2013

POPULATION AND HOUSING CENSUS

THE REPUBLIC OF THE GAMBIA

Gambia Bureau of Statistics
GBOS

MORTALITY ANALYSIS AND EVALUATION

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List of Abbreviations and Acronyms

AfDB	African Development Bank
ASDR	Age-Specific Death Rate
ASMR	Age-Specific Mortality Rate
AU	African Union
BGBM	Brass Growth Balance Method
CDR	Crude Death Rate
CEB	Children Ever Born
DHS	Demographic and Health Survey
EPI	Expanded Program of Immunization
GCPFDS	Gambia Contraceptive Prevalence and Fertility Determinants Survey
IMR	Infant Mortality Rate
LGA	Local Government Area
MCH	Maternal and Child Health
MDG	Millennium Development Goal
MoH	Ministry of Health
PCM	Preston and Coale Method
PHC	Primary Health Care
U5MR	Under-5 Mortality Rate
UNDP	United Nations Development Programme
UNECA	United Nations Economic Commission for Africa

Concepts and Definitions

On the basis of the mortality data generated as described above, the mortality estimates used in this report are general, childhood and adult mortality rates and maternal mortality ratio and rate. These include crude death rate, infant mortality rate (IMR), age-specific death rate and life expectancy at birth. Childhood mortality measures the probability of dying between birth and exact age five years. The specific measures considered are infant, child and under-five mortality rates. Adult mortality, on the other hand, measures the probability of dying between exact ages 15 and 60 years. The definitions of the mortality measures described in the report are as follows:

Crude Death Rate: This is the total number of deaths per year per 1,000 population.

Infant Mortality (1q0): This is the probability of dying between birth and age one year, i.e. the first year of life. It is expressed as a fraction (per 100) or per 1,000 live births.

Child Mortality (4q1): This is the probability of dying between exact ages one and five. It is also expressed as a fraction or per 1,000 population (i.e. children who survived the first year of life).

Under-5 Mortality (5q0), or childhood mortality, is a combination of infant and child mortality and is defined as the probability of dying between birth and exact age 5 years. It is expressed as a fraction or per 1,000 live births.

Age-Specific Death Rate is the number of deaths of people in a specified age group per 1,000 population of that age group.

Adult Mortality Rate (45q15): This is the probability of dying between exact ages 15 and 60 years.

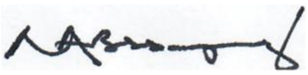
Life Expectancy (e°0) is an estimate of the average number of years a person lives assuming the age-specific death rates for a given year prevail for the rest of the person's life.

Preface

This is Volume 3 of the 2013 Population and Housing Census report. The report provides estimates of the mortality status of the population at certain reference periods. The main objective of the report is to provide updates on mortality figures for policy makers, data users and researchers.

We wish to thank Dr Momodou Jasseh for preparing this report. We also thank the GBoS staff for finalizing the report.

We wish to extend sincere thanks to The Gambia Government for providing funding for the conduct of the census, and the United Nations Population Fund (UNFPA) for their support both technical and financial for the conduct of the 2013 Population and Housing Census.



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Executive Summary

This report updates the mortality situation of The Gambia using the relevant mortality information collected in the 2013 Population and Housing Census. These included reports of deaths in the households 12 months prior to the census, including sex and age at death. For every female deceased person aged 15 years or more, further enquiry was made to confirm whether the death occurred during pregnancy, whilst giving birth or within six weeks after termination of pregnancy. A death with an affirmative response to any one of these questions was classified as a pregnancy-related death. Women aged 12 years and over were also asked to state the total number of children they had ever given birth to, as well as how many were alive at the time of the census, and how many had died, all disaggregated by sex.

Various appropriate direct and indirect estimation techniques were applied to provide reasonably acceptable mortality indicators for the country and the eight Local Government Areas where applicable. Direct measurement techniques were adopted to estimate the crude death rate, age and sex-specific death rates and pregnancy-related mortality rates and ratios. Childhood mortality indicators were derived indirectly using the Brass technique and based on proportions dead of children ever born and number of mothers by age group. Two different sets of approaches were adopted to indirectly estimate adult mortality (i.e. the probability of dying between exact ages 15 and 60 years), namely the Death Distribution Methods, comprising of the Brass Growth Balance and the Preston & Coale methods; and the orphanhood-based techniques, comprising of the lifetime and inter-censal orphanhood methods.

The data on children ever born and proportions dead were assessed to be of good quality; whilst the information on deaths in the household 12 months prior to the census was affected by omission and age misreporting errors, but adjustable for further analysis. However, low numbers coming from the dwindling population of Banjul are becoming increasingly unstable when subjected to indirect estimation techniques. The Gambia Bureau of Statistics (GBoS) should therefore consider amalgamating Banjul with Kanifing LGA in future demographic enquiries and analyses.

A total of 12,111 deaths were reported in the 12-month period preceding the census, and a total population of 1,857,181 was enumerated. This implies a crude death rate (CDR) of 6.5 per 1,000 population. This is considered to be slightly lower than expected, due mainly to omissions of deaths in the household reports.

As far as childhood mortality is concerned, the results indicate that 63 children out of every 1,000 born alive in The Gambia in 2010 were not expected to live to celebrate their fifth birthdays (i.e. under-5 mortality, ${}_5q_0$); and 35 would die within the first year of life (i.e. infant mortality, ${}_1q_0$). The corresponding ${}_1q_0$ and ${}_5q_0$ estimates for females were 31 and 55 per 1,000 live births respectively; and 40 and 70 per 1,000 live births for males. Among the LGAs, estimated levels of under-5 mortality ranged from 43 per 1,000 live births in Kanifing to 88 per 1,000 live births in Kuntaur, more than twice as high. Mansakonko also recorded under-5 mortality level almost twice as high as Kanifing. Thus, the middle and northern part of the country — represented by Mansakonko, Kerewan and Kuntaur— constitute the regions of high childhood mortality in the country. This regional pattern of under-5 mortality persisted from up to a decade prior to the census.

The trend in under-5 mortality shows a national decline of over 80 per cent in about five decades, i.e. from 341 per 1,000 live births in 1961 to the most recent level of 63 per 1,000 live births in 2010. The estimated level in 1990 was 141 per 1,000 live births, thus implying an MDG4 target of 47 per 1,000 live births for The Gambia. Projecting linearly to 2015 at a rate of decline in under-5 mortality of 3.4 deaths per 1,000 live births per annum, the country should have reached its MDG4 target in 2014.

The most recent estimates of adult mortality, ${}_{45}q_{15}$, from the various methods adopted were 131 per 1,000 for females in 2009.7; and 190 per 1,000 for males in 2008.6. After an assessment of the plausibility and reliability of all the estimates generated and compared with others derived from earlier censuses of 1973, 1983, 1993 and 2003, the most reliable estimates of adult mortality in The Gambia are considered to be 198 per 1,000 in 2008.29 for females, and 284 per 1,000 in 2012.79 for males.

At the LGA level, Mansakonko LGA recorded the highest levels of adult mortality for both sexes, followed by Basse and Janjanbureh in the eastern half of the country. Combined with the similar regional pattern observed for under-5 mortality, these LGAs constitute the regions with the highest levels of general mortality in The Gambia, headed by Mansakonko, where adult males and females respectively have 65.0 per cent and 37.0 per cent higher chance of dying than their counterparts in Kanifing.

National life tables that adequately represent the mortality experiences of females and males (and both sexes combined), and referring to mid-2011, were constructed using a method that combines indirect estimates of child and adult mortality. The generated life tables are indicative of life expectancies at birth, e^o_0, of 65.9 years for females; 60.8 years for males; and 63.4 years for both sexes. These estimates are considered to be plausible for the population of The Gambia and for the reference time of mid-2011.

CHAPTER 1: INTRODUCTION

1.1 Background

Despite improvements worldwide in the general welfare and wellbeing of humankind in the last half a century, the contemporary world still manifests significant mortality variations and differentials between developed and developing countries, and interestingly, between and within least developed countries of the world. For Sub-Saharan Africa, one of its major achievements in the twentieth century was the unprecedented decline in mortality and the corresponding increase in the expectation of life at birth (Adetunji & Bos, 2006). Notwithstanding such recent socio-demographic improvements in the continent, Sub-Saharan Africa still maintains its position as the highest mortality region in the world with children accounting for the greater proportion of deaths, and with an average life expectancy at birth of 46 years (Adetunji & Bos, 2006). Western African is the worst among the sub-regions of the continent.

Many countries in the African continent have of recent witnessed, albeit limited, revitalised health systems to respond to the Millennium Development Goals (MDGs) relating to health outcomes, namely: reducing childhood mortality (MDG4); improving maternal health (MDG5); and combating HIV/AIDS, malaria and other diseases (MDG6). However, it is generally contended that most countries in Africa are not on track to achieving any of these health-related MDGs; and that, based on current pace of progress, MDG4, for instance, can only be attained in the year 2165 (Haines & Cassels, 2004). Against this rather gloomy picture, there are a few Sub-Saharan African countries that have manifested significant improvements in general mortality, especially among children, and are actually on track to achieving MDG4. The Gambia is among eight countries that have been classed as having made remarkable progress towards achieving their MDG4 targets (UNECA, AU, AfDB, & UNDP, 2014); and detailed studies of a sub-national population revealed that it had achieved its MDG4 target seven years early (Jasseh et al., 2011).

Despite being able to adequately document the improvements being made in general mortality in Sub-Saharan Africa, no country has a complete vital registration system, the best source of mortality information provided it is 100 per cent complete. With such scarcity of data for direct measurements, censuses and surveys continue to be the main sources of information for the estimation of childhood and adult mortality using various indirect techniques. But such enquiries are infrequent and their quality in Sub-Saharan Africa are known to be affected by a range of errors such as age misreporting and differential coverage, to which most indirect mortality estimation methods are sensitive.

The population of the Gambia almost trebled its size between 1983 and 2013 from 687,817 to 1,857,181. It grew at a rate of 4.2 per cent per annum between 1983 and 1993; 2.7 per cent per annum in the subsequent decade; and 3.2 per cent per annum between 2003 and 2013 (The

Gambia Bureau of Statistics (GBoS), 2014) (Table 1.1). This places the country among those in Sub-Saharan Africa with the fastest population growth rates, with the potential of doubling its size in a couple of decades (Baingana & Bos, 2006). Despite the shortcomings of the vital registration system in the country, much effort has been made over the past few decades to estimate child mortality in particular. Much of the available evidence supporting the documented decline in childhood mortality are indirect estimates obtained from the 1973, 1983, 1993 and 2003 censuses; and surveys, such as the Gambia Contraceptive Prevalence and Fertility Determinants Survey (GCPFDS) (Pacque-Margolis, Gueye, George, & Thome, 1993) and the Gambia DHS (Demographic and Health Survey) 2013 (The Gambia Bureau of Statistics (GBoS) and ICF International, 2014).

Table 1.1: Population size of The Gambia and LGAs and inter-censal growth rates, 1983-2013

	Population				Growth Rate (per cent per annum)		
LGA	**1983**	**1993**	**2003**	**2013**	**1983-1993**	**1993-2003**	**2003-2013**
Banjul	44,188	42,326	35,061	31,054	-0.4	-1.9	-1.2
Kanifing	101,504	228,214	322,735	377,134	8.4	3.5	1.6
Brikama	137,245	234,917	389,594	688,744	5.5	5.2	5.9
Mansakonko	55,263	65,146	72,167	81,042	1.7	1.0	1.2
Kerewan	112,225	156,462	172,835	220,080	3.4	1.0	2.4
Kuntaur	57,594	67,774	78,491	96,703	1.6	1.5	2.1
Janjanbureh	68,410	88,247	107,212	125,204	2.6	2.0	1.6
Basse	111,388	155,059	182,586	237,220	3.4	1.6	2.7
The Gambia	**687,817**	**1,038,145**	**1,360,681**	**1,857,181**	**4.2**	**2.7**	**3.1**

Indirect estimates from the censuses indicate a decline in under-five mortality from 277 in 1971 to 104 per 1000 live births in 1999. Despite the uncertainties surrounding the exact levels of infant and under-five mortality in The Gambia, there have undoubtedly been significant declines as in much of Sub-Saharan Africa, which are largely attributed to Primary Health Care (PHC), including the Expanded Programme on Immunisation (EPI) and Maternal and Child Health (MCH) (Ministry of Health, 2011).

In the case of adult mortality estimation, the situation has been less encouraging. Not only does general adult health needs constitute an apparent gap in the health policy of The Gambia, very little attempt has been made over the past half a century to examine the burden adult morbidity and mortality places on the socio-economic development of the country. The little information available from registered deaths in the urban area may not sufficiently give accurate national patterns of disease and mortality, especially among adults, due to differences in lifestyle and other socio-economic and environmental factors. Whilst admitting that mental health diseases, diabetes, cardio-vascular diseases and cancer constitute the non-communicable diseases known to be significant causes of death in The Gambia, the Ministry of Health and Social Welfare

(MoH&SW) confirmed that there has not been any serious study on the epidemiological status of these diseases (Ministry of Health and Social Welfare, 2011).

It has also been confirmed that one main cause of death among female adults is maternal mortality (Ministry of Health and Social Welfare, 2011). A study comparing sub-national populations from 12 African countries including one in the North Bank Region of The Gambia showed that the population of The Gambia registered the highest level of maternal mortality (Streatfield et al., 2014). The maternal mortality ratio was estimated at 1,050 per 100,000 live births in The Gambia in 1990, and 730 per 100,000 live births in 2001 (Government of The Gambia, 2002).

This report updates the mortality situation of The Gambia using the relevant mortality information collected in the 2013 Population and Housing Census. Various appropriate direct and indirect estimation techniques are applied to provide reasonably acceptable mortality indicators for the country and the eight Local Government Areas where applicable. The available data are described in Chapter 1 of the report. Chapter 2 gives an appropriate description of the estimation methods used, with an assessment of the quality of the data obtained from the census enquiry. The results obtained with respect to general levels of mortality, childhood mortality and adult mortality are presented in Chapters 3, 4 and 5 respectively. The representation of the mortality experiences of females and males in empirical life tables is demonstrated in Chapter 6.

1.2 Data sources

The 2013 Population and Housing Census questionnaire asked specific questions that generated relevant data for mortality estimation within the general population. For every household enumerated, details of deaths that occurred in the 12-month period prior to census night were recorded; including sex and age at death (Form A – Part 3 of the census questionnaire) (see Appendix 1). The information on deaths in the past 12 months enables the direct estimation of the crude death rate (CDR) and age-specific death rates (ASDRs) experienced by the entire population.

Other questions to women aged 12 years and over enquired about the total number of children they had ever given birth to, as well as how many were alive at the time of the interview, and how many had died, all disaggregated by sex (Form A – Part 2, question 22) (see Appendix 1), i.e. the "Brass-type questions". The proportions dead of children ever born and age group of mothers are used to indirectly estimate infant mortality rate (IMR or 1q0) and under-5 mortality rate (U5MR or 5q0) mortality rates over a period spanning up to a decade prior to the census. Also, the demographic information of every person enumerated in every household establishes the survival of both parents at the time of the census using the questions "Is your father alive?" and "Is your mother alive?" (Form A – Part 2, question 8) (see Appendix 1). Responses to these questions generated paternal and maternal orphanhood data that can be used to indirectly estimate adult male and female mortality levels, respectively. The indirect methods for estimating childhood and adult mortality are described in section 3.

CHAPTER 2: METHODOLOGY AND DATA QUALITY

Direct measurement techniques were adopted to estimate the crude death rate, age and sex-specific death rates. Using the information on household deaths in the year prior to the census, the CDR was obtained as the ratio of all reported deaths and the total enumerated population. The ASDRs were obtained similarly by sex as the ratio of deaths within a specified age group and the total number of persons in that age group.

These indicators were derived for The Gambia as a whole, as well as by area of residence, LGA and among five-year age groups of women to identify women with the greatest risks of maternal mortality by age group and LGA of residence. All directly derived mortality estimates refer to the mid-point of the 12-month period prior to the census, i.e. 2012.79 or 15th October 2012. However, dates for which mortality indicators refer to in this report, whether directly or indirectly estimated, are presented in decimals.

2.1 Childhood mortality estimation

The indirect technique of estimating childhood mortality was first proposed by William Brass (Brass, 1964) and is still one of the most widely used methods of estimating childhood mortality in countries characterised by a scarcity of relevant data for direct estimation of mortality. The technique is based on responses to two retrospective questions put to women in censuses and other enquiries in addition to the question that establishes their ages at the time of the enquiry. The retrospective questions relate to: (i) the number of live-born children they have given birth to; and (ii) the number of those children that have survived. The theoretical basis and application of the technique are described in detail elsewhere (Hill, 1991, 2013). The method produces childhood mortality estimates with corresponding reference dates, usually ranging between three and ten years prior to the enquiry. These correspond to the age groups of mothers from 20-24 to 44-49. Estimates based on proportions dead of children ever born (CEB) and number of mothers aged 15-19 usually over-estimate mortality. As a result, they are not considered as reliable measures of under-5 mortality in this report. The method was applied on relevant data to produce national and regional estimates of under-5 mortality, as well as by selected socio-economic characteristics.

2.2 Adult mortality estimation

Two different sets of approaches were adopted to indirectly estimate adult mortality. The first consist of the Death Distribution Methods, which adjust the reported deaths in the year prior to the census by age to correct for under-reporting, and assume that the adult population is at least approximately stable, i.e. with a regular and unchanging age structure over time. The second set consists of the orphanhood-based techniques, which convert proportions of the population by age group with surviving parents to indicators of adult female or male mortality. The details of these methods are described briefly below.

2.2.1 Death Distribution Methods

Generally, indirect demographic estimation methods that make use of data on deaths and the population at risk by age and sex to estimate adult mortality are referred to as the Death Distribution Methods. There are two categories of such methods, namely the Growth Balance methods and the Synthetic Extinct Generations methods (Timaeus, Dorrington, & Hill, 2013). Furthermore, each category consists of a method that makes use of data on the population in question at a single time point only (i.e. one census in the context of this analysis), and another that uses data on the population at two time points (i.e. two censuses usually 10 years apart). Among the Growth Balance methods, the Brass Growth Balance Method developed by Brass (Brass, 1975) is a single-census method; whilst the Generalized Growth Balance method developed by Hill (Hill, 1987) is a two-census method and does not assume that the population is stable. Likewise, the Preston and Coale Method developed by Preston et al. (Preston, Coale, Trussell, & Weinstein, 1980) is the first of the Synthetic Extinct Generations methods and requires data on the population for one time point; and its generalised form developed by Bennett and Horiuchi (Bennett & Horiuchi, 1984) to suit non-stable populations requires data at two time points. However, the application of the respective two-census methods was not possible because the reported deaths for the 2003 Population and Housing Census were not correctly tabulated in the report of that census (The Gambia Bureau of Statistics, 2007); and a correct re-tabulation could not be obtained for the preparation of this report. As a result, only the methods requiring data at one time point, i.e. single-census methods, were used and included in the analyses presented in this report. These are the Brass Growth Balance Method and the Preston and Coale Method.

2.2.1.1 Brass Growth Balance Method

The Brass Growth Balance Method estimates the completeness of the reporting of deaths relative to an estimate of the population, and makes use of the observation that in a stable population with a constant growth rate, r, closed to migration and with accurately reported demographic data, the growth rate, r, should be equal to the birth rate, b, minus the death rate, d (i.e. $r = b - d$). Further assuming that the completeness of reporting of deaths is the same for all ages above a minimum age (taken in this analysis as age 5), the method adjusts the number of reported deaths by age group and generates corrected age-specific death rates, which are consequently used to estimate adult mortality against an appropriate model mortality standard. The INDEPTH Model Standard 1 (INDEPTH Network, 2004) was used for this purpose. Details of the theoretical basis and application of the method are described elsewhere (Dorrington, 2013a).

2.2.1.2 Preston and Coale Method

The Preston and Coale method is also described in detail elsewhere (Dorrington, 2013b). It makes use of the observation that the number of people of a given age alive at a point in time must be equal to the number of people from that cohort who die from that point in time onward. Assuming that the population is stable, closed to migration, and that reported demographic data are accurate, the number of deaths aged x, t years in the future, will be equal to the number of deaths aged x currently, multiplied by ert. This makes it possible to estimate the current population aged y using only current deaths by age above age y and the stable growth rate, r. If the number of current deaths is under-reported, but can be assumed to be under-reported to the same extent, c, at every age, then the estimate of the future number of cohort deaths will be underestimated to the same extent. From there, completeness of reporting of deaths is estimated by dividing the sum of the estimates of future cohort deaths derived from the number of deaths at any date by the population at the same date. Mortality rates can then be estimated by dividing the numbers of deaths reported in each adult age group by c and then dividing these numbers by an estimate of the population exposed to risk (Dorrington, 2013b). A life table is fitted using the INDEPTH Model Standard 1, and levels of adult mortality estimated accordingly.

2.2.2 Orphanhood Methods

2.2.2.1 Lifetime[1] (or Basic) Orphanhood

The lifetime (or basic) orphanhood method of estimating adult mortality uses data on proportions with surviving mothers or fathers by age group of respondents. It contends that the proportion of mothers or fathers alive approximately equals the mean survivorship of mothers from age M to M+N,

$$\text{i.e.} \qquad S(n) \approx {l_{M+N}}/{l_m} = {}_N P_M$$

where S(n) is the proportion of mothers alive; M, the mean age of childbearing (Mf for females and Mm for males); and N, the exact age of respondents at the time of the survey (Brass, 1975; Timaeus, 1992, 2013b). It assumes basically that:

i. the mortality risk of the parents is unrelated to their fertility or to the mortality of their children;
ii. mortality declined linearly over the period being considered;
iii. an appropriate standard mortality pattern must be used for the calculation of adult survivorship between the ages of 15 and 60, 45p15; and the level of mortality, alpha (α) relative to the standard pattern.

[1] The term "lifetime" is used to mean any age in life and distinguish the method from other orphanhood-based techniques that relate the time of orphanhood to a particular event or age, e.g. orphanhood before or since marriage; and orphanhood in adulthood or inter-censal orphanhood.

The procedures for calculating 45p15 and α for males and females are explained in detail elsewhere (Timaeus, 2013b). The method was applied on the maternal and paternal orphanhood data from the 2013 Population and Housing Census data to determine recent levels of adult male and female mortality nationally and at the individual Local Government Areas; and also on the five Population and Housing Census datasets from 1973 to 2013 to produce national trends in adult male and female mortality. The mean ages of childbearing for women, Mf, required in the calculations were obtained from the fertility data from the respective enquiries. That for men, Mm, was assumed to be 37 years throughout the country in the absence of data for its estimation. The time locations of resulting estimates for both females and males were derived using the recommended equations described by Timaeus (2013). The INDEPTH Model Mortality Standard Pattern 1 for males and females were used to derive 45p15 estimates for the respective sexes (INDEPTH Network, 2004). These model patterns were preferred over the Princeton family of model mortality patterns because they are based on contemporary African mortality experience, including that of a sub-national population of The Gambia. The patterns also reflect the experience of populations with very low HIV prevalence levels. The details of these model standards are presented in Table A2 - 1 (Appendix 2).

2.2.2.2 Orphanhood in Adulthood (Inter-censal Method)

This method constitutes an ideal option for eliminating what is referred to as the "adoption effect" and inherent in the lifetime orphanhood method of estimating adult mortality, i.e. the over-estimation of survival of parents from data on respondents aged 5-9 and 10-14. It involves the construction of a synthetic cohort, based at age 20, from data on parental survival at two specific dates that are five or ten years apart. Such a cohort indicates the proportion of the adult population whose mothers or fathers would remain alive, at prevailing average inter-censal levels of mortality, among those who had a living father or mother at exact age 20. Selecting a base age of 20 minimises the underestimation of orphanhood at that particular age as opposed to age 15, thereby avoiding overestimating subsequent orphanhood and adult mortality. The theoretical basis and derivation of the main constituents of the method are stated in detail elsewhere (Timaeus, 1991, 2013a), which show that it is sensitive to differential reporting. The time locations of the resulting estimates unambiguously refer to the period between the two enquiries. The method was applied to determine the adult mortality levels for the inter-censal period of 2003 and 2013 for the country and the eight administrative regions. It was also applied on data from previous censuses to determine adult mortality for the inter-censal periods 1973-83, 1983-93 and 1993-2003 as part of the construction of the trends in adult male and female mortality over a period of about five decades. The calculations assumed the national and regional Mf values obtained from the 2013 census, and the constant Mm value of 37 years.

The results of mortality indicators derived by direct methods, i.e. CDR, ASDRs and Pregnancy-related or Maternal Mortality Rates and Ratios, are presented in Section 4 of the report. Indirect estimates of childhood mortality are presented and discussed in Section 5; whilst those of adult female and male mortality are displayed in Section 6. In as much as possible, all relevant outputs from all the methods applied are presented in the report, with details that may interest expert readers included as appendices which may also be used for further analysis, especially at LGA level. The methods used to construct national empirical life tables are explained and applied in Section 7. Unlike reports of mortality analysis of previous censuses of The Gambia, estimates of childhood and adult are presented in detail by LGA and selected socio-economic characteristics to provide more insights as to the regional variations in key mortality indicators across the country, thus serving as a guide for national and regional planning of health, population and other socio-economic development programmes.

2.3. Quality of Data

The accuracy and reliability of results obtained through the application of the Brass method (Brass, 1964) will depend on three main issues. These are:

a. the quality of the data relating to children ever born and the proportions dead by age group of mothers. The proportions dead of children ever born represent the fundamental constituents of the technique;

b. the quality of the fertility data relating to average parities of women, which essentially control for the effects of the age pattern of childbearing;

c. the selection of an appropriate mortality model.

In this regard, one can assess the quality of the data available through the application of certain consistency checks. The checks that can be applied based on the available information are:

a. examination of sex ratios of children ever born by age group of mothers, as well as total children ever born;

b. inspection of the proportions dead of children ever born by age of mothers; and

c. examination of the average parities by age of women.

Sex Ratios of Children Ever Born

On the basis that between 103 to 107 male children are born for every 100 female children given birth to in most populations, examination of the sex ratio at birth constitutes an efficient way of evaluating data relating to children born in a specified period of time in a given population. In this circumstance, however, children are being considered by the age groups of their mothers and therefore may not necessarily have been born at the same periods. The ratios obtained by age group of mothers for children ever born, children alive and children dead as reported in the 2013 census are presented in Table 2.2.3, and compared with those derived for the 2003 census. The sex ratios for children ever born and children alive reported in both the 2003 and 2013 censuses fall within or close to the range of 103-107 males per 100 females. This therefore suggests that that the reported numbers of children ever born in the 2013 enquiry are credible and appropriate for use in the estimation of childhood mortality levels.

Table 2.3: Sex ratios of children ever born, children alive and children dead by age group of mother, 2003 and 2013 censuses

	2003 Census			2013 Census		
Age group of mother	**Children Ever Born**	**Children Alive**	**Children Dead**	**Children Ever Born**	**Children Alive**	**Children Dead**
15-19	105	103	125	106	105	130
20-24	106	105	118	107	106	137
25-29	106	105	115	106	105	125
30-34	105	104	117	106	105	127
35-39	106	105	118	106	105	122
40-44	108	106	118	106	105	121
45-49	108	106	120	108	107	118

Source: The Gambia Population and Housing Censuses, 2003 and 2013

Proportions Dead of Children Ever Born

The proportions dead of children ever born by age group of mothers are expected to increase with age of mothers. This is because children of older women born further back in the past have longer periods of exposure to the risk of dying than children of younger women. In some instances, however, this rule excludes women aged 15-19 whose children have a greater risk of dying than those born to women aged 20-24. The assessment of reported proportions dead of children ever born was conducted for The Gambia as a whole, by LGA and by ethnic group, and the results are respectively presented graphically in **Figure 2.0.1** and **Figure 2.0.2.**

Figure 2.0.3: Proportions dead of children ever born by age of mother and LGA

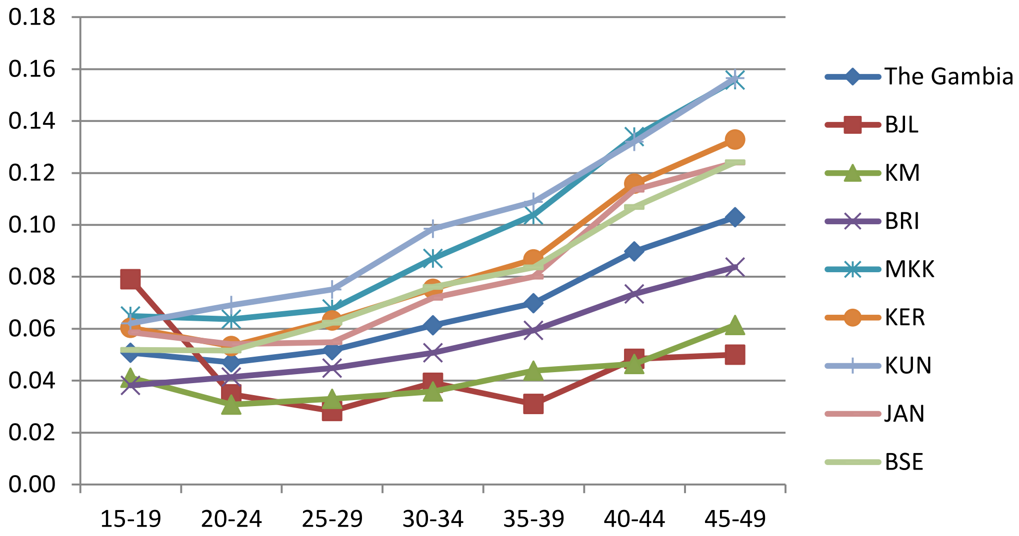
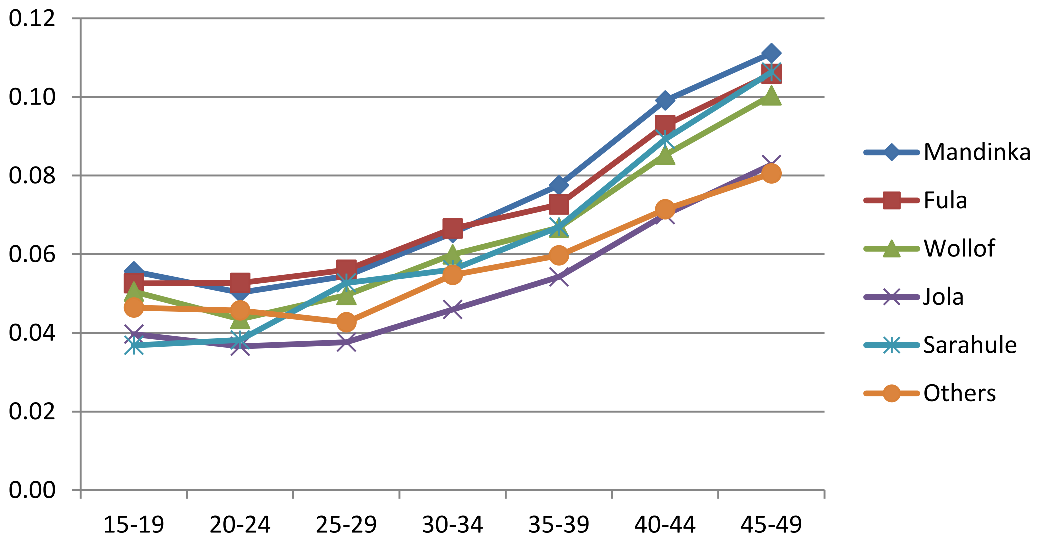


Figure 2.0.4: Proportions dead of children ever born by age of mother and ethnic group



If the 15-19 age group is excluded for the assessment, all LGAs demonstrate increasing levels of proportions dead of CEB by age group of mothers except for Banjul. Being the LGA with the least population, and has been shrinking over the past three decades, the numbers of women in Banjul and their reports of CEB and proportions dead are relatively small compared with other LGAs and may yield unstable results when applied to estimate childhood mortality indicators. GBoS should therefore consider amalgamating Banjul and Kanifing into one LGA in the future for demographic analysis purposes.

The comparison by ethnic group shows similar increasing trends in proportions dead of CEB except for the group “Others” who represent the minority of women and for whose reports of CEB and proportions dead may be too small to yield meaningful results as explained in the case of Banjul. Generally, therefore, the reports of proportions dead of CEB from women aged 15-49 in the 2013 census appear to be of reasonable quality.

Average Parities

Under normal circumstances, average parity is expected to increase with age of women. Deviation from such a pattern is an indication of omission of births, especially those relating to dead children. This recall error can be common among older women (notably those nearing the completion of their reproductive lives), and its presence in a dataset results in under-estimation of childhood mortality for periods a decade or more before the enquiry. The computed average parities are also assessed by LGA and ethnic group and the results are respectively shown graphically in **Figure 2.0.5** and **Figure 2.0.6**. Both sets of results indicate the expected increasing trends in average parities by age of mothers. This further boosts the integrity of the information given by women aged 15-49 that are required for the indirect estimation of childhood mortality. Derived estimates will be expected to be of reasonably accurate; and those obtained for Banjul LGA and "Other" ethnic groups should be interpreted with caution.

Figure 2.0.7: Average parities by age of mother and LGA

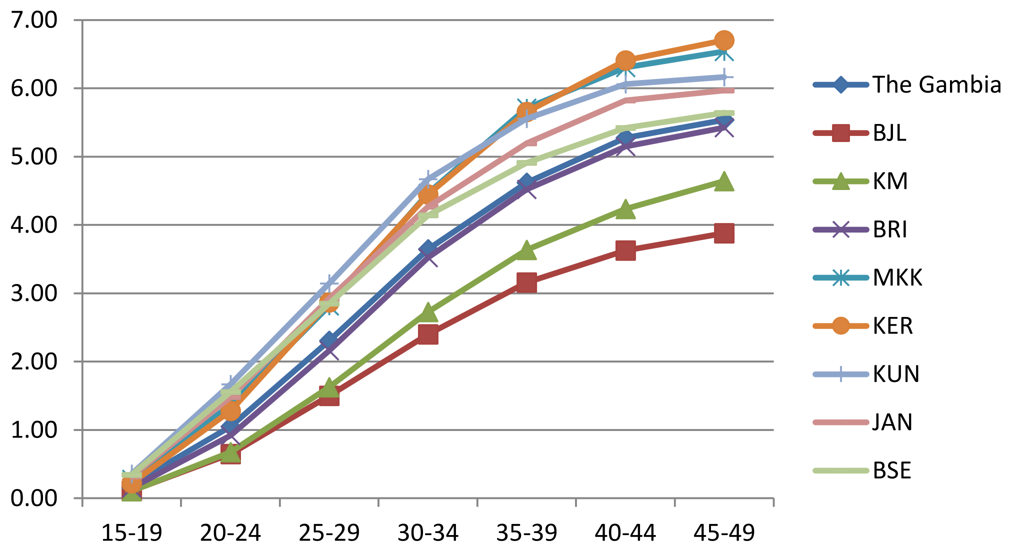
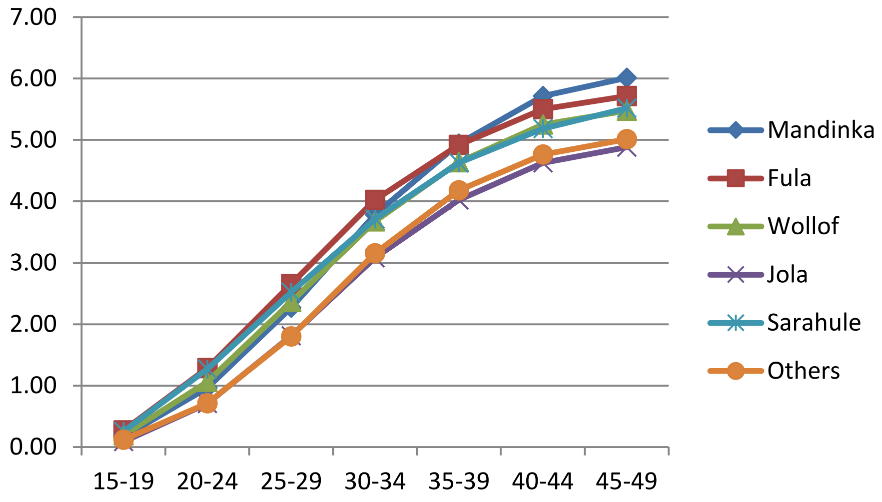


Figure 2.0.8: Average parities by age of mother and ethnic group



In addition, derived estimates at the national level will be validated with estimates obtained independently from earlier censuses of 1973, 1983, 1993 and 2003 by plotting them on the same graph and examining the extent to which they overlap with each other. The outcome of this comparison is reported in Section 5.

Deaths in last 12 months

Reports of deaths that occurred in households in the 12-month period prior to the census are usually characterised by omissions (especially for deaths of infants and the elderly) and age misreporting. The extent to which these errors are inherent in such a dataset cannot be readily determined. However, the Brass Growth Balance Method (BGBM) and the Preston and Coale Method (PCM) described above have been used to determine the completeness of the reported deaths by age, and provide adjusted ASDRs accordingly. The outputs of the application of these methods are used in Section 6 to estimate adult mortality, with more details, including completeness of death reporting, presented in Appendix 5.

CHAPTER 3: LEVELS OF MORTALITY

3.1 Crude death rate

The mortality rate or crude death rate (CDR) is generally an annual rate and consists of the ratio of the annual number of deaths occurring during one year to the number exposed to the risk of dying during the same period. The 2013 Population and Housing Census reported a total of 12,111 deaths in the 12-month period preceding the enquiry, and a total population of 1,857,181. This indicates a CDR of 6.5 per 1,000 population. The corresponding rates by area of residence were 5.1 and 7.9 per 1,000 population for urban and rural areas respectively. Similar estimates from the 2003 Census cannot be ascertained for comparison purposes over the inter-censal period because the reported deaths in households a year before the 2003 Census was in excess of 68,000 and yielded an unrealistic crude death rate of 50 per 1,000 population (The Gambia Bureau of Statistics, 2007). However, other independent sources such as the Population Reference Bureau and the World Bank estimate the CDR for The Gambia in 2012 at 9 and 10 per 1,000 population respectively (Population Reference Bureau, 2012; The World Bank, 2015). These estimates imply that deaths in the year preceding the 2013 Census were under-reported by up to 34 per cent. Whilst under-reporting of deaths is expected in such a population, the scale suggested by these independent estimates (by up to a third) appears to be on the high side and may have over-estimated the CDR of The Gambia in 2012.

3.2 Age-specific death rates

Using the reported population and deaths by age, death rates are computed for specific age groups to facilitate comparison of mortality experiences at different ages. They represent a ratio of deaths among people in a specific age group to the size of the population of that age group. They are also derived for the different sexes. The reported age-specific mortality rates (ASMRs) are presented in Table 3.2 by sex and area of residence; and graphically depicted in **Figure 3.2.** The pattern of mortality among males and females, as well as that of both sexes, depict the general "J"-shaped pattern usually observed in human populations.

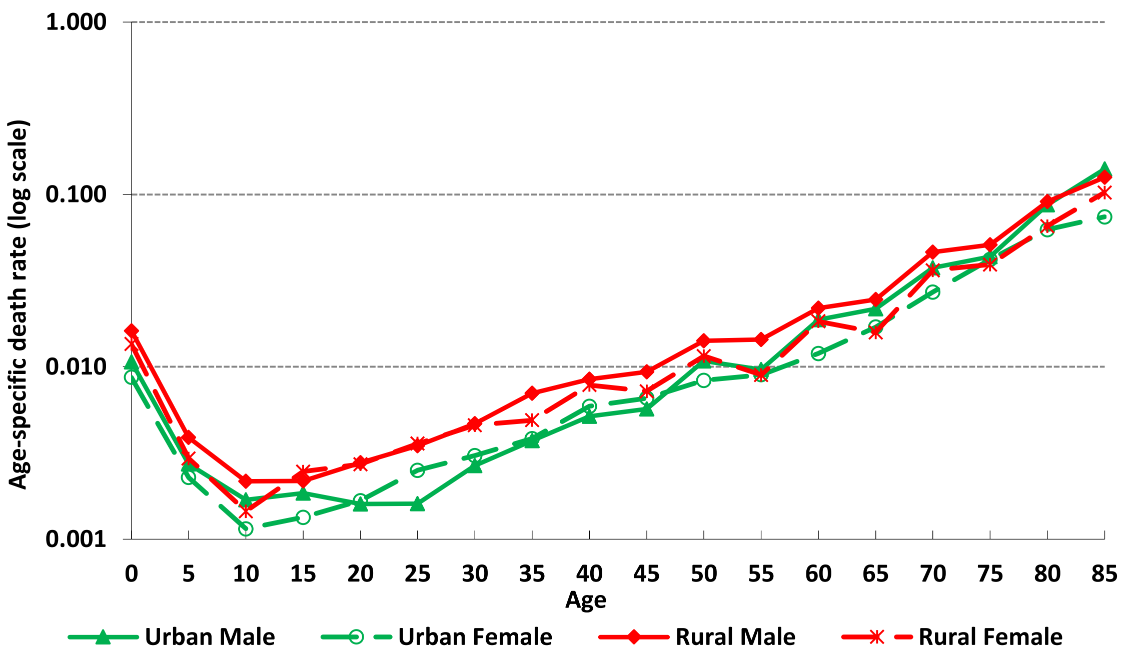
The results indicate that nationally, females generally experience lighter mortality than males at all ages except for the 20-34 and 40-44 age groups which can be attributed to the burden of maternal mortality. Many populations similar to that of The Gambia usually manifest such a difference in mortality pattern between the sexes over the entire reproductive age bracket for women (i.e. 15-49). Therefore, the relatively lower ASDRs reported for females aged 15-19 and 35-39 compared with their male counterparts is another indication of the under-reporting of deaths, especially for females.

A similar assessment of the urban population shows that female mortality was slightly higher than male mortality between the ages 20-49; and lower for all other age groups. For the rural population on the other hand, it was only for the age groups 15-19 and 25-29 that ASDRs were only slightly higher for females than males. Since maternal mortality is expected to be higher in the rural area than the urban, the reported ASDRs for rural females do not represent the expected pattern of mortality and constitutes further evidence of the under-reporting of deaths among females in the rural area.

Table 3.2: Derived age-specific death rates (mx) by sex and residence

	The Gambia			Urban			Rural		
Age	**Both Sexes**	**Male**	**Female**	**Both Sexes**	**Male**	**Female**	**Both Sexes**	**Male**	**Female**
0 - 4	0.0127	0.0138	0.0115	0.0097	0.0107	0.0087	0.0148	0.0161	0.0135
5 - 9	0.0030	0.0034	0.0027	0.0025	0.0027	0.0023	0.0034	0.0039	0.0029
10-14	0.0016	0.0020	0.0013	0.0014	0.0017	0.0011	0.0018	0.0022	0.0015
15-19	0.0020	0.0020	0.0019	0.0016	0.0019	0.0013	0.0023	0.0022	0.0025
20-24	0.0021	0.0021	0.0022	0.0016	0.0016	0.0017	0.0027	0.0028	0.0027
25-29	0.0027	0.0024	0.0030	0.0021	0.0016	0.0025	0.0035	0.0035	0.0036
30-34	0.0037	0.0035	0.0038	0.0029	0.0027	0.0031	0.0046	0.0047	0.0046
35-39	0.0047	0.0051	0.0044	0.0038	0.0037	0.0038	0.0058	0.0070	0.0049
40-44	0.0068	0.0066	0.0069	0.0055	0.0052	0.0059	0.0081	0.0085	0.0078
45-49	0.0072	0.0074	0.0069	0.0061	0.0057	0.0066	0.0082	0.0094	0.0072
50-54	0.0113	0.0125	0.0101	0.0097	0.0108	0.0083	0.0128	0.0141	0.0115
55-59	0.0107	0.0120	0.0090	0.0093	0.0096	0.0090	0.0119	0.0144	0.0090
60-64	0.0182	0.0205	0.0157	0.0157	0.0187	0.0119	0.0201	0.0219	0.0183
65-69	0.0200	0.0232	0.0163	0.0196	0.0217	0.0170	0.0204	0.0245	0.0158
70-74	0.0376	0.0429	0.0328	0.0322	0.0376	0.0271	0.0410	0.0462	0.0363
75-79	0.0443	0.0482	0.0403	0.0427	0.0435	0.0419	0.0452	0.0511	0.0392
80-84	0.0754	0.0897	0.0644	0.0728	0.0871	0.0624	0.0768	0.0910	0.0655
85+	0.1078	0.1301	0.0916	0.0980	0.1406	0.0741	0.1130	0.1257	0.1025

Figure 3.2: Age-specific death rates by sex and area of residence



ASDRs were generally lower in the urban area than rural for all age groups. Whilst the same pattern holds among males between the two areas except for the last age group of 85+, lower death rates were reported for rural females compared to urban females for the age groups

65-69 and 75-79, and similar rates for the 55-59 age group. Therefore, the majority of the unreported deaths were among rural females aged 55 years and over.

CHAPTER 4: CHILDHOOD MORTALITY

4.1 Levels and Trends

The results obtained from the application of the Brass indirect method of estimating childhood mortality indicators — infant mortality (1q0) and under-5 mortality (5q0) — are presented in Table 4.1 by sex and reference date for the whole country. They indicate that in 2010, 63 children out of every 1,000 born alive in The Gambia would not live to celebrate their fifth birthday; and 35 would die within the first year of life. The corresponding 1q0 and 5q0 estimates for males were 40 and 70 per 1,000 live births respectively; and 31 and 55 per 1,000 live births for females. Under-5 mortality rate (U5MR) decreased by 17 per cent from 76 per 1,000 live births at the end of 1999 to 63 per 1,000 live births in 2010; whilst infant mortality rate (IMR) dropped by 19 per cent from 43 per 1,000 live births within the same period. The decline in under-5 mortality observed among females (24 per cent) was twice more than that recorded among males (11 per cent). The same trend was observed among infants. The improvement in female U5MR therefore accounted for about two-thirds of the overall decline in national under-5 mortality.

Table 4.1: Probabilities of dying by age 1 year, 1q0, and by age 5 years, 5q0, by sex and reference date

Age group	Children ever born	Proportion dead	Reference date	Probability of dying by age 1 year, $_1q_0$	Probability of dying by age 5 years, $_5q_0$
Both sexes					
20-24	102,315	0.0470	2010.8	0.0353	0.0627
25-29	195,127	0.0517	2009.2	0.0330	0.0587
30-34	236,516	0.0613	2007.3	0.0347	0.0616
35-39	223,724	0.0698	2005.1	0.0355	0.0630
40-44	191,620	0.0897	2002.7	0.0417	0.0736
45-49	148,497	0.1029	1999.9	0.0429	0.0757
Male					
20-24	52,934	0.0528	2010.8	0.0397	0.0702
25-29	100,601	0.0560	2009.2	0.0358	0.0635
30-34	121,855	0.0662	2007.3	0.0375	0.0665
35-39	115,239	0.0749	2005.1	0.0381	0.0676
40-44	98,638	0.0953	2002.7	0.0443	0.0781
45-49	77,133	0.1074	1999.9	0.0449	0.0791
Female					
20-24	**49,381**	**0.0409**	**2010.8**	**0.0307**	**0.0547**
25-29	**94,526**	**0.0471**	**2009.2**	**0.0301**	**0.0536**
30-34	**114,661**	**0.0561**	**2007.3**	**0.0317**	**0.0565**
35-39	**108,485**	**0.0646**	**2005.1**	**0.0328**	**0.0583**
40-44	**92,982**	**0.0839**	**2002.7**	**0.0388**	**0.0687**
45-49	**71,364**	**0.0981**	**1999.9**	**0.0408**	**0.0721**

4.2 Childhood Mortality Differentials

Key socio-economic characteristics, such as area and administrative region of residence, ethnicity and level of maternal education, individually and collectively influence demographic, economic, cultural and environmental factors that impact on mortality of both children and adults. The scope of the analysis conducted for this report, and based on the type of data provided from the census, does not permit an assessment of the combined effect of these characteristics on under-5 mortality. However, their individual effects are as indicated in Table 4.2.1 using the most recent estimates. More detailed results, including trends, are presented in Table A4 - 1 (Appendix 4).

4.2.1 Urban-Rural and Regional Differentials

By area of residence, U5MR was estimated at 50 per 1,000 live births in urban areas; and 71 per 1,000 live births in rural areas, 43 per cent more. Among the LGAs, estimated levels of under-5 mortality ranged from 43 per 1,000 live births in Kanifing LGA to 88 per 1,000 live births in Kuntaur LGA, more than twice as high. Mansakonko LGA also recorded almost twice as high U5MR as Kanifing; whilst the observed levels in Kerewan, Janjanbureh and Basse LGAs were higher than the national level.

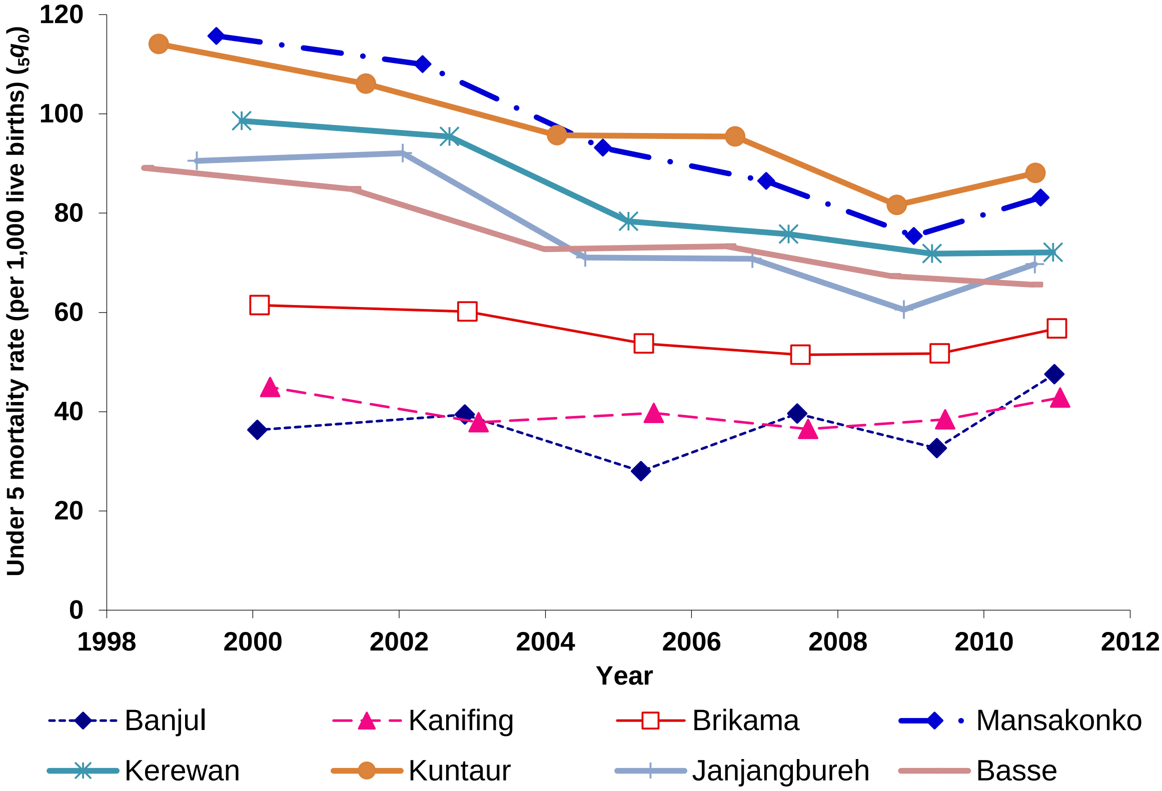
Table 4.2.1: Childhood mortality indicators and reference dates by socio-economic characteristics

	Reference Date	Infant Mortality Rate* ($_1q_0$)	Child Mortality Rate‡ ($_4q_1$)	Under-5 Mortality Rate* ($_5q_0$)	Rate Ratios $_1q_0$	Rate Ratios $_4q_1$	Rate Ratios $_5q_0$
Urban	2011.0	27.8	22.5	49.7	–	–	–
Rural	2010.8	40.2	32.2	71.1	1.45	1.43	1.43
Banjul	2011.0	26.5	21.5	47.4	1.11	1.11	1.11
Kanifing	2011.0	23.9	19.4	42.8	–	–	–
Brikama	2011.0	31.9	25.7	56.7	1.33	1.32	1.32
Mansakonko	2010.8	47.3	37.6	83.1	1.98	1.94	1.94
Kerewan	2010.9	40.8	32.6	72.1	1.71	1.68	1.68
Kuntaur	2010.7	50.2	39.9	88.0	2.10	2.06	2.06
Janjanbureh	2010.7	39.4	31.5	69.7	1.65	1.62	1.63
Basse	2010.7	37.0	29.7	65.5	1.55	1.53	1.53
Mandinka	2011.0	38.7	31.0	68.6	1.38	1.37	1.37
Fula	2010.7	38.8	31.1	68.7	1.38	1.37	1.37
Wollof	2010.9	33.0	26.5	58.6	1.17	1.17	1.17
Jola	2011.2	29.2	23.6	52.1	1.04	1.04	1.04
Sarahule	2010.8	28.1	22.7	50.2	–	–	–
Others	2011.0	35.5	28.5	63.0	1.26	1.26	1.25

	Reference Date	Infant Mortality Rate* ($_1q_0$)	Child Mortality Rate‡ ($_4q_1$)	Under-5 Mortality Rate* ($_5q_0$)	Rate Ratios $_1q_0$	$_4q_1$	$_5q_0$
None/Early childhood	2010.4	34.7	27.9	61.7	2.51	1.15	2.48
Primary	2010.8	38.0	28.0	67.2	2.75	1.16	2.70
Secondary	2011.2	30.0	30.4	53.5	2.17	1.26	2.15
Tertiary	2009.7	13.8	24.2	24.9	–	–	–

* *Expressed as per 1,000 live births;* ‡ *Expressed as per 1,000 population. "–"denotes reference category*

Figure 4.2.1: Trends in Under 5 mortality by LGA



Therefore the middle and northern part of the country — represented by Mansakonko, Kerewan and Kuntaur LGAs — constitute the regions of high childhood mortality in the country; whilst Brikama, Kanifing and Banjul LGAs are the relatively lower mortality regions. This regional pattern of under-5 mortality persisted from up to a decade prior to the census as shown in figure 4.2.1. However, the LGAs with the higher under-5 mortality levels registered faster declines — 28 per cent in Mansakonko, 27 per cent in Kerewan, 26 per cent in Basse, and 23 per cent in Janjanbureh and Kuntaur LGAs. The declines observed in Kanifing and Brikama LGAs were rather sluggish at 4.7 and 7.8 per cent respectively. The derived estimates for Banjul LGA, especially those referring to earlier periods, were not reliable enough to be subjected to similar analysis.

4.2.2 Ethnic Differentials

Among the different ethnic groups, Sarahules and Jolas recorded under-5 mortality levels of 50 and 52 per 1,000 live births — about 20 per cent less than the national average (Table). Mandinkas and Fulas experienced the same level of under-5 mortality of 69 per 1,000 live births, about a third more than that of the Sarahule ethnic group. The U5MR of Sarahules declined by more than a third (35 per cent) from 77 per 1,000 live births in 1999 to 50 per 1,000 live births in 2010. The corresponding decline among the Wollof ethnic group was about a fifth (21 per cent); 17 per cent among the Mandinkas; 14 per cent among Jolas; and 11 per cent for Fulas.

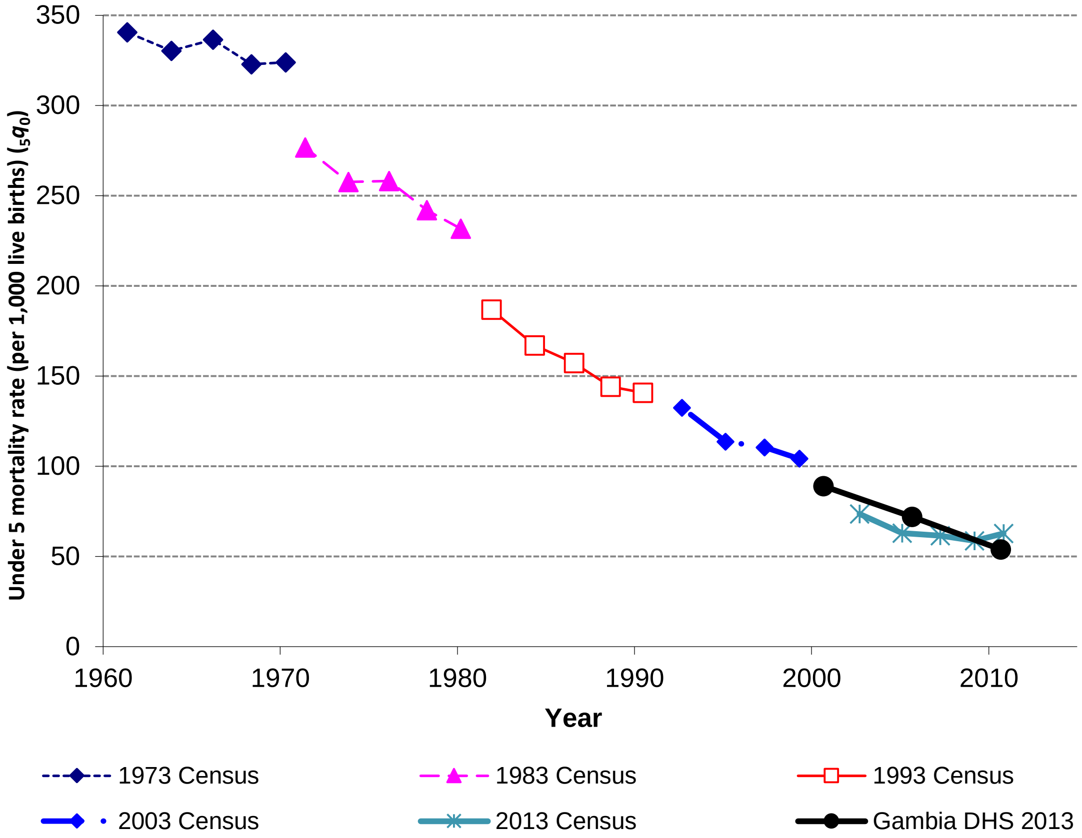
4.2.3 Differentials by Maternal Education

Although the under-5 mortality estimates derived for earlier periods for mothers with tertiary education are not reliable due to the relatively smaller number of women and children ever born, the estimate of 25 per 1,000 live births that referred to the date 2009.7 is robust enough to be considered reliable. Using it as reference category for comparison purposes, it is clear that mothers with lower educational levels experienced under-5 mortality rates more than twice as high — 2.7 times among women with primary education (67 per 1,000 live births), and 2.5 times higher among mothers without formal education or only in early childhood. It is worth noting that only mothers without or only early childhood education registered a decline in under-5 mortality over the 11-year period preceding the census.

4.3 Long Term Trends in Under-5 Mortality

Another technique of validating indirectly derived estimates of under-5 mortality is to assess the trend depicted by independent sets of estimates from previous censuses or enquiries for the same population. The Brass method was applied on data from the 1973, 1983, 1993 and 2003 censuses of The Gambia. The resulting estimates were plotted on the same graph as shown in Figure 4.3.

Figure 4.3: Trends in Under-5 mortality in The Gambia, 1961-2010, derived from five independent national census datasets and The Gambia DHS, 2013



Sources: The Gambia Population and Housing Censuses, 1973, 1983, 1993, 2003 and 2013; and The Gambia DHS, 2013

They show a distinctly declining trend in under-5 mortality in The Gambia which commenced in the early 1960s; and collectively validate each set of estimates including those derived from the 2013 census. This further shows that the information on children ever born, proportions dead and average parities obtained from the 2013 census are of reasonable quality.

The trend in under-5 mortality indicates a national decline of over 80 per cent in about five decades (**Figure 4.3)**, i.e. from 341 per 1,000 live births in 1961 to the most recent level of 63 per 1,000 live births in 2010. The estimated level in 1990 was 141 per 1,000 live births, thus implying an MDG4 target of 47 per 1,000 live births for The Gambia. Projecting linearly to 2015 at a rate of decline in under-5 mortality of 3.4 deaths per 1,000 live births per annum, the country should have reached its MDG 4 target in 2014. An earlier independent study in the Kerewan LGA showed that the sub-national population covered by prospective demographic surveillance reached its MDG 4 target seven years early (Jasseh et al., 2011).

4.4 Comparison with Estimates from other Sources

The Gambia DHS 2013, the most recent nationally representative demographic enquiry conducted in the country, yielded a direct under-5 mortality rate of 54 per 1,000 live births for the five-year period prior to the survey, i.e. March 2008 to February 2013. The three estimates generated for the 15-year period before the survey were used with reference dates at the mid-point of each period and superimposed on the graph of the under-5 mortality trend depicted by the census-based indirect estimates (see Table). The follow a similar trend with the estimates derived from the census, thus further independently enhancing the integrity of the data on children ever born and proportions dead of the census.

Other international bodies engaged in the measurement of mortality indicators for countries of the world estimated under-5 mortality for The Gambia in 2010 as follows:

i. The Wold Bank - 82 per 1,000 live births (The World Bank, 2015);
ii. The World Health Organization - 82 per 1,000 live births (WHO, 2015);
iii. United Nations Children's Fund - 98 per 1,000 live births (UNICEF, 2011).

These estimates are 30 per cent - 55 per cent higher than that obtained from the 2013 census; and about 50 per cent - 80 per cent higher than that derived from the 2013 DHS.

CHAPTER 5: ADULT MORTALITY

Application of the various methods described in Section 3 to estimate adult mortality are expected to yield either sets of estimates over time or single point estimates. The extent to which the resulting estimates from the different methods overlap and validate each other by depicting a distinct trend over time determines the level of confidence one can accord to the derived levels of adult mortality. The results from the methods applied are presented and assessed individually in this Section; and then combined a single graph for each sex to evaluate the extent to which the independent estimates validate each other and illustrate an acceptable trend in adult mortality for Gambian females and males over time.

5.1 Death Distribution Methods

The Brass Growth Balance and Preston and Coale methods were applied on appropriate data for females and males from the 2013 census to estimate adult mortality for the respective sexes. The outputs of the applications are summarised in Table 5.1 below. The detailed steps showing the application of both methods and their corresponding outputs are presented in Appendix 5.

Table 5.1: Summary of outputs from the application of the Brass Growth Balance and Preston & Coale Methods to estimate adult mortality by sex for the reference date of 2012.79

Method	Females	Males
Brass Growth Balance Method		
Age range used for fitting of line:	5 – 84	5 – 84
Estimated level of completeness, c:	141 per cent	142 per cent
Annual growth rate of stable population, r:	4.1 per cent	4.0 per cent
Resulting level of Alpha, α:	-0.5193	-0.5929
Resulting level of Beta, β:	0.7373	0.8531
Estimated level of adult mortality, ${}_{45}q_{15}$:	**0.1457**	**0.1743**
Preston and Coale Method		
Age range used for fitting of line:	5 – 84	5 – 84
Age range used to determine completeness:	15 – 64	15 – 64
Estimated level of completeness, c:	70 per cent	83 per cent
Annual growth rate of stable population, r:	3.1 per cent	3.1 per cent
Resulting level of Alpha, α:	-0.0813	-0.2698
Resulting level of Beta, β:	0.8200	0.9274
Estimated level of adult mortality, ${}_{45}q_{15}$:	**0.2798**	**0.2839**

Since basis of both methods is to adjust for under-reporting of deaths in the first instance, the results from the Brass Growth Balance methods suggest that deaths were over-reported instead in the 2013 census by 41 per cent among females and 42 per cent among males. It produced estimated adult mortality rates of 146 per 1,000 for females and 174 per 1,000 for males, all with the reference date of 2012.79 (Table 5.1). To put these estimates into context, they are compared with estimates made for all countries in the world for the period 1970-2010, where adult mortality rates for females and males of The Gambia in 2010 were estimated at 221 and 312 per 1000 respectively (Rajaratnam et al., 2010). It is clear, therefore, that the Brass Growth Balance method has not worked for the Gambian data used to warrant over-reporting of deaths, and yielding relatively low adult mortality estimates for the country that are less than those estimated for countries in Eastern Europe (for females) and Central Europe (for males) (Rajaratnam et al., 2010).

The Preston and Coale method, on the other hand, estimated that deaths were under-reported by 30 per cent among females and 17 per cent among males in the 2013 census. This corroborates the observation in Section 4 regarding the possible under-reporting of female deaths especially from the assessment of the reported ASDRs. The method also produced adult mortality estimates for 2012.79 of about 280 per 1,000 for females and 284 per 1,000 for males (Table 5.1). These estimates compare better with those derived independently by Rajaratnam et al., albeit with a rather narrow gap between females and males than usually expected.

5.2. Orphanhood Methods

Table and Table show the estimates from the orphanhood techniques applied to estimate adult mortality, indicating the survivorship and corresponding mortality probabilities between exact ages 15 and 60 years (i.e. 45p15 and 45q15) and the reference dates those probabilities prevailed. Table presents the estimates based on lifetime orphanhood for both sexes. The most recent estimates of ${}^{45}q^{15}$ for females and males are 131 and 190 per 1,000 with reference dates of 2009.7 and 2008.6 respectively. Whilst adult males consistently experienced heavier mortality than their female counterparts, the estimates appear to be low compared with the levels determined by Rajaratnam et al. (2010). However, the declines of 83 per cent in female adult mortality over a decade and 31 per cent in males over seven years indicate that the orphanhood data were not affected by the "adoption effect", i.e. over-reporting of parental survival in the younger age groups.

The orphanhood in adulthood or inter-censal method yielded single estimates of 45q15 for each sex as shown in Table . These estimates are based on the orphanhood data from the 2003 and 2013 censuses, and obviously refer to the mid-point of the two census dates, i.e. 2008.3. The derived 45q15 estimates of 198 per 1,000 for females and 324 per 1,000 for males are higher than those obtained from the lifetime orphanhood method for similar reference dates.

Estimates of 45q15 derived from lifetime orphanhood by sex, area of residence and LGA are presented in Table A6 - 1 (Appendix 6). They depict the regional trends in adult female and male mortality by about a decade and seven years respectively. Single average estimates for each sex and by area of residence and LGA were also obtained from the inter-censal method and presented in Table A7 - 1 (Appendix 7). The most recent estimates from both methods are displayed in Table .

Table 5.2a: Estimates of adult female and male mortality from lifetime orphanhood for The Gambia

Age	Proportion with living mother *S*(n)	*l*(25+n) / *l*(25)	Level (Alpha)	Reference Date	$_{45}p_{15}$	$_{45}q_{15}$
The Gambia, Females						
		(M_f = 28.08)				
10	0.9834	0.9806	-0.5865	2009.7	0.8691	0.1309
15	0.9678	0.9667	-0.5135	2007.5	0.8529	0.1471
20	0.9433	0.9454	-0.4396	2005.6	0.8349	0.1651
25	0.9114	0.9186	-0.3909	2003.8	0.8223	0.1777
30	0.8690	0.8841	-0.3873	2002.3	0.8214	0.1786
35	0.8066	0.8323	-0.3771	2001.2	0.8187	0.1813
40	0.7266	0.7645	-0.3646	2000.5	0.8153	0.1847
45	0.6076					
The Gambia, Males						
Age	**Proportion with living father S(n)**	**l(35+n) / l(35)**	**Level (Alpha)**	**Reference Date**	**45p15**	**45q15**
		(Mm = 37)				
10	0.9505	0.9580	-0.5971	2008.6	0.8105	0.1895
15	0.9097	0.9351	-0.6584	2006.6	0.8275	0.1725
20	0.8407	0.8665	-0.4695	2004.7	0.7716	0.2284
25	0.7557	0.7932	-0.4232	2003.2	0.7564	0.2436
30	0.6658	0.6903	-0.3570	2002.0	0.7338	0.2662
35	0.5458	0.5671	-0.3302	2001.6	0.7244	0.2756
40	0.4285					

Table 5.2b: Estimation of adult female and male mortality in The Gambia from orphanhood in adulthood (Inter-censal method), 2003-2013

	Proportion not orphaned in 2003 5Sx(t)	Proportion not orphaned in 2013 5Sx(t+h)	Average proportion not orphaned 5Sx(~t)	Adjusted proportion not orphaned since age 20	l(25+n) / l(45)	Alpha	45p15	45q15
The Gambia, Females					**~*m*=27.7**			
20	0.9505	0.9433	0.9469	0.9302				
25	0.9160	0.9114	0.9137	0.9811	0.9710	-0.2595	0.7853	0.2147
30	0.8661	0.8690	0.8676	0.9311	0.9292	-0.2781	0.7908	0.2092
35	0.7809	0.8066	0.7936	0.8595	0.8685	-0.2780	0.7908	0.2092
40	0.6932	0.7266	0.7097	0.7840	0.8079	-0.3366	0.8076	0.1924
45	0.5595	0.6076	0.5831	0.6653	0.6973	-0.3187	0.8025	0.1975
50	0.4646	0.5040	0.4839	0.5752	0.6100	-0.4501	0.8376	0.1624
		Reference date:	**2008.3**		**Average:**	**-0.3202**	**0.8024**	**0.1976**
The Gambia, Males								
					~m=37			
20	0.8564	0.8407	0.8485	0.8046				
25	0.7705	0.7557	0.7630	0.9437	0.9077	-0.2560	0.6975	0.3025

	Proportion not orphaned in 2003 5Sx(t)	Proportion not orphaned in 2013 5Sx(t+h)	Average proportion not orphaned 5Sx(~t)	Adjusted proportion not orphaned since age 20	l(25+n) l(45)	Alpha	45p15	45q15
30	0.6592	0.6658	0.6625	0.8174	0.7842	-0.1935	0.6742	0.3258
35	0.5239	0.5458	0.5347	0.6682	0.6372	-0.1954	0.6749	0.3251
40	0.4047	0.4285	0.4164	0.5333	0.4745	-0.1491	0.6573	0.3427
45	0.2805	0.2997	0.2900	0.3830				
50	0.2017	0.2168	0.2091	0.2859				
		Reference date:	**2008.3**		**Average:**	**-0.1985**	**0.6760**	**0.3240**

Sources: The Gambia Population and Housing Censuses, 2003 and 2013

The lifetime orphanhood estimates refer to the time period 2009.7 for females, and 2008.6 for males; whilst those obtained from the inter-censal method all refer to 2008.3 like the national estimates. As observed earlier at the national level, the estimates for adult male mortality from both methods are only about three months apart, but the lifetime orphanhood estimates are consistently lower than those derived by the inter-censal technique.

From the set of lifetime orphanhood estimates, adult female and male mortality levels in rural areas were 10 per cent and 18 per cent higher than levels in the urban areas respectively. Mansakonko LGA displays the highest level of adult mortality for both sexes, followed by Basse and Janjanbureh in the eastern half of the country. This is similar to the regional pattern observed for under-5 mortality in Section 5, thus confirming these LGAs as the regions with the highest levels of general mortality, headed by Mansakonko, where adult males and females respectively have 65 per cent and 37 per cent higher chance of dying than their counterparts in Kanifing.

Table 5.2c: Most recent orphanhood-based estimates of adult mortality by sex, residence and LGA

	$_{45}q_{15}$	**Rank**	**Rate Ratio**	$_{45}q_{15}$	**Rank**	**Rate Ratio**
Lifetime Orphanhood Method						
	Females, 2009.7			**Males, 2008.6**		
Residence						
Urban	0.1239	1	—	0.1716	1	—
Rural	0.1358	2	1.10	0.2017	2	1.18
LGA						
Banjul	0.1071	1	0.87	0.1436	2	1.01
Kanifing	0.1228	3	—	0.1424	1	—
Brikama	0.1324	5	1.08	0.1969	5	1.38
Kerewan	0.1187	2	0.97	0.1926	4	1.35
Mansakonko	0.1685	8	1.37	0.2355	8	1.65
Kuntaur	0.1288	4	1.05	0.1756	3	1.23
Janjanbureh	0.1328	6	1.08	0.2050	6	1.44
Basse	0.1377	7	1.12	0.2081	7	1.46

Orphanhood in Adulthood (Inter-censal) Method

	Females, 2008.3			Males, 2008.3		
Residence						
Urban	0.1900	1	—	0.3026	1	—
Rural	0.1955	2	1.03	0.3507	2	1.16
LGA						
Banjul	0.1864	4	0.97	0.2314	1	0.81
Kanifing	0.1931	5	—	0.2846	2	—
Brikama	0.2030	6	1.05	0.3422	6	1.20
Kerewan	0.1567	1	0.81	0.3403	5	1.20
Mansakonko	0.2223	7	1.15	0.3626	8	1.27
Kuntaur	0.1784	3	0.92	0.3198	4	1.12
Janjanbureh	0.1751	2	0.91	0.2865	3	1.01
Basse	0.2284	8	1.18	0.3527	7	1.24

"–" denotes reference category.

Sources: The Gambia Population and Housing Censuses, 2003 and 2013

5.3 Trends in Adult Mortality

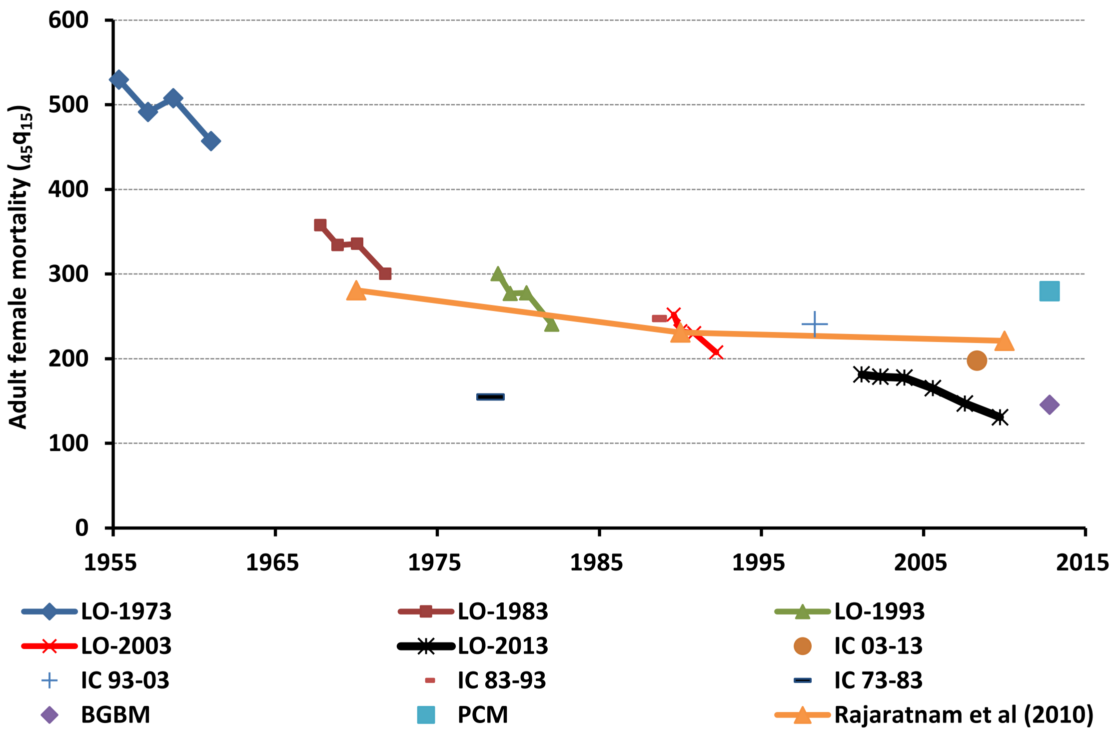
An assessment of the trends in adult mortality by sex provides an opportunity to determine which estimates can be regarded as being more reliable or to confirm ranges where the actual levels may lie. In order to generate as many estimates as possible and covering a wide range of time, orphanhood data from the 1973, 1983, 1993 and 2003 censuses were used and applied to the lifetime and inter-censal adult mortality estimation techniques. Each census dataset generated a range of estimates derived from lifetime orphanhood; and the inter-censal method generated estimates for the 1973-83, 1983-93 and 1993-2003 inter-censal periods. The details of this exercise involving previous censuses are not included in this report. However, the relevant estimates selected on the basis of their reliability are plotted in the same graphs as those obtained using the 2013 orphanhood data by sex. The outcomes are presented in Figure , panel A for females, and panel B for males. The levels estimated by Rajaratnam et al. (2010) for The Gambia in 1970, 1990 and 2010 are also included in the respective plots of adult mortality for comparison purposes.

The selected estimates of adult female mortality derived from lifetime orphanhood depict a fairly distinct declining trend ranging from about 530 per 1,000 in the mid-1950s to 131 per 1,000 in 2009 (Figure , panel A). Since these estimates come from independent datasets, the manner in which they validate each other by delineating a plausible declining trend in adult Gambian female mortality boosts their reliability, even though the two most recent among those derived from the 2013 census data appear to be somewhat low as observed earlier. Disregarding the two most recent lifetime orphahood-based estimates, the trend appears to be further corroborated by the inter-censal estimates of 1983-1993, 1993-2003 and 2003-2013. The inter-censal of 1973-1983 can be rejected as unreliable because the increase in adult female mortality it implies to have occurred between 1978 and 1988 is implausible. The single estimates derived from the Brass Growth Balance and Preston and Coale methods appear to slightly over- and under-estimate adult female mortality respectively relative to the trend depicted by the estimates obtained from the lifetime orphanhood method. As a result, the most reliable recent estimate for adult female mortality in The Gambia is the 2003-2013 inter-censal estimate of 198 per 1,000 in 2008.29.

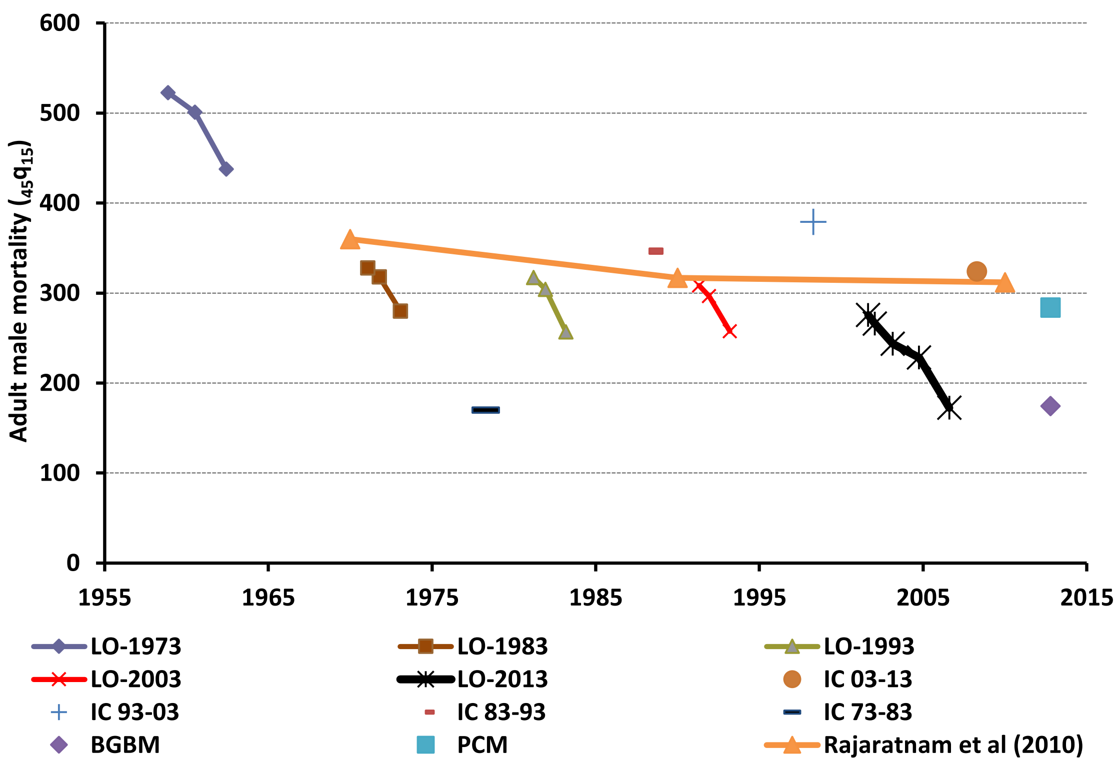
In the case of males, the trend depicted by the estimates derived from lifetime orphanhood is less clear-cut (Figure , panel B). However, the earlier of the estimates from each set (i.e. the last two obtained from each dataset) appear to mark out an acceptable trend in adult male mortality over the years, declining from 522 per 1,000 in 1958 to 266 per 1,000 in 2002. This trend is corroborated by the inter-censal estimates for 1983-1993 and 2003-2013, as well as the estimate generated by the Preston and Coale method. As in the case of females, the inter-censal estimate of adult male mortality for 1973-1983 is unreliable; and that produced by the Brass Growth Balance method represents a significant under-estimation of adult male mortality relative to the trend delineated by the earlier two of the respective sets of estimates obtained from lifetime orphanhood. Therefore, the most reliable recent estimate of adult Gambia male mortality is that produced by the Preston and Coale method, i.e. 284 per 1,000 in 2012.79.

Figure 5.3: Trends in Gambian adult female and male mortality (45q15) estimated from lifetime and inter-censal orphanhood methods, BGBM and PCM, 1955-2009

A. Females



B. Males



LO – Lifetime Orphanhood; IC – Inter-censal; BGBM – Brass Growth Balance Method; PCM – Preston and Coale Method
Sources: The Gambia Population and Housing Censuses: 1973, 1983, 1993, 2003 and 2013; and Rajaratnam et al. (2010)

CHAPTER 6: NATIONAL LIFE TABLES

From the data available and the specific mortality indicators derived from them using the methods described and presented in this report, there are three possible approaches that can be adopted to construct empirical life tables to adequately represent Gambian mortality experiences by sex. These approaches are:

1. Using the reported and unadjusted ASDRs (presented in Table *3*.3.2) to construct abridged life tables for females, males and both sexes using standard life table construction techniques with an assumed set of nax2 values to yield national life tables for The Gambia as at 2012.79.

2. Using the sets ASDRs obtained by adjusting for death distribution between exact ages 5 and 85 using the Brass Growth Balance and Preston and Coale methods (presented in Appendix 5), which were adopted in Section 6 to estimate adult mortality. These are combined with extrapolated values of 1q0 and 4q1 from the sets of under-5 mortality estimates obtained for both sexes using the Brass technique in Section 5 to the period 2012.79, the time that the adjusted ASDRs prevailed.

3. Using a method of combining indirect estimates of child and adult mortality to produce a life table for a specific period in time. This method is described in detail elsewhere (Timaeus & Moultrie, 2013). It fits a life table based on a standard life table that has an age pattern of mortality similar to that of the population for which the life table is being fitted. Also, the standard life table does not necessarily have to be any of those used to estimate the sets of under-5 and adult mortality.

All three approaches are attempted and evaluated accordingly to determine the life tables that most appropriately represent recent mortality experience of The Gambia. The first two approaches are similar and are therefore jointly explored and presented in the ensuing part of this Section. The third approach is explored in more detail and reported separately. All outputs are included as Appendices where necessary; and the plausibility of each set of life tables are assessed based on observations made on the data and derived estimates of childhood and adult mortality in earlier sections of the report.

6.1 National life tables based on reported and adjusted age and sex-specific death rates

The ASDRs by sex obtained from population numbers and reports of household deaths 12 months prior to the census (Table 3.3.2) were used as nmx values to construct life tables for females and males respectively. A value of 1.5 was assumed for nax for the 0-4 age group; 5.0 for the open age group of 85+; and 2.5 for all other age groups. The resulting abridged life tables for females and males, both with reference date of 2012.79, are presented in Table A8 -

[2] See Table A8 - 1 (Appendix 8) for a full description of life table notations

2 (Appendix 8). The derived lx values and the corresponding levels of 5q0, 45q15 and life expectancy at birth, eo0, are shown in Table 6.1.

Table 6.1: Fitted national life tables using reported and adjusted age and sex-specific death rates and referring to 2012.79, the mid-point of the 12-month period prior to the census

	Fitted Life Tables (l_x)						
	Using reported ASDRs			Adjusted ASDRs by BGBM		Adjusted ASDRs by PCM	
Age (x)	**Females**	**Males**	**Age (x)**	**Females**	**Males**	**Females**	**Males**
0	1.00000	1.00000	0*	1.00000	1.00000	1.00000	1.00000
			1*	0.97305	0.96449	0.97305	0.96449
5	0.94490	0.93431	5	0.95180	0.93728	0.95180	0.93728
10	0.92708	0.91545	10	0.94273	0.92595	0.93342	0.91826
15	0.91839	0.90502	15	0.93827	0.91964	0.92459	0.90776
20	0.90586	0.89434	20	0.93181	0.91315	0.91174	0.89693
25	0.89195	0.88320	25	0.92458	0.90635	0.89772	0.88579
30	0.87282	0.87083	30	0.91455	0.89876	0.87818	0.87304
35	0.84932	0.85286	35	0.90208	0.88765	0.85436	0.85490
40	0.82317	0.82717	40	0.88800	0.87160	0.82745	0.82880
45	0.78343	0.79514	45	0.86616	0.85131	0.78709	0.79630
50	0.74584	0.76089	50	0.84500	0.82925	0.74869	0.76163
55	0.69399	0.70650	55	0.81492	0.79337	0.69596	0.70622
60	0.65115	0.65777	60	0.78922	0.76027	0.65247	0.65681
65	0.58216	0.58225	65	0.74601	0.70697	0.58240	0.58041
70	0.51810	0.50682	70	0.70354	0.65088	0.51750	0.50422
75	0.40958	0.39158	75	0.62533	0.55836	0.40764	0.38801
80	0.30650	0.29279	80	0.54086	0.46983	0.30362	0.28885
85+	0.19162	0.16861	85+	0.42838	0.33985	0.18837	0.16487
Implied ${}_5q_0$=	55	66		48	63	48	63
Implied ${}_{45}q_{15}$=	291	273		159	173	294	276
Implied e^o_0=	63.9	63.2		78.0	72.5	64.0	63.2

* ${}_1q_0$ and ${}_4q_1$ for 2012.79 were determined from an extrapolation by simple linear regression of ${}_1q_0$ and ${}_5q_0$ estimates derived by the Brass technique.
BGBM – Brass Growth Balance Method; PCM – Preston and Coale Method

Since the ASDRs are unadjusted for the potential errors of omission and age misreporting, it is not unsurprising to observe in the resulting life tables higher adult female mortality than male, which is very unusual in most human populations. Although the implied life expectancies at birth appear to be reasonable, the difference of 0.7 years between females and males casts more doubt as to the representativeness of these life tables to mortality experiences of Gambian females and males.

The adjusted ASDRs using the Brass Growth Balance and Preston and Coale methods were subjected to the same life table construction procedure with similar assumptions of nax values for the respective age groups. Since both methods were set to adjust for potential reporting errors between the ages 5 and 84, 1q0 and 4q1 were estimated by extrapolating from a line fitted by simple linear regression of 1q0 and 5q0 estimates derived from the application of the Brass technique and presented in Table 4.1. The extrapolated values for the reference date of 2012.79 were included in the construction process and the resulting abridged sets life tables are presented in Table A8 - 3, based on ASDRs adjusted using the Brass Growth Balance method; and Table A8 - 4, based on ASDRs adjusted using the Preston and Coale method. The corresponding values of lx and their respective implied levels of 5q0, 45q15 and eo0 are also shown in Table 6.1. Whilst the life tables based on ASDRs adjusted using the Peston and Coale method appear to be very similar to those derived from the unadjusted ASDRs and with almost the same levels of 45q15 and e_o0, the life tables generated by the ASDRs adjusted using the Brass Growth Balance method yield relatively low estimates of adult mortality and life expectancies way above the range expected for developing country populations such as The Gambia. As a result, none of the two sets of life tables can be adopted as appropriate representation of the Gambia's mortality experience.

6.2 National life tables derived by combining indirect estimates of child and adult mortality

The third approach mentioned above involves using indirectly estimated levels of child and adult mortality from the same population to generate an empirical life

to represent the mortality experience of the population. Using sex disaggregated estimates produces sex-specific life tables accordingly. The method sets out to determine the parameters of the level, α, and pattern, β, of mortality of a relational logit model life table applicable to a specified point in time that offers the best fit to the observed data points used as inputs. These data points are child mortality estimates, q(x) and their corresponding reference dates, derived from data on children ever-born and proportions alive using the Brass technique; and adult survivorship estimates, np25 for females and np35 for males with corresponding reference dates, derived from lifetime orphanhood. With such input data, there is no need to assume that the age pattern of mortality in the population corresponds to that in any particular 1-parameter family of model life tables (Timaeus & Moultrie, 2013).

Using the defined input information, the method first derives and plots the implied values of α against the time location of each estimate, separately for child and adult mortality; making the assumption that β is equal to 1. The resulting "alpha plot" is used to identify the data points that depict a distinct and consistent trend in the value of α over time. The selected points are then used to iteratively calculate final estimates of α and β at the specified date the life table should refer to. A fitted model life table can then be calculated from the standard using the iteratively derived values of α and β (Timaeus & Moultrie, 2013). The method is designed to use the Princeton and UN families of model life tables as standard. As result, the UN General standard was adopted for the generation of life tables for The Gambia.

The q(x) estimates for females presented in Table A4 - 1 and the np25 estimates for females derived from lifetime ophanhood presented in Table A6 - 1 were applied as input data into the method. The estimates provided an overlap in time ranging from 1996.93 to 2012.72 and over which a life table can be generated for any specified time. A similar process for males using the relevant input data from the same sources provided a time overlap from 1996.85 to 2011.64. In order to generate life tables for males and females that refer to the same time, it was decided to select the middle of 2011, i.e. 2011.5, as the reference date for the resulting life tables; and that of both sexes taken as the simple average of the two.

Figure 6.2a: Final plot of female, child and adult αs against their time locations

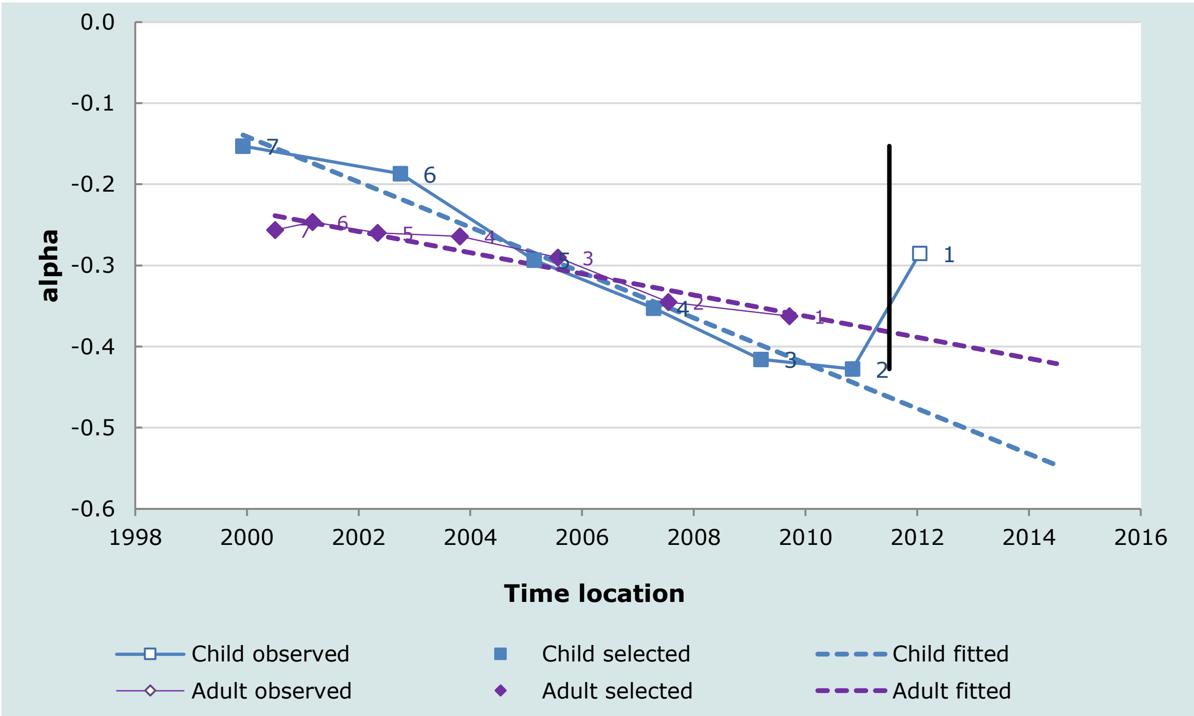


Figure 6.2b: Alpha plot for females after fitting β iteratively

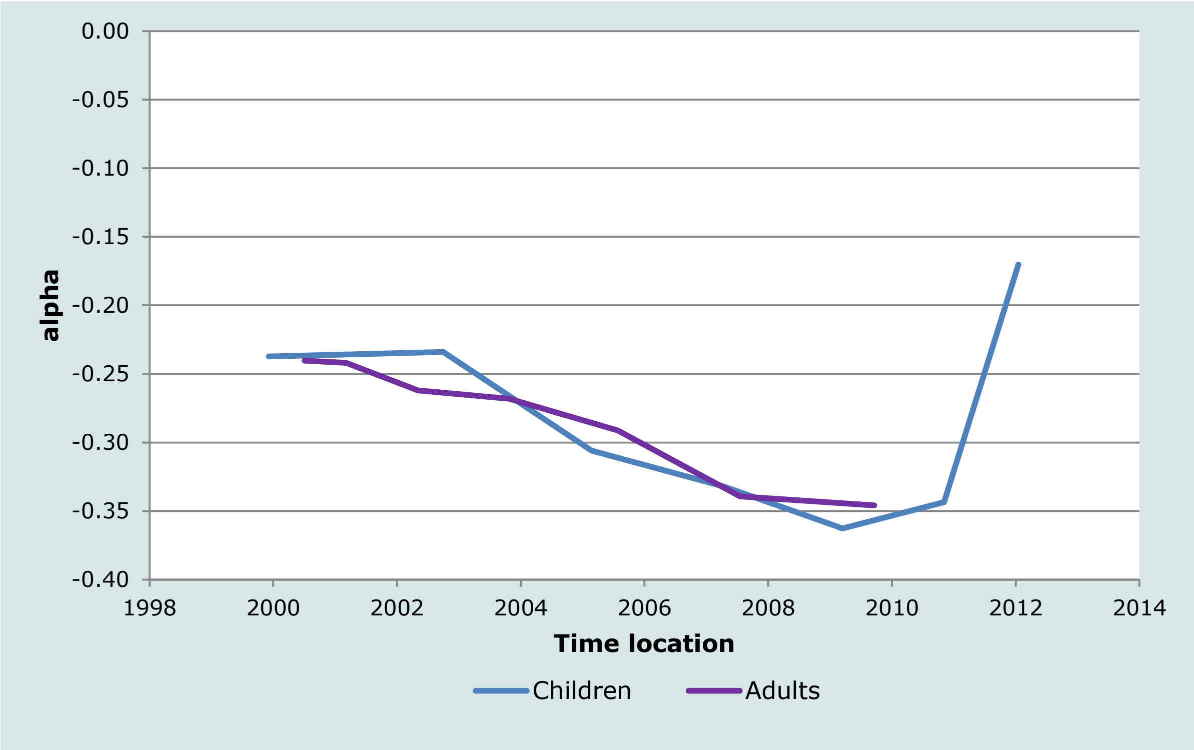


Figure 6.2c: Final plot of male, child and adult αs against their time locations

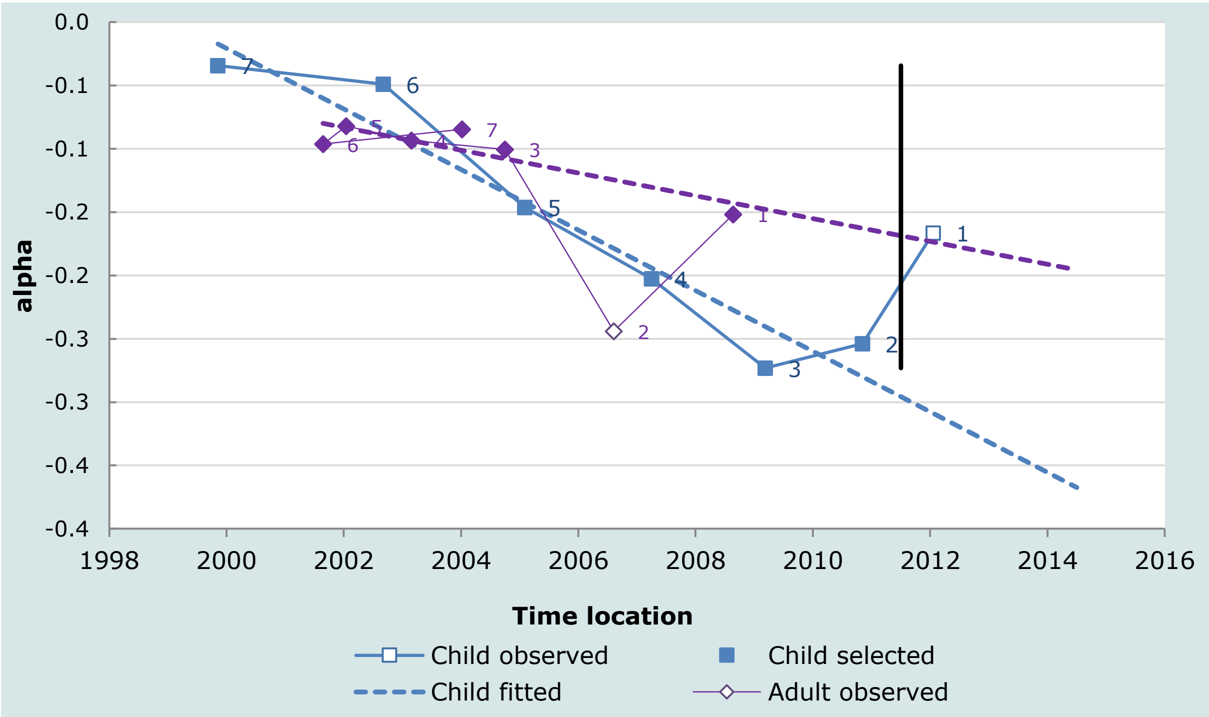
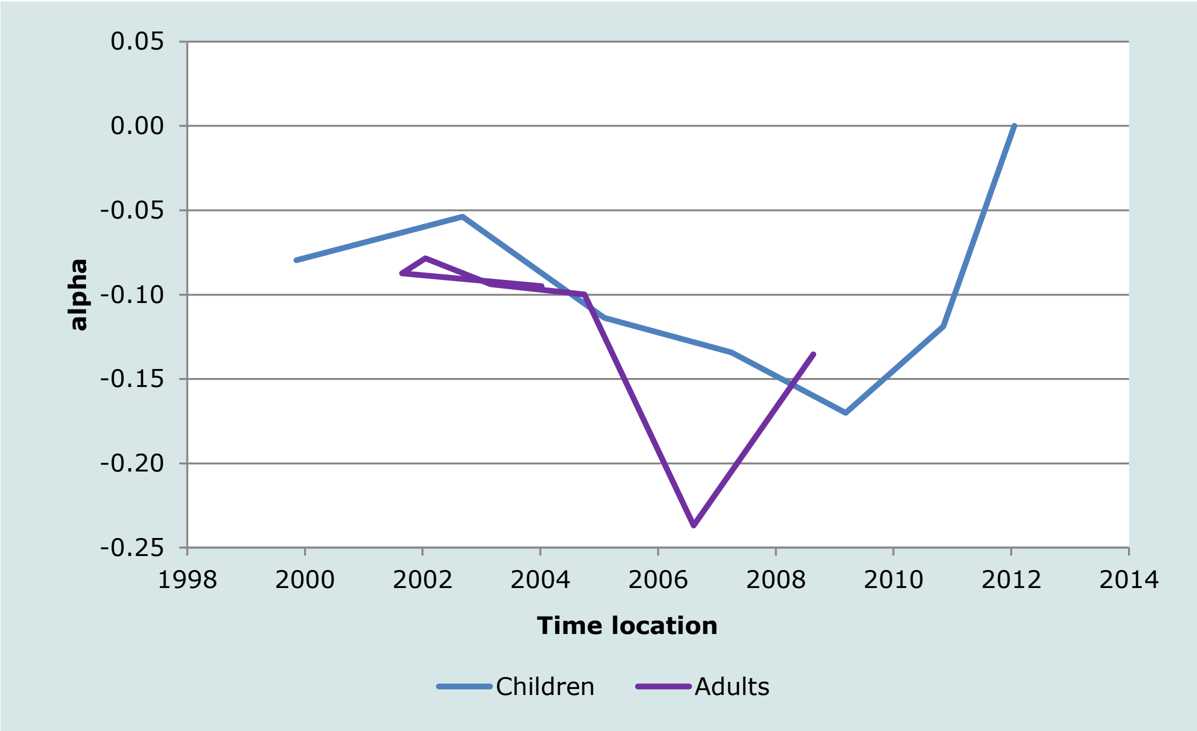


Figure 6.2d: Alpha plot for males after fitting β iteratively



The final "alpha plot" for Gambian females is as shown in Figure 6.2a and that obtained after fitting β iteratively in Figure 6.2b and the corresponding plots for Gambian males are displayed in Figure 6.2c and Figure 6.2d respectively. The final values of α and β obtained and the corresponding fitted life tables, including that of both sexes assumed to be the average of the two, are as presented in Table 6.2.

Table 6.2: Iteratively derived parameters and fitted national life tables for females and males, and an average for both sexes

	Value		
Parameter	**Females**	**Males**	
Alpha (α)	-0.3732	-0.1545	
Beta (β)	1.0823	1.1220	
	Fitted Life Tables, *l*(*x*)		
Age (*x*)	**Females**	**Males**	**Both Sexes**
0	1.00000	1.00000	1.00000
1	0.97058	0.96020	0.96539
2	0.96285	0.95260	0.95773
3	0.95867	0.94845	0.95356
4	0.95594	0.94569	0.95082
5	0.95399	0.94367	0.94883
10	0.94902	0.93820	0.94361
15	0.94600	0.93449	0.94025
20	0.94143	0.92878	0.93511
25	0.93510	0.92054	0.92782

	Value		
Parameter	**Females**	**Males**	
Alpha (α)	-0.3732	-0.1545	
Beta (β)	1.0823	1.1220	
	Fitted Life Tables, *l*(*x*)		
Age (*x*)	**Females**	**Males**	**Both Sexes**
30	0.92744	0.91098	0.91921
35	0.91810	0.89949	0.90880
40	0.90665	0.88439	0.89552
45	0.89236	0.86356	0.87796
50	0.87335	0.83379	0.85357
55	0.84631	0.79021	0.81826
60	0.80633	0.72716	0.76675
65	0.74626	0.63653	0.69140
70	0.65573	0.51357	0.58465
75	0.52517	0.36527	0.44522
80	0.35875	0.21674	0.28775
85	0.18885	0.09985	0.14435
90	0.06776	0.03172	0.04974
95	0.01499	0.00617	0.01058
100	0.00185	0.00063	0.00124
$_5q_0$	46	56	51
$_{45}q_{15}$	148	222	185
e^o_0	65.9	60.8	63.4

6.3 Abridged national life tables by sex and both sexes combined

The complete abridged life tables for females, males and both sexes combined for mid-2011 are presented in Table , Table and

Table respectively. They are indicative of 5q0 level of 46 per 1,000 live births for females, 56 for males and 51 for both sexes combined. They also imply higher adult male mortality of 222 per 1,000 against the level of 148 per 1,000 for females. The estimated life expectancies at birth of 65.9 years for females, 60.8 years for males, and 63.4 years for both sexes appear plausible for the population of The Gambia. The life tables can therefore be adopted as appropriate representation of the mortality experiences of Gambian females and males in mid-2011.

Table 6.3a: Abridged life table for females for the period 2011.5

Age (x,x+n)	n	$_nm_x$	$_na_x$	$_nq_x$	$_np_x$	l_x	$_nd_x$	$_nL_x$	T_x	e^0_x
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
0	1	0.03004	0.3	0.02942	0.97058	100,000	2,942	98,529	6,587,746	65.9
1	1	0.00799	0.5	0.00796	0.99204	97,058	773	96,671	6,873,191	70.8
2	1	0.00435	0.5	0.00434	0.99566	96,285	418	96,076	6,776,520	70.4
3	1	0.00285	0.5	0.00284	0.99716	95,867	272	95,731	6,680,444	69.7
4	1	0.00204	0.5	0.00204	0.99796	95,594	195	95,497	6,584,714	68.9
5	5	0.00104	2.5	0.00521	0.99479	95,399	497	475,754	6,489,217	68.0
10	5	0.00064	2.5	0.00319	0.99681	94,902	302	473,755	6,013,463	63.4
15	5	0.00097	2.5	0.00483	0.99517	94,600	457	471,857	5,539,708	58.6
20	5	0.00135	2.5	0.00672	0.99328	94,143	632	469,133	5,067,851	53.8
25	5	0.00165	2.5	0.00820	0.99180	93,510	767	465,635	4,598,718	49.2
30	5	0.00202	2.5	0.01007	0.98993	92,744	934	461,383	4,133,083	44.6
35	5	0.00251	2.5	0.01247	0.98753	91,810	1,145	456,185	3,671,700	40.0
40	5	0.00318	2.5	0.01575	0.98425	90,665	1,428	449,752	3,215,515	35.5
45	5	0.00431	2.5	0.02131	0.97869	89,236	1,901	441,428	2,765,763	31.0
50	5	0.00629	2.5	0.03096	0.96904	87,335	2,704	429,914	2,324,335	26.6
55	5	0.00968	2.5	0.04724	0.95276	84,631	3,998	413,159	1,894,421	22.4
60	5	0.01548	2.5	0.07449	0.92551	80,633	6,007	388,147	1,481,262	18.4
65	5	0.02583	2.5	0.12131	0.87869	74,626	9,053	350,498	1,093,115	14.6
70	5	0.04422	2.5	0.19911	0.80089	65,573	13,056	295,225	742,617	11.3
75	5	0.07531	2.5	0.31689	0.68311	52,517	16,642	220,979	447,393	8.5
80	5	0.12410	2.5	0.47358	0.52642	35,875	16,990	136,900	226,414	6.3
85	5	0.18875	2.5	0.64119	0.35881	18,885	12,109	64,154	89,513	4.7
90	5	0.25512	2.5	0.77885	0.22115	6,776	5,278	20,687	25,360	3.7
95	5	0.31199	2.5	0.87638	0.12362	1,499	1,313	4,210	4,673	3.1
100	5	0.40000	2.5	1.00000	0.00000	185	185	463	463	2.5

Table 6.3b: Abridged life table for males for the period 2011.5

Age (x,x+n)	n	nmx	nax	nqx	npx	lx	ndx	nLx	Tx	eox
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
0	1	0.04094	0.3	0.03980	0.96020	100,000	3,980	98,010	6,084,952	60.8
1	1	0.00795	0.5	0.00792	0.99208	96,020	760	95,640	6,366,810	66.3
2	1	0.00436	0.5	0.00435	0.99565	95,260	415	95,053	6,271,170	65.8
3	1	0.00291	0.5	0.00291	0.99709	94,845	276	94,707	6,176,117	65.1
4	1	0.00214	0.5	0.00214	0.99786	94,569	202	94,468	6,081,410	64.3
5	5	0.00116	2.5	0.00580	0.99420	94,367	548	470,468	5,986,941	63.4
10	5	0.00079	2.5	0.00396	0.99604	93,820	371	468,171	5,516,473	58.8
15	5	0.00123	2.5	0.00611	0.99389	93,449	571	465,816	5,048,302	54.0
20	5	0.00178	2.5	0.00887	0.99113	92,878	824	462,329	4,582,486	49.3
25	5	0.00209	2.5	0.01038	0.98962	92,054	956	457,880	4,120,157	44.8
30	5	0.00254	2.5	0.01261	0.98739	91,098	1,149	452,619	3,662,277	40.2
35	5	0.00339	2.5	0.01679	0.98321	89,949	1,510	445,972	3,209,658	35.7
40	5	0.00477	2.5	0.02356	0.97644	88,439	2,084	436,987	2,763,686	31.2
45	5	0.00702	2.5	0.03447	0.96553	86,356	2,977	424,335	2,326,699	26.9
50	5	0.01073	2.5	0.05227	0.94773	83,379	4,358	405,998	1,902,364	22.8
55	5	0.01662	2.5	0.07979	0.92021	79,021	6,305	379,341	1,496,366	18.9
60	5	0.02658	2.5	0.12463	0.87537	72,716	9,062	340,923	1,117,025	15.4
65	5	0.04276	2.5	0.19317	0.80683	63,653	12,296	287,527	776,102	12.2
70	5	0.06750	2.5	0.28877	0.71123	51,357	14,831	219,710	488,575	9.5
75	5	0.10208	2.5	0.40664	0.59336	36,527	14,853	145,501	268,865	7.4
80	5	0.14768	2.5	0.53930	0.46070	21,674	11,689	79,146	123,364	5.7
85	5	0.20714	2.5	0.68234	0.31766	9,985	6,813	32,892	44,218	4.4
90	5	0.26979	2.5	0.80560	0.19440	3,172	2,555	9,471	11,326	3.6
95	5	0.32623	2.5	0.89841	0.10159	617	554	1,698	1,855	3.0
100	5	0.40000	2.5	1.00000	0.00000	63	63	157	157	2.5

Table 6.3c: Abridged life table for both sexes for the period 2011.5

Age (x,x+n)	n	$_nm_x$	$_na_x$	$_nq_x$	$_np_x$	l_x	$_nd_x$	$_nL_x$	T_x	e^o_x
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
0	1	0.03547	0.3	0.03461	0.96539	100,000	3,461	98,269	6,336,349	63.4
1	1	0.00797	0.5	0.00794	0.99206	96,539	767	96,156	6,620,001	68.6
2	1	0.00436	0.5	0.00435	0.99565	95,772	416	95,564	6,523,845	68.1
3	1	0.00288	0.5	0.00288	0.99712	95,356	274	95,219	6,428,281	67.4
4	1	0.00209	0.5	0.00209	0.99791	95,082	199	94,983	6,333,062	66.6
5	5	0.00110	2.5	0.00551	0.99449	94,883	522	473,111	6,238,079	65.7
10	5	0.00071	2.5	0.00357	0.99643	94,361	337	470,963	5,764,968	61.1
15	5	0.00110	2.5	0.00547	0.99453	94,024	514	468,836	5,294,005	56.3
20	5	0.00156	2.5	0.00779	0.99221	93,510	728	465,731	4,825,169	51.6
25	5	0.00187	2.5	0.00928	0.99072	92,782	861	461,758	4,359,437	47.0
30	5	0.00228	2.5	0.01133	0.98867	91,921	1,041	457,001	3,897,680	42.4
35	5	0.00294	2.5	0.01461	0.98539	90,880	1,328	451,079	3,440,679	37.9
40	5	0.00396	2.5	0.01961	0.98039	89,552	1,756	443,370	2,989,600	33.4
45	5	0.00563	2.5	0.02778	0.97222	87,796	2,439	432,882	2,546,231	29.0
50	5	0.00845	2.5	0.04137	0.95863	85,357	3,531	417,956	2,113,349	24.8
55	5	0.01300	2.5	0.06296	0.93704	81,826	5,151	396,250	1,695,393	20.7
60	5	0.02067	2.5	0.09827	0.90173	76,674	7,535	364,535	1,299,144	16.9
65	5	0.03346	2.5	0.15439	0.84561	69,140	10,675	319,012	934,608	13.5
70	5	0.05416	2.5	0.23849	0.76151	58,465	13,943	257,467	615,596	10.5
75	5	0.08594	2.5	0.35371	0.64629	44,522	15,748	183,240	358,129	8.0
80	5	0.13274	2.5	0.49833	0.50167	28,774	14,339	108,023	174,889	6.1
85	5	0.19498	2.5	0.65542	0.34458	14,435	9,461	48,523	66,866	4.6
90	5	0.25973	2.5	0.78737	0.21263	4,974	3,916	15,079	18,343	3.7
95	5	0.31608	2.5	0.88281	0.11719	1,058	934	2,954	3,264	3.1
100	5	0.40000	2.5	1.00000	0.00000	124	124	310	310	2.5

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Appendix 1: Mortality-related Questions in the 2013 Census Questionnaire

I. Survival of parents: Form A – Part 2, Question 8.

FORM A – PART 2

Demographic Information for All Persons

0 Srl. No.	1 Full Name	2 Sex	3 Age	4 Relationship	5 Nationality	6 Ethnicity	7 Religion	8 Survival of Parents	
	Write the Names of the Usual Members Present and Visitors **(Please refer to GPCs 3 and 4)**	1: Male 2: Fe-male	What was your Age last Birth-day? 00:less than 1 Year 98:98 Years & Over	What is your Relationship to Head/Temporary Head of the Household? 01:Head 02:Temporary Head 03:Wife/Husband 04:Son/Daughter 05:Son's Son/Daughter 06:Daughter's Son/Daughter 07:Father/Mother 08:Mother's Husband /Father's Wife 09:Brother/Sister 10:Brother's Son/Daughter 11:Sister's Son/Daughter 12:Father's Father/Mother 13:Mother's Father/Mother 14:Father's Brother/Sister 15:Mother's Brother/Sister 16:Other Relative 17: Adopted/Foster Child 18:Live-in-Maids 19: Non Relative	What is your Nationality? 00:Gambian 10: Senegalese 11: Guinea (Conakry) 12: Guinea (Sissau) 13:Malian 14:Sierra Leonean 15: Mauritanian 16:Ghanaian 17:Nigerian 18:Liberian 19:Other West Africans 20:Other Africans 21: Non Africans If code is not 00 Enter Country code and (skip to col 7)	What is your Ethnic Origin? (For Gambians only) 0:Mandinka/ Jahanka 1:Fula/Tukulur/Lorobo 2:Wollof 3:Jola/ Karoninka 4:Serahuli 5:Serere 6:Creole/Aku Marabout 7:Manjago 8:Bambara 9:Other ethnicity	What is your Religion? 1:Islam 2:Christianity 3:Traditional 4:Other	(a) Is your Father alive? 1:Yes 2:No 3: Don't know	(b) Is your Mother alive? 1:Yes 2:No 3: Don't know
1									
2									
3									

II. "Brass-type" questions: Form A – Part 2, Questions 22 and 23.

FORM A – PART 2 (CONTINUED)

For Aged 12 and over			For Females Aged 12 Years and Over															For Aged 2 & Over			10 Years & Over
0 Srl. no	20 Marital Status	21 Type of Union	22 Number of Children Born								23 Particulars of Births in the last 12 Months April, 2012 to March, 2013 (Record 00 if None)							24 Main Disability		24a. What is the main cause of your disability?	25 Tobacco
	What is your Marital Status 1:Never Married (Skip to 22) 2:Married 3:Divorced 4:Separated 5:Widowed	What is/was your Union? (For ever married Persons only) 1:Monogamous 2:Polygamous with 2 spouses 3:Polygamous with 3 spouses 4:Polygamous with 4 spouses 5:Polygamous with 5 spouses and more	How many Children have been born alive to you?		How many of them are living in this Household?		How many of them are living elsewhere?		How many of them have died?		(a) How many Children have been born to you during the last 12 months?		(c) Year of Birth 2: 2012 3: 2013	(d) Month of Birth Enter number (01 - 12) of the Month	How many of those Children born to you during the last 12 months are still alive?			Do you have any form of disability 1: Yes 2: No (Skip to 25)	What is your main disability? 1:Seeing 2:Hearing 3:Speaking 4:Physical 5:Strange behaviour 6:Fits 7:Learning difficulties 8:Other Specify	1-Congenital / At Birth 2-Disease / Illness 3-Injury / Accident 4-Spousal Violence 5-Other Violence 6-Unknown 7-Other	Does (Name) smoke? 1 Yes 2 No
			(a) Male	(b) Fe-male	(c) Male	(d) Fe-male	(e) Male	(f) Fe-male	(g) Male	(h) Fe-male	(a) Male	(b) Fe-male	(c)	(d)	(e) Male	(f) Female		(a)	(b)		
1																					
2																					
3																					

III. Deaths in the household in last 12 months and maternal deaths: Form A – Part 3.

FORM A - PART 3

MORTALITY

MORTALITY: (To be answered by head of household or any responsible members of the household)					Maternal Deaths		
Death in the Household in the last 12 months (1)	(2)	Sex (3)	Relationship (4)	Age at death of deceased (5)	If the deceased was female 15 years and above did she die? (6)		
How many deaths occurred in this household in the last 12 months? *(April 2012 - March 2013) Enter number of deaths. (if none, enter 00, and go to part 4)*	What is the Name of the deceased Household member? *List all names of persons who died in this household in the last 12 months*	Was the person female or male? 1= Male 2=Female	What is the relationship of the deceased to Head /or Temporal Head of household? 03:Wife/Husband; 04:Son/Daughter 05:Son's Son/Daughter; 06:Daughter's Son/Daughter 07:Father/Mother 08:Mother's Husband /Father's Wife 09:Brother/Sister; 10:Brother's Son/Daughter 11:Sister's Son/Daughter; 12:Father's Father/Mother; 13:Mother's Father/Mother 14:Father's Brother/Sister; 15:Mother's Brother/Sister; 16:Other Relative; 17:Adopted/Foster Child; 18:Live-in-maids; 19:Non Relative	How old was the person when he/she died?	(a) During Pregnancy 1 Yes 2 No 9 DK	(b) Giving Birth 1 Yes 2 No 9 DK	(c) Within six weeks after delivery or termination of pregnancy? 1 Yes 2 No 9 DK

Appendix 2: Selection of appropriate model life tables for estimation of under-5 and adult mortality.

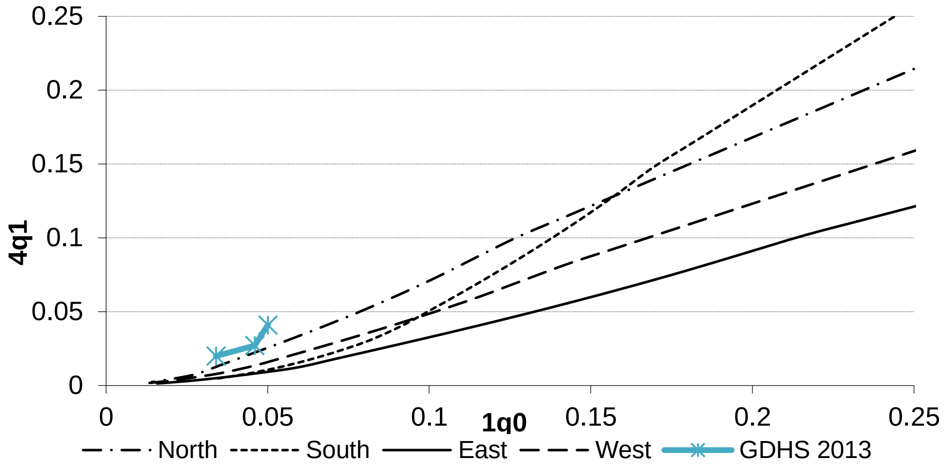


Figure A2 - 1: Observed national age patterns of childhood mortality in The Gambia based on GDHS 2013 estimates and compared with the relationships between child and infant mortality in the four Princeton model families (level 14)

Sources: (The Gambia Bureau of Statistics (GBOS) and ICF International, 2014) & (Coale, Demeny, & Vaughan, 1983)

Table A2 - 1: INDEPTH Model Mortality Standard: Pattern 1 (Regular)

	Females		Males	
Age	**Std *l*(x)**	**Std *Y*(x)**	**Std *l*(x)**	**Std *Y*(x)**
0	1.0000		1.0000	
1	0.9206	-1.2253	0.9146	-1.1856
5	0.8437	-0.8430	0.8353	-0.8118
10	0.8269	-0.7819	0.8164	-0.7461
15	0.8178	-0.7508	0.8054	-0.7102
20	0.8070	-0.7153	0.7952	-0.6783
25	0.7925	-0.6700	0.7817	-0.6378
30	0.7736	-0.6144	0.7606	-0.5780
35	0.7513	-0.5528	0.7317	-0.5016
40	0.7315	-0.5011	0.6964	-0.4151
45	0.7062	-0.4385	0.6547	-0.3199
50	0.6763	-0.3684	0.6056	-0.2144
55	0.6327	-0.2719	0.5503	-0.1009
60	0.5737	-0.1485	0.4831	0.0338
65	0.5048	-0.0096	0.4086	0.1849
70	0.4136	0.1746	0.3201	0.3767
75	0.3072	0.4066	0.2373	0.5838
80	0.2037	0.6817	0.1483	0.8740
85+	0.1182	1.0048	0.0813	1.2124

Appendix 3: Age-specific Pregnancy-related Mortality Rates and Ratios by LGA

Table A3 - 1: Pregnancy-related deaths, mortality rates and ratios by five-year age groups of women and LGA

			Female Deaths					Proportion of:			Age-Specific:			
Age Group / LGA	**Total Women**	**Births in Past Year**	**During Pregn-ancy**	**During Delivery**	**In Post-partum Period**	**Total Pregn-ancy-related Deaths**	**All Deaths**	**Deaths Pregn-ancy-related (vi/vii)**	**Pregnancy-related Deaths (vi/sum (vi))**	**Births in Past Year (ii/sum (ii))**	**Mortality Rate (vii/i)**	**Pregnancy-related Mortality Rate (vi/i)**	**Fertility Rate (ii/i)**	**Pregnancy-related Mortality Ratio (100,000*xii/xiii)**
	(i)	(ii)	(iii)	(iv)	(v)	(vi)	(vii)	(viii)	(ix)	(x)	(xi)	(xii)	(xiii)	(xiv)
The Gambia														
15-19	111,269	4,253	23	21	13	57	213	27 per	14 per cent	9 per cent	0.00191	0.00051	0.03822	1,340.23
20-24	97,864	12,240	20	30	25	75	211	36 per	18 per cent	25 per	0.00216	0.00077	0.12507	612.75
25-29	85,015	13,621	35	40	37	112	257	44 per	27 per cent	28 per	0.00302	0.00132	0.16022	822.26
30-34	65,212	10,065	20	24	27	71	248	29 per	17 per cent	21 per	0.00380	0.00109	0.15434	705.41
35-39	48,644	5,670	21	21	19	61	212	29 per	15 per cent	12 per	0.00436	0.00125	0.11656	1,075.84
40-44	36,544	1,968	12	11	9	32	252	13 per	8 per cent	4 per cent	0.00690	0.00088	0.05385	1,626.02
45-49	26,994	604	2	4	3	9	185	5 per cent	2 per cent	1 per cent	0.00685	0.00033	0.02238	1,490.07
Total	**471,542**	**48,421**	**133**	**151**	**133**	**417**	**1578**	**26 per**	**100 per**	**100 per**	**0.00335**	**0.00088**	**0.10269**	**861.20**
Urban														
15-19	53,369	1,533	9	6	3	18	71	25 per	4 per cent	3 per cent	0.00133	0.00034	0.02872	1,174.17
20-24	51,174	5,565	10	14	10	34	85	40 per	8 per cent	11 per	0.00166	0.00066	0.10875	610.96
25-29	42,919	6,240	12	17	11	40	107	37 per	10 per cent	13 per	0.00249	0.00093	0.14539	641.03
30-34	32,305	4,675	5	8	8	21	98	21 per	5 per cent	10 per	0.00303	0.00065	0.14471	449.20
35-39	23,625	2,555	7	11	12	30	90	33 per	7 per cent	5 per cent	0.00381	0.00127	0.10815	1,174.17
40-44	16,913	865	5	4	3	12	99	12 per	3 per cent	2 per cent	0.00585	0.00071	0.05114	1,387.28
45-49	12,918	236	2	2	2	6	84	7 per cent	1 per cent	0 per cent	0.00650	0.00046	0.01827	2,542.37
Total	**233,223**	**21,669**	**50**	**62**	**49**	**161**	**634**	**25 per**	**39 per cent**	**45 per**	**0.00272**	**0.00069**	**0.09291**	**743.00**

Table A3 – 1 (cont.)

Age Group / LGA	Total Women	Births in Past Year	Female Deaths: During Pregn-ancy	During Delivery	In Post-partum Period	Total Pregn-ancy-related Deaths	All Deaths	Proportion of: Deaths Pregn-ancy-related (vi/vii)	Pregnancy-related Deaths (vi/sum (vi))	Births in Past Year (ii/sum (ii))	Age-Specific: Mortality Rate (vii/i)	Pregnancy-related Mortality Rate (vi/i)	Fertility Rate (ii/i)	Pregnancy-related Mortality Ratio (100,000*xii/xiii)
	(i)	(ii)	(iii)	(iv)	(v)	(vi)	(vii)	(viii)	(ix)	(x)	(xi)	(xii)	(xiii)	(xiv)
Rural														
15-19	57,900	2,720	14	15	10	39	142	27 per	9 per cent	6 per cent	0.00245	0.00067	0.04698	1,433.82
20-24	46,690	6,675	10	16	15	41	126	33 per	10 per cent	14 per	0.00270	0.00088	0.14296	614.23
25-29	42,096	7,381	23	23	26	72	150	48 per	17 per cent	15 per	0.00356	0.00171	0.17534	975.48
30-34	32,907	5,390	15	16	19	50	150	33 per	12 per cent	11 per	0.00456	0.00152	0.16379	927.64
35-39	25,019	3,115	14	10	7	31	122	25 per	7 per cent	6 per cent	0.00488	0.00124	0.12451	995.18
40-44	19,631	1,103	7	7	6	20	153	13 per	5 per cent	2 per cent	0.00779	0.00102	0.05619	1,813.24
45-49	14,076	368	0	2	1	3	101	3 per cent	1 per cent	1 per cent	0.00718	0.00021	0.02614	815.22
Total	**238,319**	**26,752**	**83**	**89**	**84**	**256**	**944**	**27 per**	**61 per cent**	**55 per**	**0.00396**	**0.00107**	**0.11225**	**956.94**
Banjul														
15-19	1,610	40	1	1	0	2	2	100 per	0 per cent	0 per cent	0.00124	0.00124	0.02484	5,000.00
20-24	1,760	151	0	1	0	1	2	50 per	0 per cent	0 per cent	0.00114	0.00057	0.08580	662.25
25-29	1,458	159	0	0	0	0	1	0 per cent	0 per cent	0 per cent	0.00069	0.00000	0.10905	-
30-34	1,189	121	0	0	0	0	0	0 per cent	0 per cent	0 per cent	0.00000	0.00000	0.10177	-
35-39	840	68	0	0	0	0	3	0 per cent	0 per cent	0 per cent	0.00357	0.00000	0.08095	-
40-44	681	25	0	0	0	0	5	0 per cent	0 per cent	0 per cent	0.00734	0.00000	0.03671	-
45-49	561	9	0	0	0	0	2	0 per cent	0 per cent	0 per cent	0.00357	0.00000	0.01604	-
Total	**8,099**	**573**	**1**	**2**	**0**	**3**	**15**	**20 per**	**1 per cent**	**1 per**	**0.00185**	**0.00037**	**0.07075**	**523.56**

Table A3 – 1 (cont.)

Age Group / LGA	Total Women	Births in Past Year	Female Deaths: During Pregn-ancy	During Delivery	In Post-partum Period	Total Pregn-ancy-related Deaths	All Deaths	Proportion of: Deaths Pregn-ancy-related (vi/vii)	Pregnancy-related Deaths (vi/sum (vi))	Births in Past Year (ii/sum (ii))	Age-Specific: Mortality Rate (vii/i)	Pregnancy-related Mortality Rate (vi/i)	Fertility Rate (ii/i)	Pregnancy-related Mortality Ratio (100,000*xii/xiii)
	(i)	(ii)	(iii)	(iv)	(v)	(vi)	(vii)	(viii)	(ix)	(x)	(xi)	(xii)	(xiii)	(xiv)
Kanifing														
15-19	23,088	563	2	3	1	6	29	21 per	1 per cent	1 per cent	0.00126	0.00026	0.02438	1,065.72
20-24	23,464	2,226	4	6	4	14	35	40 per	3 per cent	5 per cent	0.00149	0.00060	0.09487	628.93
25-29	19,780	2,679	6	6	3	15	49	31 per	4 per cent	6 per cent	0.00248	0.00076	0.13544	559.91
30-34	14,465	1,936	1	3	2	6	46	13 per	1 per cent	4 per cent	0.00318	0.00041	0.13384	309.92
35-39	10,695	1,040	1	4	5	10	44	23 per	2 per cent	2 per cent	0.00411	0.00094	0.09724	961.54
40-44	7,420	331	0	0	2	2	42	5 per cent	0 per cent	1 per cent	0.00566	0.00027	0.04461	604.23
45-49	5,797	87	0	1	1	2	43	5 per cent	0 per cent	0 per cent	0.00742	0.00035	0.01501	2,298.85
Total	**104,709**	**8,862**	**14**	**23**	**18**	**55**	**288**	**19 per**	**13 per cent**	**18 per**	**0.00275**	**0.00053**	**0.08463**	**620.63**
Brikama														
15-19	41,174	1,301	8	6	3	17	74	23 per	4 per cent	3 per cent	0.00180	0.00041	0.03160	1,306.69
20-24	37,095	4,534	7	10	8	25	68	37 per	6 per cent	9 per cent	0.00183	0.00067	0.12223	551.39
25-29	31,335	5,068	8	12	15	35	82	43 per	8 per cent	10 per	0.00262	0.00112	0.16174	690.61
30-34	24,459	4,009	3	5	11	19	89	21 per	5 per cent	8 per cent	0.00364	0.00078	0.16391	473.93
35-39	18,222	2,294	10	9	6	25	82	30 per	6 per cent	5 per cent	0.00450	0.00137	0.12589	1,089.80
40-44	12,785	783	5	4	2	11	93	12 per	3 per cent	2 per cent	0.00727	0.00086	0.06124	1,404.85
45-49	9,399	219	1	0	1	2	71	3 per cent	0 per cent	0 per cent	0.00755	0.00021	0.02330	913.24
Total	**174,469**	**18,208**	**42**	**46**	**46**	**134**	**559**	**24 per**	**32 per cent**	**38 per**	**0.00320**	**0.00077**	**0.10436**	**735.94**

Table A3 – 1 (cont.)

			Female Deaths					Proportion of:			Age-Specific:			
Age Group / LGA	**Total Women**	**Births in Past Year**	**During Pregn-ancy**	**During Delivery**	**In Post-partum Period**	**Total Pregn-ancy-related Deaths**	**All Deaths**	**Deaths Pregn-ancy-related (vi/vii)**	**Pregnancy-related Deaths (vi/sum (vi))**	**Births in Past Year (ii/sum (ii))**	**Mortality Rate (vii/i)**	**Pregnancy-related Mortality Rate (vi/i)**	**Fertility Rate (ii/i)**	**Pregnancy-related Mortality Ratio (100,000*xii/xiii)**
	(i)	(ii)	(iii)	(iv)	(v)	(vi)	(vii)	(viii)	(ix)	(x)	(xi)	(xii)	(xiii)	(xiv)
Mansakonko														
15-19	5,030	266	3	2	1	6	14	43 per	1 per cent	1 per cent	0.00278	0.00119	0.05288	2,255.64
20-24	3,537	547	1	0	0	1	13	8 per cent	0 per cent	1 per cent	0.00368	0.00028	0.15465	182.82
25-29	3,050	580	3	2	3	8	16	50 per	2 per cent	1 per cent	0.00525	0.00262	0.19016	1,379.31
30-34	2,616	495	1	2	2	5	11	45 per	1 per cent	1 per cent	0.00420	0.00191	0.18922	1,010.10
35-39	1,964	266	0	0	1	1	8	13 per	0 per cent	1 per cent	0.00407	0.00051	0.13544	375.94
40-44	1,716	80	2	1	2	5	14	36 per	1 per cent	0 per cent	0.00816	0.00291	0.04662	6,250.00
45-49	1,342	39	1	1	0	2	10	20 per	0 per cent	0 per cent	0.00745	0.00149	0.02906	5,128.21
Total	**19,255**	**2,273**	**11**	**8**	**9**	**28**	**86**	**33 per**	**7 per cent**	**5 per**	**0.00447**	**0.00145**	**0.11805**	**1,231.85**
Kerewan														
15-19	13,187	654	3	2	1	6	23	26 per	1 per cent	1 per cent	0.00174	0.00045	0.04959	917.43
20-24	10,251	1,674	1	6	2	9	34	26 per	2 per cent	3 per cent	0.00332	0.00088	0.16330	537.63
25-29	8,829	1,795	4	6	5	15	30	50 per	4 per cent	4 per cent	0.00340	0.00170	0.20331	835.65
30-34	7,083	1,295	5	7	3	15	32	47 per	4 per cent	3 per cent	0.00452	0.00212	0.18283	1,158.30
35-39	5,496	786	0	2	1	3	20	15 per	1 per cent	2 per cent	0.00364	0.00055	0.14301	381.68
40-44	4,401	259	2	3	2	7	32	22 per	2 per cent	1 per cent	0.00727	0.00159	0.05885	2,702.70
45-49	3,320	95	0	0	0	0	15	0 per cent	0 per cent	0 per cent	0.00452	0.00000	0.02861	-
Total	**52,567**	**6,558**	**15**	**26**	**14**	**55**	**186**	**30 per**	**13 per cent**	**14 per**	**0.00354**	**0.00105**	**0.12476**	**838.67**

Table A3 – 1 (cont.)

Age Group / LGA	Total Women	Births in Past Year	Female Deaths: During Pregn-ancy	During Delivery	In Post-partum Period	Total Pregn-ancy-related Deaths	All Deaths	Proportion of: Deaths Pregn-ancy-related (vi/vii)	Pregnancy-related Deaths (vi/sum (vi))	Births in Past Year (ii/sum (ii))	Age-Specific: Mortality Rate (vii/i)	Pregnancy-related Mortality Rate (vi/i)	Fertility Rate (ii/i)	Pregnancy-related Mortality Ratio (100,000*xii/xiii)
	(i)	(ii)	(iii)	(iv)	(v)	(vi)	(vii)	(viii)	(ix)	(x)	(xi)	(xii)	(xiii)	(xiv)
Kuntaur														
15-19	5,653	259	3	2	2	7	14	50 per	2 per cent	1 per cent	0.00248	0.00124	0.04582	2,702.70
20-24	4,446	617	2	4	5	11	18	61 per	3 per cent	1 per cent	0.00405	0.00247	0.13878	1,782.82
25-29	4,226	700	1	3	4	8	18	44 per	2 per cent	1 per cent	0.00426	0.00189	0.16564	1,142.86
30-34	3,180	448	4	3	2	9	18	50 per	2 per cent	1 per cent	0.00566	0.00283	0.14088	2,008.93
35-39	2,290	241	2	2	1	5	10	50 per	1 per cent	0 per cent	0.00437	0.00218	0.10524	2,074.69
40-44	1,919	106	2	2	1	5	21	24 per	1 per cent	0 per cent	0.01094	0.00261	0.05524	4,716.98
45-49	1,310	27	0	0	0	0	3	0 per cent	0 per cent	0 per cent	0.00229	0.00000	0.02061	-
Total	**23,024**	**2,398**	**14**	**16**	**15**	**45**	**102**	**44 per**	**11 per cent**	**5 per**	**0.00443**	**0.00195**	**0.10415**	**1,876.56**
Janjanbureh														
15-19	7,827	431	0	2	3	5	23	22 per	1 per cent	1 per cent	0.00294	0.00064	0.05507	1,160.09
20-24	5,792	827	4	3	3	10	21	48 per	2 per cent	2 per cent	0.00363	0.00173	0.14278	1,209.19
25-29	5,311	924	3	3	1	7	24	29 per	2 per cent	2 per cent	0.00452	0.00132	0.17398	757.58
30-34	4,195	642	1	0	0	1	18	6 per cent	0 per cent	1 per cent	0.00429	0.00024	0.15304	155.76
35-39	3,048	341	1	1	1	3	12	25 per	1 per cent	1 per cent	0.00394	0.00098	0.11188	879.77
40-44	2,600	132	1	1	0	2	17	12 per	0 per cent	0 per cent	0.00654	0.00077	0.05077	1,515.15
45-49	1,792	46	0	1	0	1	18	6 per cent	0 per cent	0 per cent	0.01004	0.00056	0.02567	2,173.91
Total	**30,565**	**3,343**	**10**	**11**	**8**	**29**	**133**	**22 per**	**7 per cent**	**7 per**	**0.00435**	**0.00095**	**0.10937**	**867.48**

Table A3 – 1 (cont.)

Age Group / LGA	Total Women	Births in Past Year	Female Deaths: During Pregn-ancy	During Delivery	In Post-partum Period	Total Pregn-ancy-related Deaths	All Deaths	Proportion of: Deaths Pregn-ancy-related (vi/vii)	Pregnancy-related Deaths (vi/sum (vi))	Births in Past Year (ii/sum (ii))	Age-Specific: Mortality Rate (vii/i)	Pregnancy-related Mortality Rate (vi/i)	Fertility Rate (ii/i)	Pregnancy-related Mortality Ratio (100,000*xii/xiii)
	(i)	(ii)	(iii)	(iv)	(v)	(vi)	(vii)	(viii)	(ix)	(x)	(xi)	(xii)	(xiii)	(xiv)
Basse														
15-19	13,700	739	3	3	2	8	34	24 per	2 per cent	2 per cent	0.00248	0.00058	0.05394	1,082.54
20-24	11,519	1,664	1	0	3	4	20	20 per	1 per cent	3 per cent	0.00174	0.00035	0.14446	240.38
25-29	11,026	1,716	10	8	6	24	37	65 per	6 per cent	4 per cent	0.00336	0.00218	0.15563	1,398.60
30-34	8,025	1,119	5	4	7	16	34	47 per	4 per cent	2 per cent	0.00424	0.00199	0.13944	1,429.85
35-39	6,089	634	7	3	4	14	33	42 per	3 per cent	1 per cent	0.00542	0.00230	0.10412	2,208.20
40-44	5,022	252	0	0	0	0	28	0 per cent	0 per cent	1 per cent	0.00558	0.00000	0.05018	-
45-49	3,473	82	0	1	1	2	23	9 per cent	0 per cent	0 per cent	0.00662	0.00058	0.02361	2,439.02
Total	**58,854**	**6,206**	**26**	**19**	**23**	**68**	**209**	**33 per**	**16 per cent**	**13 per**	**0.00355**	**0.00116**	**0.10545**	**1,095.71**

Source: The Gambia Population and Housing Census, 2013

Appendix 4: Estimates of under-5 mortality rates by residence, sex, LGA and other characteristics

Table A4 - 1: Estimates of under-5 mortality rates, q(5), (per 1,000 live births) by residence, sex, LGA and other socio-economic characteristics.

	No. of Women	Average Parity	Proportions Dead of CEB	q(x)	alpha	Reference Date	q(5)
The Gambia							
20-24	97,864	1.0455	0.0470	0.0462	-0.5265	2010.8	62.7
25-29	85,015	2.2952	0.0517	0.0497	-0.5617	2009.2	58.7
30-34	65,212	3.6269	0.0613	0.0616	-0.5358	2007.3	61.6
35-39	48,644	4.5992	0.0698	0.0748	-0.5239	2005.1	63.0
40-44	36,544	5.2435	0.0897	0.0948	-0.4410	2002.7	73.6
45-49	26,994	5.5011	0.1029	0.1063	-0.4252	1999.9	75.7
Urban							
20-24	51,174	0.7875	0.0363	0.0365	-0.6495	2011.0	49.7
25-29	42,919	1.8378	0.0368	0.0359	-0.7322	2009.4	42.5
30-34	32,305	3.0341	0.0422	0.0428	-0.7279	2007.5	42.8
35-39	23,625	3.9862	0.0494	0.0532	-0.7058	2005.4	44.7
40-44	16,913	4.6020	0.0613	0.0651	-0.6453	2003.0	50.1
45-49	12,918	4.9102	0.0705	0.0732	-0.6299	2000.1	51.6
Rural							
20-24	46,690	1.3283	0.0540	0.0525	-0.4597	2010.8	71.1
25-29	42,096	2.7615	0.0618	0.0586	-0.4744	2009.1	69.1
30-34	32,907	4.2088	0.0748	0.0743	-0.4359	2007.0	74.2
35-39	25,019	5.1781	0.0847	0.0897	-0.4252	2004.8	75.7
40-44	19,631	5.7962	0.1092	0.1141	-0.3375	2002.3	88.9
45-49	14,076	6.0434	0.1270	0.1300	-0.3111	1999.4	93.3
Male							
20-24	97,864	0.5409	0.0528	0.0518	-0.4661	2010.8	70.2
25-29	85,015	1.1833	0.0560	0.0538	-0.5197	2009.2	63.5
30-34	65,212	1.8686	0.0662	0.0665	-0.4951	2007.2	66.5
35-39	48,644	2.3690	0.0749	0.0801	-0.4868	2005.1	67.5
40-44	36,544	2.6992	0.0953	0.1006	-0.4083	2002.7	78.1
45-49	26,994	2.8574	0.1074	0.1109	-0.4016	1999.9	79.1
Female							
20-24	97,864	0.5046	0.0409	0.0402	-0.5992	2010.8	54.7
25-29	85,015	1.1119	0.0471	0.0454	-0.6097	2009.2	53.6
30-34	65,212	1.7583	0.0561	0.0565	-0.5824	2007.3	56.4
35-39	48,644	2.2302	0.0646	0.0692	-0.5656	2005.1	58.3
40-44	36,544	2.5444	0.0839	0.0887	-0.4775	2002.7	68.7
45-49	26,994	2.6437	0.0981	0.1014	-0.4515	1999.9	72.1

Table A4 – 1 (cont.)

LGA	No. of Women	Average Parity	Proportions Dead of CEB	q(x)	alpha	Reference Date	q(5)
Banjul							
20-24	1,760	0.6375	0.0348	0.0348	-0.6745	2011.0	47.6
25-29	1,458	1.4540	0.0283	0.0274	-0.8705	2009.4	32.6
30-34	1,189	2.3213	0.0391	0.0395	-0.7702	2007.4	39.6
35-39	840	3.0631	0.0311	0.0334	-0.9496	2005.3	28.0
40-44	681	3.4244	0.0485	0.0512	-0.7720	2002.9	39.4
45-49	561	3.6364	0.0500	0.0517	-0.8152	2000.1	36.3
Kanifing							
20-24	23,464	0.6725	0.0308	0.0313	-0.7281	2011.0	42.8
25-29	19,780	1.6215	0.0330	0.0324	-0.7844	2009.5	38.4
30-34	14,465	2.7157	0.0359	0.0365	-0.8107	2007.6	36.5
35-39	10,695	3.6180	0.0438	0.0473	-0.7673	2005.5	39.7
40-44	7,420	4.2062	0.0464	0.0494	-0.7919	2003.1	37.9
45-49	5,797	4.6062	0.0615	0.0639	-0.7030	2000.2	44.9
Brikama							
20-24	37,095	0.9172	0.0413	0.0417	-0.5800	2011.0	56.7
25-29	31,335	2.1528	0.0448	0.0438	-0.6288	2009.4	51.7
30-34	24,459	3.5155	0.0508	0.0515	-0.6314	2007.5	51.4
35-39	18,222	4.5120	0.0594	0.0639	-0.6084	2005.3	53.7
40-44	12,785	5.1362	0.0734	0.0779	-0.5483	2002.9	60.2
45-49	9,399	5.4129	0.0838	0.0869	-0.5369	2000.1	61.5
Mansakonko							
20-24	3,537	1.3441	0.0637	0.0616	-0.3749	2010.8	83.1
25-29	3,050	2.7843	0.0676	0.0641	-0.4272	2009.0	75.4
30-34	2,616	4.4247	0.0871	0.0865	-0.3527	2007.0	86.4
35-39	1,964	5.6813	0.1038	0.1101	-0.3114	2004.8	93.2
40-44	1,716	6.2611	0.1340	0.1404	-0.2190	2002.3	110.0
45-49	1,342	6.4739	0.1558	0.1598	-0.1907	1999.5	115.7
Kerewan							
20-24	10,251	1.2687	0.0534	0.0532	-0.4521	2010.9	72.1
25-29	8,829	2.8540	0.0631	0.0610	-0.4532	2009.3	71.9
30-34	7,083	4.4279	0.0754	0.0758	-0.4245	2007.3	75.8
35-39	5,496	5.6385	0.0867	0.0928	-0.4062	2005.1	78.4
40-44	4,401	6.3845	0.1159	0.1223	-0.2982	2002.7	95.5
45-49	3,320	6.6690	0.1328	0.1371	-0.2805	1999.8	98.6
Kuntaur							
20-24	4,446	1.6545	0.0691	0.0653	-0.3434	2010.7	88.1
25-29	4,226	3.1133	0.0752	0.0694	-0.3844	2008.8	81.7
30-34	3,180	4.6487	0.0985	0.0955	-0.2987	2006.6	95.5
35-39	2,290	5.5127	0.1089	0.1129	-0.2973	2004.2	95.7
40-44	1,919	6.0135	0.1321	0.1353	-0.2400	2001.5	106.1
45-49	1,310	6.1206	0.1565	0.1575	-0.1992	1998.7	114.1

Table A4 – 1 (cont.)

LGA	No. of Women	Average Parity	Proportions Dead of CEB	q(x)	alpha	Reference Date	q(5)
Janjanbureh							
20-24	5,792	1.4489	0.0541	0.0515	-0.4697	2010.7	69.7
25-29	5,311	2.8870	0.0548	0.0514	-0.5439	2008.9	60.5
30-34	4,195	4.2017	0.0719	0.0710	-0.4600	2006.8	70.8
35-39	3,048	5.1299	0.0801	0.0845	-0.4580	2004.5	71.0
40-44	2,600	5.7242	0.1136	0.1184	-0.3168	2002.0	92.1
45-49	1,792	5.8666	0.1240	0.1267	-0.3262	1999.2	90.6
Basse							
20-24	11,519	1.5526	0.0516	0.0483	-0.5030	2010.7	65.6
25-29	11,026	2.8385	0.0623	0.0571	-0.4890	2008.7	67.3
30-34	8,025	4.1296	0.0761	0.0733	-0.4431	2006.5	73.3
35-39	6,089	4.8992	0.0837	0.0862	-0.4472	2004.0	72.8
40-44	5,022	5.4056	0.1069	0.1089	-0.3637	2001.3	84.9
45-49	3,473	5.6202	0.1241	0.1243	-0.3370	1998.5	89.1

Ethnicity	No. of Women	Average Parity	Proportions Dead of CEB	q(x)	alpha	Reference Date	q(5)
Mandinka							
20-24	31,906	0.9614	0.0502	0.0506	-0.4788	2011.0	68.6
25-29	26,951	2.2690	0.0545	0.0532	-0.5257	2009.4	62.8
30-34	20,724	3.7838	0.0654	0.0664	-0.4958	2007.5	66.4
35-39	15,241	4.9384	0.0775	0.0837	-0.4630	2005.4	70.6
40-44	11,656	5.7183	0.0991	0.1054	-0.3821	2003.1	82.0
45-49	8,837	6.0118	0.1111	0.1156	-0.3783	2000.2	82.6
Fula							
20-24	20,463	1.2864	0.0527	0.0507	-0.4779	2010.7	68.7
25-29	17,547	2.6515	0.0560	0.0530	-0.5277	2009.0	62.6
30-34	13,058	4.0208	0.0665	0.0661	-0.4983	2007.0	66.1
35-39	9,729	4.9167	0.0726	0.0771	-0.5076	2004.8	65.0
40-44	7,203	5.5013	0.0928	0.0973	-0.4266	2002.4	75.5
45-49	5,304	5.7159	0.1058	0.1086	-0.4134	1999.6	77.4
Wollof							
20-24	13,442	1.0620	0.0435	0.0431	-0.5626	2010.9	58.6
25-29	11,844	2.3606	0.0496	0.0478	-0.5821	2009.3	56.5
30-34	8,867	3.6769	0.0599	0.0602	-0.5483	2007.3	60.2
35-39	6,429	4.6388	0.0668	0.0714	-0.5489	2005.1	60.1
40-44	4,776	5.2544	0.0852	0.0899	-0.4701	2002.7	69.7
45-49	3,466	5.4737	0.1004	0.1036	-0.4398	1999.9	73.7
Jola							
20-24	10,224	0.7080	0.0366	0.0383	-0.6245	2011.2	52.1
25-29	8,821	1.8081	0.0376	0.0373	-0.7118	2009.7	44.2
30-34	7,374	3.0812	0.0459	0.0469	-0.6806	2007.8	46.9
35-39	5,657	4.0232	0.0543	0.0586	-0.6545	2005.6	49.3
40-44	4,151	4.6285	0.0700	0.0744	-0.5732	2003.1	57.5

45-49	3,141	4.8832	0.0828	0.0861	-0.5421	2000.2	60.9

Table A4 – 1 (cont.)

Ethnicity	No. of Women	Average Parity	Proportions Dead of CEB	q(x)	alpha	Reference Date	q(5)
Sarahule							
20-24	7,446	1.2687	0.0382	0.0368	-0.6446	2010.8	50.2
25-29	6,621	2.5187	0.0527	0.0494	-0.5652	2009.0	58.3
30-34	4,869	3.7129	0.0561	0.0550	-0.5965	2006.8	55.0
35-39	3,701	4.6282	0.0669	0.0700	-0.5600	2004.5	58.9
40-44	2,944	5.1838	0.0892	0.0922	-0.4563	2001.9	71.5
45-49	2,047	5.5193	0.1063	0.1078	-0.4178	1999.0	76.8
Others							
20-24	7,432	0.7133	0.0457	0.0464	-0.5238	2011.0	63.0
25-29	6,045	1.7972	0.0427	0.0423	-0.6462	2009.5	50.0
30-34	4,866	3.1539	0.0547	0.0564	-0.5832	2007.8	56.4
35-39	3,651	4.1783	0.0597	0.0653	-0.5968	2005.8	55.0
40-44	2,817	4.7622	0.0714	0.0769	-0.5554	2003.5	59.4
45-49	2,199	5.0123	0.0806	0.0847	-0.5511	2000.7	59.9
None/Early childhood							
20-24	34,984	1.6191	0.0508	0.0454	-0.5353	2010.4	61.7
25-29	41,525	2.8707	0.0567	0.0516	-0.5426	2008.5	60.9
30-34	38,302	4.1011	0.0677	0.0656	-0.5027	2006.4	65.6
35-39	31,360	5.0011	0.0767	0.0799	-0.4881	2004.1	67.4
40-44	26,399	5.5799	0.0989	0.1021	-0.3996	2001.7	79.4
45-49	21,093	5.8015	0.1101	0.1115	-0.3988	1998.9	79.5
Primary							
20-24	11,274	1.4336	0.0515	0.0496	-0.4894	2010.8	67.2
25-29	10,494	2.6980	0.0558	0.0515	-0.5430	2008.9	60.8
30-34	8,556	3.9930	0.0638	0.0614	-0.5382	2006.6	61.4
35-39	6,228	4.8783	0.0705	0.0724	-0.5418	2004.0	60.9
40-44	3,593	5.5291	0.0786	0.0798	-0.5354	2001.3	61.7
45-49	2,034	5.5728	0.0925	0.0923	-0.5039	1998.4	65.4
Secondary							
20-24	47,509	0.6059	0.0378	0.0393	-0.6106	2011.2	53.5
25-29	29,382	1.5364	0.0370	0.0366	-0.7214	2009.6	43.4
30-34	16,111	2.6092	0.0383	0.0392	-0.7741	2007.7	39.2
35-39	9,632	3.4827	0.0408	0.0442	-0.8034	2005.6	37.0
40-44	5,483	4.0232	0.0459	0.0489	-0.7967	2003.2	37.5
45-49	3,132	4.1976	0.0549	0.0572	-0.7622	2000.3	40.1
Tertiary							
20-24	3,460	0.2098	0.0207	0.0182	-1.0080	2009.7	24.9
25-29	3,166	0.7783	0.0325	0.0346	-0.7502	2009.4	41.0
30-34	1,912	1.6909	0.0257	0.0303	-0.9079	2009.4	30.3
35-39	1,207	2.4548	0.0300	0.0383	-0.8776	2009.6	32.1
40-44	840	2.8452	0.0209	0.0262	-1.1203	2009.1	20.0
45-49	545	3.0165	0.0231	0.0277	-1.1402	2006.8	19.2

Source: The Gambia Population and Housing Census, 2013

Appendix 5: Outputs of the application of the Death Distribution Methods

i. The Brass Growth Balance Method: The Gambia, Females

Age range for fitting of line:

Date of census: **2013.28** Lower age: **5**

Midpoint of deaths: **2012.79** Period of deaths (yrs) = **1** Upper age: **84**

Age	*x*	$_5N_x$	$_5D_x$	*N(x+)*	*D(x+)*	*PYL(x+)*	*N(x)*	*b(x+)*	*d(x+) = X*	*b(x+) = Y*	*a+bx*	*Residuals y-(a+bx)*
1	2	3	4	5	6	7	8	9	10	11	12	13
0-4	0	143,941	1,650	942,806	5,566	942,806			0.00000		0.04102	
5-9	5	138,585	368	798,865	3,916	798,865	28,248	0.03536	0.00490	0.03536	0.04455	-0.00919
10-14	10	109,635	144	660,280	3,548	660,280	24,653	0.03734	0.00537	0.03734	0.04489	-0.00756
15-19	15	111,185	213	550,645	3,404	550,645	22,081	0.04010	0.00618	0.04010	0.04548	-0.00537
20-24	20	97,779	211	439,460	3,191	439,460	20,853	0.04745	0.00726	0.04745	0.04625	0.00120
25-29	25	84,954	257	341,681	2,980	341,681	18,228	0.05335	0.00872	0.05335	0.04731	0.00604
30-34	30	65,168	248	256,727	2,723	256,727	14,881	0.05797	0.01061	0.05797	0.04867	0.00930
35-39	35	48,606	212	191,559	2,475	191,559	11,256	0.05876	0.01292	0.05876	0.05034	0.00842
40-44	40	36,513	252	142,953	2,263	142,953	8,426	0.05894	0.01583	0.05894	0.05244	0.00650
45-49	45	26,978	185	106,440	2,011	106,440	6,277	0.05897	0.01889	0.05897	0.05465	0.00433
50-54	50	22,397	225	79,462	1,826	79,462	4,916	0.06187	0.02298	0.06187	0.05759	0.00427
55-59	55	11,932	106	57,065	1,601	57,065	3,270	0.05729	0.02806	0.05729	0.06126	-0.00396
60-64	60	14,546	227	45,133	1,495	45,133	2,635	0.05838	0.03312	0.05838	0.06491	-0.00653
65-69	65	8,373	136	30,587	1,268	30,587	2,207	0.07216	0.04146	0.07216	0.07092	0.00124
70-74	70	8,090	264	22,214	1,132	22,214	1,646	0.07410	0.05096	0.07410	0.07778	-0.00368
75-79	75	4,308	173	14,124	868	14,124	1,181	0.08360	0.06146	0.08360	0.08535	-0.00176
80-84	80	4,414	284	9,816	695	9,816	872	0.08885	0.07080	0.08885	0.09210	-0.00325
85+		5,402	411	5,402	411	5,402						
Total		942,806	5,566									

Completeness relative to population at midpoint, *c* = **141 per cent** a = 0.0410156

Annual growth rate of stable population, r = **4.1 per cent** b = 0.7214489

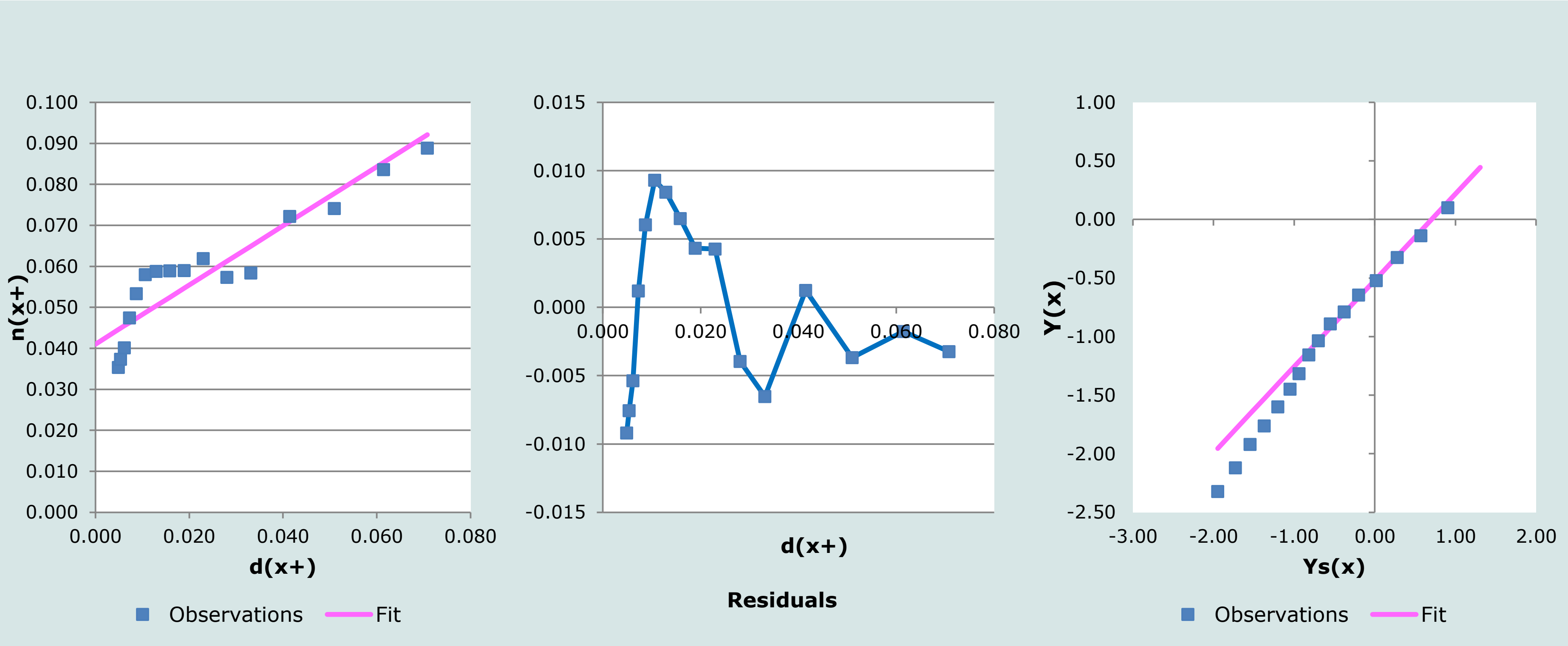
The Brass Growth Balance Method: The Gambia, Females (cont.)

Age	**Adjusted $_5N_x(t_m)$**	**Adjusted $_5D_x$**	**Adjusted PYL(x,5)**	**Adjusted $_5m_x$**	x	$_5q_x$	l_x/l_5	**Obs. $Y(x)$**	**INDEPTH Model Standard 1 (Females) $ls(x)$**	**INDEPTH Model Standard 1 (Females) $Ys(x)$**	**Fitted $Y(x)$**	**Fitted $l(x)$**	**Age**
1	2	3	4	5	6	7	8	9	10	11	12	13	14
0-4					0								0
5-9	135,783	260	135,783	0.0019	5	0.0095	1		1.0000			1	5
10-14	107,418	102	107,418	0.0009	10	0.0047	0.9905	-2.3217	0.9801	-1.9482	-1.9557	0.9804	10
15-19	108,937	151	108,937	0.0014	15	0.0069	0.9858	-2.1196	0.9693	-1.7262	-1.7921	0.9730	15
20-24	95,802	149	95,802	0.0016	20	0.0078	0.9790	-1.9209	0.9565	-1.5453	-1.6587	0.9650	20
25-29	83,236	182	83,236	0.0022	25	0.0109	0.9714	-1.7628	0.9393	-1.3697	-1.5292	0.9551	25
30-34	63,850	175	63,850	0.0027	30	0.0136	0.9609	-1.6004	0.9169	-1.2006	-1.4045	0.9432	30
35-39	47,623	150	47,623	0.0031	35	0.0156	0.9478	-1.4491	0.8905	-1.0478	-1.2919	0.9298	35
40-44	35,775	178	35,775	0.0050	40	0.0246	0.9330	-1.3166	0.8670	-0.9374	-1.2105	0.9184	40
45-49	26,432	131	26,432	0.0049	45	0.0244	0.9100	-1.1570	0.8370	-0.8181	-1.1225	0.9042	45
50-54	21,944	159	21,944	0.0072	50	0.0356	0.8878	-1.0342	0.8016	-0.6981	-1.0341	0.8878	50
55-59	11,691	75	11,691	0.0064	55	0.0315	0.8562	-0.8920	0.7499	-0.5491	-0.9242	0.8639	55
60-64	14,252	160	14,252	0.0113	60	0.0548	0.8292	-0.7899	0.6800	-0.3768	-0.7972	0.8312	60
65-69	8,204	96	8,204	0.0117	65	0.0569	0.7838	-0.6439	0.5983	-0.1992	-0.6662	0.7912	65
70-74	7,926	187	7,926	0.0235	70	0.1112	0.7392	-0.5208	0.4902	0.0196	-0.5049	0.7330	70
75-79	4,221	122	4,221	0.0290	75	0.1351	0.6570	-0.3250	0.3641	0.2788	-0.3138	0.6519	75
80-84	4,325	201	4,325	0.0464	80	0.2080	0.5683	-0.1374	0.2414	0.5724	-0.0973	0.5485	80
85+	5,293	291	5,293	0.0549	85		0.4501	0.1002	0.1401	0.9072	0.1496	0.4258	85
									0.0681	1.3079	0.4450	0.2911	90
Total	782,712	2,768							0.0262	1.8075	0.8134	0.1643	
									0.0074	2.4498	1.2869	0.0708	

Fit from:	**45**	Alpha =	**-0.5193**	$_{45}q_{15}$=	**0.1457**
Fit to:	**75**	Beta =	**0.7373**		

The Brass Growth Balance Method: The Gambia, Females (cont.)

Figure A5 - 1: Diagnostic plot, residuals, and observed and fitted logits using INDEPTH Model Standard 1 for Gambian females, 2013 census



ii. The Brass Growth Balance Method: The Gambia, Males

				Age range for fitting of line:	
		Date of census:	**2013.28**	Lower age:	**5**
Midpoint of deaths:	**2012.79**	Period of deaths (yrs) =	**1**	Upper age:	**84**

Age	*x*	$_5N_x$	$_5D_x$	*N(x+)*	*D(x+)*	*PYL(x+)*	*N(x)*	*b(x+)*	*d(x+) = X*	*b(x+) = Y*	*a+bx*	*Residuals y-(a+bx)*
1	2	3	4	5	6	7	8	9	10	11	12	13
0-4	0	147,625	2,033	913,611	6,415	913,611			0.00000		0.03971	
5-9	5	141,220	478	765,986	4,382	765,986	28,877	0.03770	0.00572	0.03770	0.04383	-0.00613
10-14	10	110,461	210	624,766	3,904	624,766	24,979	0.03998	0.00625	0.03998	0.04421	-0.00422
15-19	15	103,029	203	514,305	3,694	514,305	21,336	0.04149	0.00718	0.04149	0.04488	-0.00339
20-24	20	86,064	179	411,276	3,491	411,276	18,833	0.04579	0.00849	0.04579	0.04582	-0.00002
25-29	25	74,313	174	325,212	3,312	325,212	15,995	0.04918	0.01018	0.04918	0.04703	0.00215
30-34	30	56,939	197	250,899	3,138	250,899	13,010	0.05185	0.01251	0.05185	0.04870	0.00315
35-39	35	45,904	233	193,960	2,941	193,960	10,225	0.05272	0.01516	0.05272	0.05061	0.00210
40-44	40	36,474	239	148,056	2,708	148,056	8,184	0.05527	0.01829	0.05527	0.05286	0.00241
45-49	45	28,602	209	111,582	2,469	111,582	6,460	0.05789	0.02213	0.05789	0.05562	0.00227
50-54	50	23,167	285	82,980	2,260	82,980	5,148	0.06204	0.02724	0.06204	0.05929	0.00275
55-59	55	14,677	174	59,813	1,975	59,813	3,688	0.06166	0.03302	0.06166	0.06345	-0.00179
60-64	60	15,730	318	45,136	1,801	45,136	3,039	0.06733	0.03990	0.06733	0.06840	-0.00107
65-69	65	9,831	226	29,406	1,483	29,406	2,487	0.08458	0.05043	0.08458	0.07597	0.00861
70-74	70	7,469	318	19,575	1,257	19,575	1,714	0.08755	0.06421	0.08755	0.08587	0.00168
75-79	75	4,383	210	12,106	939	12,106	1,144	0.09452	0.07756	0.09452	0.09547	-0.00094
80-84	80	3,403	304	7,723	729	7,723	772	0.10001	0.09439	0.10001	0.10757	-0.00755
85+		4,320	425	4,320	425	4,320						
Total		913,611	6,415									

Completeness relative to population at midpoint, *c* =	**142 per cent**	a =	0.0397142
Annual growth rate of stable population, *r* =	**4.0 per cent**	b =	0.7188228

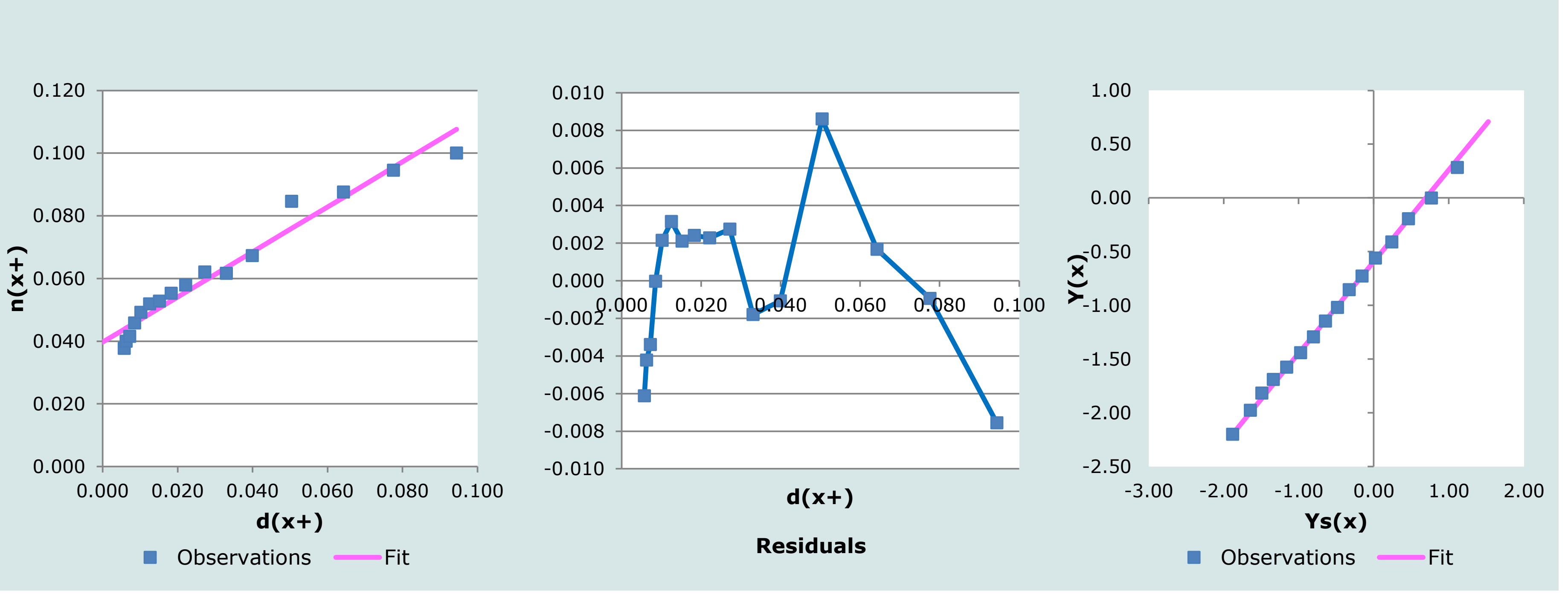
The Brass Growth Balance Method: The Gambia, Males (cont.)

Age	Adjusted $_5N_x(t_m)$	Adjusted $_5D_x$	Adjusted PYL(x,5)	Adjusted $_5m_x$	x	$_5q_x$	l_x/l_5	Obs. $Y(x)$	INDEPTH Model Standard 1 (Males) $ls(x)$	INDEPTH Model Standard 1 (Males) $Ys(x)$	Fitted $Y(x)$	Fitted $l(x)$	Age
1	2	3	4	5	6	7	8	9	10	11	12	13	14
0-4					0								0
5-9	138,454	337	138,454	0.0024	5	0.0121	1		1.0000			1	5
10-14	108,298	148	108,298	0.0014	10	0.0068	0.9879	-2.2015	0.9774	-1.8829	-2.1992	0.9879	10
15-19	101,011	143	101,011	0.0014	15	0.0071	0.9812	-1.9769	0.9642	-1.6467	-1.9978	0.9819	15
20-24	84,378	126	84,378	0.0015	20	0.0074	0.9743	-1.8168	0.9520	-1.4936	-1.8671	0.9767	20
25-29	72,858	123	72,858	0.0017	25	0.0084	0.9670	-1.6889	0.9358	-1.3400	-1.7360	0.9699	25
30-34	55,824	139	55,824	0.0025	30	0.0124	0.9589	-1.5749	0.9106	-1.1603	-1.5828	0.9595	30
35-39	45,005	164	45,005	0.0036	35	0.0181	0.9470	-1.4420	0.8760	-0.9774	-1.4267	0.9455	35
40-44	35,760	168	35,760	0.0047	40	0.0233	0.9299	-1.2928	0.8337	-0.8061	-1.2806	0.9283	40
45-49	28,042	147	28,042	0.0053	45	0.0259	0.9083	-1.1464	0.7838	-0.6439	-1.1423	0.9076	45
50-54	22,713	201	22,713	0.0088	50	0.0433	0.8847	-1.0190	0.7250	-0.4847	-1.0064	0.8821	50
55-59	14,390	123	14,390	0.0085	55	0.0417	0.8465	-0.8536	0.6588	-0.3290	-0.8736	0.8516	55
60-64	15,422	224	15,422	0.0145	60	0.0701	0.8111	-0.7287	0.5784	-0.1580	-0.7277	0.8108	60
65-69	9,638	159	9,638	0.0165	65	0.0793	0.7543	-0.5608	0.4892	0.0217	-0.5744	0.7593	65
70-74	7,323	224	7,323	0.0306	70	0.1421	0.6944	-0.4105	0.3832	0.2380	-0.3899	0.6856	70
75-79	4,297	148	4,297	0.0344	75	0.1586	0.5957	-0.1938	0.2841	0.4621	-0.1986	0.5980	75
80-84	3,336	214	3,336	0.0642	80	0.2767	0.5013	-0.0025	0.1775	0.7665	0.0611	0.4695	80
85+	4,235	300	4,235	0.0707	85		0.3626	0.2821	0.0973	1.1136	0.3572	0.3286	85
									0.0451	1.5260	0.7090	0.1950	90
Total	750,984	3,088							0.0169	2.0320	1.1407	0.0927	
									0.0048	2.6665	1.6819	0.0334	

Fit from:	**45**	Alpha =	**-0.5929**	$_{45}q_{15}$=	**0.1743**
Fit to:	**75**	Beta =	**0.8531**		

The Brass Growth Balance Method: The Gambia, Males (cont.)

Figure A5 - 2: Diagnostic plot, residuals, and observed and fitted logits using INDEPTH Model Standard 1 for Gambian males, 2013 census



i. The Preston and Coale Method: The Gambia, Females

		Date of census:	**2013.28**
Midpoint of the deaths:	**2012.79**	Period of deaths (yrs) =	**1**

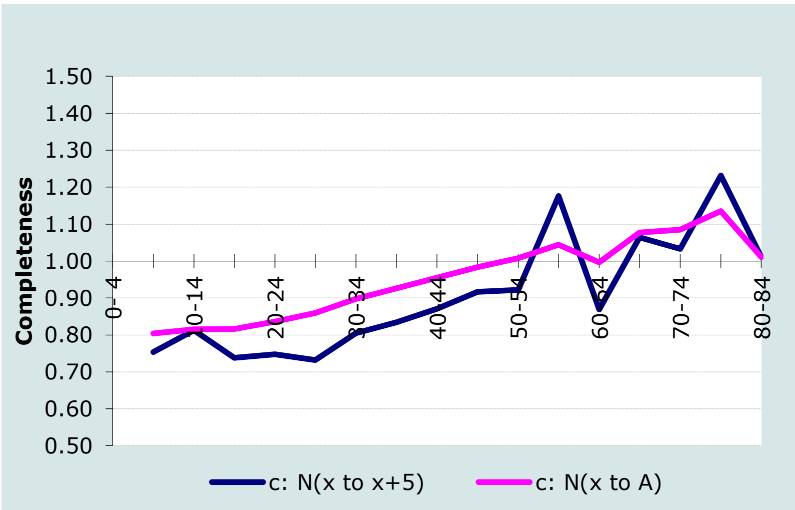
Age range for fitting of line:

Lower age=	**5**	Growth rate, *r* =	**3.1 per cent**
Upper age =	**84**	avdevN(x+)=	**0.11126**

Age	*x*	$_5N_x(t_c)$	$_5D_x$	Est N_x	Est $_5N_x$	Obs $_5N_x$	c: $_5N_x$	c: $_{A-x}N_x$
1	2	3	4	5	6	7	8	9
0- 4	0	143,941	1,650			143,941		
5- 9	5	138,585	368	20,301	93,442	138,585	0.6743	0.6732
10-14	10	109,635	144	17,076	78,981	109,635	0.7204	0.6730
15-19	15	111,185	213	14,517	66,934	111,185	0.6020	0.6634
20-24	20	97,779	211	12,257	56,443	97,779	0.5772	0.6792
25-29	25	84,954	257	10,320	47,340	84,954	0.5572	0.7088
30-34	30	65,168	248	8,616	39,445	65,168	0.6053	0.7601
35-39	35	48,606	212	7,162	32,776	48,606	0.6743	0.8142
40-44	40	36,513	252	5,948	27,045	36,513	0.7407	0.8637
45-49	45	26,978	185	4,870	22,191	26,978	0.8226	0.9081
50-54	50	22,397	225	4,007	18,089	22,397	0.8077	0.9393
55-59	55	11,932	106	3,229	14,753	11,932	1.2364	0.9964
60-64	60	14,546	227	2,672	11,886	14,546	0.8171	0.9243
65-69	65	8,373	136	2,082	9,356	8,373	1.1175	0.9862
70-74	70	8,090	264	1,660	7,101	8,090	0.8777	0.9209
75-79	75	4,308	173	1,180	5,080	4,308	1.1793	0.9608
80-84	80	4,414	284	852	3,300	4,414	0.7477	0.7477
85+		5,402	411	468				
Total		942,806	5566			937,404		

Completeness, C = **70 per cent**

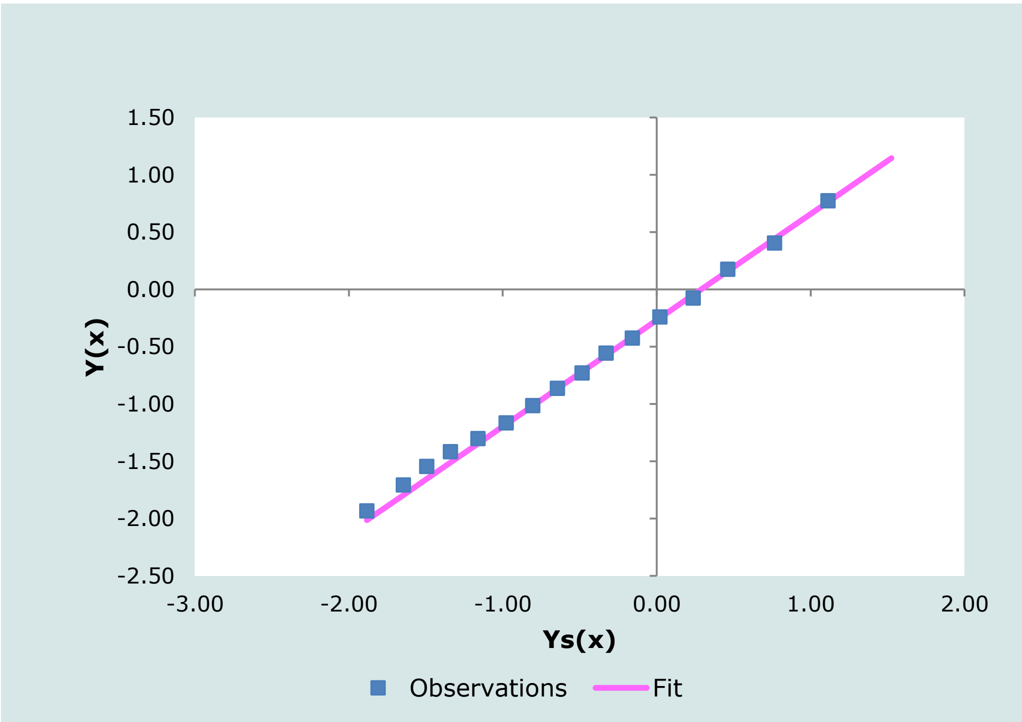
Age range to determine *C*:
Lower age= 15
Upper age = 64



The Preston & Coale Method: The Gambia, Females (Cont.)

Age	Adjusted $_5N_x(t_m)$	Adjusted $_5D_x$	Adjusted $_5m_x$	x	$_5q_x$	l_x/l_5	Obs. $Y(x)$	INDEPTH Model Standard 1 (Females) $ls(x)$	INDEPTH Model Standard 1 (Females) $Ys(x)$	Fitted $Y(x)$	Fitted $l(x)$
1	2	3	4	5	6	7	8	9	10	11	12
0-4				0							
5-9	136,486	528	0.0039	5	0.0191	1		1.0000			1
10-14	107,974	206	0.0019	10	0.0095	0.9809	-1.9682	0.9801	-1.9482	-1.6788	0.9664
15-19	109,501	305	0.0028	15	0.0138	0.9715	-1.7649	0.9693	-1.7262	-1.4968	0.9523
20-24	96,298	303	0.0031	20	0.0156	0.9581	-1.5644	0.9565	-1.5453	-1.3485	0.9368
25-29	83,667	369	0.0044	25	0.0218	0.9431	-1.4043	0.9393	-1.3697	-1.2045	0.9175
30-34	64,181	356	0.0055	30	0.0273	0.9226	-1.2390	0.9169	-1.2006	-1.0658	0.8939
35-39	47,870	304	0.0064	35	0.0313	0.8974	-1.0842	0.8905	-1.0478	-0.9405	0.8677
40-44	35,960	361	0.0100	40	0.0490	0.8693	-0.9475	0.8670	-0.9374	-0.8500	0.8455
45-49	26,569	265	0.0100	45	0.0487	0.8267	-0.7813	0.8370	-0.8181	-0.7522	0.8182
50-54	22,058	323	0.0146	50	0.0706	0.7865	-0.6519	0.8016	-0.6981	-0.6538	0.7871
55-59	11,751	152	0.0129	55	0.0626	0.7310	-0.4998	0.7499	-0.5491	-0.5315	0.7433
60-64	14,326	325	0.0227	60	0.1075	0.6852	-0.3889	0.6800	-0.3768	-0.3903	0.6858
65-69	8,246	195	0.0236	65	0.1116	0.6115	-0.2269	0.5983	-0.1992	-0.2446	0.6199
70-74	7,967	379	0.0475	70	0.2123	0.5433	-0.0867	0.4902	0.0196	-0.0652	0.5326
75-79	4,243	248	0.0585	75	0.2551	0.4279	0.1452	0.3641	0.2788	0.1473	0.4269
80-84	4,347	407	0.0937	80	0.3795	0.3188	0.3797	0.2414	0.5724	0.3881	0.3151
85+	5,320	589	0.1108	85		0.1978	0.7001	0.1401	0.9072	0.6627	0.2099
								0.0681	1.3079	0.9913	0.1210
Total	786,764	5,615						0.0262	1.8075	1.4010	0.0572
								0.0074	2.4498	1.9276	0.0207
										$_{45}q_{15}$=	**0.2798**

Fit from:	45		Alpha =	-0.0813
Fit to:	75		Beta =	0.8200



ii. The Preston and Coale Method: The Gambia, Males

Date of census: **2013.28**

Midpoint of the deaths: **2012.79** Period of deaths (yrs) = **1**

Age range for fitting of line:

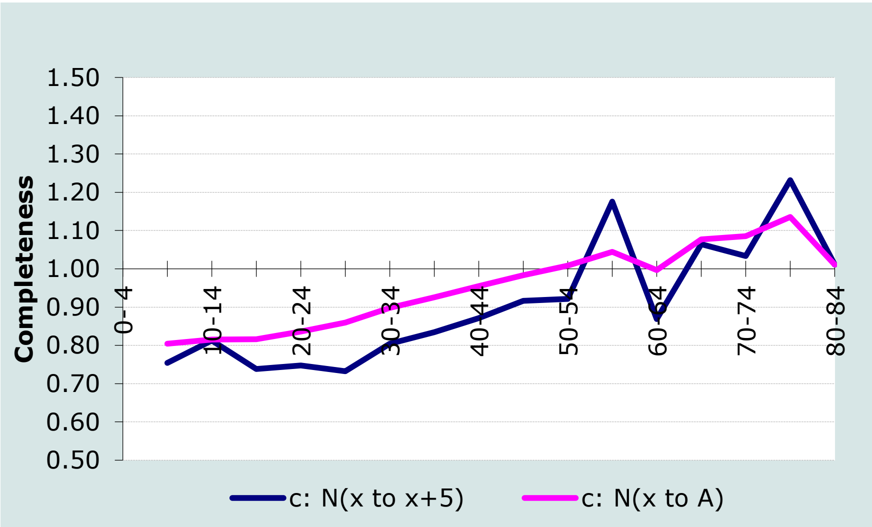
Lower age= **5** Growth rate, r = **3.1 per cent**

Upper age = **84** avdevN(x+)= **0.08968**

Age	*x*	$_5N_x(t_c)$	$_5D_x$	Est N_x	Est $_5N_x$	Obs $_5N_x$	c: $_5N_x$	c: $_{A-x}N_x$
1	2	3	4	5	6	7	8	9
0- 4	0	147,625	2,033			147,625		
5- 9	5	141,220	478	23,160	106,470	141,220	0.7539	0.8040
10-14	10	110,461	210	19,427	89,750	110,461	0.8125	0.8154
15-19	15	103,029	203	16,473	76,043	103,029	0.7381	0.8161
20-24	20	86,064	179	13,945	64,355	86,064	0.7478	0.8358
25-29	25	74,313	174	11,798	54,395	74,313	0.7320	0.8594
30-34	30	56,939	197	9,960	45,808	56,939	0.8045	0.8978
35-39	35	45,904	233	8,363	38,305	45,904	0.8344	0.9258
40-44	40	36,474	239	6,959	31,770	36,474	0.8710	0.9550
45-49	45	28,602	209	5,749	26,219	28,602	0.9167	0.9836
50-54	50	23,167	285	4,739	21,350	23,167	0.9216	1.0079
55-59	55	14,677	174	3,801	17,254	14,677	1.1756	1.0440
60-64	60	15,730	318	3,100	13,663	15,730	0.8686	0.9967
65-69	65	9,831	226	2,365	10,463	9,831	1.0642	1.0770
70-74	70	7,469	318	1,820	7,717	7,469	1.0331	1.0852
75-79	75	4,383	210	1,267	5,398	4,383	1.2315	1.1351
80-84	80	3,403	304	892	3,441	3,403	1.0110	1.0110
85+		4,320	425	484				
Total		913,611	6,415			909,291		

Completeness, C = **83 per cent**

Age range to determine C:
Lower age= 15
Upper age = 64

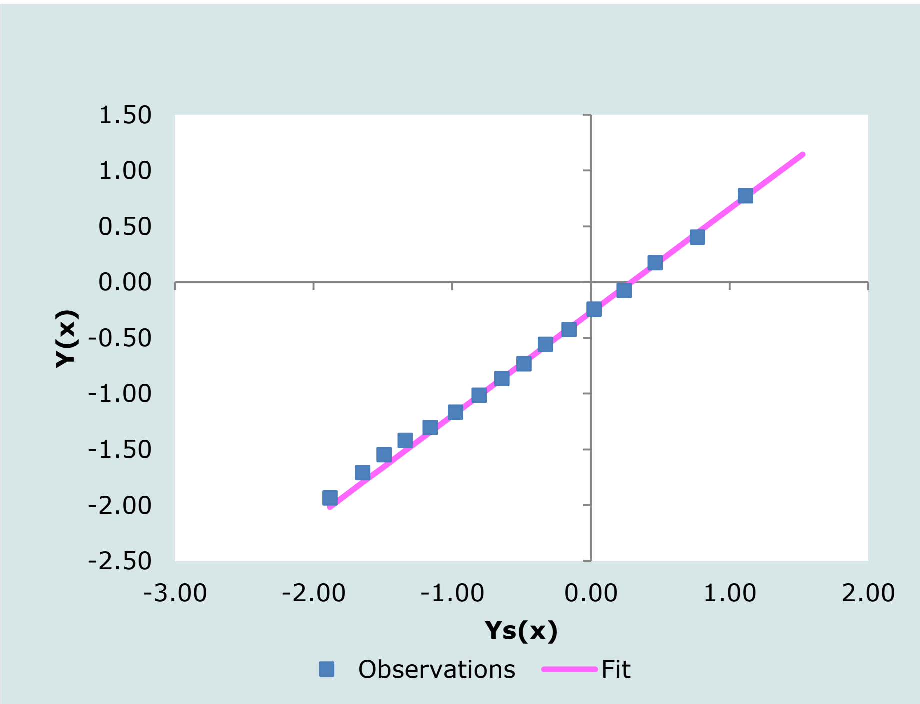


The Preston & Coale Method: The Gambia, Males (Cont.)

Age	Adjusted $_5N_x(t_m)$	Adjusted $_5D_x$	Adjusted $_5m_x$	x	$_5q_x$	l_x/l_5	Obs. $Y(x)$	INDEPTH Model Standard 1 (Males) $ls(x)$	INDEPTH Model Standard 1 (Males) $Ys(x)$	Fitted $Y(x)$	Fitted $l(x)$
1	2	3	4	5	6	7	8	9	10	11	12
0-4				0							
5-9	139,081	576	0.0041	5	0.0205	1		1.0000			1
10-14	108,788	253	0.0023	10	0.0116	0.9795	-1.9334	0.9774	-1.8829	-2.0159	0.9826
15-19	101,468	245	0.0024	15	0.0120	0.9682	-1.7076	0.9642	-1.6467	-1.7969	0.9732
20-24	84,760	216	0.0025	20	0.0126	0.9566	-1.5462	0.9520	-1.4936	-1.6549	0.9648
25-29	73,187	210	0.0029	25	0.0142	0.9445	-1.4169	0.9358	-1.3400	-1.5124	0.9537
30-34	56,077	237	0.0042	30	0.0209	0.9310	-1.3014	0.9106	-1.1603	-1.3458	0.9365
35-39	45,209	281	0.0062	35	0.0306	0.9115	-1.1663	0.8760	-0.9774	-1.1762	0.9131
40-44	35,922	288	0.0080	40	0.0393	0.8837	-1.0138	0.8337	-0.8061	-1.0173	0.8844
45-49	28,169	252	0.0089	45	0.0437	0.8489	-0.8632	0.7838	-0.6439	-0.8670	0.8499
50-54	22,816	343	0.0151	50	0.0725	0.8118	-0.7309	0.7250	-0.4847	-0.7193	0.8082
55-59	14,455	210	0.0145	55	0.0700	0.7529	-0.5572	0.6588	-0.3290	-0.5749	0.7595
60-64	15,492	383	0.0247	60	0.1165	0.7002	-0.4242	0.5784	-0.1580	-0.4163	0.6969
65-69	9,682	272	0.0281	65	0.1314	0.6187	-0.2419	0.4892	0.0217	-0.2497	0.6223
70-74	7,356	383	0.0521	70	0.2305	0.5374	-0.0749	0.3832	0.2380	-0.0491	0.5245
75-79	4,317	253	0.0586	75	0.2557	0.4135	0.1747	0.2841	0.4621	0.1588	0.4213
80-84	3,351	366	0.1093	80	0.4292	0.3078	0.4052	0.1775	0.7665	0.4411	0.2927
85+	4,255	512	0.1204	85		0.1757	0.7730	0.0973	1.1136	0.7629	0.1786
								0.0451	1.5260	1.1454	0.0919
Total	754,383	5,281						0.0169	2.0320	1.6146	0.0381
								0.0048	2.6665	2.2029	0.0121
										$_{45}q_{15}$=	**0.2839**

Fit from: 45 Fit to: 75

Alpha = -0.2698 Beta = 0.9274



Appendix 6: Estimates of adult female and male mortality from lifetime orphanhood by LGA

Table A6 - 1: Estimates of adult female and male mortality ($_{45}q_{15}$) from lifetime orphanhood by LGA.

	FEMALE						MALE					
Age	**Proportion with living mother *S*(n)**	***l*(25+n) / *l*(25)**	**Level (Alpha)**	**Reference Date**	$_{45}p_{15}$	$_{45}q_{15}$	**Proportion with living father *S*(n)**	***l*(35+n) / *l*(35)**	**Level (Alpha)**	**Reference Date**	$_{45}p_{15}$	$_{45}q_{15}$
The Gambia, Urban	(M_f = 28.08)							(M_m = 37)				
10	0.9842	0.9817	-0.6199	2009.7	0.8761	0.1239	0.9519	0.9625	-0.6619	2008.6	0.8284	0.1716
15	0.9668	0.9659	-0.5003	2007.5	0.8498	0.1502	0.9091	0.9358	-0.6651	2006.6	0.8293	0.1707
20	0.9418	0.9444	-0.4287	2005.6	0.8322	0.1678	0.8359	0.8622	-0.4483	2004.7	0.7648	0.2352
25	0.9096	0.9176	-0.3834	2003.8	0.8203	0.1797	0.7524	0.7936	-0.4247	2003.1	0.7569	0.2431
30	0.8690	0.8854	-0.3945	2002.4	0.8233	0.1767	0.6672	0.6955	-0.3715	2002.1	0.7389	0.2611
35	0.8087	0.8365	-0.3942	2001.2	0.8232	0.1768	0.5513	0.5755	-0.3505	2001.7	0.7315	0.2685
40	0.7323	0.7734	-0.3927	2000.6	0.8228	0.1772	0.4360					
45	0.6172											
The Gambia, Rural	(M_f = 27.80)							(M_m = 37)				
10	0.9829	0.9798	-0.5639	2009.7	0.8642	0.1358	0.9495	0.9549	-0.5553	2008.6	0.7983	0.2017
15	0.9686	0.9673	-0.5232	2007.5	0.8551	0.1449	0.9102	0.9342	-0.6509	2006.6	0.8255	0.1745
20	0.9447	0.9464	-0.4504	2005.6	0.8377	0.1623	0.8451	0.8707	-0.4905	2004.8	0.7784	0.2216
25	0.9136	0.9201	-0.4021	2003.8	0.8253	0.1747	0.7595	0.7927	-0.4214	2003.2	0.7559	0.2441
30	0.8691	0.8831	-0.3816	2002.3	0.8199	0.1801	0.6641	0.6844	-0.3407	2002.0	0.7281	0.2719
35	0.8042	0.8282	-0.3608	2001.1	0.8142	0.1858	0.5397	0.5578	-0.3076	2001.6	0.7163	0.2837
40	0.7204	0.7555	-0.3366	2000.4	0.8076	0.1924	0.4202					
45	0.5978											

Table A6 – 1 (cont.)

Age	FEMALE						MALE					
	Proportion with living mother $S(n)$	$\frac{l(25+n)}{l(25)}$	Level (Alpha)	Reference Date	$_{45}p_{15}$	$_{45}q_{15}$	Proportion with living father $S(n)$	$\frac{l(35+n)}{l(35)}$	Level (Alpha)	Reference Date	$_{45}p_{15}$	$_{45}q_{15}$
Banjul		*(M_f = 28.20)*						*(M_m = 37)*				
10	0.9862	0.9844	-0.7072	2009.7	0.8929	0.1071	0.9619	0.9692	-0.7736	2008.7	0.8564	0.1436
15	0.9698	0.9695	-0.5632	2007.6	0.8641	0.1359	0.9297	0.9636	-0.9844	2006.7	0.8994	0.1006
20	0.9447	0.9479	-0.4665	2005.6	0.8416	0.1584	0.8480	0.8793	-0.5349	2004.8	0.7921	0.2079
25	0.9135	0.9224	-0.4194	2003.8	0.8298	0.1702	0.7788	0.8206	-0.5237	2003.3	0.7887	0.2113
30	0.8686	0.8861	-0.3981	2002.4	0.8242	0.1758	0.6941	0.7351	-0.4838	2002.3	0.7762	0.2238
35	0.8188	0.8484	-0.4440	2001.3	0.8361	0.1639	0.5889	0.6421	-0.5124	2002.1	0.7852	0.2148
40	0.7669	0.8126	-0.5249	2000.9	0.8555	0.1445	0.4980					
45	0.6561											
Kanifing		*(M_f = 28.13)*						*(M_m = 37)*				
10	0.9843	0.9819	-0.6256	2009.7	0.8772	0.1228	0.9545	0.9695	-0.7787	2008.6	0.8576	0.1424
15	0.9665	0.9657	-0.4961	2007.5	0.8488	0.1512	0.9092	0.9355	-0.6620	2006.6	0.8284	0.1716
20	0.9407	0.9434	-0.4183	2005.6	0.8295	0.1705	0.8371	0.8628	-0.4514	2004.7	0.7658	0.2342
25	0.9083	0.9166	-0.3762	2003.8	0.8184	0.1816	0.7518	0.7976	-0.4386	2003.1	0.7616	0.2384
30	0.8672	0.8841	-0.3870	2002.4	0.8213	0.1787	0.6723	0.7025	-0.3909	2002.1	0.7455	0.2545
35	0.8104	0.8388	-0.4037	2001.2	0.8257	0.1743	0.5578	0.5852	-0.3741	2001.8	0.7398	0.2602
40	0.7393	0.7818	-0.4198	2000.7	0.8299	0.1701	0.4447					
45	0.6257											

Table A6 – 1 (cont.)

Age	FEMALE						MALE					
	Proportion with living mother S(n)	**l(25+n) / l(25)**	**Level (Alpha)**	**Reference Date**	$_{45}p_{15}$	$_{45}q_{15}$	**Proportion with living father S(n)**	**l(35+n) / l(35)**	**Level (Alpha)**	**Reference Date**	$_{45}p_{15}$	$_{45}q_{15}$
Brikama		*(M_f = 28.29)*						*(M_m = 37)*				
10	0.9829	0.9803	-0.5796	2009.7	0.8676	0.1324	0.9492	0.9561	-0.5716	2008.6	0.8031	0.1969
15	0.9673	0.9670	-0.5182	2007.5	0.8539	0.1461	0.9080	0.9339	-0.6482	2006.6	0.8247	0.1753
20	0.9400	0.9433	-0.4170	2005.6	0.8292	0.1708	0.8362	0.8611	-0.4430	2004.7	0.7630	0.2370
25	0.9083	0.9175	-0.3828	2003.8	0.8202	0.1798	0.7486	0.7828	-0.3868	2003.1	0.7441	0.2559
30	0.8652	0.8833	-0.3830	2002.4	0.8202	0.1798	0.6545	0.6782	-0.3238	2002.0	0.7221	0.2779
35	0.8016	0.8317	-0.3750	2001.2	0.8181	0.1819	0.5350	0.5544	-0.2993	2001.5	0.7133	0.2867
40	0.7183	0.7621	-0.3569	2000.5	0.8132	0.1868	0.4181					
45	0.6017											
Kerewan		*(M_f = 27.79)*						*(M_m = 37)*				
10	0.9851	0.9826	-0.6459	2009.7	0.8813	0.1187	0.9514	0.9572	-0.5862	2008.6	0.8074	0.1926
15	0.9719	0.9709	-0.5892	2007.6	0.8697	0.1303	0.9128	0.9375	-0.6809	2006.6	0.8334	0.1666
20	0.9552	0.9574	-0.5824	2005.6	0.8682	0.1318	0.8474	0.8759	-0.5169	2004.8	0.7866	0.2134
25	0.9314	0.9383	-0.5554	2003.9	0.8624	0.1376	0.7700	0.8011	-0.4514	2003.2	0.7658	0.2342
30	0.8911	0.9055	-0.5134	2002.4	0.8528	0.1472	0.6718	0.6911	-0.3592	2002.1	0.7346	0.2654
35	0.8332	0.8581	-0.4871	2001.3	0.8466	0.1534	0.5453	0.5602	-0.3133	2001.6	0.7184	0.2816
40	0.7498	0.7871	-0.4370	2000.7	0.8343	0.1657	0.4206					
45	0.6303											

Table A6 – 1 (cont.)

	FEMALE						MALE					
Age	**Proportion with living mother *S*(n)**	**$\frac{l(25+n)}{l(25)}$**	**Level (Alpha)**	**Reference Date**	**$_{45}p_{15}$**	**$_{45}q_{15}$**	**Proportion with living father *S*(n)**	**$\frac{l(35+n)}{l(35)}$**	**Level (Alpha)**	**Reference Date**	**$_{45}p_{15}$**	**$_{45}q_{15}$**
Mansakonko		*(M_f = 27.76)*						*(M_m = 37)*				
10	0.9785	0.9741	-0.4259	2009.7	0.8315	0.1685	0.9387	0.9460	-0.4476	2008.6	0.7645	0.2355
15	0.9635	0.9615	-0.4313	2007.5	0.8328	0.1672	0.8895	0.9119	-0.4733	2006.5	0.7729	0.2271
20	0.9450	0.9465	-0.4518	2005.6	0.8380	0.1620	0.8171	0.8417	-0.3535	2004.7	0.7326	0.2674
25	0.9068	0.9129	-0.3492	2003.8	0.8110	0.1890	0.7290	0.7723	-0.3513	2003.0	0.7318	0.2682
30	0.8675	0.8811	-0.3707	2002.3	0.8169	0.1831	0.6466	0.6643	-0.2859	2001.9	0.7085	0.2915
35	0.8072	0.8307	-0.3710	2001.2	0.8170	0.1830	0.5213	0.5291	-0.2375	2001.4	0.6907	0.3093
40	0.7183	0.7525	-0.3274	2000.4	0.8050	0.1950	0.3944					
45	0.5909											
Kuntaur		*(M_f = 27.46)*						*(M_m = 37)*				
10	0.9842	0.9809	-0.5964	2009.7	0.8712	0.1288	0.9561	0.9615	-0.6471	2008.6	0.8244	0.1756
15	0.9697	0.9678	-0.5327	2007.5	0.8573	0.1427	0.9215	0.9439	-0.7429	2006.6	0.8491	0.1509
20	0.9469	0.9474	-0.4615	2005.6	0.8404	0.1596	0.8680	0.8946	-0.6204	2004.9	0.8171	0.1829
25	0.9179	0.9225	-0.4205	2003.8	0.8301	0.1699	0.7848	0.8110	-0.4874	2003.3	0.7773	0.2227
30	0.8741	0.8852	-0.3932	2002.3	0.8229	0.1771	0.6803	0.6936	-0.3662	2002.2	0.7370	0.2630
35	0.8029	0.8224	-0.3383	2001.1	0.8080	0.1920	0.5463	0.5620	-0.3178	2001.7	0.7200	0.2800
40	0.7289	0.7586	-0.3460	2000.4	0.8102	0.1898	0.4224					
45	0.6007											

Table A6 – 1 (cont.)

	FEMALE						MALE					
Age	**Proportion with living mother S(n)**	**l(25+n) / l(25)**	**Level (Alpha)**	**Reference Date**	$_{45}p_{15}$	$_{45}q_{15}$	**Proportion with living father S(n)**	**l(35+n) / l(35)**	**Level (Alpha)**	**Reference Date**	$_{45}p_{15}$	$_{45}q_{15}$
Janjanbureh		*(M_f = 27.32)*						*(M_m = 37)*				
10	0.9838	0.9803	-0.5775	2009.7	0.8672	0.1328	0.9521	0.9540	-0.5444	2008.6	0.7950	0.2050
15	0.9698	0.9675	-0.5280	2007.5	0.8562	0.1438	0.9181	0.9423	-0.7272	2006.6	0.8452	0.1548
20	0.9459	0.9459	-0.4452	2005.6	0.8363	0.1637	0.8572	0.8844	-0.5623	2004.8	0.8004	0.1996
25	0.9173	0.9211	-0.4099	2003.8	0.8273	0.1727	0.7759	0.8082	-0.4771	2003.3	0.7741	0.2259
30	0.8753	0.8852	-0.3932	2002.3	0.8230	0.1770	0.6792	0.7072	-0.4039	2002.1	0.7500	0.2500
35	0.8103	0.8283	-0.3614	2001.1	0.8144	0.1856	0.5614	0.5798	-0.3608	2001.8	0.7352	0.2648
40	0.7135	0.7395	-0.2882	2000.2	0.7938	0.2062	0.4368					
45	0.5931											
Basse		*(M_f = 27.27)*						*(M_m = 37)*				
10	0.9832	0.9794	-0.5552	2009.7	0.8623	0.1377	0.9483	0.9532	-0.5341	2008.6	0.7919	0.2081
15	0.9666	0.9639	-0.4671	2007.5	0.8418	0.1582	0.9083	0.9325	-0.6356	2006.6	0.8213	0.1787
20	0.9430	0.9426	-0.4100	2005.5	0.8273	0.1727	0.8419	0.8687	-0.4807	2004.8	0.7752	0.2248
25	0.9073	0.9105	-0.3326	2003.8	0.8064	0.1936	0.7599	0.7989	-0.4434	2003.2	0.7632	0.2368
30	0.8629	0.8720	-0.3232	2002.2	0.8038	0.1962	0.6718	0.6936	-0.3661	2002.1	0.7370	0.2630
35	0.7882	0.8046	-0.2712	2000.9	0.7888	0.2112	0.5481	0.5707	-0.3388	2001.7	0.7274	0.2726
40	0.7064	0.7309	-0.2627	2000.1	0.7863	0.2137	0.4317					
45	0.5765											

Source: The Gambia Population and Housing Census, 2013

Appendix 7: Estimates of adult female and male mortality from orphanhood in adulthood by LGA

Table A7 - 1: Estimates of adult female and male mortality ($_{45}q_{15}$) from orphanhood in adulthood (inter-censal method) by LGA

Female

	Proportion not orphaned in 2003 $_5S_x(t)$	Proportion not orphaned in 2013 $_5S_x(t+h)$	Average proportion not orphaned $_5S_x(\sim t)$	Adjusted proportion not orphaned since age 20	$l(25+n)$ / $l(45)$	Alpha	$_{45}p_{15}$	$_{45}q_{15}$
The Gambia, Urban					**$\sim m$=27.8**			
20	0.9512	0.9418	0.9465	0.9297				
25	0.9171	0.9096	0.9133	0.9803	0.9706	-0.2513	0.7829	0.2171
30	0.8683	0.8690	0.8686	0.9306	0.9310	-0.2948	0.7957	0.2043
35	0.7925	0.8087	0.8006	0.8622	0.8758	-0.3183	0.8024	0.1976
40	0.7054	0.7323	0.7188	0.7853	0.8160	-0.3683	0.8163	0.1837
45	0.5796	0.6172	0.5981	0.6701	0.7120	-0.3614	0.8144	0.1856
50	0.4823	0.5205	0.5010	0.5812	0.6280	-0.4945	0.8484	0.1516
		Reference date:	**2008.3**		**Average**	**-0.3481**	**0.8100**	**0.1900**
The Gambia, Rural					**$\sim m$=27.7**			
20	0.9498	0.9447	0.9472	0.9305				
25	0.9144	0.9136	0.9140	0.9821	0.9730	-0.3044	0.7984	0.2016
30	0.8630	0.8691	0.8660	0.9320	0.9307	-0.2923	0.7950	0.2050
35	0.7660	0.8042	0.7849	0.8565	0.8660	-0.2644	0.7868	0.2132
40	0.6780	0.7204	0.6989	0.7838	0.8090	-0.3407	0.8087	0.1913
45	0.5380	0.5978	0.5671	0.6629	0.6963	-0.3159	0.8017	0.1983
50	0.4455	0.4870	0.4658	0.5717	0.6078	-0.4447	0.8362	0.1638
		Reference date:	**2008.3**		**Average**	**-0.3271**	**0.8045**	**0.1955**
Banjul					**$\sim m$=27.8**			
20	0.9484	0.9447	0.9465	0.9337				
25	0.9284	0.9135	0.9209	0.9824	0.9736	-0.3184	0.8025	0.1975
30	0.8855	0.8686	0.8770	0.9273	0.9251	-0.2403	0.7795	0.2205
35	0.8244	0.8188	0.8216	0.8630	0.8734	-0.3051	0.7986	0.2014
40	0.7429	0.7669	0.7548	0.7978	0.8251	-0.4054	0.8261	0.1739
45	0.6269	0.6561	0.6413	0.6911	0.7298	-0.4143	0.8285	0.1715
50	0.5358	0.5375	0.5366	0.5853	0.6246	-0.4862	0.8464	0.1536
		Reference date:	**2008.3**		**Average**	**-0.3616**	**0.8136**	**0.1864**

Male

	Proportion not orphaned in 2003 $_5S_x(t)$	Proportion not orphaned in 2013 $_5S_x(t+h)$	Average proportion not orphaned $_5S_x(\sim t)$	Adjusted proportion not orphaned since age 20	$l(25+n)$ / $l(45)$	Alpha	$_{45}p_{15}$	$_{45}q_{15}$
The Gambia, Urban					**$\sim m$=37**			
20	0.8515	0.8359	0.8436	0.8003				
25	0.7661	0.7524	0.7592	0.9443	0.9118	-0.2931	0.7111	0.2889
30	0.6553	0.6672	0.6612	0.8225	0.7964	-0.2495	0.6951	0.3049
35	0.5296	0.5513	0.5403	0.6819	0.6572	-0.2620	0.6997	0.3003
40	0.4138	0.4360	0.4247	0.5486	0.4968	-0.2188	0.6837	0.3163
45	0.2931	0.3112	0.3020	0.4012				
50	0.2085	0.2249	0.2165	0.2976				
		Reference date:	**2008.3**		**Average**	**-0.2559**	**0.6974**	**0.3026**
The Gambia, Rural					**$\sim m$=37**			
20	0.8618	0.8451	0.8534	0.8097				
25	0.7771	0.7595	0.7683	0.9434	0.9025	-0.2099	0.6804	0.3196
30	0.6646	0.6641	0.6643	0.8109	0.7691	-0.1240	0.6477	0.3523
35	0.5165	0.5397	0.5279	0.6514	0.6131	-0.1129	0.6435	0.3565
40	0.3934	0.4202	0.4066	0.5156	0.4498	-0.0665	0.6255	0.3745
45	0.2671	0.2880	0.2773	0.3643				
50	0.1945	0.2084	0.2013	0.2742				
		Reference date:	**2008.3**		**Average**	**-0.1283**	**0.6493**	**0.3507**
Banjul					**$\sim m$=37**			
20	0.8618	0.8480	0.8549	0.8166				
25	0.7811	0.7788	0.7799	0.9544	0.9331	-0.4986	0.7809	0.2191
30	0.6934	0.6941	0.6937	0.8486	0.8349	-0.4313	0.7592	0.2408
35	0.5721	0.5889	0.5805	0.7154	0.7146	-0.4489	0.7650	0.2350
40	0.4514	0.4980	0.4741	0.6032	0.5821	-0.4623	0.7693	0.2307
45	0.3317	0.3801	0.3551	0.4790				
50	0.2357	0.2860	0.2597	0.3804				
		Reference date:	**2008.3**		**Average**	**-0.4603**	**0.7686**	**0.2314**

Table A7 – 1 (cont.)

	Female								Male							
	Proportion not orphaned in 2003 $_5S_x(t)$	**Proportion not orphaned in 2013** $_5S_x(t+h)$	**Average proportion not orphaned** $_5S_x(\sim t)$	**Adjusted proportion not orphaned since age 20**	**$l(25+n)$ / $l(45)$**	**Alpha**	$_{45}p_{15}$	$_{45}q_{15}$	**Proportion not orphaned in 2003** $_5S_x(t)$	**Proportion not orphaned in 2013** $_5S_x(t+h)$	**Average proportion not orphaned** $_5S_x(\sim t)$	**Adjusted proportion not orphaned since age 20**	**$l(25+n)$ / $l(45)$**	**Alpha**	$_{45}p_{15}$	$_{45}q_{15}$
Kanifing					**$\sim m$=27.7**								**$\sim m$=37**			
20	0.9512	0.9407	0.9459	0.9287					0.8509	0.8371	0.8440	0.8002				
25	0.9152	0.9083	0.9118	0.9799	0.9690	-0.2159	0.7721	0.2279	0.7655	0.7518	0.7586	0.9438	0.9165	-0.3360	0.7265	0.2735
30	0.8681	0.8672	0.8677	0.9305	0.9286	-0.2725	0.7892	0.2108	0.6582	0.6723	0.6652	0.8283	0.8075	-0.3010	0.7140	0.2860
35	0.7983	0.8104	0.8043	0.8656	0.8757	-0.3175	0.8022	0.1978	0.5420	0.5578	0.5499	0.6933	0.6732	-0.3144	0.7188	0.2812
40	0.7160	0.7393	0.7276	0.7923	0.8178	-0.3755	0.8182	0.1818	0.4299	0.4447	0.4372	0.5599	0.5136	-0.2693	0.7024	0.2976
45	0.5999	0.6257	0.6127	0.6797	0.7149	-0.3700	0.8167	0.1833	0.3096	0.3255	0.3175	0.4152				
50	0.5016	0.5255	0.5134	0.5823	0.6192	-0.4729	0.8432	0.1568	0.2281	0.2305	0.2293	0.3044				
		Reference date:	**2008.3**		**Average**	**-0.3374**	**0.8069**	**0.1931**		**Reference date:**	**2008.3**		**Average**	**-0.3052**	**0.7154**	**0.2846**
Brikama					**$\sim m$=27.9**								**$\sim m$=37**			
20	0.9507	0.9400	0.9453	0.9287					0.8518	0.8362	0.8439	0.7990				
25	0.9164	0.9083	0.9124	0.9802	0.9701	-0.2398	0.7794	0.2206	0.7643	0.7486	0.7564	0.9418	0.8997	-0.1858	0.6713	0.3287
30	0.8631	0.8652	0.8641	0.9269	0.9256	-0.2442	0.7807	0.2193	0.6443	0.6545	0.6493	0.8075	0.7723	-0.1387	0.6534	0.3466
35	0.7752	0.8016	0.7883	0.8532	0.8640	-0.2538	0.7836	0.2164	0.5091	0.5350	0.5219	0.6597	0.6257	-0.1563	0.6601	0.3399
40	0.6840	0.7183	0.7009	0.7744	0.8010	-0.3098	0.8000	0.2000	0.3898	0.4181	0.4037	0.5258	0.4657	-0.1203	0.6463	0.3537
45	0.5471	0.6017	0.5737	0.6571	0.6932	-0.3068	0.7991	0.2009	0.2685	0.2918	0.2799	0.3789				
50	0.4546	0.4995	0.4765	0.5723	0.6130	-0.4575	0.8394	0.1606	0.1862	0.2105	0.1980	0.2821				
		Reference date:	**2008.3**		**Average**	**-0.3020**	**0.7970**	**0.2030**		**Reference date:**	**2008.3**		**Average**	**-0.1503**	**0.6578**	**0.3422**
Mansakonko					**$\sim m$=27.6**								**$\sim m$=37**			
20	0.9508	0.9450	0.9479	0.9308					0.8456	0.8171	0.8312	0.7848				
25	0.9212	0.9068	0.9140	0.9781	0.9654	-0.1431	0.7492	0.2508	0.7534	0.7290	0.7411	0.9365	0.8978	-0.1697	0.6652	0.3348
30	0.8680	0.8675	0.8678	0.9249	0.9210	-0.2036	0.7683	0.2317	0.6307	0.6466	0.6386	0.8054	0.7622	-0.0924	0.6355	0.3645
35	0.7841	0.8072	0.7956	0.8540	0.8612	-0.2392	0.7792	0.2208	0.4751	0.5213	0.4977	0.6464	0.6054	-0.0860	0.6331	0.3669
40	0.6887	0.7183	0.7033	0.7685	0.7885	-0.2625	0.7862	0.2138	0.3516	0.3944	0.3724	0.5094	0.4426	-0.0413	0.6158	0.3842
45	0.5336	0.5909	0.5615	0.6360	0.6603	-0.2130	0.7712	0.2288	0.2426	0.2615	0.2519	0.3613				
50	0.4292	0.4830	0.4553	0.5449	0.5702	-0.3524	0.8119	0.1881	0.1494	0.1790	0.1635	0.2500				
		Reference date:	**2008.3**		**Average**	**-0.2356**	**0.7777**	**0.2223**		**Reference date:**	**2008.3**		**Average**	**-0.0973**	**0.6374**	**0.3626**

Table A7 – 1 (cont.)

	Female								Male							
	Proportion not orphaned in 2003 $_5S_x(t)$	**Proportion not orphaned in 2013** $_5S_x(t+h)$	**Average proportion not orphaned** $_5S_x(\sim t)$	**Adjusted proportion not orphaned since age 20**	**$l(25+n)$ / $l(45)$**	**Alpha**	$_{45}p_{15}$	$_{45}q_{15}$	**Proportion not orphaned in 2003** $_5S_x(t)$	**Proportion not orphaned in 2013** $_5S_x(t+h)$	**Average proportion not orphaned** $_5S_x(\sim t)$	**Adjusted proportion not orphaned since age 20**	**$l(25+n)$ / $l(45)$**	**Alpha**	$_{45}p_{15}$	$_{45}q_{15}$
Kerewan						**~*m*=27.7**								**~*m*=37**		
20	0.9591	0.9552	0.9571	0.9421					0.8603	0.8474	0.8538	0.8143				
25	0.9232	0.9314	0.9273	0.9865	0.9805	-0.5014	0.8500	0.1500	0.7831	0.7700	0.7765	0.9497	0.9072	-0.2513	0.6958	0.3042
30	0.8815	0.8911	0.8863	0.9475	0.9487	-0.4824	0.8455	0.1545	0.6666	0.6718	0.6692	0.8166	0.7785	-0.1675	0.6644	0.3356
35	0.7900	0.8332	0.8113	0.8813	0.8927	-0.4177	0.8294	0.1706	0.5248	0.5453	0.5350	0.6604	0.6215	-0.1421	0.6546	0.3454
40	0.6996	0.7498	0.7242	0.8112	0.8383	-0.4606	0.8402	0.1598	0.3943	0.4206	0.4073	0.5158	0.4487	-0.0627	0.6241	0.3759
45	0.5665	0.6303	0.5976	0.6994	0.7368	-0.4354	0.8339	0.1661	0.2696	0.2846	0.2770	0.3614				
50	0.4686	0.5193	0.4933	0.6084	0.6494	-0.5477	0.8606	0.1394	0.1859	0.2075	0.1964	0.2670				
		Reference date:	**2008.3**		**Average**	**-0.4742**	**0.8433**	**0.1567**		**Reference date:**	**2008.3**		**Average**	**-0.1559**	**0.6597**	**0.3403**
Kuntaur					**~*m*=27.6**								**~*m*=37**			
20	0.9455	0.9469	0.9462	0.9296					0.8693	0.8680	0.8687	0.8228				
25	0.9089	0.9179	0.9134	0.9849	0.9775	-0.4162	0.8290	0.1710	0.7738	0.7848	0.7793	0.9505	0.9157	-0.3281	0.7236	0.2764
30	0.8587	0.8741	0.8664	0.9407	0.9399	-0.3845	0.8206	0.1794	0.6621	0.6803	0.6711	0.8271	0.7869	-0.2058	0.6788	0.3212
35	0.7613	0.8029	0.7818	0.8641	0.8722	-0.2985	0.7968	0.2032	0.4995	0.5463	0.5224	0.6628	0.6307	-0.1733	0.6666	0.3334
40	0.6761	0.7289	0.7020	0.8012	0.8252	-0.4059	0.8263	0.1737	0.3701	0.4224	0.3954	0.5303	0.4700	-0.1345	0.6518	0.3482
45	0.5261	0.6007	0.5621	0.6758	0.7065	-0.3456	0.8100	0.1900	0.2499	0.2820	0.2655	0.3793				
50	0.4393	0.4887	0.4633	0.5913	0.6258	-0.4892	0.8471	0.1529	0.1977	0.1960	0.1968	0.2892				
20	0.9455	0.9469	0.9462	0.9296					0.8693	0.8680	0.8687	0.8228				
		Reference date:	**2008.3**		**Average**	**-0.3900**	**0.8216**	**0.1784**		**Reference date:**	**2008.3**		**Average**	**-0.2104**	**0.6802**	**0.3198**
Janjanbureh					**~*m*=27.6**								**~*m*=37**			
20	0.9423	0.9459	0.9441	0.9283					0.8560	0.8572	0.8566	0.8136				
25	0.9082	0.9173	0.9127	0.9857	0.9788	-0.4524	0.8381	0.1619	0.7696	0.7759	0.7727	0.9517	0.9168	-0.3383	0.7272	0.2728
30	0.8542	0.8753	0.8647	0.9419	0.9412	-0.3977	0.8241	0.1759	0.6479	0.6792	0.6634	0.8284	0.8081	-0.3038	0.7150	0.2850
35	0.7526	0.8103	0.7809	0.8718	0.8806	-0.3455	0.8100	0.1900	0.5146	0.5614	0.5375	0.6941	0.6750	-0.3202	0.7208	0.2792
40	0.6605	0.7135	0.6865	0.7959	0.8186	-0.3789	0.8191	0.1809	0.3943	0.4368	0.4150	0.5620	0.5031	-0.2380	0.6909	0.3091
45	0.5235	0.5931	0.5572	0.6795	0.7101	-0.3560	0.8129	0.1871	0.2436	0.2912	0.2663	0.3869				
50	0.4418	0.4774	0.4593	0.5891	0.6222	-0.4801	0.8449	0.1551	0.1819	0.2121	0.1965	0.3101				
		Reference date:	**2008.3**		**Average**	**-0.4018**	**0.8249**	**0.1751**		**Reference date:**	**2008.3**		**Average**	**-0.3001**	**0.7135**	**0.2865**

Table A7 – 1 (cont.)

	Female								Male							
	Proportion not orphaned in 2003 $_5S_x(t)$	**Proportion not orphaned in 2013 $_5S_x(t+h)$**	**Average proportion not orphaned $_5S_x(\sim t)$**	**Adjusted proportion not orphaned since age 20**	**$\frac{l(25+n)}{l(45)}$**	**Alpha**	**$_{45}p_{15}$**	**$_{45}q_{15}$**	**Proportion not orphaned in 2003 $_5S_x(t)$**	**Proportion not orphaned in 2013 $_5S_x(t+h)$**	**Average proportion not orphaned $_5S_x(\sim t)$**	**Adjusted proportion not orphaned since age 20**	**$\frac{l(25+n)}{l(45)}$**	**Alpha**	**$_{45}p_{15}$**	**$_{45}q_{15}$**
Basse					**$\sim m$=27.3**								**$\sim m$=37**			
20	0.9478	0.9430	0.9454	0.9274					0.8705	0.8419	0.8560	0.8148				
25	0.9122	0.9073	0.9098	0.9797	0.9672	-0.1787	0.7605	0.2395	0.7916	0.7599	0.7756	0.9422	0.9057	-0.2380	0.6909	0.3091
30	0.8586	0.8629	0.8607	0.9268	0.9210	-0.2031	0.7682	0.2318	0.6958	0.6718	0.6837	0.8149	0.7663	-0.1114	0.6429	0.3571
35	0.7572	0.7882	0.7725	0.8412	0.8425	-0.1440	0.7495	0.2505	0.5337	0.5481	0.5409	0.6433	0.6050	-0.0846	0.6326	0.3674
40	0.6744	0.7064	0.6902	0.7680	0.7814	-0.2362	0.7783	0.2217	0.4242	0.4317	0.4279	0.5146	0.4478	-0.0595	0.6229	0.3771
45	0.5341	0.5765	0.5549	0.6367	0.6520	-0.1896	0.7640	0.2360	0.3033	0.2985	0.3009	0.3620				
50	0.4364	0.4823	0.4588	0.5502	0.5658	-0.3417	0.8090	0.1910	0.2303	0.2300	0.2302	0.2757				
		Reference date:	**2008.3**		**Average**	**-0.2156**	**0.7716**	**0.2284**		**Reference date:**	**2008.3**		**Average**	**-0.1234**	**0.6473**	**0.3527**

Sources: The Gambia Population and Housing Censuses, 2003 and 2013.

#Appendix 8: Fitted Life Tables

Explanation of life table notation

Table A8 - 1: Definition of life table notations

Column	Notation	Definition
1	$(x, x+n)$	Age interval or period of life between two exact ages stated in years.
2	n	Length of interval.
3	${}_{n}m_{x}$	Age-specific death rates between ages x and $x+n$.
4	${}_{n}a_{x}$	Average person-years lived between ages x and $x+n$ for persons dying in the interval.
5	${}_{n}q_{x}$	Proportion of persons alive at the beginning of the age interval who die during the age interval, i.e. probability of dying between ages x and $x+n$.
6	${}_{n}p_{x}$	Probability of surviving from age x to age $x+n$.
7	l_x	Of the starting number of newborns in the life table (called the radix of the life table, usually set at 100,000) the number living at the beginning of the age interval (or the number surviving to the beginning of the age interval).
8	${}_{n}d_{x}$	The number of persons in the cohort who die in the age interval $(x, x+n)$.
9	${}_{n}L_{x}$	Number of years of life lived by the cohort within the indicated age interval $(x, x+n)$ (or person-years of life in the age interval).
10	T_x	Total person-years of life contributed by the cohort after attaining age x.
11	e_x^0	Average number of years of life remaining for a person alive at the beginning of age interval x.

Abridged national life tables by sex estimated from reported ASDRs

Table A8 - 2: National Life Tables of The Gambia by sex for 2012.79 constructed from reported ASDRs

Age (x,x+n)	n	$_nm_x$	$_na_x$	$_nq_x$	$_np_x$	l_x	$_nd_x$	$_nL_x$	T_x	e^o_x
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
FEMALES										
0-4	5	0.01146	1.5	0.05510	0.94490	100,000	5,510	486,224	6,385,662	63.9
5-9	5	0.00381	2.5	0.01886	0.98114	94,490	1,782	467,993	5,899,438	62.4
10-14	5	0.00188	2.5	0.00937	0.99063	92,708	869	461,366	5,431,445	58.6
15-19	5	0.00275	2.5	0.01364	0.98636	91,839	1,253	456,062	4,970,078	54.1
20-24	5	0.00309	2.5	0.01535	0.98465	90,586	1,391	449,454	4,514,016	49.8
25-29	5	0.00434	2.5	0.02146	0.97854	89,195	1,914	441,193	4,064,563	45.6
30-34	5	0.00546	2.5	0.02692	0.97308	87,282	2,349	430,535	3,623,370	41.5
35-39	5	0.00625	2.5	0.03079	0.96921	84,932	2,615	418,125	3,192,835	37.6
40-44	5	0.00990	2.5	0.04829	0.95171	82,317	3,975	401,651	2,774,710	33.7
45-49	5	0.00983	2.5	0.04798	0.95202	78,343	3,759	382,316	2,373,060	30.3
50-54	5	0.01440	2.5	0.06952	0.93048	74,584	5,185	359,956	1,990,744	26.7
55-59	5	0.01274	2.5	0.06172	0.93828	69,399	4,284	336,284	1,630,788	23.5
60-64	5	0.02238	2.5	0.10595	0.89405	65,115	6,899	308,327	1,294,504	19.9
65-69	5	0.02329	2.5	0.11004	0.88996	58,216	6,406	275,064	986,177	16.9
70-74	5	0.04679	2.5	0.20945	0.79055	51,810	10,852	231,919	711,113	13.7
75-79	5	0.05758	2.5	0.25167	0.74833	40,958	10,308	179,020	479,194	11.7
80-84	5	0.09226	2.5	0.37483	0.62517	30,650	11,488	124,529	300,174	9.8
85+		0.10909	5.0	1.00000	0.00000	19,162	19,162	175,645	175,645	9.2
MALES										
0-4	5	0.01377	1.5	0.06569	0.93431	100,000	6,569	483,577	6,322,835	63.2
5-9	5	0.00408	2.5	0.02019	0.97981	93,431	1,886	462,439	5,839,258	62.5
10-14	5	0.00229	2.5	0.01139	0.98861	91,545	1,043	455,117	5,376,819	58.7
15-19	5	0.00237	2.5	0.01180	0.98820	90,502	1,068	449,840	4,921,702	54.4
20-24	5	0.00251	2.5	0.01245	0.98755	89,434	1,114	444,385	4,471,863	50.0
25-29	5	0.00282	2.5	0.01401	0.98599	88,320	1,237	438,507	4,027,478	45.6
30-34	5	0.00417	2.5	0.02063	0.97937	87,083	1,797	430,922	3,588,971	41.2
35-39	5	0.00612	2.5	0.03012	0.96988	85,286	2,569	420,007	3,158,049	37.0
40-44	5	0.00790	2.5	0.03872	0.96128	82,717	3,203	405,578	2,738,042	33.1
45-49	5	0.00881	2.5	0.04308	0.95692	79,514	3,426	389,007	2,332,464	29.3
50-54	5	0.01483	2.5	0.07148	0.92852	76,089	5,439	366,847	1,943,457	25.5
55-59	5	0.01429	2.5	0.06897	0.93103	70,650	4,873	341,069	1,576,610	22.3
60-64	5	0.02436	2.5	0.11482	0.88518	65,777	7,552	310,006	1,235,541	18.8
65-69	5	0.02770	2.5	0.12954	0.87046	58,225	7,543	272,268	925,536	15.9
70-74	5	0.05131	2.5	0.22738	0.77262	50,682	11,524	224,601	653,268	12.9
75-79	5	0.05774	2.5	0.25228	0.74772	39,158	9,879	171,094	428,667	10.9
80-84	5	0.10765	2.5	0.42413	0.57587	29,279	12,418	115,352	257,573	8.8
85+		0.11856	5.0	1.00000	0.00000	16,861	16,861	142,221	142,221	8.4

Abridged national life tables by sex estimated from ASDRs adjusted using BGBM

Table A8 - 3: National Life Tables of The Gambia for 2012.79 by sex constructed from ASDRs adjusted using the Brass Growth Balance Method

Age (x,x+n)	n	$_nm_x$	$_na_x$	$_nq_x$*	$_np_x$	l_x	$_nd_x$	$_nL_x$	T_x	e^o_x
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
FEMALES										
0	1	-	-	0.02695	0.97305	100,000	2,695	98,653	7,795,637	78.0
1-4	4	-	-	0.02184	0.97816	97,305	2,125	384,970	7,696,984	79.1
5-9	5	0.00192	2.5	0.00953	0.99047	95,180	907	473,631	7,312,013	76.8
10-14	5	0.00095	2.5	0.00473	0.99527	94,273	446	470,249	6,838,382	72.5
15-19	5	0.00138	2.5	0.00689	0.99311	93,827	646	467,520	6,368,133	67.9
20-24	5	0.00156	2.5	0.00775	0.99225	93,181	723	464,098	5,900,613	63.3
25-29	5	0.00218	2.5	0.01085	0.98915	92,458	1,003	459,783	5,436,515	58.8
30-34	5	0.00275	2.5	0.01363	0.98637	91,455	1,247	454,157	4,976,732	54.4
35-39	5	0.00315	2.5	0.01561	0.98439	90,208	1,408	447,519	4,522,575	50.1
40-44	5	0.00498	2.5	0.02459	0.97541	88,800	2,184	438,540	4,075,056	45.9
45-49	5	0.00495	2.5	0.02443	0.97557	86,616	2,116	427,790	3,636,516	42.0
50-54	5	0.00725	2.5	0.03559	0.96441	84,500	3,008	414,980	3,208,726	38.0
55-59	5	0.00641	2.5	0.03154	0.96846	81,492	2,570	401,035	2,793,746	34.3
60-64	5	0.01126	2.5	0.05475	0.94525	78,922	4,321	383,806	2,392,711	30.3
65-69	5	0.01172	2.5	0.05692	0.94308	74,601	4,247	362,387	2,008,905	26.9
70-74	5	0.02354	2.5	0.11117	0.88883	70,354	7,821	332,217	1,646,517	23.4
75-79	5	0.02897	2.5	0.13508	0.86492	62,533	8,447	291,547	1,314,300	21.0
80-84	5	0.04642	2.5	0.20796	0.79204	54,086	11,248	242,311	1,022,753	18.9
85+		0.05489	5.0	1.00000	0.00000	42,838	42,838	780,441	780,441	18.2
MALES										
0	1	-	-	0.03551	0.96449	100,000	3,551	98,225	7,250,100	72.5
1-4	4	-	-	0.02821	0.97179	96,449	2,721	380,355	7,151,876	74.2
5-9	5	0.00243	2.5	0.01209	0.98791	93,728	1,133	465,807	6,771,521	72.2
10-14	5	0.00137	2.5	0.00681	0.99319	92,595	631	461,397	6,305,714	68.1
15-19	5	0.00142	2.5	0.00706	0.99294	91,964	649	458,199	5,844,316	63.5
20-24	5	0.00150	2.5	0.00745	0.99255	91,315	680	454,876	5,386,117	59.0
25-29	5	0.00168	2.5	0.00838	0.99162	90,635	760	451,277	4,931,241	54.4
30-34	5	0.00249	2.5	0.01236	0.98764	89,876	1,111	446,602	4,479,964	49.8
35-39	5	0.00365	2.5	0.01808	0.98192	88,765	1,605	439,813	4,033,362	45.4
40-44	5	0.00471	2.5	0.02328	0.97672	87,160	2,029	430,729	3,593,549	41.2
45-49	5	0.00525	2.5	0.02592	0.97408	85,131	2,207	420,140	3,162,820	37.2
50-54	5	0.00884	2.5	0.04326	0.95674	82,925	3,587	405,655	2,742,680	33.1
55-59	5	0.00852	2.5	0.04172	0.95828	79,337	3,310	388,412	2,337,024	29.5
60-64	5	0.01453	2.5	0.07011	0.92989	76,027	5,330	366,811	1,948,612	25.6
65-69	5	0.01652	2.5	0.07935	0.92065	70,697	5,609	339,461	1,581,801	22.4
70-74	5	0.03060	2.5	0.14215	0.85785	65,088	9,252	302,308	1,242,339	19.1
75-79	5	0.03444	2.5	0.15855	0.84145	55,836	8,853	257,046	940,032	16.8
80-84	5	0.06421	2.5	0.27666	0.72334	46,983	12,998	202,418	682,986	14.5
85+		0.07072	5.0	1.00000	0.00000	33,985	33,985	480,568	480,568	14.1

*$_1q_0$ and $_4q_1$ for both sexes were estimated from a simple linear regression of estimates of $_1q_0$ and $_5q_0$ using the Brass Method as presented in Table 4.1

Abridged national life tables by sex estimated from ASDRs adjusted using PCM

Table A8 - 4: National Life Tables of The Gambia for 2012.79 by sex constructed from ASDRs adjusted using Preston and Coale Method

Age (x,x+n)	n	$_nm_x$	$_na_x$	$_nq_x$*	$_np_x$	l_x	$_nd_x$	$_nL_x$	T_x	e^o_x
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
FEMALES										
0	1	-	-	0.02695	0.97305	100,000	2,695	98,653	6,400,089	64.0
1-4	4	-	-	0.02184	0.97816	97,305	2,125	384,970	6,301,437	64.8
5-9	5	0.00390	2.5	0.01931	0.98069	95,180	1,838	471,305	5,916,466	62.2
10-14	5	0.00190	2.5	0.00946	0.99054	93,342	883	464,503	5,445,161	58.3
15-19	5	0.00280	2.5	0.01390	0.98610	92,459	1,285	459,083	4,980,658	53.9
20-24	5	0.00310	2.5	0.01538	0.98462	91,174	1,402	452,364	4,521,575	49.6
25-29	5	0.00440	2.5	0.02176	0.97824	89,772	1,953	443,974	4,069,212	45.3
30-34	5	0.00550	2.5	0.02713	0.97287	87,818	2,382	433,135	3,625,238	41.3
35-39	5	0.00640	2.5	0.03150	0.96850	85,436	2,691	420,452	3,192,103	37.4
40-44	5	0.01000	2.5	0.04878	0.95122	82,745	4,036	403,634	2,771,651	33.5
45-49	5	0.01000	2.5	0.04878	0.95122	78,709	3,839	383,944	2,368,017	30.1
50-54	5	0.01460	2.5	0.07043	0.92957	74,869	5,273	361,163	1,984,072	26.5
55-59	5	0.01290	2.5	0.06248	0.93752	69,596	4,349	337,109	1,622,909	23.3
60-64	5	0.02270	2.5	0.10740	0.89260	65,247	7,008	308,718	1,285,800	19.7
65-69	5	0.02360	2.5	0.11143	0.88857	58,240	6,489	274,974	977,082	16.8
70-74	5	0.04750	2.5	0.21229	0.78771	51,750	10,986	231,286	702,108	13.6
75-79	5	0.05850	2.5	0.25518	0.74482	40,764	10,402	177,815	470,822	11.5
80-84	5	0.09370	2.5	0.37958	0.62042	30,362	11,525	122,997	293,007	9.7
85+		0.11080	5.0	1.00000	0.00000	18,837	18,837	170,010	170,010	9.0
MALES										
0	1	-	-	0.03551	0.96449	100,000	3,551	98,225	6,315,020	63.2
1-4	4	-	-	0.02821	0.97179	96,449	2,721	380,355	6,216,795	64.5
5-9	5	0.00410	2.5	0.02029	0.97971	93,728	1,902	463,886	5,836,440	62.3
10-14	5	0.00230	2.5	0.01143	0.98857	91,826	1,050	456,506	5,372,554	58.5
15-19	5	0.00240	2.5	0.01193	0.98807	90,776	1,083	451,174	4,916,049	54.2
20-24	5	0.00250	2.5	0.01242	0.98758	89,693	1,114	445,681	4,464,875	49.8
25-29	5	0.00290	2.5	0.01440	0.98560	88,579	1,275	439,708	4,019,193	45.4
30-34	5	0.00420	2.5	0.02078	0.97922	87,304	1,814	431,984	3,579,485	41.0
35-39	5	0.00620	2.5	0.03053	0.96947	85,490	2,610	420,924	3,147,501	36.8
40-44	5	0.00800	2.5	0.03922	0.96078	82,880	3,250	406,274	2,726,577	32.9
45-49	5	0.00890	2.5	0.04353	0.95647	79,630	3,466	389,483	2,320,302	29.1
50-54	5	0.01510	2.5	0.07275	0.92725	76,163	5,541	366,964	1,930,820	25.4
55-59	5	0.01450	2.5	0.06996	0.93004	70,622	4,941	340,759	1,563,856	22.1
60-64	5	0.02470	2.5	0.11632	0.88368	65,681	7,640	309,306	1,223,097	18.6
65-69	5	0.02810	2.5	0.13128	0.86872	58,041	7,620	271,158	913,791	15.7
70-74	5	0.05210	2.5	0.23048	0.76952	50,422	11,621	223,056	642,633	12.7
75-79	5	0.05860	2.5	0.25556	0.74444	38,801	9,916	169,213	419,577	10.8
80-84	5	0.10930	2.5	0.42922	0.57078	28,885	12,398	113,429	250,363	8.7
85+		0.12040	5.0	1.00000	0.00000	16,487	16,487	136,934	136,934	8.3

*$_1q_0$ and $_4q_1$ for both sexes were estimated from a simple linear regression of estimates of $_1q_0$ and $_5q_0$ using the Brass Method as presented in Table 4.1