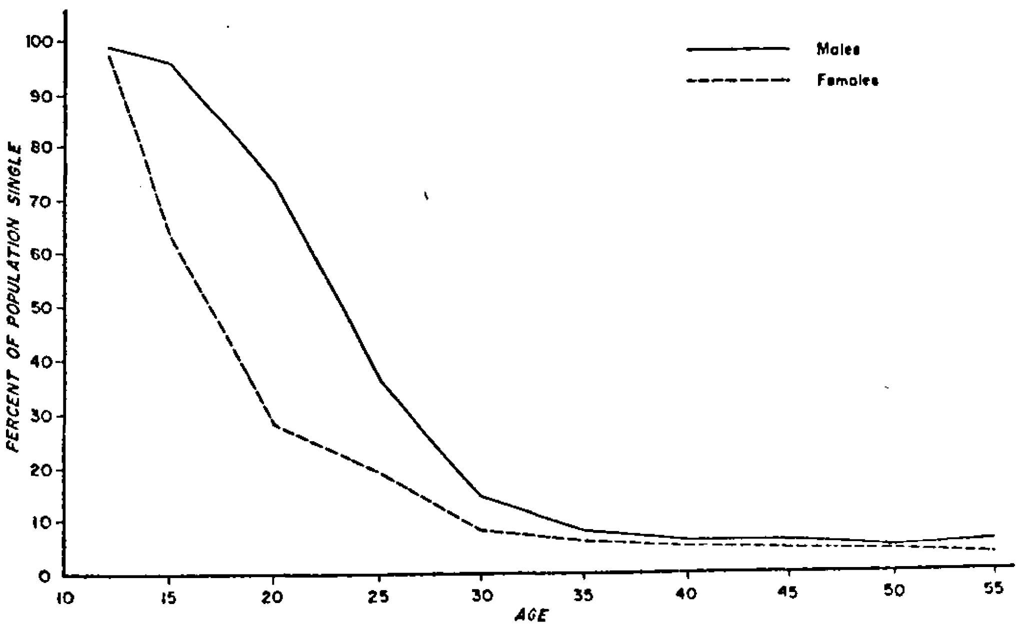
Source: CBS, Kenya Census, 1979, Table 14

Fig. 3.9.14 PERCENTAGE OF THE POPULATION SINGLE BY 5-YEAR AGE GROUPS AND SEX : KENYA 1979 CENSUS (TAITA TAVETA)



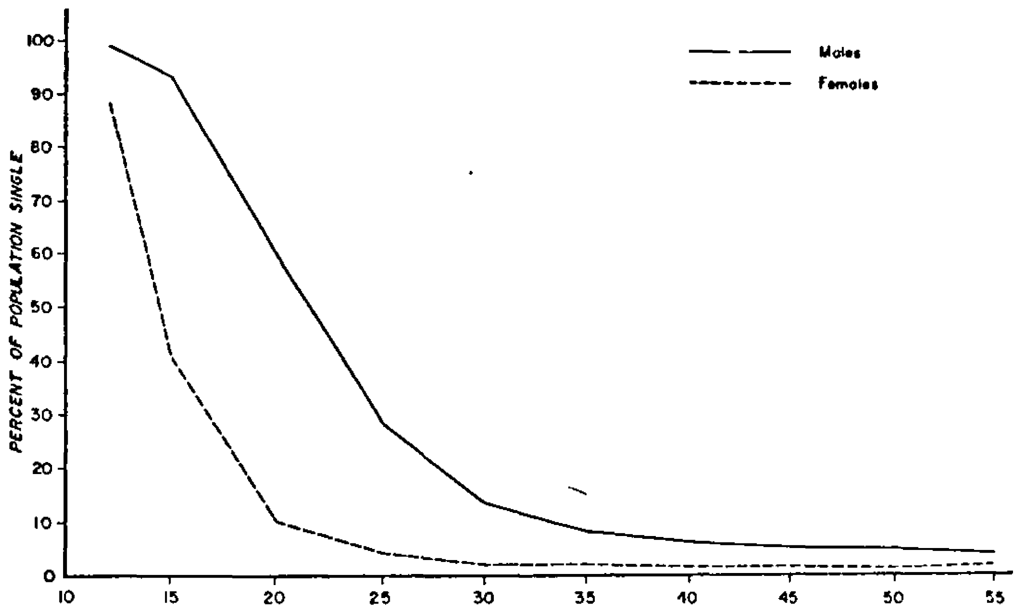
Source: CBS, Kenya Census, 1979, Table 14

Fig. 3.9.15 PERCENTAGE OF THE POPULATION SINGLE BY 5-YEAR AGE GROUPS AND SEX : KENYA 1979 CENSUS (MOMBASA)



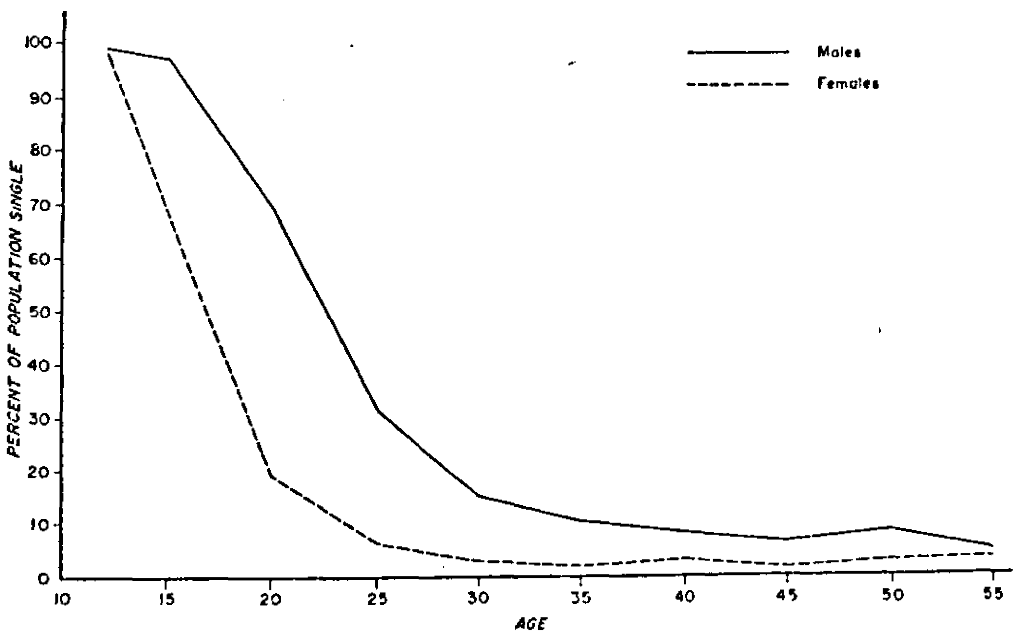
Source : CBS, Kenya Census, 1979, Table 14

Fig. 3.9.16 PPERCENTAGE OF THE POPULATION SINGLE BY 5-YEAR AGE GROUPS AND SEX : KENYA 1979 CENSUS (KILIFI)



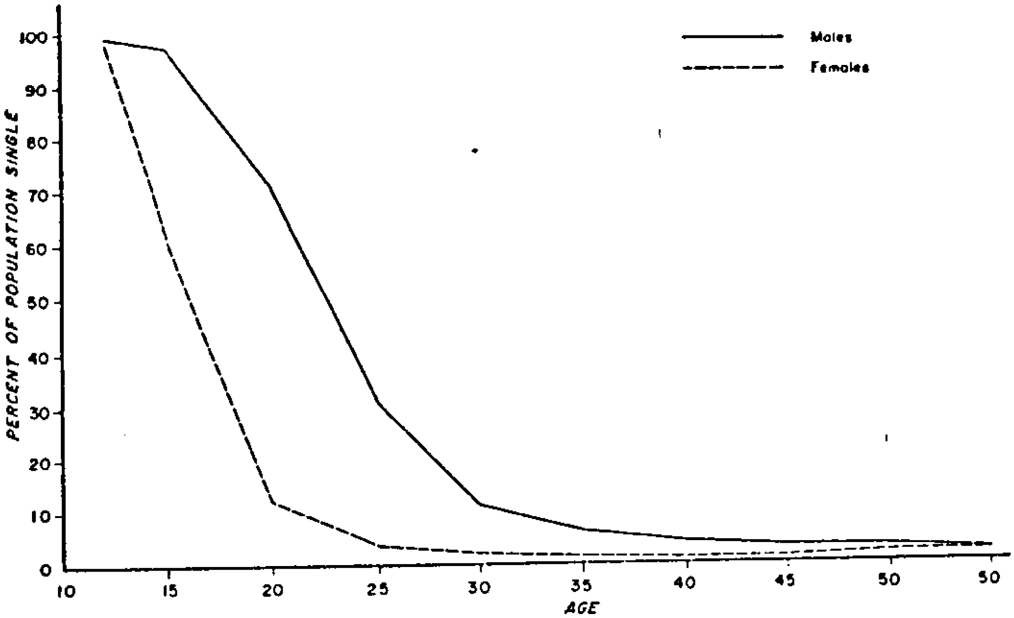
Source: CBS, Kenya Census, 1979, Table 14

Fig. 3.9.17 PERCENTAGE OF THE POPULATION SINGLE BY 5-YEAR AGE GROUPS AND SEX : KENYA 1979 CENSUS (LAMU)



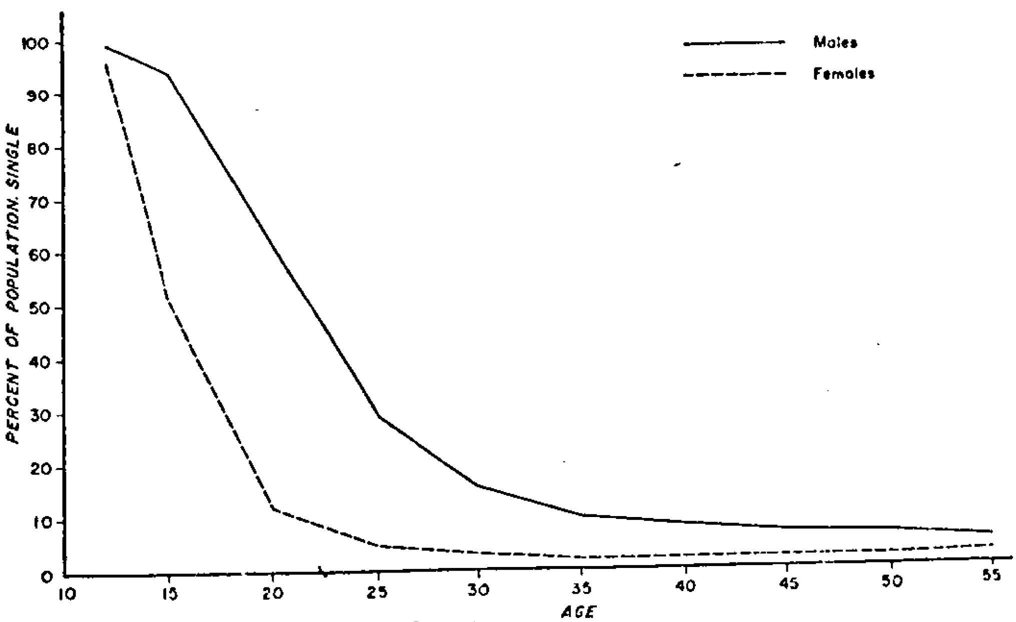
Source: CBS, Kenya Census, 1979, Table 14

Fig.3.9.18 PERCENTAGE OF THE POPULATION SINGLE BY 5-YEAR AGE GROUPS AND SEX : KENYA 1979 CENSUS (TANA RIVER)



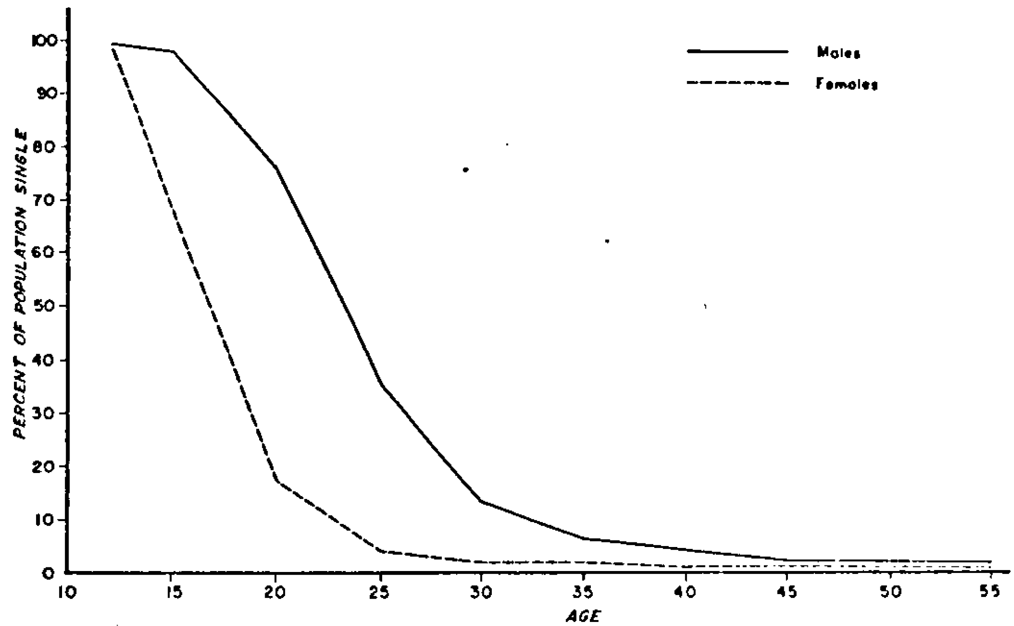
Source:.CBS, Kenya Census, 1979, Table 14

Fig. 3.9.19 PERCENTAGE OF THE POPULATION SINGLE BY 5-YEAR AGE GROUPS AND SEX : KENYA 1979 CENSUS (KWALE)



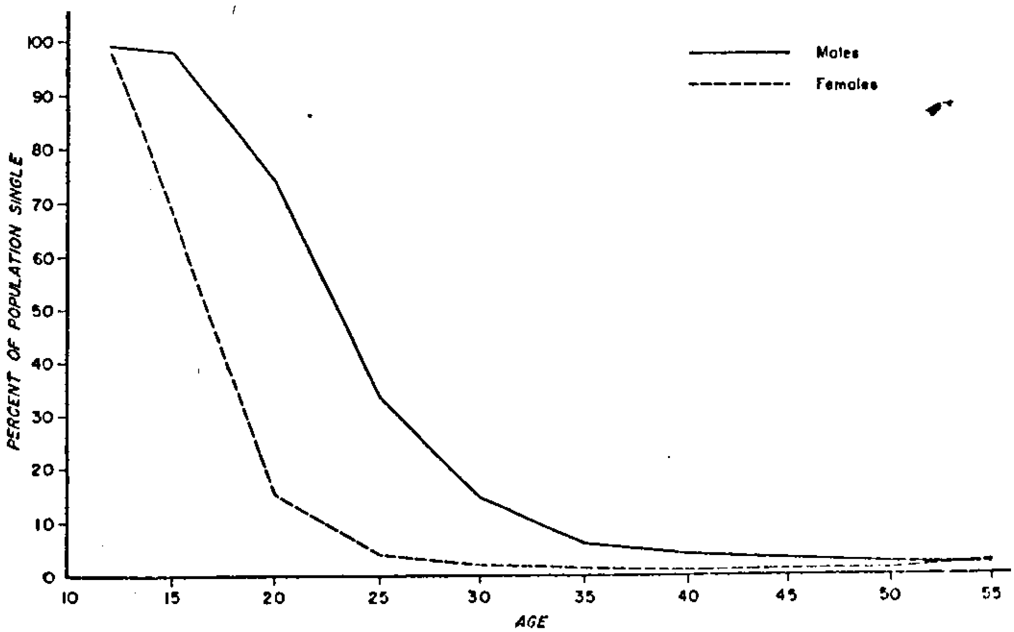
Source: CBS, Kenya Census, 1979, Table 14

Fig. 3.9.20 PERCENTAGE OF THE POPULATION SINGLE BY 5-YEAR AGE GROUPS AND SEX : KENYA 1979 CENSUS (WAJIR)



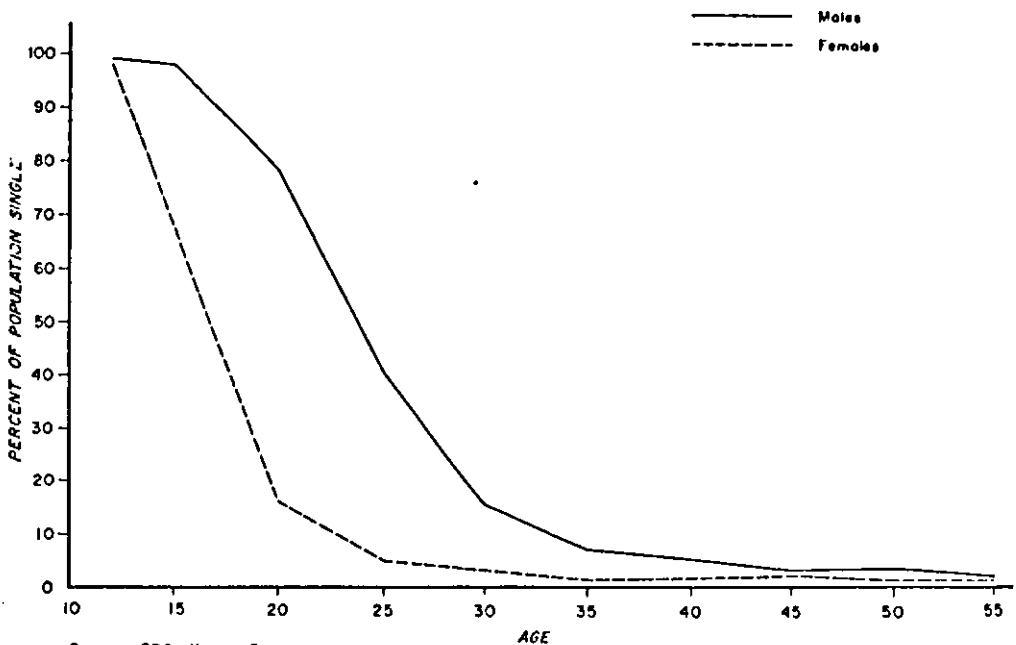
Source: CBS, Kenya Census, 1979, Table 14

Fig. 3.9.21 PERCENTAGE OF THE POPULATION SINGLE BY 5-YEAR AGE GROUPS AND SEX : KENYA 1979 CENSUS (MANDERA)



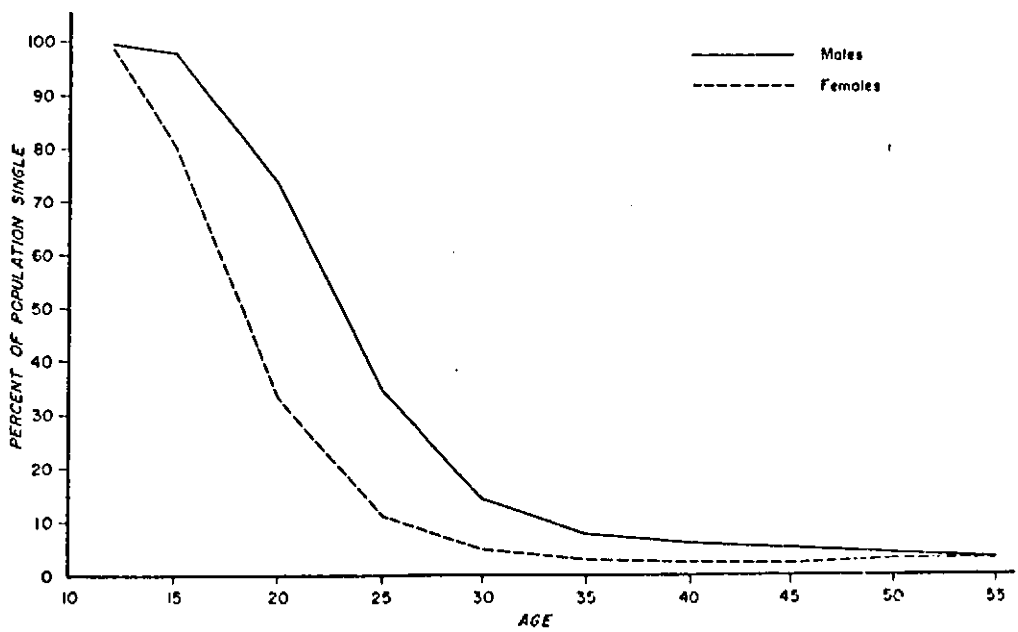
Source: CBS, Kenya Census, 1979, Table 14

Fig. 3.9.22 PERCENTAGE OF THE POPULATION SINGLE BY 5-YEAR AGE GROUPS AND SEX : KENYA 1979 CENSUS (GARISSA)



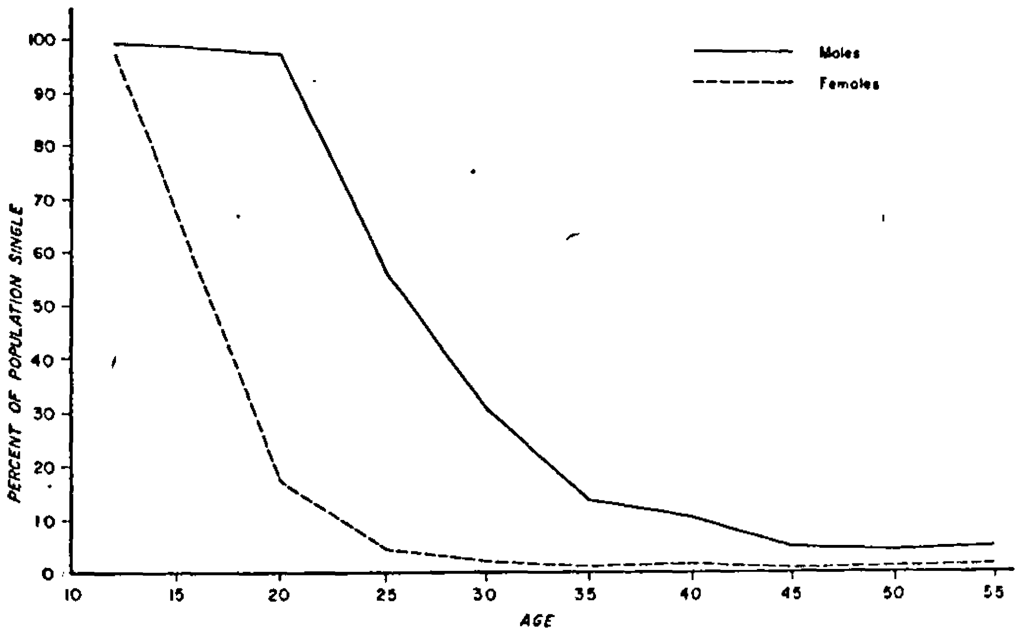
Source: CBS, Kenya Census, 1979, Table 14

Fig. 3.9.23 PERCENTAGE OF THE POPULATION SINGLE BY 5-YEAR AGE GROUPS AND SEX : KENYA 1979 CENSUS (MERU)



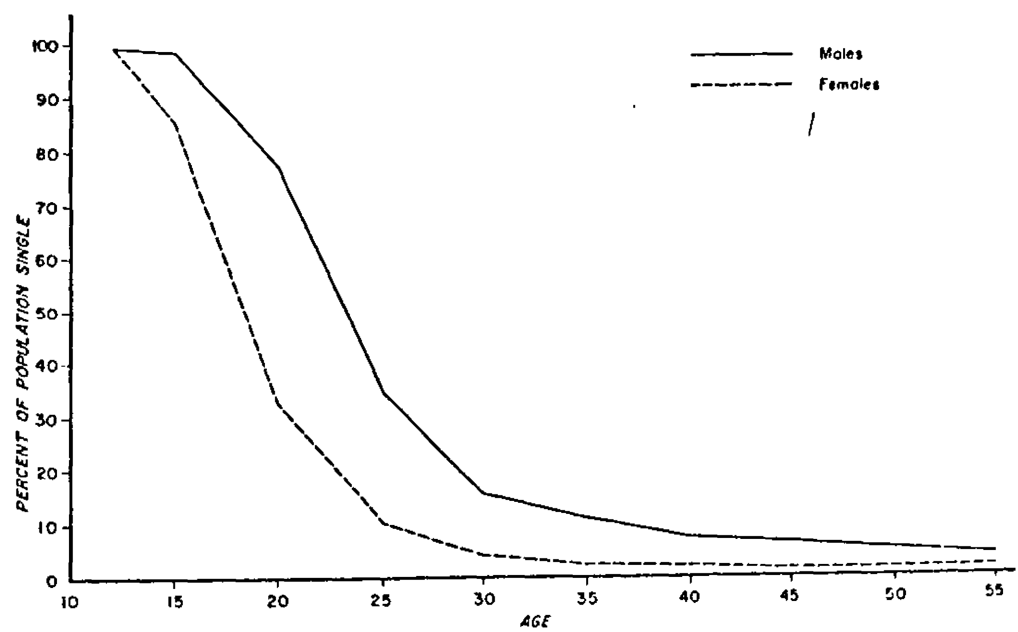
Source: CBS, Kenya Census, 1979, Table 14

Fig. 3.9.24 PERCENTAGE OF THE POPULATION SINGLE BY 5-YEAR AGE GROUPS AND SEX : KENYA 1979 CENSUS (MARSABIT)



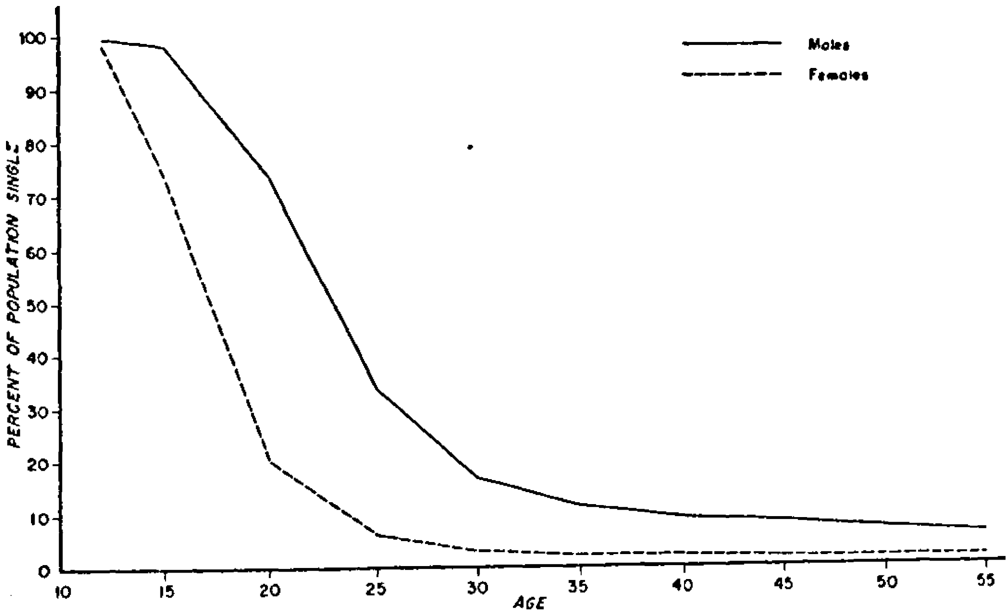
Source: CBS, Kenya Census, 1979, Table 14

Fig. 3.9.25 PERCENTAGE OF THE POPULATION SINGLE BY 5-YEAR AGE GROUPS AND SEX : KENYA 1979 CENSUS (MACHAKOS)



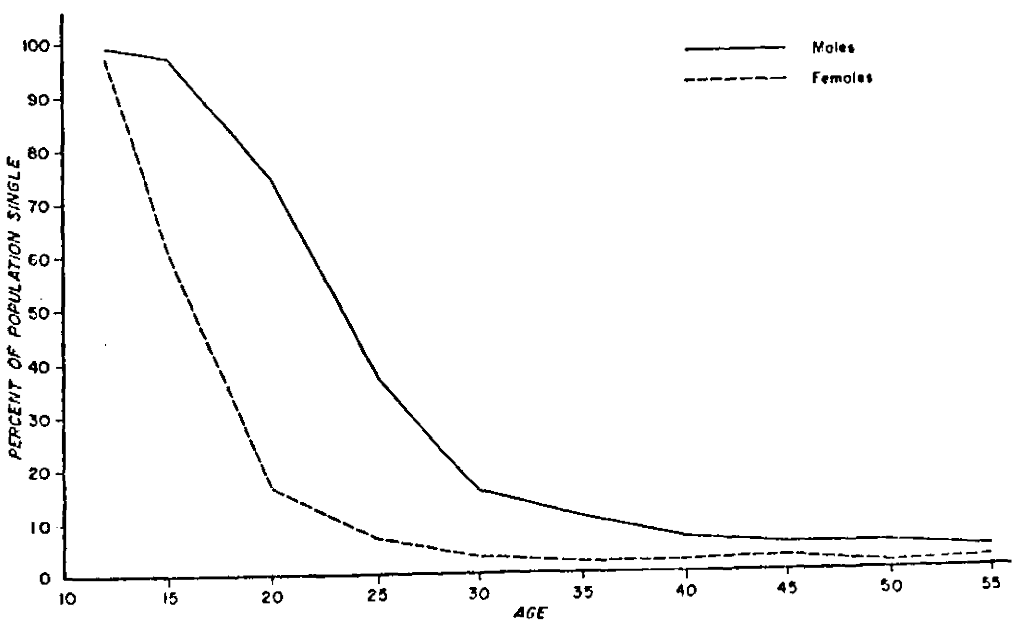
Source: CBS, Kenya Census, 1979, Table 14

Fig. 3.9.26 PERCENTACE OF THE POPULATION SINGLE BY 5-YEAR AGE GROUPS AND SEX : KENYA 1979 CENSUS (KITUI)



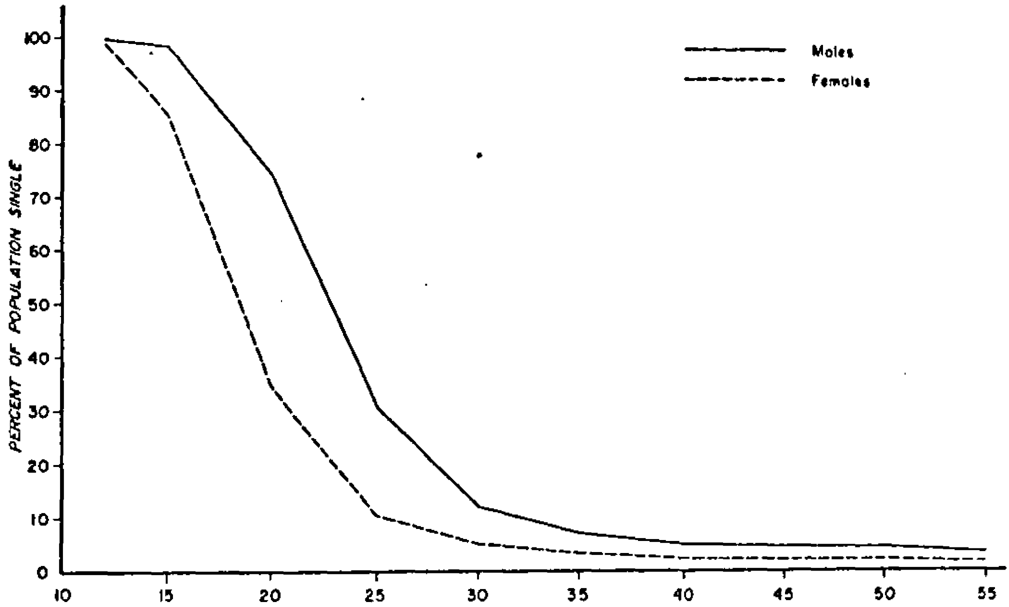
Source: CBS, Kenya Census, 1979, Table 14

Fig. 3.9.27 PERCENTAGE OF THE POPULATION SINGLE BY 5-YEAR AGE GROUPS AND SEX : KENYA 1979 CENSUS (ISIOLO)



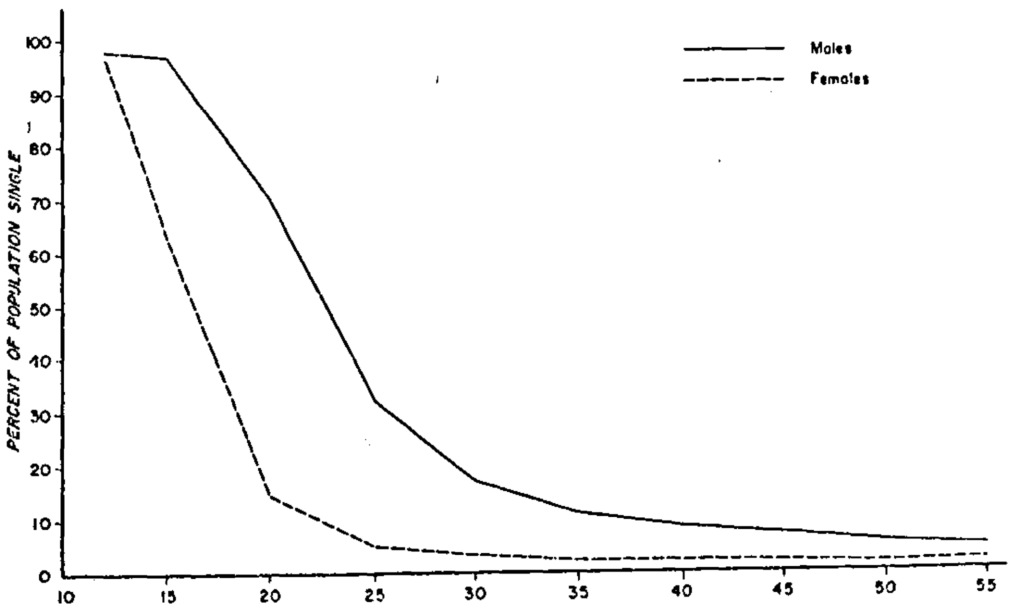
Source: CBS, Kenya Census, 1979, Table 14

Fig. 3.9.28 PERCENTAGE OF THE POPULATION SINGLE BY 5-YEAR AGE GROUPS AND SEX : KENYA 1979 CENSUS (EMBU)



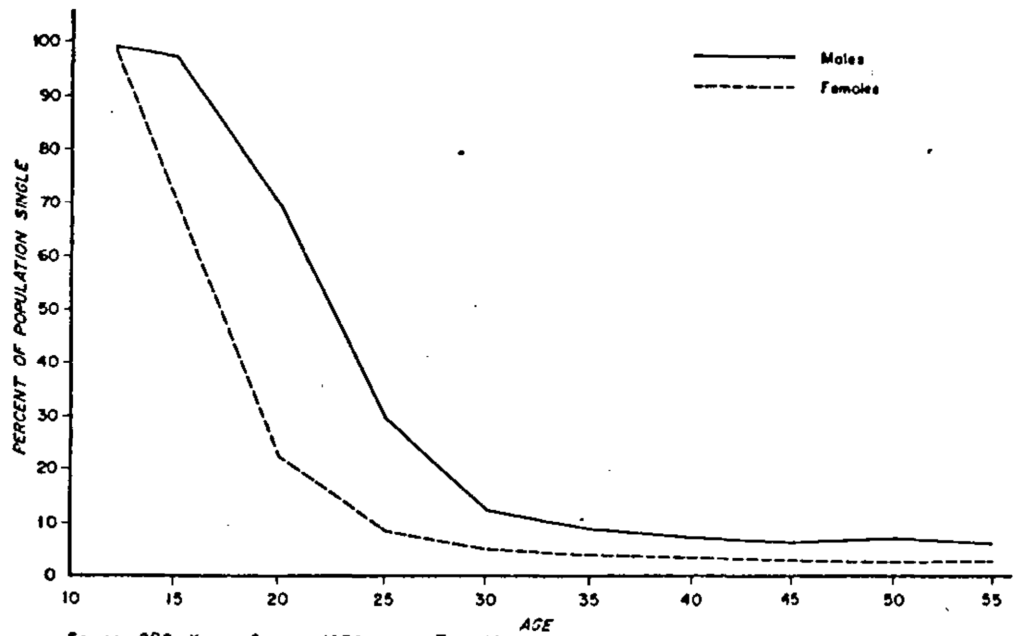
Source: CBS, Kenya Census, 1979, Table 14

Fig. 3.9.29 PERCENTAGE OF THE POPULATION SINGLE BY 5-YEAR AGE GROUPS AND SEX : KENYA 1979 CENSUS (WEST POKOT)



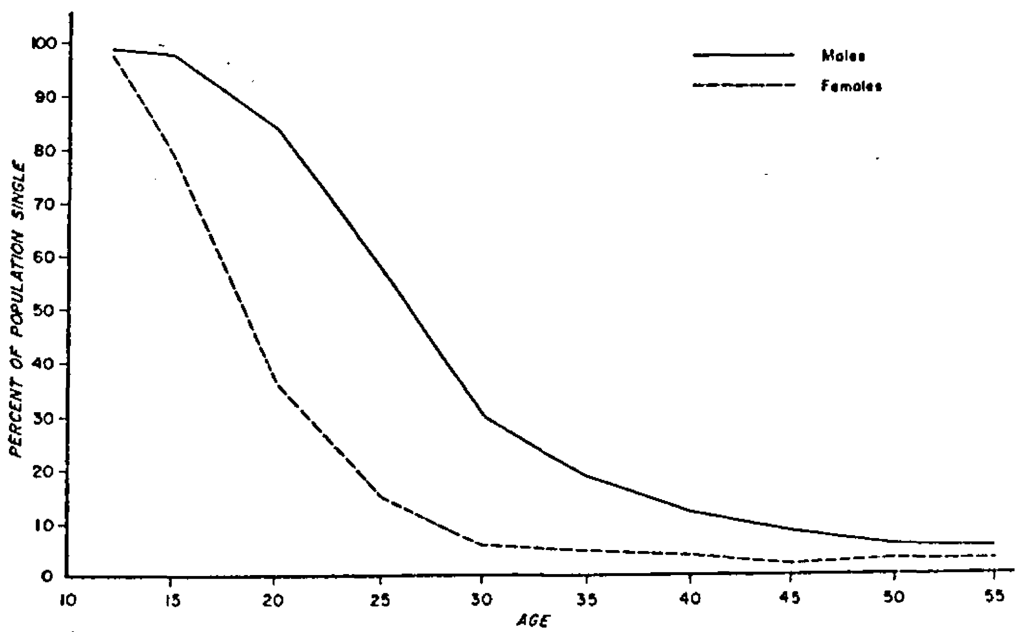
Source: CBS, Kenya Census, 1979, Table 14

Fig 3.9.30 PERCENTAGE OF THE POPULATION SINGLE BY 5-YEAR AGE GROUPS AND SEX : KENYA 1979 (UASIN GISHU)



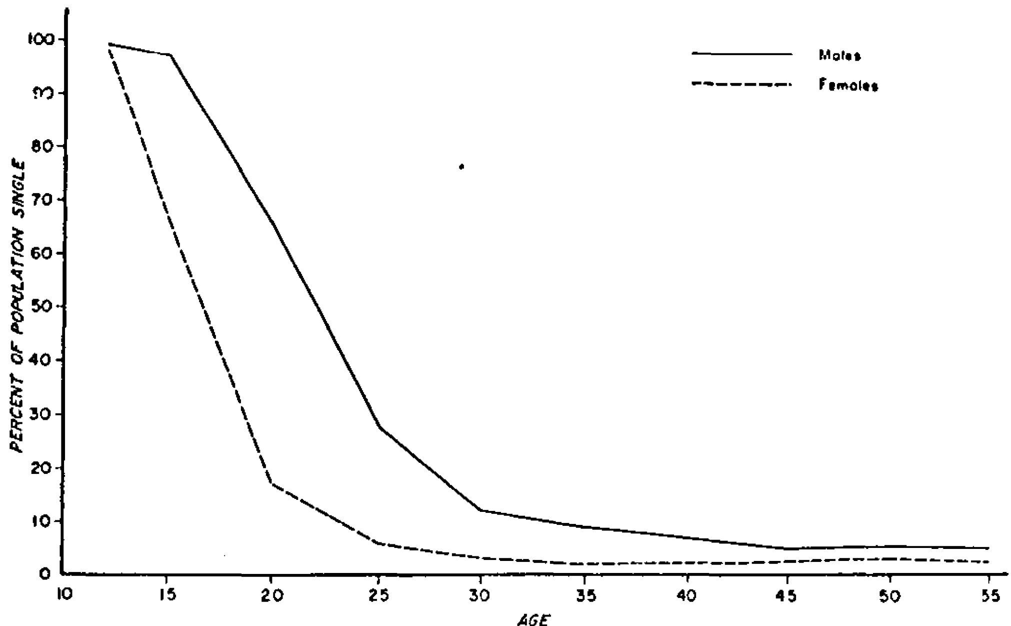
Source: CBS, Kenya Census, 1979, Table 14

Fig. 3.9.31 PERCENTAGE OF THE POPULATION SINGLE BY 5—YEAR AGE GROUPS AND SEX : KENYA 1979 CENSUS (TURKANA)



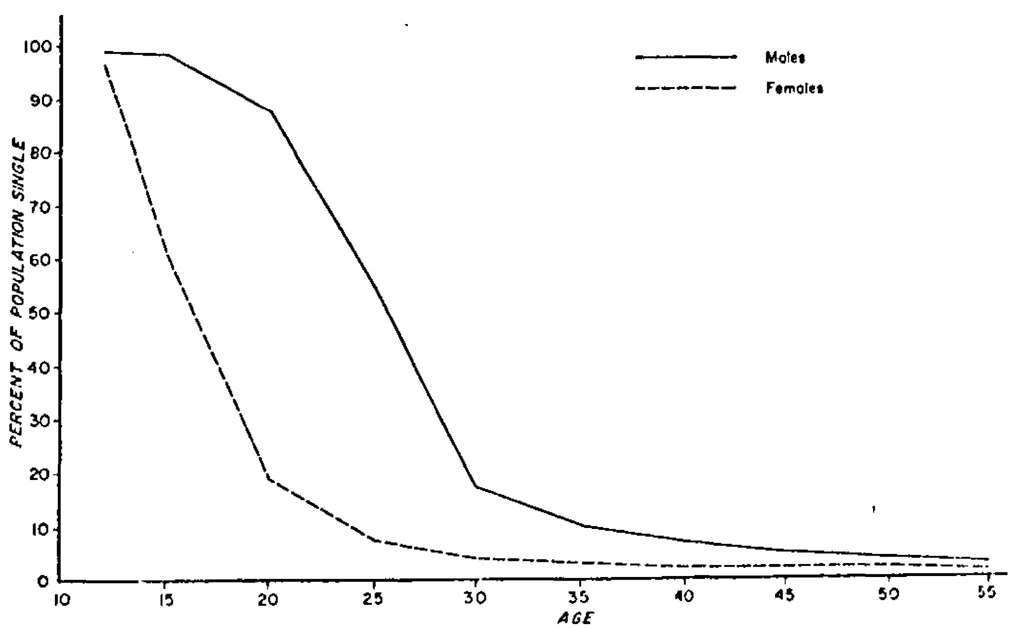
Source: Kenya Census, 1979, Table 14

Fig. 3.9.32 PERCENTAGE OF THE POPULATION SINGLE BY 5-YEAR AGE GROUPS AND SEX : KENYA 1979 CENSUS (TRANS NZOIA)



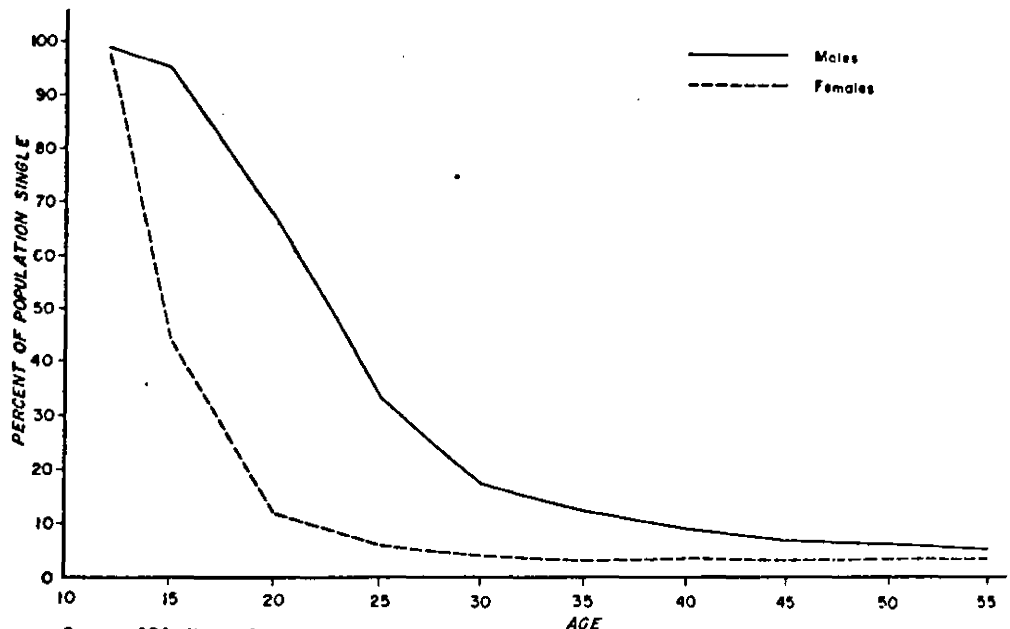
Source: Kenya Census, 1979, Table 14

Fig. 3.9.33 PERCENTAGE OF THE POPULATION SINGLE BY 5-YEAR AGE GROUPS AND SEX : KENYA 1979 CENSUS (SAMBURU)



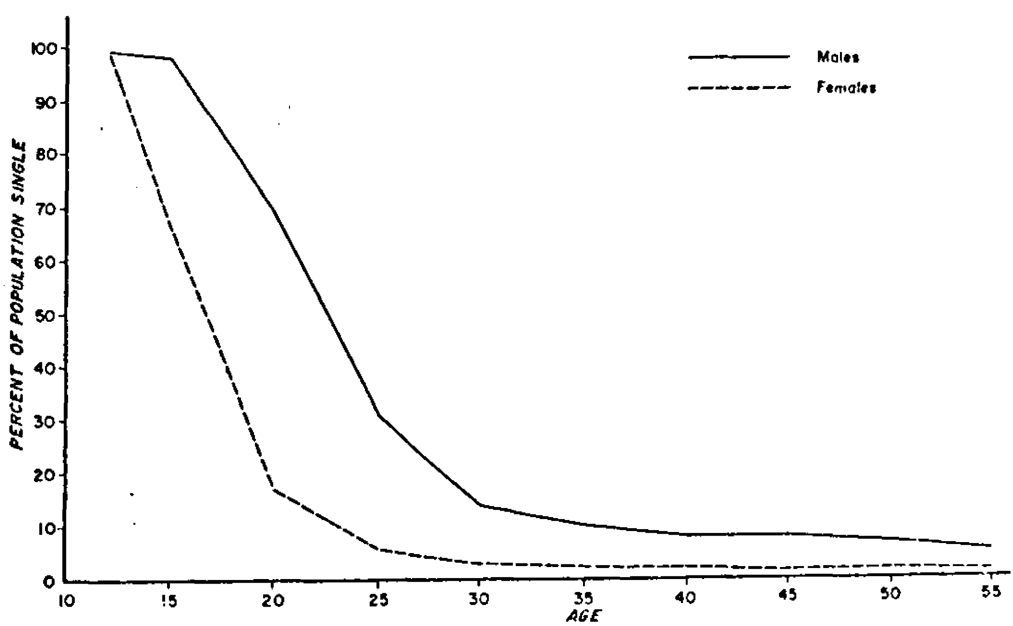
Source: CBS, Kenya Census, 1979, Table 14

Fig. 3.9.34 PERCENTAGE OF THE POPULATION SINGLE BY 5-YEAR AGE GROUPS AND SEX : KENYA 1979 CENSUS (NAROK)



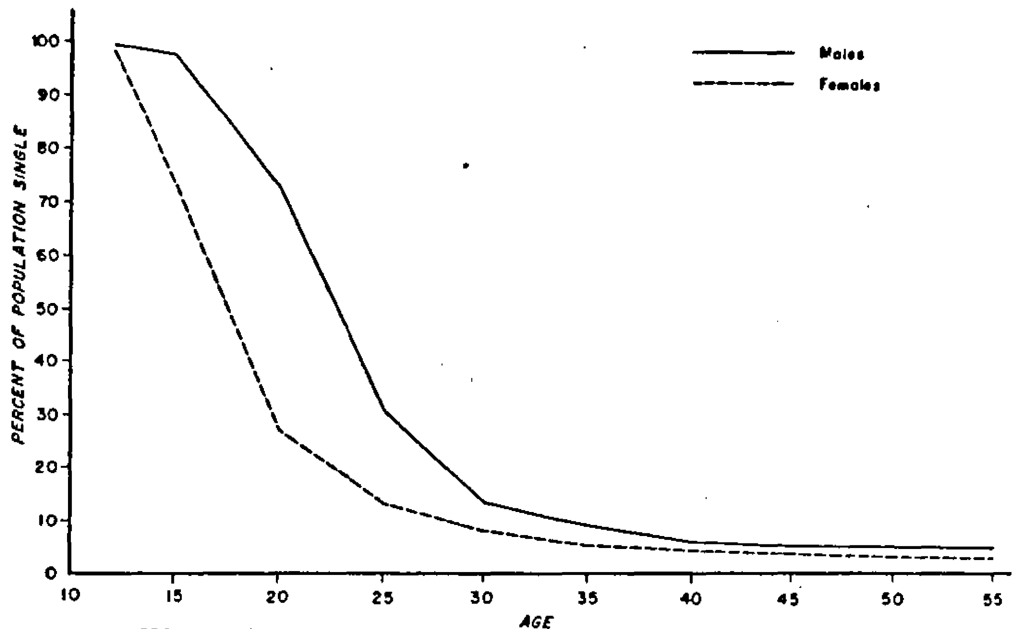
Source: CBS, Kenya Census, 1979, Table 14

Fig. 3.9.35 PERCENTAGE OF THE POPULATION SINGLE BY 5-YEAR AGE GROUPS AND SEX : KENYA 1979 CENSUS (NANDI)



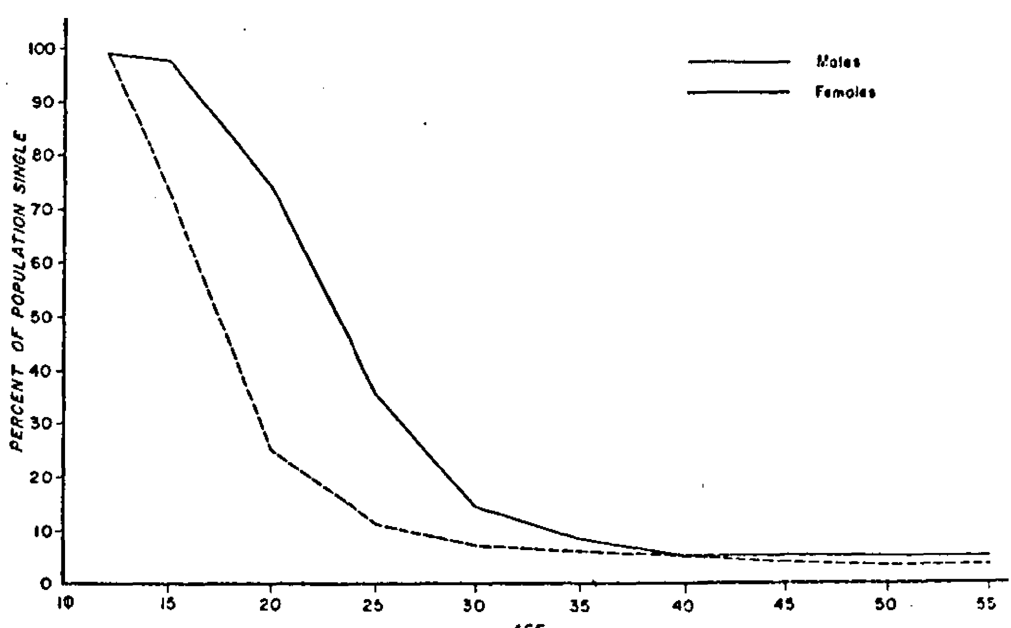
Source: CBS, Kenya Census, 1979, Table 14

Fig. 3.9.36 PERCENTAGE OF THE POPULATION SINGLE BY 5-YEAR AGE GROUPS AND SEX : KENYA 1979 CENSUS (NAKURU)



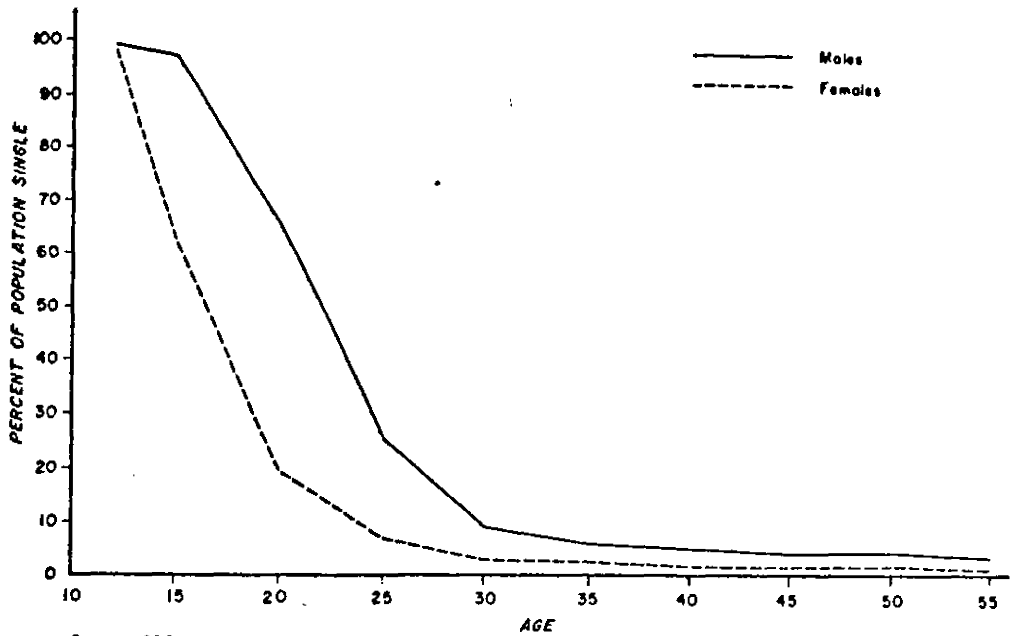
Source: CBS, Kenya Census, 1979, Table 14

Fig. 3.9.37 PERCENTAGE OF THE POPULATION SINGLE BY 5-YEARS AGE GROUPS AND SEX : KENYA 1979 CENSUS (LAIKIPIA)



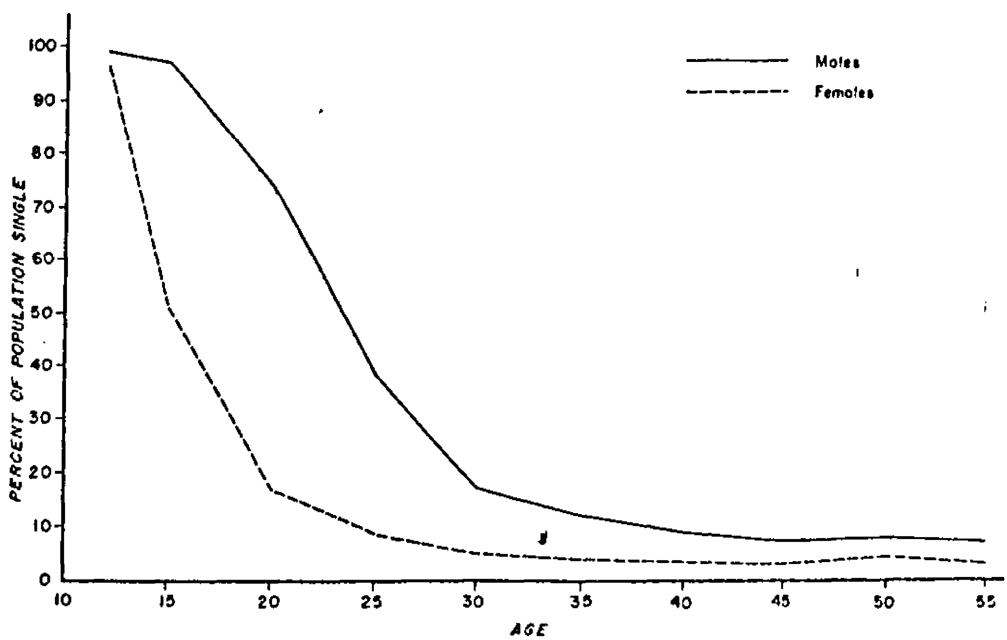
Source: CBS, Kenya Census, 1929, Table 14

Fig. 3.9.38 PERCENTAGE OF THE POPULATION SINGLE BY 5-YEAR AGE GROUPS AND SEX : KENYA 1979 CENSUS (KERICHO)



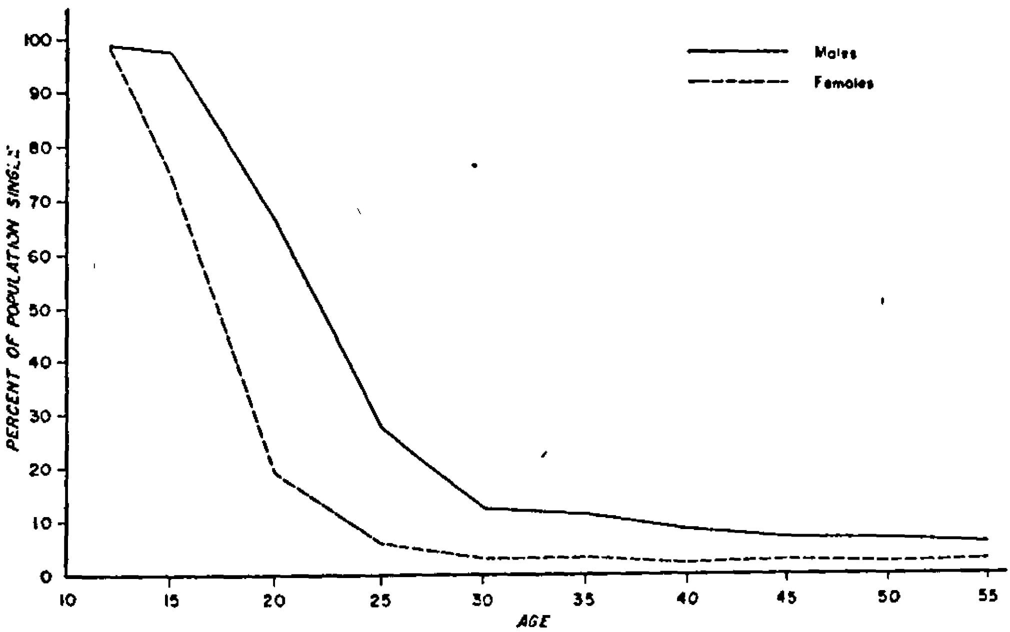
Source: CBS, Kenya Census, 1979, Table 14

Fig. 3.9.39 PERCENTAGE OF THE POPULATION SINGLE BY 5-YEAR AGE GROUPS AND SEX : KENYA 1979 CENSUS (KAJIADO)



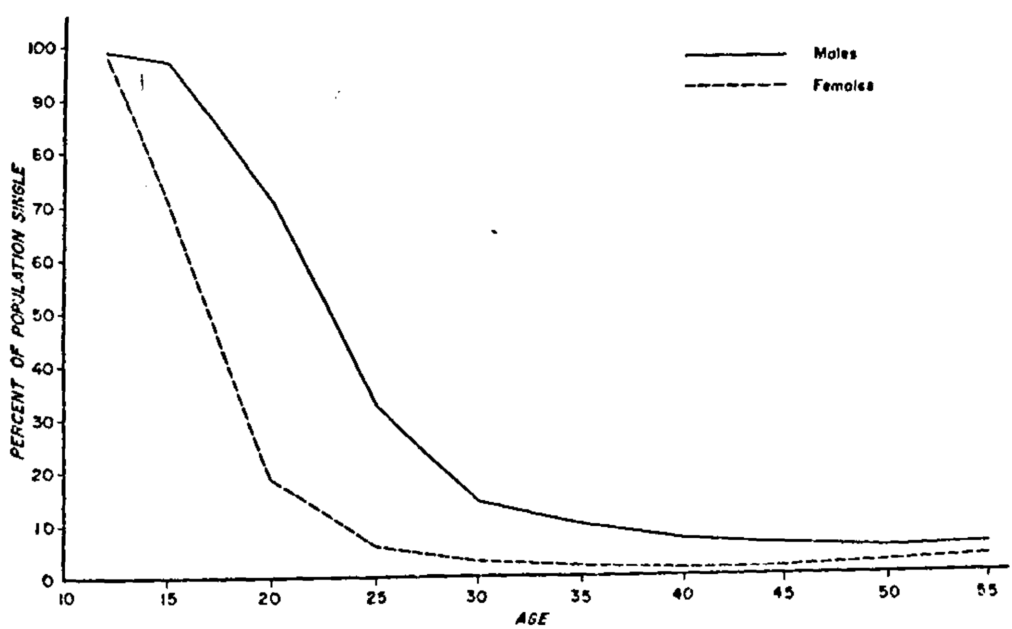
Source: CBS, Kenya Census, 1979, Table 14

Fig. 3.9.40 PERCENTAGE OF THE POPULATION SINGLE BY 5-YEAR AGE GROUPS AND SEX : KENYA 1979 CENSUS (ELGEYO MARAKWET)



Source: CBS, Kenya Census, 1979, Table 14

Fig. 3.9.41 PERCENTAGE OF THE POPULATION SINGLE BY 5-YEAR AGE GROUPS AND SEX : KENYA 1979 CENSUS (BARINGO)



Source: CBS, Kenya Census, 1979, Table 14

3.4 ADJUSTMENT OF BASIC DATA FOR AGE AND MARITAL STATUS MISREPORTING

After the evaluation of the quality of census data, for age misreporting and digital preference errors, it should be noted that both the 1969 and 1979 censuses have a very rough and inaccurate data. As such effort is made in this sub-section to graduate the basic data (marital distribution by age) for these irregularities, if meaningful marriage estimates are to be derived. However, it should be noted further that systematic errors of net shifting in age misreporting may not be affected by the smoothening. In addition, the graduation may remove the true irregularities in data, and thus give an uncalled for sense of security with regard to the data quality. The choice of methods to apply is rather arbitrary, as none is full proof in eliminating all the types of errors. Nonetheless, the choice is strongly based on the nature of errors and its contribution to minimizing their influence as much as possible.

Though it is noted, that, the incidence of digital preference may be reduced by regrouping of single years age data into 5-year or other suitable age-groups, in this study most preferences are for terminal digits 0 and 5. Thus the use of 5-year age-grouping is not a sufficient measure to reduce age heaping errors. It is, further, noted that age heaping errors are unbiased as they are likely to cancel out in either direction. The more serious errors tend to be those of the biased nature. For example, age shifting. However, as evident from the evaluation, the these are less prevalent over relevant ages (15-50) than those of digital preferences. The data are thus graduated for the digital preference errors, using the method of Moving Average (Kpedekpo, 1982).

The graduated population for total and single status are shown in Tables 3.4:1-5 for both sexes. The adjusted values are not close to those enumerated and thus both (enumerated and graduated) are applied in the estimation of marriage timing to determine if any differences arise in the results.

On the other hand, adjustment for errors in marital status reporting has been attempted using two assumptions:-

i) the 'Unknown' marital status, has an equal chance of being included in either the single, married, widowed or divorced statuses.

ii) the 'Unknown' marital status belongs to those of the ever-married status.

The results of the two assumptions (SMAM values) determine which is true. Where proportions single increase with age above age 50, misreporting on the part of those divorced, separated (report themselves as single) may be the case. To correct for such errors, the average of the two adjoining age-groups has been taken to give a smooth pattern of proportions single. However, note should be taken, that these discrepancies, could be due to real changes in mariage patterns. Adjustment for age 'unknown' has not been carried out as most 'unknown' ages tend to belong to the very early (<10 years) and very late (> 50 years) ages, which fall outside the age range considered in this study.

Tables 3.4:1-5 give the smoothed population (total and single) for 1969 and 1979 at national level, and 1979 for regions in North Eastern Province (Wajir, Garissa, Mandera). Some significant deviations do arise, particularly for the three regions, thus confirming the magnitude of age heaping error in the data.

TABLE 3.4.1 : SMOOTHED POPULATION (TOTAL AND SINGLE) BY SEX: KENYA 1969

Age Group	ENUMERATED				SMOOTHED			
	Total		Single		Total		Single	
	Males	Females	Males	Females	Males	Females	Males	Female
5-9	914703	885210	910657	881501				
10-14	716911	671140	709820	657231				
15-19	559844	545664	535140	347171	558116.4	540757.4	525492.3	345352.6
20-24	431540	451269	309857	83179	434327.7	459977.1	308619.3	103543.3
25-29	347679	408948	111575	26207	344389.4	393273.6	121762.9	17799.4
30-34	279338	300365	37702	11378	284809.1	313887.5	36926.6	10200.1
35-39	250227	257974	22640	8336	243203.3	249794.1	19222.8	7519.7
40-44	196518	197869	13198	5572	201277.6	202927.2	13785.2	5781.8
45-49	166763	167023	10861	4638	163764.9	163609.1	10206.4	4486.6
50-54	133361	131478	7719	3729				
55-59	116680	111899	6336	3463				

TABLE 3.4.2 : SMOOTHED POPULATION (TOTAL AND SINGLE) BY SEX: KENYA 1979

Age Group	ENUMERATED				SMOOTHED			
	Total		Single		Total		Single	
	Males	Females	Males	Females	Males	Females	Male	Females
5-9	1247091	1244749	1247091	1244749				
10-14	1050932	1023839	1046853	1013849				
15-19	854123	887722	831693	632238	846813.8	870661.8	808714.0	609674.0
20-24	641401	686003	461838	167965	651999.3	696212.0	469132.7	210935.4
25-29	514451	541251	165179	50103	511706.5	537137.3	178396.9	38157.9
30-34	405385	412691	52892	20199	398105.1	414604.8	50710.5	16928.9
35-39	290227	325367	24667	10922	302272.8	327251.6	21374.7	10252.6
40-44	261480	273702	15098	7262	253941.9	270164.7	14608.2	6982.3
45-49	218914	221965	11456	4920	220980.5	226165.3	11233.3	5057.8
50-54	182908	191022	8849	4072	181165.9	184562.3	8623.5	3809.8
55-59	140777	134534	5949	2689				
60-64	107710	109518	5036	2938				

TABLE 3.4.3 : SMOOTHED POPULATION (TOTAL AND SINGLE) BY SEX : WAJIR 1979

Age Group	ENUMERATED Total Males	ENUMERATED Total Females	ENUMERATED Single Males	ENUMERATED Single Females	SMOOTHED Total Males	SMOOTHED Total Females	SMOOTHED Single Males	SMOOTHED Single Females
5-9	11291	9926	11291	9926				
10-14	10549	9053	10507	8970				
15-19	9040	7992	8840	5320	9082.2	7936.9	8649.6	5198.3
20-24	7145	6365	5197	1050	6932.2	6287.1	5148.2	1465.5
25-29	4570	4676	1531	182	5016.8	5065.1	1837.4	63.0
30-34	4426	4899	576	90	3904.4	4321.6	449.2	47.1
35-39	2676	2782	164	52	3290.8	3417.6	187.6	50.8
40-44	3628	3311	156	32	2954.6	2656.9	108.1	29.8
45-59	1754	1302	36	14	2365.8	1943.0	64.0	17.4
50-54	2301	2036	55	17	1743.6	1453.1	35.4	12.3
55-59	727	538	16	5				
60-64	1409	1159	35	17				

TABLE 3.4.4 :SMOOTHED POPULATION (TOTAL AND SINGLE) BY SEX - MANDERA 1979

Age Group	ENUMERATED Total Male	ENUMERATED Total Female	ENUMERATED Single Male	ENUMERATED Single Female	SMOOTHED Total Male	SMOOTHED Total Female	SMOOTHED Single Male	SMOOTHED Single Female
5-9	8176	7533	8176	7533				
10-14	7801	6858	7774	6794				
15-19	6735	6105	6624	4169	6756.0	6071.4	6482.6	4014.3
20-24	5265	4892	3917	755	5117.6	4772.1	3866.9	1116.3
25-29	3342	3375	1107	125	3678.3	3733.6	1262.1	22.5
30-34	3275	3675	450	72	2891.1	3145.3	649.7	34.9
35-39	1993	1988	120	29	2409.2	2498.1	142.3	33.1
40-44	2567	2515	107	23	2137.6	1998.1	77.2	19.6
45-49	1409	1107	44	15	1809.8	1646.8	56.3	17.8
50-54	1802	1932	41	21	1404.7	1391.1	31.25	16.9
55-59	617	522	12	13				
60-64	1082	1064	27	28				

Table 3.4.5 : SMOOTHED POPULATION (TOTAL AND SINGLE) BY SEX : GARISSA 1979

Age Group	ENUMERATED				SMOOTHED			
	Total		Single		Total		Single	
	Males	Females	Males	Females	Males	Females	Males	Females
5-9	10655	9813	10655	9813				
10-14	9998	8517	9956	8432				
15-19	9009	7198	8849	4877	8986.2	7046.4	8658.5	2744.6
20-24	7357	5252	5722	859	7251.8	5424.1	5632.8	1276.3
25-29	5076	4501	2011	208	5257.6	4523.6	2268.3	57.5
30-34	3883	4013	580	77	3700.3	3768.5	543.2	51.1
35-39	2590	2495	176	27	2895.8	2848.6	160.3	30.3
40-44	2933	2566	135	34	2565.3	2183.7	99.9	27.4
45-49	1756	1187	44	21	2067.8	1558.8	61.9	23.9
50-54	1786	1436	51	17	1494.4	1096.3	37.1	13.3
55-59	761	443	18	5				
60-64	1085	773	30	28				

TABLE 3.5.1 : POPULATION (TOTAL AND SINGLE) AND PROPORTIONS SINGLE WHEN UNKNOWN MARITAL STATUS IS IGNORED, CONSIDERED AS EVER MARRIED AND FOR SMOOTHED POPULATION : KENYA 1969

Age Group	SINGLE POPULATION		TOTAL POPULATION				PROPORTIONS SINGLE					
			Unknown Status Ignored		Uknown Status Considered		Unknown Status Ignored		Unknown Status Considered		Smoothed for Age Heaping	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
10-14	709820	657231	712973	667307	716911	671140	99.56	98.49	99.01	97.93		
15-19	535140	347171	555502	541318	559844	545664	96.33	64.13	95.59	63.62	94.15	63.86
20-24	309857	83179	427230	447579	431540	451269	72.53	18.58	71.80	18.43	71.06	22.51
25-29	111575	26207	344044	405740	347679	408948	32.43	6.46	32.09	6.41	35.36	4.53
30-34	37702	11378	276292	298329	279338	300365	13.65	3.81	13.50	3.79	12.97	3.25
35-39	22640	8336	247617	256379	250227	257974	9.14	3.25	9.05	3.23	7.90	3.01
40-44	13198	5572	194562	196651	196518	197869	6.78	2.83	6.72	2.82	6.85	2.85
45-49	10861	4638	165217	165953	166763	167023	6.57	2.79	6.51	2.78	6.23	2.74
50-54	7719	3729	132371	130586	133361	131478	5.83	2.86	5.79	2.84		
55-59	6336	3463			116680	111899		3.11	5.43	3.09		

TABLE 3.5.2 : POPULATION (TOTAL AND SINGLE) AND PROPORTIONS SINGLE WHEN UNKNOWN MARITAL STATUS IS IGNORED, CONSIDERED AS EVER MARRIED AND FOR SMOOTHED POPULATION : KENYA 1979

Age Group	SINGLE POPULATION		TOTAL POPULATION				PROPORTIONS SINGLE					
			Unknown Status Ignored		Unknown Status Considered		Unknown Status Ignored		Unknown Status Considered		Smoothed for Age Heaping	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
10-14	1046853	1013849	1049572	1021637	1050932	1023839	99.74	99.24	99.61	99.02		
15-19	831693	632238	852339	884295	854123	887722	97.58	71.50	97.37	71.22	95.50	70.02
20-24	461838	167965	639879	684186	641401	686003	72.18	24.55	72.00	24.48	71.95	30.30
25-29	165179	50103	513491	540306	514451	541251	32.17	9.27	32.11	9.26	34.86	7.10
30-34	52892	20199	404499	411940	405385	412691	13.08	4.90	13.05	4.89	12.74	4.08
35-39	24667	10922	289702	324839	290227	325367	8.51	3.36	8.50	3.36	7.07	3.13
40-44	15098	7262	260881	273173	261480	273702	5.79	2.66	6.16	2.65	5.75	2.58
45-49	11456	4920	218557	221598	218914	221965	5.24	2.22	5.23	2.22	5.08	2.24
50-54	8849	4072	182436	190563	182908	191022	4.85	2.14	4.84	2.13	4.76	2.06
55-59	5949	2689	140603	134304	140777	134534	4.23	2.00	4.23	2.00		

Adjustment for marital status using the two assumptions suggested above, reveals that no significant differences exists in the proportions single (Table 3.5:1-2). When compared to the proportions from the smoothed data, results indicate that, graduation of data is not necessary.

Graduated and corrected age-sex distribution of the total population (CBS, Kenya Census, 1979 Vol.11 pp.122) were used together with the single population (CBS, Kenya Census, 1979, Table 14) to compute proportions single. Inconsistencies occurred at the early (<15 years) and late (>50 years) ages. As such similar adjustments need to be made for the single population.

Attempt was made to redistribute the total population and marital status population by 5-year age groups where inconsistences occurred (10-year age groups). Sprague Multipliers were used for this purpose.

TABLE 3.6 : GRADUATED AND CORRECTED AGE-SEX DISTRIBUTION AND PROPORTION SINGLE FOR KENYA 1979

Age Group	Adjusted Census		Population Single		Proportions Single	
	Males	Females	Males	Females	Male	Female
5-9	1369382	1343156	1247091	1244749	.9107	.9267
10-14	1092215	1083199	1046853	1013849	.9585	.9360
15-19	821478	822981	831693	632238	1.0124	.7682
20-24	648691	661504	461838	167965	.7120	.2539
25-29	513464	537401	165179	50103	.3217	.0932
30-34	416230	439730	52892	20199	.1271	.0459
35-39	340408	360034	24667	10922	.0725	.0303
40-44	276497	294290	15098	7262	.0546	.0247
45-49	223394	245117	11456	4920	.0513	.0201
50-54	117894	192136	8849	4072	.0751	.0212

Source: CBS, Kenya Census, 1979, Vol.11, pp.122
CBS, Kenya Census, 1979, Table 14 (Unpublished)

3.5 SUMMARY

Given the diversity in Kenya's geographic economic, social and demographic features, it is reasonable to evaluate each region against the given settings of each event. As such, the data has been evaluated at national level for 1969 and 1979 censuses, and at regional level for 1979 census. This permits a more meaningful analysis of Nuptiality estimates. This chapter, gives a detailed evaluation of the quality of census data to be used, as well as attempts an adjustment for errors likely to affect marital distribution of the population (age digital preferences and marital status reporting). The corrected and graduated age-sex distribution for Kenya, 1979 is presented in Table 3.6.

Eight methods have been applied to evaluate the quality of census data. This is because each measures different types of error(s) and none is full proof for any particular type of error. However, only one (the Moving Average) has been applied in an attempt to graduate data for digital preference errors.

All the methods, point towards the observation that, errors due to, age terminal digit preference were the most prevalent. Age transferences were most obvious at age 15 (downward push by males to age

12 and 14, while females tended to push upwards to 16 and 18). All measures for age heaping indicate rough data at national level and for 26 regions of the 41 regions considered. 10 out of the 41, showed very rough data, while 7 indicated approximate data (Trans-Nzoia, Kakamega, Nandi (males), Bungoma (males), Machakos (females) and Siaya (females) for various sexes. Only females in Bungoma, tended to report their ages accurately (without digital preference). This could be due to better enumeration carried out in the region, relative to other districts. Females tended to prefer 0, 5 more than the males.

For errors of age transference, the national data were found to be inaccurate. Majority of the regions (25) registered highly inaccurate and the rest having inaccurate data. Therefore net census error was prevalent in all regions. The pattern of misreporting at age 15 for all regions, could be attributed to the legal minimum age at marriage, 16 years for females and 18 years for males (Laws of Kenya, Cap.150), the legal voting age (18 years) or to the average age at the end of primary level education (particularly for females). The urban sector seems to have had some influence on the sex-ratios and pattern of preference in regions such as Nairobi, Mombasa, Kisumu and Nakuru, greatly affecting the value of the UN Joint Score Index.

The proportions single for both sexes tend to follow the expected pattern (declines with age) except in later ages (Over 40) though in some instances earlier. The reason, may be that, those of the divorced and separated status tend to report themselves as of single status. This is because there was no probe question to ascertain the present (current) marital status. The males seem to marry relatively later in all regions and their rate of marriage is more spread over a wider age range than for females who also tend to marry earlier (figures 3.7 and 3.8 and 3.9.1 :1-41).

Age 'unknown' (Table 3.3) is relatively high for those of the married status (especially females) followed by single status (higher for males) then the 'unknown' marital status (again higher for males). Persons of the widowed and divorced statuses seem to have very low proportions of their ages 'unknown' (however, this does not imply that age was better reported). The reason for the more complete reporting, could be that enumerators did most of the estimation (particularly for Samburu, Narok, Turkana, Laikipia, Isiolo, Marsabit, Garissa, Mandera, Wajir, Lamu, Tana River and Nyandarua). In comparison, these regions, also exhibit the most ragged patterns for age terminal digit preference and have generally poor data quality. Note, must therefore be taken, as these proportions 'unknown', indicate the inaccuracy of age reporting in our basic data. For example, caution should be exercised when interpreting the results of age at marriage (timing) for females in Wajir, where 70.59 percent of those of the married status had 'unknown' age. Similarly Kilifi which had 61 percent. In general, districts with over 50 percent of the population (single and/or married) having 'unknown' age should be given cautious interpretations for timing and incidence of marriage. There seems to be relatively more complete reporting of marital status than of age (Table 3.3 - Column 1-2) for both sexes. The 'unknown' marital status is low (<.2) for most (33) districts, with Mombasa having the extreme (>.9). The relatively, higher proportions for Mombasa, Kwale, Narok, Taita Taveta, Kajiado, West Pokot, Nakuru, Kisumu, Narok, may be because of the definition of marriage in the census, or the prevailing customary norms on marriage (child marriages, lengthy dowry negotiations before complete marriage, etc.). There seems to be some correlation between marital status 'unknown' and age 'unknown' (Table 3.3 - Column 3-4).

The Moving Average Method used to smooth data for age heaping errors (Table 3.4 : 1-5) yields some significant results. This is evident in the differences in proportions single (enumerated and smoothed) for both 1969 and 1979 males and females (Table 3.5: 1-2). This suggests, that if the basic data were applied unsmoothed, serious errors of age heaping do affect the proportions single (the basic data for this study).

When the two assumptions (ignoring and considering the 'unknown' marital status) are applied (Table 3.5:1-2) it is noted that some differences in the proportions single does arise, though not significant. For 1969, both sexes, lower proportions are noted for 'unknown' status considered as ever married, and for 1979 females too. Comparing the enumerated and graduated proportions, note is taken that the smoothed proportions are generally lower, except for females aged 15-19 for both years and 20-24 (1969) while males aged 40-45 (1969) and 20-29 (1979). Apparently, these ages (over which the smoothed proportions are higher than those for enumerated) are those over which most marriages occur for both sexes.

Proportions single, using the corrected and graduated totals for 1979 (Table 3.6) revealed inconsistences. This calls for redistribution of the single population too, before the proportions are calculated.

CHAPTER FOUR

NUPTIALITY ESTIMATION AT NATIONAL LEVEL

4.0 INTRODUCTION

The evaluation of the pattern of error in the two successive decennial censuses, points towards the observation that, there seemed to be a systematic upward bias in the pattern of age reporting. This is evident from the proportions single in figures 3.7 and 3.8. As such, the pattern of age at marriage may not be distorted, though, the scale may vary (leading to higher estimates of age at first marriage than may be expected).

The study and importance of age at first marriage, has been demonstrated by various studies (Bogue, 1969; CBS, KFS - 1977/78; Karim S. M. , 1980; Florez and Goldman, 1980; Rindfuss et al 1983; Stycos J.M., 1983; Smith P.C. et al, 1983). The process of demographic change almost always takes place at different rates in a population. The mean age at marriage is a useful summary measure for describing the marriage performance of a population. There are several approaches for the calculation of mean age at marriage. The Chapter applies four alternative methods of estimating this marriage timing using the 1969 and 1979 census data. These methods also yield alternative estimates of the marriage incidence. The chapter meets the first part of the third objective.

The first method is due to John Hajnal (1953), the second, its modification using a decade Synthetic Cohort as suggested by S.N. Agarwala (1962) and a five-year synthetic cohort by Sadiq (1965). The third method, by Van de Walle (1968) depends on Stable Population Model. The fourth, is the Nuptiality Tables as applied by Malaker (1978). Since, the accuracy of each method depends upon the quality of data, an attempt is made to apply Hajnal's method using smoothed data. This follows the evidence from the evaluation that census data are subject to errors of misreporting of age as well as of marital status. Similarly, the methods are in themselves a refinement of each other in terms of basic data used and implicit assumptions. Substantive interpretations for small quantitative differences in timing and incidence is guarded against, given the degree and magnitude of errors in the censuses. Caution must be exercised in utilizing these estimates, as the full extent to which these errors operate is unknown (graduation of data is not full proof). Attempt has been made to explain the deviations in estimates using methodology, age and sex (demographic).

4.1 THE INCIDENCE OF NUPTIALITY AT NATIONAL LEVEL

This section presents an overview of Kenyan Nuptiality incidence, using 1969 and 1979 census returns of marital information. The incidence of marriage, is discussed over the two periods by age and sex. The basis of this, is the theoretical formulation that Nuptiality patterns have standard schedules (curves) and that what varies is the incidence (quantity) and timing (age at entry) by age and sex (Bogue, 1969; Kpedekpo, 1982). The incidence is measured as a compliment of the proportions single at age 50. A general classification tends to be:-

i) Over 95 percent ever-married - high incidence

ii) 90-95 percent ever-married - intermediate incidence.

iii) 90 percent ever-married - low incidence.

Age-wise, it is considered that the proportion single in the age-group 15-19 reflects early marriage incidence, those in 25-29, late marriage incidence (as most marriages tend to occur in the 20-24 age group) and those aged 50 and above reflect the incidence of non-marriage (Bogue 1969; Dixon, B.R. 1978; Malaker C.R., 1978; Reddy and Krishnan, 1977).

Considering estimates using SMAM, the incidence of Kenyan Nuptiality was very high (over 95 percent). The incidences for 1969, were 93.30 (males) and 97.17 (females) and for 1979, 94.96 (males) and 97.82 (females). The values for the smoothed data are slightly higher (no difference when rounded up). These proportions, indicate that the incidence of marriage has not only remained high, but increased slightly in 1979. The males seem to have registered a higher increase in marriage quantity over older age groups than females. However, the values 93.8 and 94.96 fall in the category of intermediate incidence. Therefore, male marriage quantities are generally lower than those for females. The gap seems to be closing up due to the higher increase for males than females during the intercensal period (1969-1979).

Age-wise, the incidence of early marriage is evident from both censuses for females (Table 4.2). For 1969 over 97 percent were single in the age-group 10-14 while males had over 95 percent single in the age-group 15-19. For 1979 the same observation is made with each sex having higher proportions single (Table 4.2 - Columns 3 and 4). This increase in proportions single over the 10-year period indicates that while age at marriage (timing) may have increased the incidence had increased too. That is, more were getting married by 1979, but at later ages than in 1969.

TABLE 4.1 PROPORTIONS SINGLE BY AGE AND SEX (IGNORING UNKNOWN MARITAL STATUS) KENYA 1969 AND 1979

Age Group	1969 Male (1)	1969 Female (2)	1979 Male (3)	1979 Female (4)
10-14	.9956	.9849	.9974	.9924
12-14	-	-	.9956	.9868
15-19	.9634	.6413	.9758	.7150
20-24	.7253	.1858	.7218	.2455
25-29	.3243	.0646	.3217	.0927
30-34	.1365	.0381	.1308	.0490
35-39	.0914	.0325	.0852	.0336
40-44	.0678	.0283	.0579	.0266
45-49	.0657	.0280	.0524	.0222
50-54	.0583	.0285	.0484	.0214

TABLE 4.2 PROPORTIONS SINGLE BY AGE AND SEX (UNKNOWN MARITAL STATUS CONSIDERED AS EVER MARRIED) KENYA 1969 AND 1979

Age Group	1969 Male (1)	1969 Female (2)	1979 Male (3)	1979 Female (4)
10-14	.9901	.9793	.9961	.9902
12-14	-	-	.9934	.9831
15-19	.9559	.6362	.9737	.7122
20-24	.7180	.1843	.7200	.2449
25-29	.3209	.0641	.3211	.0926
30-34	.1350	.0379	.1305	.0490
35-39	.0905	.0323	.0850	.0336
40-44	.0672	.0282	.0577	.0265
45-49	.0651	.0278	.0523	.0222
50-54	.0579	.0284	.0484	.0213

TABLE 4.3 PROPORTIONS SINGLE FOR SMOOTHED POPULATION BY AGE AND SEX : KENYA 1969 AND 1979

AGE GROUP	1969 MALES (1)	1969 FEMALES (2)	1979 MALES (3)	1979 FEMALES (4)
15-19	.9415	.6386	.9550	.7002
20-24	.7106	.2251	.7195	.3030
25-29	.3536	.0453	.3486	.0710
30-34	.1297	.0325	.1274	.0408
35-39	.0790	.0301	.0707	.0313
40-44	.0685	.0285	.0575	.0258
45-49	.0623	.0274	.0508	.0224
50-54	.0579	.0284	.0476	.0206

Late marriage, as measured by the relative proportions single in the age-group 25-29, shows lower proportions for 1969, indicating, that relatively more females and males are marrying later than in 1969. The late incidence, is obviously higher for the males (>32 percent) than females (6-9 percent).

Non marriage, as reflected by the proportions single at age 50 and above, seems to be a rare phenomena for both sexes. The females have relatively lower incidences of non-marriage (2 percent) as compared to males (5 percent) in 1979 and also 1969. The incidence of non-marriage seems to have declined over the intercensal period. This is, probably implied by the increase in marriage incidence as noted from the compliment of proportions single at age 50.

In general, the incidence (quantity) of marriage seems to have increased for both sexes indicating more universal marriage patterns. The incidence, however, seems to have declined over the younger age-groups 10-30 (males) and 10-40 (females) and increased slightly for older ages. Females tend to have a higher and earlier marriage incidence than their counterparts. Nonetheless, they registered a lower increase in marriage quantities than males over the 10-year period.

The estimates for incidence of marriage using all the four procedures are presented below. Those from Nuptiality Tables are derived from the l_x column.

TABLE 4.4: NUPTIALITY INCIDENCES BY METHOD OF ESTIMATION

	SMAM		SYNTHETIC COHORT		VAN DE WALLE'S		NUPTIALITY TABLES	
	1969	1979	5-YEAR	10-YEAR	1969	1979	GNT	NNT
Male	93.80	94.96	95.85	95.59	93.80	94.96	95.67	97.08
Fe-Male	97.17	97.82	96.79	96.54	97.17	97.82	95.77	97.27

There is no difference observed between SMAM estimates as by Hajnal and as by Van de Walle's Stable Population. Basically because the proportions single utilized are the same. However, some divergence occurs between these two and the Synthetic Cohort estimates on the one hand and the Nuptiality Tables estimates on the other. The SMAM estimates are the lowest for males, when compared to both the Synthetic and Nuptiality Table procedures. These are followed by those derived from the 10-year synthetic cohort then the GNT and 5-year synthetic cohort, and lastly the NNT (gives highest estimates for males). For females, the GNT gives the lowest, followed by 10-year, 5-year, NNT and then SMAM. The differences are implicit in the assumptions made when applying each method. Generally, the more refined method (NNT) seems to give relatively higher estimates of marriage incidence for both sexes. Also Figures 3.7 and 3.8 (chapter 3) give a graphic view of the incidence of marriage.

4.2 THE TIMING OF NUPTIALITY AT NATIONAL LEVEL

In this subsection, all the four alternative methods are applied to derive Nuptiality timing estimates, using the 1969 and 1979 census data. The timing is measured by the mean age of entry into first marriage. Bogue (1969) suggests a classification of marriage timing for the less developed countries as follows:-

i) less than 18 years - Early marriage timing
ii) 18-20 years - late marriage timing
iii) 20 and above - very late marriage timing.

In this study the classification adopted is based on the range of the derived SMAM estimates, and is therefore by no means a standard classification. However, this is compared to Bogue's (1969) and Malaker (1978) classifications. Estimates from each method are presented in the following subsections. The detailed procedures, follow those outlined in chapter two.

4.2.1 ESTIMATES DERIVED FROM HAJNAL'S (1953) SMAM

The assumptions data requirements and computational procedures are as discussed in chapter two.

The proportions single for each case are presented in Tables 4.1, 4.2, and 4.3, considering various cases for the calculation of the Singulate Mean Age at Marriage. These test, the reliability of data reported as well as assumptions on the age of entry into marital unions. Table 4.5 gives the summary of SMAM values for all the cases considered. An example of the computation is given below.

Calculation of SMAM (example)

1969 - Males (Case 1, 10-14 age-groups)

STEP 1 - proportions single for males 1969 are given in Table 4.1 - Column 1

STEP 2 - person years lived in the single state

RS_1 = sum of proportions single up to age 45-49 (exclude 50-54) multiplied by the age-group interval (5).

= 3.37 x 5 = 16.85

RS_2 = youngest age at marriage $+RS_1$

= 10+16.85 = 26.85

N.B. For 12-14 and 15-19, the youngest ages at marriage will be 12 and 15 respectively.

STEP 3 - estimation of proportion who ever marry (RM).

RN = proportion who never marry by age 50.

= average of the 45-49 and 50-54

= (.0657 +.0583)/2

= .062

RM = (1.00-.062) =.938

STEP 4 - Calculation of number of person-years lived by the proportion not marrying by age 50.

RS_3 = 50 (RN)

= 50(.062)

= 3.1

STEP 5 - Calculation of the Singulate Mean Age at Marriage (SMAM).

$$SMAM = \frac{(RS_2 - RS_3)}{RM}$$

i.e. average number of years spent in the single state by those who marry before age 50.

= (26.85-3.1)/.938

= 25.3198

SMAM = 25.32 years.

TABLE 4.5 : SUMMARY OF SMAM VALUES FOR VARIOUS CASES BY SEX - KENYA 1969 AND 1979

	CASE 1			CASE 11			
	UNKNOWNS IGNORED UNSMOOTHED			UNKNOWNS CONSIDERED UNSMOOTHED			SMOOTHED
Earliest Age at which → marriage occurs.	10-14	12-14	15-19	10-14	12-14	15-19	15-19
Sex and Year ↓	(1)	(2)	(3)	(4)	(5)	(6)	(7)
1969							
Males	25.32	N.A	25.34	25.19	N.A	25.24	25.24
Females	19.14	N.A	19.22	19.08	N.A	19.19	19.28
1979							
Males	25.48	25.48	25.49	25.44	25.44	25.47	25.44
Females	20.24	20.24	20.27	20.21	20.21	20.26	20.33

N.A. - Not applicable

From the above table differences between SMAM values are negligible when those of 'unknown' marital status are ignored or considered as ever-married though, the values for Case 11 are relatively lower for all the three age-groups for both years and sexes (a difference of about 1 month at most). The difference seems to be greater for males than females.

Comparing the values from unsmoothed and smoothed populations (columns 6 and 7), it is noted that, again the differences are negligible. Female values are relatively higher for the smoothed population while those for males are lower.

Comparison of the SMAM values using different age-groups as the earliest within which marriage occurs (10-14, 12-14,15-19), shows that differences are again negligible (for example, .1 years between the 10-14 and 15-19). However, for the 10-14 and 12-14 (1979) no differences are observed for both sexes. The 15-19 age-group, has marginally higher values in all instances. The females tend to exhibit slightly higher differences.

The SMAM values for 1969 and 1979 indicate that, over the 10-year period mean age at marriage increased for both sexes. The males registered lower increases than the females, though (as observed earlier) their incidence of marriage was much higher. For example in Case 11, the SMAM for males increased by .25, and 1.13 years for females over the 10-year period.

Considering the difference between the sexes, it is evident that, these are significant. Differences between the sexes, are larger for 1969 than 1979 (6 and 5 years respectively). The larger differences arise when the 10-14 age-group is considered (column 1 and 4) as opposed to the 15-19. Differences are also relatively larger for Case 1 than Case 11. The results show that, the gap between sexes, narrowed down (from 6 to 5 years) over the 10-year period.

The presentation of SMAM values for various cases, as well as for different starting age-groups, raises the question, as to which of these are appropriate for use in further analysis of Nuptiality dynamics. Since there are no observable differences between SMAM values for the two Cases, Case 11 values may be selected for use in further analysis. This is so, because the values are relatively lower and thus closer to the true or expected values. In addition, when misreporting of marital status is considered, it may be a more relevant assumption (Case 11). Thus, the assumption that marital status was correctly reported is not validated. The values for the 15-19 age-groups are relatively high when compared to those for 10-14, as such 10-14 is prefered for further use. However, at regional level, SMAM values for 12-14 (as starting age-group) will be applied as there is seemingly no difference with the 10-14. This, somehow validates the assumption that no first marriages occur before age 10. The assumption on stability of marriage patterns over the recent past, does not hold as there is a difference between the 1969 and 1979 values, though insignificant for males but very notable for females (over 1 year).

4.2.2 ESTIMATES DERIVED FROM SYNTHETIC COHORTS

Two cases have been considered, one due to Agarwala (1962) the 10-year Synthetic Cohort, and the other as suggested by Sadiq (1965) the 5-year Synthetic Cohort.

4.2.2.1 ESTIMATES FROM THE 10-YEAR SYNTHETIC COHORT

The proportions single are derived basing on the 10-year (1969-1979) intercensal period, marriage experiences.

i) Females

TABLE 4.6 : CONSTRUCTION OF FEMALE PROPORTIONS SINGLE FOR DECENNIAL SYNTHETIC COHORT USING 1969 AND 1979 KENYA CENSUSES

Age Group	Index i	Female Proportion Single from Census		Probabilities of Remaining Single	Proportions Single in the
		1969 (1)	1979 (2)	Decade Synthetic Cohort (3)	Decade Synthetic Cohort (4)
10-14	1	.9849	.9924	.9924	.9887
15-19	2	.6413	.7150	.7150	.6782
20-24	3	.1858	.2455	.2493	.2465
25-29	4	.0646	.0927	.1446	.0981
30-34	5	.0381	.0490	.2637	.0650
35-39	6	.0325	.0336	.0520	.0510
40-44	7	.0283	.0266	.6982	.0454
45-49	8	.0280	.0222	.6831	.0348
50-54	9	.0285	.0214	.7562	.0343

STEP 1 - proportions single are given in Table 4.6 Columns 1 and 2 for 1969 and 1979.

STEP 2 - The probabilities of remaining single in the decade.

$U(i,3) = U(i,2) / U(i,1)$

e.g. $U(4,3) = U(4,2) / U(4,1)$

$.1446 = .0927 / .6413$

The rest of the values are derived following the above format. Table 4.6 column 3. However for age-groups 10-14 and 15-19, the 1979 probabilities are assumed to apply [U(1,3) and U(2,3)].

STEP 3 - Application of probabilities to a female cohort of 1000.

i) $U(1,4) = .5[U(1,1) + U(1,2)]$

ii) $U(2,4) = .5[U(2,1) + U(2,2)]$

iii) $U(3,4) = U(1,4) \times U(3,3)$

The rest follow format (iii) - Column 5 Table 4.6.

STEP 4 - $RS_1 = (2.2077)5$

$= 11.0385$

$RS_2 = 10 + RS_1$

$= 21.0385$

STEP 5 - $RN = (.0348 + .0343)/2$

$= .0346$

$RM = .9654$

STEP 6 - $RS_3 = (.0346)50$

$= 1.73$

STEP 7 - SMAM

$= (21.0385-1.73)/.9654$

$= 19.3085/.9654$

$= 20.0005$

$= 20.00$ years

ii) Males

TABLE 4.7 : CONSTRUCTION OF MALE PROPORTIONS SINGLE FOR DECENNIAL SYNTHETIC COHORT USING 1969 AND 1979 KENYA CENSUSES

Age Group	Index i	Male Proportions Single From Census		Probabilities of Remaining Single	Proportions Single in the
		1969 (1)	1979 (2)	Decade Synthetic Cohort (3)	Decade Synthetic Cohort (4)
10-14	1	.9956	.9974	.9974	.9965
15-19	2	.9634	.9758	.9758	.9696
20-24	3	.7253	.7218	.7250	.7225
25-29	4	.3243	.3217	.3339	.3237
30-34	5	.1365	.1308	.1803	.1303
35-39	6	.0914	.0852	.2627	.0850
40-44	7	.0678	.0579	.4242	.0553
45-49	8	.0657	.0524	.5733	.0487
50-54	9	.0583	.0484	.7139	.0395

STEP 1 - proportions single for 1969 and 1979 are given in Table 4.7Columns 1 and 2.

STEP 2 - Calculate the probabilities of remaining single between 1969 and 1979 for persons aged x to x+10.

U(i,3) = U(i,2)/U(i,1)

e.g. U(5,3) = U(5,2)/U(5,1)

.1803 = .1308/.1365

The rest of the values follow above format (Table 4.7 Column 3) except U(1,3) and U(2,3) i.e. 10-14 and 15-19 age groups where the 1979 values are assumed to apply.

STEP 3 - Appply the probabilities to a male cohort of 1000.

i) U(1,4) = .5[U(1,1) + U(1,2)]

ii) U(2,4) = .5[U(2,1) + U(2,2)]

iii) U(3,4) = U(1,4) X U(3,3)

e.g. .7225 = .9965 X .7250

The rest follow format (iii) Column 5 Table 4.7.

STEP 4 - $RS_1 = (3.3316)5 = 16.6580$

$RS_2 = 10+RS_1 = 26.6580$

STEP 5 - RN =.0441

RM =.9559

STEP 6 - $RS_3 = 2.205$

STEP 7 - SMAM = (26.6580-2.205)/.9559

= 25.5811 = 25.58 years.

4.2.2.2 ESTIMATES FROM THE 5-YEAR SYNTHETIC COHORT

The proportions single for the cohorts are derived basing on the experience of 5-year marriage rates. Table 4.8 below gives these proportions Column 5 for females and Table 4.9 for males. Following the assumptions and computational procedure outlined in chapter two, the application is as follows.

TABLE 4.8 : CONSTRUCTION OF FEMALE PROPORTIONS SINGLE FOR A 5-YEAR SYNTHETIC COHORT USING THE 1969 AND 1979 KENYA CENSUS

Age Group	Index (i)	Female Proportions Single from Census 1969 (1)	1979 (2)	Estimated Proportions 1974 (3)	Probabilities of Single 1974 (4)	Proportions Single for 5-Year Cohort (5)
10-14	1	.9849	.9924	.9887	.9924	.9924
15-19	2	.6413	.7150	.6782	.7232	.7177
20-24	3	.1858	.2455	.2157	.3620	.2598
25-29	4	.0646	.0927	.0787	.4298	.1117
30-34	5	.0381	.0490	.0436	.6226	.0695
35-39	6	.0325	.0336	.0331	.7706	.0536
40-44	7	.0283	.0266	.0275	.8036	.0431
45-49	8	.0280	.0222	.0251	.8073	.0348
50-54	9	.0285	.0214	.0250	.8526	.0297

(i) Females

STEP 1 - The proportions single for 1969 and 1979 are already calculated as shown in Table 4.8 Columns 1 and 2.

STEP 2 - The proportions single between 1969 and 1979 are given by:

$${}_5U^F_x\ (1974) = [{}_5U^F_x(1969) + {}_5U^F_x(1979)]/2$$

i.e. $U(i,3)^F = [U(i,1)^F + U(i,2)^F]/2$

where F= Females

e.g. - $U(2,3) = [U(2,1) + U(2,2)]/2$

$.6782 = (.6413 + .7150)/2$

The rest of the values are given in Table 4.8 Column 3.

STEP 3 - Probabilities of remaining single between age x and x+5 for females in 1974 and 1979.

$U(4,4)1974 = U(4,2) / U(3,3)$

$= .0927 / .2157$

$= .4298$

The rest of the values are given in Table 4.6 Column 4.

STEP 4 - Proportion of single females in 1974-1979 cohort (apply probabilities in step 3 to a cohort of 1000 females).

$U(i,5) = U(i,4) \times U(i-1,5)$

$U(3,5) = U(3,4) \times U(2,5)$

$= .3620 \times .7177$

$= .2598$

For the age group 10-14, the same proportion in 1979 is taken to represent the 5-year synthetic cohort. However, the rest of the values follow the format above - Column 5 (Table 4.8)

STEP 5 - Calculate the person-years lived in the single state.

RS_1 = Sum in Column 5 (excluding 50-54) X 5

$= (2.2826)5$

$= 11.4130$

$RS_2 = 10 + RS_1$

$= 21.4130$

STEP 6 - Proportions who ever-marry

$RN = (.0348 + .0297)/2$

$= .0323$

$RM = .9677$

STEP 7 - Number of person-years lived by the proportions single by age 50.

$RS_3 = 50(RN) = 1.615$

STEP 8 - SMAM

$= (RS_2 - RS_3)/RM$

$= (21.4130 - 1.615)/.9677$

$= 19.7980/.9677$

$= 20.4588$

$= 20.46$ years.

TABLE 4.9 : CONSTRUCTION OF MALE PROPORTIONS SINGLE FOR A 5-YEAR SYNTHETIC COHORT USING THE 1969 AND 1979 KENYA CENSUSES

Age Group	Index (i)	Male Proportions Single From Census 1969 (1)	1979 (2)	Estimated Proportions 1974 (3)	Probabilities of Single 1974 (4)	Proportions Single For 5-Year Cohort (5)
10-14	1	.9956	.9974	.9965	.9974	.9974
15-19	2	.9634	.9758	.9696	.9792	.9767
20-24	3	.7253	.7218	.7236	.7444	.7271
25-29	4	.3243	.3217	.3230	.4446	.3233
30-34	5	.1365	.1308	.1337	.4050	.1309
35-39	6	.0914	.0852	.0883	.6372	.0834
40-44	7	.0678	.0579	.0629	.6557	.0547
45-49	8	.0657	.0524	.0591	.8331	.0456
50-54	9	.0583	.0484	.0534	.8190	.0373

ii) Males

STEP 1 - proportion single for 1969 and 1979 given in Table 4.9 Column 1 and 2.

STEP 2 - Proportions single between 1969 and 1979

$U(i,3)^m = [U(i,1)^m + U(i,2)^m]/2$

where m=Males

e.g. $U(2,3) = [U(2,1) + U(2,2)]/2$

$.9696 = (.9634 + .9758)/2$

The rest of the values are given in Column 3 Table 4.9.

STEP 3 - probabilities of remaining single for males aged x to x+5 in 1974 for the next 5-years (1979).

$U(i,4) = U(i,2)/U(i-1,3)$

e.g. $U(4,4) = U(4,2)/U(3,3)$

$.4446 = .3217 / .7236$

The rest are given in Column 4 Table 4.9.

STEP 4 - Apply the probabilities in Step 3 to a cohort of 1000 males giving the proportions single in 1974-1979 having the experience of 5-year marriage rates.

$$U(i,5) = U(i,4) \times U(i-1,5)$$

e.g. $U(2,5) = U(2,4) \times U(1,5)$

$.9767 = .9792 \times .9974.$

The age-group 10-14 assumes the 1979 proportions . The rest follow the above format Column 5 Table 4.9.

STEP 5 - Calculate person years lived in the single state.

$RS_1 = 3.3391 \times 5$

$= 16.6955$

$RS_2 = 10+RS_1$

$= 26.6955$

STEP 6 - Proportions who ever-marry

$RN = (.0456 + .0373)/2$

$= .0415$

$RM = (1-RN)$

$= .9585$

STEP 7 - Number of person-years lived by the proportions single by age 50.

$RS_3 = 50(RN)$

$= 2.075$

STEP 8 - SMAM

$= (RS_2 - RS_3)/RM$

$= (26.6955 - 2.075)/.9585$

$= 25.6865$

$= 25.69$ years.

Both the 5-year and 10-year Synthetic Cohort estimates of mean age at marriage are compared with those derived from SMAM method. See Table below.

TABLE 4.10 : ESTIMATES FROM SMAM AND SYNTHETIC COHORTS

Method / Sex	SMAM 1969	SMAM 1979	MEAN SMAM $\frac{(1969+1979)}{2}$	5-YEAR SYNTHETIC COHORT	10-YEAR SYNTHETIC COHORT
	(1)	(2)	(3)	(4)	(5)
Males	25.32	25.48	25.40	25.69	25.58
Females	19.14	20.24	19.69	20.46	20.00

The gap in mean age at marriage between the methods is not very large. The Synthetic Cohort method tends to overstate the timing (values are much higher for the 5-year Synthetic Cohort). For the females the gap between Mean SMAM (Column 3) and 10-year cohort is .31 years and between 5-year cohort it is .77 years. For males the gaps are .18

and .29 years respectively. The Synthetic Cohort estimates (10-year) seem to be closer to the SMAM's for 1979. This may be, because most marriages occured in the later half of the decade, hence the higher estimates yielded by the 5-year synthetic method. This observation, is further manifested by the lower female value from the 10-year cohort vis-a-vis the 1979 SMAM. This shows a decline in marriage rates for females especially over young age-groups as observed from the incidence. The decline seems to have been faster for females than males and greater changes were experienced over the later half of the decade.

4.2.3 ESTIMATES DERIVED FROM STABLE POPULATION

This is an alternative method to the two discussed earlier. The Van de Walle (1968) method is based on a Stable Population Model. The estimates are expected to be free of error and bias arising from age misreporting. Thus it may be considered superior to Hajnal's (1953) and Method 11, which do not consider the effect of error in the basic data. The robustness of the estimator due to Van de Walle has been proved by Trussell (1976). Below is the brief procedure for calculating the $\bar{a}$.

TABLE 4.11 : FEMALE STABLE POPULATION AGE DISTRIBUTION BASED ON REPORTED AGE DISTRIBUTION AND RATE OF GROWTH FOR KENYA 1969 AND 1979 CENSUS

AGE X	CUMULATED PROPORTIONS UP TO AGE X C(X)		C(X) AND PARAMETERS IN STABLE POPULATION WITH MORTALITY LEVELS AS INDICATED FROM NORTH MODEL		STABLE POPULATION AGE DISTRIBUTION	
			r= .0330	r= .039		
	1969 (1)	1979 (2)	1969 (3)	1979 (4)	1969 (5)	1979 (6)
1	.0331	.0366	.0440	.0450	.0440	.0450
5	.1916	.1841	.1956	.1990	.1516	.1540
10	.3552	.3453	.3490	.3564	.1534	.1574
15	.4768	.4779	.4756	.4850	.1266	.1286
20	.5766	.5929	.5733	.5907	.0977	.1057
25	.6590	.6818	.6603	.6773	.0870	.0866
30	.7343	.7519	.7322	.7479	.0719	.0706
35	.7891	.8054	.7915	.8054	.0593	.0575
40	.8376	.8476	.8401	.8519	.0486	.0465
45	.8746	.8836	.8799	.8894	.0398	.0375
50	.9046	.9119	.9121	.9195	.0322	.0255
55	.9301	.9366	.9381	.9435	.0260	.0240
CBR			.4902	.5173		
CDR			.1602	.1273		
r	.033					

i) Females

1969

STEP 1 - The Stable age distribution is given in Table 4.11 Column 5.

STEP 2 - The total proportions single and proportions never marrying by age 50 are given in Table 4.13 Column 6 and 8.

STEP 3 - $\int_{0}^{\bar{a}} C(x)da = \frac{S-s_u}{1-s_u}$

$= \frac{.5655-.0283}{1-.0283}$

$= .5529$

STEP 4 - Interpolating for .5529 to get $\bar{a}$.

.5529 lies between C(15) = .4756

and C(20) = .5733

(See Table 4.11 Column 3).

hence $\frac{.5529-.4756}{.5733-.4756} = \frac{.0773}{.0977} = .79$

$(1-.79) = .21$

Use .79 and .21 as weighting factors.

$.79(20) + .21(15) = 18.95$

$\bar{a} = 18.95$ years.

<u>1979</u>

STEP 1 - The stable age distribution is given in Table 4.11 Column 6.

STEP 2 - The total proportions single and never marrying at age 50 are given in Table 4.13 Column 6 and 8.

STEP 3 - $\int_{0}^{\bar{a}} C(x)\,da = \frac{S-s_u}{1-s_u}$

$= \frac{.5954-.0318}{1-.0218}$

$=.5864$

STEP 4 - Interpolating for .5864 to get $\bar{a}$

.5864 lies between C(15) =.4850

and C(20) =.5909

(See Table 4.11 Column 4).

$\frac{.5864-.4850}{.5907-.4850} = .96$

$1-.96 = .04$

Using .96 and .04 as weighting factors,

$.96(20) + .04(15) = 19.8$

$\bar{a} = 19.8$ years.

TABLE 4.12 : MALE STABLE POPULATION AGE DISTRIBUTION BASED ON REPORTED AGE DISTRIBUTION AND RATE OF GROWTH FOR KENYA 1969 AND 1979 CENSUSES

AGE X	CUMULATED PROPORTIONS UP TO AGE X C(X)		C(X) AND PARAMETERS IN THE STABLE POPULATION (NORTH MODEL)		STABLE POPULATION AGE DISTRIBUTION	
	1969 (1)	1979 (2)	r=.033 Level 13 1969 (3)	r=.039 Level 15 1979 (4)	1969 (5)	1979 (6)
1	.0331	.0369	.0451	.0463	.0451	.0463
5	.1930	.1870	.1957	.2030	.1506	.1567
10	.3602	.3509	.3552	.3626	.1695	.1596
15	.4906	.4891	.4834	.4929	.1282	.1303
20	.5928	.6014	.5896	.5996	.1062	.1067
25	.6708	.6857	.6702	.6867	.0806	.0871
30	.7346	.7533	.7421	.7572	.0719	.0705
35	.7858	.8066	.7999	.8142	.0578	.0570
40	.8318	.8448	.8493	.8601	.0494	.0459
45	.8672	.8792	.8885	.8970	.0392	.0369
50	.8987	.9080	.9199	.9263	.0314	.0300
55	.9229	.9320	.9447	.9492	.0248	.0229
CBR			.5005	.5363		
CDR			.1805	.1456		
r	.033	.039				

TABLE 4.13 : POPULATION TOTAL, SINGLE, PERCENT SINGLE, AND PROPORTIONS NEVER MARRYING BY SEX FOR 1969 AND 1979 KENYA CENSUSES

CENSUS	TOTAL POPULATION		TOTAL NUMBERS		PERCENT OF SINGLE		PROPORTIONS NEVER MARRYING BY AGE 50	
	Male (1)	Female (2)	Male (3)	Female (4)	Male (5)	Female (6)	Male (7)	Female (8)
1969	5482381	5460324	3744998	3087965	68.31	56.55	.062	.0283
1979	7607113	7719948	5317578	4596290	69.90	59.54	.0504	.0218

ii) Males - 1969

STEP 1 - The stable age distribution has been estimated and given in Table 4.12 - Column 5.

STEP 2 - The total proportion single and never-marrying by age 50 are given in Table Table 4.13 Columns 5 and 7.

STEP 3 - Calculate the mean age at marriage using:

$$\int_0^{\bar{a}} C(x)da = \frac{S-s_u}{1-s_u}$$

$$= \frac{.6831 - .062}{1-.062}$$

$$= .6622$$

STEP 4 - Interpolating for .6622 to get $\bar{a}$.

.6622 lies between C(20) = .5896

and C(25) = .6702

(See Table 4.12 Column 3).

$$\frac{.6622-.5896}{.6702-.5896} = \frac{.0726}{.0806} = .9$$

$$1-.9 = .1$$

Using .9 and .1 as weighting factors

$$.9(25) + .1(20) = 24.5$$

$\bar{a}$ =24.5 years.

<u>1979</u>

STEP 1 - The stable age distribution is given in Table 4.12 Column 6.

STEP 2 - The total proportions single and never marrying by age 50 are given in Table 4.13 Columns 5 and 7.

STEP 3 - Calculating the mean age at marriage

$$\int_0^{\bar{a}} C(x)da = \frac{S-s_u}{1-s_u}$$

$$= \frac{.6990-.0504}{1-.0504}$$

$$=.6830$$

STEP 4 - Interpolating for .6830 to get $\bar{a}$

.6830 lies between C(20) = .5996

and C(25) = .6867

(See Table 4.12 Column 4).

$$\frac{.6830-.5996}{.6867-.5996} = \frac{.0834}{.0871} =.96$$

$$1-.96 =.04$$

Using .96 and .04 as weighting factors

$$.96(25) + .04(20) =24.8$$

$$\bar{a} = 24.8 \text{ years.}$$

TABLE 4.14 : SUMMARY OF RESULTS FROM STABLE POPULATION METHOD

	1969	1979
Males	24.50	24.80
Females	18.95	19.80

The above results tend to underestimate the timing vis-a-vis the two methods applied (SMAM and Synthetic Cohort). This could be due to the assumption that the population is stable (evidence points to the contrary). Note should be taken that the estimates are dependent upon the choice of the stable population model. Different models may yield different (higher or lower) estimates than derived here .

4.2.4 ESTIMATES DERIVED FROM NUPTIALITY TABLES

In this sub-section, the results from both the GNT and NNT are presented. The construction of the tables is based on the single population for 1969 and 1979 censuses of Kenya. Differences in estimates between these two tables, may be entirely due to mortality effect, taken into account by the NNT.

4.2.4.1 CONSTRUCTION OF THE GNT FOR MALES AND FEMALES (1969-1979)

This table does not take into account the effect of mortality. The assumptions, data requirements and construction procedures are as outlined in chapter two.

Males and Females

TABLE 4.15 : PROPORTIONS SINGLE IN DECADE SYNTHETIC COHORT (1969-1979) BY AGE AND SEX: KENYA

Age Group / Sex	10-14	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54
Males	.9965	.9696	.7225	.3237	.1303	.0850	.0553	.0487	.0395
Females	.9887	.6782	.2465	.0981	.0650	.0510	.0454	.0348	.0343

STEP 1 - Calculate the male and female proportions single in the decade synthetic (1969-1979) cohort (Table 4.15).

STEP 2 - Convert the five-year age proportions into single year (exact age - S_x) using Sprague multipliers and linear interpolation. These values are given in Table 4.16.

TABLE 4.16 : PROPORTIONS SINGLE AT EXACT AGE x (S_x) BY SEX (USING SPRAGUE MULTIPLIERS AND LINEAR INTERPOLATION).

Age X \ Sex	Males	Females
10	.9429	1.0159
11	.9815	1.0249
12	1.0080	1.0097
13	1.0230	.9735
14	1.0270	.9195
15	1.0205	.8509
16	1.0041	.7710
17	.9784	.6831
18	.9439	.5902
19	.9011	.4958
20	.8529	.3984
21	.7995	.2967
22	.7378	.2168
23	.6559	.1712
24	.5638	.1493
25	.4728	.1275
26	.3798	.1095
27	.3022	.0958
28	.2494	.0838
29	.2143	.0739
30	.1792	.0689
31	.1465	.0682
32	.1220	.0670
33	.1064	.0631
34	.974	.0578
35	.0922	.0545
36	.0814	.0523
37	.0889	.0506
38	.0814	.0493
40	.0666	.0477
41	.0577	.0475
42	.0533	.0465
43	.0512	.0442
44	.0505	.0411
45	.0499	.0385
46	.0493	.0363
47	.0488	.0344
48	.0482	.0239
49	.0473	.0319
50	.0459	.0316
51	.0437	.0320
52	.0406	.0333
53	.0364	.0356
54	.0309	.0391

STEP 3 - Smooth the S_x using graphic graduation, read the values at 5-year interval i.e. S_{10}, S_{15}, S_{20} etc.

TABLE 4.17 : SMOOTHED PROPORTIONS SINGLE BY 5-YEAR AGE-GROUP AND SEX : KENYA

Age / Sex	S_{10}	S_{15}	S_{20}	S_{25}	S_{30}	S_{35}	S_{40}	S_{45}	S_{50}	S_{55}
Males	.9990	.9900	.8529	.4728	.1792	.0922	.0666	.0499	.0459	.0300
Females	.9980	.8509	.3884	.1275	.0689	.0545	.0477	.0385	.0316	.0285

STEP 4 - Calculate the probabilities of marriage for each sex using the formula:

$$_5n_x = \frac{S_x - S_{x+5}}{S_x} = 1 - \frac{S_{x+5}}{S_x}$$

STEP 5 - Smooth the $_5n_x$ by using freehand graph technique.
The smoothed values are given in Table 4.18.

TABLE 4.18 : SMOOTHED $_5n_x$ BY AGE AND SEX : KENYA

Age / Sex	$_5n_{10}$	$_5n_{15}$	$_5n_{20}$	$_5n_{25}$	$_5n_{30}$	$_5n_{35}$	$_5n_{40}$	$_5n_{45}$	$_5n_{50}$
Males	.0090	.1385	.4457	.6210	.5145	.2777	.1520	.0802	.0346
Fe-males	.1474	.5318	.6800	.4596	.2090	.1248	.0750	.0440	.0210

STEP 6 - Construct the GNT Columns (by Sex)

These are given in tables 4.19 and 4.20 for males and females.

Column

1 : X-age in years

2 : $_5n_x$ - Nuptiality rate $_5n_x = 1 - \frac{S_{x+5}}{S_x}$

3 : l_x - Number of single at age x

$l_{x+5} = l_x(1 - {_5n_x})$ $l_{10} = 100{,}000$ (radix of GNT)

4 : $_5N_x$ - Number of first marriages in the age group x to x+5

$_5N_x = l_x \cdot {_5n_x}$

5 : $_5L_x$ - Number of person-years lived as single in the age group x to x+5.

$$_5L_x = \frac{5}{2}(l_x + l_{x+5})$$

6 : T_x - Number of years lived as single above age x.

$$T_x = \sum_{i=\frac{x}{5}}^{\infty} {}_5L_{5i}$$

7 : e_x^o - Average number of years of single life remaining before marriage at age x.

$$e_x^o = T_x / l_x$$

TABLE 4.19 : GROSS NUPTIALITY TABLE FOR SINGLE MALES (1969-1979) KENYA

AGE x	$_5n_x$	l_x	$_5N_x$	$_5L_x$	T_x	e_x^o
(1)	(2)	(3)	(4)	(5)	(6)	(7)
0	-	100,000	-	500,000	2629336	26.29
5	-	100,000	-	500,000	2129336	21.29
10	.0090	100,000	900	497,750	1629336	16.29
15	.1385	99,100	13725	461,188	1131586	11.42
20	.4457	85,375	38052	331,745	670398	7.85
25	.6210	47,323	29388	163,145	338653	7.16
30	.5145	17,935	9228	66,605	175508	9.79
35	.2777	8,707	2418	37,490	108903	12.51
40	.2508	6,289	1577	27,503	71413	11.36
45	.0802	4,712	378	22,615	43910	9.32
50	.0346	4,334	150	21,295	21295	4.91
55		4,184				

TABLE 4.20 : GROSS NUPTIALITY TABLE FOR SINGLE FEMALES (1969-79) KENYA

AGE X (1)	$_5n_x$ (2)	l_x (3)	$_5N_x$ (4)	$_5L_x$ (5)	T_x (6)	e_x^o (7)
0	-	100,000	-	500,000	2079056	20.79
5	-	100,000	-	500,000	1579056	15.79
10	.1474	100,000	14740	463,150	1079056	10.79
15	.5318	85,260	45341	312,948	615906	7.22
20	.6800	39,919	27145	131,733	302958	7.59
25	.4596	12,774	5871	49,193	171225	13.40
30	.2090	6,903	1443	30,908	122032	17.68
35	.1248	5,460	681	25,598	91124	16.69
40	.0750	4,779	358	23,000	65526	13.71
45	.0440	4,421	195	21,618	42526	9.62
50	.0210	4,226	89	20,908	20908	4.95
55		4,137				

4.2.4.2 CONSTRUCTION OF THE NNT (1969-1979)

This table considers mortality impact on the single population. The assumptions are as presented in chapter two.

STEP 1-5 - These steps are similar as those carried out for GNT

STEP 6 - Compute the Age-Sex Specific death rates. These have been borrowed from Nyokangi (1984) for both sexes. (Given in Table 4.21 Column 1 and 2).

STEP 7 - Convert the ASDR into probabilities of death using $_5q_x = \frac{2n \; _nM_x}{2+n \; _nM_x}$

where $n = 5$

$$= \frac{10 \; _5M_x}{2+5 \; _5M_x}$$

(See Table 4.21 - Column 3 and 4).

STEP 8 - Convert the probabilities of death ($_5q_x$) into Net probabilities of death ($_5q'_x$).

$$_5q'_x = {_5q_x}\left(1-\frac{_5n_x}{2}\right)$$

STEP 9 - Convert the probabilities of marriage ($_5n_x$) into Net probabilities of marriage ($_5n'_x$).

$$_5n'_x = {_5n_x}\left(1-\frac{_5q_x}{2}\right)$$

(See Table 4.21 - Columns 7-10).

TABLE 4.21 : CONVERSION OF AGE-SEX SPECIFIC DEATH RATES AND GROSS AGE-SEX SPECIFIC MARRIAGE PROBABILITIES INTO NET PROBABILITIES OF DEATH AND MARRIAGE (STEPS 6-9).

AGE X	AGE-SEX SPECIFIC DEATH RATES $_5M_x$		AGE-SEX SPECIFIC PROBABILITIES OF DEATH		NET AGE-SEX SPECIFIC PROBABILITIES OF DEATH		GROSS AGE-SEX SPECIFIC PROBABILITIES OF MARRIAGE		NET AGE-SEX SPECIFIC PROBABILITIES OF MARRIAGE	
	MALES $_5M_x$	FEMALES	MALES $_5q_x$	FEMALES	MALES $_5q'_x$	FEMALES	MALES $_5n_x$	FEMALES	MALES $_5n'_x$	FEMALES
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
0	.02444	.03835	.11516	.17500	.11516	.17500	-	-	-	-
5	.00289	.00443	.01435	.00943	.01435	.00943	-	-	-	-
10	.00190	.00274	.00946	.01361	.00942	.01261	.0090	.1474	.00896	.14639
15	.00225	.00301	.01119	.01494	.01042	.01097	.1385	.5318	.13773	.52783
20	.00316	.00391	.01568	.01936	.01219	.01278	.4457	.6800	.44221	.67342
25	.00494	.00511	.02440	.02523	.01682	.01943	.6210	.4596	.61342	.45380
30	.00618	.00612	.03043	.03014	.02260	.02699	.5145	.2090	.50667	.20585
35	.00894	.00754	.04372	.03700	.03765	.03469	.2777	.1248	.27163	.12249
40	.01080	.00772	.05258	.03787	.04599	.03645	.2508	.0750	.24421	.07358
45	.01309	.01076	.06338	.05239	.06084	.05124	.0802	.0440	.07766	.04285
50	.01873	.01439	.08945	.06945	.08790	.06382	.0346	.0210	.03305	.02027
55	.02153	.01617	.10215	.07771	.10215	.07771				
60	.03761	.03457	.17189	.15910	.17189	.15910				
65	.03511	.03474	.16138	.15982	.16138	.15982				
70	.05580	.05188	.25632	.22962	.25632	.22962				
75	.13181	.14297	.49570	.52662	.49570	.52662				

STEP 10 - Construction of the NNT Columns.

These are presented in Tables 4.22 and 4.23.

Columns

1 : x - age in years

2 : ${}_5n'_x$ - Net probability that a single person at age x will marry during the next 5 years

$${}_5n'_x = {}_5n_x \left(1 - \frac{{}_5q_x}{2}\right)$$

3 : ${}_5q'_x$ - Net probability that a single person at age x will die during the next 5 years.

$${}_5q'_x = {}_5q_x \left(1 - \frac{{}_5n_x}{2}\right)$$

4 : l'_x - Number of single survivors at age x.

$$l'_{x+5} = [l'_x - {}_5N'_x - {}_5d'_x]$$

5 : ${}_5d'_x$ - Number of dying as single in the age group x to x+5.

$${}_5d'_x = {}_5d'_x = l'_x \cdot {}_5q'_x$$

6 : ${}_5N'_x$ - Number of first marriages in age group x to x+5

$${}_5N'_x = {}_5N'_x = l'_x \cdot {}_5n'_x$$

7 : ${}_5L'_x$ - Number of person years lived as single and alive on the age group x to x+5.

$${}_5L'_x = 5/2\ (l'_x + l'_{x+5})$$

8 : T'_x - Person years lived as single and alive above age x.

$$T'_x = \sum_{i=\frac{x}{5}}^{\infty} {}_5L'_{5i}$$

9 : $e^{o'}_x$ - Average number of years of single life remaining before marriage or death to a single person at age x.

$$e^{o'}_x = \frac{T'_x}{l'_x}$$

N.B.

The prime (') denotes functions of the NNT (double decrement).

TABLE 4.22 : NET NUPTIALITY TABLES FOR SINGLE MALES (1969 -1979) KENYA

Age X (1)	$_5n'_x$ (2)	$_5q'_x$ (3)	l'_x (4)	$_5d'_x$ (5)	$_5N'_x$ (6)	$_5L'_x$ (7)	T'_x (8)	$e^{o'}_x$ (9)
0	-	.1152	100000	11520	-	471200	2333134	23.33
5	-	.0144	88480	1274	-	439215	1861934	21.04
10	.0090	.0094	87206	820	785	432018	1422719	16.31
15	.1377	.0104	85601	890	11787	396313	990701	11.57
20	.4422	.0122	72924	890	32247	281778	594388	8.15
25	.6134	.0168	39787	668	24405	136253	312610	7.86
30	.5067	.0226	14714	333	7456	54098	176357	11.99
35	.2716	.0377	6925	261	1881	29270	122259	17.65
40	.2442	.0460	4783	220	1168	20445	92989	19.44
45	.0777	.0608	3395	206	264	15800	72544	21.37
50	.0331	.0879	2925	257	97	13740	56744	19.40
55	-	.1022	2571	263		12198	43004	16.40
60	-	.1719	2308	397		10548	30806	13.35
65	-	.1614	1911	308		8785	20258	10.60
70	-	.2563	1603	411		6988	11473	7.16
75	-	.4957	1192	591		4485	4485	3.76
80	-		602					

TABLE 4.23 : NET NUPTIALITY TABLES FOR SINGLE FEMALES (1969-1979) KENYA

Age X (1)	$_5n'_x$ (2)	$_5q'_x$ (3)	l'_x (4)	$_5d'_x$ (5)	$_5N'_x$ (6)	$_5L'_x$ (7)	T'_x (8)	$e^{o\prime}_x$ (9)
0	-	.1750	100000	17500	-	456250	1764697	17.65
5	-	.0094	82500	776	-	410560	1308447	15.86
10	.1464	.0126	81724	1030	11964	376135	897887	10.99
15	.5278	.0110	68730	756	26276	251070	521752	7.59
20	.6734	.0128	31698	406	21345	104113	270682	8.54
25	.4538	.0194	9947	193	4514	37968	166569	16.75
30	.2059	.0270	5240	141	1079	23150	128601	24.54
35	.1225	.0347	4020	139	492	18523	105451	26.23
40	.0736	.0365	3389	124	249	16013	86928	25.65
45	.0429	.0512	3016	154	129	14373	70915	23.51
50	.0203	.0638	2733	174	55	13093	56542	20.69
55		.0777	2504	195		12033	43449	17.35
60		.1591	2309	367		10628	31416	13.61
65		.1598	1942	310		8935	20788	10.70
70		.2296	1632	375		7223	11853	7.26
75		.5266	1257	662		4630	4630	3.68
80			595					

4.3 DISCUSSION OF ESTIMATES FROM THE FOUR ALTERNATIVE METHODS

The Nuptiality Table provides insight into marital unions (timing, quantity and composition), just as the Life Table provides for the analysis of population dynamics. The results provided by both the GNT and NNT, functions, are in themselves very important in the analysis and description of Nuptiality dynamics. When analysed alongside with those from the Life Table, these provide more useful and interesting results.

The probabilities of marriage in both Tables, indicate the Nuptiality rate of the Kenyan population for the period 1969-1979. The females, tend to experience higher Nuptiality rates than males up to age-group 20-24. Above which, male marriage rates exceed through age 50. The female probabilities are highest within the age-group 20-24, while males for 25-29. This observation correlates with the mean age at marriage as estimated from other methods. The pattern also confirms earlier observations that most females tend to marry at younger ages (below 20 years), while males marry at relatively later ages (over 25 years). Estimates of Nuptiality rates are higher for the GNT vis-a-vis the NNT. This is expected due to the mortality effect considered for the Net Nuptiality rates.

The number of first marriages, is another important result from the Tables (Column 4-GNT and 6-NNT). Females tend to marry mostly below age 20, thereafter, male marriages exceeed, with a higher frequency. The pattern applies to both Tables. This too, confirms observations made earlier on marriage incidences by age. That is, females exhibit earlier and sharper peaks (10-20) while male marriages are later and extend over a wider range. The lower values for NNT vis-a-vis the GNT may again, solely be due to mortality effect.

The number of years lived as single above age x (GNT) and its equivalent, the person years lived as single and alive above age x (NNT) are other significant results. This helps yield the percentage of single males and females above any given age (i.e. $T_x/T_o.100$). For both Tables the percentages single above some selected ages is given below (Table 4.24).

TABLE 4.24 : PERCENT SINGLE ABOVE AGE X

% / Ages	Males		Females	
	GNT	NNT	GNT	NNT
10	62.0	61.0	51.9	50.9
15	43.0	42.5	29.6	29.6
20	25.5	25.5	14.6	15.3
25	12.9	13.4	8.2	9.4
30	6.7	7.6	5.9	7.3
40	2.7	4.0	3.2	4.9
50	.8	2.4	1.0	3.2

The table above, indicates that marriage is universal (very low proportions single by age 50). For example, according to the GNT, about 93 percent of the single population has ever-married by age 30 (males) and 92 percent at age 25 (females). The NNT, gives 92 percent for males and 91 percent for females. By age 50 only .8 percent and 1.0 percent (GNT) of males and females have never-married (99.2 percent and 99 percent have ever-married). For the NNT (considers mortality), the never-married by age 50 is a little higher (2.4 percent for males and 3.2 percent for females). However, both point towards the observation that marriage is universal and the incidence is therefore high. This also, reveals that non-marriage or permanent celibacy is a very rare phenomena in

Kenya and that the nearly 3 percent (never-married) for NNT, may be attributed to data quality, in part, or as reflecting a true pattern of non-marriage. The decline in single population seems to be highest over ages 10-15 (females) and 15-25 (males). The differences in percent single between the NNT and GNT, is negligible except at age 50 and age 10 which may be due to the effect of mortality. However, differences between sexes is apparent, especially over the younger ages (<30) and with the greatest difference being at ages 15 and 20, then age 10.

Another very important feature of the Nuptiality Tables, is the average number of years of single life remaining before marriage (GNT) and death (NNT) to a single person and alive at age x. These are given in columns 7 (GNT) and 9 (NNT). It is, evident that, the males have more years to marriage than the females (at birth). That is, 26.29 years (males) and 20.79 (females) for the GNT and 23.33 years (males) and 17.65 (females) for the NNT. The differences arise from the effect of infant mortality accounted for by NNT. The males maintain, this advantage, up to age 25, thereafter their counterparts tend to stay longer in single status. The differences, thin out above age 35. The same observations apply to the NNT. It should be noted that the two tables give different values of e_x^o over all ages for both sexes except ages 5,10 and 15. At age 50, the expected years in single status before marriage is about 5 years for both sexes (GNT) and for NNT it is about 20 years (single survivors). This difference, is again largely due to mortality at age 50. From this observation, it may be argued that, since males stay longer in single status they eventually marry brides much younger than themselves. This also means, that there are relatively more females eligible for marriage than males at any given time, as such a tendency to marry more than one wife occurs (polygyny).

The $e^{o'}_x$ is least within the age range 25-29 (males) in both Tables - 7.16 (GNT) and 7.86 (NNT). For females it is least within 15-19 with 7.22 years (GNT) and 7.59 years (NNT). These age-ranges (lowest expected average years of single life before marriage and death) coincide with the age-ranges where the probability of marriage (Nuptiality rate) is at a maximum. This means that, the e_x^o happens to be at a minimum at ages when marriages are numerous (Tables 4.19; 4.20; 4.22; 4.23). The exact ages can not be determined as these are abridged tables.

In the analysis of Nuptiality, the $e_o^{o'}$ can be used in conjunction with the Life Table e_o to derive significant results. First, given the Life Table e_o (at birth) for males and females, the average years of life after marriage, can be derived, by subtracting the average years of life in single status from its life table equivalent. These values are presented in the Table below. Secondly, given the same Life Table values (e_o) the total lifetime spent as single can be derived, as a percentage of that in the Nuptiality Table (i.e. $\frac{e_o(NT).100}{e_o(LT)}$

NT = Nuptiality Table
LT = Life Table

The results are presented in the table below.

TABLE 4.25 : AVERAGE YEARS OF LIFE IN SINGLE STATUS, AFTER MARRIAGE AND LIFETIME SPENT AS SINGLE.

Sex	Average Years of Life at Birth (e_o)	Average Years of Life in Single Status Before Marriage	Average Years of Life in Single Status Before Marriage and Death	Average Years of Life After Marriage $[e_o^{(LT)} - e_o^{(NT)}]$		Lifetime Spent as Single $[e_o^{(NT)}/e_o^{(LT)}.100]$ %	
	(LT) * (1)	(GNT) (2)	(NNT) (3)	(GNT) (4)	(NNT) (5)	(GNT) (6)	(NNT) (7)
MALE	52.6	26.29	23.33	26.31	29.27	49.98	44.35
FEMALE	55.4	20.79	17.65	34.61	37.75	37.53	31.86

* The e_o are borrowed from 1974 Life Tables (CBS, Kenya Census 1979 Vol.11, pp.114, Table 7.18).

It is obvious from the table 4.25 above (columns 2 and 3) that, at birth males expect to spend more years (on average) of their life in single status before marriage (GNT) or death (NNT). The differences between the sexes, is about 6 years. The three year difference between the tables may be due to mortality effect, which the NNT accounts for.

It is also apparent that females have a much higher life expectancy than males after marriage (columns 4 and 5). With a difference of over 8 years between the sexes for both Tables. The higher estimates (of 3 years) by the NNT, may be due to mortality levels. Columns 6 and 7 indicate that grooms spend more of their lifetime as single than brides. For both tables, males spend 50 percent and 44 percent of their lifetime as single, while females spend only 38 percent and 32 percent respectively. This directly yields a gap of about 13 years between the grooms and brides. The difference between the tables (6 years) is again due to mortality.

Finally, the average age at marriage can be derived from the Nuptiality Table. Using both GNT and NNT, this is achieved by, adding the minimum age at marriage to the average expected years to marriage beyond that age. In our case, the minimum age at marriage has been taken to be 10 years (both sexes) and the e^{o}_{10} and $e^{o'}_{10}$ are 16.29 (GNT) and 16.31 (NNT) for males and 10.79 (GNT) and 10.99 (NNT) for females. Thus the SMAM estimates are given as 26.29 years (10+16.29) and 26.31 years for males and 20.79 and 20.99 years for females in GNT and NNT tables respectively. The values from both tables are very close, with the NNT estimates being a little higher (however, not statistically significant). These estimates are compared with those derived earlier using the three methods in Table 4.26.

The measures in the table are not wholly comparable, as some are cohort, others are period measures. The assumptions implicit in each give rise to the differences. These measures would yield similar values if there were no violent fluctuations of marriage patterns in the recent past. The table, indicates that for both sexes, the average age at marriage (timing) are lowest for Van de Walle's method, followed by SMAM then Synthetic Cohorts and finally Nuptiality Tables. The most refined method (NNT) seems to yield relatively higher estimates. The difference ranges from 24.65-26.31 (males) and 19.38-20.99 (females) from Van de Walle's estimator to the NNT.

TABLE 4.26 : COMPARISON OF NUPTIALITY TIMING BY METHOD OF ESTIMATION

METHOD AND / SEX	METHOD 1 HAJNAL's SMAM			METHOD 11 AGARWALA AND SADIQ SYNTHETIC COHORTS		METHOD 111 VAN DE WALLE STABLE POPULATION			METHOD 1V NUPTIALITY TABLES	
	1969 (1)	1979 (2)	MEAN (3)	5-YEAR (4)	10-YEAR (5)	1969 (6)	1979 (7)	MEAN (8)	GNT (9)	NNT (10)
MALES	25.32	25.48	25.40	25.69	25.58	24.50	24.80	24.65	26.29	26.31
FEMALES	19.14	20.24	19.69	20.46	20.00	18.95	19.80	19.38	20.79	20.99

The explanation for the higher values (close to 1979 SMAMS) from the Synthetic Cohorts and Nuptiality Tables is that they consider cohorts over which most marriages occurred during the later part (1974-79).

All methods, however, yield sex differences in mean age at marriage of over 5 years with females having the lower estimates. This is consistent with observations made earlier (females having earlier and sharper peaks than males). This also implies that, grooms marry brides who are on average 5 years younger.

The results point out that cohort measures tend to yield higher values than period measures. This may mean that during the past decade age at marriage has been rising. The Synthetic cohort method and the Nuptiality Tables confirm this observation. These increases seem to have been higher for females (over a year) than males for all methods. However, as noted earlier, the males experienced a higher incidence of marriage (quantity) than females over the 10-year period. This implies, that, over the inter-censal period, relatively more males were marrying but at more less the same ages, while females were getting married at relatively much later ages. This also, points towards the observation that the gap in age between spouses narrowed down over the period (1969 and 1979 estimates from SMAM and Stable Population), by about 1 year.

From the 1962 estimates of SMAM (1969 Census Vol.lV pp.78) for males (24.1) and females (18.4), there seems to have been a less rapid increase between 1962 and 1969 Census in female SMAMS (.74 years) than between 1969 and 1979 Censuses (1.1 year). For males, the increase seems to have been very small over the 1969 and 1979 intercensal period (.16 years) than the 1962-1969 period (1.22 years).

4.4 SUMMARY

In this chapter, attempt has been made to estimate Nuptiality timing and incidence using four alternative procedures. In so doing the third objective of our study has partly been fulfilled. The four methods yield varying estimates of Nuptiality timing and incidence. (Tables 4.4 and 4.26).

Generally, the marriage incidences were very high (over 95 percent) and seem to have increased for both sexes over the 10-year period from 93.80-94.96 percent for males and from 97.17-97.82 for females. These estimates using SMAM are similar to those from the Stable Population. However, they are higher for male estimates from Synthetic Cohorts and

Nuptiality Tables, but lower for females (Table 4.4). The more refined procedures seem to yield relatively higher estimates of marriage incidence for males. Age-wise, the incidence (Table 4.2) according to SMAM varied highly over younger age groups (<30 years) for both 1969 and 1979 censuses. It increased up to ages 30 for females and 40 for males, then declined thereafter over the intercensal period. The Nuptiality Tables (Tables 4.19-20 and 4:22-23) and the SMAM (Table 4.2) methods both indicate that the highest marriage rates occured between ages 15-20 for females and 25-30 for males. Generally the quantities show that marriage was universal for both sexes.

The timing, as estimated by the four methods also varied, from 24.65-26.31 years for males and 19.38-20.99 years for females. Van de Walle's method gave the lowest, followed by Hajnal's SMAM, then the Synthetic Cohorts and finally the Nuptiality Tables. Differences, also arose between the methods by sex. That is male estimates were relatively higher (by over 5 years) than for females. This gap by sex, seems to have reduced, over the decade, by .94 years according to SMAM and by .55 years by Van de Walle's estimator. The females tended to manifest a faster upward move in narrowing this gap. That is, the timing increased more for females than males, over the period, whereas the incidence increased more for males.

The Nuptiality Tables have greatly enhanced the estimation of the timing and incidence of marriage for Kenya. The data are rough and much effort has been made to smooth out irregularities particularly for marriage probabilities during the construction of the Tables. The methodology follows that by Malaker (1978). Problems arose in the application of the life table model to Nuptiality study. These were mainly due to the assumptions made, as such the results are not a full proof refinement in Nuptiality estimates for Kenya. The differences arising between the GNT and NNT and between the NNT and other methods, are mainly due to the mortality effect accounted for by the NNT. The higher estimates in timing (table 4.26) by the NNT, may thus be representative of the true changes in marriage patterns in Kenya (increasing), though the data quality must be taken into account.

The Nuptiality Tables, yield other important results apart from the incidence and timing. These include; probabilities of marriage and derived estimates such as lifetime spent in single status and after marriage. The probabilities point towards a general observation made from the other three methods, that females marriage form earlier (<20 years) and sharper peaks than males, which are later (>25 years) and extend over wider age ranges. These probabilities also confirm that marriage is universal for both sexes in Kenya. The never-married proportions at age 50 is 3 percent (NNT) and 4 percent (GNT). The percent who are single above age 50 (Table 4.24) are less than 1 percent for GNT and 3 percent for NNT. The probabilities are .0203 and .0331 for females and males (NNT) at age 50 and .0210 and .0346 for GNT. The e_x^o and $\dot{e}_x^{o'}$ tend to be minimal at ages when marriages are numerous and when the probability of marriage (Gross and Net) is at a maximum. However, the exact ages cannot be determined as the tables are abridged.

Another Nuptiality feature confirmed by the Nuptiality Table is that males in general expect to spend more of their percentage lifetime in single status (at birth) than females (with a difference of over 12 percent) - Table 4.25 Columns 6 and 7. The difference for average years in single status before marriage is 5 (Columns 2 and 3). As a result brides of marriagable ages tend to outnumber their counterparts, yielding polygamous unions and single parenthood among other effects. It is also interesting to note that brides expect to live longer (about 8 years) after marriage, than the grooms (Table 4.25 - Columns 4 and 5).

Note should be taken that the systematic upward bias in age at marriage reporting (as observed in chapter 3) has contributed, to the relatively high estimates in the timing and incidence of marriage.

CHAPTER FIVE

5. NUPTIALITY ESTIMATION AT REGIONAL LEVEL USING SMAM METHOD

5.0 Introduction

In this chapter, we examine the regional patterns of Kenya Nuptiality using Hajnal's method. This meets the second part of the third objective. Data for 1979 (at district level) are utilized as these are relatively recent and thus permit a nearer true picture of the prevailing pattern of Nuptiality in Kenya. As data for 1969 (on marital status) were not tabulated by region, an intercensal trend is not analysed at this level. Thus the choice of SMAM method rests on the data availability (being from one census). The alternative would be the Van de Walle method, but as seen from the application at national level, the estimates yielded were relatively low. This does not, however, imply that the estimates are poor, particularly if the pattern of age misreporting is considered. No attempt has been made to apply the SMAM using smoothed data, as no significant differences in results was noted, when these (smoothed) were used at national level and also for the three districts in North Eastern Province (Wajir, Mandera, Garissa) at regional level.

The spatial distribution of Nuptiality patterns is an important demographic aspect, in that, both the national and regional life of a nation is influenced by Nuptiality. For example, through the degree of labour force participation, school attendance, urban-rural residence and housing needs, among others. More so, it is important in the analysis of fertility dynamics at regional level (reproduction rates). Attempt is therefore made to establish regional patterns as follows; very early; early; late; very late marriages. The classification is based on the derived estimates, and is by no means standard but may be very useful in identifying regional variations in other population dynamics and towards identifying the general pattern for the nation. These patterns are also significant in the line of the 'district focus for rural development' strategy adopted in Kenya in 1984.

5.1 THE INCIDENCE OF NUPTIALITY AT REGIONAL LEVEL

It can be noted from table 5.3 that the incidence of marriage is very high for both sexes. That is over 95 percent were ever-married by age 50. This is true for most of the 41 districts, except Nyeri, Murang'a, Kirinyaga, Baringo, Elgeyo Marakwet, Kajiado, Tran Nzoia, Nandi, Narok, Laikipia, Nakuru, Turkana, Uasin Gishu, West Pokot, Kakamega, Siaya, Taita Taveta, Kwale, Lamu, Mombasa, Kitui, Machakos and

Isiolo (23) for males. These have an intermediate (normal) incidence. For females all, except Nairobi district, have a very high incidence which has a low incidence of marriage (89.96). The reason, could be due to its level of modernization as it is followed by Mombasa and/or education levels achieved by females.

Among the males the highest incidences were among those in Mandera, Wajir, Garissa, Tana River and Nairobi (over 96 percent). The lowest were for Kitui, Taita Taveta, Turkana, Nandi, Kajiado, and Elgeyo Marakwet (<93 percent). This could be attributed to cultural norms in the communities residing in these districts. For females, the highest incidences were recorded for Busia, Siaya, Kisii, Marsabit and Wajir (>99 percent ever-married). There seems to be no established regional pattern of marriage incidences by sex except for the North Eastern districts (Mandera, Garissa and Wajir) which had very high incidences for both sexes. However, all the regions in Western Kenya (Nyanza and Western Provinces) recorded very high incidences for females and also for males (except Kakamega and Siaya). The deviation may partly arise from data quality (particularly for Siaya, where under-reporting of age by adult males was quite prevalent).

In general, the given incidence values, reveal that marriage is universal in Kenya, particularly among the females (all had less than 5 percent never-married, except Nairobi region). Age-wise, it can be noted that (Tables 5.1 and 2) the highest incidences are over ages 15-20 (females) and 25-29 (males). While females tend to have an earlier incidence, males have a later incidence. Non-marriage is a rare phenomena among both sexes, though male proportions are relatively higher than those for females (Tables 5.1-2). The pattern observed at national level, applies, as females tend to have an earlier peak (by age 20 over 70 percent have married except Nairobi, Nyeri, Kiambu, Murang'a, Kirinyaga, Turkana, Taita Taveta, Embu, Meru and Machakos). This could be attributed to the educational standards of women in these regions, except for Turkana, where cultural norms may give more plausible explanations. Males have, broader and later peaks (Table 5.2). That is, over 60 percent have married by age 25, except for Nyeri, Samburu, Turkana and Marsabit.

TABLE 5.1 :FEMALE PROPORTIONS SINGLE BY 5-YEAR AGE-GROUPS AND REGION - KENYA 1979

Age Group / Region	12-14	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54
Nairobi	.9914	.7366	.4047	.2194	.1481	.1125	.1101	.0962	.0971
Nyeri	.9966	.8957	.4080	.1710	.1079	.0744	.0560	.0468	.0391
Kiambu	.9960	.8419	.3760	.1582	.0918	.0688	.0568	.0498	.0340
Murang'a	.9947	.8538	.3115	.0978	.0549	.0339	.0278	.0245	.0195
Kirinyaga	.9945	.8426	.3130	.1006	.0525	.0382	.0309	.0243	.0223
Nyandarua	.9947	.8251	.2766	.1074	.0589	.0443	.0323	.0303	.0267
Baringo	.9896	.7108	.1999	.0598	.0331	.0213	.0188	.0185	.0215
Elgeyo Marakwet	.9952	.7573	.1915	.0557	.0297	.0303	.0190	.0217	.0221
Kajiado	.9614	.5076	.1746	.0899	.0523	.0430	.0355	.0292	.0422
Kericho	.9888	.6263	.1946	.0700	.0329	.0241	.0168	.0135	.0167
Samburu	.9665	.6080	.1874	.0750	.0416	.0320	.0234	.0233	.0216
Trans Nzoia	.9894	.6596	.1711	.0602	.0318	.0228	.0191	.0200	.0265
Nandi	.9929	.4039	.1730	.0615	.0311	.0238	.0223	.0162	.0174
Narok	.9727	.4383	.1230	.0619	.0427	.0335	.0372	.0298	.0366
Laikipia	.9895	.7277	.2471	.1087	.0734	.0553	.0472	.0408	.0348
Nakuru	.9905	.7330	.2733	.1273	.0774	.0491	.0397	.0357	.0322
Turkana	.9795	.7918	.3659	.1454	.0625	.0458	.0373	.0241	.0360
Uasin Gishu	.9916	.7058	.2207	.0850	.0511	.0338	.0311	.0282	.0290
West Pokot	.9814	.6234	.1441	.0518	.0304	.0215	.0219	.0191	.0144
Kakamega	.9919	.7405	.2290	.0779	.0395	.0249	.0206	.0163	.0185
Bungoma	.9914	.6956	.1701	.0499	.0274	.0165	.0155	.0134	.0167
Busia	.9883	.6362	.1288	.0350	.0177	.0141	.0109	.0103	.0092
South Nyanza	.9712	.5382	.1392	.0490	.0252	.0195	.0137	.0098	.0119
Siaya	.9877	.6734	.1463	.0421	.0192	.0130	.0124	.0102	.0091
Kisumu	.9829	.5944	.1604	.0501	.0273	.0184	.0152	.0139	.0112
Kisii	.9925	.7306	.2416	.0648	.0275	.0159	.0107	.0082	.0081
Kilifi	.8882	.4085	.1024	.0458	.0238	.0195	.0158	.0163	.0142
Taita Taveta	.9919	.8132	.3547	.1461	.0727	.0504	.0393	.0254	.0276
Tana River	.9958	.6152	.1171	.0364	.0205	.0151	.0134	.0122	.0192
Kwale	.9600	.5129	.1235	.0488	.0289	.0221	.0187	.0228	.0217
Mombasa	.9827	.6378	.2815	.1319	.0777	.0586	.0586	.0470	.0475
Lamu	.9814	.6796	.1905	.0633	.0328	.0233	.0295	.0188	.0282
Kitui	.9855	.7305	.2031	.0644	.0305	.0208	.0194	.0179	.0157
Machakos	.9937	.8543	.3202	.0998	.0435	.0257	.0197	.0156	.0135
Meru	.9926	.8032	.3285	.0817	.0470	.0299	.0242	.0230	.0276
Embu	.9965	.8616	.3470	.1080	.0532	.0353	.0255	.0250	.0227
Isiolo	.9773	.6118	.1647	.0713	.0300	.0225	.0211	.0250	.0131
Marsabit	.9746	.6687	.1661	.0446	.0197	.0118	.0150	.0068	.0079
Mandera	.9854	.6837	.1546	.0371	.0198	.0146	.0091	.0136	.0109
Garissa	.9854	.6789	.1639	.0462	.0193	.0108	.0133	.0177	.0119
Wajir	.9870	.6672	.1651	.0390	.0184	.0187	.0097	.0108	.0084

Source: CBS, Kenya Census, 1979 Table 14.

TABLE 5.2 : MALE PROPORTIONS SINGLE BY 5-YEAR AGE GROUPS AND REGION - KENYA 1979

Region / Age-Group	12-14	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54
Nairobi	.9949	.9668	.6948	.3397	.1055	.0558	.0377	.0296	.0336
Nyeri	.9973	.9910	.8370	.4154	.1715	.1138	.0769	.0665	.0644
Kiambu	.9975	.9868	.7641	.3395	.1275	.0804	.0511	.0498	.0489
Murang'a	.9970	.9880	.7713	.3503	.1446	.0913	.0625	.0548	.0513
Kirinyaga	.9966	.9828	.7330	.3243	.1480	.0903	.0696	.0605	.0563
Nyandarua	.9974	.9886	.7678	.3347	.1268	.0783	.0465	.0388	.0429
Baringo	.9941	.9772	.7070	.3195	.1425	.1024	.0715	.0618	.0428
Elgeyo Marakwet	.9951	.9847	.6594	.2680	.1230	.1087	.0850	.0727	.0698
Kajiado	.9938	.9738	.7533	.3479	.1732	.1188	.0888	.0782	.0805
Kericho	.9954	.9666	.6514	.2501	.0863	.0587	.0479	.0385	.0415
Samburu	.9948	.9884	.8864	.5369	.1718	.1002	.0711	.0519	.0367
Trans Nzoia	.9950	.9744	.6553	.2741	.1237	.0851	.0718	.0541	.0560
Nandi	.9938	.9792	.6927	.2970	.1350	.1033	.0804	.0791	.0729
Narok	.9929	.9623	.6676	.3288	.1679	.1217	.0906	.0700	.0637
Laikipia	.9952	.9799	.7454	.3496	.1433	.0840	.0489	.0541	.0506
Nakuru	.9950	.9777	.7183	.3020	.1265	.0854	.0572	.0543	.0486
Turkana	.9935	.9811	.8450	.5749	.3023	.1853	.1204	.0850	.0635
Uasin Gishu	.9952	.9747	.6926	.2931	.1220	.0856	.0682	.0634	.0665
West Pokot	.9935	.9765	.7066	.3245	.1666	.1126	.0859	.0707	.0470
Kakamega	.9961	.9795	.7086	.2789	.1170	.0898	.0662	.0555	.0531
Bungoma	.9968	.9808	.6859	.2526	.0958	.0709	.0504	.0433	.0391
Busia	.9954	.9733	.6373	.2385	.1029	.0723	.0553	.0453	.0342
South Nyanza	.9940	.9709	.7287	.3239	.1220	.0800	.0546	.0414	.0342
Siaya	.9960	.9838	.7732	.3431	.1485	.1045	.0776	.0545	.0414
Kisumu	.9932	.9751	.7039	.2878	.1084	.0730	.0547	.0445	.0373
Kisii	.9972	.9607	.6250	.2348	.0947	.0624	.0465	.0390	.0434
Kilifi	.9918	.9303	.4446	.2842	.1295	.0840	.0614	.0538	.0458
Taita Taveta	.9960	.9870	.7850	.3992	.1925	.1360	.1064	.0881	.0706
Tana River	.9945	.9737	.7082	.3042	.1130	.0611	.0395	.0312	.0312
Kwale	.9926	.9447	.6252	.2963	.1563	.0975	.0821	.0646	.0585
Mombasa	.9949	.9247	.7385	.3603	.1392	.0787	.0589	.0584	.0544
Lamu	.9949	.9750	.6880	.3136	.1505	.1028	.0830	.0605	.0846
Kitui	.9965	.9791	.7319	.3305	.1648	.1135	.0924	.0845	.0748
Machakos	.9962	.9870	.7775	.3423	.1503	.1074	.0757	.0674	.0536
Meru	.9957	.9777	.7275	.3398	.1364	.0787	.0601	.0491	.0430
Embu	.9972	.9868	.7458	.2980	.1197	.0715	.0479	.0433	.0417
Isiolo	.9966	.9764	.7465	.3675	.1589	.1045	.0644	.0515	.0520
Marsabit	.9958	.9889	.8708	.5551	.2960	.1295	.0981	.0436	.0416
Mandera	.9956	.9838	.7444	.3314	.1374	.0602	.0417	.0312	.0228
Garissa	.9941	.9838	.7786	.3963	.1496	.0680	.0460	.0251	.0286
Wajir	.9935	.9792	.7283	.3352	.1304	.0614	.0430	.0205	.0240

Source: CBS, Kenya Census 1979 Table 14

TABLE 5.3 : INCIDENCES OF MARRIAGE BY SEX AND REGION KENYA 1979

	Region	Males	Females
1.	Nairobi	96.53	89.96
2.	Mombasa	94.36	95.30
3.	Nyeri	93.45	95.70
4.	Kiambu	95.06	95.81
5.	Laikipia	94.76	96.22
6.	Narok	93.31	96.32
7.	Turkana	92.58	96.37
8.	Nakuru	94.85	96.37
9.	Taita Taveta	92.06	96.94
10.	Uasin Gishu	93.33	97.04
11.	Kajiado	92.06	97.08
12.	Nyandarua	95.62	97.15
13.	Embu	95.75	97.61
14.	Kirinyaga	94.60	97.67
15.	Meru	95.39	97.70
16.	Samburu	95.57	97.75
17.	Murang'a	94.69	97.80
18.	Elgeyo Marakwet	92.87	97.83
19.	Trans Nzoia	94.00	98.00
20.	Kakamega	94.57	98.09
21.	Lamu	93.95	98.12
22.	Nandi	92.40	98.13
23.	Baringo	94.77	98.15
24.	Kwale	93.84	98.20
25.	Kitui	92.03	98.32
26.	Kericho	95.69	98.32
27.	West Pokot	94.11	98.32
28.	Bungoma	95.88	98.36
29.	Isiolo	94.49	98.49
30.	Machakos	93.95	98.52
31.	Kilifi	95.02	98.54
32.	Garissa	96.70	98.70
33.	Kisumu	95.91	98.74
34.	South Nyanza	96.22	98.76
35.	Mandera	97.30	98.77
36.	Tana River	96.88	98.78
37.	Busia	96.02	99.02
38.	Siaya	94.95	99.03
39.	Wajir	97.12	99.12
40.	Kisii	95.58	99.18
41.	Marsabit	95.74	99.32

Figure 3.9:1-41 (chapter 3) give further insight into the marriage incidence age-wise among the regions, both by age and sex. The schedules (curves) tend to have a general shape, but are varied for age and sex over the regions. The female curves are more steep and have earlier declines in proportions single than for males. The curves also depict universal marriage for both sexes. Variations in later ages (above 35) may be attributed to the errors of age mis-statement and of marital status mis-classification (those of the separated/divorced statuses are classified as single).

5.2 THE TIMING OF NUPTIALITY AT REGIONAL LEVEL

Only one technique (Hajnal's) has been applied to the 1979 data at regional level to derive estimates for Nuptiality timing for the 41 districts. The assumptions, data requirements, and computational procedures are as outlined in chapter two. The SMAM values are presented in Tables 5.4 and 5.5 for all the 41 districts females and males (in descending order).

From the Tables, it is evident that, marriage timing highly varies over the 41 regions in Kenya. The female SMAM ranges from 17.34 years (Kilifi) to

TABLE 5.4 : FEMALE SMAMS BY REGION - KENYA 1979

	DISTRICT	FEMALE SMAM
1.	Kilifi	17.34
2.	Narok	17.59
3.	Nandi	18.06
4.	Kwale	18.17
5.	South Nyanza	18.51
6.	Kajiado	18.63
7.	Tana River	18.72
8.	Busia	18.91
9.	Kisumu	18.96
10.	West Pokot	18.98
11.	Isiolo	19.14
12.	Samburu	19.16
13.	Mandera	19.20
14.	Siaya	19.25
15.	Trans Nzoia	19.29
16.	Garissa	19.31
17.	Wajir	19.33
18.	Marsabit	19.35
19.	Kericho	19.36
20.	Bungoma	19.43
21.	Lamu	19.56
22.	Baringo	19.72
23.	Uasin Gishu	19.87
24.	Kitui	19.88
25.	Elgeyo Marakwet	19.96
26.	Mombasa	19.97
27.	Kakamega	20.17
28.	Kisii	20.23
29.	Laikipia	20.35
30.	Nakuru	20.65
31.	Meru	21.00
32.	Nyandarua	21.03
33.	Nairobi	21.26
34.	Turkana	21.32
35.	Kirinyaga	21.33
36.	Murang'a	21.38
37.	Machakos	21.45
38.	Embu	21.59
39.	Taita Taveta	21.66
40.	Kiambu	22.03
41.	Nyeri	22.61

Mean 19.85

σ_n 1.226

TABLE 5.5 : MALE SMAMS BY REGION - KENYA 1979

	DISTRICT	MALE SMAMS
1.	Kilifi	23.60
2.	Kisii	24.20
3.	Kericho	24.41
4.	Busia	24.55
5.	Elgeyo Marakwet	24.67
6.	Trans Nzoia	24.71
7.	Kwale	24.76
8.	Uasin Gishu	24.82
9.	Bungoma	24.85
10.	Nandi	24.91
11.	Kakamega	25.12
12.	Kisumu	25.20
13.	Narok	25.32
14.	Nakuru	25.32
15.	Lamu	25.36
16.	Tana River	25.37
17.	Embu	25.52
18.	Kitui	25.52
19.	Nairobi	25.53
20.	Mombasa	25.59
21.	Kirinyaga	25.61
22.	Baringo	25.62
23.	South Nyanza	25.67
24.	Meru	25.71
25.	Kajiado	25.72
26.	West Pokot	25.77
27.	Kiambu	25.79
28.	Wajir	25.84
29.	Laikipia	25.85
30.	Nyandarua	25.87
31.	Mandera	25.99
32.	Murang'a	26.03
33.	Isiolo	26.05
34.	Machakos	26.08
35.	Siaya	26.24
36.	Garissa	26.50
37.	Taita Taveta	26.60
38.	Nyeri	27.19
39.	Samburu	28.05
40.	Turkana	28.88
41.	Marsabit	29.00

Mean 25.70

σ_n 1.070

22.61 years (Nyeri) - a difference of 5.27 years (Table 5.4). That for males ranges from 23.60 years (Kilifi) to 29.00 Years (Marsabit) with a difference of 5.40 years (Table 5.5). Thus Kilifi district occupies the lowest position with regard to this Index for both sexes. For females, 10 regions, had SMAM values ranging below 19 years (Kilifi, Narok, Nandi, Kwale, South Nyanza, Kajiado, Tana River, Busia, Kisumu and West Pokot). 11 of them had values ranging over 20 years (Meru, Nyandarua, Nairobi, Turkana, Kirinyaga, Murang'a, Machakos, Embu, Taita Taveta, Kiambu and Nyeri). This means that the rest of the regions - about half (20) had values ranging between 19-20 years. This confirms the observation made earlier, that females tend to have a relatively early incidence.

For the males (Table 5.5), the lowest 10 regions had mean age at marriage ranging below 25 years (Kilifi, Kisii, Kericho, Busia, Elgeyo Marakwet, Trans Nzoia, Kwale, Uasin Gishu, Bungoma and Nandi). Another set of 10 had SMAM values ranging over 26 years (Murang'a, Isiolo, Machakos, Siaya, Garissa, Taita Taveta, Nyeri, Samburu, Turkana and Marsabit). Again about half (21) of the 41 districts had values ranging between 25-26 years.

Tables 5.4 and 5.5 also give the mean and standard deviations for SMAM value by sex. The standard deviations are 1.07 (males) and 1.226 (females). This shows that the variability was similar with females exhibiting slightly higher than the males. The mean values for males for the 41 districts was 25.7 years. This is close to the national SMAM value of 25.44 years (slightly higher by .26 years). For females, the mean for all the 41 regions was 19.85 years. This too is close to the SMAM value obtained at national level of 20.21, the difference being .36 years.

The gaps between the sexes in SMAM values (Table 5.6) are varied and high (the mean difference being 5.85 years). The differences range from 3.76 years (Kiambu) to 9.65 years (Marsabit). The mean difference confirms earlier observations from incidences and timings at national level. That is the males tend to marry brides who are on average 5.85 years younger (about six years).

TABLE 5.6 : DIFFERENCES IN SMAM BETWEEN SEXES BY REGION - KENYA 1979

	DISTRICTS	DIFFERENCES IN YEARS
1.	Kiambu	3.76
2.	Embu	3.93
3.	Kisii	3.97
4.	Nairobi	4.27
5.	Kirinyaga	4.28
6.	Nyeri	4.58
7.	Machakos	4.63
8.	Murang'a	4.65
9.	Nakuru	4.67
10.	Elgeyo Marakwet	4.71
11.	Meru	4.71
12.	Nyandarua	4.84
13.	Taita Taveta	4.94
14.	Kakamega	4.95
15.	Uasin Gishu	4.95
16.	Kericho	5.05
17.	Bungoma	5.42
18.	Trans Nzoia	5.42
19.	Laikipia	5.50
20.	Mombasa	5.62
21.	Busia	5.64
22.	Kitui	5.64
23.	Lamu	5.80
24.	Baringo	5.90
25.	Kisumu	6.24
26.	Kilifi	6.26
27.	Wajir	6.51
28.	Kwale	6.59
29.	Tana River	6.65
30.	West Pokot	6.79
31.	Mandera	6.79
32.	Nandi	6.85
33.	Isiolo	6.91
34.	Siaya	6.99
35.	Kajiado	7.09
36.	South Nyanza	7.16
37.	Garissa	7.19
38.	Turkana	7.56
39.	Narok	7.73
40.	Samburu	8.89
41.	Marsabit	9.65

Mean 5.85

As mentioned earlier, several factors may explain Nuptiality differentials in timing at regional level. With reference to Kenya, such studies as the KFS, 1977/78, among others have demonstrated clearly that the timing varies by education, region of residence, place of residence, religion, ethnicity, work patterns, and husband/wife occupation. The 1969, Kenya Census, analytical report (CBS, Kenya Census, 1969 Vol.lV Table 8.2) too points out the importance of ethnicity factor in determining Nuptiality variation in timing. Both studies, agree that the Mijikenda ethnic group (females) had among the lowest SMAM values as opposed to the Kikuyu females, who had the highest. The value for the survey are lower (probably due to sampling). The 1979 Census returns on majority of tribe by district (Mwobobia, 1982 pp.157 - Appendix A) indicate that the Mijikenda are the majority tribe in Kilifi and Kwale. Consequently, in this study, these two regions yielded the lowest values. Similarly, the proportions of the Pokomo tribe in Tana River district may have contributed to the low SMAM values for the region in 1979. On the other hand, districts with the highest SMAMS - Nyeri and Kiambu, have the Kikuyu as majority tribe. This too tallies with the 1969 and Survey observations for the Kikuyu females.

For males, the 1969 Census ranked the Gabbra, Njemps, Rendiile, Degodia tribes as having the highest SMAMS (CBS, Kenya Census 1969 Col.lV Table 8.2). For 1979, the Marsabit, Turkana, Samburu, Garissa, Isiolo districts had very high values. This may find explanation in . the dominant tribes in the respective districts.

Ethnicity readily explained SMAM variation in such studies as by, Reddy and Krishnan (1977) in Canada; Caldwell et al (1983, 1984) in India and China; Dixon B.R. (1978); Stycos J. M. (1983) in Spain, Rindfuss et al (1983) in Asia; Smith P.D. et al (1983) in Asia and the Pacific, among others. For Kenya, educational level tends to explain most of the variation in female SMAMS. However, cultural factors tend to be more prevalent for majority of male SMAMS. For example, the high SMAMS for Turkana, Marsabit, Taita Taveta, Garissa, Samburu, Isiolo and Mandera are due to both the cultural norms that govern marriage as well as socio-economic factors. The males in Turkana, for example, require large herds of cattle (50-80), goats, and camels for bridewealth. This is both a cultural, as well as an économic factor which postpones the age at marriage (Gulliver P.H. 1966). That is, numerous raids may have to be carried out or considerable time taken to accumulate enough stock for the bridewealth. Similarly, the marriage process in itself takes 2-3 years and is only recognized and complete upon formal acceptance of bridewealth. This phenomena, introduces an upward bias in the age at marriage for both sexes. In most African communities, men are culturally, not allowed sexual relationships with girls whom they can trace a blood link (cognatic) or those belonging to father's and mother's clan nor to half brothers, sisters, in-laws clans. Therefore, it takes time for a man to get a spouse of whom he has no such links.

The Turkana women (Gulliver P.H., 1966) tend to marry late if the father is rich (domestic stock) and is not therefore, in a hurry to acquire more stock. The girl's, labour is more needed at home, for example in watering the father's herds. Contrary, if the father is unwealthy, his daughters are married off relatively early, for him to acquire wealth through bridewealth. Arranged marriages among some tribes contributes to early marriages (Muslim oriented communities) as those at the Coast in Kenya - Kilifi, Kwale, Lamu, and in North Eastern - Mandera, Garissa and Wajir.

Modernization, is an important factor at present. That is, through migration and communication, traditional, ethnic norms tend to be less prevalent in determining age at marriage. Presently, marriages are contracted for lower or higher bridewealth depending on the parties involved. This is so, because wealth accumulation may be more difficult for example, in the case of numbers of stock, or much faster in the case of monetary form. Thus, an attempt to explain regional variations on basis of ethnicity may not be adequate for most districts in Kenya where migration and employment out of home regions is high.

The high female SMAMS for Taita Taveta for 1979, tally with those made for dominant tribes in the region in 1969 (CBS, Kenya Census, 1969 Vol.lV, Table 8.2). The high values for Tana River (males) may be attributed (Table 5.5) to the influx of other ethnic groups into the region (Luos, Kikuyu) due to the development of irrigation and settlement schemes and of the fishery industry. As such the Pokomo, who account for only 35 percent of the district's population (1979) do not influence the SMAM value.

The quality of data, should be taken into account for districts with high SMAMS such as Siaya (male) and Kisii (female). In the case of Siaya, the males, may have tended to overstate ages after age 30, while for Kisii older females may have overstated their ages too.

Other factors, such as the legal age at marriage Act, do govern the timing of Nuptiality in Kenya (The Laws of Kenya, Cap.150). The availability of prospective males (sex ratios) too account for some variation in marriage timing. As such it should be noted that, age and sex are not sufficient explanatory variables, though necessary and very important in the study of Nuptiality timing and quantity over regions.

5.3 REGIONAL PATTERNS OF NUPTIALITY BASED ON SMAM

In view of the data quality, and the possible influence this may have on the estimates of Nuptiality, there is need for further refinement in the estimates at regional level. The assumptions inherent in the application of Hajnal's SMAM (1953) do not permit accurate and reliable indices to be derived. As noted earlier in this study, this technique tends to overstate mean age at marriage, when compared to Van de Walle's technique. Contrary to observations made by other scholars (Agarwala, 1962 and Sadiq, 1965), that SMAM overstates the timing, vis-a-vis the synthetic cohort approach, in this study the Synthetic Cohorts yield relatively higher estimates. However, SMAM estimates are a rough guide to the identification of a national pattern of Nuptiality (basing on regional observations).

The classification used is not standard, but uses the legal minimum ages at marriage (16 and 18 years) and the mean SMAM values for the 41 districts (19.85 and 25.70 for females and males respectively). The incidence of marriage is also classified according to the derived estimates (based on proportions single at age 50). Together the timing and incidence are assumed to correlate and help identify a national pattern of Nuptiality.

TABLE 5.7 - CLASSIFICATION OF NUPTIALITY PATTERNS BASED ON REGIONAL SMAM - KENYA 1979

	PATTERN OF MARRIAGE	CLASSIFICATION OF THE TIMING AND INCID[illegible]		[illegible]
		FEMALES	[illegible]	
1.	Very Early Timing (Years)	<18	[illegible]	[illegible]
	Very High Incidence (%)	(>99)	[illegible]	
2.	Early Timing (Years)	18-21	[illegible]	[illegible]
	High Incidence (%)	(95-99)	[illegible]	
3.	Late Timing (Years)	21-24	[illegible]	[illegible]
	Low Incidence (%)	(90-95)	[illegible]	
4.	Very Late Timing (years)	24+	[illegible]	[illegible]
	Very Low Incidence (%)	(<90)	[illegible]	

According to the classification (Table 5.7) it appears that majority of the regions (28) had an early marriage pattern for females. These were, Kwale, South Nyanza, Kajiado, Tana River, Busia, Kisumu, West Pokot, Isiolo, Samburu, Mandera, Siaya, Trans Nzoia, Garissa, Wajir, Marsabit, Kericho, Bungoma, Lamu, Baringo, Uasin Gishu, Kitui, Elgeyo Marakwet, Mombasa, Kakamega, Kisii, Laikipia and Nakuru. This was followed by the late marriage pattern with 11 regions. These included, Meru, Nyandarua, Nairobi, Turkana, Kirinyaga, Murang'a, Machakos, Embu, Taita Taveta, Kiambu and Nyeri. The next was the very early pattern with two regions, Kilifi and Narok. Females did not seem to exhibit any very late patterns of marriage.

Contrary, the majority of males had a late marriage pattern with 36 regions. These were, Kisii, Kericho, Busia, Elgeyo Marakwet, Trans Nzoia, Kwale, Uasin Gishu, Bungoma, Nandi, Kakamega, Kisumu, Narok, Nakuru, Lamu, Tana River, Embu, Kitui, Nairobi, Mombasa, Kirinyaga, Baringo, South Nyanza, Meru, Kajiado, West Pokot, Kiambu, Wajir, Laikipia, Nyandarua, Mandera, Murang'a, Isiolo, Machakos, Siaya, Garissa and Taita Taveta. This pattern was followed by 4 regions, manifesting very late patterns Nyeri, Samburu, Turkana and Marsabit. Then 1 region showed early marriage pattern - Kilifi. The males, in all 41 districts tended on average to avoid very early timing of marriages.

There seems to be no definite correlation between the timing and incidence of marriage for both sexes, particularly for males. The majority of regions showed high incidence for females (35) and males (23), despite their differences in timing patterns (Table 5.7). On the whole low incidences were absent for both sexes indicating a homogenous pattern of incidence (universal marriages) despite the diversity in the timing pattern. More regions, manifested very high incidence for males (18) than females (5), confirming observations that males have higher incidences over ages below 40 years. On the whole it can be concluded that females tend to have an early pattern, while males a late pattern of marriage.

Considering the mean of the SMAM values for females (19.85) and males (25.70) they too, fall under the two patterns of early and late marriages. At national level, the 1979 SMAM values for females (20.24) and males (25.48), also fall within the value range for early and late marriage patterns. The national values for incidences of 97.82 (females) and 94.96 (males) indicate high marriage incidences for both sexes. This again, confirms that although males marry relatively later their incidences are equally very high as those for females.

The above observations conform to those made by other studies on Nuptiality timing and incidence. That is, females tend to have a sharper and earlier marriage schedule, vis-a-vis, males with broader and later peak. Bogue (1969) suggests a standard classification using only three categories, based on timing.

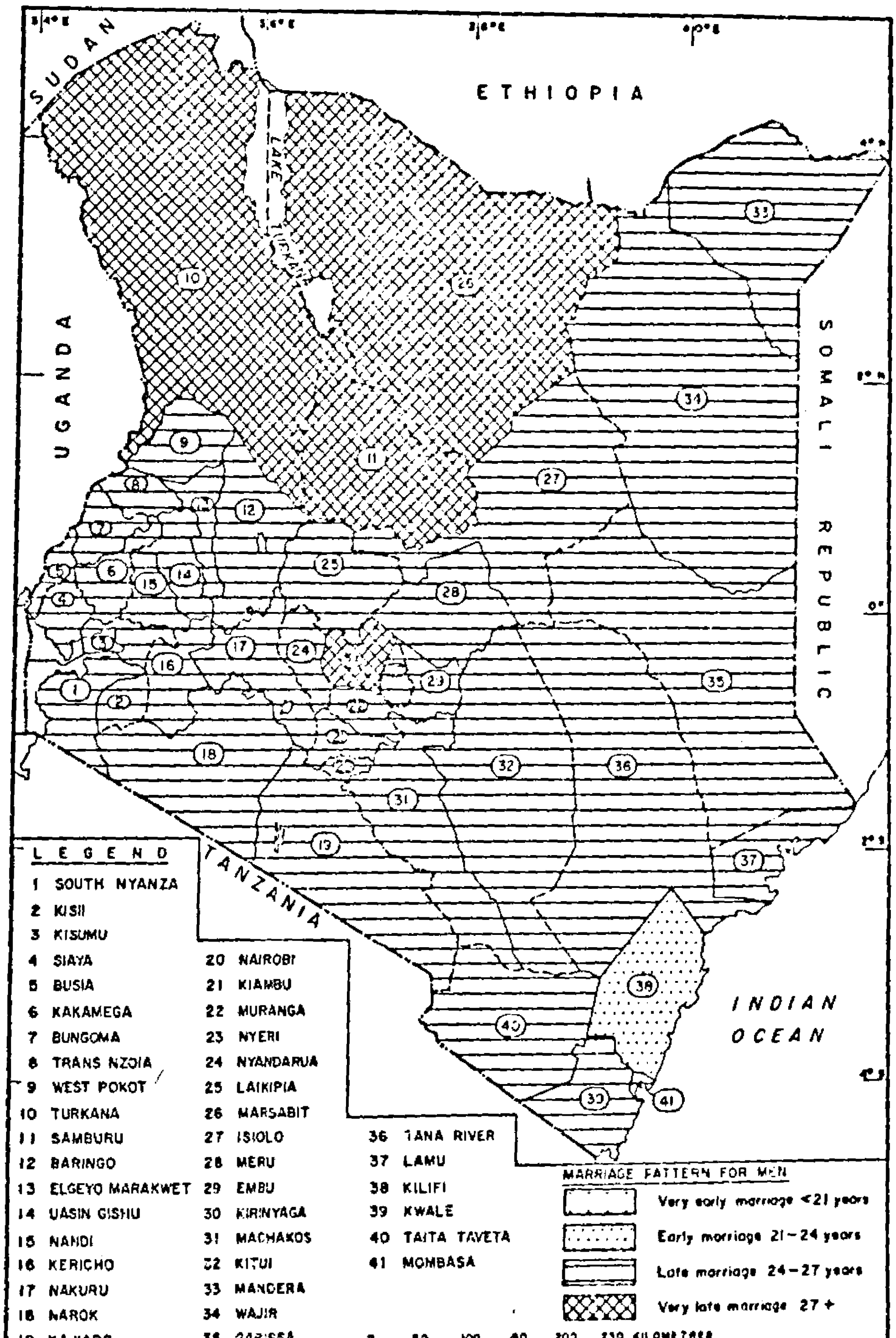
i) Very early marriage (<18 years)
ii) Early marriage (18-20 years)
iii) Late marriage (20 + years)

This classification, if applied to our situation would indicate that, very early -2 regions, early - 24 regions and late - 15 regions for females. This then confirms, our observation that females tend to marry early (early marriage pattern) in Kenya. For the males, all marriage timings (SMAM) would fall under the late category, implying late marriage pattern, as observed from the earlier analysis. Similar classifications have been applied by Dixon B.R. (1978), Malaker C.R. (1978), Reddy and Krishnan (1977). However, no standard procedures were adopted in such classifications.

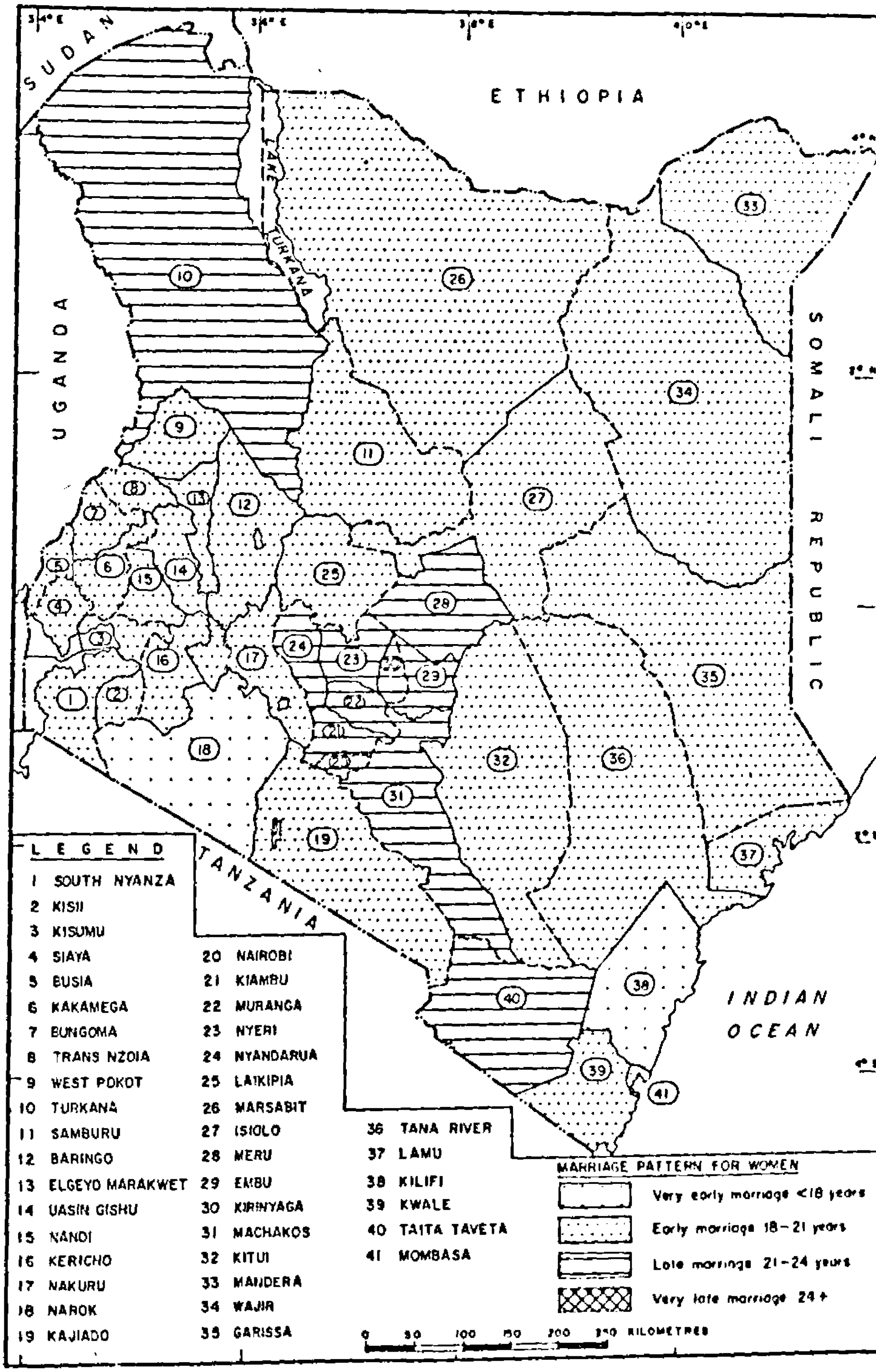
Map 4 and 5, provide a clear picture of the regional patterns of SMAMS for males and females. It is immediately, evident at a glance that while males exhibit very late marriage patterns, females do not. On the other hand, while females exhibit very early marriages in some districts, males do not have such a pattern. It is also clear, that majority of females marry at early ages, while males at late ages, and only Kilifi at early ages (21-24 years).

When, the Maps (4 and 5) are superimposed on Map 2 and 3 (Chapter 1) for both sexes, several factors are revealed. For males (Maps 4 and 2) it is noted that only 2.7 percent of the population (Kilifi) at the Coast exhibits an early marriage pattern, 92.14 percent late marriage pattern and 5.16 percent, very late (in North Western part of the country). For females (Maps 5 and 3), 4.29 percent of the population exhibits very early marriages, 59.72 percent, early marriage pattern (18-21 years) and 35.99 percent for late marriages. Thus it is clear that the highly populated regions, tend to have early marriages (females) and late marriages (males), and that it is not only the number of regions that have determined the prevalent patterns, but the majority of the population. Note may, also be taken that the female pattern is drifting towards late marriage.

MAP 4 DISTRIBUTION OF MALE SMAM BY DISTRICT – KENYA 1979



MAP 5 DISTRIBUTION OF FEMALE SMAMS BY DISTRICTS – KENYA 1979



5.4 SUMMARY

The chapter meets the second part of the third objective - Nuptiality estimation at regional level. Data for 1979 Census at regional level are utilized, to derive estimates using Hajnal's (1953) method.

For females, all districts, had high incidences of marriage (>95 percent) except Nairobi (89.96 percent), probably due to educational levels for females. Busia, Siaya, Kisii, Marsabit and Wajir, recorded very high incidences of marriage (>99 percent-Table 5.3). The males exhibited relatively lower percentages of marriage incidence, but all had over 90 percent of the single population ever-married by age 50. The reasons, may be cultural rather than economic, for majority of the regions. In general, marriage tends to be universal for all regions and both sexes in Kenya, with the females having an earlier and sharper peak than males, age-wise (Table 5:1-2).

The timing of Nuptiality, too varied for the 41 districts, ranging from 17.34-22.61 years (Kilifi and Nyeri) for females, and from 23.60-29.00 (Kilifi and Marsabit) for males. The differences being 5.27 and 5.40 years between the females and male values respectively. The means of the SMAMS were 19.85 for females and 25.70 for males. These are close to the national SMAM values for 1979 (20.21 and 25.44). About half of the female SMAMS fell below the mean (22 regions) and the rest above (19 regions). For males, 23 were below and 18 regions above. The standard deviations were close 1.226 (females) and 1.07 (males). The gap in SMAM between the spouses was on average 5.85 (Table 5.6) with a difference ranging from 3.76 years (Kiambu) and 9.65 years (Marsabit). Thus Kenyan males on average marry brides younger by about 6 years.

Several explanations are drawn for the regional variations in timing and incidence of Nuptiality in Kenya. However, attention is paid to variation by age and sex only. It nevertheless suffice to say, that education and cultural values tend to explain most variations, as indicated by earlier studies. It is also noted that data quality is poor, and thus possible over-estimation may have resulted.

On the whole, (Table 5.7) Kenya's regional estimates (1979) depict an early marriage pattern for females and a late marriage pattern for males. Compared to National estimates, as well as the means for regional SMAMS, the same patterns are derived for both sexes. Similar observations are drawn on the basis of Bogue's (1969) classification. No clear cut, correlation was established (Table 5.7) between the timing and quantity (incidence) of Nuptiality. However, on the basis of the above four classifications (using different criteria for each sex) four patterns of Nuptiality were identified (very early, early, late, very late patterns). Of these, the most prevalent in Kenya were early marriage, followed by late marriage (females) and late marriage followed by very late marriage (males). This indicates that in 1979 Kenyan females tended to marry relatively early and showed a trend towards late marriage. The males on the other hand, tended to marry relatively late, and showed a trend towards later marriage, however their incidences were relatively earlier than for females (though low). Maps 4 and 5, add visual clarity to the regional patterns of Nuptiality. However, no clear geographical pattern is established for the 41 districts by either sex. It is important to note from these maps (4 and 5) when superimposed on Maps 2 and 3 respectively, that any policy aiming to influence these patterns, must consider, the percentage of population depicting each given pattern. While for males over 90 percent exhibits late marriage, females form only 36 percent. However, females seem to be drifting towards late marriage, faster than the males as evident from the regions and population proportions.

CHAPTER SIX

6. SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

6.0 Introduction

Demographers, as well as other scholars find the study of Nuptiality very rewarding. The levels of the present and future course of the age at first marriage (timing) and of marriage quantity (incidence) are important factors that determine the fertility of any society (Bogue, 1969; Kpedekpo, 1982; UN-ECA, 1983). Particularly for the less developed nations, where most births tend to occur within marriage. For example an early timing accompanied by high incidences of marriage (proportions who enter into unions) may explain the high levels of fertility in most of these countries (through prolonged childbearing period). This phenomena, is further reinforced by the low incidences, of separation and divorce and prompt widow remarriages in most developing countries.

In this chapter, the final objective of the study is achieved. A summary of the findings, conclusions drawn and recommendations for further research and/or policy are presented.

6.1 SUMMARY

This study, dealt with the estimation of age at first marriage and the proportions who enter into unions, using four alternative methods of refinement. Age and sex were the explanatory variables used in the study. The proportions of single persons by age and sex from the Kenya Population Censuses 1969 and 1979 (macro) and 1979 (regional) were used to estimate Nuptiality.

The literature review findings indicate that, Nuptiality estimates from Kenya censuses are crude and only at macro level. That is, no study has attempted before, to refine, systematically these estimates using alternative procedures at macro and/or derive such estimates at micro levels. The review, also reveals that survey studies on Kenya utilized SMAM method at regional level (KFS, 1977/78). At global level, more refined methods have been applied and significant deviations noted in Nuptiality estimates. In view of the literature review, the theoretical formulation that Nuptiality timing and incidence vary in any given society was proposed. The study proceeded to achieve four objectives.

The major objective was to investigate, timing and incidence of Nuptiality, from Kenyan Census data. To achieve it, the study was divided into chapters according to a given objective. The first objective - the presentation of alternative methods of refining estimates of Nuptiality was achieved in chapter two. Assumptions, data requirements and computational procedures of Hajnal's SMAM; Synthetic Cohort method; Stable Population approach; and of Nuptiality Tables were discussed. In the third chapter, the second objective - evaluation and adjustment of data quality was carried out. Using different evaluation procedures, two dominant types of errors were noted; errors in the classification and reporting of marital status and in reporting of age. These two could cause variations in the timing and incidence of marriage to varying degrees. Generally, data were poor at macro as well as micro levels, with the North Eastern Province districts of Wajir, Mandera and Garissa, exhibiting extreme poor quality at regional level. Bungoma, Busia, Kakamega, Baringo, are among those which tended to have fairly accurate data. Adjustment for the two types of errors was attempted in the same chapter.

The third objective was partially met in chapter four - estimation of Nuptiality at macro level, using the four alternative methods of estimation. Of these, the Van de Walle estimator based on Stable Population yielded the lowest estimates vis-a-vis the Nuptiality Tables, which gave relatively high estimates. The values from the 10-year and 5-year Synthetic Cohorts were higher than those from Hajnal's SMAM, being close to the SMAMS for 1979. The assumptions and data quality must be taken into account before definite conclusions can be drawn from these estimates.

The fifth chapter, dealt with the second part of objective three - estimation at micro level. SMAM method was applied using 1979 census data for the 41 administrative regions in Kenya. Four regional patterns of Nuptiality were identified on the basis of this method. These were mapped (Map 4 and 5) and no geographical pattern was established in Nuptiality timing and incidence. The females seem to exhibit an early marriage pattern (28 districts), and were tending towards a late pattern. The males dominated the late marriage pattern (36 districts). There was no very early pattern for males (<21 years) and very late pattern for females (>24 years). The last chapter, achieves the fourth (final) objective of the study. It presents a summary of the findings, conclusions drawn from these and recommendations for policy and/or further research.

6.2 CONCLUSIONS

The study revealed that Nuptiality estimates for Kenya, based on census data, are varied for each method of estimation. Van de Walle's method, Hajnal's SMAM, Synthetic Cohort procedure and the Nuptiality Tables, in that order gave increasing estimates of the timing. Estimates for males showed higher variation (24.65-26.31) than females' (19.38-20.99) over these methods. Variation by sex was apparent (over 5 years), with males having the higher estimates. This gap seems to have reduced by about 1 year over the decade according to SMAM and by about .5 years according to the Van de Walle's estimator. Females manifested a higher upward swing in age at first marriage towards abridging the bride/groom gap over the decade. The relatively high estimates of timing of the Synthetic Cohorts vis-a-vis SMAM, may indicate rapid changes in marriage rates over the later part of the decade.

The incidence of marriage also varied by method of estimation at macro level. However, it is very high for all (>95 percent) by age 50. The incidences were highest over the younger ages. The highest rates seem to have occured between ages 15-20 (females) and 25-30 (males). Thus marriage tended to be early and universal for Kenyan females and relatively later for the males.

Estimates from the Net Nuptiality Tables revealed that female marriages were earlier, with sharper peaks ($5^{n'}x$). The timing of marriage appeared to be minimal at ages when marriages were numerous and the probabilities at a maximum. The tables, point out that, males expected to spend more of their lifetime in single status (at birth) by about 5 years, than females. However, after marriage, females seemed to enjoy a longer life than males. Because males spent over 45 percent of their liftime as single, while females about 32 percent (NNT) only then females of marriagable ages may tend to outnumber their counterparts. This phenomena may lead to increases in polygamous unions and single parenthood among females.

At regional level, the study concludes that while the Nuptiality patterns based on SMAM are highly varied, for both sexes, no geographical pattern was established. Of the 41 districts in Kenya, the females had 2 regions with a population percentage of 4.29 percent depicting very early pattern (<18 years), 28 regions with 59.72 percent of population, for early marriage (18-21 years) and 11 regions with 35.99 percent for late marriage pattern (21-24 years). No patterns were revealed for very late (>24 years) marriages. Thus, it was concluded that females in Kenya manifested an early marriage pattern tending towards late. On the other hand, the males, indicated no region for very early marriage pattern (< 21 years), 1 region for early, with 2.7 percent of population (21-24 years); 36 regions with 92.14 percent for late marriage (24-27 years) and 4 regions for very late marriage (27+) with a percentage of 5.16 of the total population for 1979. Clearly, this implied that males had a late marriage pattern in Kenya in 1979. There seemed to be no correlation between the timing and incidence of Nuptiality in determining the prevalent patterns (Table 5.7). The national values for SMAM (1979) also pointed towards the same conclusion for female and male patterns of marriage. The classification, is somewhat arbitrary and serves as a descriptive guide towards the identification of regional patterns of Nuptiality. However, these prevalent (early and late) patterns, conform to observations drawn using Bogue's (1969) classifications.

The lack of association between the timing and incidence is akin to Dixon's (1971) observations of no correlation as expected on theoretical grounds.

The incidences are high and early for both sexes. The study also confirms the theoretical formulation that females tend to have earlier and sharper peaks of marriage and that the difference in timing between spouses is on average about 5 years. From this study it is concluded that, for Kenya marriage timing for females has been increasing over the past 17 years as follows;- 18.4 years (1962), 19.14 (1969), 20.00 years (1978) and 20.24 years (1979). For males from 24.1 years (1962), 25.32 years (1969) and 25.48 years (1979). While the female rate of increase seems to have increased from .74 to 1.1 years that for males seems to have reduced from 1.22 to .26 years over the periods 1962-1969 and 1969-1979.

The estimation of Nuptiality has been made difficult by problems arising from methodology and/or data quality. The implicit assumptions in most methods do not befit data as those found in Kenya. These include, among others; the assumption of constancy of marriage rates, accurate data; no mortality; by SMAM, Synthetic Cohort, Stable Population and GNT methods, and that of universal marriages for the NNT (not all persons marry, whereas in the Life Table all are mortal). Problems related to data quality include, definition of marital status in the censuses. Customary marriages (where formal marriage follows many years of consummation) and consensual unions, tend to be under-estimated. Misreporting frequently occurs among the widowed, divorced/separated, who are reported as single. This leads to higher than expected proportions (often higher than those at ages 45-49) above age 50. The prevalence of polygamy and the prompt remarriage of widows in Kenya do seriously distort the timing and incidence estimates. Misleading estimates also result from age misreporting, as it directly affects the mean age at first marriage.

6.3 RECOMMENDATIONS

6.3.1 FOR FURTHER RESEARCH

Need arises for increased research in the field of Nuptiality estimation. This is in view of its importance to fertility studies, as most births occur within the context of marriage. Thus, differences in age at first marriage and proportions that enter into unions are of primary importance in determing fertility levels and trends. For example, women who marry early (and stay in the unions) are likely to have higher initial fertility. Most African countries tend to be characterized by high Nuptiality (low age at marriage and high proportions married) and high marital fertility (Ryder, 1967; UN-ECA, 1983). This is manifested by the low practice of family planning.

Thus, more research is needed, by use of the more refined techniques to estimate the timing and quantity of marriage (NNT) at regional level. This study has not undertaken this. The model (Net Nuptiality Table) as has been proved is very useful in Nuptiality study, particularly in relation to fertility. Projection of reproduction rates becomes more meaningful when treated in the context of Nuptiality rates, particularly at regional level.

The study has also fallen short of the estimates from such other procedures as the generalized Stable Population. Application of such a technique may throw more light on the level of Nuptiality in Kenya.

The estimates in this study have been derived from census data, whose shortcomings are too well known. As such, as a further research area, one may apply recent survey data, unavailable at the time of this study.

Finally, the descriptive nature of the study, further impedes the nature of policy implications drawn. As such further research, giving in depth analysis of such estimates is called for, particularly, as evident from the NNT, several analytical studies can be carried out by testing hypotheses on causes of Nuptiality variations for example.

Basing on the derived estimates it is noted that Nuptiality timing in Kenya is changing (increasing) particularly for females. An interesting area of further research would be the study of the determinants of such changes in age at first marriage over time and also over regions. Socio-economic, cultural, ethnic, political even psychological factors as determinants of such changes (among others) are possible areas of study, which would greatly enhance the understanding of Nuptiality dynamics in Kenya.

6.3.2 FOR POLICY

Kenya's present demographic situation is marked by high fertility levels. The escalating trend, has been that of an ever increasing population size. Past policies aiming to influence fertility levels, have focused on reduction, through family planning. These have met with relatively little or no success. The reasons for such failures have not been fully investigated. This study recommends that, for a meaningful and more workable policy on fertility reduction, Nuptiality timing and incidence must be taken into account.

Considering the relationship between marriage and fertility, the number of children in a marriage can be affected by several measures. The general policy has been to limit births within marriage, using family planning techniques. However from this study, it is recommended that marriage reduction, through increasing the age at marriage (timing) and through decreasing the proportions marrying (incidence) at different ages, may have a negative effect on the marital fertility. As is, already evident from the study, marriage timing in Kenya is early for females and relatively late for males, however both sexes experience early and high incidences of marriage.

The greatest impact of such a policy (increasing timing and reducing incidence) is likely to be in the regions where family planning is minimal within wed-lock and few illegitimate births exist. Kenya being a country with early and universal marriages, the potential demographic effect of increasing the legal minimum age at marriage is very high. Currently, the Kenya Marriage Act, (Laws of Kenya, Cap 150) inhibits men to marry under the age of 18 years and women under 16 years. An increase of about 2 or more years, would not only reduce the legal period during which a woman is exposed to the risk of childbearing, but have a significant impact on fertility. For males, the increase should be by 5-6 years, as already, very few marry below the age of 24, according to the regional and national estimates derived in this study. Women, appear to be already drifting towards an upward trend in marriage timing and an increase by about 2 years (from age 16) may affect fertility levels tremendously. Moreover, age 16 is not appropriate as most females are still in school, college or some training of sorts, and have thus not acquired the necessary employment skills to enable them cope with marriage demands. Nor have they attained maturity to support themselves, in the event of divorce, widowhood etc. As such, having such an age (16) as legal minimum, in effect, promotes higher births in marriage, outside marriage and results into single parenthood problems. From the 1969 SMAM estimates; the lowest values were over 17 years. It is therefore unjustifiable, that while both sexes are already marrying (on average) above the minimum legal ages, the government policy should continue to use them.

Note should be taken, however, that such a policy (increasing timing) may not be workable, where high infant and child mortality prevail and also strong cultural practices, such as those among muslims (child marriages) as they limit the potential of achieving fertility declines.

Policy measures, also need to look into ways of abridging the bride/groom gap in mean age at marriage. This is important in that more marriagable females than males, tend to increase polygamous unions, divorce and separations. More serious is the increase in the number of illegitimate births (as few marriages will have marriage certificates) and single parenthood. These may be a future problem unless means of abridging this gap are sort. The prevalence also has important bearing upon fertility, mortality and migration. Similarly, the revolution (increased single parenthood) means that legal marriage is reducing in importance in the framework of fertility analysis. Contraception, seems the readily available means of reducing the risks of unwanted conception during cohabitation, but its effectiveness, is yet to be realized. Possible means for policy formulation, may be, expansion of education opportunities, changing the employment structure and economic conditions among the urban and rural folk. These are likely to increase the age at marriage and reduce unwanted conceptions at the same time.

Policy formulators, at regional level should consider the incidence of marriage as a prime factor in instituting the nature of health services, water needs, food resources, housing needs, and educational facilities in general. The incidences are a key to the composition of the population and in identifying the needs of the population. The regional SMAM patterns, should form a policy guide in identifying and influencing areas with high fertility levels.

APPENDIX TO CHAPTER THREE

TABLE 1 : DEVIATIONS OF BLENDED POPULATION PERCENT FROM 10, BY SEX - (MYERS' INDEX) 1969 AND 1979

	BLENDED POPULATION PERCENT DEVIATIONS FROM 10			
Terminal Digit	1969		1979	
	Males	Females	Males	Females
0	4.69	5.74	3.66	5.02
1	-2.66	-3.09	-1.56	-1.58
2	0.02	-0.23	-0.24	-1.10
3	-2.30	-2.65	-1.32	-1.96
4	-1.51	-1.56	-1.13	-1.28
5	2.90	2.35	1.71	1.34
6	-0.61	-0.33	-0.64	-0.88
7	-1.49	-1.87	-0.31	-0.56
8	1.78	2.40	-0.09	0.20
9	-0.82	-0.76	-0.07	0.81
TOTAL	18.78	20.98	10.73	14.73

TABLE 2 : DEVIATIONS OF BLENDED POPULATION PERCENT FROM 10 (MALES) 1979 FOR REGIONS

Terminal Digit District	0	1	2	3	4	5	6	7	8	9	TOTAL
Nairobi	3.99	.72	.77	.79	-1.41	1.18	-1.72	-1.29	-.95	-.51	13.33
Nyeri	3.72	-1.62	-.41	-1.48	-1.19	2.12	-.23	-.71	.11	-.30	11.89
Kiambu	2.87	-1.35	.33	-.77	-.92	1.54	-.46	-.52	-.33	-.39	9.48
Kirinyaga	3.81	-1.54	-.53	-1.66	-1.43	2.17	-.41	-.50	.59	-.50	13.14
Murang'a	2.66	-1.63	-.41	-1.54	-.91	2.02	.35	.16	-.34	.36	10.38
Nyandarua	2.47	-1.45	-.19	-1.06	-.77	1.81	.36	-.75	-.01	-.41	9.28
Busia	1.37	-.94	-.55	-.97	-.56	.42	-.25	1.60	-.48	.36	7.50
Bungoma	.44	-.27	-.43	.19	-.55	.65	-.40	.63	-.73	.46	4.75
Kakamega	.75	-1.18	-0.47	.95	-.84	.96	-.15	.99	-1.03	.02	7.34
South Nyanza	7.24	-2.01	-.73	-2.04	-1.40	.53	.32	-.04	-.05	-.73	15.54
Siaya	1.58	-1.45	-.57	-1.02	-.59	1.19	.27	1.50	-.72	-.20	9.09
Kisumu	2.90	-1.20	.06	-1.27	-1.04	1.33	-.27	.42	-.52	-.41	9.42
Kisii	3.36	-1.95	-.08	-2.01	-.63	1.17	-.13	-.38	1.09	-.45	11.25
Taita Taveta	1.86	-1.61	-.46	-1.12	-.88	2.08	-.33	-.05	-.56	1.08	10.03
Mombasa	4.82	-1.59	-.03	-1.42	-1.62	2.80	-1.40	-1.01	-.49	-.05	15.23
Kilifi	3.43	-2.16	-.85	-1.94	-1.02	2.65	-1.12	-.33	-.72	2.07	16.29
Lamu	6.49	-2.56	-.65	-2.38	-2.05	3.83	-1.14	-1.52	.34	-.37	21.33
Tana River	6.03	-2.60	-1.31	-2.34	-2.01	1.71	-1.25	1.68	.33	-.25	19.51
Kwale	5.75	-3.39	-.77	-2.56	-1.82	4.15	-.96	-1.26	.25	.61	21.52
Wajir	19.14	-5.14	-1.90	-3.80	-3.31	4.35	1.82	-3.83	.52	-4.22	48.03
Mandera	18.61	-5.44	-1.40	-3.83	-3.45	5.31	-2.35	-3.46	.03	-4.04	47.92
Garissa	14.81	-4.90	-1.43	-3.35	-3.02	4.56	-1.72	-3.08	1.83	-4.46	43.16
Meru	4.99	-2.34	-.40	-2.09	-1.64	2.27	-1.00	-.45	.48	.19	15.85
Marsabit	9.79	-3.57	.15	-2.62	-2.26	3.03	-1.28	-2.26	1.00	-2.22	28.18
Machakos	2.51	-0.33	-.49	-1.06	-1.16	.63	-.66	.70	-.83	.70	9.07

TABLE 2 (Cont.)

Terminal Digit District	0	1	2	3
Kitui	3.09	-1.89	- .97	- .63
Isiolo	7.22	-2.91	.24	-1.67
Embu	3.67	-1.61	- .66	-1.84
West Pokot	4.71	-2.35	- .79	-1.71
Uasin Gishu	2.25	- .95	.10	- .80
Turkana	7.75	-3.39	-1.51	-3.26
Trans Nzoia	1.48	- .91	- .23	- .10
Samburu	6.60	-3.33	-1.59	-1.91
Narok	3.95	-2.81	- .25	-1.97
Nandi	1.75	- .95	- .28	- .84
Nakuru	3.39	-1.22	.23	-1.18
Laikipia	3.39	- .86	- .09	-1.03
Kericho	2.80	-1.20	- .21	-1.40
Kajiado	4.83	-2.58	- .24	-1.93
Elgeyo Marakwet	4.81	-1.42	- .02	- .78
Baringo	3.89	-2.18	- .21	-2.18

4	5	6	7	8	9	TOTAL
.02	1.30	- .48	- .33	- .56	.46	9.73
-1.71	2.37	-1.37	-1.91	.83	-1.10	21.33
-1.51	2.14	- .07	.03	- .35	.21	12.09
-1.27	2.71	-1.08	-1.66	.91	.52	17.71
- .65	1.19	- .95	- .05	- .45	.32	7.71
-2.97	4.07	-1.36	-2.39	1.85	1.19	29.74
- .95	1.30	- .66	.66	- .79	.20	7.28
-1.69	4.55	-3.77	-2.25	2.04	- .74	28.47
- .89	1.77	0	-1.28	1.57	- .09	14.58
- .53	1.10	- .75	.45	- .58	.62	7.85
-1.22	1.53	- .63	- .47	- .15	- .27	10.29
-1.26	1.92	- .63	.99	- .59	.15	10.91
- .97	.89	- .71	- .15	1.21	- .26	9.80
-1.25	2.46	- .70	-1.09	.51	- .01	15.60
- .49	3.28	- .12	- .17	3.03	1.40	15.52
-1.25	1.65	-1.33	-1.22	1.76	1.07	16.74

TABLE 3 : DEVIATIONS OF BLENDED POPULATION

Terminal Digit District	0	1	2	3
Nairobi	4.46	.81	- .56	-1.69
Nyeri	5.48	-2.04	-1.06	-1.99
Kiambu	4.51	-2.86	- .58	-1.61
Kirinyaga	5.60	-1.78	-1.76	-2.78
Murung'a	4.79	-1.91	-1.21	-1.86
Nyandarua	3.61	-1.93	- .50	-1.83
Busia	2.87	- .97	-1.43	-1.64
Bungoma	.23	- .23	- .34	.14
Kakamega	1.38	- .78	- .69	- .65
South Nyanza	4.06	-1.63	- .70	-2.33
Siaya	3.05	- .56	-1.10	-1.52
Kisumu	3.68	- .99	- .88	-2.00
Kisii	5.54	-2.50	-1.06	-3.01
Taita Raveta	4.02	-1.67	-1.45	-1.86
Mombasa	4.26	-1.53	- .71	-1.73
Kilifi	6.93	-1.13	-1.45	-2.09
Lamu	12.54	-1.16	-2.44	-3.53
Tana River	11.23	-2.77	-1.83	-2.86
Kwale	9.57	-3.49	-1.50	-3.21
Wajir	21.47	-4.91	-2.67	-4.44
Mandera	22.97	-5.56	-2.45	-4.72
Garissa	18.34	-5.03	-2.84	-4.32
Meru	5.52	-2.50	-1.67	-2.75
Marsabit	14.27	-3.06	- .89	-4.01
Machakos	4.20	1.01	4.66	- .87
Kitui	5.23	-1.38	-1.75	- .52
Isiolo	11.09	- .94	-2.21	-3.01
Embu	6.07	-1.68	-1.32	-2.27
West Pokot	7.03	-2.25	-1.08	-3.20
Uasin Gishu	3.21	-1.02	- .71	-1.40
Turkana	6.94	-3.57	-2.42	-4.07
Trans Nzoia	1.65	- .42	-1.05	- .33
Samburu	9.22	-2.58	-1.83	-2.63
Narok	8.72	-1.18	.01	-1.78

PERCENT FROM 10 (FEMALES) 1979 FOR REGIONS

4	5	6	7	8	9	TOTAL
-1.93	.50	-1.21	- .92	.42	.13	12.63
-1.43	2.70	- .08	-1.09	.05	- .54	16.46
-1.29	2.01	.40	- .76	.20	- .02	14.24
-1.81	1.88	-1.64	2.31	.06	- .09	19.71
-1.23	2.15	.28	- .78	- .36	- .14	14.71
-1.12	1.87	1.12	-1.13	.39	- .47	13.97
- .72	.06	-1.35	1.19	.19	1.79	12.21
- .84	.53	.23	1.30	- .98	.42	5.24
-1.02	.67	.02	1.38	-1.24	.93	8.76
-1.39	.48	- .11	.65	.38	.60	12.33
- .78	.49	- .37	1.97	- .94	- .24	11.02
-1.28	.36	- .38	.89	- .14	.74	11.34
-1.12	1.33	- .91	- .94	1.90	.77	19.08
-0.85	1.01	-1.06	- .34	- .39	2.57	15.22
-1.71	1.95	-1.06	- .92	.31	1.16	15.34
-2.21	1.84	-2.61	-1.93	-1.19	3.85	25.23
-4.27	4.59	-1.73	-3.27	- .05	- .68	34.26
-3.26	2.51	-1.83	-2.02	.69	.13	29.13
-2.60	3.11	-1.91	-2.37	.76	1.58	30.10
-4.32	4.74	-2.84	-4.17	.83	-4.11	54.50
-4.36	4.87	-2.78	-3.71	.20	-4.43	56.08
-3.93	4.98	-1.95	-3.16	1.62	-3.73	49.90
-1.51	2.83	-1.37	-1.25	1.26	1.43	22.09
-3.08	3.07	-1.66	-2.82	.94	-2.75	36.55
- .68	.85	- .70	.96	- .71	2.79	17.43
.04	.56	-1.96	-1.48	- .57	1.84	15.33
03.03	1.96	-1.22	-2.25	1.14	-1.54	28.39
-1.52	2.28	- .98	-1.22	- .15	.79	18.28
-1.27	2.35	-1.18	-2.85	1.58	.88	23.67
- .33	1.21	- .97	- .77	- .51	1.29	11.42
-3.54	2.03	-2.70	-3.90	1.20	.01	30.38
- .94	.56	- .86	1.10	- .44	.81	8.07
-2.74	4.45	-2.44	-2.46	1.31	-1.30	29.96
-1.06	2.33	- .08	-1.61	3.40	2.55	22.72

TABLE 3 (Cont.)

District	0	1
Nandi	2.85	-1.16
Nakuru	3.97	-1.47
Laikipia	4.75	- .56
Kericho	3.77	-1.62
Kajiado	7.32	-2.16
Elgeyo Marakwet	4.85	-2.46
Baringo	5.59	-2.55

2	3	4	5	6	7	8	9	TOTAL
-1.19	-1.63	- .93	.90	- .76	.11	.36	2.05	11.34
- .84	-1.99	-1.24	1.12	- .19	- .68	.60	.72	12.82
-1.27	-2.40	-1.82	1.47	- .21	- .82	- .07	1.01	14.38
-1.06	-1.90	- .86	.44	-1.37	- .69	2.26	1.00	14.97
-1.14	-2.47	-2.47	1.74	-1.49	-2.04	1.41	1.31	23.55
-1.13	-2.32	-1.37	2.06	-1.01	-1.55	2.48	.45	19.68
- .87	-2.74	-1.45	1.55	-1.44	-1.89	2.66	1.16	21.90

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