ASSESSMENT OF THE QUALITY OF AGE REPORTING AND FERTILITY DATA IN THE NATIONAL AIDS AND REPRODUCTIVE HEALTH SURVEYS OF 2005, 2007 AND 2012

By

OLATUNDE RAIMI (173620)

B.Sc Demography and Social Statistics (Ife).

A DISSERTATION SUBMITTED

TO

DEPARTMENT OF EPIDEMIOLOGY AND MEDICAL STATISTICS

FACULTY OF PUBLIC HEALTH

IN PARTIAL FULFILLMENT OF THE REQUIREMENTS

FOR THE DEGREE OF

MASTER OF PUBLIC HEALTH (MEDICAL DEMOGRAPHY)

OF THE

UNIVERSITY OF IBADAN.

FEBRUARY, 2015

ABSTRACT

Content and coverage errors are common features of demographic and fertility history data especially in developing countries. As a result, most surveys include data quality assessment findings to aid correct interpretation and improve future surveys. The National AIDS and Reproductive Health Survey (NARHS) in Nigeria has been conducted five times without any form of data quality assessment. This study was designed to assess the quality of the demographic and fertility history data in NARHS 2005-2012.

Data from NARHS (2005, 2007 and 2012) were retrieved for data quality assessment. A total of 52,837 males (15-64 years) and females (15-49 years) respondents were analysed. Data on 51,365 Children Ever Born (CEB) reported by their mothers were also analysed.

Demographic techniques involving the calculation of Myers' index, Whipples' index (WI) and Age Accuracy Index were used in assessing the digit preference in age related data, extent of age heaping, consistency of age and sex distribution. Internal consistency of fertility history data according to age group of mothers was also assessed by calculating the mean of CEB, sex ratio of CEB, sex ratio of children surviving and sex ratio of children dead.

Myers' index revealed that preferences for digits 0 and 5 were higher in 2012(22.94% and 19.86%) compared to 2005 (19.92% and 18.10%) and 2007 (9.39% and 17.43%). However, terminal digits 3(6.68%), 6(6.84%) and 1(7.10%) in 2005, 1(6.01%), 6(6.32%) and 3(6.64%) in 2007 and 6(4.52%), 3 (5.48%) and 4 (5.66%) in 2012 were all greatly avoided in all the three surveys. WI revealed high heaping at age ending with 0 (195 in 2005, 185 in 2007 and 224 in 2012) indicates that the quality of age data was poor while

heaping at age ending with digit 5(104 in 2005, 100 in 2007 and 111 in 2012) indicates that the quality of age data was approximately accurate. The Age Ratio and Sex Ratio also showed inconsistencies in the reporting of age-sex data, as there were over-representation of respondents at age group 30-34 years in 2005 and 2012 among females. Similarly, the age-specific sex ratios fluctuated across all the age groups and all the values deviated from the expected range of 102-107. This was also confirmed by Age Accuracy Index of 42.12 in 2005 and 49.92 in 2012 which showed that quality of age-sex data in these two survey periods were poor. Furthermore, the 2005 and 2007 surveys show inconsistencies in reporting number of CEB as most of the sex-ratios deviated from the normal range of expected values (102-107) while 2012 survey showed little consistency in reporting number of CEB.

Demographic and fertility history data collected in National AIDS and Reproductive Health Surveys2005-2012 showed problems of digit preference, heaping and inconsistencies in reporting age-sex and children ever born. Better quality of age-sex data was reported in the 2007 survey. Hence, adequate training of enumerators and quality of supervision of field work should be improved in future surveys. Similarly, respondents must be sensitized on the importance attached to demographic and fertility history data in order to minimize age misstatement during future surveys.

Keywords: Digit preference, Sex ratio, Age ratio, Children ever born, NARHS.

Word count: 489

ACKNOWLEDGEMENT

I give all glory and honour to the king immortal, the Almighty God that has been seeing me through my education in life. I also appreciate HIM for the successful completion of this course work.

I sincerely acknowledge the encouragement and advice of my supervisor and mentor, Dr Akinyemi J.O during the course of this research work. Sir, you moved from being a teacher, a supervisor to a brother and father for painstakingly reading through the research work and making the necessary correction(s). I express my profound gratitude. That which the Lord has said concerning your life shall be perfected and lines shall fall to you in pleasant places.

I specially appreciate my lecturers Dr A.S. Adebowale, Dr Adeoye, Dr Adedokun, Dr Fagbamigbe, Mr Gbadebo, Dr Yusuf B. Dr Dairo, Dr Akpa, Mr Nath Afolabi, Mr Afolabi for their encouragement and support. They always asked about the progress of the work. I equally appreciate the Acting HOD. Dr Fawole. May God bless you all.

I appreciate the immense care and support morally, spiritually and financially from my parents, Elder (Surveyor) Oluwafemi Raimi and Evang. (Mrs.) Blessing Raimi, since birth to present whose desire for a better living helped me to realize my future dreams to this moment. Sir and ma, I am highly indebted to you and it's my prayers that you will reap the fruit of your labour in good health. To my sister, Raimi Atinuke, I really appreciate you for your support all times, you are the best sister on earth.

I sincerely appreciate my coursemates in Medical Demography track, especially Ogun's Oluwaseun (my main man), Ginika Mary, Adefeso Yomi, Bolaji Ifeoluwa Esther, Aibinuomo Ayomide and Oyeleke Peter for their contribution and support. Also, I really

appreciate my coursemates in the same department, Alo Oluwafemi, Bakari Tunde, Morenike, Adeleke Tosin, Folarin Gbenga Quadric, Popoola Toluwani, Awere Tayo, Jimi Latunji and Enadeghe Orobosa(the internet man) for their support.

To my special lovely girl; Nurse Ibikunle Funmilayo and also, my big brothers and friends, Ogunsakin Oluwasoji Dunsi, Onifade 'Seun, Ademola Adebisi, Rabiu Taiwo, Oluyemi Oludotun and Oni Opeyemi. I like you all and God bless you all.

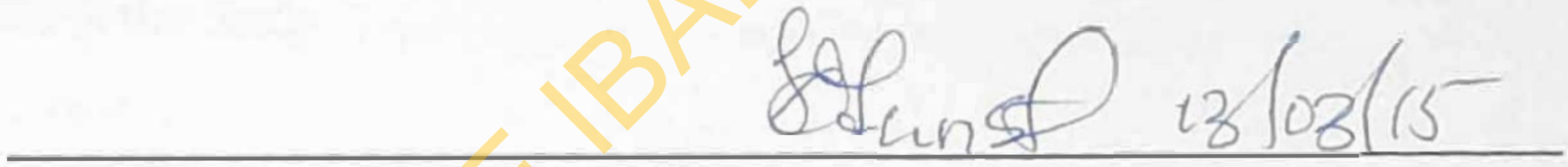
Lastly, I appreciate the effort of the Federal Government of Nigeria through the Federal Ministries of Health with support from others Agencies who provide both technical support and financial support for the implementation of National AIDS and Reproductive Health Survey for the betterment and awareness of the citizen.

DEDICATION

This work is dedicated to Almighty God

CERTIFICATION

I certify that this work was carried out by Mr Olatunde Raimi in the Department of Epidemiology and Medical Statistics, University of Ibadan under my supervision.



SUPERVISOR

J. O. Akinyemi

BTech Computer Science (Akure), MSc Medical Statistics (Ibadan), PhD (Ibadan)

Department of Epidemiology and Medical Statistics,

Faculty of Public Health, College of Medicine

University of Ibadan, Nigeria

TABLE OF CONTENT

LIST OF TABLE

LIST OF FIGURES

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

The first demographic characteristics summarized in survey results are the age and sex distribution. Estimates of fertility, migration, morbidity and mortality rates all depend on these demographic variables. They are also important for use in population projections, and for assessing the age- and sex-specific socioeconomic and health conditions of a population (Denic et al 2004). Unfortunately, data from demographic surveys often suffer from reporting errors and irregularities, which are sometimes serious enough to impair the usability of the data.

Age and sex related data are some of the core demographic variables that cannot be done without. Age is an important study variable in demographic and epidemiological studies. It is the interval of time between the date of birth and the date of the survey (census), expressed in complete years. It is a socio-demographic variable related to the host in descriptive studies and also a commonly assessed risk factor in analytical studies. It is the primary basis of demographic classification in vital statistics, censuses and surveys. Any of the demographic indices in use is expressed in terms of age at which an event happened. For example, age at marriage, age at first birth, age at sexual debut etc.

The accuracy of age, sex and fertility data collected in household surveys varies in different settings and depends on numerous factors (Unisa et al 2009). For instance, in advanced countries, the statistical measurement of demographic and fertility history hardly presents any difficulty with regards to accuracy. However in less developed countries, the accurate estimation of these variables, constitutes one of the most

intractable problems which face any survey administrator. Demographic and fertility history data have been associated with many irregularities in less developed countries (Denic et al 2004). One of such irregularities is age misstatement, which is a common example of content error in censuses and surveys. Another type of irregularity in age related data is age heaping.

Other types of errors may also affect demographic and fertility history data. In a society where vital registration is uncommon, individuals may not have precise knowledge of dates. This situation, compounded by low levels of education, may lead to erroneous reports of the dates of age at first marriage and age at first birth. Biases in the timing of first marriages, first births and first sexual intercourse may also result from omissions of early unions of short duration (in the case of first marriage). In addition, individuals may have problems recalling events that occurred in the distant past. The misreporting of the dates of first marriages and first births and the age at first sexual intercourse may also reflect errors in the reporting of the respondent's age; the magnitude of the bias will depend on the extents to which the timing of these events are estimated independently of the age of the respondent (Rutstein and Bicego 1990).

"In a perfect world, data would always be complete, accurate, current, relevant, and unambiguous. In the real world, data are generally inconsistent on some or all of these dimensions" (Feeney et al 2003). Nigeria has made progress over the years in generating data that could adequately inform policy. One of such efforts was the introduction of National AIDS and Reproductive Health survey. The survey is a nationally representative survey and aims to provide information on key HIV/AIDS and Reproductive Health issues and behavior- related issues (NARHS 2012).

The National AIDS and Reproductive Health Survey (NARHS) started in 2003 and has been conducted regularly every two years except for the NARHS 2012 edition, which was conducted 5 years after the preceding round. It was aimed at helping to understand the dynamics of the disease and provide resource for planning appropriate intervention.

Some of the area covered in the surveys includes:

- Sexual behavior
- Knowledge, opinion and attitude about HIV and AIDS
- Condom knowledge, access and use
- HIV counseling and testing
- Sexually transmitted infections
- Ante-natal and postnatal care
- Maternal mortality
- Family planning
- Gender based violence
- Sexual rights
- Cancers of the reproductive system
- Vesico – vaginal fistula (VVF)
- Tuberculosis
- Communication and behaviour change
- HIV Sero– prevalence

1.2 Problem Statement

Demographic survey data especially in developing countries is far from perfect data because they suffer from poor age-reporting on the part of the respondents. This leads to biases in the estimates of basic demographic parameters (Adebowale et al 2006).

Common error in demographic data from developing countries including Nigeria is usually associated with either coverage or content error. During survey activities in developing countries, sometimes an entire household or individuals within the household are not enumerated. Also all events may not be recorded or some events counted more than once. Failure of the enumerator to ask question correctly and report properly the information as given by the respondent constitute another major source of error in demographic data and fertility history in developing countries. It is for these reasons that standard surveys such as DHS and MICS conduct data quality assessment and provide summaries in their survey report. NARHS have been conducted four times without any report on data quality assessment. Quality of the demographic data is therefore unknown and this may limit the level of its usage for proper planning purposes and also some important vital statistics may be misreported or misinterpreted from the survey.

1.3 Justification

Demographic and fertility history data in surveys are often not error-free and the quality of demographic and fertility history in the Nigerian HIV/AIDs and Reproductive Health Survey need to be assessed because of the series of challenges associated with such surveys. These problems include misstatement, non- responses to questions, misreporting, age heaping, inadequate coordination of data flow, complexity and overlapping of data collection instruments.

The possible need to adjust demographic related data is so important because they give general information and estimate about the population at a given point in time. Estimated demographic trends are used by government to predict what services will be needed in the future. Error free demographic and fertility history data will enhance accurate demographic projection. Also information on quality of demographic and fertility history of data will assist in planning and improving future surveys.

1.4 General Objectives

To assess the quality of demographic data in the NARHS from 2005 – 2012.

Specific Objectives

1. To assess the pattern of digit preference in age related variables in NARHS
2. To determine the extent of age heaping and accuracy of age data
3. To assess the consistency of age and sex distribution
4. To assess the internal consistency of fertility history data.
5. To compare the age distribution in NARHS with Age distribution of model stable population.

1.5 Research Questions

The study seeks to provide answers to the following questions

- What are the extents of age heaping in the National AIDS and Reproductive Health Surveys, 2005-2012.
- What are the pattern of digit preference in age related variables in the National AIDS and Reproductive Health Surveys, 2005-2012?
- How consistent is the age and sex distribution in the NARHS data 2005-2012.

The possible need to adjust demographic related data is so important because they give general information and estimate about the population at a given point in time. Estimated demographic trends are used by government to predict what services will be needed in the future. Error free demographic and fertility history data will enhance accurate demographic projection. Also information on quality of demographic and fertility history of data will assist in planning and improving future surveys.

1.4 General Objectives

To assess the quality of demographic data in the NARHS from 2005 – 2012.

Specific Objectives

1. To assess the pattern of digit preference in age related variables in NARHS
2. To determine the extent of age heaping and accuracy of age data
3. To assess the consistency of age and sex distribution
4. To assess the internal consistency of fertility history data.
5. To compare the age distribution in NARHS with Age distribution of model stable population.

1.5 Research Questions

The study seeks to provide answers to the following questions

- What are the extents of age heaping in the National AIDS and Reproductive Health Surveys, 2005-2012.
- What are the pattern of digit preference in age related variables in the National AIDS and Reproductive Health Surveys, 2005-2012?
- How consistent is the age and sex distribution in the NARHS data 2005-2012.

CHAPTER TWO

LITERATURE REVIEW

2.0 Age and Sex Distribution in Nigeria

Nigeria has experienced great population change over the years. The age and sex distribution of the Nigeria population has always shows a high proportion of children (NPC 2006).The age distribution of Nigeria population for both males and females is usually divided into three important categories: those below the age of 15 years, aged 15-64 years and those aged 65 and over. The under 15 years and 65 years or older constitute the dependent population, ;while those aged 15-64 are the productive population in Nigeria. The Nigeria 2006 census shows that, those under 15years of age constituted about 42 percent of the total population and also the proportion of aged person 65years and above in the population constituted only 3.2 percent. The age structure of the population according to 2006 census shows a very broad based pyramid reflecting the large proportion of children and young persons. The large proportion of the population under 15 years portrays a large number of potential parents.

The high proportion of young people in the population has implications for future joblessness as the economy is not likely to expand (grows) rapidly enough to accommodate the population. It is observed that the high proportion of young people in the population is as a result of high fertility level and declining mortality level. The situation of a young and rapidly expanding population is likely to continue in the country for some time until fertility levels falls and the proportion of children in the population starts reducing.

2.1 Types and Different Sources of Error in Demographic Data

The uses to which demographic data are put are reliable only to the extents to which such data are accurate. The more accurate data are, the reliable the use to which they are put in compiling demographic statistics. Despite the care taken to ensure the quality of the data collected by enumeration, it sometimes give obvious indication of errors in basic demographic variables. Usually errors in census, survey and vital registration statistics (VRS) are two types:

1. Coverage error
2. Content error

2.1.1 Coverage Error

Coverage error is one in which either whole household or individuals within households are not enumerated. It is a situation in which all events are not recorded or less often one in which households, individual or event is counted more than once. It can also arise due to faulty administrative, control procedures to printed record or misfield in the files.

In a survey and vital registration statistics (VRS) there are cases of skipping registration (e.g. skipping birth, date, and marriages variables) which may show some inconsistency in demographic variables of the population.

Records which are completed at the local level may also be lost in the process of forwarding. If the number of omission exceeds the number of multiply counting, it shows that, there is net under enumeration in the same environment but when multiply counts are greater than omission over enumeration occur.

2.1.2 Content Error

These refer to instances where the characteristics of a person counted in a census enumeration or in registration or in survey are incorrectly reported, recorded or tabulated or sometime they are completely missing.

Content error can be sub divided into four categories:

I) The respondent error

II) The recorder/ enumerator/ investigator error

III) The coding process error

IV) Compiling and printing process error

The respondent error may occur due to ignorance, illiteracy or filling of wrong answer.

For example: a person may not remember his/her correct age or he/she may deliberately give wrong demographic variables. E.g. age at first sex. Sometimes the respondent does not understand the question and give wrong information. This type of error is known as respondent error.

The second error is on the part of enumerator or the investigator that may not listen correctly or may made wrong entries.

The errors at the stage of coding, editing and classification are quiet common. Placing of code at the right place is necessary.

Editors have to give extra care in comparing logical answer of similar and related questions. Similarly at the time of classification, tabulation and printing error do occur.

2.1.2 Content Error

These refer to instances where the characteristics of a person counted in a census enumeration or in registration or in survey are incorrectly reported, recorded or tabulated or sometime they are completely missing.

Content error can be sub divided into four categories:

I) The respondent error

II) The recorder/ enumerator/ investigator error

III) The coding process error

IV) Compiling and printing process error

The respondent error may occur due to ignorance, illiteracy or filling of wrong answer.

For example: a person may not remember his/her correct age or he/she may deliberately give wrong demographic variables. E.g. age at first sex. Sometimes the respondent does not understand the question and give wrong information. This type of error is known as respondent error.

The second error is on the part of enumerator or the investigator that may not listen correctly or may made wrong entries.

The errors at the stage of coding, editing and classification are quiet common. Placing of code at the right place is necessary.

Editors have to give extra care in comparing logical answer of similar and related questions. Similarly at the time of classification, tabulation and printing error do occur.

2.2 Assessment of the Quality of Demographic Data

Age and sex related data are very important demographic variables because they are utilized for description and analysis of a population structure and its estimates (Johanna et al 2014). Quality of survey data is also an important feature as it increases the reliability and potential use of demographic variables derives from it. Despite this important aspect, survey data is always prone to errors, and common among these are age and sex misreporting and digit preference. Reporting of demographic variables are also subjected to errors, and both the nature and quality of data varies greatly between countries and over time (Moultrie, 2012). Ignorance of the true age is very much common during data collection and it has great effect on the accuracy of demographic variables (Crayen & Baten, 2008). The common issue is either under-reporting of children less than one year of age or over-statement of age at very advanced ages. There is also a tendency to provide an exact age of some legal significance such as voting age or marriage age (United Nations, 1956).

There are several approaches for assessing the quality of demographic data in any survey result. Graphical techniques, such as age-sex pyramids, permit one to perform a qualitative assessment by visually identifying response errors. Several indices that allow one to quantify the magnitude of particular patterns of age errors are also available, which operate under the assumption of a rectangular digit distribution. Age accuracy indices (Whipple, Myers etc) are also used in assessing age reporting errors that result from digit preference.

2.3 Measurement of Age Heaping and Digit Preference.

Different types of date reporting may lead to different patterns of heaping in the data. When dates are reported in the form of a calendar year, age heaping may occur on calendar years ending in digit 0 and 5, or in years with notable events.

Age Heaping occurs when a population tends to report certain ages (say, those ending in 0 or 5) at the expense of other ages. It is most pronounced among populations or population subgroups having a low educational status. Heaping on ages is also common due to cultural preference for or avoidance of certain digits (Nagi et al, 1973).

The causes and patterns of age or digit preference vary from one culture to culture, but preference for ages ending in '0' and in '5' is quite widespread, especially in demographic surveys.

Age heaping and digit preference may be ascertained more precisely with indices but digit preference is an analogous concept; it carries the added feature of respondents having a preference for various ages having the same terminal digit.

Indices of digit preference assume that the true figures are rectangularly distributed over an n-year age range that is centered on the specific age being examined. If the index equals 100, there is no heaping on the age data being examined.

2.4 Method of Detecting Errors in Demographic Data

Techniques for examining the reliability of demographic data obtains from census or survey have being developed over time. Specifically there are two approaches of detecting error in demographic data:

The first approach is useful before the data is published. This involves the case by case checking techniques employing data from interviewer and in-depth list of administrative records. This error may be detected by comparison of either tabulated data or individual records. Comparison of tabulated data is made by internal comparison with previous census result. Internal comparison may reveal inconsistency between related data in the tabulated result e.g. ratio of male to female for ages at some stages of life may appear to be out of the norm. The following are example of comparison that can be employed in checking the consistency of demographic data:

1) Comparison with collateral data: means to look at related independent data

2) Comparison of individual records: Survey return of individual is critically examined with reference to itself and some other collateral records. E.g. Registration of individual tax return etc.

3) Re enumeration survey/post enumeration: In order to check the quality of survey returns, a re-enumeration survey or post enumeration survey is conducted on selected units. This survey is conducted by senior professionals and all efforts are made to obtain accurate records. Schedules of the survey are then compared with survey returns. To ascertain content errors, the post enumeration survey is sometimes knows as content evaluation survey (CES) and it is supposed to be accurate among all exercise.

The second approach involves the use of techniques of demographic analysis. E.g. age ratio, sex ratio, Whippe's index, Myer's index etc. Almost all the techniques succeed in identifying some of the error in demographic data while a few of them go further to propose methods for correcting errors in age data.

2.4.1 Whipple's Index

Whipple's index was originally designed for ages in the range of 23-62 inclusive and is only used where ages are reported in a single year. It is obtained by the summing of age returned of the years ending with 0 and 5 to one fifth of the total sum age returns from 23-62 inclusive and the percentage of born is found.

The assumption underling this index is that of rectangularity. In other word, ages are evenly distributed and there is no concentration at particular digit. It is used to detect error at terminal digit 0 and 5. This index has been developed to reflect preference for or avoidance of a particular terminal digit.

The inference about age distribution based on Whipple's index is as follows:

- Whipple's index < 105 means age is highly accurate.
- Whipple's index between 105 to 109.9 means age reported is fairly accurate.
- Whipple's index between 110 to 124.9 means age reported is approximate;
- Whipple's index between 125 to174.9 means age reported is a rough data and
- Whipple's index ≥175 means age reported is very rough.

Indices in excess of 10% indicate a tendency toward preference for a particular digit, and indices below 10% indicate a tendency toward avoidance of a particular digit.

2.4.2 Myers's Blended Method

This index helps to reflect digits preference for each of the 10 digits from 0-9. The Myer index derives a bounded population which is a weighted sum of the number of person reporting ages ending in each terminal digit 0, 1,2,3,4 ...9. The underlined assumption is that there is no system of irregularity reporting at that age.

This method yields an index of preference for each terminal digit, representing the deviation, from 10.0%, of the proportion of the total population reporting ages with a given terminal digit. A summary index of preference for all terminal digits is derived as one-half the sum of the deviations from 10.0%, each taken without regard to sign. If age heaping is nonexistent, the index would approximate zero. This index is an estimate of the minimum proportion of persons in the population for whom an age with an incorrect final digit is reported.

Values range from 0 to 90. If there are no age heapings, the value is zero. If there are maximum heapings, theoretically reporting all ages at a single digit only, the value is 90.

2.4.3 Age Ratio / Age Accuracy Index

While heaping on particular ages are generally more easily identified graphically than through calculated measures, the calculation of age ratios can provide a useful indication of possible under counts or displacements between age groups (Moultrie 2012). According to Moultrie (2012) the age ratio for a given age group is the ratio of twice the population in that age group to the sum of the population in each of the adjacent age groups.

Age Ratio Scores are calculated for ages up to 74 years and are also equivalently defined as the ratio of the population in a given age group to one-third the sum of the population in that age group and in the preceding and following groups, multiplied by 100.

In the absence of extreme fluctuations in the past vital events, the age ratios for all age groups should be about equal to 100. The sum of the deviations from 100 of the age ratios for males divided by number of age groups gives the mean deviation for males and the same procedure also gives the mean deviation for females. The average of the mean deviations of males and females is a measure of the overall accuracy of the age data, i.e., age accuracy index.

2.4.4 Sex Ratio.

The overall sex ratio (SR) is the ratio of the number of males per 100 females in the population. The sex ratio at birth is commonly thought to be 107 boys to 100 girls though this value is subject to debate in the scientific community (Moultrie 2012). Moulturie (2012) established that Female mortality is usually lower than male mortality in most populations and the sex ratio reflects this mortality differential. In developed countries, the sex ratio at birth is typically around 105, while in sub-Saharan Africa, it appears to be closer to *100* (Garenne 2004). Garenne also established that, given the differences between male and female mortality, particularly at older ages, the exact magnitude of the overall ratio will be strongly conditioned by the age structure of the population, being lower for older populations, and higher for younger populations.

2.5 DATA QUALITY IN NIGERIA CENSUSES AND OTHER NATIONAL SURVEYS

2.5.1 Population Censuses

Demographic variables and fertility history related data has always being the major component of every census and survey that has being conducted in every country. Censuses have always being the most comprehensive sources of population data available in a country if properly conducted (Oshungade1995).

Nigeria has been conducting censuses as far back as eighteen century. The first population census of Nigeria was in 1866 which is the population census of Lagos city but the first census which covered the whole of the country was the 1921 census but was not elaborate as it ought to be because of series of irregularities in its conduct. Others series of censuses conducted in Nigeria include the 1952/53, 1962/1963, 1973, 1991 and 2006 census.

In 1962 another census was conducted which is the first post-independence population census in the country. The exercise covered all regions in the country but unfortunately, at the end a lot of irregularities and evidence of inflated figures were found. This raised a lot of controversies as regards its reliability and acceptability, leading to the cancellation of the census results and to the conduct of a fresh census in 1963 (Mathews, 2002; Suberu 2001). In 1991 another population census was conducted putting Nigeria population figure at 88.5 million considerably less anticipated which lead to the assessment of the quality of demographic and fertility history data and the result was provided in the analytical report (NPC 1991). In 2006, a population and housing census was conducted but its detailed analytical report is still being awaited.

The qualities of demographic variable in 1991 census were assessed using some of the demographic techniques and this includes Myers' Index, Whipples' index, Age ratio (Age Sex Accuracy Index) and sex ratio. The Myers' and Whipple's index revealed that preference and heaping for ages exist in the population data. The preferences for digit 0 and 5 were high also; there were little preferences for ages ending with digits 2 and 8. Whipple's index shows that, age data for males tends to be more accurate than that for females in 1991 population census. The sex ratio for the population was 100.2 which deviated from the normal range of 102-107 as expected, indicating that, there were excess of female than male in the population. The sex ratio of the country also fluctuates across the age groups rather than the smooth decline in sex ratio with increasing age in the population. This was in-line with the Age ratio which shows that, there were more under reporting of age among male in the population while the Age Sex Accuracy Index of 81.2 indicates that, age sex data for the country were highly inaccurate.

2.5.2 Nigeria Demographic and Health Surveys (NDHS).

NDHS started in 1990 where there is need to provide a reliable data for the country when the population census cannot be totally relied on and it was conducted by Federal Office of Statistics (FOS) (NDHS 1990). Although, the first Demographic and Health Survey to be conducted in Nigeria took place 1986 in Ondo State, South West. Others series of NDHS that had been conducted in the country includes the 1999, 2003, 2008 and 2013. There have been improvement from one round to another in and they have all been implemented by the National Population Commission (NDHS 2013). It is the Commission that has responsibility to collect, collate, analyze, and disseminate population census and survey data at all levels that contribute to policy formulation and

The qualities of demographic variable in 1991 census were assessed using some of the demographic techniques and this includes Myers' Index, Whipples' index, Age ratio (Age Sex Accuracy Index) and sex ratio. The Myers' and Whipple's index revealed that preference and heaping for ages exist in the population data. The preferences for digit 0 and 5 were high also; there were little preferences for ages ending with digits 2 and 8. Whipple's index shows that, age data for males tends to be more accurate than that for females in 1991 population census. The sex ratio for the population was 100.2 which deviated from the normal range of 102-107 as expected, indicating that, there were excess of female than male in the population. The sex ratio of the country also fluctuates across the age groups rather than the smooth decline in sex ratio with increasing age in the population. This was in-line with the Age ratio which shows that, there were more under reporting of age among male in the population while the Age Sex Accuracy Index of 81.2 indicates that, age sex data for the country were highly inaccurate.

2.5.2 Nigeria Demographic and Health Surveys (NDHS).

NDHS started in 1990 where there is need to provide a reliable data for the country when the population census cannot be totally relied on and it was conducted by Federal Office of Statistics (FOS) (NDHS 1990). Although, the first Demographic and Health Survey to be conducted in Nigeria took place 1986 in Ondo State, South West. Others series of NDHS that had been conducted in the country includes the 1999, 2003, 2008 and 2013. There have been improvement from one round to another in and they have all been implemented by the National Population Commission (NDHS 2013). It is the Commission that has responsibility to collect, collate, analyze, and disseminate population census and survey data at all levels that contribute to policy formulation and

population activity coordination in the country. Nationally representative samples of household were usually selected by stratified two-stage sampling technique. All women age 15-49 and sub-half of men ages 15-59 present in the household on the night before the survey were usually eligible to be interviewed. Questionnaire were usually used in collecting information from the respondents and the data usually collected includes background characteristics (age, religion, education, literacy, media exposure), Reproductive history and childhood mortality, Knowledge, source, and use of family planning methods, Fertility preferences, Antenatal, delivery and postnatal care, Breastfeeding and infant feeding practices, Child immunization and childhood illnesses, Marriage and sexual activity, Women's work and husbands' background characteristics, Malaria prevention and treatment, Women's decision making among others.

Data qualities on demographic and fertility history tables were usually provided at the end of the report. The quality of age and sex data were usually assessed by age distribution of the respondents while qualities of fertility history data were assessed by comparing the results from two surveys of the same time period and by also finding the average number of birth per year. Most of the NDHS data experiences high level of heaping on ages ending with 0 and 5 particularly among women and the reason behind it as provided in the report was that, most of the people in developing countries do not know their ages and also that ages of household member are often reported by another member who may not know the ages of all people listed and may have rounded the ages up or down (NDHS 1999). Another reason for heaping of ages in NDHS was that, some interviewer intentionally displaced some ages to younger ages so as to avoid extra interviewing.

2.5.3 Multiple indicators Cluster Surveys

MICS had been conducted as far back as 1995 and was developed and implemented by the Federal Office of Statistics which is now National Bureau of Statistics (NBS) with technical and funding assistance from UNICEF and UNFPA. MICS had been conducted as a key indicator to evaluate and monitor the status of children and women regarding their health. Also, it provide the key indicators that allow countries to monitor progress towards the Millennium Development Goals (MDGs) and other internationally agreed upon commitments. The first MICS that was conducted in Nigeria was in 1995 with 16,012 household, second round was conducted in 1999 with 15,680 households, 27,750 household was covered in 2007 during the third round and 29,600 household were covered in 2011. Since the inception of MICS in 1995, it had been institutional within the National Integrated Survey Household (NISH), in the National Bureau of Statistics as a process of collecting regular, reliable and timely social statistics (MICS, 2011). Data collected included basic household and housing characteristics, child mortality, nutrition, breastfeeding, salt iodization, Children's Vitamin A Supplementation, Low Birth Weight, Immunization, Neonatal Tetanus Protection, Oral Rehydration Treatment, Care Seeking and Antibiotic Treatment of Pneumonia, use of Solid Fuel, children sleeping under mosquito nets, malaria Treatment, Hand washing, water and Sanitation, reproductive health, contraception, unmet need, antenatal care, assistance during delivery, education, birth registration, child labour, child discipline, Female Genital Mutilation/Cutting, knowledge about HIV transmission and misconception about HIV/AIDS and sexual behavior related to HIV transmission.

The only data quality checked for the demographic variables was sex ratio and the result was provided in the report. The result showed that, the age specific sex ratio was greater than 1.0 for age groups 25-29 and 50-54. This shows that, there were excess of male over the female and the excess can be as a result of under reporting of females. However, there was better consistency in reporting age sex data in 2011 survey compared to 1995 survey.

The only data quality checked for the demographic variables was sex ratio and the result was provided in the report. The result showed that, the age specific sex ratio was greater than 1.0 for age groups 25-29 and 50-54. This shows that, there were excess of male over the female and the excess can be as a result of under reporting of females. However, there was better consistency in reporting age sex data in 2011 survey compared to 1995 survey.

CHAPTER THREE

3.0 Study Setting

The geographical location of the Federal Republic of Nigeria is on the Gulf of Guinea in Western Africa. It is between Benin in the West and Cameroon in the East, in the North are Chad (North East) and Niger (North West).

Nigeria is the most populous country in Africa with an estimated population of over 140 million inhabitants (NPC 2006). The average annual growth rate according to the 2006 estimate was 2.38%. Nigeria's population is divided among 478 different ethnic groups, some numbering fewer than 10 000 people. Of the different ethnic groups, ten (Hausa, Fulani, Yoruba, Ibo, Kanuri, Tiv, Edo, Nupe, Ibibio and Ijaw) account for nearly 80% of the population. Twenty-five percent of the population is in the former Western Region (12% of area), 21% in the former Eastern Region (9% of area), and 53% in the former Northern Region (79% of area). The lowest population densities are in the northern regions, especially in Borno, Adamawa, Kebbi, Kwara, Taraba, Yobe and Zamfara States.

The area of the country is 923,768 square kms; 13,000 square kms of which are covered by water bodies. Nigeria has 36 states and a Federal Capital Territory located at Abuja. Nigeria is divided into six geopolitical zones.

3.1 Study Design

This study involves assessment of demographic data obtained from the National HIV & AIDS and Reproductive Health and Survey 2005, 2007 and 2012.

3.2 Sampling Technique and Sample Size

The eligible respondents are females and males aged 15-49 and 15-64 years respectively.

A nationally representative sample of females aged 15-49 years females and males aged 15-64 years living in households within rural and urban areas in Nigeria was drawn from the updated master sample frame of rural and urban localities and Enumeration Areas developed and maintained by the National Population Commission (NPC).

A multi-stage cluster sampling is used in selecting the eligible respondent with known probability which is made up of four stages and the stages are as follows.

1. Selection of rural and urban localities.

2. Selection of Enumeration Areas (EA) within the selected rural and urban localities.

3. Listing and selection of households.

3.3 Data Analysed

It is likely that the data used in the three surveys had being edited before it was retrieved for this study. Table 3.1 below shows the number of respondents for both males and females used in the study for the three surveys. Female constitute large respondents in all the three surveys and it was high in 2012 survey.

Table 3.1 Description of the National Aids and Reproductive Health Surveys, used in the study

Year	Dates of Field work	Implementing Organization	Number of Households Interviewed	Number of Individual Interviewed	Men Age 15-64	Women Age 15-49
2005	August 2005	Federal Ministry of health	-	10,081	4,688	5393
2007	December 2007	Federal Ministry of health	32,190	11,521	6,161	5,360
2012	September - December 2012	Federal Ministry of health	35,543	31,235	15,596	15,639

3.4 Data Collection Tool

Data were collected from households to households by personal interactive interview using two structured and semi-structured questionnaires: one each for individuals and the households. The survey captured, among others, the following broad themes:

a) Household Characteristics

b) Background Characteristics of the respondents

c) Sexual behaviour

d) Knowledge of symptoms and treatment of STIs

e) Knowledge and perception of HIV & AIDS.

f) Condom accessibility and use

g) Stigma and discrimination

h) Knowledge about family planning

i) Attitude towards and use of family planning

j) Availability, affordability and accessibility of family planning products

k) Reproductive rights and violence against women

l) Maternal mortality and vesico-vaginal fistulae

m) Exposure to Health Communication

n) Knowledge and treatment of Tuberculosis

o) Immunisation coverage

p) Under five mortality

q) Malaria prevention

r) Child birth, breast feeding, antenatal and postnatal care, and PMTCT

3.5 Variables of Interest

The variables of interest needed for this study are:

- Age at last birthday
- Age at first sex
- Age at first marriage
- Age at first birth
- Sex of the respondent
- Total number of children ever born.
- Total number of children surviving
- Total number of male children ever born.
- Total number of female children ever born

h) Knowledge about family planning

i) Attitude towards and use of family planning

j) Availability, affordability and accessibility of family planning products

k) Reproductive rights and violence against women

l) Maternal mortality and vesico-vaginal fistulae

m) Exposure to Health Communication

n) Knowledge and treatment of Tuberculosis

o) Immunisation coverage

p) Under five mortality

q) Malaria prevention

r) Child birth, breast feeding, antenatal and postnatal care, and PMTCT

3.5 Variables of Interest

The variables of interest needed for this study are:

- Age at last birthday
- Age at first sex
- Age at first marriage
- Age at first birth
- Sex of the respondent
- Total number of children ever born.
- Total number of children surviving
- Total number of male children ever born.
- Total number of female children ever born

- Number of surviving male children.
- Number of surviving female children.
- Number of children dead.

3.6 Data Management and Data Analysis

Descriptive statistics was done for all variables. A frequency table was used to summarize all the variables of interest: proportion was reported for qualitative variables.

The quality of demographic and fertility history data was assessed as follows

1). Assessing the consistency of age and sex distribution

2). Internal consistency of fertility history data

3.6.1 Assessing the Consistency of Age and Sex Distribution

Age ratio, sex ratio and the Age Sex Accuracy Index was used in assessing the consistency of age and sex data. The age ratio and the Age Sex Accuracy Index were compared with the expected standard value and decrepancy at each age is a measure of age misreporting. Sex ratio was used to assess the sex distribution of the survey data.

3.6.1.1 Age Ratio

The consistency of age and sex distribution was measured using age accuracy index as heaping on particular ages are generally more easily identified graphically than through calculated measures, but the calculation of age ratios provide a useful indication of possible undercounts or under/over representation of age groups.

The age ratio expresses the population at a given age group to $^1/_2$ of the population in the two adjacent age group. The equation that was employed for the assessment of age distribution is expressed as:

$$\text{AR for } {}_5P_a = \frac{{}_5Pa \times 100}{1/2\ [{}_5Pa_{-5} + {}_5Pa_{+5}]} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 3.1$$

Where,

${}_5P_a$ is the population in the given age group,

${}_5P_{a-5}$ is the population in the preceding age group,

${}_5P_{a+5}$ is the population in the following age group.

This was calculated for both male and female separately and also calculated for five years groups and also the graph was plotted. The values were compared with the expected value of 100. An age ratio of below 100 implies either that members of the group were selectively under enumerated, or that errors in age reporting resulted in misclassifying persons who belong to the age group and a ratio of more than 100 suggests the opposite.

3.6.1.2 The Age Sex Accuracy Index

This index employs the use of age and sex ratio simultaneously and it is computed for five years age group up to age 74 as it evaluate the quality of reported age-sex distribution in five-year age groups (United Nations, 1956). This index was calculated as three times the average of sex-ratio differences plus the average of the deviations from 100 of male and female age-ratios. Sex-ratio differences are calculated as the successive differences in sex-ratios between one age-group and the next one.

$$3(DSR/N) + (AR^{M}/N) + (AR^{F}/N) \quad \ldots\ldots 3.2$$

Where:

DSR: The age difference in the computed sex ratio

AR^{M}: The deviation of age ratio of male from 100

AR^{F}: The deviation of age ratio of female from 100

N: The total number of the population.

The Age Sex Accuracy Index was interpreted by categorizing the results as:

- If index is < 20, it implies accurate age sex data
- Index between 20 and 40, it means age sex data is inaccurate
- Index of over 40, implies that, the data is highly in accurate.

3.6.1.3 Assessment of Age Heaping

Age heaping was assessed using Whipple's Index. Whipple's index has been developed to reflect the extent of age heaping at a particular terminal digit especially digits '0 and 5' and it is only used where age are reported in single year. Whipple's index is the ratio of the total number of persons between ages 23 and 62 who report ages ending in 0 to one-tenth of the total population in the same age group, multiplied by 100.

$$\frac{\sum(P_{30} + P_{40} + P_{50} + P_{60})}{1/10\sum(P_{23} + P_{24} + P_{25} + \ldots\ldots\ldots P_{60} + P_{61} + P_{62})} * 100 \quad \ldots\ldots\ldots\ldots\ldots\ldots 3.3$$

Where:

P_{30}, P_{40}, P_{50} and P_{60} are the ages that are reported with digit ending with zero.

P_{23}, P_{24}, P_{25}+.... + P_{60}+P_{61}+P_{62} are the total sum of the age reported in the survey.

Similarly, heaping may also be measured on multiples of five (terminal digits "5") and it is also calculated as the ratio of the total number of persons between ages 23 and 62 who report ages ending in 5 to one-fifth of the total population in the same age group, multiplied by 100:

$$\frac{\sum\left(P_{25}+P_{35}+\ldots\ldots\ldots\underline{P_{45}}+P_{55}\right)}{\frac{1}{5}\sum\left(P_{23}+P_{24}+P_{25}+\ldots\ldots\underline{P_{60}}+P_{61}+P_{62}\right)}\times 100 \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 3.4$$

Where:

$P_{25}, P_{35}, +\ldots P_{45} + P_{55}$ are the ages that are reported with digit ending with five and zero.

$P_{23}, P_{24}, P_{25}+\ldots. + P_{60}+P_{61}+P_{62}$ are the total sum of the age reported in the survey.

Whipple's index varies from 0 to 500. A value of 0 indicates that digits '0' and '5' are not reported, 100 means there is no preference for '5' and 500 indicates that digit '5' are reported. The inference about age distribution based on Whipple's index is as follows:

- Whipple's index < 105 means age is highly accurate.
- Whipple's index between 105 to 109.9 means age reported is fairly accurate.
- Whipple's index between 110 to 124.9 means age reported is approximate;
- Whipple's index between 125 to174.9 means age reported is a rough data and
- Whipple's index ≥175 means age reported is very rough.

3.6.1.4 Digit Preference

Digit preference was assessed using Myers index which measures the extent of preference for or avoidance of ages ending in particular terminal digits. The extent of the digit preference were examined for the total population of the surveys for males and

females separately and for different age group. It help to reflect digit preference for each of the 10 digit from 0-9 as this was done by weighting the sum of the number of person reporting at ages ending in each terminal digit 0 to 9.

The Myers' Blended Index is similar to the Whipple's Index, except that it considers preference(or avoidance) for ages ending in any number from 0 to 9 (Johanna et al 2014). The index was calculated by first computing a "blended" population in which almost equal sums are expected for each digit (United Nations, 1956). The "blended" totals for each of the ten numbers are nearly 10 percent of their grand total, in the absence of any irregularities in the reporting of ages. The absolute deviations of each sum from 10 percent are obtained and added together. The value of the Myers' Index is one half the sums of the absolute deviations. The theoretical range of the index is from 0 to 90, where 0 indicates no age heaping and 90 indicates every age reported ending in the same digit

3.6.1.5 Smoothing Techniques of Age Distributions

Age distributions are usually corrected by methods of smoothing and results from these approaches are only approximate. Some of these techniques that were employed for correcting age misreporting and age heaping/digit preference data are `Carrier- Farrag, Karup- and Arriaga formula. Most of these techniques involve the application of a formula. Almost all of these techniques give similar result. The main difference among them is in whether or not they smooth the first and last 10-year age groups in the distribution. The Carrier-Farrag (Carrier and Farrag, 1959) formulas do not separate the first or last 10-year age groups, while the Arriaga (1968) formula does.

The Carrier-Farrag technique is based on the assumption that the relationship of a 5-year age group to its constituent 10-year age group is an average of similar relationships in three consecutive 10-year age groups while the Arriaga formula assumes that a second degree polynomial passes by the midpoint of each three consecutive 10-year age groups and then integrates a 5-year age group. All these techniques give similar results, and thus it is difficult to point out advantages or disadvantages of each one in relation to the other.

The Smoothing techniques for age misreporting and age heaping data employed are as follows:

Carrier- Farrag formula: (Carrier Farrag1959):

$${}_5P_{x+5} = {}_{10}P_X \; / \; [1 + ({}_{10}P_{X-10} \; / \; {}_{10}P_{X+10})^{1/4}$$

]……3.5

and ${}_5P_X = {}_{10}P_X - {}_5P_{x+5}$

Where

${}_5P_{x+5}$ is the population at ages x+5 to x+9;

${}_{10}P_X$ is the population at ages x and x+9; and

${}_5P_X$ is the population at ages x to x+4.

${}_{10}P_{x-10}$ is the population in the preceding age group

${}_{10}P_{x+10}$ is the population in the following age group

Once a 5-year age group is calculated from a 10-year age group, the other 5-year age group is found by subtraction.

Arriaga formula.

When the 10-year age group to be separated is the central group of three, the following formulas (Arriaga, 1968) are used:

$${}_5P_{x+5} = ({}_{-10}P_{X-10} + 11\ {}_{10}P_X + 2\ {}_{10}P_{X+10})\ /24 \quad \text{.....3.7}$$

and ${}_5P_x = {}_{10}P_X - {}_5P_{x+5}$

Where

${}_5P_{x+5}$ is the population ages x+5 to x+9

${}_{10}P_X$ is the population ages x to x+9;

${}_5P_x$ is the population at ages x to x+4

${}_{10}P_{x+10}$ is the population in the following age group

3.6.2 Internal Consistency of Fertility History Data.

Reliable fertility history data requires complete and accurate reporting of total number of women of childbearing age and the total number of children they have had. Since live births for older cohorts of women happened when they were younger, they are more likely to be omitted or misplaced. Misplacement may even affect relatively the recent past in a way that gives a false impression of decline through shifting some births from the recent periods to previous periods (Brass and Rashad, 1992). In order to investigate the existence of such errors in fertility history data in NARHS, sex ratio of children ever born and proportions of children dead by sex was computed according to 5- years age group of the mother. The sex ratio of children ever born was computed as the ratio of the number of male children ever born per 100 corresponding number of females children. If there is consistency, the sex ratio should range between 102 and 107. Similarly, the

proportion of children dead by sex was obtained by dividing the number of children dead by number of children ever born. In the absence of inconsistency, the proportion should show either a consistent male or female advantage depending on the country pattern.

3.7 Choice of Stable Population Model Life Table

According to the Manual X, a model stable population can be defined by at least two parameters: the growth rate of the population and mortality level. The equation defining the density function determining the age distribution of a stable population is:

$$C(x) = b\ exp(-rx)l(x) \quad \ldots\ldots 3.8$$

Where $C(x)$ is the infinitesimal proportion of the stable population at exact age x; b is the constant birth rate; r is the constant rate of natural increase; and $l(x)$ is the probability of surviving from birth to age x.

The procedure followed was contained in the United Nations Manual X and Adebowale et al (2011). The 2006 population census data was used to obtain the levels of mortality and the 1991 and 2006 census were used to obtain the growth rates for the population with the assumption that Nigeria population grows exponentially. The growth rates and mortality levels were used to select the appropriate standard population from the Coale-Demeny model life tables at mortality level 13. The age distribution for the standard was obtained through linear interpolation to match the calculated growth rates.

CHAPTER FOUR

RESULTS

4.1 Demographic characteristics of respondents

The data involved total number of 10081 respondents in 2005 consisting of 5396 males and 4685 females, 11521 respondents in 2007 comprising of 6161 males and 5360 females while 2012 survey has a total of 31235 respondents in which 15596 were males and 15639 females. The demographic characteristics of the three surveys by location, zone and sex are presented in Table 4.1 below with higher proportion of the respondents from rural areas. The Table shows that, the proportion of male and female respondents in 2005 and 2007 were similar (53.5%- male and 46.5% - female) and were almost the same by location. The Table also shows that, North West had the highest number of respondents in all the three surveys and its highest proportion of respondents was in 2007 (24.8%) while South East had the lowest number of respondents in all the three surveys with the least respondents in 2007 of about 11.2 percent. However, proportion of respondents from North Central and South West varies slightly in all the three surveys with 1.7% differences in 2005, 0.3% differences in 2007 and 3.29% differences in 2012 survey.

CHAPTER FOUR

RESULTS

4.1 Demographic characteristics of respondents

The data involved total number of 10081 respondents in 2005 consisting of 5396 males and 4685 females, 11521 respondents in 2007 comprising of 6161 males and 5360 females while 2012 survey has a total of 31235 respondents in which 15596 were males and 15639 females. The demographic characteristics of the three surveys by location, zone and sex are presented in Table 4.1 below with higher proportion of the respondents from rural areas. The Table shows that, the proportion of male and female respondents in 2005 and 2007 were similar (53.5%- male and 46.5% - female) and were almost the same by location. The Table also shows that, North West had the highest number of respondents in all the three surveys and its highest proportion of respondents was in 2007 (24.8%) while South East had the lowest number of respondents in all the three surveys with the least respondents in 2007 of about 11.2 percent. However, proportion of respondents from North Central and South West varies slightly in all the three surveys with 1.7% differences in 2005, 0.3% differences in 2007 and 3.29% differences in 2012 survey.

Table 4.1 Frequency distribution of Demographic characteristics of the respondents

Years	2005		2007		2012	
Parameter	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
Location						
Urban	3545	35.2	3965	34.4	9787	31.3
Rural	6536	64.8	7556	65.6	21448	68.6
Zone						
North - West	2181	21.6	2846	24.8	6152	19.7
North - East	1503	14.6	1535	13.4	4875	15.6
North- Central	1732	17.2	2047	17.8	6008	19.2
South-West	1901	18.9	2021	17.5	4979	15.9
South- East	1261	12.5	1294	11.2	4282	13.7
South South	1503	14.9	1753	15.2	4939	15.8
Sex:						
Male (15-64 years)	5396	53.5	6161	53.5	15596	49.9
Female (15-49 years)	4685	46.5	5360	46.5	15639	50.0

4.2 Pattern of Digit Preference

4.2.1 Pattern of Digit Preference for Age at last birthday

Data for the age at last birthday had being edited as there were no missing age reported in the three surveys. Myer's blended index of digit preference was used for evaluating single-year age-sex data by giving the extent of digit preference for all the digits 0, 1, 2... 9. Table 4.2 below shows the pattern of digit preferences and Myers' index in the three surveys. It reveals that 0 and 5 are the most preferred digits in the three surveys. From the Table, the preference for digit 0 was stronger than the preference for digit 5 in the three surveys and 2012 survey shows high preferences for both terminal digit '0' and '5' with respective percentages of 22.94 and 19.86. Preferences for digit '0' and '5' are slightly high in 2005 (19.92% and 18.10% respectively) compare to 2007 survey with preferences percentage of 19.39 and 17.43 for digit '0' and '5' respectively. Terminal digit 3, 6, 1 and 7 were the most terminal digit avoided in 2005, terminal digit 1, 6, 3 and 4 in 2007 and terminal digit 1, 3, 4 and 6 were the most avoided terminal digit in 2012. The results also show that preference for digit 0 declined from 9.92 in 2005 to 9.39 in 2007 and it rose again to 12.94 in 2012. There is a little improvement in the quality of age data from 2005 to 2007 as the Myers's index decrease from 18.03 in 2005 to 16.82 in 2007 while the quality of the age data shows some level of irregularities (misreporting) from 2007 to 2012 as Myers' index increased from 16.82 in 2007 to 23.4 in 2012.

Table 4.2 Pattern of Digit Preference and Myers' Indices in NARHS 2005-2012.

Terminal Digit	NARHS YEAR					
	2005		2007		2012	
	Percentage Distribution	Deviation From 10	Percentage Distribution	Deviation From 10	Percentage Distribution	Deviation From 10
0	19.92	9.92	19.39	9.39	22.94	12.94
1	7.10	-2.90	6.01	-3.99	4.52	-5.48
2	8.18	-1.82	8.46	-1.54	9.98	-0.02
3	6.68	-3.32	6.64	-3.36	5.48	-4.52
4	7.96	-2.04	8.15	-1.85	5.66	-4.34
5	18.10	8.10	17.43	7.43	19.86	9.86
6	6.84	-3.16	6.32	-3.68	6.65	-3.35
7	7.59	-2.41	9.40	-0.6	7.00	-3
8	8.78	-1.22	9.35	-0.65	10.57	0.57
9	8.84	-1.16	8.85	-1.15	7.3	-2.70
Myers' Index		**18.03**		**16.82**		**23.40**

Table 4.2 Pattern of Digit Preference and Myers' Indices in NARHS 2005-2012.

Terminal Digit	NARHS YEAR					
	2005		2007		2012	
	Percentage Distribution	Deviation From 10	Percentage Distribution	Deviation From 10	Percentage Distribution	Deviation From 10
0	19.92	9.92	19.39	9.39	22.94	12.94
1	7.10	-2.90	6.01	-3.99	4.52	-5.48
2	8.18	-1.82	8.46	-1.54	9.98	-0.02
3	6.68	-3.32	6.64	-3.36	5.48	-4.52
4	7.96	-2.04	8.15	-1.85	5.66	-4.34
5	18.10	8.10	17.43	7.43	19.86	9.86
6	6.84	-3.16	6.32	-3.68	6.65	-3.35
7	7.59	-2.41	9.40	-0.6	7.00	-3
8	8.78	-1.22	9.35	-0.65	10.57	0.57
9	8.84	-1.16	8.85	-1.15	7.3	-2.70
Myers' Index		**18.03**		**16.82**		**23.40**

The Pattern of digit preference among male and female for the three surveys were presented in Table 4.3 and 4.4 below. The preference for terminal digit '0' and '5' were high among males in all the three surveys. Table 4.3 shows that, preferences for terminal digit '0' and '5' among male were high in 2012 (14.19 for digit '0' and 9.93 for digit '5') compared to 2005 (10.44 for digit 0 and 6.91 for digit 5) and 2007 (9.34 for digit 0 and 7.18 for digit 5). Table 4.3 also shows that, there were no preferences for all other terminal digit in 2005 and 2007 unlike in 2012 where there are preferences for terminal digit '2'with 10.64 percent. However, ages ending with 1, 3, 6 and 7 among male in order of rank were generally avoided in all the three surveys. Terminal digit 1,3,4,9, 6 and 7 in order of rank were avoided in 2012 survey and this 2012 survey recorded the highest level of digit avoidance among male. The Myers's index of 17.35% in 2005, 16.52% in 2007 and 24.76% in 2012 shows that male reported ages with incorrect final digits. However, Preferences for terminal digits '0' were high compared to preferences for terminal digit '5' in 2007 and 2012 survey among female unlike in 2005 where preferences for terminal digit '5' was slightly higher than terminal digit '0'. Avoidance of terminal digit 1, 3, 4, 6, 7 and 9 in order of ranking among female ranges from -5.77 to -1.66 in 2012. The Myers' index shows that female reporting of age with incorrect final digits was high in 2012 survey while 2005 and 2007 shows slight differences in the level of incorrect final digit reporting.

Table 4.3: Pattern of Digit Preference and Myers' Indices for Male

	NARHS YEAR					
	2005		2007		2012	
Terminal Digit	Percentage Distribution	Deviation From 10	Percentage Distribution	Deviation From 10	Percentage Distribution	Deviation From 10
0	20.44	10.44	19.34	9.34	24.19	14.19
1	7.13	-2.87	6.23	-3.77	4.82	-5.18
2	8.59	-1.41	8.25	-1.75	10.64	0.64
3	6.49	-3.51	6.89	-3.11	5.55	-4.45
4	8.53	-1.47	8.22	-1.78	5.71	-4.29
5	16.91	6.91	17.18	7.18	19.93	9.93
6	6.89	-3.11	6.39	-3.61	6.41	-3.59
7	7.61	-2.39	9.91	-0.09	6.96	-3.04
8	8.61	-1.39	9.02	-0.98	9.59	-0.41
9	8.81	-1.19	8.87	-1.13	6.22	-3.78
Myers' Index		**17.35**		**16.52**		**24.76**

Table 4.4 Pattern of Digit Preference and Myers' Indices for Female

	NARHS YEAR					
	2005		2007		2012	
Terminal Digit	Percentage Distribution	Deviation From 10	Percentage Distribution	Deviation From 10	Percentage Distribution	Deviation From 10
0	19.35	9.35	19.45	9.45	21.79	11.79
1	7.06	-2.94	5.75	-4.25	4.23	-5.77
2	7.73	-2.27	8.69	-1.31	9.53	-0.47
3	6.90	-3.1	6.36	-3.64	5.42	-4.58
4	7.33	-2.67	8.07	-1.93	5.61	-4.39
5	19.43	9.43	17.71	7.71	19.79	9.79
6	6.78	-3.22	6.24	-3.76	6.89	-3.11
7	7.58	-2.42	9.17	-0.83	7.04	-2.96
8	8.97	-1.03	9.73	-0.27	11.53	1.53
9	8.88	-1.12	8.83	-1.17	8.34	-1.66
Myers' Index		**18.77**		**17.15**		**23.10**

Table A4.1 and A4.2 in the appendix, shows the pattern of digit preferences in urban and rural area respectively. The preference for terminal digit '0' in urban area was low in 2007 with Myers' index of 15.31% compare to 2012 survey with Myers' index of 18.87%. The preferences for terminal digit '5' were low in 2005 compared to 2012 survey in the urban area with corresponding indices 14.94% and 17.94% respectively. Terminal digit '6' were slightly avoided in 2005 survey but greatly avoided in 2007 and 2012 survey while terminal digit '1' were slightly avoided in 2005 and 2007 survey but greatly avoided in 2012 survey. The Myers' index shows no improvement on the quality of age data in urban area as the values of Myers' index increased from 10.57 in 2005 to 19.29 in 2012. However, Preference for digit 0 was slightly stronger than preference for digit 5 in the rural area as 2012 also shows high preference for digit 0 and 5. The most avoided digit in 2007 and 2012 were digit 1, 4, 3, 6, 2 and 9 in 2007 and digit 1, 3, 4, 6, 7 and 9 in 2012 while in 2005 the most avoidance digit were 3,6, 1, 4, and 7 in order of ranking in the rural area. Also, there was no improvement on the quality of age data from 2005 to 2012 in the rural areas as the Myers's index increased from 22.34 in 2005 to 26.05 in 2012.

Myers's index across the regions were presented in Table A4.3 of the Appendix. The pattern of Myers' index is the same for the all regions in 2005 and 2007 surveys expect for North East in 2005 and South East in 2007. From the table, it shows that there was a slight improvement in the quality of age data in 2005 compared to 2007 and 2012 as the Myers' index increase from 15.49 in 2005 to 20.91 and 20.53 in 2007 and 2012 respectively in North Central. Myers index for 2005 and 2007 were almost the same in

South South while 2012 survey shows a great difference in the Myers Index for the region.

4.2.2 Pattern of Digit Preference for Age at first sex

The pattern of digit preference for age at first sex was similar in both 2012 and 2005 surveys. However, the 2007 survey shows a slightly different pattern of digit preferences for age at first sexual intercourse. Digits '0', '8' and '5' in ranking order were the most preferred digits for age at first sex in 2005 and 2012 surveys (18.45%, 15.40% and 14.23% in 2005 and 19.36%, 16.10% and 15.01% respectively in 2012), while digits '0', '5' and '8' in ranking order were the most preferred digits in 2007 with 18.77%, 15.36% and 14.56% respectively. In 2005 and 2007 surveys, terminal digits '7' and '9' (2005) and digit 9 (2007) indicates accuracy in reporting age at first sexual intercourse. Digits '1', '3', '4' and '2' in order of ranking were the most avoided digit in all the three surveys. The pattern of reporting age at first sexual intercourse revealed that ages ending with digits '0', '8' and '5' in order of ranking among male were all the same while the preference for digit '0' was much stronger than that of any other digit. The reverse was the case among the female in which preferences for age at first sexual intercourse ending with digits '8' were little stronger than digits '0' and '5' in all the three surveys but preference for these digits were high in 2012 survey. However, avoidance for ages at first sexual intercourse ending with digit '3 were much stronger in 2005 and 2007 surveys than any other digit with digit '3' being strongly avoided in the rural area.

Table 4.5: Pattern of Digit Preference and Myers' Indices of age at first sex

	NARHS YEAR					
	2005		2007		2012	
Terminal Digit	Percentage Distribution	Deviation From 10	Percentage Distribution	Deviation From 10	Percentage Distribution	Deviation From 10
0	18.45	8.45	18.77	8.77	19.36	9.36
1	4.95	-5.05	4.58	-5.42	4.96	-5.04
2	6.58	-3.42	6.36	-3.64	7.50	-2.50
3	4.99	-5.01	4.92	-5.08	4.29	-5.71
4	6.51	-3.49	7.36	-2.64	5.82	-4.18
5	14.23	4.23	15.36	5.36	15.01	5.01
6	8.35	-1.65	8.21	-1.79	7.68	-2.32
7	10.32	0.32	9.71	-0.29	9.36	-0.64
8	15.40	5.40	14.56	4.56	16.10	6.10
9	10.21	0.21	10.17	0.17	9.92	-0.08
Myers' Index		18.09		18.69		20.47

4.2.3 Pattern of Digit Preference for Age at first marriage

Table 4.6 showed that age at first marriage ending with digits '0' and '5' were the most preferred digits in all the three surveys. The preference for digit '0' was high when compared to any other digit in the three surveys. The preference for age at first marriage ending with '0' was high in 2012 while preference for age ending with digit '5' was high in 2007. Pattern for digit avoidance were the same in all the three surveys. Digits 1, 4, 2 and 3 in order of ranking were the most avoided digits in all the three surveys. However, preference for age at first marriage ending with '0' was high among the female than the male in 2007 and 2012 surveys with 6.1% and 7.04% respectively. The preference for digit 0 was high among the males compare to the females in 2005 with 10.63%. Ages at first marriage ending with digit '5' were preferred by males in all the three surveys while preference for other terminal digits apart from terminal digit '0' varied among the females. From appendix Table A4.10, digits 5 in 2005, 2 in 2007 and 3 in 2012 were all preferred among the females with Myers' preference index of 16.53%,1 5.87% and 14.43% respectively. Almost all other ages of first marriage were avoided among both sexes but the level of avoidance was higher among the females in 2007 surveys. However, the pattern of digit preference and avoidance for age at first marriages were almost the same when divided by location and geographical regions. Preference for digits '0' and '5' were both higher than preference for any other digit in both urban and rural areas but the level of preferences were higher in rural areas in all the three surveys. The 2012 survey showed high preferences for both digits '0' and '5' as compared to 2005 and 2007 surveys but only slight differences exist between preferences in 2005 and 2007 surveys in both urban and rural areas. The Myers' index across the geographical region

follows the same pattern of digit preferences as the preferences for certain digits were higher than others in all the three surveys except the North Central in 2012 which shows evenly preferences for all the digits.

Table 4.6: Pattern of Digit Preference and Myers' Indices for age at first marriage

	NARHS YEAR					
	2005		2007		2012	
Terminal Digit	Percentage Distribution	Deviation From 10	Percentage Distribution	Deviation From 10	Percentage Distribution	Deviation From 10
0	18.41	8.41	18.09	8.09	19.86	9.86
1	5.74	-4.26	6.00	-4.00	5.57	-4.43
2	8.03	-1.97	7.94	-2.06	8.07	-1.93
3	6.25	-3.75	6.04	-3.96	5.68	-4.32
4	8.10	-1.90	8.50	-1.50	7.81	-2.19
5	16.49	6.49	16.76	6.76	16.12	6.12
6	7.48	-2.52	7.67	-2.33	7.37	-2.63
7	9.10	-0.90	8.92	-1.08	8.31	-1.69
8	11.70	1.70	11.20	1.20	12.54	2.54
9	8.70	-1.30	8.88	-1.12	8.67	-1.33
Myers' Index		16.61		16.04		18.5

4.2.4 Pattern of Digit Preference for Age at first Birth

The Table 4.7 shows that digits 0 and 8 were the most preferred digits for age at first birth with 15.31% and 15.09% in 2005 and 16.91% and 14.18% in 2012 survey respectively. Digits '0' and '5' with 21.77% and 19.29% respectively were the most preferred digits in 2007 survey. Preference for digit '0' was very strong and high when compared to preferences for any other digits in all the three surveys and this implies that females tend to report their age at first birth in age ending with this digit. The pattern of digit preferences for age at first birth seems to be the same in 2005 and 2012 surveys but slightly different in 2007, while pattern of digit avoidance was the same for the three surveys. Ages ending with digits 1 to 4 were greatly avoided in all the three surveys but the level of avoidance among these digits was high in 2007 survey when compared to the other two surveys. The Myers' index also revealed that the quality of age at first birth was also poor. When the digit preferences were disaggregated according to location and geographical regions, it showed that ages ending with '0'and'8' were most preferred among age at first birth in both urban and rural areas. Also, avoidance of ages ending with digits 1 to 4 were the same in all the three surveys. However, age at first birth reported in digit ending with '5' was slightly preferred in all the three surveys.

Table 4.7: Pattern of Digit Preference and Myers' Indices for age at first birth

	NARHS YEAR					
	2005		2007		2012	
Terminal Digit	**Percentage Distribution**	**Deviation From 10**	**Percentage Distribution**	**Deviation From 10**	**Percentage Distribution**	**Deviation From 10**
0	15.31	5.31	21.77	11.77	16.91	6.91
1	6.46	-3.54	4.30	-5.70	7.48	-2.52
2	6.02	-3.98	8.79	-1.21	9.66	-0.34
3	6.08	-3.92	4.94	-5.06	6.70	-3.30
4	6.19	-3.81	4.83	-5.17	8.15	-1.85
5	14.01	4.01	19.29	9.29	10.78	0.78
6	9.97	-0.03	7.63	-2.37	8.06	-1.94
7	10.75	0.75	7.51	-2.49	7.63	-2.37
8	15.09	5.09	12.25	2.25	14.18	4.18
9	10.11	0.11	8.68	-1.32	10.46	0.46
Myers' Index		15.27		21.06		15.41

4.3 Extent of Age Heaping

4.3.1 Age Heaping at last Birthday

Whipple's Index (WI) was calculated to measure the level of heaping at ages ending with '0' and '5' and this helps to indicate the quality of age data of the three surveys. Tables 4.8 show the WI at ages ending with '0' and ages ending with '5'for the three survey periods by sex. The WI for ages ending with '0' for the three surveys were 195(2005), 185(2007) and 224(2012). This shows that the quality of the age data was considered to be very rough but the WI for ages ending with ''5'calculated shows that the quality of the age data of the surveys were fairly accurate except in 2012 where the WI of 111 was approximately accurate. The WI for the sex shows that there were much more heaping on age ending with 0 among the male and WI for female also followed the same pattern of age heaping at digit 0 except in 2007 where the WI of 173 for female at age ending with 0 showed a little improvement on their quality of age data. WI at age ending with '5' indicate that the quality of data ending with '5' for male were highly accurate except in 2012 where the quality was fairly accurate whereas the WI for female were approximately accurate except in 2007 which was highly accurate

Table 4.8 Whipple's indices for Terminal digits '0' and '5'

	YEAR OF NARHS SURVEY					
	2005		2007		2012	
	Whipple's Index		Whipple's Index		Whipple's Index	
	0	**5**	**0**	**5**	**0**	**5**
Male	208	94	196	96	249	107
Female	176	116	173	104	198	115
Total	195	104	185	100	224	111

The Whipple's index for the urban and rural area at ages ending with '0' and '5' were shown in Table 4.9 and Table 4.10 below respectively. The WI for the urban area shows a little improvement on the quality of age data as the values of WI improved in 2005 and 2007 survey but in 2012, the WI of 184 at ages ending with '0'shows that the quality of age data was very rough. 2005 and 2007 surveys shows some level of improvement on the quality of data compares to 2012 survey. The WI for urban and rural showed that the quality of age data for both male and female in 2005 and 2007 survey followed the same pattern as all the WI for the two surveys falls under the same category. The 2012 survey did not show any sign of improvement on the quality of age data. The 2012 survey is considered to have high heaping of ages in the urban area among male while WI of 163 for female at ages 0 shows a little improvement on the quality of age data. However, Tables 4.10 shows that the quality of age data for the three surveys were very rough for both sexes unlike in the urban areas where 2005 and 2007 survey shows some little improvement on the quality of age data.

Table 4.9 Whipple's indices for Terminal digits '0' and '5' in the Urban Area

	YEAR OF NARHS SURVEY					
	2005		2007		2012	
	Whipple's Index		Whipple's Index		Whipple's Index	
	0	**5**	**0**	**5**	**0**	**5**
Male	158	77	150	78	206	93
Female	137	97	129	95	163	107
Total	149	86	163	85	184	100

Table 4.10 Whipple's indices for Terminal digits '0' and '5' in the Rural Area

	YEAR OF NARHS SURVEY					
	2005		2007		2012	
	Whipple's Index		Whipple's Index		Whipple's Index	
	0	**5**	**0**	**5**	**0**	**5**
Male	235	104	221	106	268	115
Female	202	126	197	109	215	119
Total	220	114	210	108	242	117

Table 4.11a and 4.11b shows the WI at ages ending with '0' and '5' respectively for all the regions by sex. In 2005 survey, the WI shows that, qualities of age data in three regions were very poor and the regions includes North Central, North East and North West with WI of 195, 233 and 242 respectively at age ending with '0'and WI of 92 in North Central shows that the quality of age data is highly accurate. WI of 114 in North East shows that, the data is approximately accurate and WI of 138 in North West shows that there were high heaping at ages ending with 5'. South East, South West and South South show some little improvement on their quality of age data with respective WI of 171, 168 and 147 at age ending with digit '0' in 2005. 2005 survey also shows that, the quality of male data were very poor in all the regions except in South South where the quality of age data improved with WI of 150 at age ending with '0'. Four regions also shows that quality of female age data were poor and these region includes North Central (169), South east (171), South West (168) and South South (143).at ages ending with '0'. It shows that, quality of female data across the regions is a little fair compared to the quality of male age data in 2005 survey. The quality of age data in 2007 survey is almost the same with quality of age data in 2005 survey except that in 2007 survey, female quality of age data is approximate accurate for South East with WI of 106 at age ending with '0'.

Table 11a Whipple's indices of geographical region for digit '0'

Region	2005			2007			2012		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
North Central	217	169	195	235	198	219	228	185	208
North East	250	212	233	204	204	204	282	232	260
North West	247	237	242	227	218	223	327	297	313
South East	186	155	171	171	106	139	203	142	171
South West	184	145	168	169	153	162	232	159	195
South South	150	143	147	140	125	133	185	160	172

Table 11b Whipple's indices for region area for digit '5'

Region	2005			2007			2012		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
North Central	71	117	92	101	112	105	104	107	105
North East	109	120	114	96	119	106	124	137	130
North West	136	141	138	117	125	121	134	148	140
South East	82	122	101	79	88	84	90	92	91
South West	82	106	93	80	91	85	97	113	106
South South	73	86	79	88	82	85	86	90	88

4.3.2 Age Heaping at first sex

The extent of age heaping on terminal digits '0' and '5' for age at first sex for the three surveys indicates that there was no heaping on terminal digit '0'. The WI of 86.32 in 2005, 95.51 in 2007 and 76.54 in 2012 show that the qualities of reported age at first sexual intercourse were highly accurate. The reverse was the case on terminal digit '5' as WI of 137.93 in 2005 and 132.22 in 2012 revealed that the quality of the age data were very poor whereas WI of 113.07 in 2007 indicates that, the quality of age data were approximately accurate. Extent of heaping on age at first sexual intercourse on terminal digit '0' and '5' among males and females as revealed by WI indicates that there was no heaping on digit '0' for females in all the three surveys. The quality of their data was highly accurate unlike that of the males whose data was approximately inaccurate for 2005 and 2007 but highly accurate in 2012. The pattern of heaping on terminal digit '5' for both sexes shows that the reported age of first sexual intercourse was very poor in all the three surveys.

Table 4.12 Whipple's indices for Terminal digits '0' and '5 of age at first sex

	YEAR OF NARHS SURVEY					
	2005		2007		2012	
	Whipple's Index		Whipple's Index		Whipple's Index	
	0	**5**	**0**	**5**	**0**	**5**
Male	113.58	180.25	112.15	159.92	95.07	173.65
Female	54.60	137.93	38.57	113.07	31.28	132.22
Total	86.32	160.69	95.51	149.28	76.54	161.62

4.3.3 Age Heaping at first marriage

Table 4.13 showed the extent of heaping on digit '0' and '5' for age at first marriage. The age at first marriage reported shows that age ending with digit '0'was approximately accurate in reporting especially in 2007. The WI of 90.02 indicates that there were no age heaping. However, WI for age at first marriage for male showed that the qualities of age data were very poor in all the 2005 and 2012 surveys. In 2007, the WI of 120.56 for terminal digit '5' showed that the quality of the reported age at first marriage was approximately accurate. The reverse was the case among the females where there were no heaping on terminal digits '0' and '5' in all the three surveys. When the extent of heaping on age at first marriage was disaggregated into location and geographical regions, it showed that the pattern of heaping was the same for the three surveys. This is presented in tables 4.9 to 4.12 below.

Table 4.13 Whipple's indices for Terminal digits '0' and '5 of age at first marriage

	YEAR OF NARHS SURVEY					
	2005		2007		2012	
	Whipple's Index at age:		Whipple's Index at age:		Whipple's Index at age:	
	0	**5**	**0**	**5**	**0**	**5**
Male	130.65	126.56	135.50	120.56	141.56	125.76
Female	29.47	118.86	35.20	100.52	65.54	103.69
Total	105.19	123.75	90.02	120.36	119.00	125.76

4.3.4 Age Heaping at first birth

The Whipple's indices of 48.42 in 2005 and 61.84 in 2012 shows that there were no heaping on age at first birth ending with digit '0' and this implies that the quality of reported data were highly accurate whereas the WI of 243.93 in 2007 indicates that, the quality of data for age at first birth ending with digit '0' were very poor. WI of 101.53 in 2007 and 102.90 in 2012 also shows that, the quality of reported age at first birth ending with digit '5' were highly accurate unlike in 2005 where WI of 126.63 shows that the quality of data was poor. Extent of heaping on age at first birth ending with '0' for both urban and rural area follows the same pattern. Both urban and rural area showed that quality of data was highly accurate for the three surveys unlike heaping on digit '5' which varied across the three surveys. Heaping on age at first birth ending with digit '0' across the geographical regions also show that the quality of the reported data were highly accurate for all the three surveys and they were all presented in table below.

Table 4.14 Whipple's indices for Terminal digits '0' and '5' of age at first birth

	YEAR OF NARHS SURVEY					
	2005		2007		2012	
	Whipple's Index		Whipple's Index		Whipple's Index	
	0	5	0	5	0	5
	48.42	126.63	243.93	101.53	61.84	102.90

4.4 The Consistency of Age and Sex Distribution

4.4.1 Age Ratio

Age ratios by sex for the three survey periods are presented in Table 4.15 below. The result shows that among males, there were over representation of respondents at age groups 30- 34, 40 - 44, 50 – 54 years in 2005, age groups 25 - 29, 45 - 49, 50 – 54 years in 2007and age groups 20 - 29, 35 - 39 and 55- 59 years in 2012 survey (Figure 4.1). The extent of under -representation of ages was high among the female in 2005 and 2012 unlike in 2007 where over-representation of age was high among the females. The degree of under-representation of respondents was high among the female than the male in age group 35 – 39 years in all the survey periods. However, there was inconsistency in reporting of age sex data across the age groups especially in advance ages as the age ratio deviated from the normal range of 100. Under reporting of age was also extremely high among the male in advance ages than in younger age groups.

Table 4.15: Age Ratio According to Age Group, NARHS 2005 – 2012

	2005				2007				2012			
Age Group	Male	Deviation from 100	Female	Deviation from 100	Male	Deviation from 100	Female	Deviation from 100	Male	Deviation from 100	Female	Deviation from 100
15-19												
20-24	91.19	-8.8	101.99	1.99	96.65	-3.05	101.98	1.98	89.04	-10.96	99.189	-0.81
25-29	94.37	-5.6	94.22	-5.78	110.51	10.51	102.58	2.58	104.33	4.33	112.44	12.44
30-34	105.09	5.09	103.00	3.00	85.43	-14.57	100	0	104.74	4.74	100.75	0.75
35-39	87.91	-12.09	85.49	-14.51	98.08	-1.92	89.22	-10.78	96.36	-3.64	90.08	-9.92
40-44	108.8	8.8	98.63	-1.37	98.19	-1.81	104.32	4.32	82.00	-18.0	96.24	-3.76
45-49	87.70	-12.30			103.48	3.48			86.79	-13.21		
50-54	109.90	9.9			100.8	0.8			121.79	21.79		
55-59	78.08	-21.91			74.42	-25.58			67.65	-32.35		
60-64	-											
Age score for male		10.57				7.72				12.38		
Age score for female		5.33				3.93				5.54		

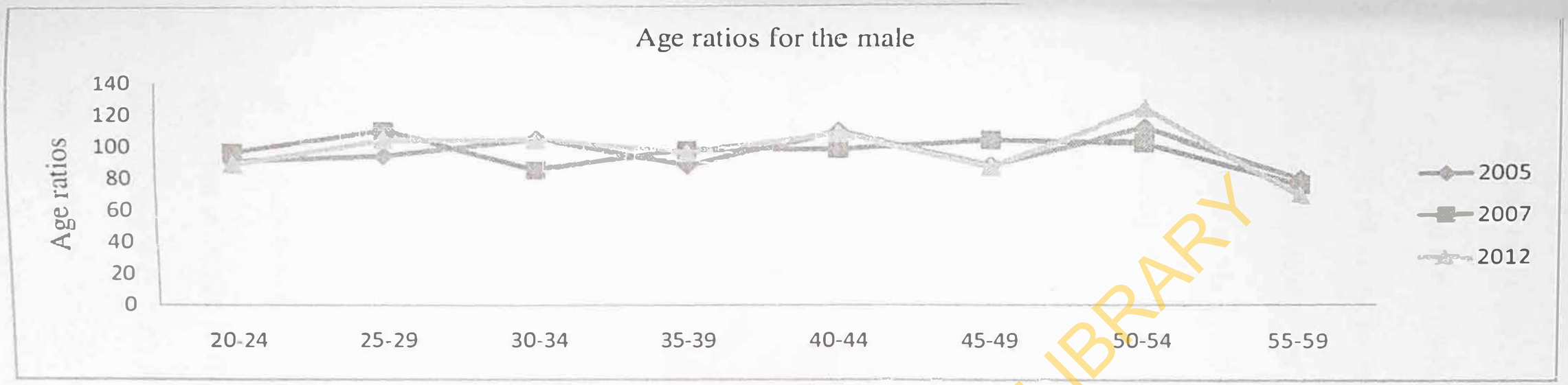


Figure 4.1: Age ratios for male, NARHS 2005-2012

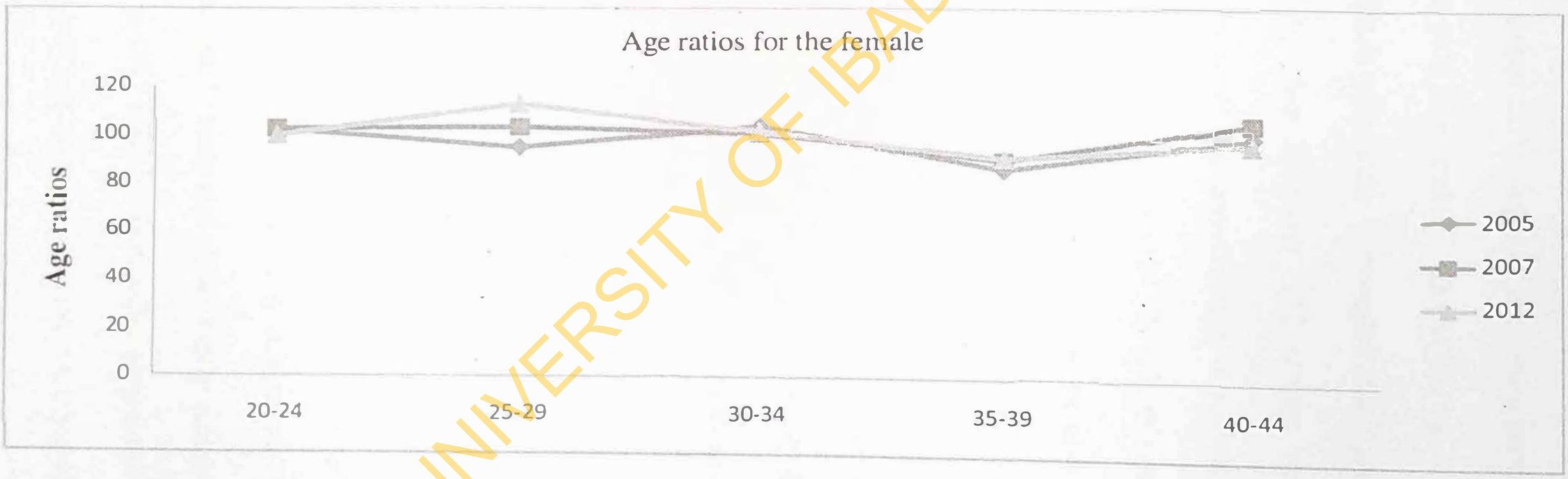


Figure 4.2: Age ratios for female, NARHS 2005-2012

Table 4.16 shows that under reporting of ages were high among male in the urban area across all the age group especially in 2012 survey. The pattern of under representation of ages among the males in urban area is almost the same for all the survey periods but the degree of age misreporting was high in 2012 compared to 2005 and 2007 at advance age group 55 -59 years. In 2005 survey, female were under represented at age group 35-39 with corresponding age ratio of 84.59, while 2007 and 2012 surveys were under represented at age group 45-49 years. However over representation of respondents was high among the female in 2012 at age group 20-24 (120.39) and this high over representation at this age group (20-24) among female in 2012 may be as a result of shifting or age displacement from age group 15-20 to age group 20-24 years. Table 4.17 also shows that, there were inconsistencies in reporting of age data as over and under representation of age exist among different age groups in all the three surveys in the rural area. There was under representation at advance age among the male in all the three survey periods and this was extremely high in 2012 at age group 55-59 hears in the rural area.

Age groups 20-24 and 30-34 years in 2005 survey for the North Central in appendix Table A4.25 shows that the age data were over represented for both male and female, age groups 25-29, 35-39 and 40-44 also indicate that there were over representation in 2007 for both male and female while over representation in 2012 survey was in age group 25-29 for both males and females. However, under representation is high among male compared to female in 2005 survey. The 2007 survey also shows similar pattern of age misreporting with 2005 survey unlike in 2012 survey where, under representation was high among the females except in advance age group where male were highly under

represented. Age ratios for other geographical regions almost followed the same pattern of inconsistencies across age groups for all the survey periods and were all presented in appendix Table A4.25 to Table A4.30. However, appendix Table A4.30 shows that, the degree of under representation in South South region was higher than over representation for both male and female across the age groups. Unlike in every other region where under representation exists in age group 55-59 among male, the South South region shows that male were slightly over represented in this age group (55-59) in 2005.

Table 4.16: Age Ratio According to Age Group in Urban Area

	2005				2007				2012			
Age Group	Male	Deviation from 100	Female	Deviation from 100	Male	Deviation from 100	Female	Deviation from 100	Male	Deviation from 100	Female	Deviation from 100
15-19												
20-24	107.47	7.47	103.30	3.30	106.81	6.81	97.58	-2.42	90.70	-9.30	91.57	-8.43
25-29	93.17	-6.83	95.80	-4.20	105.49	5.49	107.84	7.84	107.13	7.13	120.39	20.39
30-34	100.23	0.23	107.29	7.29	92.22	-7.78	95.80	-4.20	106.47	6.47	104.50	4.50
35-39	90.36	-9.64	84.59	-15.41	90.36	-9.64	101.94	1.94	92.29	-7.71	90	-10
40-44	110.77	10.77	95.91	-4.09	98.13	-1.87	91.46	-8.54	108.75	8.75	89.98	-10.02
45-49	82.05	-17.95			109.65	9.65			87.13	-12.87		
50-54	105.26	5.26			92.73	-7.27			117.50	17.50		
55-59	93.17	-6.83			88.14	-11.86			71.91	-28.09		
60-64	-											
Age score for male	8.12				7.55				12.23			
Age score for female	8.57				4.99				10.67			

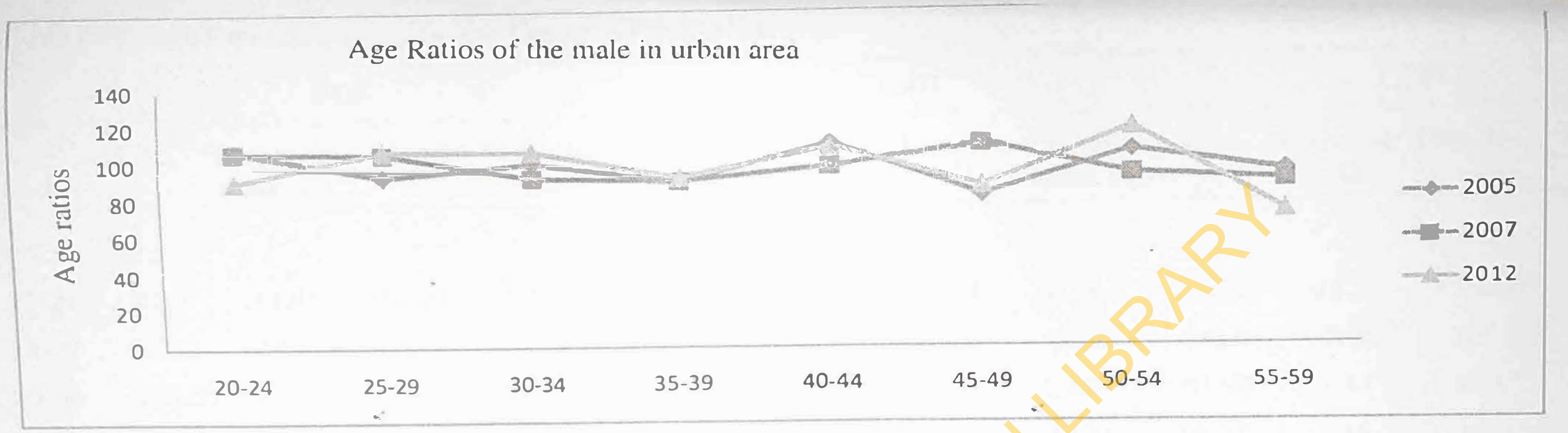


Figure 4. 3: Age Ratios of male in the urban areas for the survey periods

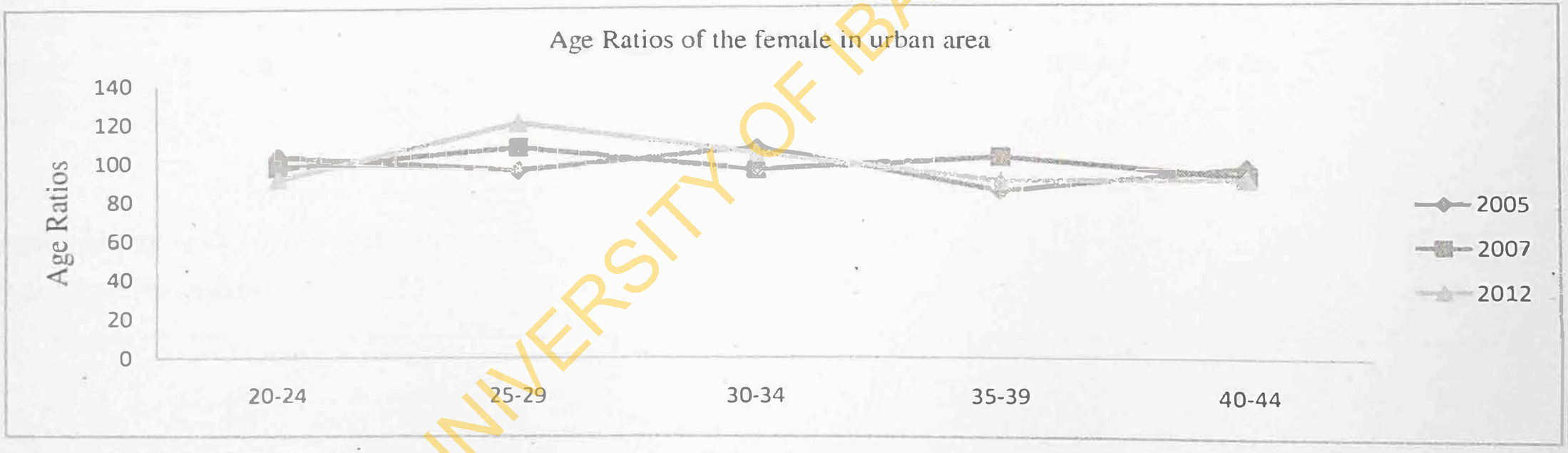


Figure 4.4: Age Ratios of female in the urban areas for the survey periods

Table 4.17: Age Ratio According to Age Group in Rural Area

	2005				2007				2012			
Age Group	Male	Deviation from 100	Female	Deviation from 100	Male	Deviation from 100	Female	Deviation from 100	Male	Deviation from 100	Female	Deviation from 100
15-19												
20-24	82.57	-17.43	101.23	1.23	91.94	-8.07	104.34	4.34	88.25	-11.75	102.67	2.67
25-29	95.12	-4.88	93.32	-6.68	113.49	13.49	99.83	-0.17	102.96	2.96	108.77	8.77
30-34	108.03	8.03	100.54	0.54	81.82	-18.18	102.46	2.46	103.93	3.93	98.87	-1.13
35-39	86.54	-13.46	85.98	-14.02	102.43	2.43	82.76	-17.24	98.25	-1.75	90.11	-9.89
40-44	107.76	7.76	100	0	98.22	-1.78	111.37	11.37	107.67	7.67	99.18	-0.82
45-49	90.59	-9.41			100.39	0.39			86.64	-13.36		
50-54	112.21	12.21			105.19	5.19			123.64	23.64		
55-59	71.73	-28.27			68.71	-31.29			65.96	-34.04		
60-64												
Age score for male		12.68				10.10				23.27		
Age score for female		3.75				7.12				4.65		

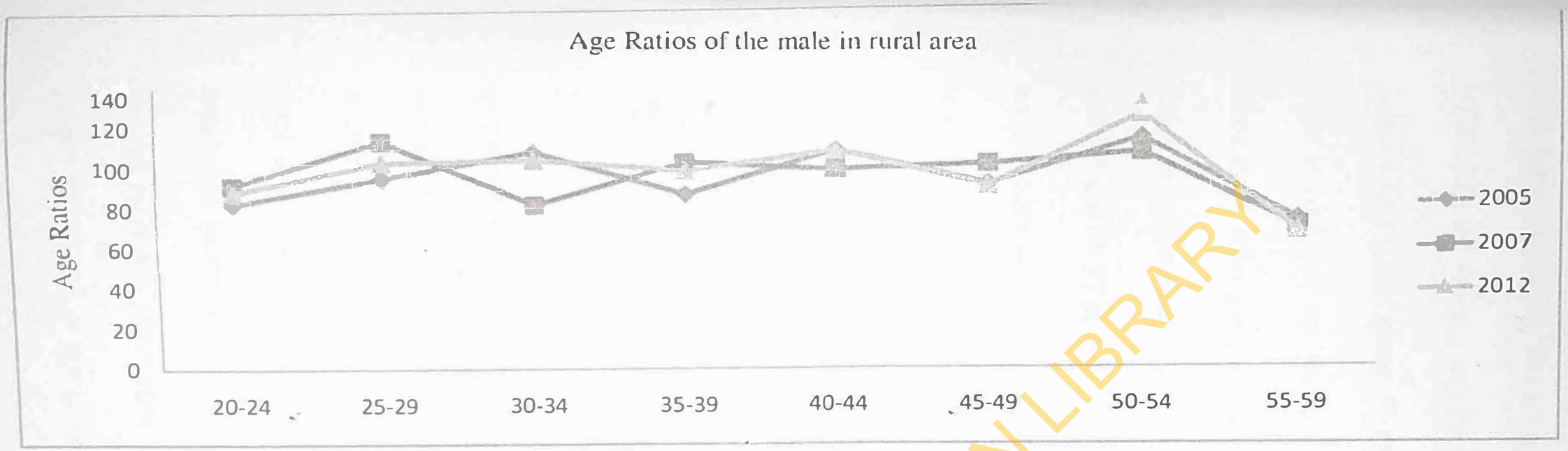


Figure 4.5: Age Ratios of male in the rural areas for the survey periods

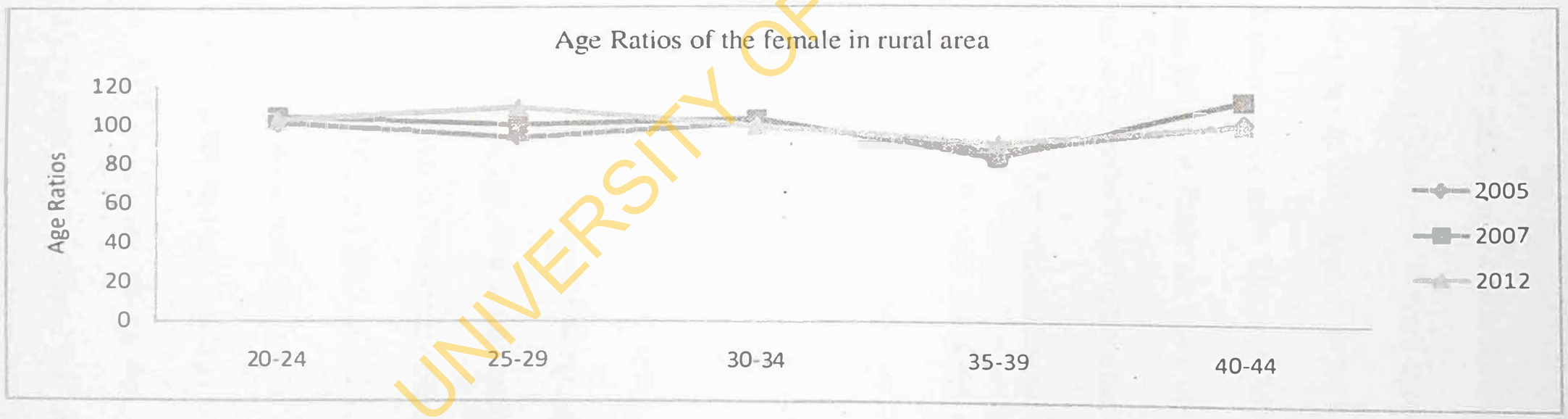


Figure 4.6: Age Ratios of female in the rural areas for the survey periods

4.4.2 Sex Ratio (Age-Specific-Sex ratio) and Age Accuracy Index.

Table 4.18 below shows the age specific sex ratio and the age accuracy index for the three survey periods. Sex ratio at age 15-19 shows excess male over female in 2005 and 2007 while the reverse was the case in 2012 survey. The pattern of sex ratio displayed in Table 4.18 for age group 40-49 years and 45-49 years in 2005, 35-39 years and 40-44 years in 2007 and age group 40-44 years and 45-49 years in 2012 appears to be normal while every other age group deviate from expected range of sex ratio. The Age Accuracy Index was calculated to test the accuracy of age data. From the Table, an index of 42.12 in 2005 and 49.92 in 2012 shows that age data for the two surveys were highly inaccurate unlike index of 37.23 in 2007 survey which shows that the data was inaccurate. The inaccuracy is more critical in male age data since the sum of the absolute deviation of the male age ratio from the 100 is almost twice that for female age ratio in the three surveys.

The age specific sex ratio and the age accuracy index in urban and rural area were presented in Table 4.19 and Table 4.20 respectively. The sex ratio of age group 15-19 years in 2005 and 2007 falls within the range of expected value of sex ratio at birth (101-104). This implies that there was no possibility of sex selective coverage at this age group in the urban area. All the age groups in 2012 survey shows lower sex ratio and this suggest that there was high inaccuracy of age misreporting error in 2012 survey compare to 2005 and 2007 survey in the urban area. The sex ratio of 2005 and 2007 survey in the rural area presented in Table 4.20 almost follow the same pattern with the sex ratio of urban area except in age group 25-29 years where 2005 survey had low sex ratio while the sex ratio was appropriate in 2007 survey. The 2005 survey also shows that the pattern of sex ratio at age groups 30-34 years and 35-39 years appears normal and show

little consistencies as they fall gradually in advance in age unlike in 2007 where there were inconsistencies in reporting age sex data as sex ratio fluctuate across the age groups in rural area. In 2012 survey, the sex ratio at age groups 35-39, 40-44 and 45-49 years also fall gradually but all the sex ratio in 2012 show a deviation from 100 and this may be due to overstatement of ages by the female in the rural area.

Age groups 30-34 years in 2005, 15-19 years in 2007 and age group 35-39 years in 2012 survey had their sex ratio within the appropriate range of sex ratio values which imply that, there were consistencies in reporting age sex data at these age groups in the North Central. From appendix Table A4.31, the high sex ratio at age group 40-45 years in 2005 suggests excess of male over female in the North Central and this may due to misreporting of age among the male in this age group. From appendix Table A4.32, the 2005 survey shows an increasing sex ratio in ascending order from age group 25-29years through age group 45-49years rather than the expected pattern of smoothly decreasing sex ratios with increasing age in the population while 2007 and 2012 survey does not also follow the expected pattern of sex ratio across the age groups, rather it fluctuate. The pattern of sex ratio for 2005 and 2012 survey are similar at age group 35-39 years through age group 45-49 years as it shows over reporting of male or under reporting of female in North East. Sex ratio at age group 15-19 for all the three surveys in North West shows that there were inconsistencies in reporting age sex data as over reporting of female in 2005 almost exist across the age groups. Sex ratio fluctuated from one age group to another in North West which implies that sex ratio in North West does not follow the pattern of smoothly decreasing sex ratio with increasing age in the population. The quality of age data in South East region shows a pattern different from all the

Northern regions. The sex ratio for South East as presented in Table A4.12 shows that there was under reporting of male or excess of female reporting in all the groups for the three surveys except at age group 15-19 in 2007 survey where there was over reporting of male. Excess of female over male as shown by the sex ratio in this region may suggest high female respondents or misreporting of ages by the female in all the age groups. The Southern Zones (South East, South West and South South) almost shows the same pattern of sex ratio. The sex ratios and age accuracy index for the Southern Zones were all presented in appendix Table A4.34 to Table A4.36.

Table 4.18: Age Specific-Sex Ratio and Age Accuracy Index of NARHS 2005 - 2012

Year	2005		2007		2012	
Age group	Sex ratio	Sex ratio differences	Sex ratio	Sex ratio differences	Sex ratio	Sex ratio differences
All ages	**99.06**		**99.53**		**82.90**	
15-19	108.23		107.56		89.28	
20-24	92.50	-15.74	99.54	-8.02	72.34	-16.94
25-29	95.96	3.46	101.07	1.53	72.29	-0.05
30-34	101.16	5.21	85.43	-15.64	84.59	12.29
35-39	104.68	3.52	98.17	12.74	96.31	11.72
40-44	102.77	-1.91	95.24	-2.93	98.21	1.90
45-49	80.158	-22.61	105.53	10.29	77.07	-21.13
Sex ratio Scores		8.74		8.52		10.67
Age sex accuracy index	**42.12**		**37.23**		**49.92**	

Table 4.19: Age Specific-Sex Ratio and Age Accuracy Index for Urban Area(NARHS 2005-2012)

	2005		2007		2012	
Age groups	Sex ratio	Sex ratio differences	Sex ratio	Sex ratio differences	Sex ratio	Sex ratio differences
All Ages	**102.26**		**100.87**		**83.74**	
15-19	104.59		101.47		95.88	
20-24	106.69	2.09	110.19	8.72	81.96	-13.91
25-29	99.64	-7.05	99.70	-10.49	72.04	-9.92
30-34	96.05	-3.58	90.46	-9.26	79.95	7.91
35-39	108.61	12.26	84.76	-5.70	89.41	9.46
40-44	111.63	3.02	104.67	19.90	99.79	10.38
45-49	81.36	-30.27	120.34	15.67	74.03	-25.20
Sex ratio Scores		**9.76**		**11.73**		**9.87**
Age sex Accuracy Index		45.98		47.40		43.50

Table 4.20: Rural Area

	2005		2007		2012	
Age group	Sex ratio	Sex ratio differences	Sex ratio	Sex ratio differences	Sex ratio	Sex ratio differences
All Ages	**97.34**		**98.83**		**82.52**	
15-19	110.08		110.72		86.60	
20-24	84.74	-25.34	94.17	-16.55	68.42	-18.18
25-29	93.80	9.06	101.84	7.66	72.42	4.01
30-34	104.28	10.47	82.67	-19.16	87.04	14.62
35-39	102.54	-1.74	106.55	23.88	99.66	12.62
40-44	98.51	-4.03	90.99	-15.56	97.53	-2.13
45-49	79.62	-18.89	98.85	7.86	78.45	-19.08
Sex ratio Scores		**11.59**		**15.11**		**11.77**
Age sex accuracy index		**51.21**		**62.55**		**52.36**

4.5 Adjustment of Age and Sex Data

Smoothing techniques were used to redistribute the respondents and to derive the smoothed age distribution for the three surveys. These techniques involve applying formulae to the original data to produce new results on the assumption that these would have been the outcome if distortions had not occurred. No attempts were made to change the total figures obtained from the surveys in making the adjustment. There are several method of smoothing techniques but only Carrier Farrag, and Arriaga were used in smoothing age sex data for the three surveys as they did not change the data unlike others smoothing techniques . Both the reported (unadjusted) and the adjusted (smoothed) age distribution for the three surveys by sex were presented in Table 4.31A to Table 4.33B. There were slight differences between all the corrected ages in 2005 and 2007 unlike in 2012 survey where there was great differences between Arriaga techniques of smoothing compared to other methods in adjusting the reported age. The reported and smoothed age distribution using the Carrier Farrag and Arriaga were all presented in Figure 4.7 to Figure 4.12 for both males and females. From the figures, Arriaga techniques show that deviations were more pronounced among the females than males at ages 15 -24 years in all the three surveys and also deviation at age 36-44 years in 2005. There were high deviation at age 15-24 years also among male in 2005 (Arraiga) than in 2007 and 2012 surveys. This implies that, there were more respondents who reported their age at this age groups than it ought to be as the Smoothen techniques especially Arriaga techniques shows lower respondents in these ages groups. However, there were similarities between the reported and smoothed age distributions from age 26 to age 54 among male indicating that the reported age distribution is relatively accurate in 2005. The 2007 and 2012

surveys shows a great difference between the Arraiga (adjusted) and reported frequency among males. However, there were similarities between the Carrier Farrag and the reported age among the males in 2007 and 2012 surveys.

Table 4.21A : Reported and Adjusted age of NARHS 2005 (male)

	Unadjusted	Adjusted	
Age group	Reported Frequency	Carrier Farrag	Arriaga
15-19	1262		713
20-24	900		838
25-29	712	788	774
30-34	609	582	580
35-39	447	474	476
40-44	408	389	388
45-49	303	322	323
50-54	283	278	276
55-59	212		219
60-64	260		
Total	5396	3050	4587

Table 4.22B. Reported and Adjusted age of NARHS 2005 (female)

	Unadjusted	Adjusted	
Age group	Reported Frequency	Carrier Farrag	Arriaga
15-19	1166		677
20-24	973		892
25-29	742	1,166	823
30-34	602	871	564
35-39	427	844	465
40-44	397		775
45-49	378		
Total	4685	1873	4196

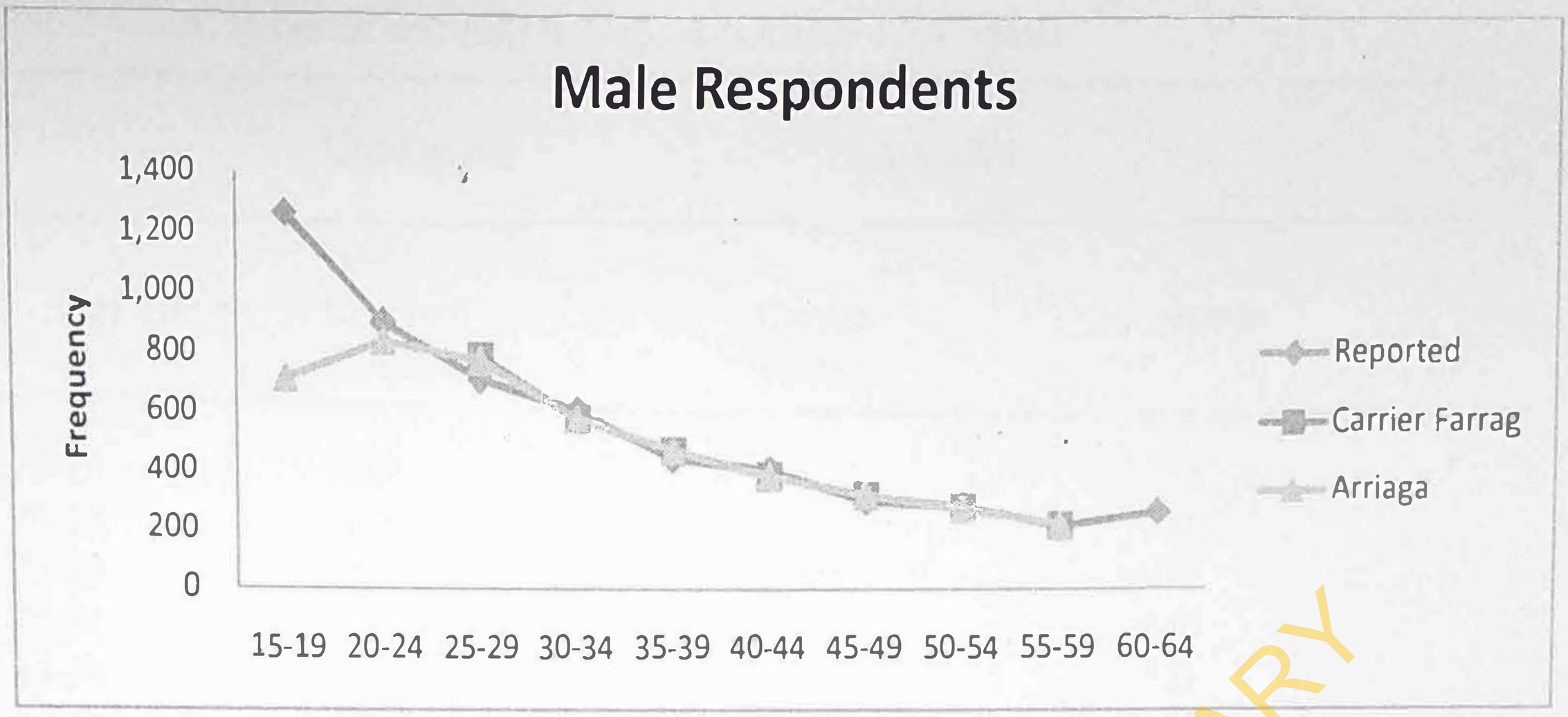


Figure 4.7 Reported and Adjusted Age data for male in 2005

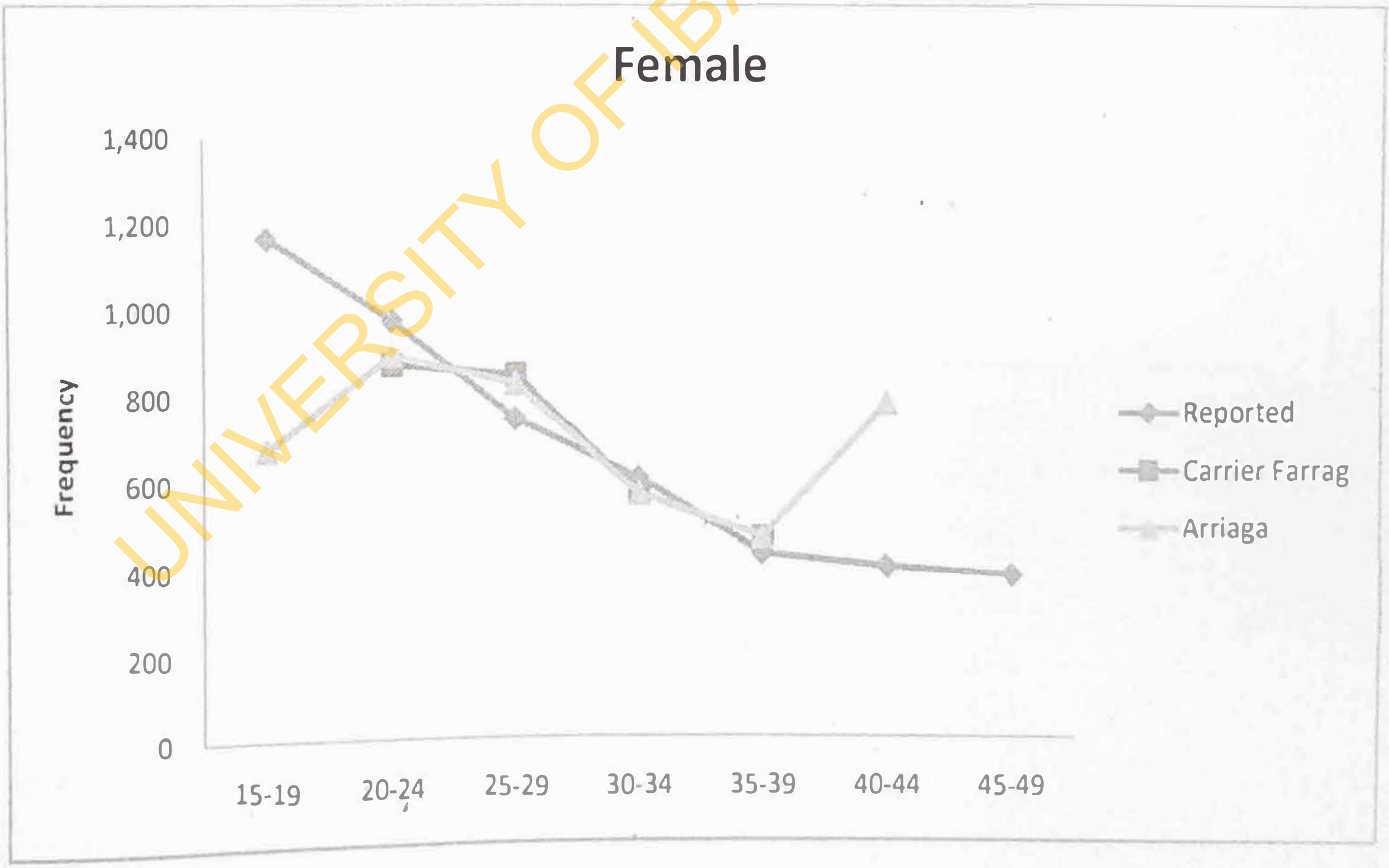


Figure 4.8 Reported and Adjusted Age data for female in 2005

Table 4.22A: Reported and Adjusted age of NARHS 2007 (male)

	Unadjusted	Adjusted	
Age group	Reported Frequency	Carrier Farrag	Arriaga
15-19	1280		755
20-24	1079		1,053
25-29	946	1,001	972
30-34	633	647	646
35-39	536	522	523
40-44	460	472	470
45-49	401	389	391
50-54	315	307	234
55-59	224		278
60-64	287		
Total	6161	3570	5627

Table 4.22B: Reported and Adjusted age of NARHS 2007 (female)

	Unadjusted	Adjusted	
Age group	Reported Frequency	Carrier Farrag	Arriaga
15-19	1190		714
20-24	1084		1,037
25-29	936	1020	984
30-34	741	712	709
35-39	546	575	578
40-44	483		433
45-49	380		
Total	5360	2307	4454

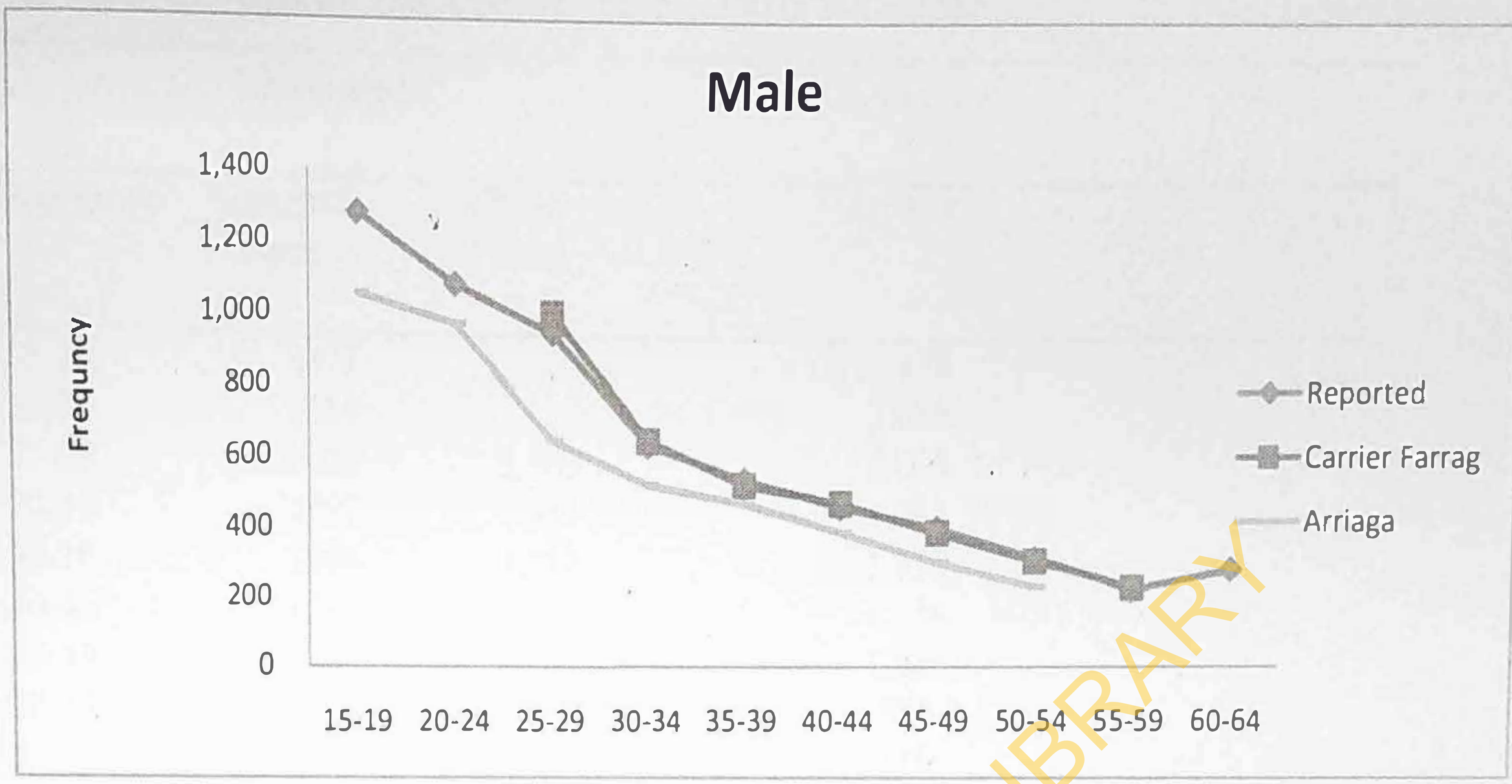


Figure 4.9 Reported and Adjusted Age data for male in 2007

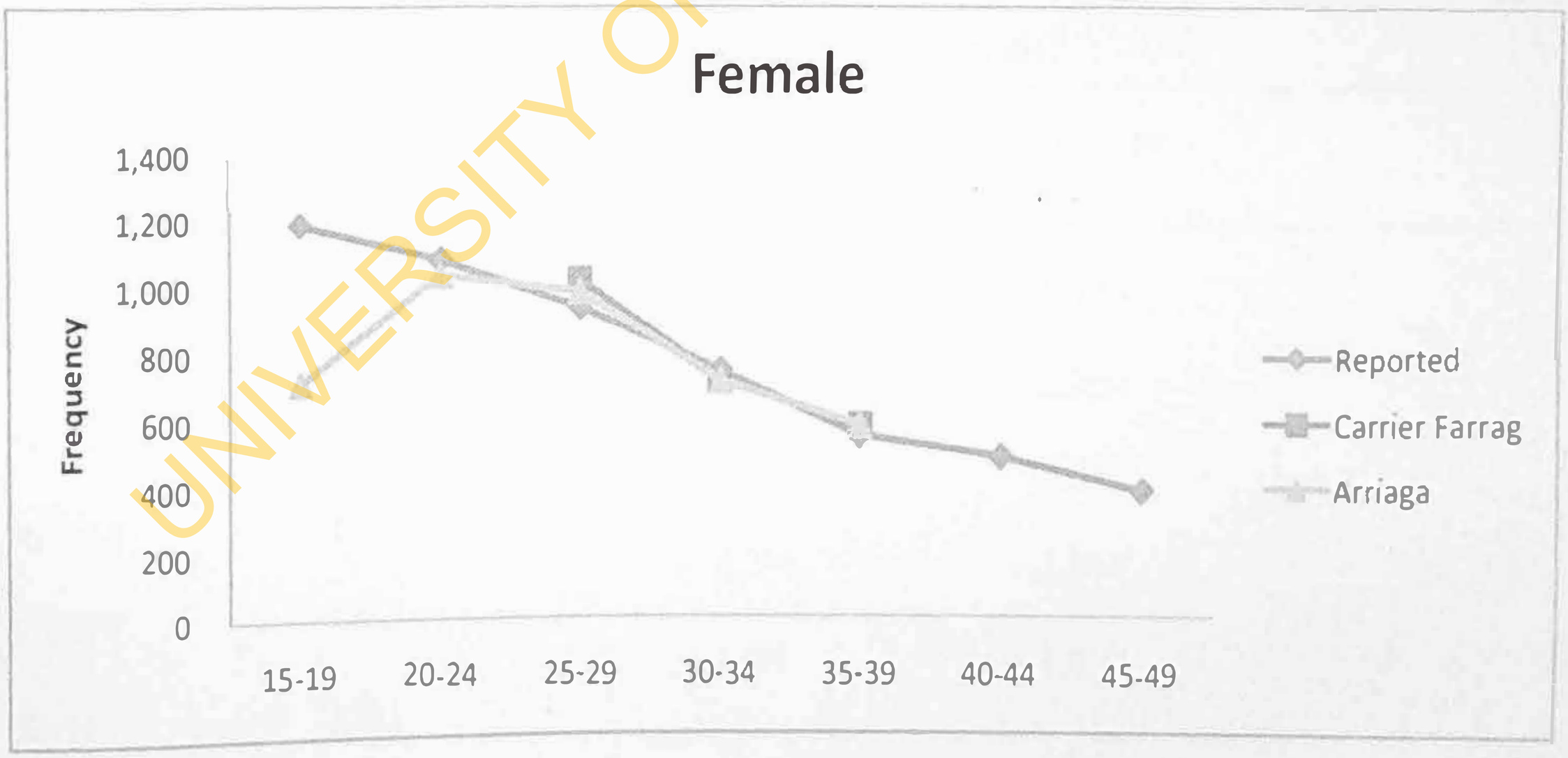


Figure 4.10 Reported and Adjusted Age data for female in 2007

Table 4.23A: Reported and Adjusted age of NARHS 2012 (male)

	Unadjusted		Adjusted
Age group	Reported Frequency	Carrier Farrag	Arriaga
15-19	2473		1,478
20-24	2035		2,035
25-29	2098	2,169	2,098
30-34	1987	1,941	1,944
35-39	1696	1,742	1,739
40-44	1533	1,461	1,456
45-49	1143	1,215	1,220
50-54	1101	1,007	996
55-59	665		770
60-64	865		
Total	15596	10294	13736

Table 4.23B. Reported and Adjusted age of NARHS 2012 (female)

Age group	Reported Frequency	Carrier Farrag	Arriaga
15-19	2770		1,746
20-24	2813		2,869
25-29	2902	2,998	2,846
30-34	2349	2,216	2,211
35-39	1761	1894	1,899
40-44	1561		1,427
45-49	1483		
Total	15639	7108	12998

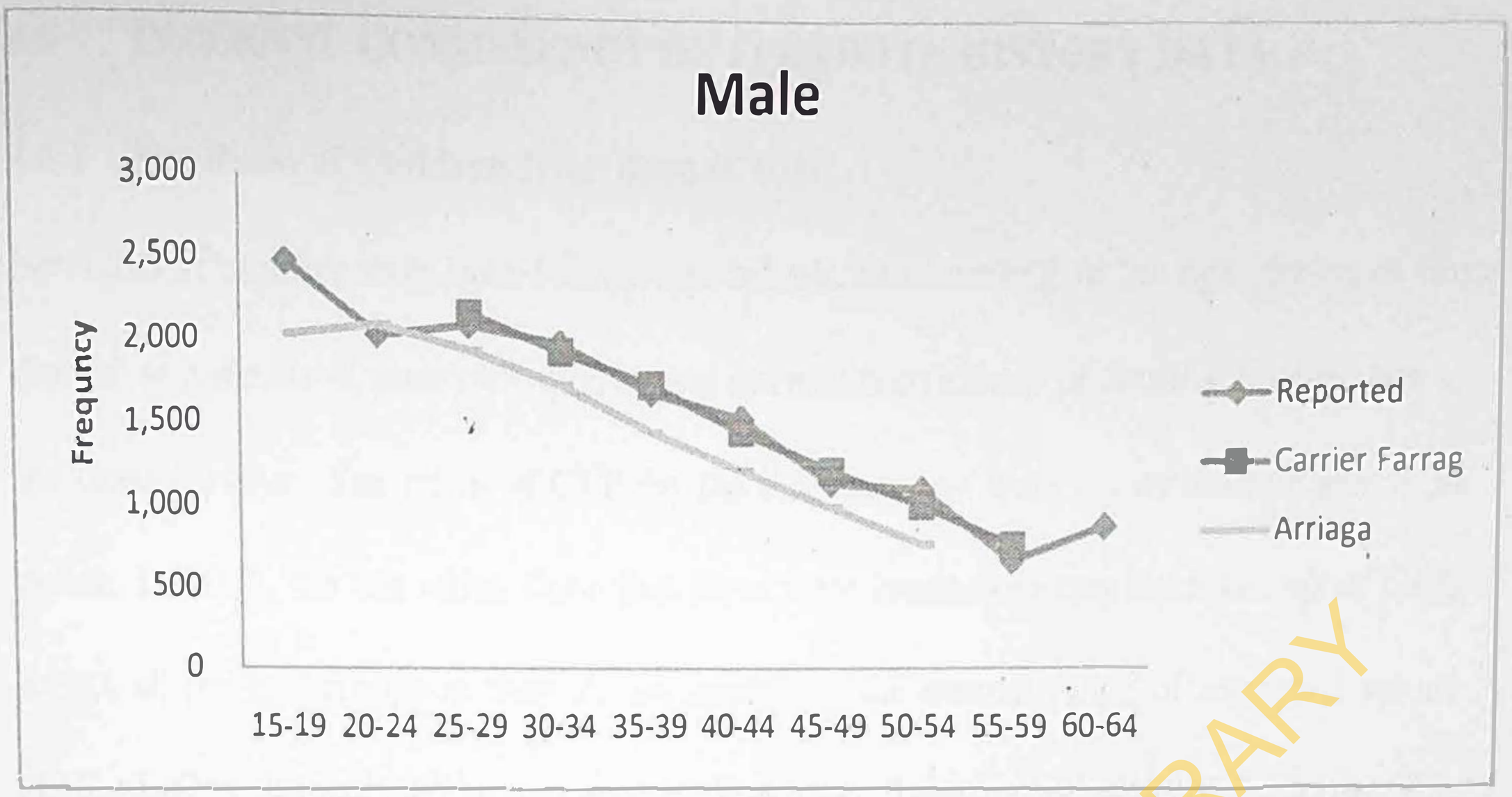


Figure 4.11 Reported and Adjusted Age data for male in 2012

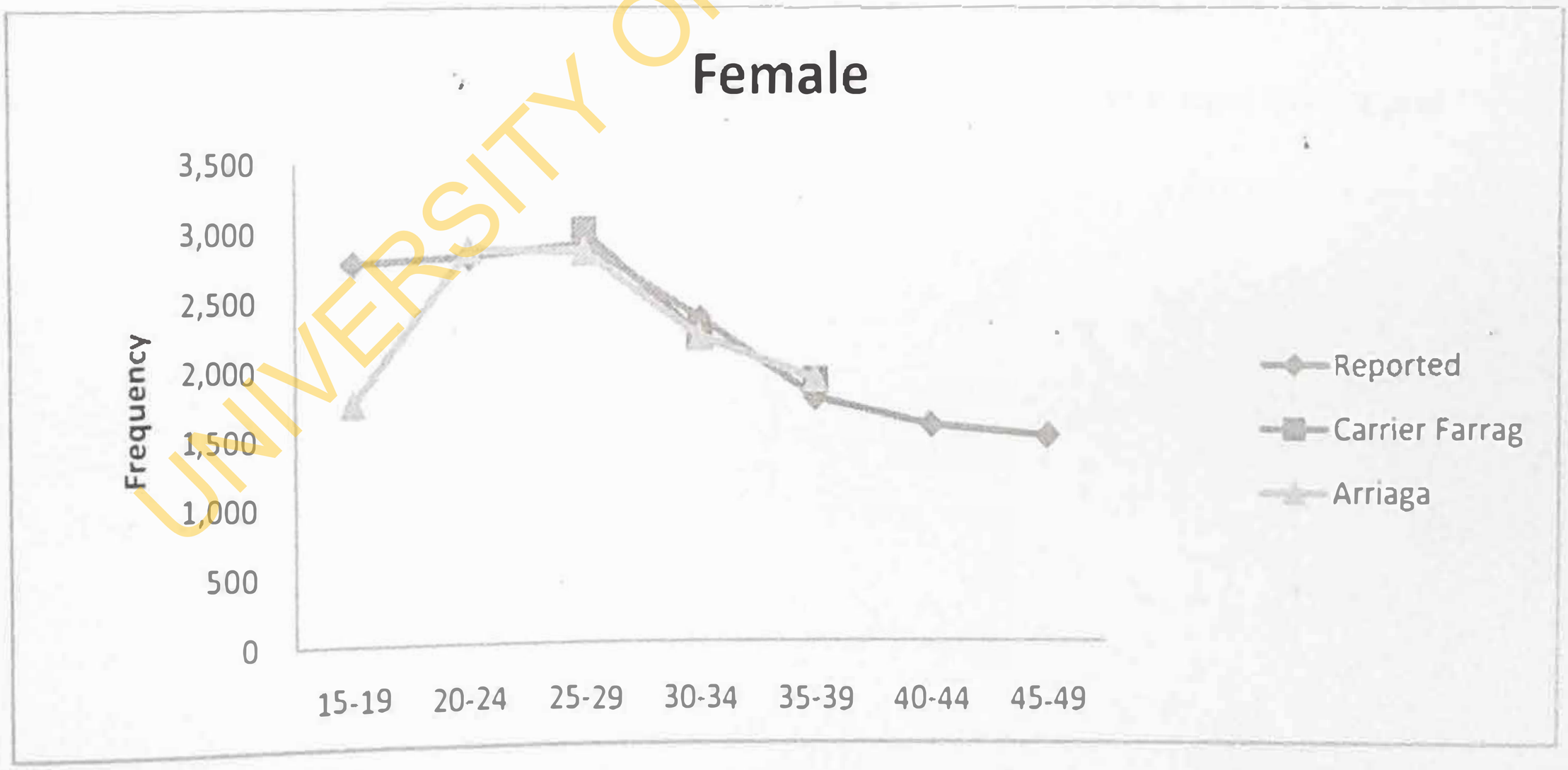


Figure 4.12 Reported and Adjusted Age data for female in 2012

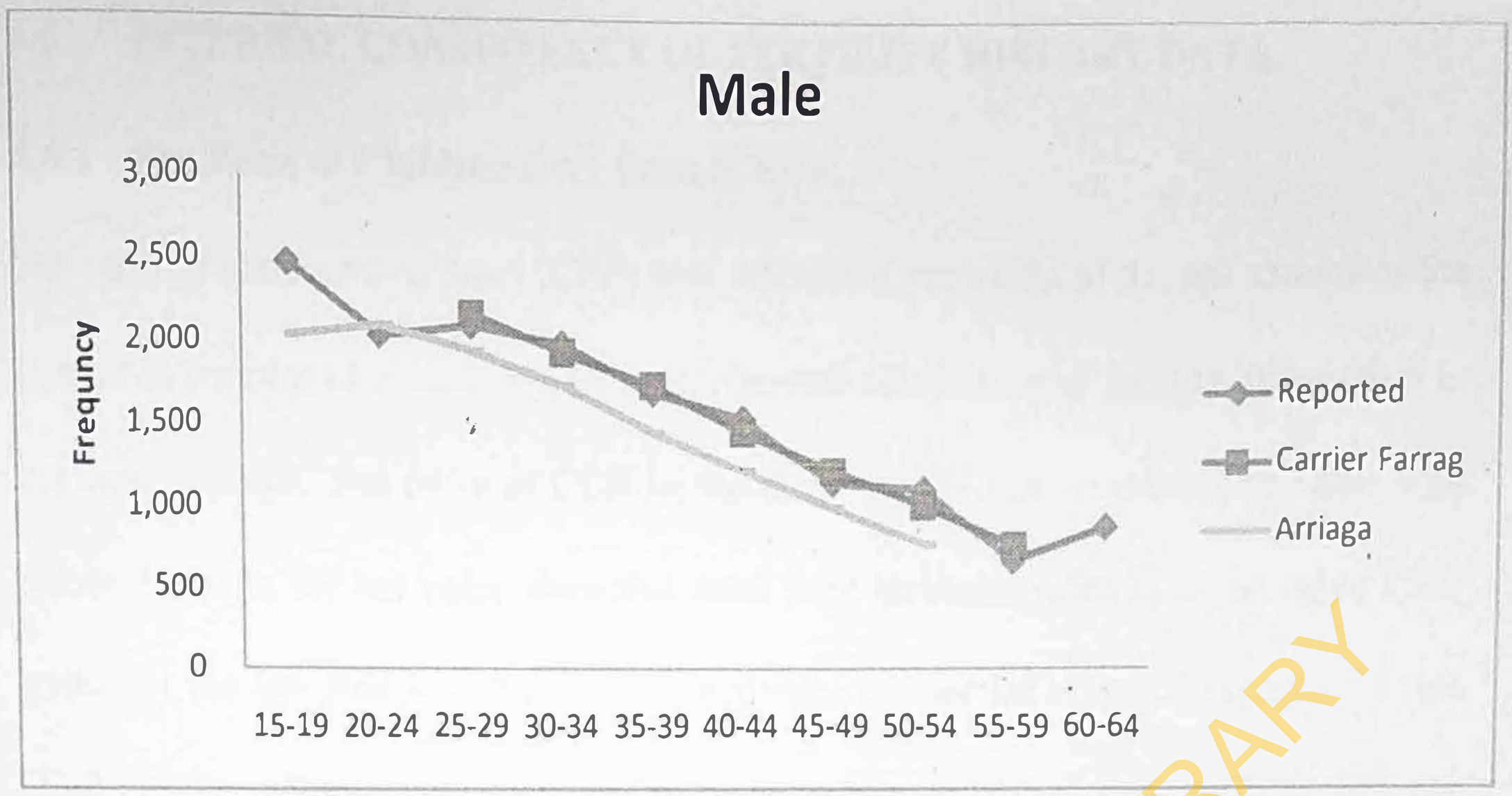


Figure 4.11 Reported and Adjusted Age data for male in 2012

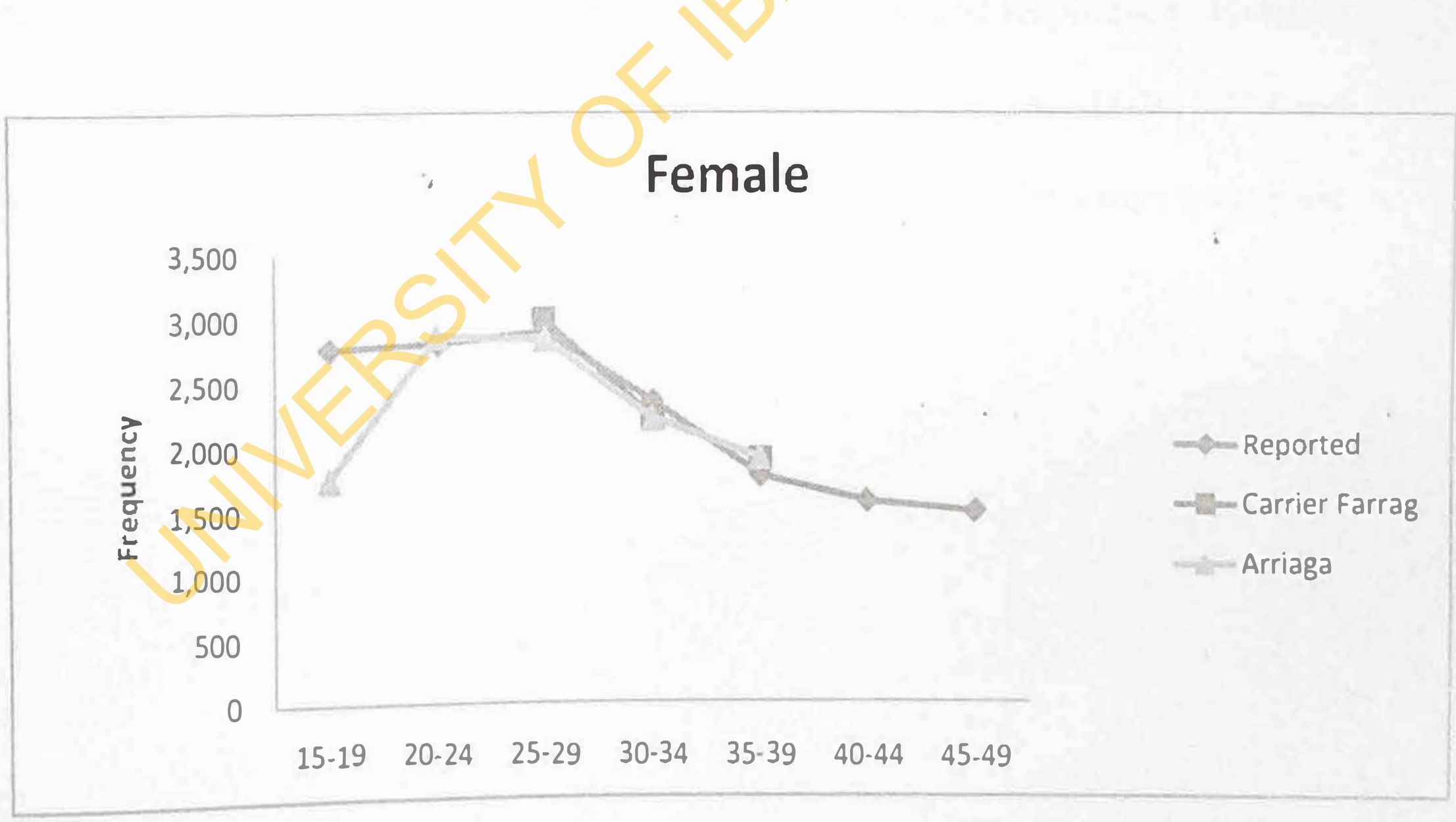


Figure 4.12 Reported and Adjusted Age data for female in 2012

4.6 INTERNAL CONSISTENCY OF FERTILITY HISTORY DATA.

4.6.1 Sex Ratio of Children Ever Born (CEB)

Sex ratio of children ever born (CEB) was calculated according to the age groups of the mother as a means of assess the quality and internal consistency of fertility history data in the three surveys. Sex ratios of CEB for the three surveys were presented in Table 4.24 below. In 2005, the sex ratios show that there were inconsistencies in reporting of CEB across all the age groups as they all deviated from the normal range of expected values (1.02 -1.07). Almost all the age groups show over reporting of male birth except age group 40-44years which shows under reporting female birth. The 2007 survey also shows some inconsistencies in the reporting of CEB as there were over reporting of male birth except in age group 15-19years and 35-39years where there was a slight over reporting of female birth and normal reporting of CEB with sex ratio of 1.02 respectively. However 2012 survey shows a little consistency in reporting of CEB as age group 15-19, 30-34 and 35-39 years all falls within normal range of sex ratio at birth while there were over report of male birth in other age groups.

Table 4.24: Sex Ratio of Children Ever Born for NARHS 2005-2012

	2005			2007			2012		
Age Group	Male CEB	Female CEB	Sex ratio	Male CEB	Female CEB	Sex ratio	Male CEB	Female CEB	Sex ratio
15-19	161	141	1.14	194	208	0.93	333	326	1.02
20-24	672	596	1.13	823	762	1.08	1652	1517	1.09
25-29	1025	939	1.09	1431	1239	1.15	3526	3180	1.10
30-34	1357	1214	1.12	1690	1546	1.09	4211	3926	1.07
35-39	1267	1151	1.10	1447	1420	1.02	3961	3759	1.05
40-44	1291	1305	0.99	1551	1410	1.10	4007	3677	1.09
45-49	1338	1235	1.08	1349	1226	1.10	4211	3867	1.09

Table 4.25A and 4.25B shows the sex ratio of CEB in urban and rural area respectively for the three surveys. The sex ratio of CEB in 2005 shows that over reporting of male birth was slightly high than over reporting of female birth across the age groups in urban area compare to rural area where there were high report of male birth over the female birth across all the ages. Age groups 30-34 years in urban area and age 40 – 49 years in the rural area shows that, there were consistencies in reporting CEB as there were probably no over or under reporting of CEB and the sex ratio also falls within normal range of sex ratio. In 2007 survey, sex ratio in the rural area shows high inconsistencies in the reporting of CEB than in urban area. However, 2012 survey was little more consistent than 2005 and 2007 in reporting of CEB as the sex ratio of CEB from age group 25 – 49 years followed the usual range of sex ratio (1.02 -1.07) in the urban whereas in the rural area, there were over reporting of male birth over female birth across

all the age group except in the age group 15-19 years (1.03) and 35-39years (1.07) in which the sex ratio of CEB were normal.

The sex ratio of CEB according to the age group of the mother for the all the geographical regions for all the survey periods were presented in appendix Table A4.37A to Table A4.37F. The sex ratio of CEB in North Central region shows that there was over reporting of female birth in 2005 survey compare to 2007 and 2012 surveys which had over reporting of male birth. The pattern of inconsistencies in the reporting of CEB in North Central almost followed the same pattern with North East for all the survey periods except in 2005 where over reporting of male was highs. There were not much difference in the consistencies of CEB reported at different regions as over reporting of male birth across the regions were high for all the survey periods.

Table 4.25A: Sex ratio of Children Ever Born for the Urban Area

	2005			2007			2012		
Age Group	Male CEB	Female CEB	Sex ratio	Male CEB	Female CEB	Sex ratio	Male CEB	Female CEB	Sex ratio
15-19	20	27	0.74	33	41	0.80	54	56	0.96
20-24	154	142	1.08	172	177	0.97	333	296	1.13
25-29	291	268	1.08	393	347	1.13	917	856	1.07
30-34	417	400	1.04	495	466	1.06	1209	1134	1.07
35-39	396	359	1.10	497	511	0.97	1099	1075	1.02
40-44	387	404	0.96	437	410	1.07	1086	1069	1.02
45-49	385	345	1.12	395	337	1.17	1169	1097	1.07

Table 4.25B: Sex Ratio of CEB for the Rural

	2005			2007			2012		
Age Group	Male CEB	Female CEB	Sex ratio	Male CEB	Female CEB	Sex ratio	Male CEB	Female CEB	Sex ratio
15-19	141	114	1.24	161	167	0.96	279	270	1.03
20-24	518	454	1.14	651	585	1.11	1319	1221	1.08
25-29	734	671	1.09	1038	892	1.16	2609	2324	1.12
30-34	940	814	1.15	1196	1088	1.10	3002	2792	1.08
35-39	871	792	1.10	950	917	1.04	2862	2684	1.07
40-44	904	901	1.00	1115	1013	1.10	2921	2608	1.12
45-49	953	890	1.07	954	889	1.07	3042	2770	1.10

4.6.2 Sex Ratio of Children Surviving (CS)

Another measure used in checking the consistency of fertility history data was the sex ratio of children surviving (CS) calculated for all the survey periods and were presented in Table 4.26 below. The sex ratio of CS shows that there was over reporting of male CS across the age groups in 2005 and 2007 survey except in some few age groups where there was over reporting of female CS and the age groups include: 40-44years in 2005, 15-19 and 35-39years in 2007. However, some age groups shows consistencies in reporting CEB as there were no misreporting of CS and their sex ratio of CS falls within the usual range of 1.02 -1.07. The age groups includes 15-19 years in 2005, 20-24, 30-34, 40 – 49 years in 2007, age 15 - 24 years and 30 – 49 years in 2012.

Table 4.26: Sex ratio of Children Surviving for NARHS 2005 -2012

	2005			2007			2012		
Age Group	Male CS	Female CS	Sex ratio	Male CS	Female CS	Sex ratio	Male CS	Female CS	Sex ratio
15-19	123	119	1.03	159	171	0.93	301	300	1.00
20-24	540	502	1.08	664	646	1.03	1473	1379	1.07
25-29	832	780	1.07	1162	1038	1.12	3141	2890	1.09
30-34	1099	1005	1.09	1327	1286	1.03	3652	3488	1.05
35-39	1004	913	1.10	1176	1189	0.99	3452	3358	1.03
40-44	1028	1046	0.98	1221	1182	1.03	3411	3202	1.07
45-49	1017	987	1.03	1051	993	1.06	3470	3265	1.06

Table 4.27A and 4.27B below shows the sex ratio of CS for the urban and rural areas respectively. The sex ratio of CS in 2005 survey shows some extent of inconsistencies in the reporting of CS as there was slight under reporting of male surviving in age groups 20-24years and 40-44years while there was high under reporting of male surviving in the age group 15-19years in the urban area. In 2007 survey, the sex ratio of CS shows a high under reporting of male surviving across the age groups expect in age group 45-49years where the sex ratio of 1.14 indicate over reporting of male and age group 25 - 34 shows a little consistency in reporting CS in urban area. 2012 survey shows an improvement in the reporting of CS as the sex ratio of CS falls within the usual range of sex ratio across the age groups except in age group 15-19 and 20-24 in the urban area. However in 2005, sex ratio of CS in rural area shows a high over reporting of male unlike in urban area except in age group 25-29 and 35-39years where there were consistencies in the reporting

of CS. 2007 surveys also shows slight consistency at age group 20-24, 30-34 and 40-44 in the rural area.

Appendix Table A4.38A to Table A4.38F shows the sex ratios of children surviving according to the age group of the mother by geographical region for all the three surveys. In 2005, the sex ratio of CS in North Central was slightly below 1 except in age groups 20-24 and 25-29years where the sex ratio of CS was slightly above 1. The sex ratio of CS in North East almost followed the same pattern with that of North Central except that there was high over reporting of male surviving in age groups 15-19years in 2005 and 2007 and also in age groups 20-29years in 2012. However, South East show a difference pattern in the reporting of male surviving as the sex ratio of CS in 2005 were all above 1 especially in age group 15-19 where the sex of CS was 2. This shows that, there was great over reporting of male children surviving over female in the South East in 2005. Table A4.16E and A4.16F show that there was over reporting of male as the sex ratio of CS were above 1 in 2005 except age group 15-19 in South South and age group 40-44 in South West. Likewise 2007 and 2012 surveys followed the same pattern of reporting CS as the sex ratio of CS for both regions varies across all the age groups.

Table 4.27A: **Sex Ratio of Children Surviving for Urban Area**

	2005			2007			2012		
Age Group	Male CS	Female CS	Sex ratio	Male CS	Female CS	Sex ratio	Male CS	Female CS	Sex ratio
15-19	18	25	0.72	29	36	0.81	50	53	0.94
20-24	122	129	0.95	143	151	0.95	301	275	1.09
25-29	249	237	1.05	335	322	1.04	840	796	1.06
30-34	36	346	1.04	411	408	1.01	1096	1045	1.05
35-39	350	307	1.14	435	453	0.96	1005	990	1.02
40-44	322	345	0.93	364	375	0.97	978	972	1.01
45-49	313	281	1.11	316	277	1.14	1006	992	1.01

Table 4.27B: Sex ratio of Children Surviving for the Rural Area

	2005			2007			2012		
Age Group	Male CS	Female CS	Sex ratio	Male CS	Female CS	Sex ratio	Male CS	Female CS	Sex ratio
15-19	105	94	1.12	130	135	0.96	251	247	1.02
20-24	418	373	1.12	521	495	1.05	1172	1104	1.06
25-29	583	543	1.07	827	716	1.16	2301	2094	1.10
30-34	739	659	1.12	917	886	1.03	2556	2443	1.05
35-39	654	606	1.08	741	744	1.00	2447	2368	1.03
40-44	706	701	1.01	858	815	1.05	2433	2230	1.09
45-49	704	706	1.00	735	716	1.03	2464	2273	1.08

4.6.3 Sex Ratio of Children Dead

The sex ratio of children dead according to age group of the mother for the three survey periods were presented in Table 4.28 below. The pattern showed a steady decline in sex ratio of CD in 2005 survey as age group increase except at age group 45-49 (1.29) which was higher than age group 40-44 (1.02). The pattern of Sex ratio of CD in 2007 and 2012 surveys showed inconsistencies in reporting CD as there were fluctuations across all the age groups instead of stead declining of sex ratio of CD due to the fact that, male mortality is always higher than female.

Table 4.28: Sex Ratio of Children Dead for NARHS 2005-2012

	2005			2007			2012		
Age Group	Male CD	Female CD	Sex ratio	Male CD	Female CD	Sex ratio	Male CD	Female CD	Sex ratio
15-19	38	22	1.73	35	37	0.95	32	26	1.23
20-24	132	94	1.40	159	116	1.37	179	138	1.30
25-29	193	159	1.21	269	201	1.34	385	290	1.33
30-34	258	209	1.23	362	260	1.39	559	438	1.28
35-39	263	238	1.11	271	231	1.17	509	401	1.27
40-44	263	259	1.02	327	233	1.40	596	475	1.25
45-49	321	248	1.29	298	233	1.28	741	602	1.23

Sex ratios of CD for urban and rural area were presented in Table 4.27A and 4.27B below. The sex ratio of CD at age group 20-24 in 2005, 25-29 and 40-44 in 2007 shows high frequencies of male CD over the female CD in the urban area as the sex ratio was similar. The sex ratio of CD shows great inconsistencies in the urban area as almost all the sex ratio of CD does not follow the usual pattern of declining in sex ratio of CD except at age group 25-39 years in 2005 and age group 25-44 years in 2012. However, the sex ratio of CD for the three survey periods in the rural area also followed the same pattern of over reporting of male CD over the female CD except in age group 40-44 in 2005 and age group 15-19 in 2007 where there were under reporting of male dead in the rural area.

There was not much difference in the pattern of CD reported across the geographical regions. In 2005, North Central shows great inconsistencies in the reporting of male CD especially in age groups 15-19 and 20-24 in which the sex ratio of CD was extremely high. There were over reporting of male CD over the female CD in 2007 and 2012. The sex ratio of CD in North East show a little consistencies in age groups 30-34 and 35-39 in 2005 unlike in North Central where there was extremely high over reporting of male across the age groups. However in the Southern regions, sex ratio of some age groups cannot be obtained due to the fact that, the number of male or female dead were not reported by their mothers especially in South East in 2005. The sex ratios of CD for the geographical regions were presented in appendix Table 4.39A to Table 4.39F.

Table 4.29A: Sex Ratio of Children Dead for the Urban Area

	2005			2007			2012		
Age Group	Male CD	Female CD	Sex ratio	Male CD	Female CD	Sex ratio	Male CD	Female CD	Sex ratio
15-19	2	2	1	4	5	0.80	4	3	1.33
20-24	32	13	2.46	29	26	1.12	32	21	1.52
25-29	42	31	1.35	58	25	2.32	77	60	1.28
30-34	57	54	1.06	84	58	1.45	113	89	1.27
35-39	46	52	0.88	62	58	1.07	94	85	1.11
40-44	65	59	1.10	73	35	2.09	108	97	1.11
45-49	72	64	1.13	79	60	1.31	163	105	1.55

Table 4.29B: Sex Ratio of Children Dead for the Rural Area

	2005			2007			2012		
Age Group	Male CD	Female CD	Sex ratio	Male CD	Female CD	Sex ratio	Male CD	Female CD	Sex ratio
15-19	36	20	1.8	31	32	0.97	28	23	1.22
20-24	100	81	1.23	130	90	1.44	147	117	1.26
25-29	151	128	1.17	211	176	1.20	308	230	1.34
30-34	201	155	1.30	279	202	1.38	446	349	1.28
35-39	217	186	1.17	209	173	1.20	415	316	1.31
40-44	198	200	0.99	257	198	1.30	488	378	1.29
45-49	249	184	1.35	219	173	1.27	578	497	1.16

4.6.4 Mean of Children Ever Born (CEB)

The mean of children Ever Born (CEB) were displayed in Table 4.28 below for all the three surveys. The mean CEB for the three survey periods follow the same pattern as the average number of CEB per woman increase with increasing in age of the mother across all the age groups. However, 2005 survey had the highest average number of CEB at age 45-49years. Average number of CEB at age group 15-19years to age group 25-29 years in 2012 were high compare to 2005 and 2007 surveys. Age groups 35-39years to 45-49 years in 2005 had the highest average number of CEB per woman. Both urban and rural area almost followed the same pattern of average number of CEB per women across all the age groups for the three survey periods.

Table 4.30: Mean of Children Ever Born

	2005			2007			2012		
Age group	No of Women	CEB	Mean of CEB	No of Women	CEB	Mean of CEB	No of Women	CEB	Mean of CEB
15-19	2232	302	0.13	2380	402	0.17	5540	659	0.19
20-24	1946	1268	0.65	2168	1585	0.73	5626	3169	0.56
25-29	1484	1964	1.32	1872	2670	1.43	5804	6706	1.56
30-34	1204	2571	2.14	1482	3245	2.19	4698	8137	1.73
35-39	854	2418	2.83	1092	2875	2.63	3522	7720	2.19
40-44	794	2596	3.27	966	2975	3.08	3122	7684	2.46
45-49	756	2573	3.40	760	2575	3.39	2966	8078	2.72

Table 4.31A: Mean of Children Ever Born for the Urban Area

	2005			2007			2012		
Age group	No of Women	CEB	Mean of CEB	No of Women	CEB	Mean of CEB	No of Women	CEB	Mean of CEB
15-19	784	47	0.06	814	74	0.09	1600	110	0.07
0-24	688	296	0.43	726	349	0.48	1630	629	0.39
25-29	548	559	1.02	674	740	1.10	1960	1773	0.90
30-34	456	817	1.79	524	961	1.83	1626	2343	1.44
35-39	302	755	2.50	420	1008	2.4	1152	2174	1.89
40-44	258	791	3.07	300	847	2.82	934	2155	2.31
45-49	236	730	3.09	236	732	3.10	924	2266	2.45

Table 4.31B: Rural Area

	2005			2007			2012		
Age group	No of Women	CEB	Mean of CEB	No of Women	CEB	Mean of CEB	No of Women	CEB	Mean of CEB
15-19	1548	255	0.16	1566	328	0.21	3940	549	0.14
20-24	1258	972	0.77	1442	1236	0.86	3996	2540	0.64
25-29	936	4105	1.50	1198	1930	1.61	3844	4933	1.28
30-34	748	1754	2.34	958	2284	2.38	3072	5794	1.89
35-39	552	1663	3.01	672	1867	2.78	2370	5546	2.34
40-44	536	1805	3.37	666	2128	3.20	2188	5529	2.53
45-49	520	1843	3.54	524	1843	3.52	2042	5812	2.85

4.6.5 Proportion of Children Dead (CD)

Proportion of children dead (CD) according to the age group of mother for the three surveys were presented in Table 4.30 below. The proportion of CD among female across the age groups shows inconsistencies in all the three survey periods as the proportion of CD increases with age groups except at age group 40-44years in 2005 where the proportion decreases. The male proportion of CD is almost similar to that of female CD except in 2005 and 2007 where the proportions of CD (male) fluctuate across the age groups. From the Table, it also show that the male proportion of CD for 2005 shows a little consistencies in between age groups 15-19years and 25-29 years as the proportion of CD decreases across these age groups before it rose again in age group 30-34 to 45-49.

Table 4.32 Proportion of Children Dead by Sex According to the Age Group of the Mother for NARHS (2005-2012)

Age group	2005		2007		2012	
	Male	Female	Male	Female	Male	Female
15-19	0.2360	0.1560	0.1804	0.1779	0.0961	0.0798
20-24	0.1964	0.1577	0.1932	0.1522	0.1084	0.0901
25-29	0.1883	0.1693	0.1880	0.1622	0.1092	0.0912
30-34	0.1901	0.1722	0.2148	0.1682	0.1327	0.1116
35-39	0.2076	0.2068	0.1873	0.1627	0.1285	0.1067
40-44	0.2037	0.1985	0.2128	0.1617	0.1487	0.1292
45-49	0.2399	0.2008	0.2209	0.1900	0.1760	0.1557

Appendix Table A4.41A and A4.41B shows the proportion of children dead by sex according to age groups of the mother in urban and rural area. The Tables shows that, there were inconsistencies in the proportion of female CD in both urban and rural area for the surveys as the proportion of female CD increases across the age groups except in age groups 25-29years through age group 35-39years in the rural area where the proportion of female CD decreases across the age groups before it rose again in age group 40-44years and decrease again at age group 45-49years in 2007. However 2005 survey in the urban area shows a little consistency among the male as the proportion of CD decreases from age group 20-24 to 30-34years. The pattern of inconsistencies among male for the survey periods were almost the same in both the urban and rural areas as the proportion of CD (male) fluctuate across the age groups for all the survey periods.

The proportions of CD for the geographical regions were displayed in appendix Table 4.42A to Table 4.42F. There were no much differences in the proportion of CD for both male and female as the proportion of CD varies across the age groups for all the survey periods except in 2007 where the proportion of female CD increases across the age groups rather than decreasing across the age groups.

4.7 Comparison of Age Distribution in NARHS (2005, 2007 and 2012) with Stable Population

Age distribution of NARHS 2005, 2007 and 2012 in Table 4.21 shows that higher proportions of the respondents were within age group 15-19 years for all the survey periods. Out of 10081 respondents in 2005, 24.1% of the respondents were within age group 15-19 years, while the 55-59 age group was the least represented (2.1%). The other two surveys show a similar pattern of frequency distribution among the age groups. The percentage age distributions in 2005 and 2007 survey almost followed the same pattern and the age distribution decreases as the age increases except at age group 60-64 years where the age distribution rose again for both surveys. This implies that the population was made up of younger people than the older people. There were slight fluctuations in the percentage age distribution at age groups 15-19 years (16.8%), 20-24years (15.5%) and age group 20-29years (16.0%) in the 2012 survey.

However, the stable population at mortality level 30 of the North model also shows that Nigeria is made up of young population. The stable population shows that 17.0% of the populations were within age group 15-19 years, age group 20-24years consists of 14.9% while 4.8% of the population were within age group 60-64 years.

Table 4.33 Age Distribution of NARHS 2005-2012 and Stable Population at mortality level 13

	NARHS						Stable Population	
	2005		2007		2012			
Age group	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
15-19	2428	24.1	2470	21.4	5243	16.8	317602	17.0
20-24	1873	18.6	2163	18.8	4848	15.5	278600	14.9
25-29	1211	14.4	1882	16.3	5000	16.0	244316	13.1
30-34	1454	12.0	1374	11.9	4336	13.9	214303	11.5
35-39	874	8.7	1082	9.4	3457	11.1	187775	10.0
40-44	805	8.0	943	8.2	3094	9.9	164166	8.8
45-49	681	6.8	781	6.8	2626	8.4	142985	7.7
50-54	283	2.8	315	2.7	1101	3.5	123725	6.6
55-59	212	2.1	224	1.9	665	2.1	106017	5.6
60-64	260	2.6	287	2.5	865	2.8	89517	4.8
Total	**10081**		**11521**		**31235**		**1869006**	

CHAPTER FIVE

5.0 DISCUSSION

This study was set to assess the quality of demographic and fertility history data collected in the National AIDS and Reproductive Health survey from 2005-2012. This study shows that the quality of demographic and fertility history data varied across age groups for the three surveys. The result also shows some level of irregularities in reporting demographic and fertility history data.

5.1 Quality of Demographic Data.

5.1.1 Accuracy of Age Data.

Both Myer's Index and Whipple's Index show the degree and magnitude of digit preference in a single year age –sex data for the three survey periods. This study showed that the pattern of digit preferences and avoidance were almost the same for all the three surveys. Preference for ages ending with digit 0 and 5 were very high for age at first sex and age at first marriage in all the three surveys. This study also revealed a similar pattern of digit avoidance for digits 1-4 for age at first marriage, age at first birth and age of first sexual intercourse while terminal digit 6, 3 and 1 were the avoided terminal digit for age at last birthday in all the three surveys. This may arise when the respondents tend to round their date of birth or age related variables to the nearest number. A study by Bhandary et al (2011) in a Nepal community also showed that age preferences at terminal digits 0 and 5 are quite common in any census or survey. In addition, Thomas (2005) stated a natural tendency to have these digits('0' and '5') as being confident of one's true age in many setting as the reason for pronouncing age that end with final digit 0 or 5.

The pattern of digit preference among males and females indicates that males prefer age ending with digit 0 while preferences for digit 5 were high among the females in all the surveys. When the results were disaggregated by location, preferences for both digits 0 and 5 were high among males in the urban area while the reverse was the case in rural areas. In a similar study, Aida et al (2012) opined that the preference for these digits may be attributed to a greater tendency to overestimate age by males and underestimate age by females respectively. The preferences and avoidance of certain digits across location and region might be a reflection of the level of importance attached to age in different settings and culture. Illiteracy might also have contributed to misreporting of age.

Age misreporting has also been linked to the level of illiteracy among different settings and culture. For example, Johanna (2014) found out that substantial sex differences in the degree of age heaping could be caused by sex differences in literacy rates or education. Also, a study by Tukur (2013) linked the quality of WI to the level of literacy of the respondent or individual in declaring their age and that Nigerian censuses have documented lower literacy levels among the females compared to males. The Northern part of the country exhibited great age heaping at ages ending with 0 but there was little improvement at age ending with 5 as the quality of age data was rough.

5.2 Consistency Age and Sex Distribution:

5.2.1 Sex Ratio (Age Specific Sex Ratio)

The sex ratio revealed that, there were about 82.90 males for every 100 females in 2012 survey compared to 99.06 in 2005 and 99.53 in 2007. This means that there was higher reporting of females than males in all the survey periods as there was a slight difference between the 2005 and 2007 sex ratios before it fell in 2012. Examination of the age specific sex ratio from 2005 to 2012 revealed that only few age groups show consistency in reporting age-sex data in the three surveys while others deviated from expected range of sex ratio. The age-specific sex ratio also fluctuated across the age groups. Gaisie (2005) argued that sex ratios are not expected to fluctuate from one period to another unless there have been major shifts in the dynamics of population change. Likewise, age-specific sex ratio was expected to fall gradually in advanced ages as sex ratio is influenced by mortality differences between the sexes at various age groups. This was not the case in the three surveys as the sex ratio fluctuate across all the age groups. In 2012 survey, the lower sex ratio in all the age groups might have arisen as a result of under-enumeration or inadequate sampling size. Another possible explanation is that males were not around during the survey period. There might also be possibility of sex selective coverage in the urban areas as there were more of females than males across all the age groups. The pattern of inconsistencies were similar across all geographical regions of the country.

The age ratio revealed that inconsistency in age misreporting was common to all the survey periods. Inconsistencies in reporting age was common and higher in advanced age groups for both sexes. This suggest that age misreporting occurred more often at older

ages. The reason might be associated with the inability of older people to recall their age. Only age group 30-34 in 2007 among females shows consistency in reporting age data. However, in 2012, the same age group showed a little consistency in reporting age data among the females. Also, the age ratios of more than 100 for the age 25-29 in 2007 and 2012 suggest tendency of females to misreport their ages as childbearing ages. However, inconsistency in age reporting was also high among males in both urban and rural areas. This was contrary to findings in a study by Martin (1995) who found out that urban areas tend to report correct ages data better than the rural area as residents of urban areas were regarded as relatively better educated, well informed and more knowledgeable than their rural counterparts.

This study also revealed that there was no much difference in age reporting across the geographical regions but under-representation of age was higher among males as compared to females in 2005 survey. Martin (1995) reported in his study that the Northern region of Malawi was less distorted than other regions due to an higher level of literacy in the region as they understood the western concept of age together with social stigma attached to it. This is contrary to the result gotten from NARHS data as there were no much difference in the reporting of age between the Northern regions and Southern regions despite the higher level of literacy in the Southern region of the country.

Age accuracy index revealed that the age data was highly inaccurate in the 2005, 2007 and 2012 surveys. The inaccuracy is more in males as the sum of the absolute deviation of the males age ratio is almost twice that for females in the three surveys. When the age accuracy index was calculated by location and geographical region, it revealed that there

were no differences in reporting of age data in both the urban and rural area as the age data were all highly inaccurate. This is also applicable to the geographical regions.

5.3 Internal Consistency of Fertility History Data

5.3.1 Sex Ratio of CEB

This study revealed that, there were inconsistencies in reporting children ever born as most of the sex ratio of CEB deviated from the expected range of sex ratio (1.02-1.07) and there were more males CEB than females CEB. This was clearly shown in the 2007 survey as only age group 35-39 years falls within the expected range of sex ratio while others show over-reporting of male CEB. The 2012 survey showed a little consistency of reporting CEB when compared to 2005 and 2007 surveys, as most of the age groups fall within normal range of sex ratio. When the result of CEB was disaggregated by location and geographical regions, consistency of CEB were more pronounced in the urban areas than rural area in 2012 surveys as almost all the age group were within the normal range of sex ratio. Rural areas tended to attach more importance to male children especially in 2005 and 2007 where there was over reporting of males CEB.

Internal consistency of fertility history data was also tested by calculating the sex ratio of children surviving, children dead and means number of children ever born by ages and sex for all the three surveys. There were little consistency in reporting children surviving in all the three surveys but 2012 survey showed more consistency in reporting children surviving. However, over reporting of males surviving is common to the three surveys. More male children surviving is likely to be as a result of over-reporting of male children

ever born over their female counterpart in all the survey periods. Although the sex ratio of children surviving were almost the same by location (rural and urban), the 2005 survey shows greater inconsistency among the three surveys. The extent of inconsistency in fertility history can be linked to misreporting of fertility history data among the childbearing women. Nyarko (2005) observed a similar pattern of inconsistency (age heaping) of births for a census data and suggested that this pattern of heaping of births could either inflate or deflate the estimate of fertility levels of a study population depending on the direction and degree of heaping.

5.5.1 Conclusions

This study had shown that although NARHS had being conducted as far back as 2003 in Nigeria across all the geographical regions and in both rural and urban area, age misreporting continues to be a problem.

The assessment of the quality of demographic and fertility history data from NARHS survey revealed some inconsistencies in the reporting of ages, sexes and number of children ever born. These inconsistencies include the preference for ages that end with 0 and 5 and also avoidance of some terminal digits especially digit 6, 3 and 1. Age reporting errors were more severe in 2012 than in 2005 and 2007 but there was slight improvement in reporting of age sex data in 2007 than the other two surveys. The Whipple's Index also confirmed that the quality of reported age-sex data was very poor and there was high heaping of age at terminal digits "0" and "5" in all the surveys. Age Accuracy index shows that age sex data was highly inaccurate in all the three surveys.

Severe surplus of females over males especially in 2005 and 2012 as revealed by sex ratio also contributed to high inaccuracy of age- sex data in the surveys. Internal consistency of fertility history was low as the study showed that the sex ratio of CEB, CS and CD deviated from the normal expected range especially in 2005 and 2007 survey.

Recommendation

Problems related to age misreporting and fertility history data can be alleviated by adequate training of enumerators on other measures used in evaluating age related data and fertility history data such as historical calendar or cohort identification method. These methods will help in placing the life events of the respondents on standard scale in case the respondents cannot recall their age and should be incorporated in future surveys. Also, quality field work supervision during data collection, recording and entering should be ensured so as to minimize content errors. Data quality assessment should be planned for during future surveys and then carried out properly.

REFERENCES

Adebowale, S.A: Fagbamigbe, F.A; Bamgboye, E.A (2011). REFINED Age Distribution and Demographic Parameters Estimation in Nigeria: An Indirect Approach: Journal of statistics and management system. vol.15, No 1, pp 29-48

Bicego G .T and Ahmad O. B (1996). Infant and child Mortality, DHS comparative studies No. 20. Calverton, Marland: Macro Internation Inc.

Brass, W. and Rashad, H. (1992) Exploratory Demographic Analysis of Imperfect Maternity Histories to Determine Levels and Trends of Fertility, in Allan G. Hill and William Brass ed. The Analysis of Maternity Histories, International Union for the Scientific Study of Population, Liege, Belgium.

Chevan, A and SurtherLand M. (2009). Revisiting Das Gupta: Refinement and Extension of Standardization and Decomposition. Demography. Volume 46-Number 3, Aug. 2009: 429-449.

Crayen, D., & Baten, J. (2008). Global trends in numeracy 1820-1949 and its implications for long-rungrowth. CESifo working paper, No. 2218.Leibniz Institute for Economic Research at theUniversity of Munich.

Denic, S., Khatib, F., Saadi, H., (2004). Quality of age data in patients from developing countries. Journal of Public Health 26 (2). 168-171

Federal Ministry of Health Nigeria (2013). National HIV & AIDS and Reproductive Health Survey,2012 (NARHS Plus). Federal Ministry of Health Abuja, Nigeria

Feeney G, Yuan J. (2003) "Below Replacement Fertility in China? A Close Look at Recent Evidence" Population Studies.;48:381–94.

Ghana Statistical Service (2013). 2010 Population &Housing Census: National Analytical Report and Summary Report of Final Results Accra: Ghana Statistical Service

Garenne M. (2004) "Sex ratio at birth in population of Eastern &Southern Africa", Southern Africa Journal of Demography 9(1); 91-96.

Johanna Fajardo-González, Laura Attanasio, and Jasmine Trang Ha (2014). An Assessment of the Age Reporting in the IPUMS-I Micro data. Paper submitted for presentation at the 2014 Annual Meeting of the Population Association of America.

Mathews M. P. (2002). Nigeria: Current issues and historical background. Hauppauge, New York: Nova Publishers, pp. 159.

Moultrie, T.A. (2012). General assessment of age and sex data. Published on Tools for Demographic Estimation. Available at http://demographicestimation.iussp.org

REFERENCES

Adebowale, S.A: Fagbamigbe, F.A; Bamgboye, E.A (2011). REFINED Age Distribution and Demographic Parameters Estimation in Nigeria: An Indirect Approach: Journal of statistics and management system. vol.15, No 1, pp 29-48

Bicego G .T and Ahmad O. B (1996). Infant and child Mortality, DHS comparative studies No. 20. Calverton, Marland: Macro Internation Inc.

Brass, W. and Rashad, H. (1992) Exploratory Demographic Analysis of Imperfect Maternity Histories to Determine Levels and Trends of Fertility, in Allan G. Hill and William Brass ed. The Analysis of Maternity Histories, International Union for the Scientific Study of Population, Liege, Belgium.

Chevan, A and SurtherLand M. (2009). Revisiting Das Gupta: Refinement and Extension of Standardization and Decomposition. Demography. Volume 46-Number 3, Aug. 2009: 429-449.

Crayen, D., & Baten, J. (2008). Global trends in numeracy 1820-1949 and its implications for long-rungrowth. CESifo working paper, No. 2218.Leibniz Institute for Economic Research at theUniversity of Munich.

Denic, S., Khatib, F., Saadi, H., (2004). Quality of age data in patients from developing countries. Journal of Public Health 26 (2), 168-171

Federal Ministry of Health Nigeria (2013). National HIV & AIDS and Reproductive Health Survey,2012 (NARHS Plus). Federal Ministry of Health Abuja. Nigeria

Feeney G, Yuan J. (2003) "Below Replacement Fertility in China? A Close Look at Recent Evidence" Population Studies.;48:381–94.

Ghana Statistical Service (2013). 2010 Population &Housing Census: National Analytical Report and Summary Report of Final Results Accra: Ghana Statistical Service .

Garenne M. (2004) "Sex ratio at birth in population of Eastern &Southern Africa", Southern Africa Journal of Demography 9(1); 91-96.

Johanna Fajardo-González, Laura Attanasio, and Jasmine Trang Ha (2014). An Assessment of the Age Reporting in the IPUMS-I Micro data. Paper submitted for presentation at the 2014 Annual Meeting of the Population Association of America.

Mathews M. P. (2002). Nigeria: Current issues and historical background. Hauppauge, New York: Nova Publishers, pp. 159.

Moultrie, T.A. (2012). General assessment of age and sex data. Published on Tools for Demographic Estimation . Available at http://demographicestimation.iussp.org

Nagi, M.H., Stockwell, E.G. &Snavley, L.M. (1973). Digit Preference and Avoidance in the Age Statistics of Some Recent African Censuses: Some Patterns and Correlates. International Statistical Review, 41(2):165-174.

National Population Commission. (2006). Population and Housing Census of the Federal republic of Nigeria. Abuja: National Population Comunission

National Population Commission. (1991). Population and Housing Census of the Federal republic of Nigeria. Abuja: National Population Commission

Nigeria Demographic and Health Survey (2013). Preliminary Report. National population commission Abuja, Nigeria. Measure DHS ICF International Calverton, Maryland, USA

Nigeria Demographic and Health Survey (1999). Preliminary Report. National population commission Abuja, Nigeria. Measure DHS ICF International Calverton, Maryland, USA

Nigeria Demographic and Health Survey (1990). Preliminary Report. National population commission Abuja, Nigeria. Measure DHS ICF International Calverton, Maryland, USA

Raymer, J and Rogers, A. (2007).Using age and spatial flow structures in the indirect estimation of migration streams. Demography. Volume 44-: 199-223.

Rutstein, Shea O., and George T. Bicego. (1990). Assessment of the quality of data used to ascertain eligibility and age in the Demographic and Health Surveys. In An Assessment of DHS-IData Quality.DHS Methodological Reports. No. 1. Columbia, Maryland: Institute for Resource Development/Macro Systems, Inc.

Stock R. F. , (2004). Africa South of the Sahara: a geographical interpretation. New York, US: Guilford Press, pp. 410-411.

Suberu R. T. (2001). Federalism and ethnic conflict in Nigeria. Washington DC, US: US Institute of Peace Press, , pp. 62.

Unisa S, Dwivedi LK, Reshmi RS, Kumar K. (2009). Age reporting in Indian census: An insight. Paper presented at the 26th IUSSP International Population Conference. Morocco

United Nations. (1956). Manuals on Methods of Estimating Population. Manual X: Methods of Appraisal of Quality of Basic Data for Population Estimates. Sales No.E.56. XIII.2. Available at: http://www.un.org/esa/population/pubsarchive/migration_publications/UN_1955_Manual2.pdf

Nagi, M.H., Stockwell, E.G. &Snavley, L.M. (1973). Digit Preference and Avoidance in the Age Statistics of Some Recent African Censuses: Some Patterns and Correlates. International Statistical Review, 41(2):165-174.

National Population Commission. (2006). Population and Housing Census of the Federal republic of Nigeria. Abuja: National Population Commission

National Population Commission. (1991). Population and Housing Census of the Federal republic of Nigeria. Abuja: National Population Commission

Nigeria Demographic and Health Survey (2013). Preliminary Report. National population commission Abuja, Nigeria. Measure DHS ICF International Calverton, Maryland, USA

Nigeria Demographic and Health Survey (1999). Preliminary Report. National population commission Abuja, Nigeria. Measure DHS ICF International Calverton, Maryland, USA

Nigeria Demographic and Health Survey (1990). Preliminary Report. National population commission Abuja, Nigeria. Measure DHS ICF International Calverton, Maryland, USA

Raymer, J and Rogers, A. (2007).Using age and spatial flow structures in the indirect estimation of migration streams. Demography. Volume 44-: 199-223.

Rutstein, Shea O., and George T. Bicego. (1990). Assessment of the quality of data used to ascertain eligibility and age in the Demographic and Health Surveys. In An Assessment of DHS-IData Quality.DHS Methodological Reports, No. 1. Columbia, Maryland: Institute for Resource Development/Macro Systems, Inc.

Stock R. F. , (2004). Africa South of the Sahara: a geographical interpretation. New York, US: Guilford Press, pp. 410-411.

Suberu R. T. (2001). Federalism and ethnic conflict in Nigeria. Washington DC, US: US Institute of Peace Press, , pp. 62.

Unisa S, Dwivedi LK, Reshmi RS, Kumar K. (2009). Age reporting in Indian census: An insight. Paper presented at the 26th IUSSP International Population Conference. Morocco

United Nations. (1956). Manuals on Methods of Estimating Population. Manual X: Methods of Appraisal of Quality of Basic Data for Population Estimates. Sales No.E.56. XIII.2. Available at: http://www.un.org/esa/population/pubsarchive/migration_publications/UN_1955_Manual2.pdf

APPENDIX

Table A4.1 Pattern of digit preference and Myers' indices for urban area

	NARHS YEAR					
	2005		2007		2012	
Terminal Digit	**Percentage Distribution**	**Deviation From 10**	**Percentage Distribution**	**Deviation From 10**	**Percentage Distribution**	**Deviation From 10**
0	15.37	5.37	15.31	5.31	18.87	8.87
1	8.59	-1.41	7.04	-2.96	4.95	-5.05
2	10.27	0.27	9.38	-0.62	11.57	1.57
3	8.29	-1.71	7.88	-2.12	6.37	-3.63
4	8.06	-1.94	8.84	-1.16	6.53	-3.47
5	14.94	4.94	15.01	5.01	17.94	7.94
6	8.21	-1.79	6.74	-3.26	7.30	-2.7
7	8.40	-1.6	10.03	0.03	7.43	-2.57
8	9.01	-0.99	10.11	0.11	10.91	0.91
9	8.87	-1.13	9.68	-0.32	8.13	-1.87
Myers' Index		**10.57**		**10.45**		**19.29**

Table A4.2 Pattern of digit preference and Myers' indices for Rural Area

	NARHS YEAR					
	2005		2007		2012	
Terminal Digit	Percentage Distribution	Deviation From 10	Percentage Distribution	Deviation From 10	Percentage Distribution	Deviation From 10
0	22.47	12.47	21.59	11.59	24.88	14.88
1	6.26	-3.74	5.45	-4.55	4.32	-5.68
2	7.01	-2.99	7.97	-2.03	9.24	-0.76
3	5.78	-4.22	5.97	-4.03	5.07	-4.93
4	7.90	-2.1	5.78	-4.22	5.26	-4.74
5	19.87	9.87	18.73	8.73	20.75	10.75
6	6.08	-3.92	6.09	-3.91	6.35	-3.65
7	7.14	-2.86	9.07	-0.93	6.80	-3.2
8	8.65	-1.35	8.95	-1.05	10.42	0.42
9	8.83	-1.17	8.40	-1.6	6.91	-3.09
Myers' Index		**22.34**		**20.32**		**26.05**

Table A4.3 Myers' Index for the region

	NARHS YEAR								
	2005			2007			2012		
Terminal Digit	Male	Female	Total	Male	Female	Total	Male	Female	Total
North Central	14.83	17.01	15.49	20.16	22.51	20.91	22.48	19.96	20.53
North East	24.51	22.91	23.77	18.84	21.86	21.20	31.01	28.57	29.65
North West	27.85	29.37	28.63	23.45	24.92	23.94	36.99	36.87	36.93
South South	9.74	9.85	9.28	9.36	12.57	9.73	17.43	17.06	17.00
South West	13.69	14.39	13.90	11.24	13.76	12.28	22.74	20.13	21.13
South East	13.84	16.51	15.06	11.46	8.4	9.36	17.30	15.96	16.47

Table A4.4: Pattern of Digit Preference and Myers' Indices of age at first sex (male)

	NARHS YEAR					
	2005		2007		2012	
Terminal Digit	Percentage Distribution	Deviation From 10	Percentage Distribution	Deviation From 10	Percentage Distribution	Deviation From 10
0	22.68	12.68	23.13	13.13	24.00	14.00
1	5.53	-4.47	5.45	-4.55	5.63	-4.37
2	7.40	-2.60	7.15	-2.85	8.48	-1.52
3	4.84	-5.16	4.64	-5.36	4.19	-5.81
4	4.67	-5.33	5.03	-4.97	4.79	-5.21
5	13.75	3.75	14.38	4.38	14.11	4.11
6	6.74	-3.26	6.54	-3.46	5.65	-4.35
7	8.82	-1.18	9.09	-0.91	8.57	-1.43
8	15.76	5.76	14.48	4.48	15.17	5.17
9	9.81	-0.19	10.12	0.12	9.41	-0.59
Myers' Index		19.59		19.14		21.77

Table A4.5: Pattern of Digit Preference and Myers' Indices of age at first sex (female)

	NARHS YEAR					
	2005		2007		2012	
Terminal Digit	Percentage Distribution	Deviation From 10	Percentage Distribution	Deviation From 10	Percentage Distribution	Deviation From 10
0	13.44	3.44	13.76	3.76	14.51	4.51
1	4.27	-5.73	3.59	-6.41	4.26	-5.74
2	5.59	-4.41	5.48	-4.52	6.52	-3.48
3	5.17	-4.83	5.26	-4.74	4.39	-5.61
4	8.70	-1.30	10.03	0.03	6.90	-3.10
5	14.82	4.82	16.49	6.49	15.95	5.95
6	10.28	0.28	10.13	0.13	9.80	-0.20
7	12.07	2.07	10.38	0.38	10.16	0.16
8	14.97	4.97	14.65	4.65	17.06	7.06
9	10.69	0.69	10.24	0.24	10.44	0.44
Myers' Index		8.25		10.25		10.46

Table A4.6: Pattern of Digit Preference and Myers' Indices of age at first sex in the urban area

	NARHS YEAR					
	2005		2007		2012	
Terminal Digit	Percentage Distribution	Deviation From 10	Percentage Distribution	Deviation From 10	Percentage Distribution	Deviation From 10
0	19.39	9.39	18.69	8.69	20.57	10.57
1	6.23	-3.77	5.60	-4.40	5.36	-4.64
2	7.16	-2.84	6.98	-3.02	8.32	-1.68
3	5.13	-4.87	4.98	-5.02	5.00	-5.00
4	5.42	-4.58	6.65	-3.35	5.42	-4.58
5	11.85	1.85	13.04	3.04	13.03	3.03
6	8.66	-1.34	7.05	-2.95	7.34	-2.66
7	9.30	-0.70	9.79	-0.21	9.06	-0.94
8	15.68	5.68	15.98	5.98	16.05	6.05
9	11.18	1.18	11.22	1.22	9.86	-0.14
Myers' Index		16.92		17.71		19.64

Table A4.7: Pattern of Digit Preference and Myers' Indices of age at first sex in the rural area

	NARHS YEAR					
	2005		2007		2012	
Terminal Digit	Percentage Distribution	Deviation From 10	Percentage Distribution	Deviation From 10	Percentage Distribution	Deviation From 10
0	17.94	7.94	18.83	8.83	18.79	8.79
1	4.25	-5.75	4.03	-5.97	4.77	-5.23
2	6.26	-3.74	6.03	-3.97	7.12	-2.88
3	4.91	-5.09	4.87	-5.13	3.95	-6.05
4	7.11	-2.89	7.73	-2.27	6.01	-3.99
5	15.53	5.53	16.59	6.59	15.94	5.94
6	8.18	-1.82	8.84	-1.16	7.85	-2.15
7	10.87	0.87	9.67	-0.33	9.50	-0.50
8	15.26	5.26	13.80	3.80	16.13	6.13
9	9.70	-0.30	9.61	-0.39	9.94	-0.06
Myers' Index		18.72		19.22		20.86

Table A4.6: Pattern of Digit Preference and Myers' Indices of age at first sex in the urban area

	NARHS YEAR					
	2005		2007		2012	
Terminal Digit	Percentage Distribution	Deviation From 10	Percentage Distribution	Deviation From 10	Percentage Distribution	Deviation From 10
0	19.39	9.39	18.69	8.69	20.57	10.57
1	6.23	-3.77	5.60	-4.40	5.36	-4.64
2	7.16	-2.84	6.98	-3.02	8.32	-1.68
3	5.13	-4.87	4.98	-5.02	5.00	-5.00
4	5.42	-4.58	6.65	-3.35	5.42	-4.58
5	11.85	1.85	13.04	3.04	13.03	3.03
6	8.66	-1.34	7.05	-2.95	7.34	-2.66
7	9.30	-0.70	9.79	-0.21	9.06	-0.94
8	15.68	5.68	15.98	5.98	16.05	6.05
9		1.18	11.22	1.22	9.86	-0.14
Myers' Index		16.92		17.71		19.64

Table A4.7: Pattern of Digit Preference and Myers' Indices of age at first sex in the rural area

	NARHS YEAR					
	2005		2007		2012	
Terminal Digit	Percentage Distribution	Deviation From 10	Percentage Distribution	Deviation From 10	Percentage Distribution	Deviation From 10
0	17.94	7.94	18.83	8.83	18.79	8.79
1	4.25	-5.75	4.03	-5.97	4.77	-5.23
2	6.26	-3.74	6.03	-3.97	7.12	-2.88
3	4.91	-5.09	4.87	-5.13	3.95	-6.05
4	7.11	-2.89	7.73	-2.27	6.01	-3.99
5	15.53	5.53	16.59	6.59	15.94	5.94
6	8.18	-1.82	8.84	-1.16	7.85	-2.15
7	10.87	0.87	9.67	-0.33	9.50	-0.50
8	15.26	5.26	13.80	3.80	16.13	6.13
9	9.70	-0.30	9.61	-0.39	9.94	-0.06
Myers' Index		18.72		19.22		20.86

Table A4.8 Pattern of Digit Preference and Myers' Indices of age at first sex for the geographical region

	NARHS YEAR								
	2005			2007			2012		
Terminal Digit	Male	Female	Total	Male	Female	Total	Male	Female	Total
North Central	16.91	7.58	16.82	15.86	11.59	16.68	17.23	9.80	18.78
North East	22.77	7.72	18.78	26.33	13.12	11.86	24.58	9.22	20.88
North West	18.47	21.67	12.63	26.33	13.12	20.73	26.84	16.25	24.31
South South	16.74	6.38	17.32	17.92	10.74	21.84	16.27	6.63	18.45
South West	18.89	7.62	18.20	16.84	11.47	19.37	22.15	12.86	21.64
South East	22.44	7.01	19.13	21.45	4.70	20.07	19.87	6.31	16.27

Table A4.9: Pattern of Digit Preference and Myers' Indices of age at first marriage (male)

	NARHS YEAR					
	2005		2007		2012	
Terminal Digit	Percentage Distribution	Deviation From 10	Percentage Distribution	Deviation From 10	Percentage Distribution	Deviation From 10
0	23.50	13.50	23.38	13.38	24.45	14.45
1	6.42	-3.58	6.68	-3.32	5.88	-4.12
2	9.52	-0.48	9.15	-0.85	9.09	-0.91
3	5.61	-4.39	5.76	-4.24	5.57	-4.43
4	6.21	-3.79	6.18	-3.82	6.27	-3.73
5	16.39	6.39	16.42	6.42	16.98	6.98
6	6.37	-3.63	5.71	-4.29	5.38	-4.62
7	7.65	-2.35	8.51	-1.49	7.09	-2.91
8	11.09	1.09	10.93	0.93	11.58	1.58
9	7.25	-2.75	7.27	-2.73	7.71	-2.29
Myers' Index		20.50		19.89		22.1

Table A4.10: Pattern of Digit Preference and Myers' Indices of age at first marriage (female)

	NARHS YEAR					
	2005		2007		2012	
Terminal Digit	Percentage Distribution	Deviation From 10	Percentage Distribution	Deviation From 10	Percentage Distribution	Deviation From 10
0	12.87	2.87	29.99	19.99	31.49	21.49
1	5.03	-4.97	12.64	2.64	10.78	0.78
2	6.58	-3.42	15.87	5.87	14.43	4.43
3	6.94	-3.06	9.27	-0.73	8.73	-1.27
4	9.98	-0.02	8.42	-1.58	8.75	-1.25
5	16.53	6.53	9.91	-0.09	9.98	-0.02
6	8.77	-1.23	3.62	-6.38	5.62	-4.38
7	10.75	0.75	3.88	-6.12	4.54	-5.46
8	12.35	2.35	4.21	-5.79	3.95	-6.05
9	10.19	0.19	2.19	-7.81	1.73	-8.27
Myers' Index		9.40		19.90		21.47

Table A4.11: Pattern of Digit Preference and Myers' Indices of age at first marriage in the urban area

	NARHS YEAR					
	2005		2007		2012	
Terminal Digit	Percentage Distribution	Deviation From 10	Percentage Distribution	Deviation From 10	Percentage Distribution	Deviation From 10
0	16.31	6.31	17.44	7.44	19.07	9.07
1	6.90	-3.10	6.62	-3.38	5.91	-4.09
2	8.71	-1.29	9.20	-0.80	9.31	-0.69
3	7.23	-2.77	5.95	-4.05	6.37	-3.63
4	8.13	-1.87	8.27	-1.73	8.01	-1.99
5	15.95	5.95	14.93	4.93	14.62	4.62
6	8.13	-1.87	7.40	-2.60	7.50	-2.50
7	8.55	-1.45	9.67	-0.33	8.83	-1.17
8	10.26	0.26	10.87	0.87	11.54	1.54
9	9.84	-0.16	9.65	-0.35	8.84	-1.16
Myers' Index		12.52		13.25		15.23

Table A4.12: Pattern of Digit Preference and Myers' Indices of age at first marriage in the rural area

	NARHS YEAR					
	2005		2007		2012	
Terminal Digit	Percentage Distribution	Deviation From 10	Percentage Distribution	Deviation From 10	Percentage Distribution	Deviation From 10
0	19.39	9.39	18.73	8.73	20.21	10.21
1	5.15	-4.85	5.05	-4.95	5.42	-4.58
2	7.73	-2.27	10.98	0.98	7.50	-2.50
3	5.84	-4.16	5.98	-4.02	5.39	-4.61
4	8.03	-1.97	6.16	-3.84	7.72	-2.28
5	16.79	6.79	17.39	7.39	16.77	6.77
6	7.19	-2.81	7.90	-2.10	7.34	-2.66
7	9.28	-0.72	7.85	-2.15	8.07	-1.93
8	12.37	2.37	11.34	1.34	12.99	2.99
9	8.24	-1.76	8.62	-1.38	8.59	-1.41
Myers' Index		18.75		12.44		19.97

Table A4.11: Pattern of Digit Preference and Myers' Indices of age at first marriage in the urban area

	NARHS YEAR					
	2005		2007		2012	
Terminal Digit	Percentage Distribution	Deviation From 10	Percentage Distribution	Deviation From 10	Percentage Distribution	Deviation From 10
0	16.31	6.31	17.44	7.44	19.07	9.07
1	6.90	-3.10	6.62	-3.38	5.91	-4.09
2	8.71	-1.29	9.20	-0.80	9.31	-0.69
3	7.23	-2.77	5.95	-4.05	6.37	-3.63
4	8.13	-1.87	8.27	-1.73	8.01	-1.99
5	15.95	5.95	14.93	4.93	14.62	4.62
6	8.13	-1.87	7.40	-2.60	7.50	-2.50
7	8.55	-1.45	9.67	-0.33	8.83	-1.17
8	10.26	0.26	10.87	0.87	11.54	1.54
9	9.84	-0.16	9.65	-0.35	8.84	-1.16
Myers' Index		12.52		13.25		15.23

Table A4.12: Pattern of Digit Preference and Myers' Indices of age at first marriage in the rural area

	NARHS YEAR					
	2005		2007		2012	
Terminal Digit	Percentage Distribution	Deviation From 10	Percentage Distribution	Deviation From 10	Percentage Distribution	Deviation From 10
0	19.39	9.39	18.73	8.73	20.21	10.21
1	5.15	-4.85	5.05	-4.95	5.42	-4.58
2	7.73	-2.27	10.98	0.98	7.50	-2.50
3	5.84	-4.16	5.98	-4.02	5.39	-4.61
4	8.03	-1.97	6.16	-3.84	7.72	-2.28
5	16.79	6.79	17.39	7.39	16.77	6.77
6	7.19	-2.81	7.90	-2.10	7.34	-2.66
7	9.28	-0.72	7.85	-2.15	8.07	-1.93
8	12.37	2.37	11.34	1.34	12.99	2.99
9	8.24	-1.76	8.62	-1.38	8.59	-1.41
Myers' Index		18.75		12.44		19.97

Table A4.13: Pattern of Digit Preference and Myers' Indices of age at first marriage for the geographical region

	NARHS YEAR								
	2005			2007			2012		
Terminal Digit	Male	Female	Total	Male	Female	Total	Male	Female	Total
North Central	17.95	8.51	13.60	17.69	13.41	16.01	16.85	17.51	7.16
North East	25.13	9.70	20.03	14.25	8.34	11.70	23.71	1.00	19.61
North West	18.89	22.12	15.04	20.52	13.27	20.52	27.90	32.44	23.19
South South	19.60	5.06	14.68	16.16	6.92	16.55	20.12	5.04	16.23
South West	17.85	8.51	14.68	19.33	7.95	13.88	19.04	11.14	15.70
South East	18.77	18.77	15.08	19.77	4.14	14.50	18.83	3.6	14.11

Table A4.13: Pattern of Digit Preference and Myers' Indices of age at first marriage for the geographical region

	NARHS YEAR								
	2005			2007			2012		
Terminal Digit	Male	Female	Total	Male	Female	Total	Male	Female	Total
North Central	17.95	8.51	13.60	17.69	13.41	16.01	16.85	17.51	7.16
North East	25.13	9.70	20.03	14.25	8.34	11.70	23.71	1.00	19.61
North West	18.89	22.12	15.04	20.52	13.27	20.52	27.90	32.44	23.19
South South	19.60	5.06	14.68	16.16	6.92	16.55	20.12	5.04	16.23
South West	17.85	8.51	14.68	19.33	7.95	13.88	19.04	11.14	15.70
South East	18.77	18.77	15.08	19.77	4.14	14.50	18.83	3.6	14.11

Table A4.14: Pattern of Digit Preference and Myers' Indices for age at first birth in the urban area

	NARHS YEAR					
	2005		2007		2012	
Terminal Digit	Percentage Distribution	Deviation From 10	Percentage Distribution	Deviation From 10	Percentage Distribution	Deviation From 10
0	15.25	5.25	15.68	5.68	17.24	7.24
1	7.93	-2.07	7.34	-2.66	7.64	-2.36
2	8.67	-1.33	9.19	-0.81	9.06	-0.94
3	6.56	-3.44	5.99	-4.01	7.19	-2.81
4	5.76	-4.24	6.58	-3.42	7.18	-2.82
5	12.63	2.63	12.83	2.83	11.05	1.05
6	9.37	-0.63	8.46	-1.54	8.55	-1.45
7	10.61	0.61	10.82	0.82	9.23	-0.77
8	12.78	2.78	13.57	3.57	13.27	3.27
9	10.45	0.45	9.55	-0.45	9.59	-0.41
Myers' Index		11.72		12.89		11.56

Table A4.15: Pattern of Digit Preference and Myers' Indices for age at first birth in the rural area

	NARHS YEAR					
	2005		2007		2012	
Terminal Digit	Percentage Distribution	Deviation From 10	Percentage Distribution	Deviation From 10	Percentage Distribution	Deviation From 10
0	17.25	7.25	16.68	6.68	19.24	9.24
1	6.93	-3.07	8.34	-1.66	8.64	-1.36
2	6.67	-3.33	9.19	-0.81	9.06	-0.94
3	6.56	-3.44	5.00	-5.00	7.50	-2.50
4	6.76	-3.24	7.58	-2.42	8.18	-1.82
5	12.63	2.63	13.83	3.83	13.05	3.05
6	9.35	-0.65	8.46	-1.54	8.48	-1.52
7	10.61	0.61	10.82	0.82	9.23	-0.77
8	14.78	4.78	14.57	4.57	16.27	6.27
9	11.45	1.45	9.50	-0.55	9.00	-1.00
Myers' Index		15.23		13.94		14.24

Table A4.14: Pattern of Digit Preference and Myers' Indices for age at first birth in the urban area

	NARHS YEAR					
	2005		2007		2012	
Terminal Digit	Percentage Distribution	Deviation From 10	Percentage Distribution	Deviation From 10	Percentage Distribution	Deviation From 10
0	15.25	5.25	15.68	5.68	17.24	7.24
1	7.93	-2.07	7.34	-2.66	7.64	-2.36
2	8.67	-1.33	9.19	-0.81	9.06	-0.94
3	6.56	-3.44	5.99	-4.01	7.19	-2.81
4	5.76	-4.24	6.58	-3.42	7.18	-2.82
5	12.63	2.63	12.83	2.83	11.05	1.05
6	9.37	-0.63	8.46	-1.54	8.55	-1.45
7	10.61	0.61	10.82	0.82	9.23	-0.77
8	12.78	2.78	13.57	3.57	13.27	3.27
9	10.45	0.45	9.55	-0.45	9.59	-0.41
Myers' Index		11.72		12.89		11.56

Table A4.15: Pattern of Digit Preference and Myers' Indices for age at first birth in the rural area

	NARHS YEAR					
	2005		2007		2012	
Terminal Digit	Percentage Distribution	Deviation From 10	Percentage Distribution	Deviation From 10	Percentage Distribution	Deviation From 10
0	17.25	7.25	16.68	6.68	19.24	9.24
1	6.93	-3.07	8.34	-1.66	8.64	-1.36
2	6.67	-3.33	9.19	-0.81	9.06	-0.94
3	6.56	-3.44	5.00	-5.00	7.50	-2.50
4	6.76	-3.24	7.58	-2.42	8.18	-1.82
5	12.63	2.63	13.83	3.83	13.05	3.05
6	9.35	-0.65	8.46	-1.54	8.48	-1.52
7	10.61	0.61	10.82	0.82	9.23	-0.77
8	14.78	4.78	14.57	4.57	16.27	6.27
9	11.45	1.45	9.50	-0.55	9.00	-1.00
Myers' Index		15.23		13.94		14.24

Table A4.16: Pattern of Digit Preference and Myers' Indices of age at first birth for the geographical region

	NARHS YEAR		
	2005	2007	2012
Terminal Digit	**Female**	**Female**	**Female**
North Central	17.72	17.86	17.09
North East	29.07	23.52	22.78
North West	24.29	23.00	27.57
South South	16.89	14.42	12.23
South West	15.55	19.88	13.57
South East	14.88	11.88	14.81

Table A4.17 Whipple's indices for Terminal digits '0' and '5 of age at first sex in the urban area

	YEAR OF NARHS SURVEY					
	2005		2007		2012	
	Whipple's Index		Whipple's Index		Whipple's Index	
	0	5	0	5	0	5
Male	80.99	167.25	118.78	136.13	90.81	160.04
Female	33.90	88.98	36.58	121.95	32.26	135.30
total	67.16	144.28	93.16	132.13	68.10	150.10

Table A4.18 Whipple's indices for Terminal digits '0' and '5 of age at first sex in the rural area

	YEAR OF NARHS SURVEY					
	2005		2007		2012	
	Whipple's Index		Whipple's Index		Whipple's Index	
	0	5	0	5	0	5
Male	68.18	171.40	109.82	173.88	97.29	182.49
Female	-	119.79	42.02	100.84	30.18	128.77
total	57.69	163.46	98.61	161.81	82.08	169.17

Table A4.19a Whipple's indices of age at first sex in the geographical region for digit '0'

Region	2005			2007			2012		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
North Central	73.2	25.6	61.7	83.8	20	69.1	72.9	20.2	55
North East	77.5	125	80.3	68.3	-	63.2	89.0	25.3	80.1
North West	73.1	-	70.5	117.6	43.5	111.9	117.0	38.5	107.01
South East	73.0	-	50.8	174.3	40.8	132.9	81.8	13.0	53.5
South West	58.8	26.7	47.4	128.2	40	93.8	113.9	54.6	86.3
South South	61.5	-	44.9	114.6	63.8	97.9	61.2	16.4	46.3

TableA4.19b Whipple's indices of age at first sex in the geographical region for digit '5'

Region	2005			2007			2012		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
North Central	130.1	89.7	120.4	143.7	140	142.9	144.5	131.3	140.0
North East	178.3	62.5	171.5	111.8	38.5	106.3	183.2	132.9	176.2
North West	173.5	125	171.8	193.0	87.0	184.7	195.2	153.8	191.3
South East	197.1	116.7	172.6	160.6	112.2	145.6	139.4	114.7	129.2
South West	183.8	106.7	156.4	166.7	135	154.3	180.2	137.9	160.7
South South	130.8	83.3	118.0	156.3	74.5	129.4	175.5	135.2	162.1

Table A4.20 Whipple's indices for Terminal digits '0' and '5 of age at first marriage in the Urban area

	YEAR OF NARHS SURVEY					
	2005		2007		2012	
	Whipple's Index		Whipple's Index		Whipple's Index	
	0	5	0	5	0	5
Male	138.7	115:32	164.95	100.88	145.72	118.70
Female	34.22	106.46	38.87	93.64	70.28	103.41
total	106.46	112.68	126.82	98.75	117.29	112.93

Table A4.21 Whipple's indices for Terminal digits '0' and '5 of age at first marriage in the marriage rural area

	YEAR OF NARHS SURVEY					
	2005		2007		2012	
	Whipple's Index		Whipple's Index		Whipple's Index	
	0	5	0	5	0	5
Male	125.51	133.23	134.52	138.28	139.60	143.62
Female	20.33	132.11	44.35	129.03	60.61	103.97
total	104.27	131.77	116.70	136.54	119.89	133.99

Table A4.22a Whipple's indices of age at first marriage in the geographical region for digit '0'

Region	2005			2007			2012		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
North Central	112.9	47.1	96.1	139.9	57.5	123.3	119.9	79.0	106.9
North East	105.9	50	100	88.7	55.6	86.0	114.0	89.4	110.5
North West	97.6	-	92.0	125.0	-	116.6	116.9	47.1	110.1
South East	179.0	36.0	135.9	206.4	101.0	170.3	207.7	60.5	147.9
South West	154.2	21.6	113.3	147.0	41.4	121.0	146.2	68.6	114.6
South South	93.8	10.7	71.6	122.4	9.61	89.7	155.5	56.7	120.8

Table A4.22b Whipple's indices of age at first marriage in the geographical region for digit '5'

Region	2005			2007			2012		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
North Central	112.9	117.6	114.1	119.5	132.2	122.1	123.7	120.1	122.6
North East	170.9	150	168.4	120.7	55.6	115.4	154.5	122.0	149.8
North West	156.5	200	159.0	172.7	68.2	165.6	190.0	135.3	184.6
South East	95.3	112.6	9.2	82.6	96.0	86.6	84.7	91.9	87.0
South West	121.7	118.9	120.8	124.0	110.2	120.8	126.2	100.3	115.9
South South	121.1	96.8	114.6	120.6	125.0	121.8	121.3	95.4	112.4

Table A4.23 Whipple's indices for Terminal digits '0' and '5' of age at first birth for urban and rural area

	YEAR OF NARHS SURVEY					
	2005		2007		2012	
	Whipple's Index		Whipple's Index		Whipple's Index	
	0	5	0	5	0	5
Urban	63.34	113.14	59.88	122.75	70.81	92.34
Rural	22.81	142.59	57.62	130.51	52.63	114.03

Table A4.24 Whipple's indices for Terminal digits '0' and '5' of age at first birth for geographical region

	YEAR OF NARHS SURVEY					
	2005		2007		2012	
	Whipple's Index		Whipple's Index		Whipple's Index	
	0	5	0	5	0	5
North central	80.46	109.20	48.08	110.58	52.22	105.74
North East	95.24	47.62	-	97.22	40.65	134.14
North West	43.48	152.17	21.27	85.11	66.67	104.76
South East	20.20	131.31	94.34	99.06	59.10	98.11
South South	19.60	127.45	59.83	111.11	59.10	98.10
South West	53.66	134.14	55.81	165.12	60.91	97.72

Table A4.25: Age Ratio of North Central according to Age Group

Age Group	2005 Male	2005 Deviation from 100	2005 Female	2005 Deviation from 100	2007 Male	2007 Deviation from 100	2007 Female	2007 Deviation from 100	2012 Male	2012 Deviation from 100	2012 Female	2012 Deviation from 100
15-19												
20-24	111.04	11.04	107.88	7.88	95.74	-4.26	97.87	-2.13	96.24	-3.76	104.10	4.10
25-29	80	-20	87.59	-12.41	120.26	20.26	105.47	5.47	109.07	9.07	117.43	17.43
30-34	121.93	21.93	111.44	11.44	79.86	-20.14	96.95	-3.05	103.66	3.66	94.31	-5.69
35-39	73.20	-26.80	86.55	-13.45	104	4.00	90.32	-9.68	98.32	-1.68	94.81	-5.19
40-44	131.15	31.15	85.50	-14.49	104.29	4.29	109.09	9.09	102.30	2.30	95.80	-4.20
45-49	82.26	-17.74			82.52	-17.48			87.53	12.47		
50-54	115.79	15.79			117.17	17.17			125.79	25.79		
55-59	61.73	-38.27			71.43	-28.57			62.46	-37.54		
60-64												
Age score for male	22.84				14.52				7.32			
Age score for female	11.94				5.88				12.03			

Table A4.26: Age Ratio of North East according to Age Group

Age Group	2005 Male	2005 Deviation from 100	2005 Female	2005 Deviation from 100	2007 Male	2007 Deviation from 100	2007 Female	2007 Deviation from 100	2012 Male	2012 Deviation from 100	2012 Female	2012 Deviation from 100
15-19												
20-24	87.34	-12.66	91.14	-8.86	117.60	17.60	117.34	17.34	92.95	-7.05	101.44	1.44
25-29	87.07	-12.93	114.29	14.29	94.98	-5.02	87.22	-12.78	101.38	1.38	112.26	12.26
30-34	118.24	18.24	94.57	-5.43	99.51	-0.49	110.31	10.31	103.14	3.14	96.51	-3.49
35-39	72.05	-27.95	73.24	-26.76	109.33	9.33	94.55	-5.45	100.33	0.33	85.46	-14.5
40-44	131.37	31.37	127.97	27.97	65.31	-34.69	95.08	-4.92	114.87	14.87	115.46	15.46
45-49	82.24	-17.76			149.43	49.43			79.74	-20.26		
50-54	112.68	12.68			83.87	-16.13			128.17	28.17		
55-59	76.06	-23.94			81.16	-18.84			64.29	-35.71		
60-64												
Age score for male	16.53				10.27				13.52			
Age score for female	16.65				10.16				9.44			

Table 4.27: Age Ratio of North West according to Age Group

	2005				2007				2012			
Age Group	Male	Deviation from 100	Female	Deviation from 100	Male	Deviation from 100	Female	Deviation from 100	Male	Deviation from 100	Female	Deviation from 100
15-19												
20-24	73.36	-26.64	110.31	10.31	78.91	-21.09	100.71	0.71	84.98	-15.02	107.42	7.42
25-29	118.09	18.09	83.84	-16.16	133.69	33.69	101.07	1.07	110.60	10.60	97.82	-2.18
30-34	87.11	-12.89	108.43	8.43	74.54	-25.46	104.18	4.18	103.47	3.47	124.94	24.94
35-39	117.53	17.53	85.71	-14.29	100.38	0.38	82.43	-17.57	100.27	0.27	73.27	-26.73
40-44	82.63	-17.37	112.66	12.66	106.25	6.25	112.11	12.37	110.37	10.37	100.53	0.53
45-49	82.81	17.19			92.08	-7.92			81.54	-18.46		
50-54	125.53	25.53			112.16	12.16			129.94	29.94		
55-59	66.13	-33.87			71.43	-28.57			51.03	-48.97		
60-64												
Age score for male		21.14				16.94				17.14		
Age score for female		12.37				7.18				12.36		

Table A4.28: Age ratio of South East according to Age Group

Age Group	2005 Male	2005 Deviation from 100	2005 Female	2005 Deviation from 100	2007 Male	2007 Deviation from 100	2007 Female	2007 Deviation from 100	2012 Male	2012 Deviation from 100	2012 Female	2012 Deviation from 100
15-19												
20-24	81.28	-18.72	83.87	-16.13	92.11	-7.89	101.63	1.63	85.39	-14.61	97.51	-2.49
25-29	79.45	-20.55	91.36	-8.64	86.25	13.75	97.98	-2.02	94.24	-5.76	108.52	8.52
30-34	109.62	9.62	84.67	-15.33	94.02	-5.98	90.12	-9.88	105.18	5.18	87.80	-12.20
35-39	89.32	-10.68	106.78	6.78	88.89	-11.11	92.20	-7.80	94.83	-5.17	101.71	1.71
40-44	95.83	-4.17	80.54	-19.46	110.42	10.42	107.09	7.09	92.65	-7.35	93.56	-6.54
45-49	111.11	11.11			104.35	4.35			89.43	-10.57		
50-54	93.62	-6.38			91.76	-8.24			124.0	24.0		
55-59	96.70	-3.30			91.36	-8.64			94.41	-5.59		
60-64												
Age score for male	1057				8.80				9.78			
Age score for female	13.27				5.68				6.29			

Table A4.29: Age Ratio of South West according to Age Group

Age Group	2005 Male	2005 Deviation from 100	2005 Female	2005 Deviation from 100	2007 Male	2007 Deviation from 100	2007 Female	2007 Deviation from 100	2012 Male	2012 Deviation from 100	2012 Female	2012 Deviation from 100
15-19												
20-24	91.49	-8.51	109.48	9.48	95.02	-4.98	99.15	-0.85	87.59	-12.41	81.52	-18.48
25-29	104.58	4.58	100.34	0.34	97.52	-2.48	112.54	12.54	99.07	-0.93	133.16	33.16
30-34	107.2	7.2	97.82	-2.18	108.26	8.26	100.74	0.74	118.84	18.84	94.58	-5.42
35-39	88.24	-11.76	90.22	-9.78	76.92	-23.08	85.59	-14.41	78.79	-21.21	102.62	2.62
40-44	94.59	-5.41	87.80	-12.20	117.65	17.65	102.99	2.99	125.47	25.47	80.50	-19.50
45-49	96.67	-3.33			97.14	-2.86			88.17	-11.83		
50-54	102.04	2.04			97.09	-2.91			111.11	11.11		
55-59	74.77	-25.23			68.63	-31.37			68.59	-31.41		
60-64												
Age score for male		8.51				11.70					15.83	
Age score for female		6.80				6.31					16.65	

Table A4.30:Age Ratio of South South according to Age Group

Age Group	2005 Male	2005 Deviation from 100	2005 Female	2005 Deviation from 100	2007 Male	2007 Deviation from 100	2007 Female	2007 Deviation from 100	2012 Male	2012 Deviation from 100	2012 Female	2012 Deviation from 100
15-19												
20-24	109.03	9.03	102.22	2.22	120.60	20.60	98.73	-1.27	85.90	-14.10	99.67	-0.33
25-29	85.95	-14.05	93.22	-6.78	110.03	10.03	109.85	9.85	106	6.00	110.43	10.43
30-34	98.84	-1.16	115.98	15.98	71.31	-28.69	93.51	-6.49	96.28	-3.72	103.48	3.48
35-39	84.47	-15.53	73.75	-26.25	111.84	11.84	96.09	-3.91	104.74	4.74	87.85	-12.15
40-44	132.17	32.17	112.73	12.73	85.53	-14.47	95.30	-4.70	98.66	-1.34	98.84	-1.16
45-49	77.05	-22.95			120.72	20.72			98.39	-1.61		
50-54	112.20	12.05			95.83	-4.17			109.82	9.82		
55-59	101.45	1.45			69.88	-30.12			1.88	-28.12		
60-64												
Age score for male		13.57				17.58				8.68		
Age score for female		12.79				5.24				5.51		

Table A4.31: Age Specific-Sex Ratio and Age Accuracy Index for North Central

Age group	2005 Sex ratio	2005 Sex ratio differences	2007 Sex ratio	2007 Sex ratio differences	2012 Sex ratio	2012 Sex ratio differences
All Ages	**99.02**		**101.17**		**88.66**	
15-19	99.01		101.42		86.31	
20-24	98.88	-0.14	103.80	2.39	76.18	-10.13
25-29	91.34	-7.54	112.20	8.39	79.09	2.91
30-34	101.79	10.45	90.55	-21.64	96.81	17.72
35-39	95.95	-5.84	106.12	15.57	103.85	7.04
40-44	135.59	39.65	94.44	-11.68	105.47	1.63
45-49	79.69	-55.90	88.06	-6.38	91.45	-14.02
Sex ratio Scores		19.92		11.01		8.91
Age sex accuracy index		**94.53**		**53.43**		**46.07**

Table A4.32: North East

Age group	2005 Sex ratio	2005 Sex ratio differences	2007 Sex ratio	2007 Sex ratio differences	2012 Sex ratio	2012 Sex ratio differences
All Ages	**104.22**		**100.56**		**90.21**	
15-19	116.85		92.90		79.18	
20-24	95.83	-21.01	98.74	5.84	70.37	-8.81
25-29	76.52	-19.32	106.03	7.29	74.32	3.95
30-34	108.05	31.53	95.33	-10.71	98.80	24.47
35-39	111.54	3.49	105.13	9.80	125.41	26.61
40-44	121.82	10.28	82.76	-22.37	117.99	-7.42
45-49	129.41	7.59	147.73	64.97	108.82	-9.17
Sex ratio Scores	15.54		20.16		13.41	
Age sex accuracy index	**79.79**		**80.92**		**63.52**	

Table A4.33: Age Specific-Sex Ratio and Age Accuracy Index for North West

Age group	2005 Sex ratio	2005 Sex ratio differences	2007 Sex ratio	2007 Sex ratio differences	2012 Sex ratio	2012 Sex ratio differences
All Ages	**95.92**		**97.97**		**84.65**	
15-19	107.95		104.64		78.89	
20-24	73.04	-34.91	82.27	-22.37	63.04	-15.84
25-29	113.07	40.03	105.49	23.22	80.48	17.44
30-34	92.59	-20.48	75.94	-29.55	80.23	-0.25
35-39	118.75	26.16	107.38	31.44	126.69	46.46
40-44	77.53	-41.22	109.17	1.80	114.98	-11.71
45-49	85.48	7.96	129.17	19.99	81.08	-33.89
Sex ratio Scores		28.46		21.40		20.93
Age sex accuracy index		**118.89**		**88.31**		**92.30**

Table A4.34: Age Specific-Sex Ratio and Age Accuracy Index for South East

Age group	2005 Sex ratio	Sex ratio differences	2007 Sex ratio	Sex ratio differences	2012 Sex ratio	Sex ratio differences
All Ages	**81.91**		**84.04**		**68.64**	
15-19	92.53		106.71		91.16	
20-24	85.58	-6.95	84	-22.71	67.86	-23.30
25-29	78.38	-7.20	71.13	-12.87	60.88	-6.98
30-34	98.28	19.90	75.34	4.21	73.29	12.40
35-39	73.02	-25.26	73.85	-1.50	61.57	-11.72
40-44	76.67	3.65	77.94	4.10	58	-3.57
45-49	58.14	-18.53	77.42	-0.52	55.43	-2.57
Sex ratio Scores		13.58		7.65		10.09
Age sex accuracy index		**64.58**		**37.43**		**46.34**

Table A4.35: South South

Age group	2005 Sex ratio	Sex ratio differences	2007 Sex ratio	Sex ratio differences	2012 Sex ratio	Sex ratio differences
All Ages	**106.34**		**115.86**		**81.32**	
15-19	115.00		102.92		98.89	
20-24	113.77	-1.23	129.49	26.56	72.65	-26.24
25-29	94.55	-19.22	109.66	-19.83	70.17	-2.48
30-34	86.73	-7.81	80.56	-29.10	73.64	3.47
35-39	115.25	28.52	98.84	18.28	93.97	20.33
40-44	122.58	7.33	91.55	-7.29	86.67	-7.30
45-49	92.16	-30.42	106.35	14.80	78.21	-8.46
Sex ratio Scores		15.76		19.31		11.38
Age sex accuracy index		**73.63**		**80.76**		**48.33**

Table A4.36: Age Specific-Sex Ratio and Age Accuracy Index for South West

	2005		2007		2012	
Age group	Sex ratio	Sex ratio differences	Sex ratio	Sex ratio differences	Sex ratio	Sex ratio differences
All Ages	**105.39**		**105.45**		**81.60**	
15-19	119.34		137.64		106.97	
20-24	96.09	-23.25	109.14	-28.45	88.45	-18.52
25-29	109.59	13.50	89.71	-19.43	63.86	-24.60
30-34	119.64	10.05	96.32	6.61	83.46	19.61
35-39	108.13	-11.21	89.47	-6.85	70.27	-13.19
40-44	97.22	-11.21	104.65	15.18	103.91	33.64
45-49	71.60	-25.62	94.44	-10.21	62.71	-41.2
Sex ratio Scores		15.81		14.46		25.12
Age sex accuracy index		**62.72**		**61.39**		**107.86**

Table A4.37A: Sex ratio of children ever born for North Central

Age Group	2005 Male CEB	2005 Female CEB	2005 Sex ratio	2007 Male CEB	2007 Female CEB	2007 Sex ratio	2012 Male CEB	2012 Female CEB	2012 Sex ratio
15-19	31	28	1.11	31	32	0.97	50	51	0.98
20-24	127	115	1.10	137	128	1.07	340	275	1.24
25-29	162	164	0.99	249	193	1.29	760	701	1.08
30-34	225	218	1.03	276	239	1.15	779	703	1.11
35-39	210	212	0.99	227	242	0.94	777	725	1.07
40-44	194	211	0.92	318	278	1.14	711	648	1.10
45-49	218	224	0.97	235	233	1.01	681	646	1.05

Table A4.37B: North East

Age Group	2005 Male CEB	2005 Female CEB	2005 Sex ratio	2007 Male CEB	2007 Female CEB	2007 Sex ratio	2012 Male CEB	2012 Female CEB	2012 Sex ratio
15-19	37	30	1.23	30	28	1.07	75	81	0.93
20-24	158	146	1.08	165	154	1.07	369	314	1.18
25-29	260	258	1.01	248	164	1.51	730	603	1.21
30-34	250	221	1.13	290	270	1.07	686	669	1.03
35-39	174	174	100	258	239	1.08	635	593	1.07
40-44	209	204	1.02	204	189	1.08	645	560	1.15
45-49	149	156	0.96	189	160	1.18	559	548	1.02

Table A4.37C: North West

Age Group	2005 Male CEB	2005 Female CEB	2005 Sex ratio	2007 Male CEB	2007 Female CEB	2007 Sex ratio	2012 Male CEB	2012 Female CEB	2012 Sex ratio
15-19	66	61	1.08	109	115	0.95	153	126	1.21
20-24	262	234	1.12	331	317	1.04	494	533	0.93
25-29	334	278	1.20	513	480	1.07	903	804	1.12
30-34	408	356	1.15	561	533	1.05	1248	1114	1.12
35-39	350	301	1.16	421	388	1.09	850	782	1.09
40-44	337	353	0.95	386	382	1.01	847	749	1.13
45-49	221	207	1.07	281	250	1.12	930	814	1.14

Table A4.37D: Sex ratio of Children Ever Born for South East

Age Group	2005 Male CEB	2005 Female CEB	2005 Sex ratio	2007 Male CEB	2007 Female CEB	2007 Sex ratio	2012 Male CEB	2012 Female CEB	2012 Sex ratio
15-19	6	2	3.00	5	7	0.71	11	19	0.58
20-24	10	9	1.11	32	28	1.14	102	83	1.23
25-29	54	33	1.64	76	77	0.99	270	233	1.56
30-34	112	75	1.49	124	105	1.18	335	337	0.99
35-39	176	144	1.22	162	140	1.16	468	463	1.01
40-44	191	184	1.04	187	188	0.99	543	508	1.07
45-49	321	293	1.10	201	186	1.08	610	602	1.01

Table A4.37E: South South

Age Group	2005 Male CEB	2005 Female CEB	2005 Sex ratio	2007 Male CEB	2007 Female CEB	2007 Sex ratio	2012 Male CEB	2012 Female CEB	2012 Sex ratio
15-19	8	9	0.89	13	18	0.72	35	39	0.90
20-24	51	38	1.34	90	73	1.23	220	211	1.04
25-29	102	94	1.09	178	162	1.10	465	424	1.10
30-34	195	180	1.08	194	197	0.98	640	568	1.13
35-39	180	166	1.08	186	217	0.86	598	614	0.97
40-44	197	177	1.11	242	180	1.34	703	651	1.08
45-49	159	143	1.11	222	207	1.07	705	601	1.17

Table A4.37F: South West

Age Group	2005 Male CEB	2005 Female CEB	2005 Sex ratio	2007 Male CEB	2007 Female CEB	2007 Sex ratio	2012 Male CEB	2012 Female CEB	2012 Sex ratio
15-19	13	11	1.18	6	7	0.86	9	10	0.9
20-24	64	54	1.19	67	61	1.10	127	101	1.26
25-29	113	112	1.01	164	160	1.03	398	415	0.96
30-34	167	164	1.02	236	203	1.16	523	535	0.98
35-39	177	154	1.15	190	198	0.96	633	582	1.09
40-44	163	176	0.93	207	204	1.01	558	561	0.99
45-49	270	212	1.27	221	190	1.16	726	656	1.11

Table A4.37D: Sex ratio of Children Ever Born for South East

Age Group	2005 Male CEB	2005 Female CEB	2005 Sex ratio	2007 Male CEB	2007 Female CEB	2007 Sex ratio	2012 Male CEB	2012 Female CEB	2012 Sex ratio
15-19	6	2	3.00	5	7	0.71	11	19	0.58
20-24	10	9	1.11	32	28	1.14	102	83	1.23
25-29	54	33	1.64	76	77	0.99	270	233	1.56
30-34	112	75	1.49	124	105	1.18	335	337	0.99
35-39	176	144	1.22	162	140	1.16	468	463	1.01
40-44	191	184	1.04	187	188	0.99	543	508	1.07
45-49	321	293	1.10	201	186	1.08	610	602	1.01

Table A4.37E: South South

Age Group	2005 Male CEB	2005 Female CEB	2005 Sex ratio	2007 Male CEB	2007 Female CEB	2007 Sex ratio	2012 Male CEB	2012 Female CEB	2012 Sex ratio
15-19	8	9	0.89	13	18	0.72	35	39	0.90
20-24	51	38	1.34	90	73	1.23	220	211	1.04
25-29	102	94	1.09	178	162	1.10	465	424	1.10
30-34	195	180	1.08	194	197	0.98	640	568	1.13
35-39	180	166	1.08	186	217	0.86	598	614	0.97
40-44	197	177	1.11	242	180	1.34	703	651	1.08
45-49	159	143	1.11	222	207	1.07	705	601	1.17

Table A4.37F: South West

Age Group	2005 Male CEB	2005 Female CEB	2005 Sex ratio	2007 Male CEB	2007 Female CEB	2007 Sex ratio	2012 Male CEB	2012 Female CEB	2012 Sex ratio
15-19	13	11	1.18	6	7	0.86	9	10	0.9
20-24	64	54	1.19	67	61	1.10	127	101	1.26
25-29	113	112	1.01	164	160	1.03	398	415	0.96
30-34	167	164	1.02	236	203	1.16	523	535	0.98
35-39	177	154	1.15	190	198	0.96	633	582	1.09
40-44	163	176	0.93	207	204	1.01	558	561	0.99
45-49	270	212	1.27	221	190	1.16	726	656	1.11

Table A4.37D: Sex ratio of Children Ever Born for South East

Age Group	2005 Male CEB	2005 Female CEB	2005 Sex ratio	2007 Male CEB	2007 Female CEB	2007 Sex ratio	2012 Male CEB	2012 Female CEB	2012 Sex ratio
15-19	6	2	3.00	5	7	0.71	11	19	0.58
20-24	10	9	1.11	32	28	1.14	102	83	1.23
25-29	54	33	1.64	76	77	0.99	270	233	1.56
30-34	112	75	1.49	124	105	1.18	335	337	0.99
35-39	176	144	1.22	162	140	1.16	468	463	1.01
40-44	191	184	1:04	187	188	0.99	543	508	1.07
45-49	321	293	1.10	201	186	1.08	610	602	1.01

Table A4.37E: South South

Age Group	2005 Male CEB	2005 Female CEB	2005 Sex ratio	2007 Male CEB	2007 Female CEB	2007 Sex ratio	2012 Male CEB	2012 Female CEB	2012 Sex ratio
15-19	8	9	0.89	13	18	0.72	35	39	0.90
20-24	51	38	1.34	90	73	1.23	220	211	1.04
25-29	102	94	1.09	178	162	1.10	465	424	1.10
30-34	195	180	1.08	194	197	0.98	640	568	1.13
35-39	180	166	1.08	186	217	0.86	598	614	0.97
40-44	197	177	1.11	242	180	1.34	703	651	1.08
45-49	159	143	1.11	222	207	1.07	705	601	1.17

Table A4.37F: South West

Age Group	2005 Male CEB	2005 Female CEB	2005 Sex ratio	2007 Male CEB	2007 Female CEB	2007 Sex ratio	2012 Male CEB	2012 Female CEB	2012 Sex ratio
15-19	13	11	1.18	6	7	0.86	9	10	0.9
20-24	64	54	1.19	67	61	1.10	127	101	1.26
25-29	113	112	1.01	164	160	1.03	398	415	0.96
30-34	167	164	1.02	236	203	1.16	523	535	0.98
35-39	177	154	1.15	190	198	0.96	633	582	1.09
40-44	163	176	0.93	207	204	1.01	558	561	0.99
45-49	270	212	1.27	221	190	1.16	726	656	1.11

Table A4.38A: Sex ratio of Children Surviving for the North Central

Age Group	2005 Male CS	2005 Female CS	2005 Sex ratio	2007 Male CS	2007 Female CS	2007 Sex ratio	2012 Male CS	2012 Female CS	2012 Sex ratio
15-19	20	23	0.95	26	26	1	49	49	1
20-24	96	101	1.01	109	106	1.03	317	254	1.25
25-29	137	135	1.01	213	170	1.25	673	644	1.05
30-34	185	186	0.99	212	199	1.07	701	645	1.09
35-39	168	173	0.97	187	213	0.88	686	653	1.05
40-44	156	169	0.92	253	235	1.08	617	579	1.07
45-49	166	185	0.90	194	201	0.97	560	540	1.04

Table A4.38B: North East

Age Group	2005 Male CS	2005 Female CS	2005 Sex ratio	2007 Male CS	2007 Female CS	2007 Sex ratio	2012 Male CS	2012 Female CS	2012 Sex ratio
15-19	32	23	1.39	26	22	1.18	66	75	0.88
20-24	126	130	0.97	130	128	1.02	330	288	1.15
25-29	201	206	0.98	189	136	1.04	640	534	1.20
30-34	216	188	1.15	224	218	1.03	592	597	0.99
35-39	135	137	0.99	205	198	1.04	544	531	1.02
40-44	150	150	1	160	157	1.02	545	469	1.16
45-49	108	108	1	143	118	1.21	457	446	1.02

Table A4.38C: North West

Age Group	2005 Male CS	2005 Female CS	2005 Sex ratio	2007 Male CS	2007 Female CS	2007 Sex ratio	2012 Male CS	2012 Female CS	2012 Sex ratio
15-19	48	52	0.92	84	93	0.90	133	111	1.20
20-24	210	181	1.16	255	264	0.97	415	473	0.88
25-29	252	224	1.13	385	377	1.02	767	703	1.09
30-34	287	280	1.03	419	416	1.01	995	916	1.09
35-39	247	222	1.11	308	288	1.07	704	664	1.06
40-44	249	253	0.98	279	284	0.98	659	592	1.11
45-49	155	152	1.02	192	192	1	656	630	1.04

Table A4.38A: Sex ratio of Children Surviving for the North Central

Age Group	2005 Male CS	2005 Female CS	2005 Sex ratio	2007 Male CS	2007 Female CS	2007 Sex ratio	2012 Male CS	2012 Female CS	2012 Sex ratio
15-19	20	23	0.95	26	26	1	49	49	1
20-24	96	101	1.01	109	106	1.03	317	254	1.25
25-29	137	135	1.01	213	170	1.25	673	644	1.05
30-34	185	186	0.99	212	199	1.07	701	645	1.09
35-39	168	173	0.97	187	213	0.88	686	653	1.05
40-44	156	169	0.92	253	235	1.08	617	579	1.07
45-49	166	185	0.90	194	201	0.97	560	540	1.04

Table A4.38B: North East

Age Group	2005 Male CS	2005 Female CS	2005 Sex ratio	2007 Male CS	2007 Female CS	2007 Sex ratio	2012 Male CS	2012 Female CS	2012 Sex ratio
15-19	32	23	1.39	26	22	1.18	66	75	0.88
20-24	126	130	0.97	130	128	1.02	330	288	1.15
25-29	201	206	0.98	189	136	1.04	640	534	1.20
30-34	216	188	1.15	224	218	1.03	592	597	0.99
35-39	135	137	0.99	205	198	1.04	544	531	1.02
40-44	150	150	1	160	157	1.02	545	469	1.16
45-49	108	108	1	143	118	1.21	457	446	1.02

Table A4.38C: North West

Age Group	2005 Male CS	2005 Female CS	2005 Sex ratio	2007 Male CS	2007 Female CS	2007 Sex ratio	2012 Male CS	2012 Female CS	2012 Sex ratio
15-19	48	52	0.92	84	93	0.90	133	111	1.20
20-24	210	181	1.16	255	264	0.97	415	473	0.88
25-29	252	224	1.13	385	377	1.02	767	703	1.09
30-34	287	280	1.03	419	416	1.01	995	916	1.09
35-39	247	222	1.11	308	288	1.07	704	664	1.06
40-44	249	253	0.98	279	284	0.98	659	592	1.11
45-49	155	152	1.02	192	192	1	656	630	1.04

Table A4.38D: Sex ratio of Children Surviving for South East

Age Group	2005 Male CS	2005 Female CS	2005 Sex ratio	2007 Male CS	2007 Female CS	2007 Sex ratio	2012 Male CS	2012 Female CS	2012 Sex ratio
15-19	4	2	2	5	7	0.71	11	19	0.58
20-24	10	9	1.11	28	27	1.04	96	79	1.22
25-29	49	33	1.48	65	72	0.90	251	222	1.13
30-34	94	56	1.68	110	92	1.20	303	312	0.97
35-39	145	120	1.20	140	118	1.19	415	427	0.97
40-44	160	156	1.03	163	167	0.98	481	465	1.03
45-49	254	249	1.03	166	158	1.05	549	534	1.03

Table A4.38E: South South

Age Group	2005 Male CS	2005 Female CS	2005 Sex ratio	2007 Male CS	2007 Female CS	2007 Sex ratio	2012 Male CS	2012 Female CS	2012 Sex ratio
15-19	6	8	0.75	13	17	0.76	33	36	0.92
20-24	47	31	1.52	79	65	1.22	200	190	1.05
25-29	87	80	1.09	158	135	1.17	428	393	1.09
30-34	168	150	1.12	152	176	0.86	571	514	1.11
35-39	152	128	1.18	157	190	0.83	521	543	0.96
40-44	170	157	1.08	189	159	1.19	607	580	1.05
45-49	119	113	1.05	176	171	1.03	603	510	1.18

Table A4.38F: South West

Age Group	2005 Male CS	2005 Female CS	2005 Sex ratio	2007 Male CS	2007 Female CS	2007 Sex ratio	2012 Male CS	2012 Female CS	2012 Sex ratio
15-19	13	11	1.18	5	5	1	9	10	0.9
20-24	51	50	1.02	62	55	1.13	115	95	1.21
25-29	106	102	1.04	149	145	1.03	382	394	0.97
30-34	149	145	1.03	202	186	1.09	490	504	0.97
35-39	157	133	1.18	176	186	0.95	582	540	1.08
40-44	143	161	0.89	173	186	0.93	502	517	0.97
45-49	215	180	1.19	180	153	1.18	645	605	1.07

Table A4.39A: Sex ratio of children dead for the North Central

Age Group	2005 Male CD	2005 Female CD	2005 Sex ratio	2007 Male CD	2007 Female CD	2007 Sex ratio	2012 Male CD	2012 Female CD	2012 Sex ratio
15-19	11	5	2.2	5	6	0.833	1	2	0.5
20-24	31	14	2.21	28	22	1.27	23	21	1.10
25-29	25	29	0.86	36	23	1.57	87	57	1.53
30-34	40	32	1.25	64	40	1.6	78	58	1.34
35-39	42	39	1.08	40	29	1.38	91	72	1.26
40-44	38	42	0.90	65	43	1.51	94	69	1.36
45-49	52	39	1.33	41	32	1.28	121	106	1.14

Table A4.39B: North East

Age Group	2005 Male CD	2005 Female CD	2005 Sex ratio	2007 Male CD	2007 Female CD	2007 Sex ratio	2012 Male CD	2012 Female CD	2012 Sex ratio
15-19	5	7	0.71	4	6	0.67	9	6	1.5
20-24	32	16	2	35	26	1.35	39	26	1.5
25-29	59	52	1.13	59	28	2.11	90	69	1.30
30-34	34	33	1.03	66	52	1.27	94	72	1.31
35-39	39	37	1.05	53	41	1.29	91	62	1.47
40-44	59	54	1.09	44	32	1.38	100	91	1.01
45-49	41	48	0.85	46	42	1.10	102	102	1

Table A4.39C: North West

Age Group	2005 Male CD	2005 Female CD	2005 Sex ratio	2007 Male CD	2007 Female CD	2007 Sex ratio	2012 Male CD	2012 Female CD	2012 Sex ratio
15-19	18	9	2	25	22	1.34	20	15	1.33
20-24	52	53	0.98	76	53	1.43	79	60	1.32
25-29	82	54	1.52	128	103	1.24	136	101	1.35
30-34	121	76	1.59	142	117	1.21	253	198	1.28
35-39	103	79	1.30	113	100	1.13	146	118	1.24
40-44	88	100	0.88	107	98	1.09	188	157	1.20
45-49	66	55	1.2	89	58	1.53	274	184	1.49

Table A4.39A: Sex ratio of children dead for the North Central

Age Group	2005 Male CD	2005 Female CD	2005 Sex ratio	2007 Male CD	2007 Female CD	2007 Sex ratio	2012 Male CD	2012 Female CD	2012 Sex ratio
15-19	11	5	2.2	5	6	0.833	1	2	0.5
20-24	31	14	2.21	28	22	1.27	23	21	1.10
25-29	25	29	0.86	36	23	1.57	87	57	1.53
30-34	40	32	1.25	64	40	1.6	78	58	1.34
35-39	42	39	1.08	40	29	1.38	91	72	1.26
40-44	38	42	0.90	65	43	1.51	94	69	1.36
45-49	52	39	1.33	41	32	1.28	121	106	1.14

Table A4.39B: North East

Age Group	2005 Male CD	2005 Female CD	2005 Sex ratio	2007 Male CD	2007 Female CD	2007 Sex ratio	2012 Male CD	2012 Female CD	2012 Sex ratio
15-19	5	7	0.71	4	6	0.67	9	6	1.5
20-24	32	16	2	35	26	1.35	39	26	1.5
25-29	59	52	1.13	59	28	2.11	90	69	1.30
30-34	34	33	1.03	66	52	1.27	94	72	1.31
35-39	39	37	1.05	53	41	1.29	91	62	1.47
40-44	59	54	1.09	44	32	1.38	100	91	1.01
45-49	41	48	0.85	46	42	1.10	102	102	1

Table A4.39C: North West

Age Group	2005 Male CD	2005 Female CD	2005 Sex ratio	2007 Male CD	2007 Female CD	2007 Sex ratio	2012 Male CD	2012 Female CD	2012 Sex ratio
15-19	18	9	2	25	22	1.34	20	15	1.33
20-24	52	53	0.98	76	53	1.43	79	60	1.32
25-29	82	54	1.52	128	103	1.24	136	101	1.35
30-34	121	76	1.59	142	117	1.21	253	198	1.28
35-39	103	79	1.30	113	100	1.13	146	118	1.24
40-44	88	100	0.88	107	98	1.09	188	157	1.20
45-49	66	55	1.2	89	58	1.53	274	184	1.49

Table A4.39A: Sex ratio of children dead for the North Central

Age Group	2005 Male CD	2005 Female CD	2005 Sex ratio	2007 Male CD	2007 Female CD	2007 Sex ratio	2012 Male CD	2012 Female CD	2012 Sex ratio
15-19	11	5	2.2	5	6	0.833	1	2	0.5
20-24	31	14	2.21	28	22	1.27	23	21	1.10
25-29	25	29	0.86	36	23	1.57	87	57	1.53
30-34	40	32	1.25	64	40	1.6	78	58	1.34
35-39	42	39	1.08	40	29	1.38	91	72	1.26
40-44	38	42	0.90	65	43	1.51	94	69	1.36
45-49	52	39	1.33	41	32	1.28	121	106	1.14

Table A4.39B: North East

Age Group	2005 Male CD	2005 Female CD	2005 Sex ratio	2007 Male CD	2007 Female CD	2007 Sex ratio	2012 Male CD	2012 Female CD	2012 Sex ratio
15-19	5	7	0.71	4	6	0.67	9	6	1.5
20-24	32	16	2	35	26	1.35	39	26	1.5
25-29	59	52	1.13	59	28	2.11	90	69	1.30
30-34	34	33	1.03	66	52	1.27	94	72	1.31
35-39	39	37	1.05	53	41	1.29	91	62	1.47
40-44	59	54	1.09	44	32	1.38	100	91	1.01
45-49	41	48	0.85	46	42	1.10	102	102	1

Table A4.39C: North West

Age Group	2005 Male CD	2005 Female CD	2005 Sex ratio	2007 Male CD	2007 Female CD	2007 Sex ratio	2012 Male CD	2012 Female CD	2012 Sex ratio
15-19	18	9	2	25	22	1.34	20	15	1.33
20-24	52	53	0.98	76	53	1.43	79	60	1.32
25-29	82	54	1.52	128	103	1.24	136	101	1.35
30-34	121	76	1.59	142	117	1.21	253	198	1.28
35-39	103	79	1.30	113	100	1.13	146	118	1.24
40-44	88	100	0.88	107	98	1.09	188	157	1.20
45-49	66	55	1.2	89	58	1.53	274	184	1.49

Table A4.39D: Sex ratio of Children Dead for the South East

Age Group	2005 Male CD	2005 Female CD	2005 Sex ratio	2007 Male CD	2007 Female CD	2007 Sex ratio	2012 Male CD	2012 Female CD	2012 Sex ratio
15-19	2	-	-	-	-	-	-	-	-
20-24	-	-	-	4	1	4	6	4	1.5
25-29	5	-	-	11	5	2.2	19	11	1.73
30-34	18	19	0.95	14	13	1.08	32	25	1.28
35-39	31	24	1.29	22	22	1	53	36	1.47
40-44	31	28	1.11	24	21	1.14	62	43	1.44
45-49	67	44	1.52	35	28	1.25	61	68	0.90

Table A4.39E: South South

Age Group	2005 Male CD	2005 Female CD	2005 Sex ratio	2007 Male CD	2007 Female CD	2007 Sex ratio	2012 Male CD	2012 Female CD	2012 Sex ratio
15-19	2	1	2	-	1	-	2	3	0.67
20-24	4	7	0.57	11	8	1.38	20	21	0.95
25-29	15	14	1.07	20	27	0.74	37	31	1.19
30-34	27	30	0.90	42	21	2	69	54	1.28
35-39	28	38	0.74	29	27	1.07	77	71	1.08
40-44	27	20	1.35	53	21	2.5	96	71	1.35
45-49	40	30	1.33	46	36	1.28	102	91	1.12

Table A4.39F: South West

Age Group	2005 Male CD	2005 Female CD	2005 Sex ratio	2007 Male CD	2007 Female CD	2007 Sex ratio	2012 Male CD	2012 Female CD	2012 Sex ratio
15-19	-	-	-	1	2	0.5	-	-	-
20-24	13	4	3.25	5	6	0.83	12	6	2
25-29	7	10	0.7	15	15	1	16	21	0.76
30-34	18	19	0.95	34	17	2	33	31	1.06
35-39	20	21	0.95	14	12	1.67	51	42	1.21
40-44	20	15	1.33	34	18	1.89	56	44	1.27
45-49	55	32	1.72	41	37	1.11	81	51	1.59

Table A4.40A: Mean of Children Ever Born for the zone North Central

Age group	2005 No Of Women	2005 CEB	2005 Mean OF CEB	2007 No Of Women	2007 CEB	2007 Mean OF CEB	2012 No Of Women	2012 CEB	2012 Mean OF CEB
15-19	406	59	0.15	424	63	0.15	1008	101	0.10
20-24	356	242	0.68	368	265	0.72	1142	615	0.54
25-29	254	326	1.28	328	442	1.35	1186	1461	1.23
30-34	224	443	1.98	254	515	2.02	878	1482	1.69
35-39	148	422	2.85	196	469	2.39	676	1502	2.22
40-44	118	405	3.43	180	596	3.31	548	1359	2.48
45-49	128	442	3.45	134	468	3.49	468	1327	2.84

Table A4.40B: North East

Age group	2005 No Of Women	2005 CEB	2005 Mean OF CEB	2007 No Of Women	2007 CEB	2007 Mean OF CEB	2012 No Of Women	2012 CEB	2012 Mean OF CEB
15-19	368	67	0.18	310	58	0.19	922	156	0.17
20-24	288	304	1.06	318	319	1.00	918	683	0.74
25-29	264	518	1.96	232	412	1.78	888	1333	1.50
30-34	174	471	2.71	214	560	2.62	664	1355	2.04
35-39	104	348	3.35	156	497	3.19	488	1228	2.52
40-44	110	413	3.75	116	393	3.39	478	1205	2.52
45-49	68	305	4.49	88	349	3.96	340	1107	3.26

Table A4.40C: North West

Age group	2005 No Of Women	2005 CEB	2005 Mean OF CEB	2007 No Of Women	2007 CEB	2007 Mean OF CEB	2012 No Of Women	2012 CEB	2012 Mean OF CEB
15-19	528	127	0.24	646	224	0.35	1080	279	0.26
20-24	460	496	1.08	564	648	1.5	1158	1027	0.89
25-29	306	612	2.00	474	993	2.09	1076	1707	1.59
30-34	270	764	2.83	374	1094	2.93	1042	2362	2.27
35-39	192	651	3.39	244	809	3.32	592	1632	2.76
40-44	178	690	3.88	218	768	3.52	574	1596	2.78
45-49	124	428	3.45	144	531	3.69	550	1744	3.17

Table A4.40A: Mean of Children Ever Born for the zone North Central

Age group	2005 No Of Women	2005 CEB	2005 Mean OF CEB	2007 No Of Women	2007 CEB	2007 Mean OF CEB	2012 No Of Women	2012 CEB	2012 Mean OF CEB
15-19	406	59	0.15	424	63	0.15	1008	101	0.10
20-24	356	242	0.68	368	265	0.72	1142	615	0.54
25-29	254	326	1.28	328	442	1.35	1186	1461	1.23
30-34	224	443	1.98	254	515	2.02	878	1482	1.69
35-39	148	422	2.85	196	469	2.39	676	1502	2.22
40-44	118	405	3.43	180	596	3.31	548	1359	2.48
45-49	128	442	3.45	134	468	3.49	468	1327	2.84

Table A4.40B: North East

Age group	2005 No Of Women	2005 CEB	2005 Mean OF CEB	2007 No Of Women	2007 CEB	2007 Mean OF CEB	2012 No Of Women	2012 CEB	2012 Mean OF CEB
15-19	368	67	0.18	310	58	0.19	922	156	0.17
20-24	288	304	1.06	318	319	1.00	918	683	0.74
25-29	264	518	1.96	232	412	1.78	888	1333	1.50
30-34	174	471	2.71	214	560	2.62	664	1355	2.04
35-39	104	348	3.35	156	497	3.19	488	1228	2.52
40-44	110	413	3.75	116	393	3.39	478	1205	2.52
45-49	68	305	4.49	88	349	3.96	340	1107	3.26

Table A4.40C: North West

Age group	2005 No Of Women	2005 CEB	2005 Mean OF CEB	2007 No Of Women	2007 CEB	2007 Mean OF CEB	2012 No Of Women	2012 CEB	2012 Mean OF CEB
15-19	528	127	0.24	646	224	0.35	1080	279	0.26
20-24	460	496	1.08	564	648	1.5	1158	1027	0.89
25-29	306	612	2.00	474	993	2.09	1076	1707	1.59
30-34	270	764	2.83	374	1094	2.93	1042	2362	2.27
35-39	192	651	3.39	244	809	3.32	592	1632	2.76
40-44	178	690	3.88	218	768	3.52	574	1596	2.78
45-49	124	428	3.45	144	531	3.69	550	1744	3.17

Table A4.40D: Mean of Children Ever Born for South East

Age group	2005 No Of Women	2005 CEB	2005 Mean OF CEB	2007 No Of Women	2007 CEB	2007 Mean OF CEB	2012 No Of Women	2012 CEB	2012 Mean OF CEB
15-19	348	8	0.02	298	12	0.04	882	30	0.03
20-24	208	19	0.09	250	60	0.24	784	185	0.24
25-29	148	87	0.59	194	153	0.79	726	503	0.69
30-34	116	187	1.61	146	229	1.57	554	672	1.21
35-39	126	320	2.54	130	302	2.32	536	931	1.74
40-44	120	375	3.13	136	375	2.46	500	1051	2.10
45-49	172	614	3.57	124	387	3.12	534	1212	2.27

Table A4.40E South South

Age group	2005 No Of Women	2005 CEB	2005 Mean OF CEB	2007 No Of Women	2007 CEB	2007 Mean OF CEB	2012 No Of Women	2012 CEB	2012 Mean OF CEB
15-19	320	17	0.05	342	31	0.09	902	74	0.08
20-24	276	89	0.32	312	163	0.52	914	431	0.47
25-29	220	196	0.89	290	340	1.17	932	889	0.95
30-34	196	375	1.91	216	391	1.81	774	1208	1.56
35-39	118	346	2.93	172	403	2.34	564	1212	2.15
40-44	102	374	3.02	142	422	2.97	510	1354	2.65
45-49	124	302	2.96	126	429	3.40	468	1306	2.79

Table A4.40F South West

Age group	2005 No Of Women	2005 CEB	2005 Mean OF CEB	2007 No Of Women	2007 CEB	2007 Mean OF CEB	2012 No Of Women	2012 CEB	2012 Mean OF CEB
15-19	362	24	0.07	356	13	0.04	746	19	0.03
20-24	358	118	0.33	350	128	0.37	710	228	0.32
25-29	292	225	0.77	350	324	0.93	996	813	0.82
30-34	224	331	1.48	272	439	1.61	789	1058	1.34
35-39	166	331	1.99	190	388	2.04	666	1215	1.82
40-44	144	339	2.35	172	411	2.39	512	1119	2.19
45-49	162	482	2.98	144	411	2.85	606	1382	2.28

Table A4.41A: Proportion of children dead by sex according to the age group of the mother for the urban area

	2005		2007		2012	
Age group	Male	Female	Male	Female	Male	Female
15-19	0.1000	0.0741	0.1212	0.1220	0.0741	0.0536
20-24	0.2078	0.0915	0.1686	0.1469	0.0961	0.0709
25-29	0.1443	0.1157	0.1476	0.0720	0.0840	0.0701
30-34	0.1367	0.135	0.1697	0.1245	0.0935	0.0907
35-39	0.1162	0.1448	0.1247	0.1135	0.0855	0.0791
40-44	0.1680	0.1460	0.1670	0.0854	0.0994	0.0907
45-49	0.1870	0.1855	0.2000	0.1780	0.1394	0.0957

Table A4.41B: Rural Area

	2005		2007		2012	
Age group	Male	Female	Male	Female	Male	Female
15-19	0.2553	0.1754	0.1925	0.1916	0.1004	0.0852
20-24	0.1931	0.1784	0.1997	0.1538	0.1148	0.0958
25-29	0.2057	0.1908	0.2033	0.1973	0.1181	0.0990
30-34	0.2138	0.1904	0.2333	0.1857	0.1486	0.1250
35-39	0.2491	0.2348	0.2200	0.1887	0.14500	0.1177
40-44	0.2190	0.2220	0.2305	0.1955	0.1671	0.1449
45-49	0.2613	0.2067	0.2296	0.1946	0.1900	0.1794

Table A4.42A: Proportion of children dead by sex according to the age group of the mother for North central

	2005		2007		2012	
Age group	Male	Female	Male	Female	Male	Female
15-19	0.3548	0.1786	0.1613	0.1875	0.0200	0.0392
20-24	0.2441	0.1217	0.2044	0.1719	0.0676	0.0764
25-29	0.1543	0.1768	0.1446	0.1192	0.1145	0.0813
30-34	0.1778	0.1468	0.2319	0.1674	0.1001	0.0825
35-39	0.2000	0.1840	0.1762	0.1198	0.1171	0.0993
40-44	0.1959	0.1991	0.2044	0.15468	0.1322	0.1065
45-49	0.2385	0.1741	0.1745	0.13373	0.1777	0.1641

Table A4.42B: North East

	2005		2007		2012	
Age group	Male	Female	Male	Female	Male	Female
15-19	0.1351	0.2333	0.1333	0.2143	0.1200	0.0740
20-24	0.2025	0.1096	0.2121	0.1688	0.1057	0.0828
25-29	0.2269	0.2016	0.2379	0.1707	0.1233	0.1144
30-34	0.1360	0.1493	0.2276	0.1926	0.1370	0.1076
35-39	0.2241	0.2126	0.2054	0.1715	0.1433	0.1046
40-44	0.2823	0.2647	0.2157	0.1693	0.1550	0.1625
45-49	0.2752	0.3077	0.2434	0.2625	0.1825	0.1861

Table A4.42C: North West

	2005		2007		2012	
Age group	Male	Female	Male	Female	Male	Female
15-19	0.2727	0.1475	0.2294	0.1913	0.1307	0.1191
20-24	0.1984	0.2265	0.2296	0.1672	0.1599	0.1126
25-29	0.2455	0.1942	0.2495	0.2146	0.1506	0.1256
30-34	0.2966	0.2135	0.2531	0.2195	0.2027	0.1778
35-39	0.2943	0.2135	0.2684	0.2577	0.1718	0.1509
40-44	0.2611	0.2625	0.2773	0.2565	0.2220	0.2096
45-49	0.2986	0.2657	0.2565	0.2320	0.2946	0.2260

Table A4.42D: Proportion of children dead by sex according to the age group of the mother for South East

	2005		2007		2012	
Age group	Male	Female	Male	Female	Male	Female
15-19	0.3333	-	-	-	-	-
20-24	-	-	0.125	0.0357	0.0588	0.0482
25-29	0.0926	-	0.1447	0.0649	0.0704	0.0472
30-34	0.1607	0.2533	0.1129	0.1238	0.0955	0.0742
35-39	0.1761	0.1667	0.1358	0.1571	0.1132	0.0778
40-44	0.1623	0.1522	0.1283	0.1117	0.1142	0.0846
45-49	0.2087	0.1502	0.1741	0.1505	0.1000	0.1130

Table A4.42E: South South

	2005		2007		2012	
Age group	Male	Female	Male	Female	Male	Female
15-19	0.2500	0.1111	-	0.0556	0.0571	0.0769
20-24	0.0784	0.1842	0.1222	0.1096	0.0909	0.1000
25-29	0.1471	0.1489	0.1124	0.1667	0.0796	0.0731
30-34	0.1385	0.1667	0.2165	0.1066	0.1078	0.0951
35-39	0.1556	0.2289	0.1559	0.1244	0.1288	0.1156
40-44	0.1371	0.1129	0.2190	0.1167	0.1366	0.1091
45-49	0.2518	0.2098	0.2072	0.1739	0.1447	0.1514

Table A4.42F: South West

	2005		2007		2012	
Age group	Male	Female	Male	Female	Male	Female
15-19	-	-	0.1667	0.2857	-	-
20-24	0.2031	0.0741	0.0746	0.0984	0.0945	0.0594
25-29	0.0619	0.0893	0.0915	0.0938	0.0402	0.0506
30-34	0.1078	0.1159	0.1441	0.0837	0.0631	0.0579
35-39	0.1130	0.1364	0.0737	0.0606	0.0806	0.0722
40-44	0.1227	0.0852	0.1643	0.0882	0.1004	0.0784
45-49	0.2037	0.1509	0.1855	0.1947	0.1116	0.0778

Table A4.43A Reported and Adjusted age of NARHS 2005 (male in urban area)

Age group	Reported Frequency	Carrier Farrag	Arriaga
15-19	410		241
20-24	367		332
25-29	273	317	308
30-34	219	215	214
35-39	164	168	169
40-44	144	131	131
45-49	96	109	109
50-54	90	106	104
55-59	75		81
60-64	71		
Total	1909	1125	1689

Table A4.43B. Reported and Adjusted age of NARHS 2005 (female in urban area)

Age group	Reported Frequency	Carrier Farrag	Arriaga
15-19	392		231
20-24	344		320
25-29	274	308	299
30-34	228	211	210
35-39	151	168	169
40-44	129		247
45-49	118		
Total	1636	687	1475

Table A4.44A: Reported and Adjusted age of NARHS 2005(male in rural area)

Age group	Reported Frequency	Carrier Farrag	Arriaga
15-19	852		472
20-24	533		506
25-29	439	472	466
30-34	390	367	366
35-39	283	306	307
40-44	264	256	256
45-49	207	215	215
50-54	193	184	183
55-59	137		147
60-64	189		
Total	3487	1946	2918

Table A4.44B: Reported and Adjusted age of NARHS 2005 (female in rural area)

Age group	Declared respondents	Carrier Farrag	Arriaga
15-19	774		446
20-24	629		572
25-29	468	560	525
30-34	374	537	354
35-39	276	650	296
40-44	268		528
45-49	260		
Total	3049	1747	2721

Table A4.45A. Reported and Adjusted age of NARHS 2007 (male in urban area)

Age group	Reported Frequency	Carrier Farrag	Arriaga
15-19	413		251
20-24	400		381
25-29	336	368	355
30-34	237	231	231
35-39	178	184	184
40-44	157	165	164
45-49	142	134	135
50-54	102	105	104
55-59	78		76
60-64	75		
Total	2118	1262	1881

Table A4.45B. Reported and Adjusted age of NARHS 2007 (female in urban area)

Age group	Reported Frequency	Carrier Farrag	Arriaga
15-19	407		245
20-24	363		357
25-29	337	356	343
30-34	262	264	263
35-39	210	208	210
40-44	150		150
45-49	118		
Total	1847	828	1567

Table A4.46A. Reported and Adjusted age of NARHS 2007 (male in rural area)

Age group	Reported Frequency	Carrier Farrag	Arriaga
15-19	867		505
20-24	679		672
25-29	610	633	618
30-34	396	416	415
35-39	358	338	339
40-44	303	307	306
45-49	259	255	256
50-54	213	201	200
55-59	146		159
60-64	212		
Total	4043	2308	3469

Table A4.46B. Reported and Adjusted age of NARHS 20007 (female in rural area)

Age group	Reported Frequency	Carrier Farrag	Arriaga
15-19	783		469
20-24	721		680
25-29	599	663	640
30-34	479	448	447
35-39	336	367	368
40-44	333		284
45-49	262		
Total	2113	1478	2887

Table A4.47A. Reported and Adjusted age of NARHS 2012 (male in urban area)

Age group	Reported Frequency	Carrier Farrag	Arriaga
15-19	767		466
20-24	668		679
25-29	706	723	695
30-34	650	621	621
35-39	515	544	544
40-44	466	445	443
45-49	342	363	365
50-54	319	520	295
55-59	201		225
60-64	240		
Total	4874	3216	4333

Table A4.47B. Reported and Adjusted age of NARHS 2012 (female in urban area)

Age group	Reported Frequency	Carrier Farrag	Arriaga
15-19	800		516
20-24	815		890
25-29	980	959	905
30-34	813	752	750
35-39	576	637	639
40-44	467		442
45-49	462		
Total	4913	2348	4142

Table A4.48A. Reported and Adjusted age of NARHS 2012 (male in rural area)

Age group	Reported Frequency	Carrier Farrag	Arriaga
15-19	1706		1,012
20-24	1367		1,356
25-29	1392	1,447	1,403
30-34	1337	1,320	1,323
35-39	1181	1,198	1,195
40-44	1067	1,016	1,013
45-49	801	852	855
50-54	782	708	701
55-59	464		545
60-64	625		
Total	10722	7079	9403

Table A4.48B. Reported and Adjusted age of NARHS 2012 (female in rural area)

Age group	Reported Frequency	Carrier Farrag	Arriaga
15-19	1970		1,230
20-24	1998		1,979
25-29	1922	2,039	1,941
30-34	1536	1,465	1,461
35-39	1185	1,256	1,260
40-44	1094		986
45-49	1021		
Total	10726	4760	8856

Table A4.48A. Reported and Adjusted age of NARHS 2012 (male in rural area)

Age group	Reported Frequency	Carrier Farrag	Arriaga
15-19	1706		1,012
20-24	1367		1,356
25-29	1392	1,447	1,403
30-34	1337	1,320	1,323
35-39	1181	1,198	1,195
40-44	1067	1,016	1,013
45-49	801	852	855
50-54	782	708	701
55-59	464		545
60-64	625		
Total	10722	7079	9403

Table A4.48B. Reported and Adjusted age of NARHS 2012 (female in rural area)

Age group	Reported Frequency	Carrier Farrag	Arriaga
15-19	1970		1,230
20-24	1998		1,979
25-29	1922	2,039	1,941
30-34	1536	1,465	1,461
35-39	1185	1,256	1,260
40-44	1094		986
45-49	1021		
Total	10726	4760	8856