HACETTEPE UNIVERSITY INSTITUTE OF POPULATION STUDIES

Technical Demography Program

DATA QUALITY ASSESSMENT OF BIRTH HISTORY DATA IN TURKEY DEMOGRAPHIC AND HEALTH SURVEYS

YADİGAR COŞKUN

Dissertation Submitted in Partial Fulfillment of the Requirements

for the Degree of Doctor of Philosophy

in Technical Demography

ANKARA, SEPTEMBER 2008

HACETTEPE UNIVERSITY INSTITUTE OF POPULATION STUDIES

Technical Demography Program

DATA QUALITY ASSESSMENT OF BIRTH HISTORY DATA IN TURKEY DEMOGRAPHIC AND HEALTH SURVEYS

YADİGAR COŞKUN

Supervisor

Assoc. Prof. İsmet KOÇ

ANKARA, SEPTEMBER 2008

ACCEPTANCE AND APPROVAL

This is to certify that we have read and examined this thesis and that in our opinion it is fully adequate, in scope and quality, as a thesis for the degree of Doctor of Philosophy in Technical Demography.

Examining Committee Members

Member (Chair): ……
Prof. Dr. H. Öztaş AYHAN, Middle East Technical University, Faculty of Arts and Sciences, Department of Statistics

Member (Supervisor): ……
Assoc. Prof. Dr. İsmet KOÇ, Hacettepe University, Institute of Population Studies

Member: ……
Assoc.Prof.Dr. Banu ERGÖÇMEN, Hacettepe University, Institute of Population Studies

Member: ……
Assist.Prof.Dr. Şeref HOŞGÖR, Baskent University, Faculty of Commercial Sciences, Department of Insurance and Risk Management

Member: ……
Assist.Prof.Dr. A. Sinan TÜRKYILMAZ, Hacettepe University, Institute of Population Studies

This thesis has been accepted by the above-signed members of the Committee and has been confirmed by the Administrative Board of the Institute of Population Studies, Hacettepe University
Date:

…….

Prof. Dr. Sabahat TEZCAN
Director

ABSTRACT

Turkey has a considerably long history of nationwide demographic and health surveys. Starting from 1963 Turkish Demographic Survey to 2003 Turkey Demographic and Health Survey (TDHS-2003) eleven national surveys had been carried out. Eight of these surveys were done by Hacettepe University Institute of Population Studies (HUIPS). The last three of the surveys are based on the Demographic and Health Survey (DHS) phase-3 program.

Despite the importance of its content and widely used characteristics of the TDHS data, the data quality are not evaluated in a broad sense in terms of the quality of the data having direct effect on fertility and mortality indicators. To evaluate the data quality of TDHSs focusing on special variables effective on mortality and fertility rates is aimed at this study. While discussing the overall quality of the data, the impact of the quality on fertility and mortality rates are also aimed to be evaluated. By using the simulations the effect of the data quality problems on Total Fertility Rate, Infant Mortality Rate, Child Mortality Rate and Under-Five Mortality Rate are evaluated. Assessing the data quality of DHS gives an idea about the common errors faced. The results are discussed to give suggestions for future surveys.

The overall data quality at TDHS seems in good condition. Although age heaping and digit preference problems are seen at the data, they are at tolerable levels. On the other hand, the results of the simulations and estimations indicate that the problems at data quality have no clear impact on the fertility and mortality rates. The results indicate that regional and residential differences are seen in terms of the quality of the data. The quality of data seems better at urban areas than rural. As the overall data quality of the studied variables are high; among three surveys TDHS-1993 and TDHS-2003 have higher data quality as compared to TDHS-1998.

ÖZET

Türkiye ulusal düzeyde gerçekleştilien nüfus ve sağlık araştırmaları konusunda oldukça uzun sayılabilecek bir geçmişe sahiptir. 1963 Türkiye Nüfus Araştırmasından 2003 Türkiye Nüfus ve Sağlık Araştırmasına değin onbir ulusal araştırma gerçekleştirilmiştir. Bu araştırmaların sekiz tanesi Hacettepe Üniversitesi Nüfus Etütleri Enstitüsü (HÜNEE) tarafından yürütülmüştür. Bu araştırmaların son üç tanesi Nüfus ve Sağlık Araştırmaları (DHS) programı temel alınarak gerçekleştirilmiştir.

TNSA verisinin içerik önemi ve sıklıkla kullanımına rağmen doğurganlık ve ölümlülük göstergeleri üzerinde doğrudan etkisi olan değişkenler geniş çaplı incelenmemiştir. Bu çalışmada TNSA'nın veri kalitesinin ölümlülük ve doğurganlık hızları üzerinde etkisi olan seçilmiş değişkenler üzerine odaklanılarak incelenmesi amaçlanmıştır. Verinin genel kalitesinin tartışılmasının yanı sıra doğurganlık ve ölümlülük hızları üzerine olan etkisi nin ölçülmesi de hedeflenmiştir. Simülasyonlar kullanılarak, veri kalitesi sorunlarının Toplam Doğurganlık Hızı, Bebek Ölüm Hızı, Çocuk Ölüm Hızı ve Beş Yaş Altı Ölüm Hızı üzerindeki etkisi değerlendirilmiştir. TNSA'nın veri kalitesinin değerlendirilmesi karşılaşılan genel sorunlar hakkında bir fikir verecektir. Sonuçlar gelecekte yapılacak olan araştırmalar açısından öneri verecek şekilde incelenmiştir.

Genel olarak TNSA veri kalitesi iyi durumdadır.. Yaşa ilişkin değerlendirmelerde yaş yığılması ve basamak tercihi gibi sorunlar görülmesine rağmen sorunların boyutları kabul edilebilir düzeylerdedir. Simülasyon ve diğer hesaplamalar veri kalitesi problemlerinin doğurganlık ve ölümlülük hızları üzerinde çok net bir etkisinin olmadığını göstermektedir. Sonuçlar, bölgesel ve yerleşim yeri tipi bağlamında farklılıkların olduğunu, genel olarak kentten elde edilen bilginin kıra göre daha iyi olduğunu ortaya çıkarmaktadır. Her üç araştırma için çalışılan değişkenler için genel veri kalite düzeyi yüksek olmakla birlikte bu araştırmalar arasında TNSA-1993 ve TNSA-2003'nın veri kalitesi TNSA-1998'e göre daha yüksektir.

ACKNOWLEGDEMENTS

I would like to start to thank to my colleagues at Hacettepe University Institute of Population Studies (HUIPS) for their support to complete this study. My supervisor Assoc.Prof. Dr. İsmet Koç contributed this study in every stage and he never lost his interest and support. Sometimes I lost myself among the surveys carried out at the institute but he was very good at reminding me my first and important duty was to complete this thesis.

Prof.Dr. H. Öztaş Ayhan and Assoc.Prof.Dr. Şeref Hoşgör as being two members of my jury gave valuable criticisms on my thesis. I like to express my gratitude to them and my other jury member Assoc.Prof. Dr. Banu Ergöçmen who is the first person I met at the institute. I also like to thank to my two other jury members Assoc.Prof.Dr. Turgay Ünalan and Assist. Prof.Dr. A. Sinan Türkyılmaz not only gave valuable comments and advices writing the thesis but behaved like two elder brothers.

I would like to express my gratitude to Assoc.Prof.Dr. Attila Hancıoğlu who gave me the idea for this study. I am also grateful to Prof.Dr. Sabahat tezcan in believing me to complete this study. During the master program and PhD, I had chance to take lectures from him. I feel the support and encourage of my roommates at the institute and wish to thank to their friendship and support starting from Dr. Sutay Yavuz, Erhan Özdemir and Mehmet Ali Eryurt. I appreciate to Dr. Elif Yiğit for her friendship during the time I'm at HUIPS. I would like to thank to my research assistant colleagues Pelin Çağatay, Hande Tunçkanat and Tuğba Adalı for their friendship and smiling faces. A special thank must go to Dr. Şebnem Canpolat my dear classmate and friend, who was with me in every stage of the study and encouraged me to complete my PhD. Güler Sel, Leyla Budak and Cahide Alcu gave me support during my PhD and I would like to thank to them for creating a suitable environment for completing my study.

I would like to thank to the members of my family. A special thank goes to my mother who was calling me “Doctor” even before I started Primay School. I gave her a word to become a doctor and with this study I think I’m keeping it. My father is a great person and I am grateful to him for supporting me during my life. I would also like to thank to my brothers Mustafa and İsmail, and sisters Hediye and Armağan for believing in me to complete this study. I also like to thank to my little sister Dilan for always reminding me to study hard to complete this thesis.

I am also grateful to my mother-in-love Fethiye Atay and father-in-law Şevket Atay for their encouragement and hospitality during the visits of their house. I thank to my sister-in law Kamuran who created extra time by sharing my duties at home. I give my deepest thanks to my beloved wife Neslihan; she was patient and lovely and in every means of support she gave me during my PhD. Without her I would not complete this study.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

TO MY FAMILY:

WHICH I WAS BORN INTO,

WHICH I HAVE CREATED...

I. INTRODUCTION AND OBJECTIVES

I.1. Introduction

Fertility, mortality and migration are the three main study areas of demography. Since the first studies considered as “demographic” made by academicians, scientists or researchers; these subjects have been “sine qua non” (without which -there is-nothing") for most of the studies. As they are the main components of the population change, most of the studies on demography are related with them. The need for accurate, complete and up to date data is crucial for demographic studies. The vital registration systems aim to record these basic demographic events regularly for the whole population. In addition, both various small scale and the worldwide demographic surveys are designed to get information on fertility, mortality and migration. With statistical approaches, specific rates, proportions, ratios and various indexes are developed on these subjects to evaluate the differences within and between populations. In most of the developing countries, sample surveys and censuses are the main sources used to estimate available demographic indicators since the vital registration systems have both coverage and quality and reliability problems.

As the surveys are the only source for various demographic events and rates; the quality of the survey data is crucial. Not only the researchers who conduct these surveys, but also the academicians and policy makers who evaluate the survey results concern about the quality of the data. Reliable data gathered from field surveys is valuable and important to estimate reliable indicators which are commonly used by policy makers in the countries where registration systems have no ability to produce these indicators. In addition, up to date and better quality data are constantly pursued at the country level by governments, nongovernmental organizations and international organizations to develop policies, programs and interventions, and to

monitor their accomplishments in improving the living conditions of different populations. Moreover, at the international level, good quality data is needed to monitor the goals and targets agreed at international forums and in particular for the Millennium Development Goals (Loaiza, 2004).

In Turkey, besides censuses, nationwide surveys starting from 1963 Turkish Demographic Survey to 2003 Turkey Demographic and Health Survey had been carried out by School of Public Health, Ministry of Health and Hacettepe University Institute of Population Studies (HUIPS). Surveys were designed to collect data on various demographic and health subjects are the only sources for many demographic indicators commonly used by not only social scientists but policy makers as well. The information collected by the surveys is used to determine the demographic situations at the time of survey and evaluate the trends and changes of the demographic indicators within the survey periods. The main concern of these surveys was to put on the demographic situation within the intercensal periods for Turkey. These surveys were applied at the years ending 3 and 8 after 3 years of each census. Nearly all of these surveys were a part of worldwide demographic and health surveys and especially technical assistance was provided by the international agencies (HUIPS, 2008, Macro International Inc, 2008). Therefore, at the critical stages of the survey like sampling, questionnaire design, data entry, tabulation and dissemination the experience of the international agencies helped the quality of the overall survey.

Surveys -because of their nature- carry certain problems with themselves depending on their sample design, data collection, methodology, questionnaire design, wording and sequence of the questions, interviewers' training period, content and the topic interested in. In addition, the errors may be large or small depending on the obstacles to accurate recording which are present in the area concerned, the methods used in compiling the data, and the relative efficiency which the methods are applied (UN, 1955). It is possible to minimize the effect of these errors on the quality of the results of a survey; getting rid of them is impossible. Errors can be classified into two broad categories; sampling and non-sampling errors.

In most of the developing countries there exists a gap for reliable data sets for the precise estimation of demographic indicators. In countries where reliable demographic data is scarce, the estimates based on the birth history module in demographic and health surveys are particularly desirable to obtain important demographic measures. (Goldman, et al. 1979). Likewise, demographic and health surveys conducted in Turkey are accepted as the sources for accurate and reliable results about population components. However, potential errors arise from the survey data are the main misleaders for the data users as it is in other sample surveys. They cannot be free from both sampling and non-sampling errors that may produce biased results. In both Turkish and international literature, there are various studies about the errors originated from respondent, interviewer and data collection tools in censuses and surveys which are being studied with indexes like Myers and Whipple (Al Abdel 1987, Albayrak 1991, Tungul 1995) However, these studies are limited in a descriptive position in which there is only the amount of the deviations from the expected age structure have been studied.

The last three of the surveys carried out by HUIPS is based on the Demographic and Health Survey (DHS) phase-3. With Turkey Demographic and Health Surveys (TDHSs) 1993, 1998 and 2003 -as a standard schedule- HUIPS published preliminary reports followed by main report and summary reports in which various topics covered by questionnaires are included. However, data quality of the study is discussed in a limited way, not in line with its importance. Only basic data quality tables were supplied in TDHS-93 and TDHS-98 main reports in Appendix D sections (HUIPS 1994, 1999). Similarly, in TDHS-2003 main report, in addition to the tables a brief explanation of the tables had found place for the first time (HUIPS, 2004). However, these “basic” data quality tables are inadequate for DHSs as compared to their value. On the other hand the data quality of TDHS-1993 was studied at the further analysis report in 1997 by HUIPS staff (HUIPS, 1997). Hancıoğlu (1997) at this report discuss the data quality of TDHS-1993 both on household and ever married women levels.

Assessment of the data quality of the birth history and data used for direct estimation of infant and child mortality is very important. DHS program carried out only in developing countries and most of the developing countries have known to be famous with having high fertility and infant and child mortality rates. Therefore the quality of the data of these issues are more essential than any other sections in terms of having reliable estimations which is valuable for policy makers to monitor the future programs. In Turkey, the plans, programs, policies and estimations for resources (human, financial) developed by the Ministry of Health and State Planning Organization are based on these rates. In Official Statistical Program organized by Turkish Statistical Institute (TURKSTAT) for the years 2007-2011, selected indicators of TDHSs are accepted as "official statistics" under "health statistics" and "demographic statistics" sections.

I. 2. Objectives

This study has three different but highly interrelated aims. The first one is to evaluate the data quality of TDHSs. As the nationwide surveys carried out by HUIPS is well-known with their accurate and reliable results on various demographic and health issues. However, it seems important to assess the data quality of TDHSs in order to put forward the strong and weak points in terms of data quality. Same statistical tests of data quality are going to be applied to all three TDHSs, so that the general quality of the data sets can be assessed and a comparison between these surveys can be done.

Infant Mortality Rate (IMR) and Child Mortlity Rate (CMR) are seen as the critical measures of the wellbeing of the children and a good proxy indicator of the overall level of development of the country. Moreover, fertility rates are very important in terms of the effects both on the quality and the quantity of the population. The quality of the data used for the direct estimation of infant and child mortality (IMR and CMR) and fertility is the primary concern of this study. However not only the women but the data collected at household level is going to be studied on. As the eligibility of ever married women for applying the women questionnaire is decided

on the information collected at the household list, the quality of age and usual residency information is crucial for the data quality.

The focus of the data quality evaluation at ever married questionnaire is first on the age and birth date data of the woman at the first section of the questionnaire and the birth history section. Birth history data is the source for estimating the fertility and infant and child mortality rates. This study is interested in the possible and observed errors in birth history data in TDHSs. As the birth and death date of the child has direct effect on fertility and mortality rates. The quality of the birth and death date is aimed to be studied at this study.

To evaluate the effects of the errors on fertility and mortality rates is the second aim of this study. Both the information at the household questionnaire and ever married individual data is used to determine the effect of data quality on the mortality and fertility rates. The impact of the displacement of the eligible women out of ages 45-49 and the sleeping away exclusion of the women on Total Fertility Rate and Under Five Mortality Rates are going to be studied. In addition, the effect of heaping on 12^{th} month on age at death is going to be studied on the Infant Mortality Rate and Child Mortality Rate.

The third aim of this study is to identify the errors that are inherit in TDHSs which may indicate problems that need to be addressed or changes that need to be made in future surveys. DHSs are alike with other many small/large scale field surveys in terms of non sampling errors. The underlying reasons for the possible non-sampling errors effecting data quality and solutions to free from these errors will be studied. The possible reasons of the errors and the ways to overcome these errors are going to be discussed at this study.

I.3. Contributions of the Study

The TDHSs 1993, 1998 and 2003 results and datasets are used not only by HUIPS staff, but social scientists form different departments, universities and policy makers as well. Despite its broad usage, the data quality of the surveys is not studied in detail. This study will help the users to judge the survey results in a more correct situation and the gap on assessing the data quality is going to be filled. The overall quality of the data used for the fertility and mortality of children is aimed to be studied.

Assessing the data quality of TDHS will both put forward the strong and weak sides of the TDHSs in terms of data quality and give suggestions for future demographic studies in the lights of results. The data quality problems according to the questionnaire and fieldwork will be evaluated at this study. Therefore, the results of this study will be helpful for the researchers who are going to carry future demographic surveys.

The lessons learned at these surveys in terms of improving the data quality of the further studies are also going to be discussed. The common data quality problems at TDHSs and the proposals for the solution are aimed to be discussed.

I. 4. Organization of the Study

Study starts with the introduction chapter where the justification of the topic selected for this thesis is mentioned at the first stage. The reasons to estimate the data quality of TDHSs are discussed. In addition, the objectives and the contribution of the thesis to the literature are discussed at this chapter too. Chapter ends with the organization of the thesis which will also help the readers to understand the coverage of the thesis.

In Chapter II, the literature review on the data assessment of the surveys is discussed. The former studies will be evaluated and the content and the contribution these

studies are presented. Chapter III is reserved for the data and the methodology in which the history of the Demographic and Health surveys in the World and Turkey is presented. In addition the structure of DHSs –the questionnaires used, the months they carried on, the sampling design, etc. - specifically TDHSs is discussed here.

In Chapter IV, the assessment of the data used to determine the eligibility for the individual interview is presented. The household interview results' are evaluated in terms of result codes. Age information of the members of the household list is going to be studied in the household questionnaire. The main focus is the digit preference which is evaluated with Myers Blended Index and Whipple Index. While examining the quality of the age data at household survey, some important characteristics (age, sex, relationship to the household, education level, etc) of the respondent with whom the questionnaire is filled are going to be discussed.

In addition, the reported age of the women which has direct effect of the eligibility of the women is discussed. The scope of error is going to be evaluated with upper boundary and lower boundary effect indices. Moreover, by assessing the results for the question on the information whether the women stayed last night at the house which shows the extent of the problem of the exclusion of women who did not sleep the night before the interview is discussed.

The assessment of age data in individual questionnaire is also aimed to be studied at the fourth chapter. The methods on the age information at the individual data are discussed at this part of the chapter. Myers and Whipple Indexes are estimated to understand the extent of the digit preference. In addition to these calculations, five year age group distortions are computed to understand the total picture of the age distribution problem. In addition the extent of the imputation on age information is discussed.

The quality of the birth history data is placed at Chapter V. The answers to the questions: What is the extent of missing information of the birth dates of the children? In what percentage is the imputation done? are aimed to be answered. The

problem of carrying the birth dates of the children out of the five year period which gives the interviewer to escape from the workload of asking additional questions in the next sections of the questionnaire about the children under five. This problem is discussed in terms of the length of the section about the children under five. In addition the duration of the interviewer in the field, and the comparison of interviewers with other interviewers in terms of the quality of the data are going to be done.

The digit preference and the age heaping problems in the birth history data are also going to be discussed at Chapter V. The problem of miscalculation of year of birth by either the interviewer, or the respondent is discussed. If the mother doesn't know the birth month of the children, either the respondent or the interviewer may calculate the age of the children by easily subtracting the year of birth from the year of interview. If the month of birth is not known and the age of the respondent is not equal to the result of the subtraction of year of interview and year of birth then the age is imputed during the data entry. The level that the imputation done is important in terms of data quality of the TDHSs and assessed at this chapter.

On the other hand, the quality of the data used for the direct estimation of infant and child mortality is also evaluated at Chapter V. The completeness of the date of birth data and its accuracy is re-discussed (heaping, omission, etc.) at this chapter. The completeness of the age at death data and the extent of the missing information are going to be evaluated. Moreover at this chapter the accuracy of the data; the age heaping problem especially on month 12 and its impacts on mortality estimates is also going to be discussed.

The Impact of the Quality of Data on Fertility and Mortality Rates is discussed at the last section of Chapter V. The impacts of the problems in data on rates are discussed with giving references to each of the estimation. The last part of the chapter assesses the simulations made which will show the effect of the possible data quality problems on the Total Fertility, Under Five Mortality and Infant Mortality Rates.

Chapter VI. is reserved for discussion and conclusion. The results are evaluated to discuss the solutions to reduce or eliminate these problems in the future. The overall data quality estimations are assessed at this chapter and comments and results for future studies are discussed. In addition, the efforts made on the field study to decrease the errors on the data and a new approach to data entry which may have effects on data quality is also discussed at this chapter.

II. LITERATURE REVIEW

The literature on the data quality of surveys has a long history at social sciences. The researchers have always been interested with the quality of the data gathered by the censuses, registration systems and surveys. The reliability of the results has always been questioned and the level of sampling and non-sampling errors are tried to be estimated. Several statistical methods were structured to estimate the level of sampling errors for different type of surveys, censuses and registration system. Depending on the type of sampling, special formulas and techniques were used to assess the sampling errors. In addition, the non sampling errors, caused by the interviewer, the respondent or the questions themselves are also widely studied and basic techniques are developed to put forward the level of errors.

Various studies on the quality of the data collected by the local and international studies developed and applied by the researchers especially in USA are seen at the literature. After the Second World War the importance of the knowledge on the population gained importance in terms of developing policies. Various studies were started to be carried out on special issues on population interested. Both the surveys directly conducted by Census Bureau and other American companies especially on the topics of fertility and mortality in developing world is well known about their technical papers on the quality of the data gathered from the field. Starting from the quality of survey design in pure statistics concerns to quality of variables used for the estimation of rates and ratios are studied thoroughly.

It is expected and seen that UN has always had great interest on the information on population especially of the developing and undeveloped countries. Therefore, the data gathered by censuses, registration systems and surveys have an importance in policies and programs offered and followed by UN. Data quality of the data is focused on any kind of statistics had been specifically studied with one of the series

of manuals for the estimating the population. In 1955, one of the second series of manuals; Manual II "The Methods of Appraisal of Quality of Basic Data for Population Estimates" was published by Population Branch of the United Nations Bureau of Social Affairs (UN,1967). Manual concerns the data quality of the census enumerations of the total population and sex and age groups. The basic aim of the manual is to assist governments in improving the quality of official population estimates. As the methods for estimating the data quality of demographic data are gathered together for the use of social scientists; this study can be considered as one of the cornerstone studies on the data quality.

UN followed the processes in the methodology of data quality and published reports on the quality of data of World Fertility Surveys conducted especially on the undeveloped and developing areas of the world.

During the WFS program, various research papers and methodological papers/studies were published. Most of the studies were the reflection of the concerned points of the program. The quality of the data gathered from the WFSs was also another important interest area of the program. Rindfuss; Bumpass and Palmore published an article in "Demography" in 1987. They discussed the ways in which the restricted fertility histories produce a biased sample of births. In addition, they evaluated "the effect of the restriction by using a high-quality data set that does not contain the usual restriction" (Rindfuss et al. 1987). They used the 1974 Korean WFS dataset and discussed the information on contraception and breastfeeding for every birth interval. Thus, they could be able to analyze the determinants of birth intervals with and without the WFS restrictions to examine the degree of bias they introduce. They tried to find answers to the level of the errors of the selection of last closed and open intervals which lead to biased estimates of the levels of contraceptive use and breastfeeding duration. In addition, they focused on the bias sourced by this selection by which the findings regarding the structure of relationships between these parameters and other variables of concern.

When the birth histories started to be used in surveys, some criticisms was made on the quality of the data collected with birth histories especially at the undeveloped and developing countries. Potter (1997) made one of the remarkable critiques on birth history data of El Salvador (WFS-1973), and Bangladesh (WFS-1961/62 and National Impact Survey-1969). By using simulations with the data, he tried to put on the actual fertility in these countries at the time of survey and the estimated ones from the survey. He noticed that the estimations based on birth history data are too sensitive to the age misreporting and will lead to an artificial decline in fertility rates.

The scientific reports published at the WFS project covered the assessment of the data quality in participating countries. In addition to these single country reports evaluating data quality, a comparative report was published by using the data from 41 countries to assess the quality of the WFS data (Goldman , et al, 1985). At this study, a few general types of error are recognized; omission of events -like live births or unions- and household members; and misreporting of dates of events. They discuss the level of the sampling errors, the errors originated from the wording of the questions and the effects of imputation at the results. They conclude that the imputation of the data at WFSs don't have a clear effect on the general results.

The data sets of different WFS countries were studied by researchers on special interest areas. Chidambaram and Pullum focused on the sensitivity of estimated fertility levels and trends to alternative interpretations of the responses by using the data from the 1975 Bangladesh Fertility Survey (BFS). Some simple mathematical models were used to evaluate the consequences of an incorrect interpretation and they also offered guidelines for a correct interpretation. They focused on the 'years ago' responses used in WFS questionnaires. They indicate that there will be a problem that will occur" indirectly when the respondent and/or interviewer essentially mimic the imputation procedure by first estimating an age or elapsed time and, then converting this to a date." (Chidambaram and Pullum, 1981)

Before the DHS program is developed and applied, many evaluations of the previous surveys were done to increase the quality of the DHS and further surveys in the

future. Cleland (1986) published an article in which he reviewed the experience of the Contraceptive Prevalence Survey (CPS) and the World Fertility Survey (WFS), and attempted to identify their major implications for similar future projects, particularly the Demographic and Health Survey (DHS). The lessons learned from DHS's predecessors are thoroughly absorbed and with this article personal view of these lessons are presented by Cleland and some key choices that the DHS must face were told about.

An example evaluating the WFS experience is taken into consider by Pullum, Harpham and Ozsever (1986). They published an article titled: "The Machine Editing of Large-Sample Surveys: The Experience of the World Fertility Survey" focused on the various costs and benefits attached to the machine editing of data which accompanied the preparation of standard computer files for each country. Although their paper was based exclusively on WFS experience, and functions in part as a summary and appraisal of that experience, they also intended to have some value for the planning of similar surveys in the future. They deal with six countries' data sets selected on the point that they have the early unedited raw data file and constructed a 'dirty' Standard Recode File and compare it with the 'clean' Standard Recode to understand the effect of machine editing. They used 25 indicator variables used in tabulation in country reports. The results indicated that percentage of the cases lost in the matching is very low except Ghana (6%) because most of the structural changes were already done in earlier stages of the survey. Out of 147 different occurrences of these 25 indicators in these 6 countries only 12 of them seems to have different distribution more than 1%. Changes appeared to be least likely for numbers of children ever born and living' fertility desires and background variables. In addition they found that the TFR estimated both from dirty and clean data are quite close except Ghana.

Another study on the experience of WFS is on the quality of the birth history data collected by WFS. At this study written by Hobcraft, Goldman and Chidambaram in 1982, the results of the rates estimated directly by birth history and with the aid of the conventional P/F procedure is compared. They stressed that "when complete

birth histories are available, the basic fertility rates themselves should always be examined and the P/F procedure should be viewed as one of a series of measures which aid in the interpretation of fertility data" (Hobcraft, et al. 1982). They also indicated that it is more natural and much simpler to analyze the birth histories by using period rates for cohorts rather than more conventional period rates for age or duration groups.

Pullum (1991) continued his studies on data quality of demographic surveys with the assessments with DHS datasets. He attempted to illustrate general difficulties associated with the reporting of ages and dates in developing countries by focusing on Pakistan DHS. He indicated that misreporting of the age is a common problem in Pakistan. He advises that, if the reports of the surveys are published without concerning the quality of the age data, the results will be misleading for the users. He focused on the birth history section of the data and developed a model that shows the extent and severity of the transfer of infants and one-year olds into the later ages of childhood. Under this model, he mentioned that the reported number of infants is plausibly adjusted to correspond with the reported number of births (Pullum, 1991).

Another study done by Pullum is the Methodological Reports 5 published by Macro International Inc. which deals with the quality of age and date reporting in DHS surveys (Pullum, 2006). Most of the indicators produced by DHS surveys depend on accurate reporting of ages of women and children, as well as dates when events occurred are assessed with this report. The 141 DHS surveys conducted from 1985 to 2003 in 66 countries are examined. The center of the attention of the report is measuring the levels and patterns of four kinds of potential errors: incompleteness, heaping or digit preference, transfers across boundaries, and inconsistencies between successive surveys. Household and individual data from nearly all of the DHS surveys are used at this report to identify evidence of misreporting of ages and dates. Report focuses on the levels of incompleteness, digit preference, and transfers across specific boundaries such as ages 5, 15, and 50. It measures the heaping of age at death at 12 months with a logit regression calculation with the births in the ten years before the survey.

DHS program made evaluations between the stages of the program. In 1996 Marckwardt and Rutstein prepared a working paper "Accuracy of DHS-II Demographic Data: Gains and Lose in Comparison with Earlier Surveys" (Marckwardt and Rutstein, 1996). The Datasets from DHS-II program are compared with the data collected in the earlier WFS and DHS-I programs. They aimed to measure any improvements in the probable accuracy of demographic measures, as well as detect any problem areas where quality may have deteriorated, or not changed. They examined the accuracy of two basic demographic measures, current fertility rates and current infant mortality rates, as measured in the second round of DHS surveys. They deal with issues like Distortions at the boundaries of age eligibility and Distortions in Reporting De facto status in household list. In addition, they put forward the improvements at the data quality of birth history. They discuss the possible effects of the distortions, displacements at the birth history data to fertility and mortality rates calculated directly with the information in birth history.

In evaluating the DHS II datasets in terms of their quality; Marckwardt and Rutstein (1996) mention that although DHS-II demographic data has better quality as compared to earlier surveys "two of the most intractable problems, the age displacement of women at the borders of eligibility and the displacement of birth dates of children just outside the window of eligibility, remain unsolved" (Marckwardt and Rutstein, 1996). They mention that in order to solve these two problems, new solutions are improved such as using different interviewers to conduct household and individual interviews and to make a change in field procedures which will substantially cut the number of women excluded from interview because they were mistakenly classified as having "slept away" from home. The level of displacement of the birth dates of both mothers and children's is greater in Sub-Saharan Africa than other regions of the world. In addition, the overall assessment of the DHS-II demographic data indicated that the side of gains is heavier than loses as compared to DHS-I and WFS.

Macro International Inc. published the “occasional papers” series starting with “An Evaluation of the Pakistan DHS Survey Based on the Reinterview Survey” (Curtis and Arnold, 1994). With this study, the reliability of data collected in the Pakistan DHS (1991) is evaluated through an analysis of the reinterview survey. Reinterview survey is conducted 5 or 11 months after the Pakistan DHS with the 10% sample of the women interviewed by using a much shorter version of the original questionnaire. The reinterview survey focused on fertility and contraceptive use, with a reduced number of questions on marriage and background characteristics of the woman and her husband. The primary aim of the reinterview survey is to assess the reliability of reporting of key variables in Pakistan DHS. Reinterview survey indicated that the majority of the variables are not reported consistently. However the discrepancies between the surveys are not mentioned as systematic. Especially the age and date reporting between the two surveys are estimated inconvenient. In addition, although the total number of living children information in two surveys was convenient; there was a substantial displacement of births probably because of the attempts by the interviewers to reduce their workloads. As the reporting of age and date effects many rates calculated directly from the survey data, one of the important results was that according to the reinterview survey the fertility rates and infant and child mortality rates are underestimated.

The methodological reports published by Institute for Resource Development/Macro Systems (IRD) carry valuable information in terms of evaluating the data quality of the DHSs carried out (IRD 1990, Arnold 1990, Curtis 1995). By these reports the design and implementation of DHS were examined to provide answers, explanations which will be of benefit to survey researchers, particularly in developing countries. These methodological reports consists the methods to evaluate the possible data quality problems of DHS carried out in many countries. Reports show the methods and results reached by the application of these methods in a comparative way. Some selected countries were compared in terms of their data quality. Possible data quality problems are mentioned and comparative studies were done in these studies.

Arnold (1990) in his section in *An Assessment of DHS-I Data Quality* focuses on the data quality of the birth history data lists the possible sources of non-sampling errors that can be seen at that section as; incompleteness of reporting of children's birth rates, displacement of children's birth dates, age heaping, miscalculation of year of birth and coverage problems of live births and their implications on the fertility rates. He also makes comparison among the DHS datasets of selected countries from different parts of the world.

In the same report a section is developed by Sullivan et.al. (1990) on assessment of the quality of data used for the direct estimation of infant and child mortality in the demographic and health surveys. They aimed to identify errors in data collection which have occurred in a number of surveys and which may signal a need to modify the DHS questionnaires or field procedures; to provide users of DHS data with comprehensive, as well as survey-specific, information about the quality of the data used to calculate childhood mortality rates. They mention the collection of DHS mortality data, the completeness of the date of birth and age at death data, their accuracy and impacts on estimates on mortality estimates. In addition, they focused on the completeness of the event reporting which is mainly takes place in omitting the death of the children. Like Arnold, they finish their section by making a comparison among different countries' DHS data quality.

On the other hand, Curtis (1995) in his study evaluated the data quality of second phase DHSs focusing on the data used for the direct estimation of infant and child mortality. He applied same tests with Jeremiah Sullivan and et al. for the DHS-II data sets constructed in various countries. He found that two basic problems on mortality data is the differential displacement of the date of birth of surviving and dead children to the period prior to that covered by health section of the questionnaire and the omission (or misplacement) of deaths that occurred more than 10 years before the survey.

Another study which is also noticeable is done by Brass (1996). In his paper "Demographic Data Analysis in Less Developed Countries: 1946-1996" discusses

the chronologic development of demographic data analysis methods developed or used for the less developed countries for a better estimate in fertility and mortality. He focused on especially the indirect estimate techniques which help the demographers to reach reliable results when they have inadequate or limited data. He discuss the general techniques for the estimation of vital rates from censuses or surveys like reverse survival, own children and P/F ratio. This is a brief history of the developments in the demography in terms of demographic methods to analyze the data collected from different sources.

The quality of the data collected by registration systems and censuses are still an important interest area of the scientists. Data quality literature has many studies focused on these types of datasets. Maged Ishak presented a paper discussing the misreporting of age and underreporting of the death problem in vital registration system in Egypt in his study (Ishak, 1999). As the mortality data, especially of the childhood span, are known to be mostly affected data by under registration, he presents some mathematical and regression techniques to model the under registration behavior. His objective was to utilize the limited information together with the available knowledge of underreporting in developing countries in order to present a mathematical model that can reveal the age pattern of under registration. At the end of his study, he combines the model with a regression model for infant mortality to finally present an improved model that is free from the affects of both the under registration and age misreporting problems to verify the model.

Age and sex data quality is studied in nearly all countries who conduct censuses. Poston and friends conducted a comprehensive analysis of the quality of the age and sex data of the country of the Republic of Korea (ROK) and its provinces. They evaluated age and sex data gathered in the 1970 and 1995 Korean censuses pertaining to the entire populations of the ROK, and also to its provinces in the two time periods. They used indexes and methods described by Shryock and Siegel (1976) and Arriaga and Associates (1994).In general although there is no clear problem in reporting the age in both of the censuses, they realized that the quality of age and sex data increased between 1975 and 1990 censuses. The important point at

this study is the Whipple index which focuses on the digits "0" and "5" did not seem useful for the countries which the heaping is not commonly seen at these digits. Therefore although there is a heaping at digit 5 Whipple index could not be able to put forward this problem.

Another study is done by Bailey and Makannah (1996) which focused on the data quality of age data held in African censuses during 1970s and 1980s. They work on the single age distribution on the surveys by using Myers's index, Bachi index, Carrier index, and Ramachandran index. They find that age misreporting is more obvious among females than males and among rural than urban residents. In addition they found that literacy has a positive effect on the quality of data on age. They also find that the countries where the age misreporting is relatively low, the coverage of birth registration is better.

There are various papers in the literature focusing on the quality of surveys and studies other than WFS or DHS type international surveys. US Census Bureau is conducting "The Survey of Income and Program Participation" (SIPP) which provides information at household level to analyze the economic situation of households and persons in the United States. The roots of the program go to 1975 when the first Income Survey Development Program (ISDP), was initiated by the Department of Health, Education, and Welfare to collect income and social related data related with income. The techniques are developed to get better quality data at these surveys and the structure of the program changed and the first questionnaires of SIPP are applied at 1983. SIPP program published both the reports on the results of the questionnaires and besides, reports on the data quality of the study to give light about the quality of the survey carried out (Kalton, 1998; Killion, 2004).

The quality of the data on sensitive issues is focused by many academicians with different methods. A study based on a validation survey conducted in Estonia in April and May 1992 (Anderson et al, 1994). Sample of the study is the records from the maternity hospital. With this study, the women who had abortion in 1991 were

asked about their health events by using a life history chart which links together on a multicolumn grid such life-course events as marriages, divorces, pregnancies, births, and abortions. It is estimated with this study that more than 80 percent of the women reported their recent abortion. According to the study, this tool is helpful in reconstructing pregnancy and abortion histories that date back many years.

The rates estimated from the surveys have also been questioned by the researchers with further studies. Retherford, Mishra and Prakasam (2001) intended to put forward the underlying reasons for the drastic changes in Uttar Pradesh state in India. They used the data sets of National Family Health Surveys conducted in 1992-1993 (NFHS-1) and 1998-1999 (NFHS-2) and India's Sample Registration System to understand the possible reasons for the noticeable fertility decline at NFHS-2 as compared to NFHS-1. They evaluated the survey datasets and the registration system and; both assessed the distribution of age and sex by using Myers' Index and focused on the displacement of births which will mainly caused by interviewers which is done purposively to lighten their workload in the field. They used to compare the fertility rates with both birth history method and own children method. They find that there is a great displacement and omission of births and misreporting of both mothers' and children's ages in NFHS-2 as compared to NFHS-1 which leads the great decrease in the fertility rates. In addition, they indicate that trend for the survey years estimated by using the sample registration system is also affected by the underregistration of births.

Retherford and Mishra's interest on the quality of the fertility data of Indian National Family Health Survey did not end with the Uttar Pradesh state. They also attempted to evaluate the reasons for the discrepancies in National Family Health Surveys 1992-1993 (NFHS-1) and 1998-1999 (NFHS-2) and India's Sample Registration System (SRS) and to assess the true trend of fertility in all India and 16 major states in India (Retherford and Mishra, 2001). They use both birth history method and won children method to estimate TFR with the adjusted birth and age information. Age misreporting and heaping is one of the major problems on the data in both the NFHSs and SRS in India. They found that misreporting of women's ages in the two

NFHS surveys does not have a large effect on the estimates of the TFR, for either India or major states. However, misreporting does have a large effect on the estimates of ASFRs. They calculated correction factors with the relation of General Fertility rates estimated form NFHS to adjust the dataset of SRS to estimate fertility rates.

Quality of the data used to estimate infant and child mortality is studied by different researchers all over the world. A study in Egypt were done to determine levels and possible trends and differentials in completeness of registration data of infant and child deaths in Egypt, and to use these estimates to adjust reported levels of infant and child mortality for the whole country (Becker et al., 1996). They used the two survey data UN's PAPCHILD-1991-1992 and DHS-1992 to estimate the underreporting of the infant and child mortality in the vital registration system. They selected the all deaths of children reported as born in five years before the date of interview and checked these deaths in the registration system whether they are recorded in the registration system. Their study indicates that only 64% of the cases were notified by the registration system. Only 35% of the neonatal deaths and about 90% of the deaths above 1 year were notified. With these findings they calculated correction factors for the registration data and found that not only the mortality rates in registration system but the rates in the Surveys directly calculated from data are about 21% level than the estimated levels.

In addition, Kingkade and Sawyer (2001) on their study focused on the problems of the data in the former Soviet countries with regarding to the calculation of Infant Mortality. They mention that the infant mortality rates estimated in the former Soviet countries is vulnerable to the miscalculation and comparing them to other countries indicators will lead to misunderstanding. Therefore they used the methodology to use the mortality rates at ages 4-9 months is used to predict mortality in the earlier months of infancy. With this methodology they adjusted national infant mortality rates to improve their international comparability. They found that in most instances the adjustment factors derived by this methodology are stable, or does not make obvious trends in direction, except over very long time spans like decades. They

resulted that most East European countries have experienced sustained declines in infant mortality after the 1990's, while a number of former Soviet countries exhibit stagnating tendencies. On the other hand, they put forward that Lithuania, Azerbaijan, and the countries of former Soviet Central Asia are characterized by clear declines in their adjusted IMRs.

One of the recent studies which examine the measurement of infant mortality is done by Nadezdha and Redmond (2003). They studied the data of the countries of Central and Eastern Europe and the Commonwealth of Independent States. They indicate that the IMR is underestimated in most of the countries especially if the results of the registrations system are used. They work on the strong and the weak aspects of the surveys done in these countries which also give results on IMR. They resulted in that although the surveys –especially DHS- have reasonable results on IMR; surveys are rather blunt instruments, and that the confidence intervals that surround estimates from these surveys are often large. It is suggested that to improve the collection of official statistics on births and infant deaths in many countries across the region and the effectiveness of surveys as a measurement tool further works needed to be done.

Loaiza (2004) in his study "Does data quality explain the differences in the current global estimates for mortality and education?" discusses data quality as one of the main issues associated with the found differences between the global estimates for mortality and education produced by International Organizations. According to him the statistics published by international organizations are not always coherent and will be affected by the data quality problems. He focuses on the potential data sources for under five mortality data and net enrolment/attendance ratios and their problems in terms of reliability and quality. He suggest that vital statistics and data obtained from administrative records are the most desirable and commonly used data sources to monitor levels and trends or these two indicators. However, he puts forward that these data sources are not complete or are not consistent with the population to which they refer. He mentions the household survey data as an alternative to improve estimates for these two indicators and to improve the routinely systems of data collection.

Comparing the data quality estimations with other data sources is crucial for understanding the extent of the problems. The Puerto Rico Fertility and Family Planning Assessment (PRFFPA) were conducted in 1982 by the Puerto Rico. Warren (1985) in his study examined the internal consistency of the marriage and birth histories data from the individual questionnaire of the PRFFPA. In addition, he compared his findings with external data sources (censuses, and vital registration system and earlier studies). He evaluated the individual data set and found that there is no clear evidence of omission of children or displacement of the births

Language barrier of the respondents to understand the questions well is also studied in terms of the factors effecting data quality. Mc Govern intended to conduct a quantitative assessment of data quality between non-English and English-speaking households in the American Community Survey (ACS). With this research an understanding of which language groups in the United States have the greatest numbers of households with the lowest levels of English proficiency is discussed. In addition, the research determined how these households are interviewed in the ACS, and how complete the data collected from these households are. This research addresses key questions about whether existing methods are resulting in the collection of incomplete data in the ACS due to language barriers or not. It is mentioned that linguistically isolated households had lower percentages of response by mail than households speaking English only.

Malaysian Family Life Surveys (MFLS), fielded in Peninsular Malaysia in 1976 and 1988, is studied in terms of the quality of the retrospective answers (Beckett, et al. 2001). It is found that although some events may be forgotten over time, the answers for the retrospective questions are consistent at the two studies. They suggested that long-term retrospective histories provide nearly as good quality reports as provided by short-term retrospective histories as indicated in the literature.

The effects of the data quality problems on the rates are also assessed in various studies. Preston, Elo and Stewart (1998) in their paper, examined how age

misreporting can affect estimates of mortality at older ages. They checked the effects of three patterns of age misreporting that reflect age overstatement, age understatement, and symmetric age misreporting. They found that regardless of the method employed, all three forms of age misreporting causes underestimates of mortality at the oldest ages. In addition they indicated that "the age at which the distortion begins varies according to the type of age misstatement that is present".

Data quality of the longitudinal surveys is also studied by the researchers. By comparing the responses of the same individuals for two rounds of the surveys in Thailand, Knodel and Piampiti (1977) tried to measure the extent of the response reliability for the questions asked both times. In addition to measuring individual reliability they are also interested in the extent to which the aggregate results agree or differ for the two rounds of the survey. It is found that, in general, reliability is much higher for the behavioral variables than for the attitudinal ones. Moreover, the highest reliability is found in responses of male household heads and married women. They also found that "response reliability showed little relationship to education level in the Longitudinal Study and urban respondents were characterized by only slightly higher reliability than rural ones".

To increase the level of data quality, new tools were tried and studies were done to estimate the difference at the level of quality of data with or without using these instruments. Becker and Sosa discussed on the results of the Costa Rica Family Planning Survey in which a monthly calendar is used to record the events related with for the five-year reference period before the survey for the recording of fertility-related events (sexual unions, contraceptive use, pregnancies, and breastfeeding). They showed that this is a better way to record these events as compared to the traditional question formats. Moreover, it is indicated that with using calendar they overcome the problem of inconsistencies and overlapping at the history of events related with fertility (Becker and Sosa, 1992).

New technologies were also presented for the surveys which will be helpful in terms of data quality. Using Personal Digital Assistants (PDA) at the surveys instead of

paper and pencil (PAPI) has introduced “computer aided personal interviewing technology” (CAPI) to the surveys. The pros and cons of the CAPI surveys are discussed by Bixby, Cespedes and Montero (2005) at the Population Association of America Meeting in 2005. They reported the lessons learned from the CAPI survey using PDA’s in Costa Rica. The cost effectiveness, the advantage of detecting the data errors and making editing during the interview is mentioned as the most powerful sides of using the PDA. Another important advantage is to handle the complex questionnaires, including skip patterns, filters and rosters, which are difficult to implement, and prone to error, when are on paper. On the other hand, the important problem of using PDA is mentioned as the programming and preparing the data entry program for a full-scale survey is mentioned as expensive because of using highly qualified personnel.

Turkish literature on data quality of surveys and censuses are mainly focused on the age reporting problems. In that manner, censuses are evaluated by various studies to estimate the quality of age data. Demeny and Shorter (1968) discussed the overall census quality and the age reporting problem of the censuses 1935 to 1965. They made age corrections by Demeny-Shorter method for the census results. Following this study Das Gupta (1975) and Ntozi (1978) also focused on age misreporting problem in Turkish censuses and criticized the method of Demeny and Shorter and offered new techniques to estimate and correct the age reporting problem in the censuses. All of the studies attracted the attention of the age heaping problem for both sexes, especially the women responses.

Mukherjee and Mukhopadhay (1988) and Güneş (1989) also studied on the methods of correcting the age reporting problem of the censuses conducted in Turkey. Like the previous studies, they found that there is a heaping problem for the ages ending with “0” and “5”. Moreover, Albayrak in her thesis, studied on the correction of age misreporting at the censuses of 1975, 1980 and 1985 (Albayrak, 1991). She indicated that as the former studies on Turkish censuses, there is a coverage problem for the censuses and although the age misreporting problem is corrected by different methods, this coverage problem will still create the problem for this correction.

Another thesis on age misreporting in censuses is done by Tungul (1995). The censuses between 1975 and 1990 are studied with this study. The results are more or less the same with the earlier works; a decreasing level of the heaping problem for the digits “0” and “5” which is more at women ages than men as the year of the census is increasing. The coverage and response errors for the censuses assessed with this thesis are also indicated by Tungul.

One of the latest studies was done by Yavuz and Coşkun (2002). They take the age misreporting and age heaping problem into consider for all censuses conducted during the republic period. They mentioned that, although there is a clear preference for the digits “0” and “5”, as the overall digit preference is analyzed, even numbers are preferred more than odd numbers. In addition the least preferred digits are found as “1” and “9”.

Two studies concerning the data quality of the census results are done by Canpolat (2002 and 2003). In the former study, she focused on the data quality of the age reporting of the 10 selected provinces –according to the level of literacy- for 1990 and 2000 censuses. The results show that the level of errors decreased between the 1990 and 2000 censuses. She indicated that, the errors have relations with the economical development and education levels; when the education level increases the problem of age misreporting decreases (Canpolat, 2002). In her thesis of expertise, she studied the age reporting problems and age correction techniques of the censuses conducted in Turkey since 1935. She used Myers, Whipple and UN Age-Sex Accuracy Index methods to estimate the level of age reporting problem and by using the Arriaga, Carrier-Farrag, Karup-King-Newton, UN and Strong Moving Averages techniques, smoothed the age distribution of the censuses (Canpolat, 2003).

In addition to the studies on censuses’ data quality –which are limited with the age distribution problems- the results of the WFS and DHS were assessed in terms of data quality. As a publication of the WFS scientific reports series Üner evaluated the 1978 Turkish Fertility Survey. The primary goal of the report is to assess the data quality of the survey with the goal of comprehending the extent to which the

estimates of the demographic measures and variables obtained through the survey are accurate and reliable (Üner, 1983). According to the results of the study, in general the data from the birth history of the Turkish Fertility Survey was very good, but it is mentioned that there will be a small level of omission and heaping problem in the data. However, the problem of misreporting and omission is mentioned to affect the single year estimates of the mortality. The most common error in the Turkish Fertility Survey dataset is mentioned as the digit preference.

In his study "Fertility Trends in Turkey: 1978-1993" inside Fertility Trends, Women's Status, and Reproductive Expectations in Turkey Hancıoğlu (1997) aims to revaluate the results of the Demographic Surveys in Turkey with focusing on the fertility trends and levels. In addition, the data quality of birth history is examined to understand the extent of the non-sampling errors of TDHS-93. He focused on the data has direct effect on fertility rates. Although the standard DHS reports has a section specifically prepared for overall data quality of the surveys, this study is important for the discussion of the data quality of the variables used for the direct estimation of the fertility. In addition to this study, although the main concern of the study is not the data quality, Törüner (2001) in his master thesis worked on the comparability of the national surveys conducted in Turkey and within his study he also worked on the potential respondent and interviewer errors in these surveys.

The standard DHS main reports have always had a separate section (Appendix -D) to bring the basic data quality estimations in to matter. Like other country reports, in 1993 and 1993 TDHS main report (MOH et al., 1993; HUIPS, 1999), standard tables to show the basic response errors like heaping, omission and age and sex ratios of the survey population. On the other hand, besides the tables, explanation of the data quality tables was made at TDHS-2003 main report (Koç, 2004).

III. DATA AND METHODOLOGY

III.1. THE HISTORY OF THE DEMOGRAPHIC SURVEYS IN THE WORLD

It is known that as compared to demographic surveys the censuses has a longer history which goes back to ancient times in Egypt, Babylonia, China, Palestine and Rome (Shyrock and Tauber, 1976). The importance of the demographic surveys for developing policies for population programs is obvious. To understand the situation is the first step to control and change it. Information on the population is needed to develop policies and programs for different specific purposes. The main purpose of the first demographic surveys was to decide the economic, labor and military obligations of the population and limited with household heads, male population, adults or taxpayers. Although censuses are subject to various types of errors it is nearly universal and for nearly all national governments census has always seen as the main source of information about their population.

On the other hand; to collect information on demographic events with surveys has a history goes back to the Domesday survey in 1089. William the Conqueror made a survey in England to learn the extent of the land and resources in order to foresee the tax will be collected from this land. The information was collected and written into two books however the study did not finished and has ended with the death of William. This study will be accepted as the first survey conducted and published. After that, various population surveys were conducted all over the world with different purposes. The first study made using probabilistic sampling was the investigation done by A. L. Bowley (1913) on the living conditions of the working classes in Reading (England).

Raymond Pearl carried out one of the first demographic surveys in 1939 with 31,000 women in American hospitals. US Census Bureau conducted the Current Population Survey (CPS) monthly since 1940. The 1960 Growth of American Families Study by Whelpton, Arthur Campbell, and John Patterson; and the 1965, 1970 and 1975 National Fertility Surveys carried out by Charles F. Westoff and Norman B. Ryder of Princeton University are the other important American surveys on demography. In addition, the National Center for Health Statistics (NCHS) carried out six rounds of the National Survey of Family Growth (NSFG) between 1973 and 2002. (Vaessen, 2008).

Like in U.S. other developed countries conducted more or less the same contented surveys nearly same time period. Most of these surveys were designed to estimate the labor force participation and were not specifically designed for demographic purposes. With the Britain fertility study of David Glass and Eugene Grebenik in 1946, the fertility based demographic surveys were gained in speed and in 1960s in Belgium, Canada, Greece, Hungary, The Netherlands, the United Kingdom, and the Soviet Union fertility studies were done.

The 20'th century- especially after the second world war, the interest on the mortality and fertility levels of the developing countries increased the worldwide research projects. The high rates of population growth have been viewed as surpassing the ability of countries to sustain socioeconomic development, reducing the resources and causing major political instability. Instead of pro-natalist polices policy makers and governments begin to support anti-natalist policies especially for the rapid growing undeveloped and developing countries. The close relationship between the eugenic theories should be kept in mind while evaluating the international demographic survey programs. The theory focuses on the birth control for the "systematic elimination of the so-called 'undesirable' biological traits and use of selective breeding to 'improve' the characteristics of an organism or species" (Araujo and Sommer, 2002). The aim to control the fertility of special groups needs better knowledge and information on the fertility practices of the group. Therefore, both financial and technical support by the developed 'West' for the demographic and

health surveys which were conducted on especially undeveloped and developing areas of the world have been giving valuable information on the fertility levels and movements at these areas.

Leaded by the Population Council, during the 50's and 60's, the surveys aimed to get information about the needs, attitudes and level of information of people on contraceptive use and limiting and/or spacing births were supported. Since 1970, 400 different surveys were conducted in 67 countries, most during 1960's (Mauldin et.al. 1970). Just before the start of WFS program in 1970's; independent demographic surveys were conducted focusing on fertility in 15 European Countries. In addition, at the Population Centre and the Department of Biostatistics of the University of North Carolina to develop the survey techniques and to improve the methodology to measure, analyze and evaluating the data on demographic processes the study POPLAB (Program of Laboratories for Population Statistics) started in 1969. Program continued all through 1970's and 80's in various developing countries including Turkey. The data from surveys, censuses and registration systems were evaluated and improvements for the quality of the data were proposed.

In 1990's UNFPA supported the Fertility and Family Survey (FFS) Programme followed by Generations and Gender Programme (GGP) (after year 2000) which were conducted in United Nations Economic Commission for Europe (UNECE) countries. The basic aim of FFS is to uncover the new fertility trends, marriage and partnership relations and contraceptive behavior in Europe since 1960's. The Center for Population and Family Studies (CBGS) prepared the core questionnaire for FFS in 1989-90 which were later shaped the final version of the core questionnaire by FFS Informal Working Group. On the other hand, GGP aims to carry out multidisciplinary and comparative studies to examine the family dynamics in developed countries, and to study the relations between the generations, genders and their effects on new demographic trends in UNECE countries. As making causal deductions needs a lifetime data of the individual on demographic events, in a prospective manner, GGP broadens the explanatory scope of the collected data. Instead of applying the cross-sectional survey series, GGP aims to make panel

studies (waves) in 3 year periods to collect important variables like income and opinions which is very difficult to be collected by retrospective questions. It is a multi-country program covers relationships between generations also from the viewpoint of the population above the reproductive ages, which allows analysts and policy-makers to address the pertinent issues of population ageing in developed countries (UNECE, 2008).The GGP is coordinated by Population Activities of United Nations Economic Commission for Europe (UNECE PAU) and methodology and questionnaires were developed by Max Planck Institute of Demographic Research.

III.2. THE HISTORY OF THE DEMOGRAPHIC AND HEALTH SURVEYS

Most of the developing countries are lacking reliable sources for social, economic and demographic information. As the vital registration system has problems in terms of reliability and coverage; and censuses are very expensive and have structural problems to obtain detailed information on various demographic issues, surveys are the only main source for many interest areas for both the social scientists and the policy makers. Sourcing from the interest to know and control the demographic and epidemiologic transformations in developing countries, and the need to make comparisons in international level; World Fertility Survey (WFS) is designed and carried out in 41 countries during the period 1972-1984. Project was financially supported by UNFPA, U.S. Agency for International Development (USAID), UK Overseas Development Administration (UKODA), governments of France, Japan, Netherlands and International Development Research Center of Canada; and technical assistance was supplied by International Statistical Institute (ISI) and UNFPA. There were two main model questionnaires: Household and Ever Married (aged 15-49). However, in some countries never-married and male questionnaires were also applied. All 41 internationally-funded developing country surveys produced detailed national reports. In addition, the central office produced about 80 scientific reports, 50 multi-national comparative studies, 11 technical bulletins, 12 methodological studies, and at least 500 analytic projects based on WFS data. At the

very least, "these papers probably contain more information about the practical methods of survey taking and interviewing in developing countries than has been published in any previous enquiry" (Grebenik 1981: 25, cited by Blake 1983: 154).

Besides WFS, Contraceptive Prevalence Survey (CPS) designed specifically to estimate main indicators of fertility and family planning was applied between the years 1977-1985. The Centers for Disease Control (CDS) carried out the first CPS which was lately funded by USAID and under the technical assistance of Westinghouse Applied Health Systems (Measure Macro). The CPS were conducted in 110 developing countries where the results were used directly for policy purposes.

The structure of these two important surveys became inadequate with the changing interest areas of the demographers and the policy makers. Therefore, by merging the characteristics of WFS and CPS and expanding the interest to mother and child health issues the Demographic and Health Surveys (DHS) program is established at The Institute for Resource Development, Inc. (IRD), a subsidiary of the Westinghouse Electric Company in 1984.

Three phases of DHS are as follows: DHS I in 1984-1989, DHS II in 1988-1993, and DHS III in 1992-1999. Since 1997 DHS changes its name to DHS+ to reflect a new mandate under the MEASURE program. MEASURE DHS+ incorporates traditional DHS features with expanded content on maternal and child health. Until now the DHS+ program has provided technical assistance for more than 100 surveys in Africa, Asia, the Near East, Latin America, and the Caribbean.

Demographic and Health Surveys (DHS) are nationally representative household surveys with large sample sizes of between 5,000 and 30,000 households generally. Although nationally representative sample of women ages 15-49 are interviewed and basic criteria for interviews were this group of women, never-married in that range also covered in many countries. In addition, along with female interviews, a sub-sample of males was also interviewed in some countries.

The DHS combines the qualities of the WFS and the CPS and adds important questions on maternal and child health and nutrition. The standard DHS survey consists of a household questionnaire and a women's questionnaire. The household questionnaire contains information on the following topics: household listing, household characteristics, and nutritional status and anemia. The women's questionnaire contains information on the following topics: background characteristics, reproductive behaviour and intentions, contraception, antenatal, delivery, and postpartum care, breastfeeding and nutrition, children's health, status of women, AIDS and other sexually transmitted infections, husband's background, and other topics like domestic violence and maternal mortality.

Fieldworks of the DHS were primarily conducted by national agencies. As well as the country specific analysis, comparative analyses also were carried out by using countries' data set. Besides the dissemination networks of each country institution, Measure DHS, makes distribution of hardcopy or electronic copy of the final reports and other document from their web site. Data is disseminated through Macro International and final reports are produced for most DHS surveys by the collaboration with the national agencies. Comprehensive survey results are published in the DHS Final Reports approximately 8-12 months after the completion of fieldwork. Standard reports are approximately 200 pages in length and include, but are not limited to, topics such as: household and respondent characteristics, fertility and family planning, maternal and child health, nutrition, and HIV/AIDS. Besides these country reports, there are comparative studies and analytical reports done on some important issues held in the survey design.

III.3. THE HISTORY OF THE NATIONWIDE DEMOGRAPHIC SURVEYS IN TURKEY

Turkey has a census history which goes back to Ottoman Empire period. First census attempts were done between 1326 and 1360 to follow up the military potential and the extent of the lands. Moreover, the first successful census was done in 1831 by which the male population was counted to estimate the potential military population and new tax sources (TURKSTAT, 2008). After the establishment of the Turkish Republic in 1923, first census was taken at 1927; starting with 1935 census until 1990; every 5 year census was held by TURKSTAT. In 1997, an enumeration was done specifically for the decision of the population give vote in the elections. The latest census was taken in 2000 and after that an effort was made to solve the problems in vital registration system. With the changes in population law in 2006, the new population registration system, which will be the main data source of population censuses, was established in the country hand in hand with MERNIS registration system. The 'National Address Database' that covers all addresses in the boundaries of the country was established and Turkish citizens living in these addresses were registered according to the 'Turkish Republic Identification Numbers', whereas the foreigners were registered to the system with their passport numbers. According to the 'Address Based Population Registration System' the population of Turkey is calculated as 70,586,256 for December 31, 2007.

After the Second World War, parallel to the interest on making plans for health purposes have increased the awareness in demography in the world and Turkey as well. In a situation where no reliable information was brought by about nearly all demographic rates; surveys seemed as a solution to understand the demographic situation of Turkey. The nationwide health and demographic surveys in Turkey have always been designed and carried out as a part of the worldwide demographic surveys. Nearly for all nationwide surveys, the timing were planned to bring demographic information for intercensal periods.

The first nationwide demographic study was the 1963 Turkey Demographic Survey carried out by School of Public Health (SPH) with the financial support of Population Council. Two types of questionnaires were used; household and ever married women, and 9701 households and approximately 8000 eligible women interviews were done. It was a round of KAP surveys carried out at the first half of the 60's in 20 developing countries. It was a policy oriented study and the results were directly used to create a population program for Turkey.

During 1965 and 1968 SPH conducted dual-record survey which was organized as collecting the data from two independent sources; registration system and household survey data. The resident registers were collecting data by monthly visits to the selected households, whereas SPH field staff was visiting the same households with a 6 month interval. After the success of this study, State Institute of Statistics (SIS) conducted 1974-75 survey which has the same structure with the 1965-68 study. However, the results of the study were not successful as compared with the previous one and criticized as being in low quality.

III.3.1. Demographic Surveys carried out by HUIPS

The history of the nationwide demographic and health surveys is directly related with the history of HUIPS. With the collaboration of Ministry of Health and other governmental organizations and with the financial support and technical assistance of the various international foundations and companies, HUIPS carried out 8 national demographic and health surveys and other national and small scale surveys on demographic subjects during the 40 year.

After the establishment of the institute in 1967, one year later, Institute carried out Survey on Family Structure and Population Problems in Turkey (1968). It is aimed to examine the main demographic structure and family formation and relations of Turkey and their socio-economic and cultural determinants as well as family planning issues (Timur, 1972). No survey report was published after the survey

whereas two books of Çavdar and others (1971) and Timur (1972) published by Hacettepe University where the information on the survey can be found.

In 1973, the aim to conduct nationwide demographic surveys within the censuses was brought to life with the second demographic survey carried by HUIPS. With the financial aid of UNFPA, 1973 Turkish Population Structure and Population Problems Survey demographic situation and trends were tried to put on. After the survey, The Second Demography Conference was organized in Çeşme (İzmir) in 1975 where the findings of the survey were discussed. However the main report of the survey was able to be published in 1978 (HUIPS, 1978) at the time of the third nationwide demographic survey: Turkey Fertility Survey. As a part of the World Fertility survey programme, HUIPS carried out the survey with the financial aid of the UNFPA. In addition to household and ever married questionnaire, husband questionnaire was planned to be applied at the field, however, by extending the household questionnaire with additional questions, husband questionnaire was not used.

The fourth national demographic survey was carried out in 1983 as a part of the CPS programme. The focus of the 1983 Turkish Fertility, Contraceptive Prevalence and Family Health Status Survey was to collect information on fertility, mortality, contraceptive use and other health issues of women and child. Hacettepe Foundation and Westinghouse Overseas Corporation Public Applied Systems and the Demographic Data for Development Project funded the survey. Data was analyzed by HUIPS and in 1987 the main report was published.

After one year publishing the main report of the 1983 survey HUIPS handled the 1988 Turkey Population and the Health Survey funded by USAID-Center for Disease Control. The information collected by the survey did not changed much, it covered the basic demographic indicators of fertility and mortality and contraceptive use and health services. After 1968, this is the first survey by which the Husband Questionnaire was used for half of the selected households. The report writing took one year and the main report was published in 1989 (HUIPS, 1989).

III.3.2. Turkey Demographic and Health Surveys

In Turkey, three DHS (Phase 3) were carried out by HUIPS in 1993 (TDHS-93), 1998 (TDHS-98) and 2003 (TDHS-2003) (fieldwork of the latest leg hang down to first months of 2004) respectively. The importance of these DHS and the previous quinquennial surveys is apparent for Turkey as being the only nationwide surveys which provide information on mortality, fertility and migration in general; infant and child mortality, mother and child health, social and economic composition of the households, contraceptive usage, migration, vaccination of the children and the anthropometric characteristics of the mothers and their children aged under five, in particular.

TDHS-1993

Main funding sources of THDS-93 were Macro International Inc. and State U.S Agency for International Development (USAID).The fieldwork was carried out August to October in 1993. Sample size of the survey was 8619 households and 5257 women. Two different questionnaires derived from DHS questionnaire format are used. After the household, eligible ever-married women aged 12-49 were interviewed.

TDHS-1998

The TDHS-98 was conducted through an agreement with Macro International Inc. under the auspices of the MEASURE DHS+ project supported by the United States Agency for International Development. It is the second demographic survey carried out in collaboration with Macro International Inc. In addition, the contributions of the United Nations Population Fund also were critical in realization of the survey in its scope. Survey was implemented between August and November 1998 and 8,059 household, 8,576 women and 1,971 husband interviews were completed.

TDHS-2003

The TDHS-2003 was implemented by HUIPS, in collaboration with the General Directorate of Mother and Child Health and Family Planning of the Ministry of Health. Financial support for the TDHS-2003 was mainly provided through the national budget as a three-year advanced project in the investment program of the State Planning Organization. Moreover, the TDHS-2003 was supported for the first time as a project in the frame of the European Union "Turkey Reproductive Health Program", implemented by the General Directorate of Mother and Child Health and Family Planning of the Ministry of Health. The TDHS-2003 is the last leg of the 8th national sample surveys carried out by HUIPS. 10,836 household and 8,075 ever married women questionnaires were applied during the field study started in December 2003 to May 2004.

Demographic and health surveys mainly have modules on family planning, maternal and child health, child survival, HIV/AIDS/sexually transmitted infections (STIs), and reproductive health. On the other hand, country specific modules/questions can be added to the core questionnaire. The contents of the questionnaires used in three TDHSs all were based on the International MEASURE/DHS+ survey project model questionnaires and the questionnaires that had been employed in previous Turkey population and health surveys.

Table III.1. Sample Size and Completed Interviews at Demographic and Health Surveys, Turkey 1993, 1998, 2003

	Demographic and Health Surveys, Turkey		
	1993	**1998**	**2003**
Household			
number of households selected	10631	9970	13049
number of household questionnaires completed	8619	8059	10836
Ever married women			
number of eligible women	6862	9468	8447
number of women questionnaires completed	6519	8576	8075
Male			
number of eligible males	-	3043	-
number of male questionnaires completed	-	1971	-

III.4. DATA SOURCES

In this study 1993, 1998 and 2003 Turkey Demographic and Health Survey data sets are going to be used in terms of evaluating the data quality specifically on the variables used to estimate fertility and early age mortality rates.

In this study, although the main focus is on the individual questionnaire and especially on the quality of birth history section, the quality of the data used to decide the eligibility of the ever married women is also going to be discussed. As the selection of the ever married women starts from the age and sleeping last night (de facto) information of the female members of the household is crucial for selecting the eligible women from the household list.

In DHS surveys, a birth history section on ever-married woman questionnaires is used by which information about all the live births of the woman were purposed to

be obtained. Using birth history module helps for both the interviewer and the respondent. If the woman is at the end of her fertility period (e.g. in the age group 45-49), then she will have problems to remember the time of the births. Getting the birth history of a woman in a chronological order will decrease the possible recall errors and the literature stresses the handy characteristic of the birth history.

In TDHSs birth history module is placed at the "Section 2A: Reproduction". At that section, questions from 201 to 210 (Q208, q209 and 210 are the filter questions -they are not directly asked to the women, but filled by the interviewer from the information from the answers of the respondent-) were asked to all the eligible women, by which the total number and the sex of the live births of the respondent are going to be written down, which will help the interviewer at the birth history section.

Questions from 201 to 210 are:

201: Now I would like to ask about all the births you have had during your life. Have you ever given birth?
202: Do you have any sons or daughters to whom you have given birth who are living with you?
203: How many sons live with you? And how many daughters live with you? *IF NONE, RECORD "00".*
204: Do you have any sons or daughters to whom you have given birth who are alive but do not live with you?
205: How many sons are alive but do not live with you? How many daughters are alive but do not live with you? *IF NONE, RECORD "00".*
206: Have you ever given birth to a boy or a girl who was born alive but died later? *IF NO, PROBE BEFORE RECORDING:* Any baby who cried or showed signs of life but only survived a few hours or days?
207: In all, how many boys have died? And how many girls have died? *IF NONE, RECORD "00".*

If woman has at least one or more live births, interviewer completes the birth history section by asking questions about all the live births of the women one by one. For every live birth, the questions above were asked:

Q212 : What name was given to your (first/next) baby? *WRITE "BABY IF THE BABY DIED BEFORE A NAME GIVEN.*

Q213: *RECORD SINGLE OR MULTIPLE BIRTH STATUS.*

Q214: Is ….. a boy or a girl?

Q215: In what month and year..... born? *PROBE:* In what season was s/he born? *NOTE: FOR ALL CHILDREN, THE YEAR OF BIRTH; FOR CHILDREN BORN AFTER 1998, THE MONTH OF THE YEAR OF BIRTH MUST BE DETERMINED.*

Q216: Is …… still alive?

Q217: How old was .... at his/her last birthday? *RECORD AGE IN COMPLETED YEARS. MAKE CALCULATIONS FOR CONSISTENCY.*

Q218: Is..... living with you

Q218A: *RECORD THE LINE NUMBER OF CHILD IN THE HH LIST. IF S/HE WASN'T RECORDED IN HH LIST, RECORD "00".*

Q219: *IF DEAD:* How old was ..... when he/she died? *IF "1" YR., PROBE:* How many months old was .....? *RECORD DAYS IF LESS THAN 1 MONTH, MONTHS IF LESS THAN TWO YEARS OR YEARS OTHERWISE.*

Q221: Were there any other live births between *(NAME OF PREVIOUS BIRTH)* and .....?

In addition to the information collected with the questions above, interviewers are responsible to complete the calendar module –which covers the 5 year period preceding the survey-. Although the extent of the information needed to complete calendar module, the basic aim of it is to place pregnancies (whether completed with a delivery or not), contraceptives used- reason not to continue and to determine the time that the women lived married during 5 year period preceding survey.

III.5. METHODOLOGY

III.5.1. The Assessment of Data Used to Determine Eligibility for the Individual Interview

While studying the data quality of the birth history of the TDHSs, the assessment should be started with the household questionnaire. Since, in all surveys, age is the principal criterion used to determine eligibility for the women's individual interview, it is important to assess the quality of age reporting in connection with the household interview (Marckwardt and Rutstein. 1996)The quality of the household data is highly interrelated with the rates and ratios estimated from the individual questionnaire where the birth history section is placed. The age distribution of the household, the exclusions at the household with the sleeping away responses should be studied to understand the overall data quality of the TDHSs which are highly integrated with each other.

DHS Programme developed 2 types of questionnaires, Household and Individual. All countries used DHS structure and questionnaires applied household questionnaire to take the characteristics of the households and decide the members selected for individual interview. Depending on the countries' needs and socio-demographic characteristics, while some countries collected information from all women at reproduction ages (commonly 15-49 ages), in some countries only ever married women at reproductive ages were interviewed. In TDHS-1993 and TDHS-2003 only household and ever married women questionnaires were applied. Whereas, in TDHS-1998, in addition to these questionnaires, never married women (aged 15-49) and husband questionnaires (for half of the ever married women's husbands) were used.

While the household questionnaire is applied for all households selected by the sampling procedure, individual questionnaires are used for the members who are selected to be interviewed after the eligibility criteria are supplied. The basic criterion for eligibility is "the age". For the household selected by the sampling

procedure, first of all, a Household Questionnaire is applied where all the household members were listed. Age and sex of the members listed at the household list are used to select the eligible persons to make individual interview.

III.5.1.1. The Assessment of the Data at Household Interview

III.5.1.1.1. Household Interview Results

The households selected after the sampling procedure -described in DHS Sampling manual (IRD, 1987)- were aimed to be interviewed. In order not to change the sampling frame, replacement is not allowed. It is known that replacement affects the selection possibility given to each dwelling. The data quality of the data is directly affected with the response rates of the selected household interviews. Sample weights are calculated after each survey to overcome the problem of response errors. If the response rates are higher, the weights calculated to reflect the response rates to the data will be higher to compensate this problem. The household result codes are evaluated by region and type of place of residence at this study.

The response rates are estimated for each survey as an indicator of the success of the survey sampling. The response rates are estimated by dividing the number of completed household questionnaires by the sum of completed, Household present but no respondent, Postponed, Refused and Dwelling not found results. The formula to estimate the Household Response Rate is below.

$$HRR = \frac{C}{C + HP + P + R + DNF} * 100$$

III.5.1.1.2. The Quality of Age Reporting in Household Questionnaire

The one single variable included without exception in every demographic data collection exercise is 'age', and it is thus the most widely studied and examined demographic variable. Eligibility for inclusion in the survey of women age 15-49 rely on the age given in the household survey. Eligibility of children for questions on health depends on the birth dates given in the birth histories. Both the numerators and the denominators of age-specific fertility rates, infant mortality rates, and other rates depend on reported age. In addition, the quality of the reports of ages and dates reflects on the quality of other information in the surveys. (Pullum, 2006). Although its importance and in spite of generations of research, age continues to be a variable on which it is difficult, if not possible, to get good quality data in most populations of the developing world (Chidambaram, et.al. 1984). Although the basic information on a population is given by age, various studies indicated that the good quality of age information is still not very possible in some developing areas of the world. Age distribution of a population gives valuable current and historical information to the researchers. The quality of the age data of the censuses and surveys gives basic knowledge on the quality of the other information collected. Two basic forms of misreporting of ages are "heaping" (digit preference) and "shifting". In order to estimate the possible errors on the distribution of age and sex, various techniques and methods were developed and used. The most common ones are; Myers, Whipple and Bachi Indexes and UN's Age Sex Ratio Technique. At this study TDHS-1998, TDHS-1998 and TDHS-2003 household data is evaluated in terms of age and sex data quality by using these techniques.

Whipple Index

Whipple Index gives information about the digit preference for the ages ending with "0" and "5". Commonly for this index only the ages between 23 and 62 are taken into consider because outside these ages the range of shifting and other problems often tend to confuse the normal pattern of heaping (Newell 1988, Shryock and

Taeuber 1976). Within this range, the percent of the people age mentioned ending with “0” or “5”at total population within this age group multiplied by 5.

The Formula for Whipple index is:

$$W = \frac{P_{y(23-62)}}{P_{(23-62)}} * 5 * 100$$

where,

W : Whipple Index

$P_{y(23-62)}$: population in ages 23-62 mentioned as aged years ending with “0” or “5”,

$P_{(23-62)}$: total population in ages 23-62.

Index takes value between 100 and 500, and while the index score 100 indicates that there is no accumulation at the digits “0” and “5”, score 500 mentions the fact that all the ages are mentioned ending with either “0” or “5”. Table III.5.1.1.1. indicates the score to evaluate the age quality with Whipple Index (Newell,1988):

Table III.5.1.1.2.1. Whipple Index Score for Estimating Reliability of Age Data

Quality	**Whipple Index**
Highly accurate	under 105
Fairly accurate	105-110
Approximate	110-125
Rough	125-175
Very rough	above 175

Myers Blended Index

This index shows the preferences or dislikes for each of the ten digits, from 0 to 9. As the technique gives the preference or avoidance results for each digit, it gives more detailed results as compared to Whipple Index. Technique takes successive sums of numbers recorded at ages ending in each of the digits. In theory, all the digits should have the 10 percent share; Myers Index puts on the deviance from this "equal" distribution. The total summary of the digit preference is the sum of all digit deviance in absolute values. The theoretical range of Myers index is between "0" to "90". If there is no digit preference in other words, all the digits were preferred equally, and then the index is "0". On the other hand if only one digit is preferred for all population then the index value equals to "90" (Shryock and Siegel, 1976). If the Myers index score is below "10", the digit preference is very low and acceptable. If the score is between "10" and "20" the digit preference is medium level and if the score is above 20 the digit preference is mentioned as high.

Bachi Index

Another method for estimating the digit preference is the Bachi index. Although Bachi index has some theoretical advances as compared to Whipple and Myers indexes, as the calculation procedures are more laborious and the in general the extent of heaping differ little from other indexes (Shryock and Siegel, 1976). Bachi method gives estimations for each digits between the ages 23 and 77. The index score is the same like Myers index and gives the absolute total deviations from 10 percent equal distribution. Like Myers, the theoretical range for Bachi index is from 0 to 90. If there is an equal digit distribution at the population, the index is 0, if all everyone prefer one certain digit then the index score is 90. The results obtained by Bachi index is similar to with the results obtained by Myers index.

United Nations Age-Sex Accuracy Index

In order to summarize the accuracy of a population in terms of age and sex distribution, UN developed the Age-Sex Accuracy Index in the early 1950's (UN, 1952, 1955). This index is also called as "Joint Score Index" and the mostly used method to estimate the 5 year grouped age data by sex. It is generally used to compare the age and sex data of different countries from all over world and to evaluate their data quality. For every age group age specific sex ratios are estimated (Sex ratio is calculated by dividing the number of male population by female population multiplied by 100). After calculating sex ratios for each possible age groups; age ratios were estimated by dividing the sex ratios of an age group by the previous and later age group. Three indexes were calculated from this method:

(1) *The index of sex-ratio score (SRS):* The mean difference between sex ratios for the successive age groups, averaged irrespective of sign.
(2) *The index of age-ratio score (ARS):* The mean deviation of the age ratios from 100 percent, also irrespective of sign.ASR is calculated for both males (ASRM) and females(ASRF) seperately.
(3) *The joint score (JS) or age-sex accuracy index:* It is based on empirical relationships between the sex-ratio scores and the age-ratio scores and calculated with the formula:

JS = 3xSRS + ARSM + ARSF

The results of the joint score can be evaluated as follows:
(a) *accurate:* if the joint score index is under 20,
(b) *inaccurate* if the joint score index is between 20 and 40, and
(c) *highly inaccurate* if the index value is over 40.

Although the index can be effected by war, migration, epidemics etc. As it gives results on the accuracy of both age and sex, it is commonly used and can be

mentioned as more effective than Myers and Whiplle Indexes. (Arriaga, 1994; UN, 1955).

Age information of the respondent is going to be studied in the household questionnaire. Digit preference is going to be studied by using Myers Blended Index and Whipple Index. In addition, age-sex accuracy index is going to be used to evaluate the age and sex distribution at the household level. While examining the quality of the age data at household survey, some important characteristics (age, sex, relationship to the household, education level, etc) of the respondent with whom the questionnaire is filled are going to be discussed.

III.5.1.1.3. Boundary Effects

The age, sex and current marital status information collected from household interview constructs the base for the individual interviews. In 1993 and 2003 TDHS fieldwork, after completing the household interview, if there was eligible woman - aged 15 to 49 and ever married- ever married woman questionnaire were applied. On the other hand, besides the 15-49 aged ever married woman questionnaire, never married women questionnaire at the same ages and for the half of the eligible ever married women's husbands, husband questionnaire was applied. Within these three criterions to ascertain eligibility the most critical and easily manipulated criteria by the interviewers is "age". Interviewer has the chance to lessen the workload by making small arrangements on the age. To have a standard application for the possible situations which the interviewer may face with while collecting the data, during the TDHS training period the ways to overcome the problems on collecting age were studied carefully and all the possible situations were discussed and standard rules were put for common situations. Moreover, also during the training the supervisors of the field team were told to follow some interviews or revisit some households to check the information collected by the interviewers. As expected, to revisit all the households for this purpose seems unnecessary and very difficult.

As mentioned above the interviewer who completes both the household and the individual questionnaires may keep the eligible woman aged closer to the eligible ages out from the eligibility criterions. This exclusion will be more likely fotr the women who are unsure about their exact ages. In addition to the interviewers purposive exclusion, because of individual reasons, the respondent for the household interview may misinform the interviewer about the age of some members of the household (Rutstein and Bicego, 1990). In both situations, the number of eligible women will decrease and depending on the size of this exclusion, there will be a possibility for miscalculation of indicators which uses the information of number of women in eligible ages.

The previous studies show that this exclusion is more possible for the ages on older ages. The level of education among women decreases with age and the women at older ages may have problem at remembering their exact age. At that point, during the training the interviewers were told to probe to get an average age. However, the interviewer will not probe and will round the age and left an eligible woman outside the survey. On the other hand, as the women at older ages are completed their reproductive period and have all the pregnancies and births, an interviewer who thinks to escape from the workload to deal with all the pregnancies and live births of such women will push women out of the eligible age ranges.

The calculation of the sex ratios at the five year groups for the first and last eligible age groups (15-19 and 45-49) and the age groups just before and after the eligible ages (10-14 and 50-54) will reflect the exclusion of eligible women before and after the eligible ages. If there is a systematic exclusion at the data then the sex ratios at the first and last eligible ages will be higher than the last and first non-eligible age groups because of the lower percent of woman at the eligible ages.

At this section three types of boundary effects indices can be calculated: Upper Boundary and Lower Boundary Effect Indices and Total Boundary Effect Index. Age and sex ratio of the boundary ages for eligibility are used to estimate these indices. Lower Boundary Effect Index formula is:

$LBE = (AR_{15-19} - AR_{10-14}) - (SR_{15-19} - SR_{10-14})$

Whereas Upper Boundary Effect Index formula is:

$UBE = (AR_{45-49} - AR_{50-54}) - (SR_{45-49} - SR_{50-54})$

On the other hand, after the calculation of Lower and Upper Boundary Effect indices, these two indices results were used to estimate the total Boundary Effect with the formula:

$TBE = |LBE| + |UBE|$

As the total boundary effect index gives absolute value it only gives the total distortion but not the direction. The total boundary effect index will be evaluated within these ranges:

00-24 : Negligible
25-49 : Low
50-99 : Moderate
100+ : High.

III.5.1.1.4. The Household Residency

TDHS household questionnaire is used to select the eligible person for individual interview. Besides the criterion age and sex, slept last night information is used for eligibility. The standard DHS questionnaire collects information for each person indicated as a member of the household and the visitors slept last night at the house. Like a usual member if a visitor slept last night at the household selected he/she is also selected for the individual interview. The de facto selection process is used at TDHS to select the all women and to avoid the possibility of selection of a woman twice. Like the other two criterions to be selected, “slept last night” is also crucial for the data quality and should be studied.

TDHS-1993, 1998 and 2003 household data is going to be studied in terms of household residency which can be identified at household list. In theory, the percent of usual residents away from home should be equal to the visitors slept last night.
If there is a large difference, this will be a sign of exclusion of usual resident eligible women from the household. Small difference will be accepted and will be a reflection of the women staying at institutional places (like, hospital, dormitory, etc.).

The interviewers might record the woman not at home during the visit as "not slept last night" and want to escape from the burden of interview with them. If this intentional exclusion is large, then the estimations from the data will be biased.

III.5.1.2. The Assessment of Age Data at Individual Questionnaire

The woman questionnaire in TDHS starts with collecting birth month and year in addition to the completed age information. Although the age information is taken at household list, the information at the household questionnaire may be different from the information got directly from woman. In some situations the women who are in very close ages to the eligible ages may be mentioned eligible for individual questionnaire although they were not. With the questions at the beginning of woman questionnaire such kind of an error may be noticed and by cancelling this interview and the interviewer will turn back to household questionnaire to change the age information for this woman.

The age information gathered from woman is the basis for TFR and thus very valuable. To reach the correct age information, during the training, interviewers were emphasized to get the exact age. When the women do not know her exact birth date the interviewer are trained to probe by using some important dates and/or seasons to get the exact month and year information. If the women have no idea about the birth year and month the interviewer is told to guess her age. "Age and year table" is used to check the year-age consistency. While calculating the age information to year or vice versa the interviewer may make mistake, however, at this table according to the

information whether the respondent celebrated her birthday at the survey year, it is better to check the information from the table instead of calculating from mind. Question 103 and 104 in TDHS-1993, and 105 and 106 in TDHS-1998 and TDHS-2003 are the questions by which the birth month and year and the age information of the respondent is collected. At this study the information of the women questionnaire is also assessed.

III.5.1.2.1. Digit Preference

The Myers, Whipple and Bachi Indexes which are used to estimate the overall data quality of the household member's age is also going to be used to understand the extent of the digit preference at woman questionnaire. In addition to these calculations, five year age group distortions are going to be computed to understand the total picture of the age distribution problem.

III.5.1.2.2. Imputation at the Age Data

During the field survey, it is highly recommended to get information directly from the respondent not to impute the information during the data entry process. It is important to get complete information directly from the women in terms of data quality and the estimations done based on the women's age. At this part of the study the amount of the imputed age information of the women is going to be discussed.

III.5.2. The Assessment of the Quality of the Birth History Data

Retrospective questions have potential problems in terms of remembering the date of the interest event and even the event itself. Woman may have problems in remembering all the information about all her live births. Therefore, interviewer is responsible for probing the women to remember the exact date of the child is born

and -if dead- death. Interviewer is responsible to catch any types of internal consistency inside the questionnaire and probe as much as possible to overcome from the inconsistency. Interviewer will not catch some of the inconsistencies at the fieldwork. However, computer programs designed specifically on data entry catches all terms of inconsistent information in the questionnaires. At that point imputation gains importance. If there is inconsistent information about the date of the birth, imputation is made. If there is an imputation on the date of the birth of the child, then a flag is placed by which the data user understand that whether this information is imputed or not. Imputation will be done in the field but it is impossible to know its extent and/or it may be imputed during the editing process at the data entry. The further studies mention that if the number of the births increases women has the possibility of recall errors, and this will increase for the women who have lowest education. In this study the socio-demographic characteristics of the women and the data quality is also going to be studied.

All methods to assess the quality of the birth history data are going to be applied for 1993, 1998 and 2003 TDHS datasets. Hence, a comparison between the three surveys will be done and the impacts of the possible quality problems on fertility rates can be evaluated.

III.5.2.1. The Quality of Birth Related Data

III.5.2.1.1. Completeness of the information of Birth Dates of the Children

To evaluate the data quality of the data on the children's birth dates generally contains the completeness of the information. The completeness of the information on birth dates of the children is related with the quality of the estimations done based on this information. The data is directly collected by the mother of the children and the questionnaire aims to collect both the birth month and birth year of each child. While collecting the data from the women about the birth date of their children, women may have difficulty in remembering the exact month and year of birth of

their children. For these situations “Don’t know” answers are recorded as “98” and “9998” for the month and year respectively. The completeness of the birth dates and the level of imputation is evaluated in the categories: “No imputation” “Month and age reported -year imputed” “Year and age reported - month imputed” “Year reported – age and month imputed” “Age reported – year and month imputed” “Month reported – age and year imputed” and “All imputed”.

III.5.2.1.2. The Displacement of Children’s Birth Dates

The problem of carrying the birth dates of the children out of the five year period gives the interviewer to escape from the workload of asking additional questions in the next sections of the questionnaire about the children under five. DHS Program has emphasized the collection of accurate data on demographic events and indicators. During its three phases over the last decade, the scope of data collection has increased tremendously. Beginning with preexisting substantial questionnaire based on the WFS that included a full birth history, a contraceptive history and many other topics, a great expansion of the survey instruments has occurred. (Marckwardt and Rutstein,1996). The additions to the questionnaires consist numerous questions for young children, anthropometric measures of the mother and the children, work and occupation of women and the husband, reproductive health questions, HIV/AIDS etc. If the woman gave birth within 5 years preceding the survey, then many questions should be asked to this woman about the health, breastfeeding and immunization of the child. Previous studies indicates that the interviewers who want to escape from the workload for the child under five interviewers may change the birth date and carry child to the age 5 or more. This displacement effects all the estimations created for the under five children aged under five. The magnitude of the displacement will have direct effect on the indicators estimated. If the interviewers move the birth date in few month, this will make a small problem, however, if the displacement is for a whole year then the data will be effected.

It is difficult to evaluate the extent of the displacement; however, the distribution of living children by their ages will show the extent of the displacement problem. If there is a clear displacement to the age 5 and more the percent of the children at this ages in the birth history should be clearly higher whereas the percent of the children at age 4 should be clearly low. In TDHS 2003, different from TDHS-98 and TDHS-93, in order to calculate an average time spent for each section, the hour and minute that the interviewer started to the section and finishes is recorded. The problem is going to be discussed in terms of the length of the section about the children under five. In addition the duration of the interviewer in the field, and the comparison of interviewers with other interviewers is done in terms of evaluating the displacement of the children to the age 5 and more.

Age Heaping

Another problem at the birth history data will be the age heaping. Digit preference is one of the common problems for censuses and surveys nearly all over the world for nearly all age groups. Especially in the underdeveloped and developing countries, typically for the ages ending 0 and 5, a common preference is seen. Theere are various studies which indicates that the age heaping increases if the education level decreases and the age increases. In addition, the year of the birth may be miscalculated by either the respondent herself or the interviewer and this will make a data quality problem and should be evaluated. At this study the age ratios for the children at the birth history is evaluated to understand the level of age heaping problem for the birth history data. Estimations are done for the age and education level of the mother and the time period of the interviewer at the field.

Miscalculation of Year of Birth

If the respondent doesn't know the birth month of the children, either the respondent or they may calculate the age of the children by easily subtracting the year of birth from the year of interview. If the month of birth is not known but the age of the

respondent is not equal to the result of the subtraction of year of interview and year of birth then the age is imputed. The level that the imputation is done is important.

III.5.2.1.3. Coverage of Live Births

Respondents will forget to declare their children who have died, who are not living at home or very young. A check from the household survey will catch the misinformed number of children in individual questionnaire and household list. A comparison will be done for this reason.

Median age at birth and sex ratios at birth should be estimated to give an idea of the exclusion of the births.

Covering all the live births is one of the most crucial issues in TDHSs, not only the ones 5 year preceding the survey, all the births should be recorded down by the interviewer. Not only the ones living with the respondent; the ones not living at home, who have died and who are very young are specifically asked to the respondent to fully cover all live births. With this study, the possible coverage errors will be studied on.

III.5.2.2. The Quality of Death Related Data

IMR and CMR levels are very important not only for the researchers and public health specialists but for General Directorate of Mother and Child Health and Family Planning of the Ministry of Health staff for policy purposes. Assessment of the quality of the data used to estimate these rates directly from TDHSs survey is also very important. Besides evaluating birth history data on the potential error points mentioned above, the problems on the information about the age of the child at death have to be studied. Birth history data is also crucial for the estimation of IMR and CMR. Completeness and the accuracy of the data and its impacts on infant mortality

estimations are studied. On the other hand, in this study, the completeness and the accuracy of the age at death data and its implications on mortality estimates are studied. Same tests of data quality are going to be applied to all three surveys so that the general quality of the data sets can be assessed and a comparison within these surveys can be done.

The data quality of the birth history data -in general- is very important for demographers to understand the accuracy and reliability of the results that they are dealing with. As mentioned above, to follow the impact of the policies and develop new ones, the data quality is vital. This study aims to fill a gap in the field of demographic study in Turkey on data quality of TDHSs.

III.5.2.2.1. Date of Birth Data

The mortality estimations are based on the date of birth information. Hence, the quality of the birth history data has direct effect on the estimations of the IMR and CMR. The previous studies indicated that the quality of the data for the dead children is worse than the living children. Mother either don't remember or don't want to remember the exact information on the birth and death date of their children. The DHS data set has a flag information for the birth date for the cases the imputation is done. This indicates the quality difference between the living children and the dead children birth data. The completeness of the information on the birth dates of living children and the dead children is done for the type of place of residence, region, mother's age and education.

Moreover, the distribution of the death births according to the years prior to the survey will show the extent of the displacement of the births. The displacement will lead to a miscalculation of infant and child mortality estimations. In DHS reports mortality rates are estimated for five year preceding the survey and if the displacement is noticeable, the rates will be affected. The birth ratios for the fifth calendar year preceding the survey by survival status of children is evaluated by

region, type of place of residence, age and education of the mother and the time period of the interviewer at the field.

III.5.2.2.2. Age at Death Data

At the standard DHS questionnaire the age at death data is collected by a question with two parts. The answer of the respondent is coded by the interviewer either in days, months or years as units depending on the answer and in numbers regarding on the units according to the recording rules. If the time mentioned is less than 1 month it is coded as days, if it is 1 month to 2 years it is coded as months and if the time is 2 years or more the answer is coded as in years.

During the training it is stressed to the interviewers try their best to get the complete information about the birth and death dates of the children. A special emphasis to the correct and consistent death information occurred inside the 5 year preceding the interview date was mentioned to be done by the interviewer. The standard DHS data set has two variables keeping the date of death of children. First variable keeps the information as they are recorded at the field and the second one is the converted time of death information into months. For some cases, time of death answer can be inconsistent with other answers and needed to be imputed. While imputing new information is assigned both controlling other answers. For some cases the interviewer might either not ask the question or forgot to record the answer, and during data entry a date can be assigned for these cases with controlling the other answers.

At this study, the completeness of time of death variable is evaluated in terms of data quality. If the incompleteness of the information is high this will create a question for the quality of the data and the situation in the field. The completeness of the time of death is estimated in birth cohorts by socio-demographic characteristics of mother.

The accuracy of the data is also assessed in terms of heaping on 12th month at age of death information. The index of heaping for month 12 is estimated by taking the age at death information for months 10, 11, 13, and 14. The formula for Index of Heaping is:

$$IH = \frac{4 * d12}{d10 + d11 + d13 + d14}$$

Where d= deaths on age x.

III.5.2.3. The Impact of Data Quality on Demographic Rates

III.5.2.3.1. Fertility Impact of Data Quality

The exclusion of the eligible women from the eligibility criterions will have a direct effect on rates which are based on the information gathered from the women questionnaire. Total fertility rate (TFR) is one of the important indicators of fertility and can be calculated directly from the data collected from DHS. The interview date, the birth date of woman and the birth date of the child information is used to estimate TFR. TFR is a age period fertility rate for a synthetic cohort of women and measures the average number of births a group of women would have by the time they reach age 50 if they were to give birth at the current age-specific fertility rates and expressed as the average number of births per woman (Rutstein and Rojas, 2003). Standard DHS reports have been publishing the TFR either for 5 year or 3 years or both. The quality of the dates has direct effect on the TFR and therefore is evaluated at this study related with other variables.

At this study simulations which were aimed to show the effect of exclusion of women are done. First group of simulations are made to estimate the effect of

exclusion of women on TFR. The estimated Boundary Effects and Sleeping Away Exclusions were used for the simulations. The simulations are:

Total Fertility Rate Simulations

Simulations based on Boundary Effects
Simulation based on Lower Boundary Effect (FLB0)
Excluded women had an age-specific fertility of 0.0 (no births).

Simulation based on Upper boundary Effect - 1 (FUB0)
Excluded women had an age-specific fertility of 0.0 (no births).

Simulation based on Upper boundary Effect - 2 (FUB2)
Excluded women had twice the age-specific fertility as included.

Simulations based on Sleeping Away Exclusion
Simulations based on Sleeping Away Exclusion - 1 (FSA75)
Excluded woman had 75 percent of the age-specific fertility of included women.

Simulations based on Sleeping Away Exclusion - 2 (FSA125)
Excluded woman had 125 percent of the age-specific fertility of included women.

III.5.2.3.2. Mortality Impact of Data Quality

The impact of the exclusion of women at the household questionnaire caused by the boundary effects and sleeping away is evaluated by using three simulations to understand the impact of these exclusions on under-five mortality rate. In addition, the heaping on month 12 at age at death data at birth history section of the ever married women data is assessed for the impact of the heaping on infant and child mortality rates.

Under-five Mortality Rate (5q0) Simulations

The impact of exclusion of eligible women to non eligible ages and the nexclusion by sleeping away factoron under-five mortality rate is studied at this part of the study.

Simulations based on Boundary Effects
Simulation based on Lower Boundary Effect (MLB150)
Excluded children have 150 percent the rate under-five mortality by age of mother as included children.

Simulation based on Upper boundary Effect (MUB150)
Excluded children have 150 percent the rate under-five mortality by age of mother as included children.

Simulation based on Sleeping Away Exclusion
Simulations based on Sleeping Away Exclusion (MSA150)
Excluded children have 150 percent the rate under-five mortality by age of mother as included children.

The Effect of Heaping on 12th Month on Infant Mortality Rates

The age specific mortality estimates will be affected by the quality time of death data. At that point, the importance of the heaping the death of children to 12 month, comes with the calculation of Infant Mortality Rate (IMR) and Child Mortality Rate (CMR) indicators, which counts in the deaths occurred until 1 year period and from 1 year to 5 year respectively. If there is a noticeable heaping for the 12 month at the data, the quality of IMR and CMR will decrease. During data collection, a heaping to 1 month or 1 year for the time of death is expected. Interviewers are told to be careful at such kind of heaping and were advised to probe to avoid these heaping. If the respondent gives 1 month answer, the interviewer should probe and be sure that

the answer is exactly 1 month. Likewise, for the answers 1 year, the interviewer should probe to get the exact month information. At this study, an evaluation of the frequency of the 12 month answers for the time of death question in birth cohorts and by socio demographic characteristics of mother is done. In addition, the effect of heaping on the 12^{th} month is evaluated on the infant mortality rates for all three surveys at this study. The excess deaths calculated for the 12^{th} month is redistributed. The excess deaths are accepted as the difference between the number of deaths at 12 months and the average number at months 10, 11, 13 and 14 (Sullivan, et al., 1990). The 25 % of the excess deaths are distributed to the months 0-11 from the month 12. New IMR and CMR estimates are estimated with the new distribution of excess deaths at month 12.

IV. THE ASSESSMENT OF DATA USED TO DETERMINE ELIGIBILITY FOR THE INDIVIDUAL INTERVIEW

The data used to determine the eligibility for the individual interview is aimed to be evaluated at this section of the study. Assessing the quality of the data used for the selection for the individual interview is crucial for evaluating the overall quality of the TDHS data. The selection process at the household data effects all means of rates and ratios calculated. To study the effect of the data quality on fertility and mortality rates, it is better to start with the household age and sex data.

The standard DHS household and individual questionnaires are applied in an order that the interviewer starts the interview in a household by applying the household questionnaire in which the household members are listed and various demographic and social characteristics of the members are collected with the household characteristics and assets in the household. The additional modules at the household questionnaire used in TDHSs are never married and elderly modules to get information for the never married 15-49 aged women and elderly people (aged 65+ and aged 60+ respectively at TDHS-1998 and TDHS-2003).

IV.I. The Assessment of the Data at Household Interview

IV.1.1. Household Interview Results

The household response rates are evaluated as an indicator for the data quality. The lower the response rates the quality of the data can be criticized. The potential eligible women at the households that cannot be reached or the questionnaire is not filled will create a bias at the data. The sample weight calculated from the household

response rates accepts the interviewed households reflect the characteristics of the not interviewed ones. However, the low level of completion rate will question the quality of the data. Therefore, the household result rates are evaluated at this study as an indicator of the data quality in terms of selection of the eligible women.

The detailed household results are evaluated at TDHS-1993, TDHS-1998 and TDHS-2003 in general and by the region and type of place of residence for each survey. Table IV.1.1., Table IV.1.2. and Table IV.1.3. present the household result codes and response rates at TDHS-1993, TDHS-1998 and TDHS-2003 respectively. The overall results indicate that the completed household rates are more than 80 percent for all surveys. The highest rate is seen in TDHS-2003 with 83.0 percent followed by TDHS-1993 (81.1 %) and TDHS-1998 (80.8). The highest completion rate is seen in rural areas for all three surveys. The gap between the urban and rural is closing around 2 percent between the legs of the TDHSs. The gap was 10 % at TDHS-1993 closed to 8.1 % at TDHS-1998 and at TDHS-2003. On the other hand, the difference between the rural and urban was estimated as 5.8 %. Refusal has always been lower in rural areas. The household results for all three surveys indicate that the refusals in rural areas are very low as compared to the urban areas. Although the refusal rate increased to 3.4 percent for Turkey, the refusal rate in rural areas for this survey dropped to 0.4 percent when compared with the TDHS-1998 (0.6 %).

When the completion rates are evaluated by regions, it is seen that, although one of the lowest completion rates are seen at East region, the lasts TDHS indicated that 9 out of 10 of the household questionnaires were completed. The refusal rate on the other hand seems increased in West region at TDHS-2003 (6.3 %). At this survey the lowest refusal is seen in East region. It is clearly seen that from one survey to another the refusal rates are changing and it is hard to mention a trend for the refusal rates between the surveys.

The “dwelling destroyed” and “dwelling not found” result codes have direct relation with the listing procedure which is done seriously in TDHSs. The blocks selected from the address lists of TURKSTAT (former name was State Institute of Statistics

(SIS)) were visited by listing personnel of HUIPS. The main aim was to update the dwellings at the block selected. The systematic selection is done after the complete listing of the block is done. The dwellings in which there is no households are living is not included in the selection process. This listing procedure aims to increase the response rates and decrease the rates for “dwelling destroyed” and “dwelling not found” as result codes. With a successful listing operation for all three surveys the total percent of these two codes are always below 2 %. The lowest rates for them are seen in TDHS-2003 with 0.3 %.

The response rates are estimated from the raw data for all three surveys. Mainly because of the increasing refusal rate, the response rates are decreasing among three surveys. On the other hand, there is a clear difference among urban and rural response rates. For all three surveys the response rates for rural areas are above 97 percent (99.4 % at TDHS-1993, 97.0 % at TDHS-1998 and 98.0 % at TDHS-2003). However, the response rates for urban households decreased from 95.5% at TDHS-1993 to 91.4 % at TDHS-2008. The acceptance for the interview at the urban areas seems decreasing for the interviewers.

The regional estimation for response rates reveals the clear decline at the West region from TDHS-1998 to TDHS-2003 (941 % to 88.6 %). It is important to stress the fact that the only response rate below 90% has seen for all three surveys is at the West region at TDHS-2003. The gap between the region having highest response rate and the lowest increased at this survey to around 8 %. This gap was around 4 % for the previous surveys. On the other hand, the highest response rates are estimated at South region for the first two DHSs. While at TDHS-2003, the highest response rates are seen at East region (96.5%), the highest rate of all three surveys is seen at South region in TDHS-1993 (98.7%).

Table IV.1.1. Household Response Rates and Percent Distribution of Household Result Codes by Region and Type of Place of Residence, TDHS-1993

	Completed	HH present, no resp.	HH absent	Postponed	Refused	Dwelling vacant	Dwelling destroyed	Dwelling not found	Other	Total	Number of Households	Household Response Rate
Region												
West	79.2	0.2	9.8	0.1	3.7	6.2	0.3	0.3	0.2	100.0	3,374	94.9
South	84.6	0.3	7.9	0.0	0.5	5.7	0.3	0.3	0.2	100.0	2,045	98.7
Central	85.1	0.4	8.6	0.0	1.3	4.1	0.3	0.1	0.1	100.0	2,269	97.9
North	76.3	0.5	16.0	0.0	0.5	6.1	0.3	0.2	0.1	100.0	1,554	98.5
East	79.0	0.2	10.7	0.1	1.9	5.5	0.6	1.7	0.4	100.0	1,389	95.3
Type of place of residence												
Urban	77.7	0.3	11.8	0.0	2.8	6.3	0.4	0.6	0.1	100.0	7,065	95.5
Rural	87.7	0.3	7.0	0.0	0.1	4.1	0.3	0.1	0.4	100.0	3,566	99.4
Total	81.1	0.3	10.2	0.0	1.9	5.6	0.3	0.4	0.2	100.0	10,631	96.9

Table IV.1.2. Household Response Rates and Percent Distribution of Household Result Codes by Region and Type of Place of Residence, TDHS-1998

	Completed	HH present, no resp.	HH absent	Postponed	Refused	Dwelling vacant	Dwelling destroyed	Dwelling not found	Other	Total	Number of Households	Household Response Rate
Region												
West	83.9	3.1	6.0	0.5	1.4	4.8	0.0	0.3	0.0	100.0	2,827	94.1
South	83.3	2.5	5.6	0.2	1.5	6.7	0.1	0.2	0.0	100.0	1,815	95.0
Central	80.3	4.3	7.2	0.3	2.5	5.0	0.1	0.2	0.0	100.0	2,104	91.7
North	74.8	2.7	9.6	0.1	1.2	9.9	0.1	1.4	0.1	100.0	1,479	93.3
East	79.1	0.9	8.5	0.1	1.1	7.0	0.4	2.2	0.7	100.0	1,745	94.8
Type of place of residence												
Urban	78.4	3.3	7.8	0.3	2.0	6.9	0.1	1.0	0.2	100.0	6,989	92.2
Rural	86.5	1.7	5.6	0.2	0.6	5.1	0.1	0.2	0.0	100.0	2,981	97.0
Total	80.8	2.8	7.2	0.3	1.6	6.3	0.1	0.8	0.2	100.0	9,970	93.6

Table IV.1.3. Household Response Rates and Percent Distribution of Household Result Codes by Region and Type of Place of Residence, TDHS-2003

	Completed	HH present, no resp.	HH absent	Postponed	Refused	Dwelling vacant	Dwelling destroyed	Dwelling not found	Other	Total	Number of Households	Household Response Rate
Region												
West	79.0	3.4	4.7	0.1	6.3	5.5	0.0	0.4	0.6	100,0	4,267	88.6
South	85.1	3.1	4.2	0.0	2.4	4.6	0.0	0.6	0.1	100,0	1,797	93.3
Central	83.0	2.1	8.0	0.1	2.0	4.6	0.0	0.0	0.2	100,0	2,433	95.2
North	80.2	1.8	9.9	0.0	1.8	6.0	0.0	0.3	0.1	100,0	1,587	95.4
East	89.2	1.3	3.6	0.0	1.7	3.6	0.0	0.2	0.2	100,0	2,965	96.5
Type of place of residence												
Urban	81.6	2.9	5.0	0.1	4.4	5.4	0.0	0.3	0.3	100,0	9,754	91.4
Rural	87.4	1.2	7.4	0.0	0.4	3.1	0.0	0.2	0.3	100,0	3,295	98.0
Total	83.0	2.5	5.6	0.0	3.4	4.8	0.0	0.3	0.3	100,0	13,049	93.0

IV.1.2. The Quality of Age Reporting in Household Questionnaire

The two indicators for the eligibility of the individual interview are sex and age. At the training period and during the field survey, interviewers were told to record the age and sex of the household members as correct as possible. At the household questionnaire with one question "How old is …….?" the age information for all household members is collected from the answers of a member of the household as proxy informant. The single age distribution of the de facto male, female and total household members at TDHS-1993 are presented at Table IV.1.2.1. and Figure IV.1.2.1.. It is clearly seen that there is a digit preference for 0 and 5. Digit preference seems clearer among females as compared to males. As the results are evaluated focusing on the eligibility criterion ages for females (ages 14, 15 and 49, 50), it is seen that there is no intensification for age15 but a shift or a heaping can come to mind for age 50. For the first 14 ages the percent of male household members are higher than the female. This can be a reflection of the usual result of sex ratio at birth (usually 105 male births for 1000 female births) or the traditions to mention male children and ignore the female ones. This trend can be also seen at the other two survey age distributions.

The de facto age distribution of household members at TDHS-1998 is presented at Table IV.1.2.2. and Figure IV.1.2.2.. The percent difference between male and female household members to age 15 is clear for also this survey. On the other hand, the heaping for ages ending with 0 or 5 is also evident. The sharp fluctuations at the figure show the extent of the digit preference. Similar to TDHS-1993, TDHS-1998 and TDHS-2003 results shows that digit preference is more common among female household members. On the other hand, Table IV.1.2.3 indicates the de facto household population for TFHS-2003. Similar to previous surveys, a clear digit preference for ages ending with 0 and 5 is also seen at TDHS-2003.

The household member's age distribution shows some fluctuations which cannot be only explained by digit preference or heaping problem. For all three surveys there is a sharp decrease for ages around 20 for male members. The sample design of the

TDHS does not include the institutional population like students at the dormitories, prisoners or soldiers. As the military service is obligatory for males after age 18, the noticeable fluctuation for males around age 20 can be a reflection of the soldier population at these households which are not mentioned as a member.

Table IV.1.2.1. De Facto Age Distribution of TDHS-1993

	Male		Female		Total			Male		Female		Total	
Age	n	%	n	%	n	%	Age	n	%	n	%	n	%
0	396	2.12	373	1.91	769	2.01	50	226	1.21	198	1.01	424	1.11
1	328	1.75	315	1.61	643	1.68	51	105	0.56	169	0.86	274	0.72
2	329	1.76	323	1.65	652	1.70	52	118	0.63	209	1.07	327	0.85
3	365	1.95	325	1.66	690	1.80	53	150	0.80	191	0.98	341	0.89
4	374	2.00	355	1.81	729	1.90	54	104	0.56	130	0.66	234	0.61
5	362	1.93	355	1.81	717	1.87	55	248	1.33	285	1.46	533	1.39
6	385	2.06	415	2.12	800	2.09	56	127	0.68	126	0.64	253	0.66
7	468	2.50	444	2.27	912	2.38	57	100	0.53	126	0.64	226	0.59
8	481	2.57	468	2.39	949	2.48	58	126	0.67	116	0.59	242	0.63
9	467	2.50	392	2.00	859	2.24	59	87	0.46	76	0.39	163	0.43
10	517	2.76	499	2.55	1016	2.65	60	269	1.44	327	1.67	596	1.56
11	450	2.41	419	2.14	869	2.27	61	95	0.51	64	0.33	159	0.42
12	521	2.78	511	2.61	1032	2.70	62	106	0.57	99	0.51	205	0.54
13	546	2.92	497	2.54	1043	2.72	63	116	0.62	108	0.55	224	0.59
14	446	2.38	472	2.41	918	2.40	64	72	0.38	78	0.40	150	0.39
15	444	2.37	471	2.41	915	2.39	65	222	1.19	239	1.22	461	1.20
16	446	2.38	498	2.54	944	2.47	66	82	0.44	116	0.59	198	0.52
17	439	2.35	521	2.66	960	2.51	67	85	0.45	97	0.50	182	0.48
18	428	2.29	492	2.51	920	2.40	68	65	0.35	57	0.29	122	0.32
19	344	1.84	382	1.95	726	1.90	69	41	0.22	27	0.14	68	0.18
20	298	1.59	453	2.31	751	1.96	70	144	0.77	145	0.74	289	0.75
21	221	1.18	352	1.80	573	1.50	71	21	0.11	23	0.12	44	0.11
22	311	1.66	389	1.99	700	1.83	72	32	0.17	37	0.19	69	0.18
23	358	1.91	360	1.84	718	1.88	73	39	0.21	24	0.12	63	0.16
24	310	1.66	317	1.62	627	1.64	74	14	0.07	19	0.10	33	0.09
25	360	1.92	355	1.81	715	1.87	75	64	0.34	66	0.34	130	0.34
26	261	1.39	284	1.45	545	1.42	76	18	0.10	21	0.11	39	0.10
27	297	1.59	315	1.61	612	1.60	77	16	0.09	12	0.06	28	0.07
28	298	1.59	298	1.52	596	1.56	78	16	0.09	16	0.08	32	0.08
29	228	1.22	221	1.13	449	1.17	79	17	0.09	6	0.03	23	0.06
30	355	1.90	382	1.95	737	1.93	80	54	0.29	71	0.36	125	0.33
31	203	1.08	219	1.12	422	1.10	81	9	0.05	3	0.02	12	0.03
32	221	1.18	246	1.26	467	1.22	82	15	0.08	17	0.09	32	0.08
33	250	1.34	332	1.70	582	1.52	83	6	0.03	10	0.05	16	0.04
34	203	1.08	218	1.11	421	1.10	84	5	0.03	9	0.05	14	0.04
35	305	1.63	292	1.49	597	1.56	85	24	0.13	29	0.15	53	0.14
36	212	1.13	199	1.02	411	1.07	86	4	0.02	10	0.05	14	0.04
37	250	1.34	212	1.08	462	1.21	87	11	0.06	10	0.05	21	0.05
38	258	1.38	271	1.38	529	1.38	88	1	0.01	7	0.04	8	0.02
39	187	1.00	183	0.94	370	0.97	89	2	0.01	3	0.02	5	0.01
40	285	1.52	297	1.52	582	1.52	90	9	0.05	23	0.12	32	0.08
41	134	0.72	149	0.76	283	0.74	91	2	0.01	2	0.01	4	0.01
42	183	0.98	188	0.96	371	0.97	92	1	0.01	2	0.01	3	0.01
43	221	1.18	224	1.14	445	1.16	93	4	0.02	1	0.01	5	0.01
44	130	0.69	135	0.69	265	0.69	94	1	0.01	0	0.00	1	0.00
45	227	1.21	217	1.11	444	1.16	95	12	0.06	16	0.08	28	0.07
46	125	0.67	139	0.71	264	0.69	DK	3	0.02	4	0.02	7	0.02
47	130	0.69	134	0.68	264	0.69	Missing	5	0.03	1	0.01	6	0.02
48	158	0.84	157	0.80	315	0.82	**Total**	**18710**	**100.00**	**19571**	**100.00**	**38281**	**100.00**
49	102	0.55	81	0.41	183	0.48							

Table IV.1.2.2. De Facto Age Distribution of TDHS-1998

	Male		Female		Total			Male		Female		Total	
Age	**n**	**%**	**n**	**%**	**n**	**%**	**Age**	**n**	**%**	**n**	**%**	**n**	**%**
0	387	2.35	367	2.12	754	2.23	50	172	1.04	175	1.01	347	1.03
1	377	2.29	335	1.93	712	2.11	51	106	0.64	149	0.86	255	0.75
2	344	2.09	304	1.75	648	1.92	52	139	0.84	119	0.69	258	0.76
3	333	2.02	310	1.79	643	1.90	53	106	0.64	127	0.73	233	0.69
4	349	2.12	339	1.95	688	2.04	54	97	0.59	115	0.66	212	0.63
5	336	2.04	316	1.82	652	1.93	55	148	0.90	195	1.12	343	1.01
6	409	2.48	388	2.24	797	2.36	56	93	0.56	118	0.68	211	0.62
7	346	2.10	350	2.02	696	2.06	57	103	0.63	92	0.53	195	0.58
8	403	2.45	369	2.13	772	2.28	58	114	0.69	119	0.69	233	0.69
9	307	1.87	335	1.93	642	1.90	59	78	0.47	95	0.55	173	0.51
10	389	2.36	323	1.86	712	2.11	60	197	1.20	193	1.11	390	1.15
11	361	2.19	340	1.96	701	2.07	61	64	0.39	48	0.28	112	0.33
12	361	2.19	378	2.18	739	2.19	62	96	0.58	74	0.43	170	0.50
13	386	2.34	379	2.19	765	2.26	63	72	0.44	86	0.50	158	0.47
14	322	1.96	403	2.32	725	2.14	64	75	0.46	70	0.40	145	0.43
15	329	2.00	330	1.90	659	1.95	65	165	1.00	163	0.94	328	0.97
16	347	2.11	421	2.43	768	2.27	66	79	0.48	94	0.54	173	0.51
17	370	2.25	378	2.18	748	2.21	67	65	0.39	79	0.46	144	0.43
18	404	2.45	460	2.65	864	2.56	68	63	0.38	81	0.47	144	0.43
19	307	1.87	318	1.83	625	1.85	69	48	0.29	42	0.24	90	0.27
20	240	1.46	380	2.19	620	1.83	70	111	0.67	143	0.82	254	0.75
21	203	1.23	320	1.85	523	1.55	71	52	0.32	30	0.17	82	0.24
22	290	1.76	330	1.90	620	1.83	72	43	0.26	54	0.31	97	0.29
23	291	1.77	324	1.87	615	1.82	73	35	0.21	40	0.23	75	0.22
24	302	1.83	347	2.00	649	1.92	74	32	0.19	28	0.16	60	0.18
25	325	1.97	328	1.89	653	1.93	75	58	0.35	56	0.32	114	0.34
26	304	1.85	338	1.95	642	1.90	76	28	0.17	27	0.16	55	0.16
27	266	1.62	276	1.59	542	1.60	77	17	0.10	13	0.07	30	0.09
28	254	1.54	285	1.64	539	1.59	78	29	0.18	25	0.14	54	0.16
29	206	1.25	256	1.48	462	1.37	79	9	0.05	16	0.09	25	0.07
30	266	1.62	291	1.68	557	1.65	80	23	0.14	43	0.25	66	0.20
31	193	1.17	180	1.04	373	1.10	81	2	0.01	8	0.05	10	0.03
32	225	1.37	251	1.45	476	1.41	82	5	0.03	10	0.06	15	0.04
33	255	1.55	277	1.60	532	1.57	83	6	0.04	11	0.06	17	0.05
34	236	1.43	256	1.48	492	1.46	84	8	0.05	10	0.06	18	0.05
35	240	1.46	237	1.37	477	1.41	85	16	0.10	19	0.11	35	0.10
36	199	1.21	229	1.32	428	1.27	86	7	0.04	11	0.06	18	0.05
37	215	1.31	236	1.36	451	1.33	87	5	0.03	10	0.06	15	0.04
38	249	1.51	262	1.51	511	1.51	88	2	0.01	10	0.06	12	0.04
39	160	0.97	189	1.09	349	1.03	89	1	0.01	0	0.00	1	0.00
40	255	1.55	239	1.38	494	1.46	90	5	0.03	16	0.09	21	0.06
41	156	0.95	162	0.93	318	0.94	91	2	0.01	0	0.00	2	0.01
42	218	1.32	191	1.10	409	1.21	92	0	0.00	5	0.03	5	0.01
43	182	1.11	209	1.21	391	1.16	93	1	0.01	4	0.02	5	0.01
44	168	1.02	174	1.00	342	1.01	94	1	0.01	3	0.02	4	0.01
45	193	1.17	206	1.19	399	1.18	95	2	0.01	10	0.06	12	0.04
46	160	0.97	160	0.92	320	0.95	DK	14	0.09	8	0.05	22	0.07
47	124	0.75	122	0.70	246	0.73	**Total**	**16461**	**100.00**	**17341**	**100.00**	**33802**	**100.00**
48	197	1.20	197	1.14	394	1.17							
49	128	0.78	102	0.59	230	0.68							

Table IV.1.2.3. De Facto Age Distribution of TDHS-2003

	Male		Female		Total			Male		Female		Total	
Age	**n**	**%**	**n**	**%**	**n**	**%**	**Age**	**n**	**%**	**n**	**%**	**n**	**%**
0	399	1.91	370	1.68	769	1.79	50	235	1.13	198	0.90	433	1.01
1	354	1.70	348	1.58	702	1.64	51	152	0.73	193	0.88	345	0.81
2	447	2.14	404	1.84	851	1.99	52	189	0.91	240	1.09	429	1.00
3	479	2.30	414	1.88	893	2.08	53	191	0.92	243	1.10	434	1.01
4	403	1.93	404	1.84	807	1.88	54	165	0.79	196	0.89	361	0.84
5	409	1.96	408	1.85	817	1.91	55	212	1.02	220	1.00	432	1.01
6	421	2.02	408	1.85	829	1.93	56	145	0.70	125	0.57	270	0.63
7	438	2.10	432	1.96	870	2.03	57	125	0.60	139	0.63	264	0.62
8	447	2.14	439	1.99	886	2.07	58	161	0.77	169	0.77	330	0.77
9	400	1.92	412	1.87	812	1.89	59	142	0.68	91	0.41	233	0.54
10	412	1.98	433	1.97	845	1.97	60	132	0.63	185	0.84	317	0.74
11	427	2.05	439	1.99	866	2.02	61	110	0.53	83	0.38	193	0.45
12	416	2.00	376	1.71	792	1.85	62	97	0.47	107	0.49	204	0.48
13	450	2.16	453	2.06	903	2.11	63	120	0.58	133	0.60	253	0.59
14	414	1.99	424	1.93	838	1.96	64	97	0.47	128	0.58	225	0.53
15	386	1.85	387	1.76	773	1.80	65	173	0.83	220	1.00	393	0.92
16	450	2.16	445	2.02	895	2.09	66	81	0.39	97	0.44	178	0.42
17	456	2.19	468	2.13	924	2.16	67	81	0.39	120	0.55	201	0.47
18	414	1.99	435	1.98	849	1.98	68	75	0.36	91	0.41	166	0.39
19	372	1.78	369	1.68	741	1.73	69	67	0.32	77	0.35	144	0.34
20	246	1.18	442	2.01	688	1.61	70	172	0.83	177	0.80	349	0.81
21	303	1.45	364	1.65	667	1.56	71	60	0.29	61	0.28	121	0.28
22	381	1.83	484	2.20	865	2.02	72	63	0.30	74	0.34	137	0.32
23	397	1.90	435	1.98	832	1.94	73	78	0.37	87	0.40	165	0.39
24	369	1.77	411	1.87	780	1.82	74	50	0.24	58	0.26	108	0.25
25	362	1.74	409	1.86	771	1.80	75	90	0.43	115	0.52	205	0.48
26	327	1.57	412	1.87	739	1.72	76	57	0.27	67	0.30	124	0.29
27	304	1.46	343	1.56	647	1.51	77	55	0.26	44	0.20	99	0.23
28	324	1.55	374	1.70	698	1.63	78	46	0.22	38	0.17	84	0.20
29	319	1.53	337	1.53	656	1.53	79	37	0.18	22	0.10	59	0.14
30	375	1.80	414	1.88	789	1.84	80	48	0.23	70	0.32	118	0.28
31	286	1.37	305	1.39	591	1.38	81	19	0.09	13	0.06	32	0.07
32	329	1.58	311	1.41	640	1.49	82	20	0.10	20	0.09	40	0.09
33	299	1.43	334	1.52	633	1.48	83	9	0.04	25	0.11	34	0.08
34	284	1.36	283	1.29	567	1.32	84	15	0.07	16	0.07	31	0.07
35	307	1.47	325	1.48	632	1.47	85	19	0.09	16	0.07	35	0.08
36	227	1.09	224	1.02	451	1.05	86	8	0.04	14	0.06	22	0.05
37	249	1.19	298	1.35	547	1.28	87	4	0.02	6	0.03	10	0.02
38	324	1.55	327	1.49	651	1.52	88	4	0.02	1	0.00	5	0.01
39	271	1.30	334	1.52	605	1.41	89	1	0.00	6	0.03	7	0.02
40	335	1.61	306	1.39	641	1.50	90	18	0.09	15	0.07	33	0.08
41	203	0.97	262	1.19	465	1.09	91	2	0.01	3	0.01	5	0.01
42	260	1.25	274	1.25	534	1.25	92	0	0.00	3	0.01	3	0.01
43	284	1.36	316	1.44	600	1.40	93	4	0.02	5	0.02	9	0.02
44	256	1.23	250	1.14	506	1.18	94	1	0.00	1	0.00	2	0.00
45	280	1.34	287	1.30	567	1.32	95	13	0.06	14	0.06	27	0.06
46	195	0.94	215	0.98	410	0.96	DK	17	0.08	4	0.02	21	0.05
47	253	1.21	225	1.02	478	1.12	**Total**	**20843**	**100.00**	**22007**	**100.00**	**42850**	**100.00**
48	235	1.13	242	1.10	477	1.11							
49	205	0.98	166	0.75	371	0.87							

Figure IV.1.2.1. Age Distribution of De Facto Household Population, TDHS-1993

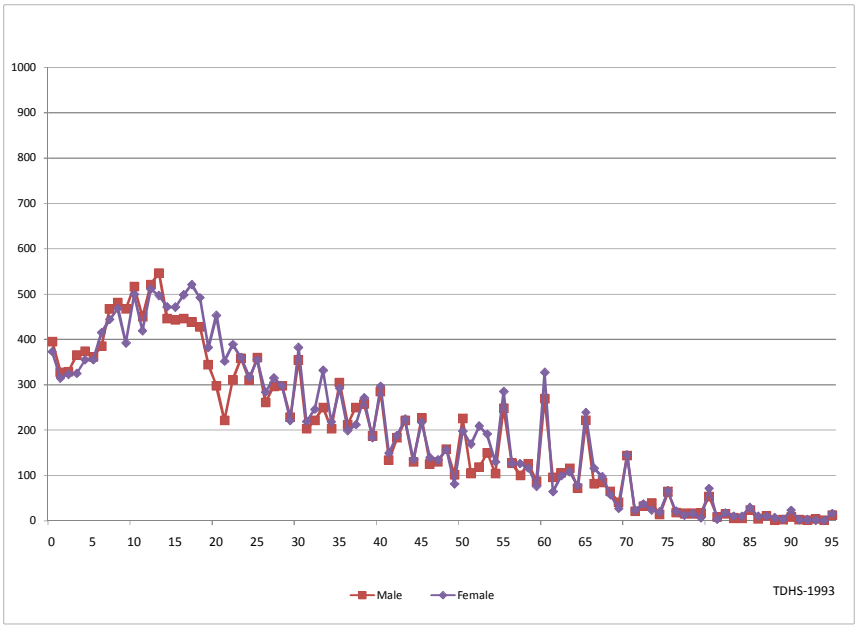


Figure IV.1.2.2. Age Distribution of De Facto Household Population, TDHS-1998

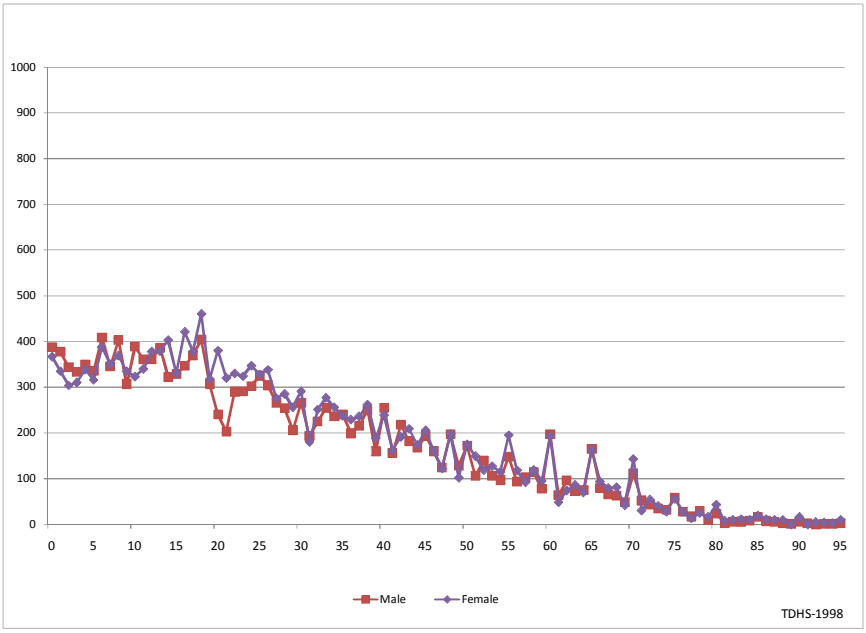
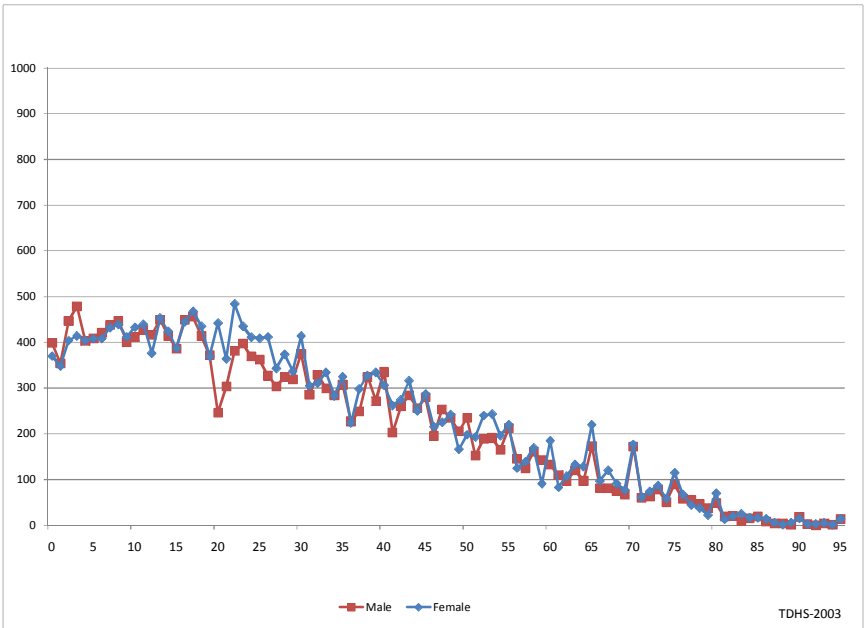


Figure IV.1.2.3. Age Distribution of De Facto Household Population, TDHS-2003



At this study, the Myers, Whipple, Bachi and UN Age-Sex Ratio Indexes were estimated in terms of assessing the data quality of the household members at TDHS-1993, TDHS-1998 and TDHS-2003. The Myers digit preference at these three surveys can easily be identified with figures from Figure IV.1.2.4. to IV.1.2.6.. For all three surveys, the obvious digit preference problem for ages ending with "0" and "5" is seen. For male population the preference for these ages are lower than females. However, the results indicate that the problem of digit preference is decreasing. The Myers digit preference for "0" was 3.4 for males and 4.1 for females at TDHS-1993. However, it dropped down to 1.5 and 2.0 at TDHS-1998 and 0.8 and 1.5 at TDHS-2003 respectively for males and females. On the other hand, Myers estimation for the preference of digit "5" indicates that at TDHS-1993 and TDHS-1998 the preference is seen more for males than females. At TDHS-2003 the preference of digit "5" is more or less same for males and females. Likewise, the preference of "5" decreased among three surveys.

In addition to “0” and “5”, the digits “3” and “8” seems attractive for the respondents. The TDHSs have applied at the years ending with 3 and 8. The respondents may think the birth year of the household member and they may round up the year of birth and calculate the age with using this rounded year information. Except TDHS-1998, the digit preference for “3”and “8” is remarkable. At TDHS-1998, although there is no clear preference for digit “3”, a vivid digit preference for “8” is seen. Even this preference is close to the preference of “0” and “5” for this survey.

On the other hand, the preference of certain digits causes problem of “non-preferable” digits like “1”, “4”, “6” and “9”. The figures indicate that, for these digits the preference estimation resulted in minus values. It is clear that, as the neighboring digits are at the center of interest; these digits are less preferred by the respondents. However, the overall preference and non- preference seems decreasing for males and females and total population. With this survey the digit preference for Bachi Index is also estimated and presented at Annex VIII.with Figure VIII.2., Figure VIII.2.2. and Figure VIII.2.3.. As the results of the index shows little dissimilarity from the Myers index estimations, no additional comments were done on the results. Interested readers may find the results at this section of the study.

Figure IV.1.2.4. Myers Preference by Digit, TDHS-1993

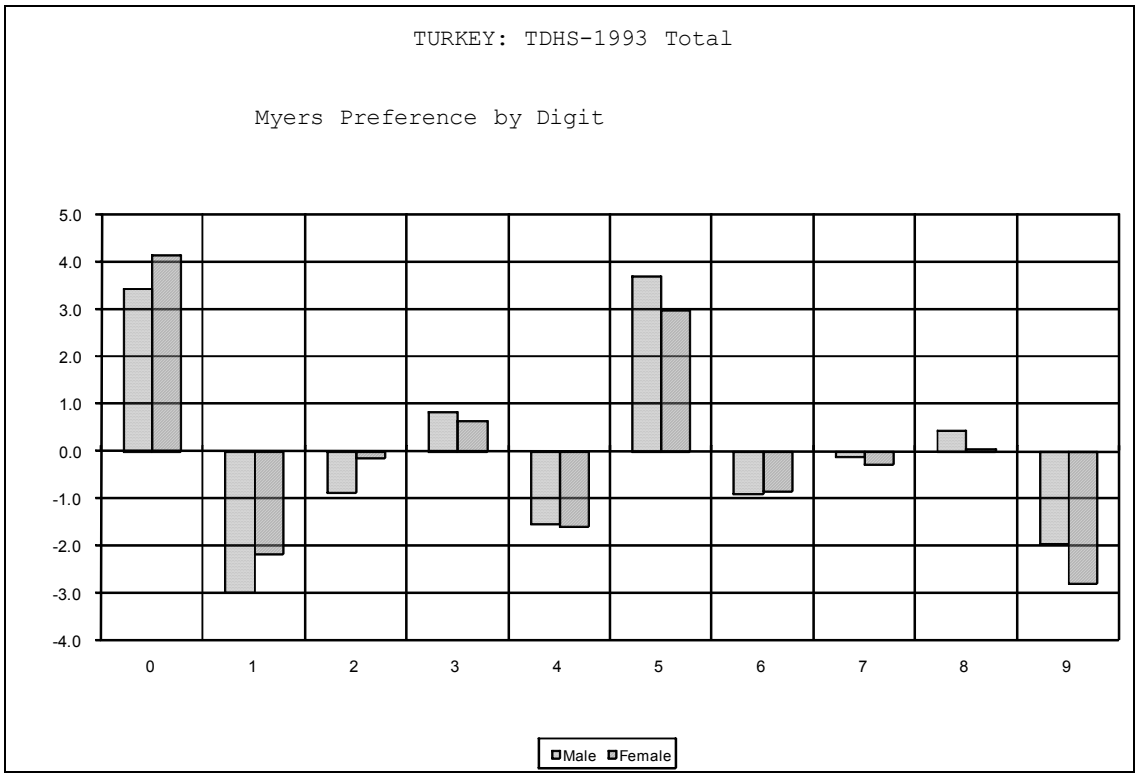


Figure IV.1.2.5. Myers Preference by Digit, TDHS-1998

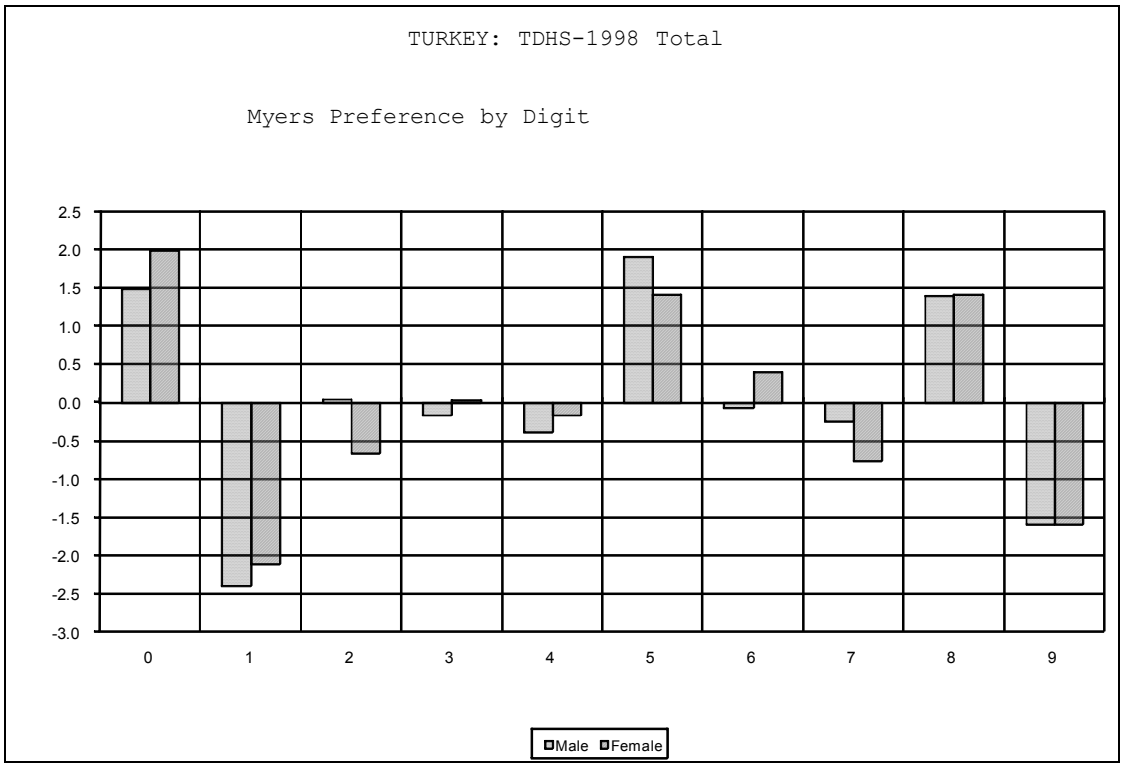


Figure IV.1.2.6. Myers Preference by Digit, TDHS-2003

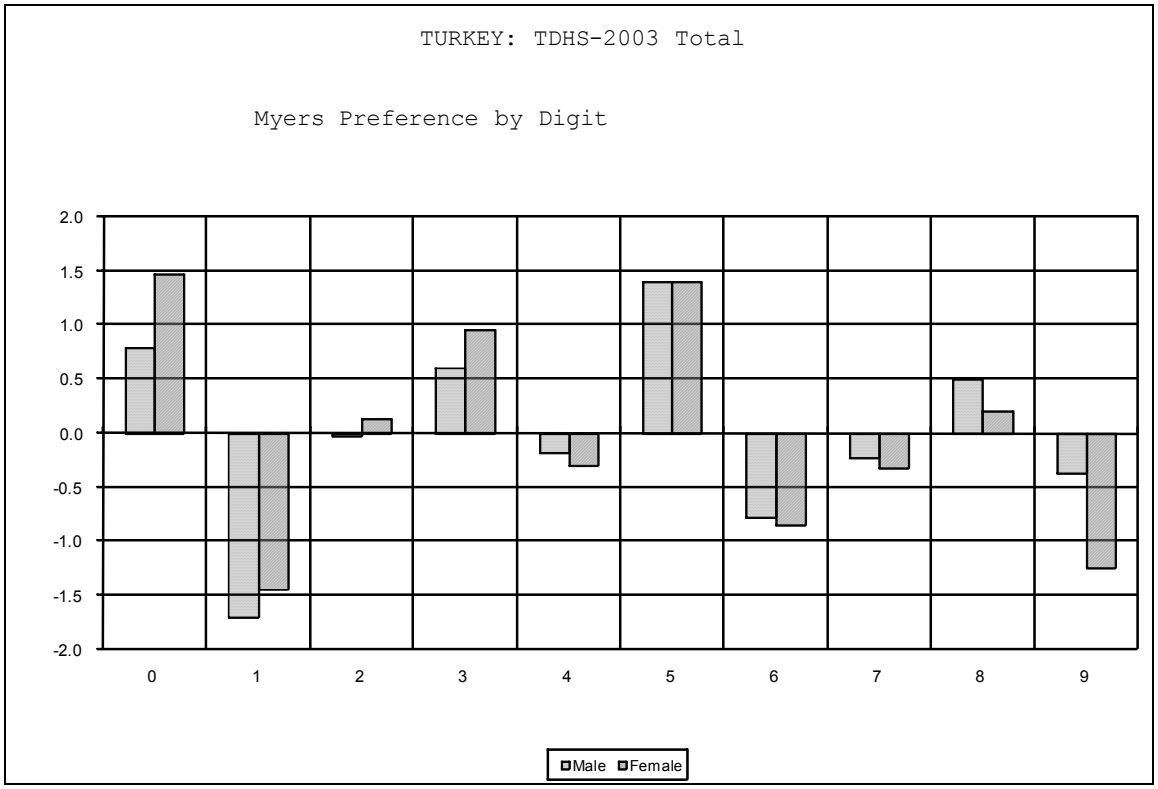


Table IV.1.2.4 indicates the household age and sex ratios and United Nations Index at TDHS-1993, 1998 and TDHS-2003 and Myers, Bachi and Whipple Indices for female household population for these surveys. The table presents the estimations by region and type of place of residence and total. As the main focus of this section is to assess the data quality of the data used for the eligibility of women questionnaire, although the index results are calculated for total population, the Table VIII.2.1. at Annex VIII.2. indicates the results for both sexes and they are not going to be discussed here.

The Myers index results for females show that the age heaping problem is decreasing at TDHSs. The Index results at TDHS-1993 and TDHS-1998 indicates that the digit preference problem for these surveys among female population is at medium level. On the other hand, as the index score decreased to an 8.2 at TDHS-2003; the heaping problem can be regarded as low and acceptable for this survey. There was clear regional difference in terms of the level of digit preference problem. At TDHS-1993 the Myers index is estimated at 26.2 –which is the only result below medium level.

On the contrary, the results for other regions are at medium level for the same survey. With TDHS-1998, the age heaping problem in West, Central and North regions decreased to acceptable levels. In addition, the problem in East region (17.5) drops to medium level for this survey. With TDHS-2003, for all regions including East, the Myers index results are below 10. The lowest results were seen in different regions for different surveys. While the lowest result is seen in West region (11.7) at TDHS-1993, at TDHS-1998 the lowest result comes from the data of North region (7.4). At TDHS-2003 the lowest Myers index result is calculated for South region with a score of 6.8.

There is a gradual decrease in Myers Index results for both urban and rural female population of Turkey. The results indicate that, at TDHS-1993 for both urban and rural areas the age heaping problem is at medium level for females. With the TDHS-1998 it is seen that for urban female population the size of the problem is calculated low and acceptable (8.6)., whereas for the same survey for rural female population the digit preference is still at medium level (16.3). With TDHS-2003, the digit preference problem is estimated acceptable for both residential areas (7.2 and 9.9 for urban and rural female populations respectively).

The Bachi index is another way of estimation for evaluating the age distribution problem of populations. The results of Bachi Index for female population at TDHS-1993, TDHS-1998 and TDHS-2003 is also shown in Table IV.1.2.4.. Bachi index gives us results for ages 23 to 77 and the index scores are assessed same as Myers index scores. As the age evaluated at this index is limited with the adult ages, the scores are lower than Myers index scores. The respondents with whom the household list is filled with possibly have better information about the age of the females aged 23 to 77 as compared with the all females. The score for Turkey decreased from medium level with 11.0 at TDHS-1993 to low level 6.5 at TDHS-1998 and 5.2 at TDHS-2003. At the urban areas Bachi index score have always lower than the rural areas. For the last two surveys the score is even below 5 among females aged 23 to 77 living in urban areas. In rural areas, on the other hand, at TDHS-1993 and TDHS-1998 the Bachi index is calculated as medium level and for the last TDHS, the score

dropped to accurate level (6.2). The distinction between East region and rest can be easily seen for the Bachi index results at TDHS-1193. Although the highest score for other regions is 11.9 at North, digit preference for East is estimated at 20.5 (high). However, the problem of age heaping first decreased to medium level at TDHS-1998 and to low at TDHS-2003 at East region.

The results of the Whipple Index calculations are also presented at Table IV.1.2.4 for Regions, Type of Place of Residence and Turkey. The overall results point to a decrease at the level of age reporting error for Turkey among three surveys. At TDHS-1993 the score is evaluated as "Rough", at TDHS-1998 and at TDHS-2003 as "Approximate". If the trend continues, for the next survey the Whipple Index score will be calculated as "Fairly Accurate". The regional differences seen at other Index scores can also be seen for Whipple Index score. The poorest (highest) and the best (lowest) score among all three surveys is calculated for East Region at TDHS-1993 with 193 (Very rough) and at TDHS-2003 for North region with 99 (Highly accurate) respectively. Like other index results, the quality of the urban female age data is in good condition as compared to rural. For the last two surveys the Whipple index score indicates fairly accurate age data for females.

The UN Age-Sex Index is also applied to all three TDHS data. The results indicate that the overall joint score for Turkey for last two surveys is inaccurate whereas at TDHS-1993 the score is highly inaccurate. The distribution of the males for especially early ages and the heaping problem for certain ages creates such kind of results. The males at military ages will also affect the score. For all regions and surveys the UN index is calculated above 40 which show a highly inaccurate age and sex distribution. One of the interesting findings is the data quality of the population living in rural areas. At TDHS-1998 the joint score was very close to inaccurate level (40.3) and at TDHS-2003 the score is estimated as inaccurate (38.4).

For the eligible age groups (15-49) and the previous age group of the first eligible age group (10-14) and latter age group (50-54) is evaluated in terms of age and sex ratio. When these age groups are compared regarding the age ratios of females, it is

seen that except last survey, the latter age group has more number of females as compared to the former. However, at TDHS-2003, the 10-14 age group has more females than the first eligible age group. Except West region at TDHS-2003, for nearly all regions and surveys the age ratio for 10-14 age group is lower than 15-19 age group. For West region at TDHS-2003, there is a clear distinction between the age ratios for these two age groups. This finds its reflection on the urban age ratio results in TDHS-2003. While for the rest surveys and for urban and rural areas the age ratio of the first eligible age group is higher than the previous age group.

When age ratios are assessed for the last eligible age group and the next, it is seen that females are less mentioned at 45-49 age group when compared with the 50 -54. Although there is no clear trend for the first eligible age group and the previous one, for all three surveys, obvious trend can be seen for the last eligible age group and the next. The data at TDHS-1998 is somehow shows different trend for age ratios for these age groups. However, TDHS-1993 and TDHS-2003 results confirm the imbalance at the age groups 45-49 and 50-54. This creates an exaggerated female population for age group 50-54 and will result in problems in estimation of fertility rates.

Table IV.1.2.4 also illustrates the sex ratios for the age groups 10-14, 15-19, 45-49 and 50-54 which give the information on the data quality in terms of carrying the eligible women to not eligible age groups. It is seen that there is no clear problem of underestimating the female population at first eligible age group for all TDHSs. The female population at age group 15-19 is higher than male population. The only situation where male population is higher than female is in TDHS-1993 for the age group 10-14. At this survey, for this age group, around 103 males were mentioned for 100 females.

The residential differentiation can be identified for nearly all surveys. For the first two TDHSs, the sex ratio for age group 10-14 is very close to each other and above 104. Whereas, at TDHS-2003 the sex ratio for age group 10-14 is 97 and for the first eligible age group it is estimated 107.6. This brings the possibility of carrying the

eligible females to not eligible ages into mind. For rural areas this kind of problem is not seen, the only situation is for the TDHS-1998 where for both age groups the sex ratios are 93.6 and 80.6 for age groups 10-14 and 15-19 respectively. When regional sex ratio evaluation done for all three surveys, it is except the West region, there is clear problem of carrying females to 10-14 age groups. At west for all surveys there are more males at age group 15-19 as compared to age 10-14.

The sex ratio at the last eligible age group (45-49) and the next age group (50-54) is also assessed at Table IV.1.2.4.. The results indicate that there are more females at age group 50-54 when compare to 45-49. There were 78.4 males for 100 females at 50-59 ages at TDHS-1993, 90.5 at TDHS-1998 and 87 at the last TDHS. On the other hand sex ratios for three TDHSs are calculated as 101.9, 101.9 and 102.9 respectively for the last eligible age group. Although there is a balance between the sexes are seen for age group 45-49, women excess is seen for the age group 50-54. This problem is more vivid in urban areas. While the sex ratio for the last eligible age group is around 105 for all TDHSs, the sex ratio drops to 80.0, 98.5 and 87.5 for the surveys in that order. In the rural areas, for both the last eligible age group and the next age group women are mentioned more than males. However the excess of female population at rural areas for the age group 50-54 is obvious. TDHS-1993 results indicate that for age group 50-54, for 100 females only 76.6 males are mentioned. Although this increased to first 80.0 and 85.3 respectively for the last two surveys, sex ratios are still questionable for rural areas.

The estimations for regions regarding the sex ratio for age groups 45-49 and 50-54 indicates that especially for East and Central region systematic repelling of women to 50-54 age group will be a problem for these regions. While 123.4 males were mentioned at age group 45-49 at TDHS-1993 at East Region; for the same survey for 50-54 age group only 66.7 men were mentioned. Although the imbalance at the age group 50-54 seems decreased with the surveys TDHS-1998 and TDHS-2003, the problem at the last eligible age group continues. The imbalance of sexes for the 45-49 and 50-54 age groups increased at Central region with the surveys. While there were 102.3 males and 84.3 males mentioned for 100 females at age groups 45-49 and

50-54 respectively at TDHS-1993 the gap increased to 114.5 males and 79.8 males per 100 females at TDHS-2003. It will be true to mention an overall excess of females at 50-54 age group with respect to 45-49 nearly for all regions.

The indices, used for the assessment of the age data for females are assessed for each TDHS data sets by the selected demographic characteristics of the respondent whom the household interview is completed. The results are presented at Table IV.1.2.6. To select the best respondent for the household interview is crucial for the data quality of the survey. The results indicate that the best information is taken from either household head or her/his spouse. For all three surveys the answers less affected by age heaping and digit preference is brought by these members of the household. The high index results are estimated for the household members who are other than household head, wife/husband or son/daughter. The age of the respondent is evaluated in terms of indices estimating the digit preference and age heaping. Results show that when the respondent is above age 55, the quality of the data is very low. The best answers were taken by the 35-54 aged respondents at TDHS-1993 and TDHS-2003. On the other hand, at TDHS-1998, the best quality age information is taken from the interviews done with 15-34 aged members of the household.

The female respondents seem giving more dirty age data in terms of age heaping and digit preference as compared to males at the first and the last TDHSs. In TDHS-1998 females gave better quality age information as compared to males at the same survey. Education seems the most important factor affecting the data quality of age at the household list. Except TDHS 1993, the index results decrease with the increase at education levels. The index results for the group of respondent have no education or did not complete the primary education is two times higher than the index estimated from the answers of respondents completed the primary education.

Table IV.1.2.4. Household Age and Sex Ratios and Myers, Bachi, Whipple and United Nations Indices for Household Data by Region and Type of Place of Residence, TDHS 1993, 1998 and 2003

	Myers Index (Females)	Bachi Index (Females)	Whipple Index (Females)	UN Index	Age Ratios (Females)				Sex Ratios			
					10-14	15-19	45-49	50-54	10-14	15-19	45-49	50-54
Region												
West												
1993	11.7	7.9	123	54.6	114.0	103.8	79.7	123.7	97.8	104.2	99.3	78.2
1998	8.4	4.3	100	64.0	97.9	100.8	104.2	83.9	100.2	102.6	103.7	100.0
2003	8.3	4.8	109	57.4	105.4	87.3	97.2	118.6	94.6	113.8	95.8	85.8
South												
1993	12.2	8.9	124	63.5	106.5	108.7	73.7	118.0	110.4	89.1	94.3	81.3
1998	11.3	7.3	120	68.2	99.5	114.5	113.8	82.9	108.8	91.3	79.7	101.2
2003	6.8	4.4	106	57.7	93.8	107.3	83.1	122.2	118.3	94.2	103.0	93.7
Central												
1993	15.3	11.0	132	48.0	100.8	117.8	80.8	118.0	104.8	73.4	102.3	84.3
1998	9.8	6.5	114	48.3	91.9	112.4	80.2	111.3	106.0	92.2	114.7	82.7
2003	9.2	6.3	112	70.1	101.7	106.1	91.5	110.0	90.7	91.8	114.5	79.8
North												
1993	17.5	11.9	137	68.0	116.5	105.6	93.2	102.9	89.8	86.5	97.1	84.5
1998	7.4	5.7	120	53.3	109.1	110.0	97.9	94.0	106.7	83.8	98.6	92.7
2003	9.0	6.3	099	41.2	103.0	100.7	102.6	88.3	101.9	97.4	93.9	102.8
East												
1993	26.2	20.5	193	111.2	106.2	116.6	60.6	147.9	110.4	86.7	123.4	66.7
1998	17.5	13.7	161	66.7	105.3	110.4	77.5	132.0	88.0	81.1	106.1	76.6
2003	9.9	6.9	124	51.2	99.3	102.7	74.5	116.2	103.5	90.0	114.2	90.0

Table IV.1.2.4. Household Age and Sex Ratios and Myers, Bachi, Whipple and United Nations Indices for Household Data by Region and Type of Place of Residence, TDHS 1993, 1998 and 2003 (Continued)

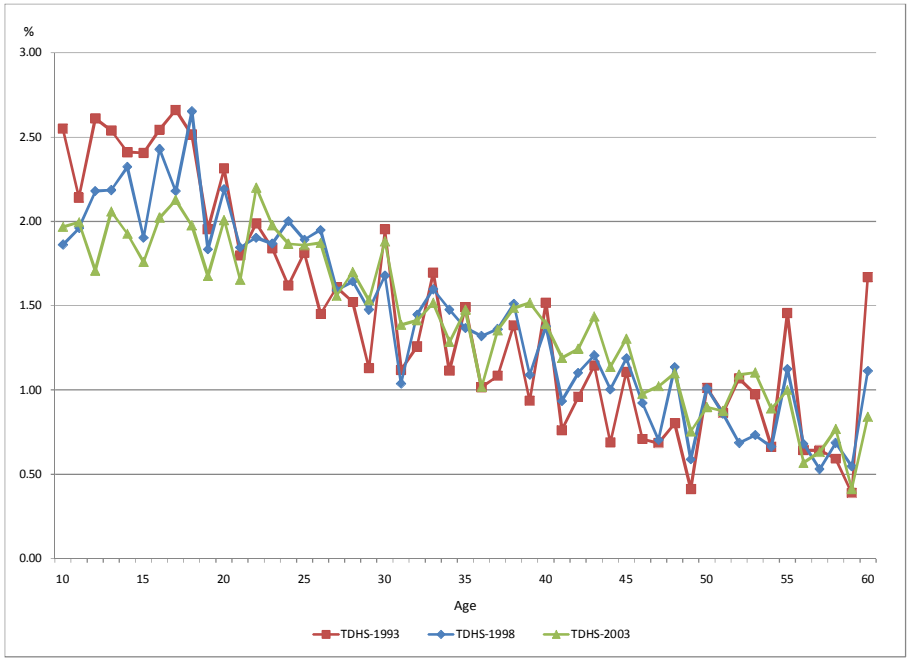
	Myers Index (Females)	Bachi Index (Females)	Whipple Index (Females)	UN Index	Age Ratios (Females)				Sex Ratios			
					10-14	15-19	45-49	50-54	10-14	15-19	45-49	50-54
Type of Place of Residence												
Urban												
1993	13.6	10.0	131	54.0	108.2	108.6	73.7	128.9	104.5	94.1	105.3	80.0
1998	8.6	4.6	107	42.5	93.3	105.2	98.9	90.7	104.6	99.7	105.4	98.5
2003	7.2	4.7	109	51.9	101.9	95.7	91.3	116.3	97.0	107.6	104.8	87.9
Rural												
1993	17.8	12.6	149	56.2	107.8	113.9	82.6	115.0	102.0	81.5	97.6	76.6
1998	16.3	10.3	138	40.3	109.3	113.6	87.7	108.3	93.6	80.4	94.8	80.0
2003	9.9	6.2	115	38.4	99.6	105.2	92.5	108.3	104.9	81.8	98.2	85.3
Total												
1993	15.7	11.0	138	43.7	108.1	110.8	77.0	123.1	103.4	88.9	101.9	78.4
1998	10.5	6.5	117	34.1	99.5	108.2	94.8	97.4	99.8	92.1	101.9	90.5
2003	8.2	5.2	110	39.3	101.1	98.8	91.6	113.9	99.7	98.8	102.9	87.1

Table IV.1.2.5. Myers, Bachi, Whipple Indices for Household Data by Demographic Characteristics of Respondent whom the Household Interview is Completed, TDHS 1993

	Myers Index (Females)			Bachi Index (Females)			Whipple Index (Females)		
	1993	1998	2003	1993	1998	2003	1993	1998	2003
Relationship with HH Head									
HH Head	14.8	9.8	9.7	9.8	4.7	5.6	138	116	109
Wife/Husband	15.5	10.2	7.0	10.6	5.5	4.3	134	108	112
Son/Daughter	15.3	12.8	9.2	10.2	9.2	7.3	141	131	110
Other	15.9	14.5	10.2	12.5	11.4	8.0	149	137	108
Age									
15-34	17.2	10.2	12.0	11.3	8.0	7.6	124	112	101
35-54	14.8	12.5	8.9	9.0	6.7	5.1	130	107	111
55+	33.0	23.6	18.5	19.8	13.2	10.4	196	155	140
Sex									
Male	12.6	11.8	8.3	9.4	7.2	5.0	134	120	109
Female	16.2	10.6	7.9	11.6	6.5	5.3	139	116	111
Education									
No educ/Primary incomplete	24.2	19.1	12.6	15.8	10.1	7.9	164	144	118
Primary	11.0	10.1	7.2	8.4	5.8	5.0	123	110	109
Secondary +	12.2	5.4	6.5	8.4	3.9	4.6	121	104	107
Total	15.7	10.5	8.2	11.0	6.5	5.2	138	117	110

Figure IV.1.2.7. illustrates the percentage of women aged 10 to 60 for THDS-1993, TDHS, 1998 and TDHS-2003. The fluctuation at the years ending with "0" and "5" is a common problem for all three surveys. Similar to the trends at Myers, Whipple and Bachi indices for THDSs, the quality of the data for the surveys are increasing in terms of age heaping and digit preference. The fluctuation at THS-1993 is more vivid and the least heaping problem is seen in TDHS-2003. It is also interesting that after the last eligible age 49 for individual interview, the percent of the female population is significantly increasing. The interviewers or the respondent with whom the household list is completed may carry the eligible women to not eligible ages.

Figure IV.1.2.7. Percentage of Women 10 to 60 Years, TDHS 1993, 1998 and 2003



IV.1.3. Boundary Effects

The age group distortion is one of the important problems at household surveys where eligibility is directly related with age information. Age heaping will result in carrying an eligible women to a not eligible age easily. During the field survey wither the interviewer herself or the respondent will make age heaping and transfer the eligible women outside the eligible age boundaries. Table IV.1.3.1 indicates the Boundary Effect indices based on household data at TDHS-1993, TDHS-1998 and TDHS-2003 by region. The age and sex ratios of age groups are used for calculating the boundary effect indices. While lower boundary effect index is estimated among the relations with the age groups 10-14 and 15-19; upper boundary effect index is with 45-49 and 50-54 age groups.

Table IV.1.3.1 indicates that total boundary effect is highest at TDHS-1993 with 86.9. The result indicates that the out transference of the women from the eligible age groups is at moderate level. At TDHS-1998 and TDHS-2003, the total boundary effect index is estimated inside low ranges (30.4 and 39.5 respectively). Although there is no clear difference among urban and rural females at the last TDHS, at TDHS-1998 while at urban areas the total boundary effect is estimated 181, for rural areas it is 53.0. The lowest scores are estimated at TDHS-1998. The highest total boundary effect score is calculated for East region at TDHS-1993 (178.1). The score is one of the two “high” level score among all regions at the surveys. the other one is estimated in Central region with a score of 103.5 at the same survey. The lowest scores are estimated at the North region for all three surveys. The scores are all inside “low” level and very close to “negligible” for the last two surveys.

The lower and upper boundary effect indexes are also presented at Table IV.1.3.1. Results show that although for the first two surveys there are more women at the first eligible age group than the previous one, at TDHS-2003, although the score is very low, the possibility of the problem of transferring the eligible women from age 15-19 to age 10-14 is seen. In TDHS-1993 the only two regions which has more number of women at age 10-14 with regard to age 15-19 is West (-16.6) and North (-7.5). There

is no sign of carrying eligible women to not eligible 10-14 age group is seen at other three regions and both urban and rural populations as well. At TDHS-1993 both among the regions and residential areas no transference of women from 15-19 age group to 10-14 is seen. On the other hand, at TDHS-2003 except the North region, at all regions and urban areas excess of women at age 10-14 as compared to age 15-19 is seen.

Upper Boundary effect is seen more common and vital in TDHSs. Although the level of the problem decreased from -69.6 to -14.0 at TDHS-1993 and TDHS-1998, at the last survey the score again estimated as -38.1. The interviewers might try to carry the women at their last years of reproductive ages to 50-54 age group to avoid the heavy workload of filling a complete birth history. The lowest scores which indicates high problem are calculated for East region for all three surveys. The lowest problem is seen, on the other hand, at North region except the results of South region at TDHS-1998. Opposite to other region results, at South the number of women at ages 45-49 is more than 50-54 age group. This situation is also true for North region at TDHS-2003. Except the result for urban areas at TDHS-1998, for both urban and rural areas, the transference of women to not eligible ages is possible.

Table IV.1.3.1. Indices of Age Eligibility Distortion Based on Household Data by Region and Type of Place of Residence, TDHS 1993, 1998 and 2003

	1993			1998			2003		
	L*	U**	Total (|L| + |U|)	L*	U**	Total (|L| + |U|)	L*	U**	Total (|L| + |U|)
Region									
West	-16.6	-65.1	81.7	16.4	-14.0	30.4	-37.3	-31.4	68.7
South	23.4	-57.3	80.7	32.5	52.3	84.8	37.7	-48.4	86.1
Central	48.4	-55.1	103.5	34.3	-63.1	97.5	3.4	-53.2	56.6
North	-7.5	-22.2	29.8	23.8	-2.0	25.8	2.2	23.1	25.3
East	34.0	-144.0	178.1	12.0	-84.0	96.1	16.9	-65.8	82.7
Type of Place of Residence									
Urban	10.8	-80.5	91.3	16.8	1.3	18.1	-16.7	-41.9	58.6
Rural	26.7	-53.4	80.1	17.6	-35.4	53.0	28.7	-28.8	57.6
Total	17.2	-69.6	86.9	16.4	-14.0	30.4	-1.4	-38.1	39.5

* Lower boundary

** Upper Boundary

Table IV.1.3.1. shows the boundary effect index results according to some socio-demographic characteristics of the respondent whom the household questionnaire is filled with. The total boundary effect results indicate that, the household head's spouse gives the best results as compared to the other household members. For the last two surveys the level of total boundary effect is even at negligible level (12.3 and 23.9 respectively). When the age of the respondent is taken into consider, the best results are seen among 55+ ages at the first two surveys and among 35-54 age group at TDHS-2003. The level of error at age group 55+ at TDHS-1998 is very low (6.0) as compared to all other ages and years. The sex and the educational status of the respondent seem not significant in terms of total boundary effect scores. For the first and the last TDHSs, males' score is worse than female respondents'. In addition, the total boundary error score of respondents who have no education or did not complete the primary school is lower for the first two surveys. However, at TDHS-2008, the lowest score is calculated among the respondents having secondary or more education.

The lower boundary effect results shows us that, the transference of women to 10-14 age group from 15-19 age group is seen at TDHS-2003 among the respondents who are wife or husband of the household head. -22.8 lower boundary effect score is calculated for this group which is the lowest score among all three years and socio-demographic characteristics. On the contrary, mentioning more females at the first eligible age group is more common situation among the son or daughter of the household head for all three TDHSs. The age of the respondents seem no clear relationship with the lower boundary score. However, the results indicate that among males –although not very high- the problem of carrying the eligible women to not eligible ages is seen for the early eligible ages. Female respondents, on the other hand, lists down more women to the first eligible age group than to the 10-14 age group. For the first two TDHSs, if the respondent's educational level increases, the possibility of writing down more women to age group 15-19 also increases. However, TDHS-2003 results show that, this situation is true for only members who completed primary education. At TDHS-2003 the level of lower boundary effect is in negligible levels.

Upper boundary effect seems common at TDHS datasets. Except for some categories of TDHS-1998, more or less for every socio-demographic characteristic of respondents; transferring eligible women from the last eligible age group to the next is seen clearly. The lowest problem is found among the age information given by wife or husband of the household head and their children for all three surveys. In addition, the quality of the responses is increasing at the advanced ages at TDHS-1993 and TDHS-1998. At the last survey, for all age groups the upper boundary effect scores are significantly low.

Table IV.1.3.2 also presents the upper boundary effect results by sex of the respondent and the education level. While the score at TDHS-1993 is remarkably low for both males and females; male responses are worse than females (-65.3 and -48.0 respectively). The same situation is true for the last survey with better results. TDHS-1998 have the best of the worst results in terms of upper boundary effects, while the male respondents' score (-2.4) is negligible, females' score (-11.9) is around 5 times worse than males'. On the other hand, while no clear relationship is seen with the education level and the level of upper boundary score at TDHS-1993, for the last two surveys it is seen that, when the level of education of the respondent is increasing the quality of the data is also increasing.

Table IV.1.3.2. Indices of Age Eligibility Distortion Based on Household Data by Demographic Characteristics of Respondent whom the Household Interview is Completed, TDHS 1993, 1998 and 2003

	1993			1998			2003		
	L*	U**	Total (|L| + |U|)	L*	U**	Total (|L| + |U|)	L*	U**	Total (|L| + |U|)
Relationship with HH Head									
HH Head	8.4	-60.5	68.9	-8.2	-13.6	21.8	5.4	-60.7	66.1
Wife/Husband	-3.2	-40.0	43.2	7.9	4.4	12.3	-22.8	-1.1	23.9
Son/Daughter	47.3	-40.8	88.2	48.3	14.6	62.9	70.9	-9.4	80.3
Other	44.5	-64.1	108.5	43.4	-25.2	68.5	17.6	-24.4	42.0
Age									
15-34	4.2	-97.1	101.4	38.8	-34.7	73.5	14.1	-33.8	47.9
35-54	25.6	-60.3	85.9	18.9	-4.9	23.8	-3.4	-21.6	25.0
55+	47.4	-15.5	62.9	-3.6	2.4	6.0	36.4	-26.8	63.2
Sex									
Male	-2.4	-65.3	67.7	-1.3	-2.4	3.7	-2.6	-41.4	43.9
Female	13.7	-48.0	61.6	21.4	-11.9	33.3	5.2	-16.0	21.2
Education									
No educ/Pri. Inc.	8.2	-35.6	43.9	9.6	-20.1	29.7	-6.9	-39.9	46.7
Primary	7.3	-70.5	77.7	16.5	-13.6	30.1	10.6	-18.9	29.4
Secondary +	32.0	-45.6	77.6	28.5	20.1	48.6	-2.6	-6.6	9.2
Total	17.2	-69.6	86.9	16.4	-14.0	30.4	-1.4	-38.1	39.5

* Lower boundary

** Upper Boundary

IV.1.4. The Household Residency

The household questionnaire consists a question for the members of the household and the visitor's status of sleeping at the dwelling the night before the survey. To become eligible at TDHSs, a woman at ages 15-49 must be either a usual resident of the household or a visitor who slept last night of the interview day. If there is large difference between the number of overnight visitors and the usual residents sleep

away, an exclusion of eligible women problem will be brought into manner. TDHS household data is evaluated to assess the sleeping away exclusion of female usual residents from the household list. Table IV.1.4.1. illustrates the number of eligible female population, percent of usual residents sleeping away at the interview date and the percent of the overnight visitors at TDHS-1993. No systematic exclusion of usual female members at eligible ages is seen in general except the age group 45-49. While 7.5 % of the usual female residents were mentioned as slept away, visitors only 4.5 percent of the usual residents were written down at the list at this age group. Regional differences for the last eligible age groups are seen. While there is no exclusion at North region, 9 percent of the usual resident female population at 45-49 age group is estimated as excluded. In addition, 2.1 %, 2.2 %, and 3.5 % of females at this age group is assessed as excluded at West, South and Central regions respectively. On the other hand, at the urban areas, the percent of the excluded women are higher than rural in general. At the age group 45-49, 4.5% of the eligible usual resident is estimated as excluded.

TDHS-1998 data is evaluated in terms of sleeping away exclusion of eligible women at Table IV.1.4.2. No clear omission of eligible women is seen at TDHS-1998 in general. However at Region East, for the first and the last eligible age groups, 4.4 % and 4.7% exclusion is estimated respectively. In addition, at South region, 3.7 % of the females aged 15-19 and 45-49 is assessed being excluded. On the other hand, Table IV.1.4.3. shows the sleeping away exclusion of the female usual residents from the household list of TDHS-2003. In general the omission is seen at 15-19 age group. 4.4 % of the usual resident women are excluded at this age group. 7.5 % of the rural females and 2.7 % of urban females at this age group are also excluded. For all regions, more or less, exclusion is calculated. The highest exclusion is seen at North region where nearly 1 out of 10 women are excluded. The omission of women at the last eligible age group is noticeable in rural areas and in East, North and South regions.

Table IV.1.4.1. Evaluation of the Sleeping Away Exclusion of the Female Usual Residents, TDHS-1993.

	Age group								
	10-14	**15-19**	**20-24**	**25-**	**30-**	**35-39**	**40-44**	**45-49**	**50-54**
Region									
West									
A	688	665	604	514	505	452	379	289	317
B	3.9	5.5	6.9	3.8	5.8	4.1	4.2	6.8	4.6
C	3.6	5.5	5.1	3.8	5.6	4.6	5.2	4.7	7.3
Est. % excluded	0.4	0.0	1.8	0.0	0.2	-0.5	-1.0	2.1	-2.7
South									
A	370	379	316	243	210	182	155	107	134
B	5.5	7.6	6.7	4.5	4.4	6.0	6.0	10.1	11.0
C	4.8	7.0	9.4	6.4	7.8	6.8	7.0	8.0	6.4
Est. % excluded	0.6	0.6	-2.7	-1.9	-3.3	-0.9	-1.0	2.2	4.6
Central									
A	518	553	412	336	313	251	239	183	208
B	3.7	5.5	6.4	3.1	3.0	5.8	5.7	6.3	5.1
C	4.0	5.5	8.1	6.2	4.6	5.0	1.3	2.8	6.0
Est. % excluded	-0.4	0.0	-1.8	-3.1	-1.6	0.9	4.4	3.5	-0.9
North									
A	231	203	161	138	118	115	75	67	73
B	8.5	7.0	11.4	9.9	4.5	7.7	9.4	6.1	12.9
C	6.7	8.5	14.3	15.9	12.1	7.7	10.2	10.5	8.9
Est. % excluded	1.8	-1.5	-2.9	-6.0	-7.5	0.0	-0.8	-4.4	4.0
East									
A	586	560	365	215	234	159	146	103	165
B	1.4	4.1	4.4	4.1	6.1	7.1	2.9	10.0	3.1
C	3.5	4.4	5.3	6.2	4.8	5.1	4.3	1.0	1.8
Est. % excluded	-2.1	-0.3	-0.9	-2.0	1.3	2.0	-1.4	9.0	1.3
Type of Place of Residence									
Urban									
A	1389	1376	1144	972	925	755	661	453	524
B	4.4	5.8	5.7	4.1	3.9	5.9	5.4	7.5	6.9
C	3.2	5.8	7.2	4.3	4.6	4.7	4.1	3.2	7.0
Est. % excluded	1.2	0.1	-1.5	-0.2	-0.7	1.2	1.3	4.2	-0.1
Rural									
A	1003	985	715	474	454	404	334	296	374
B	3,2	5,4	8,1	5,0	6,9	4,9	4,4	7,7	5,0
C	5,5	5,7	7,4	10,4	9,2	6,7	6,2	7,0	4,6
Est. % excluded	-2,2	-0,3	0,6	-5,4	-2,3	-1,8	-1,8	0,7	0,4
Total									
A	2392	2361	1859	1446	1379	1159	995	749	898
B	3.9	5.6	6.6	4.4	4.9	5.5	5.0	7.5	6.1
C	4.1	5.7	7.3	6.3	6.1	5.4	4.8	4.7	6.0
Est. % excluded	-0.2	-0.1	-0.7	-1.9	-1.2	0.1	0.3	2.8	0.1

(A) The Number of Women reported to reside in Interviewed Households,
(B) the Percentage of Resident Women Not Sleeping In the Household During the Night Before the Survey,
(C) the Standardized Percentage of Non-Resident Women Sleeping In the Household during the Night Before the Survey
Est. % excluded: Estimated Percentage of Women Who Were Excluded from Eligibility for the Individual Interview by Region and Type of Place of Residence.

Table IV.1.4.2. Evaluation of the Sleeping Away Exclusion of the Female Usual Residents, TDHS 1998.

	Age group								
	10-14	**15-19**	**20-24**	**25-**	**30-**	**35-39**	**40-44**	**45-49**	**50-54**
Region									
West									
A	556	622	672	573	535	443	387	320	254
B	8.8	9.2	11.2	8.4	6.5	8.8	8.7	5.5	9.8
C	8.3	6.3	7.2	7.2	4.5	5.2	4.9	6.3	5.4
Est. % excluded	0.5	2.9	4.0	1.2	1.9	3.6	3.8	-0.7	4.4
South									
A	265	301	229	214	173	173	138	131	89
B	3.7	8.0	4.0	8.4	1.2	1.7	3.6	6.3	9.2
C	6.2	4.3	6.3	7.1	4.9	3.6	5.4	2.6	4.5
Est. % excluded	-2.6	3.7	-2.3	1.3	-3.6	-2.0	-1.9	3.7	4.6
Central									
A	365	409	356	344	258	282	247	174	170
B	4.7	6.4	4.7	2.7	2.2	5.7	4.2	7.1	4.7
C	4.5	9.4	12.5	7.6	7.7	7.0	5.5	5.2	6.6
Est. % excluded	0.2	-3.0	-7.8	-4.9	-5.5	-1.3	-1.3	1.9	-1.8
North									
A	150	147	117	107	105	99	84	67	58
B	10.0	10.3	14.6	10.6	5.2	7.3	7.8	5.6	8.2
C	10.9	10.9	16.0	16.5	13.3	5.2	11.4	9.9	4.5
Est. % excluded	-0.9	-0.6	-1.5	-5.9	-8.2	2.1	-3.5	-4.3	3.7
East									
A	496	464	318	215	164	169	130	103	131
B	6.5	9.6	8.3	4.9	6.4	6.7	8.1	9.6	5.2
C	3.7	5.2	8.7	12.7	7.6	6.6	3.5	4.9	3.3
Est. % excluded	2.8	4.4	-0.4	-7.7	-1.3	0.1	4.6	4.7	1.9
Type of Place of Residence									
Urban									
A	1086	1193	1163	1035	876	809	676	525	400
B	7.9	8.8	9.1	6.1	4.7	7.5	7.4	6.3	8.7
C	4.9	5.8	8.0	6.4	4.3	3.1	3.8	4.6	6.1
Est. % excluded	3.0	3.0	1.0	-0.3	0.4	4.4	3.6	1.7	2.5
Rural									
A	746	750	528	418	359	356	311	269	302
B	5,0	8,3	7,3	8,1	4,7	4,4	5,2	6,9	6,0
C	8,1	8,2	11,4	14,5	11,5	11,4	9,3	7,4	3,7
Est. % excluded	-3,2	0,1	-4,1	-6,4	-6,8	-7,0	-4,1	-0,5	2,3
Total									
A	1832	1944	1691	1453	1235	1165	987	794	701
B	6.7	8.6	8.5	6.7	4.7	6.6	6.7	6.5	7.5
C	6.2	6.7	9.1	8.8	6.4	5.6	5.5	5.6	5.1
Est. % excluded	0.5	1.9	-0.6	-2.1	-1.7	0.9	1.2	1.0	2.4

((A) The Number of Women reported to reside in Interviewed Households,
(B) the Percentage of Resident Women Not Sleeping In the Household During the Night Before the Survey,
(C) the Standardized Percentage of Non-Resident Women Sleeping In the Household during the Night Before the Survey
Est. % excluded: Estimated Percentage of Women Who Were Excluded from Eligibility for the Individual Interview by Region and Type of Place of Residence.

Table IV.1.4.3. Evaluation of the Sleeping Away Exclusion of the Female Usual Residents, TDHS 2003.

	Age group								
	10-14	**15-19**	**20-24**	**25-**	**30-**	**35-39**	**40-44**	**45-49**	**50-54**
Region									
West									
A	723	695	787	768	653	595	567	497	467
B	2.0	9.8	5.7	3.6	2.1	2.2	1.7	3.2	5.3
C	1.3	4.7	6.1	8.0	2.9	2.7	3.2	5.3	5.1
Est. % excluded	0.7	5.2	-0.4	-4.5	-0.8	-0.5	-1.5	-2.1	0.2
South									
A	283	306	291	246	232	207	175	138	145
B	3.1	9.3	12.1	6.7	2.4	2.2	2.6	4.5	5.2
C	1.4	5.3	4.2	4.3	2.8	2.6	3.7	1.4	4.5
Est. % excluded	1.7	4.0	7.9	2.3	-0.3	-0.4	-1.1	3.1	0.8
Central									
A	454	511	493	378	344	361	360	275	236
B	2.6	6.5	6.2	3.4	1.2	3.2	4.5	2.8	3.9
C	2.5	3.9	4.1	1.9	2.8	1.5	2.6	2.6	9.0
Est. % excluded	0.2	2.6	2.1	1.5	-1.5	1.7	1.9	0.1	-5.1
North									
A	162	169	154	118	136	112	123	105	74
B	6.5	12.7	8.3	3.9	2.8	2.8	1.9	7.9	4.9
C	3.4	3.5	4.0	5.5	2.0	3.4	0.0	2.2	2.8
Est. % excluded	3.1	9.2	4.3	-1.6	0.8	-0.6	1.9	5.7	2.2
East									
A	531	520	453	346	271	238	184	127	141
B	3.4	6.7	6.5	4.9	2.0	4.1	5.2	7.6	4.5
C	1.2	2.8	5.7	3.8	2.6	2.3	3.9	2.0	3.7
Est. % excluded	2.3	3.9	0.8	1.1	-0.6	1.9	1.3	5.6	0.8
Type of Place of Residence									
Urban									
A	1417	1423	1500	1389	1154	1058	1014	791	719
B	2.0	7.7	7.3	3.8	1.6	3.0	2.7	3.2	5.1
C	2.0	4.9	5.7	5.5	3.1	2.5	3.1	4.2	6.7
Est. % excluded	-0.1	2.7	1.5	-1.8	-1.5	0.5	-0.4	-1.0	-1.5
Rural									
A	737	778	678	466	481	456	396	352	737
B	5,0	10,0	6,6	5,6	3,0	2,2	3,9	6,3	5,0
C	1,0	2,4	4,0	4,8	1,9	2,2	2,5	2,1	1,0
Est. % excluded	3,9	7,5	2,6	0,8	1,1	0,0	1,4	4,2	3,9
Total									
A	2154	2201	2177	1855	1636	1514	1410	1142	1063
B	3.0	8.5	7.0	4.2	2.0	2.8	3.0	4.2	4.8
C	1.7	4.0	5.2	5.3	2.7	2.4	2.9	3.5	5.5
Est. % excluded	1.3	4.4	1.9	-1.1	-0.7	0.4	0.1	0.6	-0.7

(A) The Number of Women reported to reside in Interviewed Households,
(B) the Percentage of Resident Women Not Sleeping In the Household During the Night Before the Survey,
(C) the Standardized Percentage of Non-Resident Women Sleeping In the Household during the Night Before the Survey
Est. % excluded: Estimated Percentage of Women Who Were Excluded from Eligibility for the Individual Interview by Region and Type of Place of Residence.

IV.2. The Assessment of Age Data in Individual Questionnaire

The household questionnaire -in its nature- as filled with a proxy respondent, is more vulnerable to age reporting errors. Besides the quality of the age and sex data used for the decision of the eligibility of the individual interview from the household questionnaire, the quality of the age data collected by the individual questionnaire is very important in terms of estimating fertility rates. Similar methods and indexes used for age at household list are used to assess the data quality of age information at individual data set. The age information at individual questionnaire is supported by the year and month questions with respect to household questionnaire. It both gives the opportunity for the individual and respondent to make a connection with the birth date and the age of the respondent at time of survey. A woman will be sure about her birth date and either she or the respondent or both may calculate her birth date with this information. Another situation is woman can know her age and respondent will probe her birth date with the age information given and make women confirm the birth year. At this section of the study, the women's age information is assessed from different points.

IV.2.1. Digit Preference

Digit preference seems one of the common problems in surveys and censuses especially for the developing and undeveloped countries. Table IV.2.1.1 presents the percent distribution of women 20-49 by reported terminal digit of age and Myers Index by Region, Type of Place of Residence and Education of Woman. The percents of the digits mentioned for ages indicates that, there is noticeable digit preference in general for the digits "0", "3", "5" and "8". "0" and "5" are the "universal" digits preferred by the individuals. In addition, TDHS surveys are applied at the years ending with 3 and 8. Rounding the birth years to the years ending with "0" and "5" will result in digit preference for "3"and "8". For the East Region a tendency to prefer the digits "0", "3" and "5" is vivid. Although the preference of these digits decreased with the last survey, a clear preference is seen.

In the rural areas, on the other hand, a tendency to heap the age to the years ending with these three digits is also remarkable. Preferences of these digits are seen for all three surveys. In urban, only digit having a percent more than 10 for all three surveys is “3”.

Digit preference is also evaluated with the education of the respondent. Except the results of TDHS-1998, when the level of education increases, the digit preference for “0” is decreasing. For other digits, it is difficult to mention a relation between the education of the woman and the digit preference.

Myers index is assessed for women 20-49 and also presented at Table IV.2.1.1. It is seen that the index results are lower at individual questionnaire as compared to the household for all surveys. For the first and the last TDHSs, the index result is remarkably low. It is also seen that the Myers index results at TDHS-2003 is only 4.0. When the results are evaluated in terms of regional differences, it is seen that
For the first two surveys the Myers index results are highest at East Region. The only region at where the Myers Index result is higher at TDHS-2003 as compared to TDHS-1993 is North. At this region Myers index result increased gradually from 10.6 to12.9 and then 15.2 among the three survey chronologically. Although there are fluctuations at the index results, except South for all regions the clear improvement at the data quality of the age mentioned is seen.

Myers index results are at least 2 point lower in urban areas to rural at all TDHSs. In urban areas, the index drops nearly 7 points and in rural 6 points from TDHS-1998 to TDHS-2003. Although there is a fluctuation for rural areas, a gradual decrease is seen at urban. As mentioned above for the digit preference, a positive correlation between the education of woman and the index result is not seen. While the Myers index results decreases between the first and the last survey (ignoring TDHS-1998), among the women who had secondary or more education there is around 3 point increase. TDHS-1998 results are very dislike the other two survey results and create a fluctuation at Myers index results.

Table IV.2.1.1. Percent Distribution of Women 20-49 by Reported Terminal Digit of Age (Individual Questionnaire) and Myers index by Region, Type of Place of Residence and Education of Woman, TDHS 1993, 1998 and 2003

	Terminal Digit										Myers
	0	1	2	3	4	5	6	7	8	9	Index
Region											
West											
1993	9.7	8.8	10.6	11.4	10.8	10.3	9.3	10.2	10.8	8.1	8.2
1998	11.3	8.7	10.9	11.3	11.5	8.3	10.5	9.7	10.0	7.8	11.0
2003	10.1	8.9	9.8	9.8	9.2	10.3	10.1	10.8	10.8	10.2	4.6
South											
1993	10.3	9.6	8.8	11.4	11.0	11.6	8.0	9.7	11.9	7.7	12.4
1998	11.9	9.2	9.7	11.0	10.1	11.8	10.9	9.0	9.6	6.7	11.5
2003	9.1	8.8	10.5	11.7	10.2	10.0	9.8	10.3	9.5	10.0	5.5
Central											
1993	10.5	10.1	9.3	12.4	10.4	10.9	8.9	9.0	10.3	8.3	9.1
1998	10.8	10.1	9.3	11.3	10.7	9.1	10.6	8.4	11.2	8.4	9.5
2003	9.8	10.0	11.1	8.8	9.9	11.1	9.1	8.7	11.7	9.8	7.8
North											
1993	11.4	9.4	9.6	9.4	8.0	9.0	9.6	11.3	12.5	9.6	10.6
1998	12.8	8.6	9.9	10.8	11.4	11.5	9.4	7.5	9.6	8.6	12.9
2003	8.9	8.0	8.7	11.9	11.6	8.3	10.0	8.4	13.5	10.5	15.2
East											
1993	19.0	8.8	9.2	10.0	9.7	12.6	6.4	8.9	9.1	6.3	23.2
1998	16.7	7.5	10.2	11.4	8.8	13.6	9.6	8.9	8.5	4.9	23.7
2003	12.0	8.0	11.3	10.9	9.8	12.0	8.7	8.5	9.6	9.3	12.3
Type of Place of Residence											
Urban											
1993	10.8	9.0	9.9	11.4	11.4	10.8	8.8	9.7	10.7	7.6	10.1
1998	11.7	9.1	10.4	11.4	10.7	9.6	10.2	9.8	9.9	7.3	8.7
2003	10.0	8.9	10.1	10.1	9.9	10.6	9.7	10.0	11.0	9.8	3.5
Rural											
1993	13.2	9.7	9.5	11.0	8.3	11.1	8.2	9.8	10.9	8.4	12.3
1998	13.3	8.4	9.8	10.9	10.6	11.1	10.8	7.4	10.0	7.8	13.3
2003	10.5	9.0	10.9	10.3	9.4	10.6	9.4	9.0	10.5	10.4	6.4

Table IV.2.1.1. Percent Distribution of Women 20-49 by Reported Terminal Digit of Age (Individual Questionnaire) and Myers index by Region, Type of Place of Residence and Education of Woman, TDHS 1993, 1998 and 2003 (Continued)

	Terminal Digit										Myers
	0	1	2	3	4	5	6	7	8	9	Index
Education											
No educ/Pri. Inc.											
1993	13.4	6.8	8.4	10.6	9.1	13.1	8.5	10.3	11.7	8.0	18.3
1998	12.7	4.8	8.7	10.7	9.5	13.4	9.7	9.7	13.2	7.4	20.2
2003	10.9	7.0	10.7	10.1	9.3	10.1	8.1	9.9	12.2	11.7	11.4
Primary											
1993	11.1	10.9	10.4	11.5	10.5	9.7	8.7	9.4	10.5	7.4	9.7
1998	11.1	9.9	10.0	11.6	11.2	9.3	11.6	8.5	9.4	7.4	11.0
2003	10.3	9.8	10.9	9.9	9.5	10.5	9.3	9.1	11.1	9.6	5.6
Secondary +											
1993	8.4	8.9	10.6	11.8	13.0	9.7	8.5	9.3	9.0	10.8	12.4
1998	14.7	11.2	12.7	10.9	10.5	8.0	7.5	9.7	7.4	7.5	19.9
2003	8.6	8.4	7.9	11.0	11.2	11.5	12.4	11.8	8.2	9.0	15.8
Total											
1993	11.6	9.3	9.7	11.2	10.3	10.9	8.6	9.7	10.8	7.9	9.6
1998	12.2	8.9	10.2	11.2	10.7	10.1	10.4	9.0	10.0	7.4	9.5
2003	10.1	8.9	10.3	10.2	9.8	10.6	9.6	9.7	10.8	10.0	4.0

IV.2.2. Imputation at the Age Data

Women who have no connection to the registration system may have problem in remembering her birth month and year and even her age. At the countries where the registration "culture" is not placed, people lives problem of the dates of the vital events in their life. As mentioned before TDHS individual questionnaire includes two questions to get the exact age of the women which is very valuable in estimation of rates, especially fertility rates. Both the birth month and year and current age of the woman is asked by the interviewer. This information is both checked by the interviewer and field editor at the field and during the data entry by the entry

program for internal consistency. Defective and inconsistent data collected from the field is corrected during data entry with using the standard imputation procedures, partial information will be completed after the editing procedure at the data entry when needed.

Table IV.2.2.1 indicates completeness of the date of birth and age information by region, type of place of residence. Except TDHS-1998 for the other two surveys, the around 80 % of the data collected on birth month and year and age is completed at the field. In THSDS-198 this is true for 71.4 % of the interviews. Around 20 % of the interviews, age is given by the respondent and year is calculated with imputation of the month in the same survey. At TDHS-1993 and TDHS-2003 this occurred at 16.0 % and 13.5 % of the interviews respectively. Clear regional difference is seen especially between West and East. The highest complete information percent is collected at West region with 89.0 %, 82.7% and 88.4 % at TDHS-1993, TDHS-1998 and TDHS-2003 in that order. On the other hand, at East region the lowest percents are seen among all regions for all three surveys in terms of completeness of the age and birth date information. Only 68.4 % of the responses were complete and this dropped to 56.4 % at TDHS-2003. It is very surprising that less than half of the age and birth date information is complete at TDHS-1998. The gap between East region and the rest is opened in connection with completeness of the data with TDHS-2003.

The respondents living in urban areas seem good at remembering their birth date and age together as compared to the ones living in rural residences. At least 10% difference is seen between urban and rural responses regarding the completeness of the birth date and age data. Although TDHS-1998 results disrupt the trend, for both urban and rural responses the percent of completeness decreases.

The common situation where the completeness percents are low is the one at which respondents give the age information and with imputing the month a year value is assessed. In TDHS-1993 nearly one third of the respondents mentioned their age correctly and month is imputed and a year is assigned for these questionnaires at East

region. As both this situation and completeness rate decreases, the condition at which only year is mentioned and month is imputed and age is calculated increases. This is clearly seen at East region and rural areas. Another eye catching result is on the ,east region where at TDHS-1993, only 1.3 percent of the respondents give their year information and age is calculated by imputing the month information. However, this is seen at 22.7 % of the interviews for the last two TDHSs which is very surprising. On the other hand, results indicate that, at the South region, while the completeness percent of the age and birth date data is decreasing from TDHS-1993 to TDHS-2003, the situation where the age information is given and year is calculated with the imputation of the month information.

Table IV.2.2.1. Percent Distribution of the Completeness of the Date of Birth and Age Information by Region and Type of Place of Residence, TDHS 1993, 1998 and 2003

Given	Year & Month	Year & Age	Age	Year	Total	
Imputed		Month	Month	Month		
Calculated	Age		Year	Age	%	n
Region						
West						
1993	89.0	0.2	10.1	0.6	100.0	2325
1998	82.7	0.2	12.9	4.2	100.0	3204
2003	88.4	0.2	9.6	1.8	100.0	3286
South						
1993	83.6	0.2	15.8	0.5	100.0	998
1998	68.0	0.0	24.2	7.8	100.0	1258
2003	72.0	0.5	21.7	5.8	100.0	1028
Central						
1993	85.5	0.1	13.5	0.9	100.0	1520
1998	71.1	0.8	19.2	9.0	100.0	1985
2003	85.8	0.3	12.5	1.4	100.0	1867
North						
1993	75.0	0.2	20.1	4.7	100.0	612
1998	73.0	0.2	22.1	4.6	100.0	692
2003	80.8	0.7	14.5	4.0	100.0	590
East						
1993	68.4	0.2	30.2	1.3	100.0	1064
1998	48.6	0.5	28.2	22.7	100.0	1437
2003	56.4	3.2	17.7	22.7	100.0	1305
Type of Place of Residence						
Urban						
1993	87.5	0.2	11.7	0.7	100.0	4181
1998	77.8	0.2	15.5	6.4	100.0	5704
2003	84.7	0.7	10.7	4.0	100.0	5752
Rural						
1993	74.2	0.2	23.6	2.0	100.0	2338
1998	58.6	0.5	26.9	14.0	100.0	2872
2003	68.3	1.1	20.4	10.2	100.0	2323
Total						
1993	82.7	0.2	16.0	1.2	100.0	6519
1998	71.4	0.3	19.3	9.0	100.0	8576
2003	80.0	0.8	13.5	5.8	100.0	8075

Table IV.2.2.2. demonstrates the completeness percent of the date of birth and age information by age and education of the respondent. The highest completeness rate is gathered by the women under 30. At TDHS-1993 and TDHS-1998, 87.1% and 83.9% of the respondents aged 15-19 gave complete information respectively which is highest for these surveys. At TDHS-2003 the highest rate is seen among 20-2 age group of women with 87%. Lowest completeness rates, on the other hand, are seen among the last eligible age group. Difference between 15-19 and 45-49 age groups are, 10.5 %, 28.4% and 7.5% at TDHS-1993, TDHS, 1998 and TDHS-2003 in that order. The gap at the first and the last eligible age groups in terms of complete age and birth date information is remarkably high at TDHS-1998.

Education of women seems have positive relation on the quality of the age and birth date data. When the education level of the women increases the completeness of the data is getting close to perfect. Nearly all of the women having secondary or more education gave complete age and birth date information. On the contrary, women have no education or did not complete the primary school gives the highest incomplete information. While TDHS-1993 individual data shows that, two thirds of women at the lowest education level gave complete information, completeness rates dropped to 30.3 % at TDHS-1998 and 44.2% at TDHS-2003.

Table IV.2.2.2. Percent Distribution of the Completeness of the Date of Birth and Age Information by Demographic Characteristics of Women, TDHS 1993, 1998 and 2003

Given	Year & Month	Year & Age	Age	Year	Total	
Imputed		Month	Month	Month		
Calculated	Age		Year	Age	%	n
Age						
15-19						
1993	87.1	0.2	11.2	1.5	100.0	332
1998	83.9	0.4	10.3	5.4	100.0	1720
2003	81.5	0.9	7.5	10.1	100.0	238
20-24						
1993	86.4	0.1	12.8	0.7	100.0	1040
1998	80.2	0.1	13.5	6.2	100.0	1558
2003	87.0	1.0	7.4	4.6	100.0	1045
25-29						
1993	85.8	0.3	12.9	0.9	100.0	1211
1998	73.9	0.8	17.0	8.3	100.0	1397
2003	85.6	0.7	8.8	4.9	100.0	1480
30-34						
1993	83.9	0.0	15.3	0.8	100.0	1283
1998	68.4	0.1	21.6	9.9	100.0	1202
2003	80.0	0.9	13.8	5.4	100.0	1489
35-39						
1993	80.2	0.3	18.1	1.4	100.0	1073
1998	61.9	0.5	26.7	10.9	100.0	1081
2003	77.0	0.8	16.2	6.1	100.0	1420
40-44						
1993	78.3	0.1	20.0	1.6	100.0	901
1998	56.1	0.2	30.7	13.0	100.0	885
2003	75.9	0.8	16.5	6.7	100.0	1330
45-49						
1993	76.6	0.3	21.4	1.7	100.0	679
1998	55.5	0.3	28.9	15.3	100.0	733
2003	74.0	0.7	19.3	6.0	100.0	1073
Education						
No educ/Pri. Inc.						
1993	67.7	0.2	29.2	2.9	100.0	2196
1998	30.3	0.5	37.3	31.8	100.0	1861
2003	44.2	3.0	30.0	22.7	100.0	1761
Primary						
1993	88.6	0.2	10.9	0.3	100.0	3662
1998	77.8	0.3	18.5	3.4	100.0	5158
2003	87.4	0.2	11.1	1.3	100.0	4940
Secondary						
1993	99.7	0.0	0.3	0.0	100.0	661
1998	99.2	0.1	0.5	0.2	100.0	1556
2003	99.2	0.1	0.7	0.0	100.0	1374
Total						
1993	82.7	0.2	16.0	1.2	100.0	6519
1998	71.4	0.3	19.3	9.0	100.0	8576
2003	80.0	0.8	13.5	5.8	100.0	8075

The assessment of data used to determine the eligibility for the individual interview is crucial in terms of the number of ever married women added for all means of rates and ratios calculated from the TDHS. The quality of the data at household questionnaire is assessed at this chapter of the study to put the potential problems of the data into the matter of discussion. Chapter starts with the household interview results which gives an overview of the result codes of the responses. It is seen that the completed questionnaires are lower at TDHS-1998 as compared to the first and the last TDHS. On the other hand, the response rates are decreasing during the surveys. The response rates even decreased to 90 % at region West which will bring questions to mind of the users of the data about the respresentativeness of it at this region.

The quality of the age reporing in household questionnaire is assessed at this chapter. The age distribution of the de facto population is discussed in terms of heaping and digit preference for males and females separately. It is seen that, although the heaping is seen at both sexes the level of heaping is high at females. At this section of the chapter, the Myers, Whipple, Bachi and UN Age-Sex Ratio indices were used to estimate the problems of age at household data. In addition to the nearly universal digits preferred 0 and 5; at TDHSs 3 and 8 is also preferrered by the respondents at the survey years are ending with 3 and 8.

The quality of the age data of the female members of the household is at the center of the section. Age and sex ratios and Myers, Bachi, Whipple and United Nations indices for household data for total, regions residencial difference is estimated for female members. The index results for females show that the age heaping problem is decreasing at TDHSs. While the results of the first two TDHSs are evaluated as medium quality, the age distribution of TDHS-2003 female member's age distribution is low and acceptable. A gradual increase at the data quality of the age information is seen at both urban and rural females. In addition same indices and indexes are done for the selected characteristics of the respondent whom the household questionnaire is completed with. The results indicate that the best information is taken from either household head or her/his spouse.

The upper, lower and total boundary effect problems which are mainly sourced from the displacement of eligible women out of eligible ages are evaluated for all TDHSs at this chapter. While there seems no problem at the lower boundary, at upper boundary where the women at the end of reproductive ages are carried to age group 50-54 is quite common. While the level of the problem decreased from TDHS-1993 to TDHS-1998, at the last survey the upper boundary effect seems increased. The result that indicates that the highest problem is seen at East region is important as the TFR at this region is high and exclusion of women may lead problems at this region. The charactersistics of the respondent is also taken into consider while estimating the boundary effects. Results show that the household head's spouse gives the less problematic age information in terms of boundary effects.

The sleeping away exclusion of the women from the household list is also evaluated with the results of the household residency answers at the household list. The difference between the number of overnight visitors and the usual residents sleep away is studied in terms of finding the sleeping away exclusion of women. It is seen that except the last eligible age group no significant sleeping away exclusion is seen at TDHS-1993. At TDHS-1998, on the other hand at Region East omission of eligible women at the first and the last eligible age group is seen caused by sleeping away exclusion. In general, the omission is seen at 15-19 age group where the usual resident women are excluded at this age group at the last TDHS.

The assessment of the age data in individual questionnaire is studied at the second section of this chapter. Similar techniques and indices are used to evaluate the age data of the women at individual questionnaire. The digit preference assessment is the first part of this section. Myers index and the percent distribution of the ages of 20-49 women are estimated for the assessment. Like the household questionnaire, the percents of the digits mentioned for ages indicates that, there is noticeable digit preference in general for "0", "3", "5" and "8". At some regions although the preference of these digits decreased at TDHS-2003, the digit preference is more clear especially "0" "3" and "5". In addition, results show that except TDHS-1998, the education of the women has positive effect on avoiding from digit preference.

The completeness of the birth month, year and age is also studied at this section of the chapter. The level of imputation at the age data is also one of the cruacial study points at this section. The completeness of the age information is lower at TDHS-1998 as compare to the first and the last survey. Around10 % difference is seen at this survey with regards to other two. The data collected from the respondents living in urban areas seem good as compared to the ones living in rural residences. Women aged under 30 gives more complete birth date data than the women 30 or older. On the other hand, it is seen that when the education level of the women increases the completeness of the data is getting close to perfect. Nearly all of the women having secondary or more education gave complete age and birth date information at all the three TDHSs.

V. THE ASSESSMENT OF THE QUALITY OF THE BIRTH HISTORY DATA

V.1. The Quality of Birth Related Data

One of the aims of DHS program is to collect reliable and comparable fertility and infant and child mortality data all over the world, especially at the undeveloped and developing countries. In addition to the quality of the age data, the quality of the birth history data has direct relation with these rates and ratios of fertility and mortality. Hence, to collect data with high quality is aimed at TDHSs. At this section of the study, the birth history data of TDHS-1993, TDHS-1998 and TDHS-2003 is assessed. In addition to the evaluation of completeness of the information on birth dates of the children, the displacement of the birth dates, the age heaping problem, the miscalculation of year of birth and the coverage of live births is also assessed at this section for a complete appraisal for the birth history data in terms of the information used for the fertility estimations.

V.1.1. Completeness of the information of Birth Dates of the Children

Birth history section takes place at "Section 2. Reproduction" at the ever married woman questionnaire. After Brass type questions about the reproductive history of the woman; detailed information for each live birth is collected. Section starts with asking the mother the birth date of the child. Table V.1.1.1. illustrates the percent distribution of children born by completeness of information on date of birth and current age of children by region and type of place of residence. The overall results show that, the percent of the not imputed birth date information of the children data decreases among the first and the last survey. While 96.4 % of the birth dates were

not imputed at TDHS-1993, the non-imputed cases are 93.0 % at TDHS-2003. Like the previous estimations done other sections of this chapter, TDHS-1998 results seem to break down the trend among the tree surveys. The percent of the non-imputed information is lower at all analysis groups at TDHS-1998 when compared to other two surveys. 85.5% of the total births at TDHS-1998 are not imputed in terms of birth dates of the children at birth history section.

The information collected from the women living in urban areas is in better quality than the data collected in urban areas. While only 2.6 percent of the birth date information gathered at urban areas is imputed in TDHS-1993, for the same year percent of the births imputed is 4.9. The difference at urban and rural data increases to 4.7% at TDHS-2003. There is no clear difference among the regions in terms of the completeness of the birth date information at birth history section. For all regions at TDHS-1993, the percent of the births with no information is above 90%. The highest and lowest completeness rates are seen at West and North regions for this survey respectively. At TDHS-1998, West (90.5 %) and East (73.0 %) are the regions where the highest and lowest completeness is seen. At TDHS-2003, the women living at Central region, on the other hand, with a percent of 96.7 mentioned complete information of their children's birth dates with the highest completeness rate whereas at East region 84.3 % of the birth date is information is respondent completely.

Reporting the year and age and imputation of the month is the commonly seen situation where the imputation is done. At TDHS-1998, the highest percent for this situation is seen 9.5 % of the responses. Mentioning year and age and the imputation of month is higher in rural areas for all surveys (respectively, 2.5 %, 11.2 % and 5.8 %) and at East Region at TDHS-1998 (19.5 %) and TDHS-2003 (8.5 %). At North region, imputation of only month data is seen highest at TDHS-1998 with a percent of 3.9.

The cases where month and age reported but year imputed; age reported but year and month imputed; month reported but age and year imputed and all information is

imputed are separately lower than 1 percent for all characteristics and in general for all surveys. On the other hand, the responses where year reported but age and month imputed is 1.3 %, 3.4 % and 1.5 % in general at TDHS-1993, TDHS-1998 and TDHS-2003 respectively. The percent of such cases do not differ according to the type of place of residence of women living. However, at East region, around 5 % and 3 % of the births for the last two surveys in that order, years are reported only correctly and age and month is imputed. The highest percent for such situation at TDHS-1993 is seen at North region with 2.1 %.

The percent distribution of children recorded at birth history section in terms of the completeness of the birth date information is assessed by the characteristics of the mother is presented at Table V.1.1.2. It is clearly seen that the complete information is given by mothers aged 15-19. The women at the beginning of their reproductive period give complete birth date data. As mostly, these births are the first of the woman and at most 5 year will be passed after the birth of their children and this is a short time to remember the exact birth date of their child. The completeness of the information decreases when the age of the mother increases. It is better to keep up in mind that information of the all live births are collected at birth history and a woman at the 45-49 age group is asked to remember the birth date of her child regardless the year the birth given. Sometimes woman was asked to give information about a birth given 34 years ago. The fluctuation sourcing from TDHS-1998 results is seen among all age groups except 15-19 where every birth is recorded completely. At the data gathered from the others aged above 40, around 15 percent of the birth dates are recorded as year and age reported but the month is imputed.

Table V.1.1.2 also presents the completeness percents of the date of birth information of children at TDS-1993, TDHS-1998 and TDHS-2003 by the education of mother. Results indicate that when the education level of mother increases, the completeness of the birth information of the child also increases. While nearly complete data is collected from the women who have secondary or more education (99.8 %, 99.3 %, 99.9 % respectively), the completeness is seen among the women have no education or did not complete primary education. Dislike from other education groups, at the

group where the women completed secondary school or more, the completeness rate did not decrease from TDHS-1993 to TDHS-2003.

Table V.1.1.1. Percent Distribution of Children Born by Completeness of Information on Date of Birth by Region and Type of Place of Residence, TDHS 1993, 1998 and 2003

	No imputation	Month and age reported - year imputed	Year and age reported - month imputed	Year reported – age and month imputed	Age reported – year and month imputed	Month reported – age and year imputed	All imputed	Total
Region								
West								
1993	97.6	0.0	1.2	0.9	0.0	0.0	0.3	5688
1998	90.5	0.0	5.3	3.3	0.6	0.0	0.3	5414
2003	96.6	0.0	2.1	0.9	0.2	0.0	0.1	7232
South								
1993	97.0	0.0	2.0	0.9	0.0	0.0	0.1	3096
1998	89.5	0.0	8.2	1.9	0.2	0.0	0.1	2579
2003	91.3	0.9	4.9	1.5	1.1	0.1	0.2	2766
Central								
1993	96.7	0.0	1.6	1.6	0.0	0.0	0.1	4668
1998	88.4	0.1	6.8	3.3	0.8	0.0	0.6	3895
2003	96.7	0.1	1.9	0.9	0.2	0.1	0.1	4691
North								
1993	92.3	0.8	3.9	2.1	0.6	0.0	0.3	1851
1998	85.2	0.2	8.7	3.6	1.9	0.1	0.5	1500
2003	95.1	1.0	1.4	0.8	1.0	0.2	0.6	1583
East								
1993	95.9	0.2	2.2	1.4	0.1	0.0	0.1	4524
1998	73.0	0.0	19.5	4.8	1.7	0.0	0.9	3821
2003	84.3	1.5	8.5	3.1	1.8	0.2	0.6	4901
Type of Place of Residence								
Urban								
1993	97.4	0.1	1.4	0.9	0.0	0.0	0.2	11332
1998	87.1	0.0	8.5	3.4	0.6	0.0	0.3	10644
2003	94.9	0.3	2.8	1.1	0.6	0.1	0.2	13986
Rural								
1993	95.1	0.2	2.5	1.8	0.2	0.0	0.2	8495
1998	82.9	0.1	11.2	3.5	1.6	0.0	0.8	6565
2003	89.2	1.2	5.8	2.2	1.1	0.1	0.4	7187
Total								
1993	96.4	0.1	1.9	1.3	0.1	0.0	0.2	19827
1998	85.5	0.1	9.5	3.4	0.9	0.0	0.5	17209
2003	93.0	0.6	3.8	1.5	0.8	0.1	0.3	21173

Table V.1.1.2. Percent Distribution of Children Born by Completeness of Information on Date of Birth by Demographic Characteristics of Women, TDHS 1993, 1998 and 2003

	No imputation	Month and age reported -year imputed	Year and age reported - month imputed	Year reported – age and month imputed	Age reported – year and month imputed	Month reported – age and year imputed	All imputed	Total
Age								
15-19								
1993	100.0	0.0	0.0	0.0	0.0	0.0	0.0	177
1998	100.0	0.0	0.0	0.0	0.0	0.0	0.0	159
2003	100.0	0.0	0.0	0.0	0.0	0.0	0.0	140
20-24								
1993	99.0	0.0	0.5	0.2	0.0	0.0	0.3	1387
1998	98.0	0.0	1.4	0.6	0.0	0.0	0.0	1190
2003	99.3	0.0	0.5	0.2	0.0	0.0	0.0	1249
25-29								
1993	98.9	0.0	0.6	0.5	0.0	0.0	0.0	2705
1998	95.0	0.1	3.5	0.9	0.4	0.0	0.2	2384
2003	97.1	0.2	1.9	0.5	0.1	0.0	0.1	2846
30-34								
1993	97.9	0.2	1.1	0.5	0.1	0.1	0.1	3966
1998	90.0	0.1	7.3	1.8	0.5	0.1	0.2	3110
2003	95.2	0.4	2.8	1.2	0.2	0.0	0.1	3879
35-39								
1993	96.9	0.0	1.7	1.3	0.0	0.0	0.1	4176
1998	85.8	0.0	9.2	3.4	1.0	0.0	0.7	3537
2003	93.0	0.9	3.2	1.5	0.9	0.3	0.3	4339
40-44								
1993	94.1	0.3	3.0	1.9	0.3	0.0	0.5	4070
1998	79.7	0.1	14.0	4.0	1.4	0.0	0.8	3501
2003	90.4	1.0	5.0	1.8	1.2	0.1	0.5	4719
45-49								
1993	93.7	0.1	3.3	2.6	0.2	0.0	0.2	3347
1998	75.2	0.1	14.9	7.4	1.6	0.0	0.8	3327
2003	88.6	0.4	6.7	2.6	1.3	0.1	0.3	4001

Table V.1.1.2. Percent Distribution of Children Born by Completeness of Information on Date of Birth by Demographic Characteristics of Women, TDHS 1993, 1998 and 2003 (Continued)

	No imputation	Month and age reported - year imputed	Year and age reported - month imputed	Year reported – age and month imputed	Age reported – year and month imputed	Month reported – age and year imputed	All imputed	Total
Education								
No educ/Pri. Inc.								
1993	94.3	0.2	3.0	1.9	0.2	0.0	0.3	10042
1998	72.7	0.1	17.9	6.3	2.0	0.0	1.0	7378
2003	83.9	1.4	8.7	3.1	1.9	0.2	0.7	7435
Primary								
1993	98.4	0.0	0.8	0.7	0.0	0.0	0.0	8776
1998	94.5	0.1	3.6	1.4	0.2	0.0	0.2	8603
2003	97.5	0.1	1.4	0.7	0.1	0.0	0.1	11732
Secondary								
1993	99.8	0.0	0.1	0.1	0.0	0.0	0.0	1009
1998	99.3	0.0	0.2	0.5	0.0	0.0	0.0	1227
2003	99.9	0.0	0.1	0.0	0.0	0.0	0.0	2005
Total								
1993	96.4	0.1	1.9	1.3	0.1	0.0	0.2	19827
1998	85.5	0.1	9.5	3.4	0.9	0.0	0.5	17209
2003	93.0	0.6	3.8	1.5	0.8	0.1	0.3	21173

Table V.1.1.3 shows the percentage of children with complete information on year and month of birth by number of years since birth of child by region and type of place of residence for all three TDHSs. During the taining, all interviewers were especially told to record complete birth and dead date information for children born within 5 years before the survey. Hence, nearly complete information is collected for the 5 years preceding the surveys. Overall results show that ignorable level of incompleteness is seen at the births 1, 2 and 4 years preceding the survey at TDHS-1998 and 2, 3 and 4 years preceding the survey at TDHS-2003. While the incompleteness is 0.1 % at TDHS-2003 for these years, 0.3, 0.2 and 0.4 percent of the total birth date responses are calculated as incomplete at TDHS-1998 for the years 1.2 and 4. For all three years as the birth date of the child is far from the survey, the completeness rates are decreasing. Lowest completeness rates are seen at

the births given 20 or more years ago. The remembrance of the birth dates will go down when the year is increasing. For the births 5 or more year ago, the completeness of the month and year information decreases noticeable at North in TDHS-1993 and East in TDHS-1998 and TDHS-2003. Fluctuation caused by 1998 TDHS results are also seen for all regions. On the other hand, more complete information is seen at urban areas at the births happen 5 years or before the surveys.

Table V.1.1.4. indicates the completeness of the birth date data according to age and education of the mother. For all births, mentioned at age 15-19, birth month and year information is completely reported. The births occurred 4 or less year from the survey is close to complete for all age groups of woman. However, the lowest percent is seen at TDHS-1998 for the children born 4 or fewer years ago from the survey with 88.5 %. The completeness for births happened 5 or more years ago decreases especially after age 30. The highest completeness rates are seen among the women aged 15 to 29. Educational difference is seen clearly at the completeness of the birth date information with controlling the birth year of the children. It is seen that for some surveys, except from the first 5 years, for some years more than 4 the complete information is given by the women completed secondary education or more. For all the births of these women, completeness of the information are high than 98.0 ignoring the birth year of the children. Women having secondary or more education gives 100.0 % and 99.6 % completeness rate at first two and at the last respectively for the children born 20 or more year ago.

Table V.1.1.3. Percentage of Children with Complete Information on Year and Month of Birth by Number of Years since Birth of Child by Region and Type of Place of Residence, TDHS 1993, 1998 and 2003

	Number of Years since Birth of Child									
	0	**1**	**2**	**3**	**4**	**5-9**	**10-14**	**15-19**	**20+**	**Total**
Region										
West										
1993	100.0	100.0	100.0	100.0	100.0	98.8	97.4	96.3	95.9	5688
1998	100.0	99.1	100.0	100.0	100.0	95.4	91.1	85.9	82.2	5414
2003	100.0	100.0	100.0	100.0	100.0	98.3	96.9	96.0	92.8	7232
South										
1993	100.0	100.0	100.0	100.0	100.0	98.3	96.8	95.7	93.9	3096
1998	100.0	100.0	100.0	100.0	98.6	93.4	88.9	87.0	79.8	2579
2003	100.0	100.0	100.0	100.0	99.1	93.9	90.3	88.6	83.6	2766
Central										
1993	100.0	100.0	100.0	100.0	100.0	98.1	96.8	95.7	92.8	4668
1998	100.0	100.0	100.0	100.0	100.0	92.4	85.6	85.5	78.6	3895
2003	100.0	100.0	100.0	100.0	100.0	99.1	96.6	95.3	93.9	4691
North										
1993	100.0	100.0	100.0	100.0	100.0	94.1	92.5	88.3	86.0	1851
1998	100.0	100.0	100.0	100.0	99.3	92.2	85.5	78.7	73.4	1500
2003	100.0	100.0	100.0	100.0	100.0	95.7	93.5	94.5	93.2	1583
East										
1993	100.0	100.0	100.0	100.0	100.0	96.7	95.4	93.8	91.0	4524
1998	100.0	100.0	99.3	100.0	99.3	74.3	64.5	62.6	55.0	3821
2003	100.0	100.0	99.7	99.8	100.0	87.0	77.5	77.7	72.6	4901
Type of Place of Residence										
Urban										
1993	100.0	100.0	100.0	100.0	100.0	98.5	97.2	96.6	94.1	11332
1998	100.0	99.5	100.0	100.0	99.9	90.6	85.2	82.9	77.1	10644
2003	100.0	100.0	99.9	100.0	99.8	96.9	94.2	93.3	90.6	13986
Rural										
1993	100.0	100.0	100.0	100.0	100.0	96.5	95.0	92.6	91.7	8495
1998	100.0	100.0	99.5	100.0	99.0	85.6	79.4	77.0	72.9	6565
2003	100.0	100.0	100.0	99.8	100.0	90.4	84.7	86.4	84.9	7187
Total										
1993	100.0	100.0	100.0	100.0	100.0	97.6	96.2	94.8	93.0	19827
1998	100.0	99.7	99.8	100.0	99.6	88.7	82.9	80.7	75.5	17209
2003	100.0	100.0	99.9	99.9	99.9	94.7	90.9	90.9	88.7	21173

Table V.1.1.4. Percentage of Children with Complete Information on Year and Month of Birth by Number of Years since Birth of Child by Demographic Characteristics of Women, TDHS 1993, 1998 and 2003

	Number of Years since Birth of Child									
	0	**1**	**2**	**3**	**4**	**5-9**	**10-14**	**15-19**	**20+**	**Total**
Age										
15-19										
1993	100.0	100.0	100.0	100.0	100.0	-	-	-	-	177
1998	100.0	100.0	100.0	100.0	100.0	-	-	-	-	159
2003	100.0	100.0	100.0	100.0	100.0	100.0	-	-	-	140
20-24										
1993	100.0	100.0	100.0	100.0	100.0	95.5	49.3	-	-	1387
1998	100.0	100.0	100.0	100.0	100.0	89.3	39.3	-	-	1190
2003	100.0	100.0	100.0	100.0	100.0	95.8	46.3	-	-	1249
25-29										
1993	100.0	100.0	100.0	100.0	100.0	98.2	97.3	100.0	-	2705
1998	100.0	100.0	100.0	100.0	100.0	91.4	85.4	82.1	-	2384
2003	100.0	100.0	100.0	100.0	99.7	95.8	88.6	100.0	-	2846
30-34										
1993	100.0	100.0	100.0	100.0	100.0	98.1	97.7	92.6	100.0	3966
1998	100.0	98.5	100.0	100.0	99.0	90.9	85.1	79.1	81.6	3110
2003	100.0	100.0	100.0	100.0	100.0	94.8	93.0	90.0	100.0	3879
35-39										
1993	100.0	100.0	100.0	100.0	100.0	97.7	96.5	96.2	95.4	4176
1998	100.0	100.0	100.0	100.0	100.0	89.4	85.9	84.2	64.1	3537
2003	100.0	100.0	99.3	100.0	100.0	94.8	92.0	92.6	83.5	4339
40-44										
1993	100.0	100.0	100.0	100.0	100.0	95.7	94.5	94.5	92.4	4070
1998	100.0	100.0	93.9	100.0	100.0	77.4	77.8	79.9	79.7	3501
2003	100.0	100.0	100.0	98.6	100.0	92.8	88.8	90.9	89.4	4719
45-49										
1993	-	100.0	100.0	100.0	100.0	97.7	94.2	93.7	93.1	3347
1998	100.0	100.0	-	100.0	88.5	72.9	76.3	76.9	74.3	3327
2003	-	100.0	100.0	100.0	100.0	87.4	86.4	88.5	88.9	4001

Table V.1.1.4. Percentage of Children with Complete Information on Year and Month of Birth by Number of Years since Birth of Child by Demographic Characteristics of Women, TDHS 1993, 1998 and 2003 (Continued)

	Number of Years since Birth of Child									
	0	**1**	**2**	**3**	**4**	**5-9**	**10-14**	**15-19**	**20+**	**Total**
Education										
No educ/Pri Inc.										
1993	100.0	100.0	100.0	100.0	100.0	96.0	94.6	92.7	90.6	10042
1998	100.0	98.8	99.3	100.0	99.4	75.6	68.6	68.6	65.1	7378
2003	100.0	100.0	99.7	99.8	99.6	85.7	79.9	80.7	79.5	7435
Primary										
1993	100.0	100.0	100.0	100.0	100.0	98.8	97.8	97.5	97.4	8776
1998	100.0	100.0	100.0	100.0	99.6	95.7	93.5	91.7	89.0	8603
2003	100.0	100.0	100.0	100.0	100.0	98.5	96.8	96.6	95.4	11732
Secondary										
1993	100.0	100.0	100.0	100.0	100.0	99.6	100.0	99.0	100.0	1009
1998	100.0	100.0	100.0	100.0	100.0	98.0	99.7	98.7	100.0	1227
2003	100.0	100.0	100.0	100.0	100.0	100.0	99.8	99.8	99.6	2005
Total										
1993	100.0	100.0	100.0	100.0	100.0	97.6	96.2	94.8	93.0	19827
1998	100.0	99.7	99.8	100.0	99.6	88.7	82.9	80.7	75.5	17209
2003	100.0	100.0	99.9	99.9	99.9	94.7	90.9	90.9	88.7	21173

The sex of the child and the survival status of the children will have an effect on the completeness of the birth date information of the children. Mothers may have in a psychological situation by which they will forget the exact birth date of the dead children. TDHS datasets are assessed for the completeness of the birth date data by the survival status of the child and sex of the child with controlling the number of years since the birth of child. Results are presented at Table V.1.1.5. It is clearly seen that ignoring the births since 4 and less years before the surveys, the completeness of the information on the birth date of the dead children is less complete than the living ones. For all three surveys mother give more complete birth dates for the living children as compared to the dead ones. On the other hand, female children's birth date information is more complete than the male children. With some exceptions, at all three surveys, mothers remember their daughters' birth dates better than their sons.

Table V.1.1.5 also brings the estimation of completeness of the children's birth dates according to the time period of interviewer at the field with controlling the number of years passed since the birth of child. The results show that there is no obvious relationship between the time passed at the field and the completeness of the birth date information. The interviewers focusing on the births of last 5 years and the experience of them did not make any change on the quality of the date of birth data of the children.

Table V.1.1.5. Percentage of Children with Complete Information on Year and Month of Birth by Number of Years since Birth of Child by Survival Status and Sex of Child and Time Period of Interviewer at the Field, TDHS 1993, 1998 and 2003

	Number of Years since Birth of Child									
	0	**1**	**2**	**3**	**4**	**5-9**	**10-14**	**15-19**	**20+**	**Total**
Survival status of child										
Dead										
1993	100.0	100.0	100.0	100.0	100.0	91.8	88.9	85.7	84.1	2418
1998	100.0	92.8	100.0	100.0	100.0	68.9	62.1	56.8	54.7	1753
2003	100.0	100.0	97.5	100.0	96.8	80.2	70.3	75.8	75.3	1697
Alive										
1993	100.0	100.0	100.0	100.0	100.0	98.2	97.2	96.4	95.4	17409
1998	100.0	100.0	99.8	100.0	99.5	90.1	84.9	84.1	80.2	15456
2003	100.0	100.0	100.0	99.9	100.0	95.5	92.5	92.3	91.1	19476
Sex of child										
Male										
1993	100.0	100.0	100.0	100.0	100.0	97.4	96.1	94.4	93.2	10219
1998	100.0	100.0	99.7	100.0	99.7	89.4	82.8	78.0	74.6	8837
2003	100.0	100.0	99.9	99.9	99.8	94.7	90.0	90.0	89.1	10818
Female										
1993	100.0	100.0	100.0	100.0	100.0	97.8	96.4	95.2	92.8	9608
1998	100.0	99.4	100.0	100.0	99.5	88.0	83.0	83.5	76.5	8371
2003	100.0	100.0	100.0	100.0	100.0	94.7	91.8	91.8	88.3	10355

Table V.1.1.5. Percentage of Children with Complete Information on Year and Month of Birth by Number of Years since Birth of Child by Survival Status and Sex of Child and Time Period of Interviewer at the Field, TDHS 1993, 1998 and 2003 (Continued)

	Number of Years since Birth of Child									
	0	**1**	**2**	**3**	**4**	**5-9**	**10-14**	**15-19**	**20+**	**Total**
Time period of interviewer in the field										
1st week										
1993	100.0	100.0	100.0	100.0	100.0	97.4	95.5	94.1	91.2	2504
1998	100.0	100.0	100.0	100.0	100.0	86.7	82.3	79.1	72.5	1945
2003	100.0	100.0	100.0	100.0	100.0	97.9	94.2	96.7	93.9	2613
2nd week										
1993	100.0	100.0	100.0	100.0	100.0	98.2	96.7	94.1	88.8	2590
1998	100.0	100.0	100.0	100.0	100.0	90.8	86.1	78.6	71.2	1965
2003	100.0	100.0	100.0	99.4	100.0	96.3	94.8	92.5	90.8	2269
3rd week										
1993	100.0	100.0	100.0	100.0	100.0	97.8	94.7	93.7	94.3	2996
1998	100.0	100.0	100.0	100.0	98.4	88.3	85.3	82.1	73.7	2332
2003	100.0	100.0	100.0	100.0	98.9	93.9	92.2	89.9	89.1	2448
4th week										
1993	100.0	100.0	100.0	100.0	100.0	97.1	97.6	95.5	92.8	2518
1998	100.0	100.0	98.8	100.0	100.0	88.1	81.0	82.2	71.3	2348
2003	100.0	100.0	100.0	100.0	100.0	97.2	93.7	93.0	88.5	2526
More										
1993	100.0	100.0	100.0	100.0	100.0	97.6	96.4	95.3	94.3	9218
1998	100.0	99.4	100.0	100.0	99.6	88.9	82.2	80.8	78.4	8620
2003	100.0	100.0	99.9	100.0	100.0	93.4	88.4	88.9	86.9	11318
Total										
1993	100.0	100.0	100.0	100.0	100.0	97.6	96.2	94.8	93.0	19827
1998	100.0	99.7	99.8	100.0	99.6	88.7	82.9	80.7	75.5	17209
2003	100.0	100.0	99.9	99.9	99.9	94.7	90.9	90.9	88.7	21173

V.1.2. The Displacement of Children's Birth Dates

The displacement of the children's birth dates has also studied at the quality of the birth history data. To escape from the workload of asking additional questions especially at the section 4 and 5 of the questionnaire, interviewers may carry the birth dates of the children out of the five year period. If there is a child written born inside the 5 years preceding the survey, many questions had to be asked about the pregnancy, delivery and early ages and current life of the children. Interviewers may avoid asking these questions just change the birth date and carry child to the age 5 or more. If the total fertility rate is estimated for 5 years preceding the survey, such kind of a displacement of children will create a bias on the rate. Currently at most of the countries, TFR at TDHS is estimated for 3 years period preceding the survey. Therefore the effect of the displacement on TFR is not taken into consider at the section: The Impact of Data Quality on Demographic Rates.

To understand "the heavy workload" of the interviewers, the number of questions at Section 4 and 5 are shown at Table V.1.2.1. Questions about the last birth and the previous births are evaluated in terms of whether they are directly asked to the respondent or filled by the interviewer without asking. It is clearly seen that, questions asked to the respondents are relatively high at TDHS-1998. While 95 and 85 questions were asked at TDHS-1993 and TDHS-2003 respectively, 127 questions were placed to ask for the last birth. Although one out of three less questions was asked for the previous birth, at the last two surveys, nearly same number of questions was asked to last and previous births. On the other hand, the information filled in by the interviewer is decreasing among the surveys. While 41 and 30 questions were asked for the last and the previous births respectively, the number of questions dropped to 22 for the last birth and 21 for the previous birth at TDHS-2003.

The median minutes to complete the ever-married questionnaire according to the number of children under 5 is shown at Table V.1.2.2.. As expected, median time to complete the questionnaire increases with the increase in numbers of the children

aged under 5. On the other hand, although the questions asked for the children under 5 increases the median time to complete the questionnaire decreases at TDHS-1998.

Table V.1.2.1. Number of Questions in Ever-Married Woman Questionnaires that Depend on Children's Year of Birth, TDHS 1993, 1998 and 2003

	Questions about Last Birth	Questions about Previous Birth
Questions asked of respondents		
1993	95	67
1998	127	121
2003	85	84
Other Information filled in by the interviewer		
1993	41	30
1998	23	22
2003	22	21

Table V.1.2.2. Median Minutes to Complete the Ever-Married Woman Questionnaire by the Number of Children Born in Last Five Years prior to Survey, TDHS-2003.

Number of Children	Median Minutes to Complete the Questionnaire		
	TDHS-1993	TDHS-1998	TDHS-2003
0	29	25	32
1	36	35	42
2+	42	42	51
Total	33	30	36

The level of displacement of children is hard to calculate. The year of birth distribution of children at all three surveys will help to identify the extent of displacement If there is a significant displacement problem, the number of children born 6 years prior to survey is more than 5 years. The birth year ratios for 4, 5 and 6 years prior to the survey shows the displacement of births from 5 to 6 years. In theory, the birth ratios of 5 and 6 years must be around 100. If the ratio is over 100, the number of children at this particular year is more than the year where the age ratio is below 100.

Table V.1.2.3. indicates the number of births by calendar years and birth year ratios for 4, 5, and 6 years prior to survey by region and type of place of residence the respondent is living at the time of survey. For all surveys the number of children at age 6 is more than 5. The highest displacement is seen at TDHS-1998. The gap between the age ratio at 5 and 6 seems closed with the TDHS-2003. A vivid variation is seen at the urban and rural areas for all three surveys. The displacement is high at urban areas as compared with the rural. The highest gap between urban and rural is seen at TDHS-1998. The gap between urban and rural in terms displacement closes at TDHS-2003 as compared with the previous surveys. On the other hand, no clear regional difference at level of displacement for all three surveys. The highest displacement at TDHS-1993 is seen at East region; at TDHS-1998, West region has the highest level of displacement and for the last TDHS, South region has the highest displacement level.

Number of births by calendar years and birth year rations for 4, 5 and 6 years prior to survey is calculated by age groups and the education of respondents whom the ever-married women questionnaire is completed shown at Table V.1.2.4.. The least difference is seen at the responses of the women aged 20-24 for the last two TDHSs and women aged 25-29 at TDHS-1993. No clear relation is seen with the displacement level and the age of respondent. The highest displacement is collected from the women aged 45-49 at TDHS-1993 and TDHS-2003. At TDHS-1998 the age group where the highest displacement level is seen among 40-44.

The lowest displacement is seen among the information collected from the primary educated women for all surveys. It's interesting that, women don't have education or did not completed primary education and the women having secondary or higher education gave information where the displacement is seen high.

Table V.1.2.3. Number of Births by Calendar Years and Birth Year Ratios for 4, 5 and 6 Years prior to the Survey by Region and Type of Place of Residence, TDHS 1993, 1998 and 2003

	Years Prior to Survey										Birth Year Ratios centered on Period prior to survey		
	0	1	2	3	4	5	6	7	8	9	4 yrs.	5 yrs.	6 yrs.
Region													
West													
1993	202	191	188	176	193	192	238	217	221	238	105.1	89.1	116.4
1998	209	229	189	188	215	185	253	186	226	190	115.5	79.0	136.3
2003	233	277	284	274	274	268	305	297	307	276	101.1	92.6	107.9
South													
1993	110	110	102	119	116	134	119	118	125	131	91.2	114.5	94.2
1998	103	100	93	96	99	96	104	105	112	101	103.5	94.4	103.4
2003	118	94	110	117	119	100	121	105	138	117	109.3	83.4	118.1
Central													
1993	153	176	133	174	147	148	195	191	178	173	91.0	86.9	114.8
1998	185	161	146	136	168	151	163	147	158	142	117.4	91.1	109.5
2003	134	142	183	174	179	179	186	166	160	180	101.4	98.3	107.4
North													
1993	77	69	66	65	67	63	63	66	77	74	105.3	96.3	98.1
1998	56	54	53	53	55	58	54	52	64	50	99.9	105.8	98.2
2003	41	42	64	53	52	61	71	63	58	54	90.7	99.5	114.2
East													
1993	206	169	163	182	174	155	254	229	217	180	103.2	72.5	132.2
1998	182	174	175	169	170	169	227	190	184	142	100.6	85.2	126.4
2003	233	220	227	246	242	211	245	246	227	219	105.9	86.9	106.9
Type of Place of Residence													
Urban													
1993	444	421	409	431	427	419	523	473	467	446	100.5	88.2	117.3
1998	453	439	415	406	448	398	517	412	476	382	111.4	82.6	127.6
2003	490	513	582	578	559	551	621	571	584	566	99.0	93.3	110.8
Rural													
1993	305	295	244	286	270	273	346	348	351	350	96.5	88.9	111.1
1998	281	278	241	236	260	261	284	268	267	243	104.8	95.8	107.4
2003	268	263	286	286	307	269	306	308	305	280	110.6	87.8	106.2
Total													
1993	749	716	653	717	697	692	869	821	817	795	98.9	88.5	114.8
1998	735	718	656	642	709	659	801	680	743	625	108.9	87.3	119.6
2003	759	776	868	864	866	820	927	878	890	846	102.8	91.4	109.2

Table V.1.2.4. Number of Births by Calendar Years and Birth Year Ratios for 4, 5 and 6 Years prior to the Survey by Demographic Characteristics of Women, TDHS 1993, 1998 and 2003

	Years Prior to Survey										Birth Year Ratios centered on Period prior to survey		
	0	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**4 yrs.**	**5 yrs.**	**6 yrs.**
Age													
15-19													
1993	87	40	27	5	2	-	-	-	-	-	-	-	-
1998	78	45	22	8	4	1	1	-	-	-	87.1	20.5	-
2003	69	37	18	13	2	1	-	-	-	-	31.2	-	-
20-24													
1993	271	258	194	196	145	85	87	34	16	7	103.5	72.9	146.5
1998	247	225	206	157	138	103	61	31	15	3	105.6	103.9	91.3
2003	279	233	229	179	139	97	50	26	12	4	100.9	102.0	82.1
25-29													
1993	207	219	218	240	238	262	266	226	201	149	94.9	103.8	109.0
1998	206	226	223	241	256	223	250	202	205	118	110.3	88.3	117.5
2003	216	275	289	300	308	276	268	255	211	166	106.9	95.9	100.8
30-34													
1993	125	121	129	167	191	205	266	300	280	302	102.6	89.6	105.5
1998	128	137	132	134	177	180	245	221	242	245	113.0	85.2	122.4
2003	126	137	205	235	237	220	312	294	317	311	104.1	80.0	121.7
35-39													
1993	45	56	59	71	84	88	147	155	186	179	105.6	76.5	120.5
1998	63	63	51	72	92	100	145	123	183	141	107.4	83.9	130.7
2003	54	71	85	92	125	155	195	196	208	213	101.1	97.1	111.1
40-44													
1993	15	18	21	34	30	47	76	82	93	114	73.4	89.4	117.6
1998	12	20	20	23	31	40	77	75	74	80	99.2	74.0	133.8
2003	15	20	34	40	41	62	82	80	109	123	80.5	100.3	115.1
45-49													
1993	-	3	5	4	7	6	27	24	40	44	152.2	35.0	181.6
1998	1	2	-	7	11	13	21	29	23	38	110.2	78.4	102.2
2003	-	3	8	5	13	9	19	26	32	29	193.6	56.3	108.5

Table V.1.2.4. Number of Births by Calendar Years and Birth Year Ratios for 4, 5 and 6 Years prior to the Survey by Demographic Characteristics of Women, TDHS 1993, 1998 and 2003 (Continued)

	Years Prior to Survey										Birth Year Ratios centered on Period prior to survey		
	0	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**4 yrs.**	**5 yrs.**	**6 yrs.**
Education													
No educ/Pri.Inc.													
1993	247	248	219	275	277	268	376	372	361	331	102.0	82.1	117.5
1998	179	169	183	197	208	182	315	237	287	241	109.7	69.7	150.0
2003	189	186	227	239	258	224	292	270	290	269	111.2	81.6	118.3
Primary													
1993	431	400	367	378	353	368	421	398	401	408	94.5	95.2	109.8
1998	474	453	392	378	420	415	408	381	406	328	105.9	100.3	102.4
2003	463	450	501	511	493	491	516	517	526	499	98.4	97.3	102.3
Secondary													
1993	72	68	68	64	67	56	73	51	55	57	112.1	80.6	134.5
1998	81	96	81	67	80	62	79	62	50	55	125.1	77.6	127.7
2003	107	139	140	114	115	104	119	91	75	78	105.4	89.1	121.8
Total													
1993	749	716	653	717	697	692	869	821	817	795	98.9	88.5	114.8
1998	735	718	656	642	709	659	801	680	743	625	108.9	87.3	119.6
2003	759	776	868	864	866	820	927	878	890	846	102.8	91.4	109.2

Table V.1.2.5. shows the number of births by calendar years and the birth year ratios calculated for 4, 5 and 6 years prior to survey by the survival status and the sex of child and time period of interviewer in the field. While no displacement of children to 6 years prior to survey is seen among dead children at TDHS-1993 and TDHS-1998, for the last survey results show that a clear displacement is seen among the dead children. Although, among the children who are alive at the time of survey, the displacement is seen for all surveys; the level of displacement decreased with the results of TDHS-2003 when compared with the previous surveys.

The displacement of the births to 6 year prior to survey is seen all surveys regarding the sex of children. The significantly high displacement is seen at the female children at TDHS-1998. While the displacement level did not change among male children, among female children the displacement decreased at TDHS-2003. The time period for the interviewer at the field seems have relation with the displacement level of the children born 5 years prior to survey to 6 years at TDHS-1993 and TDHS-1998. While the time the interviewer stays at the field increases, the level of displacement also increases. TDHS-2003 results are dissimilar than the previous surveys, the highest displacement is seen among the data which the interviewer collected at their first week at the field.

Table V.1.2.5. Number of Births by Calendar Years and Birth Year Ratios for 4, 5 and 6 Years prior to the Survey by Survival Status and Sex of Child and Time Period of Interviewer in the field, TDHS 1993, 1998 and 2003

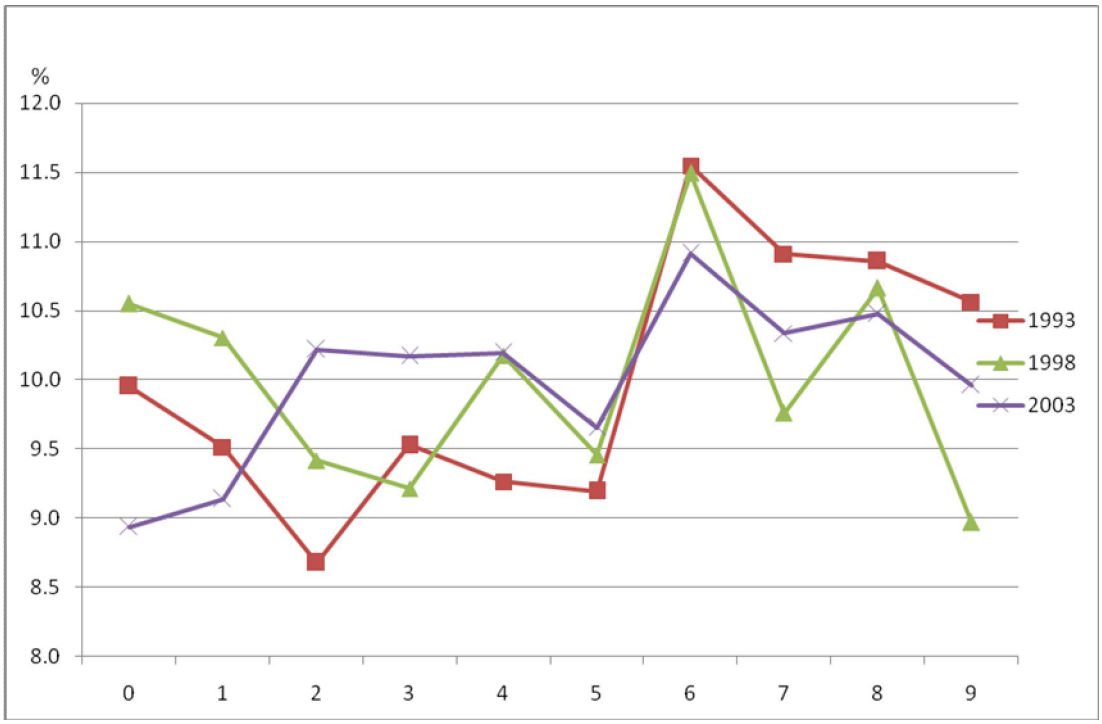
	Years Prior to Survey										Birth Year Ratios centered on Period prior to survey		
	0	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**4 yrs.**	**5 yrs.**	**6 yrs.**
Survival status of child													
Dead													
1993	27	47	42	40	48	65	79	71	78	108	91.8	101.9	116.6
1998	23	28	44	30	35	43	51	46	43	45	94.2	101.2	113.3
2003	15	27	23	35	32	26	44	51	55	58	105.9	67.5	114.1
Alive													
1993	749	716	653	717	697	692	869	821	817	795	98.9	88.5	114.8
1998	712	689	612	612	674	616	750	634	700	580	109.8	86.5	120.1
2003	743	749	845	829	833	794	884	827	834	788	102.7	92.5	109.0
Sex of child													
Male													
1993	381	385	322	363	366	347	439	434	402	431	103.1	86.2	112.4
1998	377	372	353	336	358	350	397	351	392	314	104.3	92.7	113.3
2003	396	392	460	461	423	416	477	425	444	439	96.5	92.4	113.4
Female													
1993	368	331	331	354	331	346	430	387	415	365	94.7	90.9	117.4
1998	357	346	303	306	350	309	404	329	352	310	114.0	82.0	126.5
2003	363	383	408	403	442	404	450	453	445	407	109.6	90.4	105.1

Table V.1.2.5. Number of Births by Calendar Years and Birth Year Ratios for 4, 5 and 6 Years prior to the Survey by Survival Status and Sex of Child and Time Period of Interviewer in the field, TDHS 1993, 1998 and 2003 (Continued)

	Years Prior to Survey										Birth Year Ratios centered on Period prior to survey		
	0	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**4 yrs.**	**5 yrs.**	**6 yrs.**
Time period of interviewer in the field													
1st week													
1993	98	102	75	80	85	92	99	108	80	90	99.1	100.2	99.0
1998	95	82	68	78	75	75	81	85	79	85	97.7	96.1	101.2
2003	79	82	101	104	128	82	122	99	103	106	137.8	66.1	134.3
2nd week													
1993	95	79	80	77	94	101	109	107	104	112	105.4	99.4	105.0
1998	90	83	81	69	88	73	85	81	84	64	124.1	84.0	110.8
2003	72	92	55	90	66	95	90	85	95	88	71.9	121.4	99.9
3rd week													
1993	118	120	85	117	108	124	135	124	123	116	89.4	102.1	109.1
1998	89	96	104	99	101	109	118	95	99	75	96.5	99.9	115.7
2003	94	85	84	97	91	93	113	112	109	89	96.3	91.1	110.1
4th week													
1993	92	84	98	89	96	74	115	101	112	105	117.5	70.3	131.5
1998	106	104	99	92	103	85	106	86	102	76	117.1	81.4	123.6
2003	94	91	119	86	99	88	96	97	95	114	113.6	90.4	103.6
More													
1993	347	331	316	354	314	301	410	381	397	373	96.0	83.1	120.2
1998	354	353	304	304	342	317	411	333	380	326	110.1	84.2	126.4
2003	418	425	510	488	481	461	507	486	488	449	101.3	93.4	107.1
Total													
1993	749	716	653	717	697	692	869	821	817	795	98.9	88.5	114.8
1998	735	718	656	642	709	659	801	680	743	625	108.9	87.3	119.6
2003	759	776	868	864	866	820	927	878	890	846	102.8	91.4	109.2

The percent of births by years prior to survey for 10 years is summarized with Figure V.1.2.1.. The fluctuation at the distribution of births for the years prior to survey is high at TDHS-1998. Especially the decrement from year 4 to 5 and increment from 5 to 6 is sharpest at TDHS-1998.The sharp decreases seen for year 7 and 9 at TDHS-1998. The least fluctuation, on the other hand, is seen at TDHS-2003 data. The peak at year 6 is lowest for this survey.

Figure V.1.2.1. Percent Distribution of Births for Ten Years prior to Survey, TDHS 1993, 1998 and 2003



V.1.3. Age Heaping

Age heaping can be a common problem for the births mentioned by the mothers at the birth history section of the DHS questionnaires especially for the undeveloped countries. Like the age data at household list and at the beginning of the individual questionnaire, heaping the ages to certain years will be a problem of birth history data. The single age ratios will help to illustrate the problem of heaping. Table

V.1.3.1. shows the age ratios surviving children up to age 15 by region and type of place of residence at TDHS-1993, 1998 and 2003. In general, a heaping to age 6 is seen for all three surveys. The interviewers may carry the children aged 5 to age 6 to escape from the workload of asking several questions at Section 4 and 5. On the other hand at TDHS-1998, a heaping for age 8 is seen. It will be a problem of heaping the birth year of the children to the year 1990 which results in a heaping on age 8. Except from age 6, the highest single age ratios are seen for age 13 which will be a result of mentioning the birth years of the children as 1980 and 1990 respectively at TDHS-1993 and TDHS-2003.

Heaping at age 6 is seen nearly at all regions. The highest heaping to age 6 is seen at East region at TDHS-1993, at West region at TDHS-1998 and at South region at TDHS-2003. While the heaping on age 6 is decreasing at East, Central and West regions from TDHS1993 to TDHS-2003, for South and North, the heaping problems seems increasing for age 6. In addition, at TDHS-1998, a clear heaping on age 8 is seen especially at West and North region. At South region the heaping of age 8 and 13 is vivid at TDHS-2003. For the same survey, at Region North age heaping for age 2 is remarkable.

The heaping problem for age 6 is seen more in urban data than the rural. Ignoring the TDHS-1998 urban data, the heaping seems decreasing. Besides the heaping at age 6, at TDHS urban data, the heaping of age 4 and age 8 is remarkable. At TDHS-1993 and TDHS-2003 urban data the highest heaping is seen at age 13. At TDHS-2003 rural data, on the other hand, the highest heaping is seen at age 4. The highest heaping at TDHS-1993 rural data is seen at age 13.

Table V.1.3.1. Age Ratios for Living Children by Single Year of Age by Region and Type of Place of Residence, TDHS 1993, 1998 and 2003

	Age Ratio Centered on Age														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Region															
West															
1993	97.8	102.7	92.2	105.1	89.1	116.4	94.6	97.0	105.2	100.3	95.5	99.2	112.3	94.6	21.4
1998	115.2	90.7	92.9	115.5	79.0	136.3	77.8	120.0	86.6	105.3	105.8	88.0	115.5	87.5	19.2
2003	107.4	102.9	98.2	101.1	92.6	107.9	97.2	107.1	96.6	88.0	122.1	86.4	111.2	102.6	14.0
South															
1993	104.0	88.6	109.9	91.2	114.5	94.2	96.8	100.3	105.3	97.9	97.0	99.1	116.7	82.6	25.1
1998	101.8	95.1	99.8	103.5	94.4	103.4	97.4	108.8	89.6	110.7	89.8	110.8	103.6	89.7	18.5
2003	82.3	104.4	102.3	109.3	83.4	118.1	81.2	123.9	88.9	105.9	106.6	79.6	129.7	90.8	18.0
Central															
1993	123.4	75.9	124.6	91.0	86.9	114.8	102.4	97.8	97.3	96.4	106.2	101.5	99.0	97.5	24.6
1998	97.2	98.2	86.5	117.4	91.1	109.5	91.5	109.2	97.4	95.1	92.5	118.0	87.3	118.2	16.5
2003	89.6	116.0	96.1	101.4	98.3	107.4	96.1	92.6	111.9	97.0	96.7	91.9	107.1	105.1	16.1
North															
1993	96.6	99.1	96.8	105.3	96.3	98.1	94.8	109.6	91.7	116.0	88.6	96.6	125.8	78.6	26.1
1998	98.7	99.7	97.7	99.9	105.8	98.2	88.4	125.0	85.2	96.3	103.9	107.4	94.4	103.8	17.6
2003	80.7	132.9	92.5	90.7	99.5	114.2	98.1	98.6	99.0	97.1	87.7	115.2	93.3	108.2	18.6
East															
1993	91.4	93.0	108.0	103.2	72.5	132.2	97.2	106.2	83.2	122.7	81.7	114.8	106.2	85.1	28.9
1998	97.6	101.9	98.1	100.6	85.2	126.4	92.5	110.8	81.3	112.3	92.3	112.0	89.0	115.4	19.7
2003	95.7	97.6	104.7	105.9	86.9	106.9	104.5	97.5	99.1	101.3	97.2	104.5	94.7	108.2	21.8
Type of Place of Residence															
Urban															
1993	98.7	96.0	103.1	100.5	88.2	117.3	95.5	101.6	94.4	105.8	95.2	102.7	107.3	94.5	23.6
1998	101.2	98.1	94.1	111.4	82.6	127.6	83.0	119.9	85.3	108.0	94.8	103.2	100.9	97.5	18.8
2003	95.6	106.7	101.4	99.0	93.3	110.8	94.7	102.8	100.1	97.7	107.1	85.2	115.7	103.0	15.5
Rural															
1993	107.5	84.1	111.3	96.5	88.9	111.1	100.1	100.5	99.1	104.8	92.4	103.1	113.2	83.1	25.9
1998	106.5	93.8	94.1	104.8	95.8	107.4	97.3	104.6	92.3	99.9	99.9	107.5	95.7	108.1	17.7
2003	94.8	104.3	96.4	110.6	87.8	106.2	100.6	104.0	97.3	93.2	103.8	107.4	92.0	103.7	19.4
Total															
1993	102.1	91.2	106.2	98.9	88.5	114.8	97.4	101.1	96.4	105.4	94.0	102.9	109.7	89.6	24.6
1998	103.2	96.5	94.1	108.9	87.3	119.6	88.1	113.9	87.9	104.7	96.8	104.9	98.7	101.5	18.4
2003	95.4	105.9	99.7	102.8	91.4	109.2	96.7	103.2	99.1	96.1	105.9	92.6	107.0	103.2	16.8

Table V.1.3.2. presents the age ratios of living children by single year of age by age, and education of the women. When the heaping is assessed by the age of women, it is hard to mention a relationship between the age of woman and the heaping of certain digits. The digits like 6, 4, and 8 and 13 are preferred by nearly all women with different magnitudes. Heaping of digit 6 highly effected by the displacement of the births from age 5 to age 6. Therefore this heaping has to be evaluated with keeping the displacement factor in mind. When the heaping s evaluated with the education of the woman respondent, it is seen that the relationship with the heaping problem and the level of education of women is not vivid. Different digits were

preferred by women with different level education lowest heaping on certain digit 6 is seen among women having primary education only. The heaping on digit 8 is highest at TDHS-1998 at women did not have education or did not complete primary education. In addition, the heaping on digit 13 is seen as highest at TDHS-2003 among women having secondary or more education.

The age ratios of living children of single age by the sex of children and the time period of interviewer in the field is shown at Table V.1.3.3.. The heaping at age 8 is not seen at the data collected at the interviewers' first week at the field. The age ratio on age reaches to highest levels at 2nd week at TDHS-2003, and 4th week at TDHS-1993 and TDHS-1998. Like age 8, the heaping on age 13 is not seen at the data collected at the first week of the interviewer at the field. The heaping on age 13 is seen at 3rd week for all three surveys. The sex of the child, on the other hand, does not have direct effect on the heaping of the certain ages like 6, 8 and 13. Heaping on age 8 is seen both males and females at TDHS-1998. While no heaping on this age is seen at TDHS-2003, only for female children at TDHS-1993, heaping is vivid. Heaping on age 13 is seen at female children's ages at TDHS-1993 and TDHS-2003 only. Results show that the heaping on age 13 decreases among male children gradually among the surveys.

Table V.1.3.2. Age Ratios for Living Children by Single Year of Age by Demographic Characteristics of Women, TDHS 1993, 1998 and 2003

	Age Ratio Centered on Age														
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**
Age															
15-19															
1993	70.7	118.0	36.8	-	-	-	-	-	-	-	-	-	-	-	-
1998	89.6	84.3	59.7	87.1	20.5	-	-	-	-	-	-	-	-	-	-
2003	85.8	69.9	135.3	31.2	-	-	-	-	-	-	-	-	-	-	-
20-24															
1993	111.1	85.4	115.5	103.5	72.9	146.5	66.4	78.5	77.3	-	-	-	-	-	-
1998	99.4	107.8	91.5	105.6	103.9	91.3	80.8	89.3	38.3	-	-	-	-	-	-
2003	91.8	111.2	97.1	100.9	102.0	82.1	84.1	78.3	54.0	-	-	-	-	-	-
25-29															
1993	103.2	94.9	105.3	94.9	103.8	109.0	96.8	107.4	91.6	111.1	84.8	110.3	62.9	48.8	149.3
1998	105.1	95.8	100.4	110.3	88.3	117.5	88.8	128.4	77.5	109.6	90.9	92.7	86.1	64.9	89.6
2003	108.8	100.6	100.5	106.9	95.9	100.8	106.6	100.2	102.5	92.5	95.0	95.5	94.4	-	-
30-34															
1993	95.4	89.8	104.3	102.6	89.6	105.5	109.7	93.0	105.5	100.2	98.3	107.1	109.9	92.5	74.8
1998	104.9	97.9	86.5	113.0	85.2	122.4	90.7	103.8	95.4	114.0	97.1	105.8	88.8	113.4	69.7
2003	82.9	110.1	106.5	104.1	80.0	121.7	93.4	104.8	100.2	99.1	107.2	100.1	100.3	106.2	75.5
35-39															
1993	109.0	92.8	98.9	105.6	76.5	120.5	93.4	111.2	86.0	114.8	88.5	104.7	114.6	84.6	43.8
1998	110.4	76.0	100.5	107.4	83.9	130.7	74.7	138.8	79.3	98.2	105.5	98.3	107.8	95.4	35.6
2003	101.3	105.0	87.1	101.1	97.1	111.1	97.3	101.7	99.6	94.7	102.2	95.1	108.5	106.6	34.6
40-44															
1993	98.9	80.5	134.6	73.4	89.4	117.6	96.6	95.3	107.1	96.2	95.9	94.6	114.4	95.0	20.3
1998	123.4	94.4	90.4	99.2	74.0	133.8	98.7	96.5	93.1	97.5	93.4	108.3	104.8	104.4	13.2
2003	82.3	113.1	107.2	80.5	100.3	115.1	84.1	107.6	101.2	95.2	107.1	88.8	113.6	90.1	14.9
45-49															
1993	-	151.1	60.0	152.2	35.0	181.6	70.1	119.9	84.2	110.5	105.5	95.6	99.0	92.9	10.0
1998	-	-	-	110.2	78.4	102.2	131.2	69.6	125.5	86.2	81.7	126.4	86.9	101.1	8.6
2003	-	210.5	44.8	193.6	56.3	108.5	101.5	117.0	75.5	95.5	134.0	65.7	109.6	123.2	5.6
Education															
No educ/Pri. Inc.															
1993	106.6	83.6	111.0	102.0	82.1	117.5	100.9	102.8	87.8	110.1	93.5	102.7	112.1	88.4	22.8
1998	93.1	100.3	100.7	109.7	69.7	150.0	78.9	120.0	86.6	101.1	101.2	103.8	94.9	111.4	15.4
2003	89.5	107.0	98.6	111.2	81.6	118.3	92.7	107.6	90.9	107.2	99.9	93.1	107.1	105.8	15.6
Primary															
1993	100.2	94.3	105.1	94.5	95.2	109.8	96.9	99.5	101.5	104.0	93.6	103.6	107.0	91.8	26.7
1998	104.6	94.3	93.2	105.9	100.3	102.4	93.7	114.5	85.6	109.7	92.1	107.6	102.0	91.5	21.6
2003	93.4	104.2	102.9	98.4	97.3	102.3	99.4	103.4	104.4	86.7	113.1	93.0	104.3	101.7	17.6
Secondary +															
1993	98.1	102.5	94.5	112.1	80.6	134.5	80.6	101.8	122.1	81.2	103.4	97.3	107.8	83.5	31.5
1998	118.5	99.1	82.9	125.1	77.6	127.7	95.7	85.5	113.1	92.0	106.5	93.0	101.7	109.3	26.1
2003	112.8	110.5	89.2	105.4	89.1	121.8	94.4	87.9	97.9	117.8	87.7	88.3	124.2	101.5	18.1
Total															
1993	102.1	91.2	106.2	98.9	88.5	114.8	97.4	101.1	96.4	105.4	94.0	102.9	109.7	89.6	24.6
1998	103.2	96.5	94.1	108.9	87.3	119.6	88.1	113.9	87.9	104.7	96.8	104.9	98.7	101.5	18.4
2003	95.4	105.9	99.7	102.8	91.4	109.2	96.7	103.2	99.1	96.1	105.9	92.6	107.0	103.2	16.8

Table V.1.3.3. Age Ratios for Living Children by Single Year of Age by Sex of the Child and Time Period of Interviewer in the Field, TDHS 1993, 1998 and 2003.

	Age Ratio Centered on Age														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Sex of Child															
Male															
1993	109.5	86.2	105.5	103.1	86.2	112.4	103.2	93.0	103.7	100.8	98.1	101.2	108.6	88.3	25.3
1998	101.8	99.8	94.6	104.3	92.7	113.3	89.0	117.7	83.7	108.1	97.7	101.6	105.1	92.6	19.0
2003	91.7	107.8	104.4	96.5	92.4	113.4	92.3	102.9	102.7	96.3	98.5	101.0	103.6	101.9	17.0
Female															
1993	94.8	96.6	106.9	94.7	90.9	117.4	91.6	110.4	89.0	110.7	89.7	104.6	110.8	91.0	23.8
1998	104.8	92.9	93.6	114.0	82.0	126.5	87.1	110.0	92.6	101.2	95.9	108.5	92.5	111.4	17.9
2003	99.5	103.8	94.8	109.6	90.4	105.1	101.2	103.6	95.5	96.0	113.9	84.4	110.7	104.7	16.6
Time period of interviewer in the field															
1st week															
1993	117.7	82.9	99.2	99.1	100.2	99.0	120.5	81.1	100.8	101.8	101.6	106.3	94.0	101.6	23.8
1998	100.6	84.8	109.7	97.7	96.1	101.2	105.9	93.6	104.2	101.0	95.0	106.4	95.6	105.7	20.6
2003	91.5	108.1	90.6	137.8	66.1	134.3	87.8	100.6	97.2	108.7	97.4	95.6	110.9	93.9	16.4
2nd week															
1993	90.2	102.9	88.6	105.4	99.4	105.0	100.6	95.1	110.4	90.8	99.9	105.1	110.3	86.9	22.3
1998	96.9	106.7	81.7	124.1	84.0	110.8	96.1	115.5	86.4	85.8	116.4	109.6	74.0	130.4	19.9
2003	144.5	60.4	148.2	71.9	121.4	99.9	92.0	109.6	93.6	95.7	128.7	73.8	125.7	87.5	14.4
3rd week															
1993	119.2	71.1	121.9	89.4	102.1	109.1	95.7	102.8	93.0	110.0	89.8	101.0	116.3	91.4	22.9
1998	99.1	106.9	96.9	96.5	99.9	115.7	87.8	116.0	80.8	98.6	120.1	81.2	118.8	94.9	18.3
2003	95.4	92.7	110.2	96.3	91.1	110.1	100.9	108.2	92.0	87.5	118.7	85.0	121.0	89.8	19.3
4th week															
1993	88.4	113.2	91.8	117.5	70.3	131.5	88.8	109.1	91.6	118.9	82.4	106.3	112.1	85.1	25.8
1998	101.5	101.2	90.5	117.1	81.4	123.6	82.8	125.5	79.4	107.7	96.4	103.7	108.0	85.5	22.1
2003	85.3	134.3	79.1	113.6	90.4	103.6	101.5	90.3	120.3	86.0	114.0	79.6	125.8	99.9	16.5
More															
1993	100.0	92.1	112.4	96.0	83.1	120.2	94.3	105.4	94.3	105.6	95.1	101.1	111.0	88.0	25.6
1998	107.2	92.5	94.1	110.1	84.2	126.4	84.2	115.4	88.5	111.0	88.0	111.1	98.4	100.9	16.7
2003	91.7	111.6	98.5	101.3	93.4	107.1	97.7	104.4	97.8	97.7	99.2	101.6	96.2	113.0	17.0
Total															
1993	102.1	91.2	106.2	98.9	88.5	114.8	97.4	101.1	96.4	105.4	94.0	102.9	109.7	89.6	24.6
1998	103.2	96.5	94.1	108.9	87.3	119.6	88.1	113.9	87.9	104.7	96.8	104.9	98.7	101.5	18.4
2003	95.4	105.9	99.7	102.8	91.4	109.2	96.7	103.2	99.1	96.1	105.9	92.6	107.0	103.2	16.8

V.1.4. Miscalculation of Year of Birth

During the field study, either by the respondent or by the interviewer the year of birth of the child may be miscalculated. When the age of the child is known but the year and month of the child is unknown, interviewer may just subtract the age from the year of interview and calculate the year of birth. This calculation is true if the month of birth is earlier than the month of interview. If the month of interview is earlier than the month of birth, the year of birth will be overestimated for one year. If the imputation is done at the field it is hard to understand , however if the imputation is done at data entry process it will be more clear. An uneven distribution of birth will show extent of this problem. At this section of the study the month of interview is used as a basis to understand the level of problem.

The percent of the child whose month of birth falls in the month of interview or earlier is shown on Table V.1.4.1.. The assessment is done for imputed and non-imputed cases separately to see the effect of imputation during the data entry. The results indicate that, the imputed cases at TDHS-1998 are around 5.5 times more from TDHS-1993 and nearly 2 times than TDHS-2003. No clear distortion at the distribution of births is seen at TDHS-2003. At TDHS-1993 and TDHS-1998, the percent of the expected births earlier than the interview date is less than the actual cases. There is around 15 % difference between the actual and expected percents among imputed cases. This is only around 6 percent for non-imputed cases. The imputation of the birth months in general is noticeably high which will result in a problem of calculating the year of birth of children to an earlier year. The comparison of the non-imputed cases to the imputed cases shows that the distortion seems a problem of imputed cases.

The regional difference is seen at the problem of miscalculation of year of birth. At TDHS-1993 data, the lowest gap between the expected and actual percentage is seen at West region. The highest problem is seen at South region at imputed cases for the same survey. North region seems the biggest problematic region a TDHS-1998 with nearly 20 % difference between the expected and actual distribution of the birth

months. TDHS-2003 birth history data on birth date of children seems problematic for Central and East regions where the expected months are higher than the actual months given by the imputation process.

The data collected at urban areas needed to be imputed more than the data of rural areas at TDHS-1998. For the last and the first TDHS the imputed cases are high in numbers at rural areas than urban. No clear difference is seen at the expected and actual birth month distribution of the births for imputed cases.

Same assessments were done by age and education of the respondent and time period of the interviewer at the field. Table VIII.3.1. and Table VIII.3.2. at Annex VIII.3 indicates the calculation of percentage of children whose month of birth falls in the month of interview or earlier by the age and education of mother and the time of the interviewer at the field. As there is no direct relationship between the data collected from the different age groups of women, their education and the time period of the interviewer at the field and the level of distortion at the birth date data imputed at the data entry process, the tables will only be used to evaluated for the evaluation of number of cases imputed and their change with the selected demographic characteristics of women and the interviewer.

Table V.1.4.1. Percentage of Children Whose Month of Birth Falls in the Month of Interview or Earlier by Region and Type of Place of Residence, TDHS 1993, 1998 and 2003

	Imputed Cases		Number of Children	Non-Imputed Cases		Number of Children
	Actual	Expected		Actual	Expected	
Region						
West						
1993	75.0	70.7	134	77,2	72.9	5554
1998	84.3	70.4	514	74.7	71.4	4901
2003	65.1	67.3	243	72.0	71.5	6989
South						
1993	92.4	75.8	91	79.0	73.8	3005
1998	88.2	74.4	270	80.2	76.7	2308
2003	82.5	85.6	214	84.6	83.8	2552
Central						
1993	91.3	75.8	155	82.7	75.7	4513
1998	89.9	76.0	447	78.7	75.1	3447
2003	30.7	40.1	148	45.1	44.4	4544
North						
1993	88.5	73.1	127	73.4	72.1	1723
1998	90.4	71.9	219	75.4	71.3	1280
2003	15.1	17.6	59	16.3	16.7	1524
East						
1993	85.4	70.5	176	80.9	72.1	4348
1998	88.6	72.3	1030	77.3	69.9	2792
2003	24.9	34.5	686	37.1	35.6	4215
Type of Place of Residence						
Urban						
1993	83.1	72.1	287	78.4	73.2	11045
1998	88.7	73.3	1365	76.9	73.3	9279
2003	45.4	51.2	667	58.7	58.1	13319
Rural						
1993	88.5	73.6	396	80.5	73.8	8099
1998	87.3	72.1	1115	77.3	71.9	5450
2003	37.6	45.6	682	49.8	48.6	6505
Total						
1993	86.2	72.9	683	79.3	73.5	19144
1998	88.1	72.8	2480	77.1	72.8	14729
2003	41.5	48.4	1349	55.8	55.0	19824

V.1.5. Coverage of Live Births

The DHS program improved the fertility section of the survey with previous experiences. The latest reproduction section starts with asking the number of children born, number of children living with the mother, number of children away separately for both sexes. With brass type questions the basic aim is not to miss any of the children born whether live or dead. To ask the question for each sex strengthens the quality of data in terms of not missing any children at the birth history. After the birth history completed, the interviewer sums up all the births mentioned at the birth history section and a follow up question is asked to ascertain the number of live births of the woman.

The underreporting of the dead children is one of the common problems in developing countries especially the child was dead in neo-natal period. The omission of births are hard to catch is there is no huge number of underreporting To calculate the underreporting in a birth history data average number of children ever born by age of mother in groups can be used. In a situation where no gross underreporting is seen, the average parity should increase monotonically with the age groups.

Table V.1.5.1. indicates the average number of children ever born by age of mother by region and type of place of residence for all three surveys. Results indicate that, monotonical increase in average number of births is at least “0.4” among all age groups at all surveys except a “0.2” increase at TDHS-2003 for the last two age groups. Coverage of living children problem may be at this survey at the age group 45-49.. In addition, at the West region for the same survey the increase at parity among the ages 30-34 and 35-39 and for the last two age groups is calculated as 0.3 and 0.1 respectively. Again at TDHS-2003, birth history data collected at North region brings into matter a coverage problem for 305-39 and 40-44; and 40-44 and 45-49 age groups with an increase of 0.3and 0.2 in that order. The only minus value is calculated for all surveys is at North region at TDHS-1993 for the last two age groups. For the last two eligible age groups, the average number of children is below

0.4 at urban areas at TDHS-1993 and TDHS-2003 and at rural areas at TDHS-1998 and TDHS-2003.

The median age at first birth is also used to identify the coverage of live births. If the median age of first birth did not changed significantly over time the age at first birth of the cohorts will be more or less same. The assessment of median age at first birth by age of woman at the time of survey by region and type of place of residence for all the three surveys is presented at Table V.1.5.2. Results show that, except the West region at TDHS-2003 and at the rural data at TDHS-1998 the median age of first birth at age 40-44 and 45-49 are same or the last age groups is higher than the 40-44 age group. At these two situations the median ages are 1 year older at 45-49 age group than 40-44.

Table V.1.5.1. Average Number of Children Ever Born by Age of Mother by Region and Type of Place of Residence, TDHS 1993, 1998 and 2003

	Age of Woman							
	15-19	**20-24**	**25-29**	**30-34**	**35-39**	**40-44**	**45-49**	**Total**
Region								
West								
1993	0.5	1.1	1.8	2.4	2.9	3.4	3.8	2.4
1998	0.1	0.6	1.4	2.1	2.6	3.2	3.7	1.7
2003	0.4	1.0	1.6	2.2	2.5	2.9	3.0	2.2
South								
1993	0.5	1.4	2.1	3.1	3.9	4.6	5.3	3.1
1998	0.1	0.7	1.5	2.6	3.4	4.1	4.9	2.1
2003	0.8	1.2	1.9	2.6	3.1	3.7	4.1	2.7
Central								
1993	0.5	1.3	2.4	3.0	4.1	4.5	5.1	3.1
1998	0.1	0.8	1.7	2.6	3.1	3.6	4.2	2.0
2003	0.6	1.2	1.7	2.5	2.9	3.3	3.7	2.5
North								
1993	0.5	1.2	2.1	3.2	4.0	4.9	4.8	3.0
1998	0.0	0.8	1.9	2.7	3.1	4.2	4.6	2.2
2003	0.5	1.2	1.9	2.5	3.1	3.4	3.6	2.7
East								
1993	0.6	1.8	3.1	4.6	6.3	7.1	7.8	4.3
1998	0.1	1.1	2.6	3.9	5.3	6.6	7.4	2.7
2003	0.7	1.6	2.8	3.8	4.8	5.9	6.6	3.8
Type of Place of Residence								
Urban								
1993	0.5	1.2	2.0	2.8	3.5	4.0	4.3	2.7
1998	0.1	0.7	1.5	2.4	3.0	3.5	4.2	1.9
2003	0.5	1.1	1.8	2.4	2.8	3.3	3.4	2.4
Rural								
1993	0.5	1.5	2.6	3.7	4.6	5.5	5.9	3.6
1998	0.1	0.9	2.1	3.0	3.8	4.9	5.2	2.3
2003	0.7	1.3	2.4	3.0	3.6	4.3	4.5	3.1
Total								
1993	0.5	1.3	2.2	3.1	3.9	4.5	4.9	3.0
1998	0.1	0.8	1.7	2.6	3.3	4.0	4.5	2.0
2003	0.6	1.2	1.9	2.6	3.1	3.5	3.7	2.6

Table V.1.5.2. Median Age at First Birth by Age of Woman at the Time of Survey by Region and Type of Place of Residence, TDHS 1993, 1998 and 2003

	Age of Woman						
	20-24	**25-29**	**30-34**	**35-39**	**40-44**	**45-49**	**Total**
Region							
West							
1993	20	20	20	20	20	20	20
1998	20	21	21	20	20	20	20
2003	19	21	21	21	20	21	21
South							
1993	19	20	20	20	20	20	20
1998	19	21	21	21	20	19	20
2003	19	21	21	21	21	21	21
Central							
1993	19	20	20	19	19	20	19
1998	19	21	20	20	20	20	20
2003	19	20	21	20	20	20	20
North							
1993	20	21	19	20	20	19	20
1998	20	21	21	20	20	20	20
2003	20	21	20	21	21	20	20
East							
1993	18	19	19	19	20	20	19
1998	18	19	19	19	19	19	19
2003	19	20	20	19	19	19	19
Type of Place of Residence							
Urban							
1993	20	20	20	20	20	20	20
1998	19	21	21	20	20	20	20
2003	19	21	21	21	20	21	21
Rural							
1993	19	20	19	19	20	20	19
1998	19	20	20	20	19	20	20
2003	19	20	20	20	20	20	20
Total							
1993	19	20	20	20	20	20	20
1998	19	21	21	20	20	20	20
2003	19	21	21	21	20	20	20

V.2. The Quality of Death Related Data

The birth history module of the DHS questionnaire collects information on all live births ignoring the current status of living of the children. The birth information of all children whether died or living at the time of survey is aimed to be collected accurately and complete. For the dead children additional questions were asked to collect information on the exact dead date. At this study, the quality of the death related data is aimed to be assessed focusing on the birth and dead death of the dead children.

V.2.1. Date of Birth Data

The assessment of the quality of the death related data starts with the date of birth data comparison of the living and dead children. Table V.2.1.1. illustrates the percentage of births with incomplete information on date of birth by survival status by region and type of place of residence, TDHS 1993, 1998 and 2003. The results indicate that there is a clear difference between the children dead and alive in respect to the completeness of the birth information. It is seen that for all the three surveys, the completeness of the information of dead children's birth dates are less complete than the living children. While the complete information on birth date of living children is 97.6 % at TDHS-1993, for the same survey 88.1 of the dead children's birth date information is complete. At TDHS-1998, the 88.1 of the living children's birth date is reported complete, but the completeness of the birth date is 62.3 % among the dead children with the gap increased to 25.8 %. Although the completeness rates are still below the levels of TDHS-1993, at TDHS-2003 the completeness of the birth date of living and dead children are respectively 94.4 % and 77.0 %.

The completeness problem of dead children is higher in rural areas except TDHS-1998. At this year, the completeness of the birth information of dead children is calculated 59.8 % and % 89.9 for living children. Both at urban and rural areas, the

gap between the living and dead children is around 9 percent at TDHS-1993. The rural data of TDHS-2003 have less completion on the birth dates of both living and children as compared to TDHS-1993. The gap between the dead and living children's information seems high at rural areas for this survey.

The South region has the highest completion rates of dead children's birth dates as compared to other regions for the first two TDHSs. The lowest rates are seen at North region (80.1 %) at TDHS-1993, and East region at TDHS-1998 and TDHS-2003 (respectively, 52.7 % and 61.7%). The gap between the living children and the dead in terms of completeness of the date of birth data is highest at West region at TDHS-1998 with 32.2%. Except the region South, for all regions the gap of completeness is above 23 %. The highest gap among the dead and living children's birth date information is seen at East Region at TDHS-2003.

Table V.2.1.2.shows the percentage of births with incomplete information on date of birth by survival status by age and education level of women, TDHS-1993, 1998 and 2003. The women aged 15-19 gives complete birth date information both for the living and the dead children. With small fluctuations, the completeness of the birth date information of the dead children decreases with the age of the mother. Women at older ages seem have problem of remembering especially the birth dates of their dead children completely. TDHS-1993 results show that, women between the ages 20-34 give complete information for more than 90% of the births regarding the survival status of the children. The lowest completeness of dead children is seen at age group 40-44 with nearly 85%.

The education of the women seems have relationship between the completeness of the birth date information. The percent of complete information among dead children in terms of birth date increases when the level of mother's education increases. While 86.2%, 49.9 % and 65.9 % of the dead children's birth information is complete among women with no education or did not complete the primary school at TDHS-1993, TDHS-1998 and TDHS-2003 respectively, 95.7, 82.3 and 99.0 of the birth dates of the dead children is recorded completely for the same years among the

women having secondary or higher education. The difference in terms of reporting the complete information on birth information of the dead children between the women did not have any education or did not complete the primary level the secondary or higher educated increased from 9.5 % at TDHS-1993 to 33.1 % at TDHS-2003.

Table V.2.1.1. Percentage of Births with Incomplete Information on Date of Birth by Survival Status by Region and Type of Place of Residence, TDHS 1993, 1998 and 2003.

	Living Children				Dead Children				
	No information missing	Any Information missing	Month Only Missing	Yr., Month and Age are Missing	No information missing	Any Information missing	Month Only Missing	Yr., Month and Age are Missing	All Births
Region									
West									
1993	98.7	0.0	1.3	0.0	88.5	8.1	0.0	3.4	5688
1998	93.5	0.7	5.8	0.0	61.2	35.1	0.0	3.7	5414
2003	97.5	0.3	2.2	0.0	84.6	13.4	0.0	2.0	7232
South									
1993	97.6	0.1	2.2	0.0	91.9	7.7	0.0	0.5	3096
1998	90.7	0.3	8.9	0.1	75.1	24.6	0.0	0.3	2579
2003	92.5	2.2	5.3	0.0	74.4	22.2	0.0	3.4	2766
Central									
1993	98.1	0.1	1.8	0.0	88.0	11.5	0.0	0.5	4668
1998	90.9	1.2	7.7	0.2	67.6	28.9	0.0	3.5	3895
2003	97.5	0.3	2.1	0.0	87.1	12.4	0.0	0.5	4691
North									
1993	94.0	1.6	4.4	0.0	80.1	17.5	0.0	2.5	1851
1998	87.7	2.6	9.7	0.0	63.5	32.0	0.0	4.5	1500
2003	96.3	2.1	1.6	0.0	79.4	13.0	0.0	7.6	1583
East									
1993	97.0	0.4	2.5	0.0	88.8	10.3	0.0	0.8	4524
1998	75.8	2.0	22.2	0.0	52.7	39.6	0.0	7.7	3821
2003	86.8	3.7	9.4	0.0	61.7	32.1	0.0	6.2	4901
Type of Place of Residence									
Urban									
1993	98.3	0.1	1.6	0.0	89.2	9.2	0.0	1.7	11332
1998	89.9	0.7	9.4	0.0	59.8	36.9	0.0	3.3	10644
2003	96.0	0.9	3.1	0.0	80.3	16.8	0.0	2.9	13986
Rural									
1993	96.6	0.5	2.9	0.0	87.2	11.5	0.0	1.3	8495
1998	85.2	2.0	12.7	0.1	65.4	28.8	0.0	5.8	6565
2003	91.1	2.5	6.4	0.0	72.4	23.4	0.0	4.2	7187
Total									
1993	97.6	0.3	2.1	0.0	88.1	10.4	0.0	1.5	19827
1998	88.1	1.2	10.6	0.1	62.3	33.3	0.0	4.4	17209
2003	94.4	1.5	4.2	0.0	77.0	19.6	0.0	3.4	21173

Table V.2.1.2. Percentage of Births with Incomplete Information on Date of Birth by Survival Status by Demographic Characteristics of Woman, TDHS 1993, 1998 and 2003.

	Living Children				Dead Children				
	No information missing	Any Information missing	Month Only Missing	Yr., Month and Age are Missing	No information missing	Any Information missing	Month Only Missing	Yr., Month and Age are Missing	All Births
Age									
15-19									
1993	100.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	177
1998	100.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	159
2003	100.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	140
20-24									
1993	99.4	0.0	0.5	0.1	93.0	3.3	0.0	3.7	1387
1998	98.5	0.0	1.5	0.0	89.0	11.0	0.0	0.0	1190
2003	99.5	0.0	0.5	0.0	95.0	5.0	0.0	0.0	1249
25-29									
1993	99.3	0.0	0.7	0.0	93.7	6.3	0.0	0.0	2705
1998	95.8	0.5	3.7	0.0	82.6	15.6	0.0	1.8	2384
2003	97.7	0.3	2.0	0.0	84.3	12.3	0.0	3.4	2846
30-34									
1993	98.5	0.3	1.2	0.0	92.8	5.8	0.0	1.4	3966
1998	91.4	0.7	7.9	0.0	73.2	24.5	0.0	2.3	3110
2003	96.3	0.7	3.0	0.0	77.7	20.9	0.0	1.4	3879
35-39									
1993	98.0	0.1	1.9	0.0	88.3	11.2	0.0	0.5	4176
1998	88.6	1.2	10.2	0.0	60.6	32.7	0.0	6.7	3537
2003	94.6	1.9	3.5	0.0	73.8	22.4	0.0	3.8	4339
40-44									
1993	95.8	0.7	3.5	0.0	84.6	12.3	0.0	3.1	4070
1998	82.3	1.9	15.8	0.0	59.8	33.7	0.0	6.5	3501
2003	91.9	2.4	5.6	0.0	76.0	18.8	0.0	5.2	4719
45-49									
1993	95.5	0.4	4.1	0.0	85.7	13.4	0.0	0.9	3347
1998	79.9	2.0	17.8	0.3	51.0	45.4	0.0	3.6	3327
2003	90.3	2.0	7.6	0.0	76.0	21.2	0.0	2.9	4001

Table V.2.1.2. Percentage of Births with Incomplete Information on Date of Birth by Survival Status by Demographic Characteristics of Woman, TDHS 1993, 1998 and 2003. (Continued)

	Living Children				Dead Children				
	No information missing	Any Information missing	Month Only Missing	Yr., Month and Age are Missing	No information missing	Any Information missing	Month Only Missing	Yr., Month and Age are Missing	All Births
Education									
No educ/Pri. Inc.									
1993	95.8	0.6	3.6	0.0	86.2	11.8	0.0	2.0	10042
1998	76.5	2.5	20.9	0.1	49.9	43.8	0.0	6.3	7378
2003	86.3	3.8	9.8	0.0	65.9	28.4	0.0	5.8	7435
Primary									
1993	99.1	0.0	0.9	0.0	91.7	7.8	0.0	0.4	8776
1998	95.7	0.3	3.9	0.1	80.4	17.9	0.0	1.7	8603
2003	98.2	0.3	1.5	0.0	87.8	11.1	0.0	1.1	11732
Secondary +									
1993	99.9	0.0	0.1	0.0	95.7	4.3	0.0	0.0	1009
1998	99.8	0.0	0.2	0.0	82.3	17.7	0.0	0.0	1227
2003	99.9	0.0	0.1	0.0	99.0	1.0	0.0	0.0	2005
Total									
1993	97.6	0.3	2.1	0.0	88.1	10.4	0.0	1.5	19827
1998	88.1	1.2	10.6	0.1	62.3	33.3	0.0	4.4	17209
2003	94.4	1.5	4.2	0.0	77.0	19.6	0.0	3.4	21173

V.2.2. *Age at Death Data*

The standard DHS questionnaire allows the interviewer to record the age at death information either by days, months or year by circling the appropriate unit according to the response of the women. The two variables at the standard recode DHS data keeps the coded version at the field and the recoded version of the death age information in months. This section of the study deals with the quality of the age at death information. The completeness of the birth data information is studied at the previous sections of the study. The completeness of the age at death information gives the level of imputation problem for the age at death which will result in changes in mortality estimations.

Table V.2.2.1. shows the distribution of the deaths among children by calendar period in which the birth occurred by type of place of residence and region where the women lives at the time of survey. Among the three surveys, TDHS-1998 seems more problematic in terms of completeness of the age at death data especially for the 5 years preceding the survey. In general, 6.7 % of the deaths were reported as incomplete at this survey. Incompleteness is 1.4 at TDHS-1993 and 2.5 % at TDHS-2003. The quality of the information decreases especially at TDHS-1993 for the calendar year periods of 10 or more. While the completeness of the age at death is same at the first two surveys at 0-24 years, at the last TDHS, the quality of the overall age at death data seems lowest for the same period.

TDHS-1998 results show that %8.3 of the rural deaths and 5.2 % of urban deaths are incomplete for the births happened within 5 year period before the survey. The quality of the data age at death is better in rural at TDHS-1993 and TDHS-2003 for the same period. However, regarding the period of 0-24, the urban data is better in terms of completeness of the age at death data.

For the births of 0-5 period preceding the survey, the age at death information is complete at West and North Regions for all the three surveys. At TDHS-2003 at North Region for the same period the age at death data is also completed. The same situation is seen at TDHS-1993 for East Region. At TDHS-2003 all the death information seems complete at West region for all calendar year periods of births preceding the survey. The highest quality of the data is seen at this region for TDHS-2003 and TDHS-1993. For TDHS-1998 the highest completeness percent is seen at North region. The lowest quality age at death data, on the other hand, is seen at North, East and Central regions respectively at TDHS-1993, TDHS-1998 and TDHS-2003.

Table V.2.2.1. Percentage of Deaths with Incomplete Information on Age at Death by Calendar Period in Which the Birth Occurred by Region and Type of Place of Residence, TDHS 1993, 1998 and 2003.

	Calendar-Year Period Preceding Survey					
	0-4	**5-9**	**11-14**	**15-19**	**20-24**	**0-24**
Region						
West						
1993	0.0	0.0	1.1	1.9	1.1	1.0
1998	0.0	6.7	4.0	3.4	4.0	3.9
2003	0.0	0.0	0.0	0.0	0.0	0.0
South						
1993	2.3	5.3	0.0	2.1	6.2	3.1
1998	10.8	0.0	7.9	0.0	3.3	3.5
2003	14.2	3.6	7.6	0.0	0.0	3.8
Central						
1993	4.1	0.0	4.6	2.9	4.7	3.3
1998	1.8	0.0	0.0	1.9	1.9	1.2
2003	0.0	0.0	2.4	12.7	2.8	4.6
North						
1993	0.0	3.3	7.8	7.7	7.3	6.2
1998	0.0	1.7	0.0	2.3	0.0	1.0
2003	0.0	2.2	0.0	5.3	0.0	1.6
East						
1993	0.0	3.2	4.9	7.2	8.3	5.0
1998	13.3	1.9	3.7	4.5	6.9	5.8
2003	2.4	1.6	0.8	1.5	1.2	1.4
Type of Place of Residence						
Urban						
1993	2.7	0.8	2.5	3.6	4.6	2.9
1998	5.2	4.6	3.2	2.6	2.3	3.2
2003	3.1	1.0	1.2	1.6	1.4	1.5
Rural						
1993	0.0	3.3	4.6	4.5	5.1	4.0
1998	8.3	0.0	2.4	3.2	5.7	3.7
2003	1.7	1.6	1.9	6.4	0.4	2.5
Total						
1993	1.4	2.1	3.6	4.1	4.9	3.5
1998	6.7	2.6	2.8	2.8	3.7	3.5
2003	2.5	1.3	1.5	3.6	1.0	1.9

Table V.2.2.2. Percentage of Deaths with Incomplete Information on Age at Death by Calendar Period in Which the Birth Occurred by Demographic Characteristics of Woman, TDHS 1993, 1998 and 2003.

	Calendar-Year Period Preceding Survey					
	0-4	**5-9**	**11-14**	**15-19**	**20-24**	**0-24**
Age						
15-19						
1993	0.0	-	-	-	-	0.0
1998	0.0	0.0	-	-	-	0.0
2003	0.0	-	-	-	-	0.0
20-24						
1993	0.0	0.0	50.0	-	-	1.3
1998	10.4	0.0	-	-	-	7.7
2003	0.0	0.0	0.0	-	-	0.0
25-29						
1993	3.9	3.3	1.4	-	-	3.0
1998	8.8	4.7	0.0	0.0	-	5.1
2003	0.0	2.9	0.0	-	-	1.4
30-34						
1993	0.0	1.9	4.3	0.0	0.0	2.3
1998	0.0	3.9	0.9	6.4	0.0	2.8
2003	4.2	0.6	2.2	9.6	-	2.7
35-39						
1993	4.7	2.4	2.9	3.5	6.0	3.6
1998	0.0	0.0	3.9	0.0	2.0	1.3
2003	8.3	1.6	0.7	4.4	3.5	3.0
40-44						
1993	0.0	0.0	5.1	5.5	4.8	4.5
1998	9.5	0.0	6.1	2.5	4.7	4.0
2003	11.5	0.0	0.7	1.1	0.8	1.0
45-49						
1993	0.0	4.0	1.6	5.2	4.6	4.1
1998	23.2	0.0	2.1	5.9	3.5	4.1
2003	0.0	0.0	4.8	4.2	0.3	1.7
Total						
1993	1.4	2.1	3.6	4.1	4.9	3.5
1998	6.7	2.6	2.8	2.8	3.7	3.5
2003	2.5	1.3	1.5	3.6	1.0	1.9

Table V.2.2.2. Percentage of Deaths with Incomplete Information on Age at Death by Calendar Period in Which the Birth Occurred by Demographic Characteristics of Woman, TDHS 1993, 1998 and 2003. (Continued)

	Calendar-Year Period Preceding Survey					
	0-4	**5-9**	**11-14**	**15-19**	**20-24**	**0-24**
Education						
No educ/Pri. Inc.						
1993	1.9	2.8	4.4	5.2	6.2	4.5
1998	11.7	3.2	3.4	3.5	5.0	4.5
2003	6.0	1.4	2.0	2.8	1.0	2.2
Primary						
1993	1.0	1.1	2.3	2.1	1.7	1.7
1998	3.9	2.2	1.9	0.5	0.9	1.8
2003	0.0	1.0	0.9	5.0	1.0	1.8
Secondary +						
1993	0.0	0.0	0.0	0.0	0.0	0.0
1998	0.0	0.0	0.0	15.8	0.0	5.8
2003	0.0	2.6	0.0	0.0	0.0	0.7
Total						
1993	1.4	2.1	3.6	4.1	4.9	3.5
1998	6.7	2.6	2.8	2.8	3.7	3.5
2003	2.5	1.3	1.5	3.6	1.0	1.9

Table V.2.2.2. illustrates the incompleteness of the age at death information by calendar year period preceding the survey with controlling the age and educational status of the mother. Results show that, there is no clear relationship between the age of women and the completeness of the information. For different surveys, at different ages complete information on the age at death is seen. The TDHS-1998 results especially for the age groups 20-24 and 25-29 disorders the trends at the completeness levels. On the other hand, table indicates that, when the education level of the mother increases the completeness of the age at death information increases. Except the TDHS-1998 data of the period of 15-19 years preceding the survey, women having secondary or more education nearly gives complete information for all calendar year periods preceding the surveys. The highest incompleteness is seen among the women who did not have any education at all or did not complete the primary school.

The defect in the age at death information gives the problem in recording the data at the field. The number of deaths and the deaths without complete information is presented at Table V.2.2.3. with the detailed information of the defect. In TDHS-1993 2418 deaths are mentioned by the mothers while filling the birth history. 79 of the deaths' information are not complete. 82.3 % of these deaths were noticed as inconsistent with other answers at the questionnaire and imputed during data entry. While at only one death, some information is missing; all information is missing at 13 deaths at this survey. At TDHS-1998 and TDHS-2003 for nearly 30 % of the deaths reported incompletely it is seen that all information is missing. The inconsistent response problem is seen 58.9 % and 70% of the deaths with incomplete age at death information at TDHS-1993 and TDHS-2003 respectively.

The data of rural areas seems more problematic in terms of inconsistent response problem at TDHS-1993 and TDHS-2003.88.6 % and 66.7 % of the deaths reported incomplete at these surveys are inconsistent with the other answers. At TDHS-2003, for rural areas, the problem of all information missing reaches to 46.7 % of the deaths lacking complete age at death information. At this survey, the inconsistent response problem reaches to its highest levels at urban areas.

At West region, all the information of the deaths mentioned is calculated as complete at TDHS-2003. At region North only 1 out of 159 and 117 deaths are reported incomplete at TDHS-1998 and TDHS-2003 respectively. At TDHS-1993 and TDHS-1998 the highest number of deaths reported incomplete is seen at East region with 30 and 25 deaths in that order. 93.3 % and 72.0 % of these deaths were mentioned as inconsistent with other information and imputed at the data entry process. At TDHs-2003 the highest incomplete information at age at death data is seen at Central region with 16 deaths. While for 43.7 % of the incomplete deaths, all information is missing, 56.3 % of these deaths' information is inconsistent with other data.

Table V.2.2.3. Total Reported Deaths and the Number of Deaths with Incomplete Age at Death Information by Type of Defect in Information by Region and Type of Place of Residence, TDHS 1993, 1998 and 2003.

	Total Reported Deaths	Deaths Lacking Complete Age at Death Information	Defect in Age at Death Information		
			All Information Missing	Some Information Missing	Inconsistent Response
Region					
West					
1993	580	6	2	0	4
1998	505	16	4	4	7
2003	511	0	0	0	0
South					
1993	322	9	0	1	8
1998	198	5	3	0	3
2003	187	5	1	0	4
Central					
1993	653	21	6	0	15
1998	429	8	5	0	3
2003	387	16	7	0	9
North					
1993	220	12	2	0	10
1998	159	1	0	0	1
2003	117	1	0	0	1
East					
1993	642	30	2	0	28
1998	462	25	7	0	18
2003	494	7	1	0	6
Type of Place of Residence					
Urban					
1993	1136	35	9	1	25
1998	979	31	10	4	17
2003	985	15	2	0	12
Rural					
1993	1281	44	4	0	39
1998	773	24	8	0	16
2003	711	15	7	0	8
Total					
1993	2418	79	13	1	65
1998	1753	56	18	4	33
2003	1697	30	9	0	21

The number of deaths mentioned at age group 15-19 is very few as they are at the beginning of the reproductive ages. It is known that births are also very few at these ages. All the deaths reported at this age group are complete in terms of the information on age at death. Even till to age 35 and above very few deaths are mentioned as incomplete. As the births increase in numbers with the age of women, the number of deaths also increases. The number of deaths in which the age of death information is not complete increases with the age of women. The deaths of all the children regardless of birth date are collected at the birth history. A woman at the last reproductive age group reports the death of her child even she gave birth at the first ages of reproduction. Therefore the level of completeness is decreasing at the older age groups. .

Table V.2.2.4. also indicates the completeness of the information and the defect of information at the incomplete age at death data according to the education of the women interviewed. The highest numbers of deaths are reported by the women with no education at all or did not complete the primary education. The incomplete age at death information at this group of women is mainly sourced from the inconsistent data with other information. Although, the number of deaths mentioned by the women having secondary or higher education is increasing among the surveys; only 2 of the reported deaths at TDHS-1998 are lacking complete age at death information. No deaths are incomplete at TDHS-1993 and TDHS-2003 at the data reported by the women at this level of education.

Table V.2.2.4. Total Reported Deaths and the Number of Deaths with Incomplete Age at Death Information by Type of Defect in Information by Demographic Characteristics of Woman, TDHS 1993, 1998 and 2003

			Defect in Age at Death Information		
	Total Reported Deaths	Deaths Lacking Complete Age at Death Information	All Information Missing	Some Information Missing	Inconsistent Response
Age					
15-19					
1993	16	0	0	0	0
1998	10	0	0	0	0
2003	6	0	0	0	0
20-24					
1993	91	1	0	0	1
1998	67	5	2	0	4
2003	53	0	0	0	0
25-29					
1993	202	6	0	1	5
1998	145	7	0	0	7
2003	118	2	0	0	2
30-34					
1993	387	9	0	0	9
1998	241	7	2	2	2
2003	232	6	2	0	3
35-39					
1993	485	17	4	0	12
1998	350	4	2	0	2
2003	347	10	6	0	4
40-44					
1993	607	25	5	0	20
1998	397	15	5	0	10
2003	456	4	0	0	4
45-49					
1993	630	21	4	0	17
1998	543	18	8	2	8
2003	485	8	0	0	8

Table V.2.2.4. Total Reported Deaths and the Number of Deaths with Incomplete Age at Death Information by Type of Defect in Information by Demographic Characteristics of Woman, TDHS 1993, 1998 and 2003. (Continued)

			Defect in Age at Death Information		
	Total Reported Deaths	Deaths Lacking Complete Age at Death Information	All Information Missing	Some Information Missing	Inconsistent Response
Education					
No educ/Pri. Inc.					
1993	1592	66	8	1	58
1998	1043	42	14	4	24
2003	865	15	2	0	13
Primary					
1993	796	12	5	0	7
1998	671	12	3	0	9
2003	773	14	7	0	7
Secondary +					
1993	29	0	0	0	0
1998	38	2	2	0	0
2003	59	0	0	0	0
Total					
1993	2418	79	13	1	65
1998	1753	56	18	4	33
2003	1697	30	9	0	21

V.2.3. Accuracy of the data:

Heaping the month of the death of children to 12 is a common problem of DHS. During the training, interviewers were told to probe the answer 1 year for age at death, whether it is exactly 12 months or not. If there is a heaping on month 12, DHS program did not develop a system to distribute the excess deaths to other months. The simple solution to overcome this problem is to stress the importance of to probe the 1 year answers. Heaping on 12^{th} month has a direct effect on infant and child

mortality rates. However, like any other DHS survey reports, TDHS survey reports are not adjusted for the heaping while estimating the infant and child mortality rates. The extent of the problem is studied at this study with some socio-demographic variables of the women.

Table V.2.3.1. illustrates the index of heaping of death at 12 months of age by region and type of place of residence. If there is no heaping at the data, the index score must be 1.0. Any number above 1 indicates a level of heaping for 12^{th} month. If the score is calculated less than 1.0, the number of deaths reported at month 12 must be less than the neighboring months. All Index results indicate that the highest heaping is seen at TDHS-1998 with 8.6 of an index score. The lowest heaping is seen at TDHS-2003 with a score of 5.The lowest level also indicates a heaping on month 12. This indicates 5 times high preference of this month than the neighboring months. At TDHS-1998 the index is calculated as 6.8.

The heaping at rural areas is higher than the urban areas for all surveys. The heaping is highest atTDHS-1998 (9.9) at rural areas. Ignoring the results of TDHS-1998 the heaping seems decreasing, at TDHSs. On the other hand, the lowest heaping at month 12 at TDHS-1993 and TDHS-2003 is seen at West region with the index scores 2.9 and 3.1 respectively. At TDHS-1998, while the lowest heaping is seen at Central region (4.1), the highest score among all regions is seen at this survey at North region with an index score of 26.2. The highest heaping is seen at East region (18.7) for TDHS-1993 and South region (13.9) at TDHS-2003.

Table V.2.3.1. Index of Heaping of Deaths at Twelve Months of Age by Region and Type of Place of Residence, TDHS 1993, 1998 and 2003

	Month of Death					Index of Heaping
	10	11	12	13	14	at month 12
Region						
West						
1993	5	17	20	1	4	2.9
1998	3	7	21	0	2	7.2
2003	0	6	8	1	4	3.1
South						
1993	3	6	19	1	2	6.0
1998	2	4	12	1	1	5.6
2003	0	1	11	2	1	13.9
Central						
1993	11	8	39	0	2	7.3
1998	3	6	13	2	2	4.1
2003	4	6	17	2	0	5.7
North						
1993	2	7	12	1	0	4.5
1998	0	1	16	0	1	26.2
2003	2	3	7	0	1	4.9
East						
1993	6	1	51	2	1	18.7
1998	3	6	36	0	1	13.9
2003	6	4	19	5	4	3.9
Type of Place of Residence						
Urban						
1993	14	17	58	2	4	6.2
1998	6	14	46	2	3	7.5
2003	8	13	34	5	6	4.3
Rural						
1993	14	23	82	3	5	7.3
1998	6	10	51	1	4	9.9
2003	5	7	29	5	3	5.8
Total						
1993	28	40	140	5	9	6.8
1998	12	24	97	2	7	8.6
2003	13	20	63	10	8	4.9

Table V.2.3.2. Index of Heaping of Deaths at Twelve Months of Age by Demographic Characteristics of Woman, TDHS 1993, 1998 and 2003.

	Month of Death					Index of Heaping
	10	11	12	13	14	at month 12
Age						
15-19						
1993	1	0	0	0	0	0.0
1998	0	0	0	0	0	-
2003	0	0	0	0	0	-
20-24						
1993	1	1	3	0	0	6.9
1998	1	1	4	1	0	4.8
2003	1	0	0	0	1	0.0
25-29						
1993	0	2	11	0	0	17.4
1998	1	3	8	0	1	5.7
2003	3	1	2	1	0	2.1
30-34						
1993	4	11	22	1	3	5.0
1998	2	1	14	1	0	14.1
2003	1	1	9	2	2	6.2
35-39						
1993	4	2	22	1	2	9.3
1998	2	6	15	0	1	6.4
2003	3	4	15	0	2	6.7
40-44						
1993	15	13	35	1	3	4.3
1998	2	5	29	0	2	12.0
2003	1	8	16	3	1	5.0
45-49						
1993	3	11	47	2	1	11.2
1998	3	8	28	1	2	8.2
2003	3	6	20	5	4	4.8

Table V.2.3.2. Index of Heaping of Deaths at Twelve Months of Age by Demographic Characteristics of Woman, TDHS 1993, 1998 and 2003. (Continued)

	Month of Death					Index of Heaping
	10	11	12	13	14	at month 12
Education						
No educ/Pri. Inc.						
1993	20	26	102	5	5	7.3
1998	6	8	77	1	3	16.9
2003	7	9	44	9	3	6.3
Primary						
1993	8	14	38	0	4	5.8
1998	3	14	21	1	3	3.8
2003	5	11	18	2	4	3.4
Secondary +						
1993	0	1	0	0	0	0.0
1998	2	2	0	1	1	0.0
2003	0	0	1	0	2	1.3
Total						
1993	28	40	140	5	9	6.8
1998	12	24	97	2	7	8.6
2003	13	20	63	10	8	4.9

Index of heaping calculated according to the age and education of women is presented at Table V.2.3.2.. No relation with the age of mother and the level of imputation is seen. The highest index scores are estimated at age 25-29 (17.4), 30-34 (14.1) and 35-39 (67) respectively for TDHS-1993, 1998 and 2003. The education level of the women and the level of heaping are calculated at this section of the study. Results show that when the level of education increases the level of heaping for month 12 is decreasing. The highest heaping is seen among women have no education or did not complete the primary level for all surveys. The highest index score is calculated as 16.9 at TDHS-1998 among the woman with no education or not completed primary level. In addition to the tables on the heaping at month 12 at the

date of death data, figures at Annex VIII.4. illustrates the heaping on month 12 at date of death information by selected socio-demographic characteristics of woman.

V.3. The Impact of Data Quality on Demographic Rates

V.3.1. Fertility impact of data quality

At this section of the study the impact of boundary effects and the sleeping away distortion at the data on Total Fertility Rate and Under 5 Mortality Rate is aimed to be assessed. Simulations are constructed and used for different situations that is related with the boundary effect and sleeping away exclusion of the women. Simulations are used to measure the effect of both lower and upper boundaries separately. Five simulations were used to assess the impact of exclusion of woman at the household questionnaire.

Simulation 1: FLB0 (Lower Boundary)
Excluded women had an age-specific fertility of 0.0 (no births)

Simulation 2: FUB0 (Upper boundary)
Excluded women had an age-specific fertility of 0.0 (no births)

Simulation 3: FUB2 (Upper Boundary)
Excluded women had twice the age-specific fertility as included

Simulation 4: FSA75 (Sleeping away)
Excluded woman had 75 percent of the age-specific fertility of included women

Simulation 5: FSA125 (Sleeping away)
Excluded woman had 125 percent of the age-specific fertility of included women

Table V.3.1.1. indicates the results of simulations for TDHS-1993 at regional and residential separation. The overall results show that while the boundary effect is estimated high at upper boundary estimation, no effect on fertility rates is seen. Likewise, the effect of sleeping away exclusion did not have impact on Total Fertility Rates at TDHS-1993. Simulations, on the other hand, created a 0.01 increase at TFR estimated for rural area. At the urban area, simulation where the women excluded because of upper boundary effect having no births resulted in only a 0.01 decrease at TFR. For all other simulations, nothing has changed at TFR at urban area. The scenario where the women excluded because of the lower boundary effect having no births create a 0.04 and 0.03 decrease at West and North region respectively. Results also show that, if the women excluded from the last eligible age group had no births, TFR at regions West, North and East decreases with a negligible number of births. However, at the simulation where the women estimated as excluded by the upper boundary effect have twice Age Specific Fertility Rate (ASFR) as excluded, the TFR calculated is 3 times high than the TFR at the report at East region. This is mainly sourced from the continuation of births still at the last eligible age group of women

Table V.3.1.1. Results of Simulations to Estimate the Effect of Lower Boundary, Upper Boundary and "Sleeping Away" Exclusions on Total Fertility Rate, TDHS 1993

	Actual TFR	Total Fertility Rate				
		FLB0	FUB0	FUB2	FSA75	FSA125
Region						
West	1.93	1.89	1.92	1.92	1.92	1.93
South	2.31	2.31	2.31	2.31	2.31	2.32
Central	2.44	2.44	2.44	2.44	2.44	2.44
North	2.76	2.73	2.75	2.75	2.75	2.76
East	4.07	4.07	4.05	12.80	4.07	4.07
Type of Place of Residence						
Urban	2.31	2.31	2.30	2.31	2.31	2.31
Rural	2.87	2.88	2.88	2.88	2.88	2.88
Total	**2.51**	**2.51**	**2.51**	**2.51**	**2.51**	**2.51**

Table V.3.1.2. shows the result of simulations for TDHS-1998. It is seen that overall TFR did not affected by the exclusions estimated by the boundary effect calculations and sleeping away. TFR estimated at TDHS-1998 for urban areas was 2.39 and at rural areas 3.08. The simulations FLB0 ad FUB0 where the women excluded at lower boundary and upper boundary supposed to have no births did not make any change at TFR for both residential areas. In addition the FUB2 and FSA75 and FSA125 simulation results did not change TFR at urban. A 0.01 increase is seen after the application of these simulations to the rural data. The simulation based on lower boundary seems no effect on TFR at all regions. Simulation, FUB0 on the other hand, only affected TFR at North region with a 0.03 decrease. The upper boundary exclusion simulation where the excluded women are supposed to have twice ASFR of the mother at the last reproductive ages, had effect only at East region where TFR nearly doubled at this region to 8.39. At other regions, as there is no births recorded

for the age group 45-49 although the upper boundary effect is seen at some regions TFR did not changed with the simulations. The effect of sleeping away exclusions on TFR is also presented at Table IV.1.2.. Results show that the simulation where the excluded women sourced by sleeping away exclusion having 75 percent of the age-specific fertility of included women did not changed the TFR at all regions. The excluded women by sleeping away factor are also simulated as they have 125 percent of ASFR included women and this simulation resulted in a 0.01 increase only at West and South regions.

Table V.3.1.2. Results of Simulations to Estimate the Effect of Lower Boundary, Upper Boundary and "Sleeping Away" Exclusions on Total Fertility Rate, TDHS 1998

	Actual	Total Fertility Rate				
	TFR	FLB0	FUB0	FUB2	FSA75	FSA125
Region						
West	2.03	2.03	2.03	2.03	2.03	2.04
South	2.55	2.55	2.55	2.55	2.55	2.56
Central	2.56	2.56	2.56	2.56	2.56	2.56
North	2.68	2.68	2.65	2.68	2.68	2.68
East	4.19	4.19	4.19	8.39	4.19	4.19
Type of Place of Residence						
Urban	2.39	2.39	2.39	2.39	2.39	2.39
Rural	3.08	3.08	3.08	3.09	3.09	3.09
Total	**2.61**	**2.61**	**2.61**	**2.61**	**2.61**	**2.61**

The simulation results for TDHS-2003 on TFR are presented at Table V.1.3.3. Although there is high level of exclusion of women at both lower and upper boundary, it is seen that simulations on lower boundary effect have only effect on TFR at urban areas and West region with 0.04 and 0.07 decrease respectively. The upper boundary exclusion, on the other hand finds its reflection on a 0.01 decrease with simulation FUB0 at Central region and rural data. The FUB2 simulation on the other hand, increased TFR at Central region to 3.99. Negligible increase at TFR is seen at East region and rural data with the simulation of FUB2. While sleeping away exclusion with FSA75 simulation did not make any change at TFR, FSA125 simulation only increased TFR at East region with an increase of 0.01.

Table V.3.1.3. Results of Simulations to Estimate The Effect of Lower Boundary, Upper Boundary and "Sleeping Away" Exclusions on Total Fertility Rate, TDHS 2003

	Actual	Total Fertility Rate				
	TFR	FLB0	FUB0	FUB2	FSA75	FSA125
Region						
West	1.88	1.81	1.88	1.88	1.88	1.88
South	2.30	2.30	2.30	2.30	2.30	2.30
Central	1.86	1.86	1.85	3.99	1.86	1.86
North	1.94	1.94	1.94	1.94	1.94	1.95
East	3.65	3.65	3.65	3.66	3.65	3.66
Type of Place of Residence						
Urban	2.06	2.02	2.06	2.06	2.06	2.06
Rural	2.65	2.65	2.64	2.66	2.65	2.65
Total	**2.23**	**2.23**	**2.23**	**2.23**	**2.23**	**2.23**

V.3.2. Mortality Impact of Data Quality

At this section of the study, the impact of data quality on mortality estimates at TDHs in terms of exclusion of women from the household interview and the heaping of deaths at twelve months of age at birth history section of the ever married women questionnaire. Section starts with the impact of boundary effect and sleeping away exclusion of Women on under-five mortality rate (U5MR) by applying some simulations in which the women excluded have different levels of U5MR. The next part of the section is the overall estimation of impact of heaping on month 12 at age at death on infant mortality rate (IMR) and child mortality rate (CMR).

V.3.2.1.The Impact of Boundary Effect and Sleeping Away Exclusion on U5MR.

The sleeping away and boundary effect results are used at three simulations to understand the effect of exclusion of women on under-five mortality rates (U5MR) at each survey. Simulations are constructed and used for different situations that is related with the boundary effect and sleeping away exclusion of the women. Three simulations were used to assess the impact of exclusion of woman at the household questionnaire.

Under the same ASFR as included women;

Simulation 1: (MLB150) Lower Boundary
Excluded children have 150 percent the rate under-five mortality by age of mother as included children.

Simulation 2: (MUB150) Upper boundary
Excluded children have 150 percent the rate under-five mortality by age of mother as included children.

Simulation 3: (MSA150) Sleeping away

Excluded children have 150 percent the rate under-five mortality by age of mother as included children.

The results of the simulation on TDHS-1993 data is presented at Table V.3.2.1.. Results show that simulation results based on upper boundary exclusion have no effect on U5MR. Ignorable increase on U5MR is seen with the simulations of lower boundary and sleeping away exclusion. Upper boundary simulation resulted in no change at urban and rural data.. At the urban data U5MR increased 0.02 and 0.05 with the MLB150 and MSA150 exclusions. At the rural data, while MSA150 resulted in no change, the simulation based on lower boundary exclusion increased the U5MR 0.1 points. The regions which are not affected by lower boundary exclusion are Central and East. At West simulation MLB150 resulted in 0.22 increase, this is 0.13 at North region. The highest effect of the lower boundary exclusion simulated is at South region which resulted in an U5MR of 65.03. The MUB150 simulation created difference at West and North region only. While U5MR increased 0.77 points, at region North, the increment of U5MR is 1.19. The simulation based on sleeping away exclusion changed U5MR at West with 0.01 points and at East with an increase of 1.21.

Table V.3.2.1.1. Results of Simulations to Estimate the Effect of Lower Boundary, Upper Boundary and "Sleeping Away" Exclusions on Under-Five Mortality Rate, TDHS 1993

	Actual U5MR	Under –five Mortality Rate		
		MLB150	MUB150	MSA150
Region				
West	48.00	48.22	48.77	48.01
South	62.80	65.03	62.80	62.80
Central	69.22	69.22	69.22	69.22
North	49.52	49.65	50.71	49.52
East	70.37	70.37	70.37	71.58
Type of Place of Residence				
Urban	50.50	50.52	50.50	50.55
Rural	76.43	76.53	76.43	76.43
Total	62.24	62.25	62.24	62.26

Table V.3.2.1.2. shows the results of simulations applied to TDHS-1998 data. U5MR increased to 53.20 with the simulation based on lower boundary effect exclusion. The upper boundary exclusion of women did not make any change for all regions and rural and urban data. The only region that sleeping away exclusion seems effective by the simulation MSA150 is the North region with a negligible increase of 0.04. In addition same simulation resulted in same quantity of increase at Rural data. Simulation MLB150, on the other hand seems changed U5MR with different levels. While U5MR increased 0.01 at rural areas, at North and Central region; the highest increase is seen at 1.64 increase at South region.

Table V.3.2.1.2. Results of Simulations to Estimate the Effect of Lower Boundary, Upper Boundary and "Sleeping Away" Exclusions on Under-Five Mortality Rate, TDHS 1998

	Actual U5MR	Under –five Mortality Rate		
		MLB150	MUB150	MSA150
Region				
West	38.25	39.58	38.25	38.25
South	43.04	44.68	43.04	43.04
Central	49.62	49.63	49.62	49.62
North	50.54	50.55	50.54	50.58
East	75.93	76.09	75.93	75.93
Type of Place of Residence				
Urban	42.41	42.89	42.41	42.41
Rural	68.01	68.02	68.01	68.05
Total	53.05	53.20	53.05	53.05

The results of the simulations on U5MR at TDHS-2003 is shown at Table V.3.2.1.3.. Results indicate that the simulations based on upper boundary and sleeping away exclusions did not make any noticeable change on the mortality rate. MLB150 simulation created difference in U5MR for all regions and urban and rural. However, of simulation is seen highest at North region with a 2.77 increase than the actual U5MR.. Moreover the effect of lower boundary excluded women who supposed to heave 150 percent higher rate under-five mortality by age of mother as included children resulted in a U5MR of 32.39 at South region. The impact of the exclusion of women at lower boundary seems negligible both urban and rural U5MR. The upper boundary exclusion have no effect on rural data and the data at regions except West. The simulation MUB150 gives results of U5MR 0.25 and 0.15 points higher at West region and urban areas respectively. Sleeping away exclusion seems have no effect on U5MR or in insignificant amounts. U5MR increased at Central and East regions

with 0.32 and 0.21 increases in that order. While there is no difference at urban data, simulation MSA150 resulted in 50.17 U5MR.

Table V.3.2.1.3. Results of Simulations to Estimate the Effect of Lower Boundary, Upper Boundary and "Sleeping Away" Exclusions on Under-Five Mortality Rate, TDHS 2003

	Actual	Under –five Mortality Rate		
	U5MR	MLB150	MUB150	MSA150
Region				
West	30.28	31.13	31.55	30.28
South	30.48	32.39	30.48	30.48
Central	32.78	33.30	32.78	33.10
North	47.76	50.53	47.76	47.76
East	48.59	48.63	48.59	48.80
Type of Place of Residence				
Urban	30.41	30.49	30.66	30.41
Rural	50.07	50.30	50.07	50.17
Total	37.57	37.66	37.58	37.58

V.3.2.2. The Impact of Heaping of Deaths at Twelve Months of Age, on IMR and CMR Estimates.

The impact of the heaping on IMR and CMR is estimated by reassigning the proportion of deaths at 12 months to infancy period and calculating the mortality rates according to the new distribution. The 25 percent of the excess deaths on month 12 are carried to the 0-11 month period for this calculation.

The results of the IMR and CMR are presented at Table V.3.2.2.1. for TDHS-1993, 1998 and 2003. Overall results indicate that the effect on heaping on month 12 at age at death data is negligible. As the heaping of the deaths at the last 5 year preceding the survey is small in numbers, the redistributing the excess deaths have less effect on IMR and CMR estimated after the distribution. The fewest change on the rates are seen at TDHS-2003. While IMR increased 0.4 %, CMR decreased 1.2 %. The increase at TDHS-1998 is higher at IMR as compare to TDHS-1993 (1.4 and 1.0 percents respectively). On the other hand the decrease at CMR is higher at TDHS-1993. While CMR decreased 6.0 percent at TDHS-1998, the percent change of the same rate is 6.2 at TDHS-1993.

The IMR increase after redistributing the deaths on month 12 resulted in 2.2 increase at rural data of TDHS-1998. This is the highest increase among all rural data. At the same survey, CMR decreased 9.0 percent which is 2.6 and 6.8 points high than TDHS-1993 and TDHS-2003.At the urban data, for all surveys the increase at IMR is below 1 percent. The highest decrease is seen at urban data at TDHS-1993 with a 6.0 %.

The reassigning the heaping children on month 12 did not make changes more than 3 percent at all regions for all surveys. The highest increase is seen for TDHS-1993 data is at East region with 2.7 % . For TDHS-1998 and TDHS-2003, the highest change is seen at South and Central regions respectively with 2.8 %and 2.9 %. After the distribution of the deaths, there is no change seen at IMR at South and North regions for TDHS-2003, and West region for TDHS-1998 and South region for

TDHS-1993. As the deaths of the children is happening at the early ages of the children, as expected, the effect of redistributing the excess deaths at 12 months is slightly more on CMR. The highest decrease is seen at North and East regions at TDHS-1993 with a percent decrease of 13.7 and 12.6 respectively. For the same survey while no change is seen at South region, the decrease on West and Central is 4.6 % and 3.3% respectively. At TDHS-1998, no difference is seen at West region in terms of CMR. The order of the regions from highest change to lowest at this survey is North, Couth, Central and East. The lowest decrease is seen at TDHS-2003 at CMR as compared to other surveys. The CMR results of the regions South and North did not change with the distribution of excess deaths of 12 months to earlier months. The highest percent change at CMR is seen at Central region with 4.6.

The effect of heaping on 12^{th} month on IMR and CMR is also estimated for 5 to 10 years preceding the surveys to compare the results of the heaping with the 5 year period preceding the survey. Table VIII.5.1. at Annex VII.5. illustrates the results of this estimation. The overall indicates that the heaping on the age at death data at 12^{th} months of the births of this period have more or less same amount of effect on the rates. It is interesting that the region where the impact of the heaping seems respectively high at five year prior to the survey decreased at 5 to 10 years preceding the surveys. In contrast, the regions where the impacts are very low at 5 years preceding the survey are found high at. 5 to 10 years prior to survey.

Table V.3.2.2.1. Estimates of Infant and Child Mortality for the Five year Period Preceding the Survey, Adjusted for Heaping of Deaths at Twelve Months of Age, by Region and Type of Place of Residence, TDHS 1993, 1998, 2003.

	Infant Mortality (1q0)			Child Mortality (4q1)		
	Unadjusted Rate	Adjusted Rate	Percent Increase	Unadjusted Rate	Adjusted Rate	Percent Decrease
Region						
West						
1993	42.66	42.91	0.6	5.59	5.33	4.6
1998	32.79	32.79	0.0	5.65	5.65	0.0
2003	22.09	22.13	0.2	8.38	8.33	0.5
South						
1993	55.40	55.40	0.0	7.83	7.83	0.0
1998	32.70	33.62	2.8	10.69	9.75	8.8
2003	28.59	28.59	0.0	1.94	1.94	0.0
Central						
1993	57.88	58.26	0.7	12.04	11.64	3.3
1998	41.26	41.93	1.6	8.72	8.04	7.8
2003	20.54	21.14	2.9	12.49	11.92	4.6
North						
1993	44.20	44.93	1.7	5.57	4.81	13.7
1998	42.04	42.97	2.2	8.87	7.91	10.8
2003	33.96	33.96	0.0	14.28	14.28	0.0
East						
1993	60.04	61.44	2.3	10.99	9.60	12.6
1998	61.52	62.50	1.6	15.35	14.37	6.4
2003	41.43	41.54	0.3	7.47	7.35	1.5
Type of Place of Residence						
Urban						
1993	44.04	44.44	0.9	6.76	6.35	6.0
1998	35.22	35.43	0.6	7.46	7.24	2.8
2003	23.43	23.52	0.4	7.15	7.06	1.3
Rural						
1993	65.44	66.18	1.1	11.76	11.01	6.4
1998	55.01	56.21	2.2	13.75	12.51	9.0
2003	39.25	39.38	0.3	11.27	11.13	1.2
Total						
1993	53.47	54.01	1.0	8.78	8.24	6.2
1998	43.25	43.84	1.4	9.80	9.21	6.0
2003	29.02	29.12	0.4	8.55	8.45	1.2

At this chapter of the study, the quality of the birth history section of the ever married questionnaire is assessed. The birth and death date data has direct effect on mortality and fertility rates estimated from TDHS. At this chapter by using different tools of assessment the quality of birth and death information at birth history section is evaluated. The overall quality of the data at birth history at all three TDHSs seems not problematic. The information both at the birth and death date of the children is nearly complete for the last 5 years. As the focus of the interviewers are collecting complete data especially for the last 5 years preceding the survey, the birth and death date data comes complete from the field. TDHS-1998 results draw inconsistent results with the first and the last TDHS. For most of the estimations, it is hard to mention a trend between the three surveys. TDHS-2003 results give high level of complete information for both birth and death dates of the children. The data from urban areas more complete than the data collected from rural in terms of birth date. When the information is not complete the common situation is seen the complete year and age but not the month. The mothers at earlier ages give complete birth date information as the birth event occurs in maximum five year period. When the birth of the children and the interview date is at far dates the data quality will be effected by the remembrance problem. The mothers on the other hand having high level of education are good at remembering their children's birth dates completely. Education seems has positively effect on the completeness of the birth date information. On the other hand, the sex of the child and the time period that the interviewer has no effect on the completeness of the information as the incompleteness of the data is directly related with the mother's response.

The displacement of the children from eligible ages for section 4 and section 5 at the ever married woman questionnaire where various questions are asked to the mother about the children born 5 year preceding the survey also studied at this chapter. Although the level of displacement is ignorable in all the three DHSs, it is noticeable at TDHS-1998 as compared to the first and the last TDHS. Displacement seems decreased at TDHS-2003. While the displacement is seen at urban areas more clear than rural, no regional difference is estimated. TDHS-1998 results seems distorting

the trends at the level of displacement on most of the socio-demographic characteristics of the women studied.

The possible heaping problem at the birth data is also discussed. Heaping of age 6, which is mainly a result of displacement is common for all level of estimations. Moreover, heaping on age 8 and 13 is also common for three survey data. The survey years ending with 3and 8 effects the heaping to these digits while calculating the age of children by using the birth years which commonly ends with either 0 or 5. While mentioning the birth year, the preference of digits 0 and 5 finds its reflection on the age of children at age 8 or 13.

The miscalculation of the year because of the incomplete birth date information came from the field is also the subject of this study. It is seen that, the imputed cases are more vulnerable to miscalculation of year of birth problem than the not imputed ones. When the percent of the imputed cases increase in a dataset, the possibility of miscalculation increases. The problem seems more or less same at TDHS-1993 and 1998. Whereas, because of the reason that the fieldwork of TDHS-2003 is carried out at the end of 2003 and at the first months of 2004, the techniques to estimate the extent of the problem did not work at TDHS-2003. The quality of the TDHS-1998 is questionable in terms of the high numbers of imputed cases at the birth date of the children.

The coverage problem of the dead children is one of the data quality problems in DHS especially at undeveloped or developing countries. Results indicate that except a possibility of a coverage problem at TDHS-2003 for the age group of mother 45-49, no coverage problem is seen for all other surveys and all other age groups.

The quality of the death related data at the birth history section is also discussed at this chapter. The section starts with the evaluation of the completeness of the date of birth data of the dead children with the comparison of survived one. For all surveys the level of completeness of the dead children is lower than the living children. In addition the incompleteness of the date of birth information of the dead children is

more common at rural areas. TDHS-1998 is an exception where the rural data is more complete than the urban data as compared to two other surveys. The women having secondary or higher education gave complete birth date information as compared to women having lower education.

The completeness of the age at death data is also the subject matter of this study and evaluated at this chapter. The overall completeness of the information is high in all the three surveys. However, TDHS-1998 dataset seems more problematic when compared to other two TDHSs in terms of the completeness of the date of death. This survey results creates an inconsistency with TDHS-1993 and TDHS-2003. Without considering the results of TDHS-1998, it is seen that, the urban data is more complete at the birth date information than rural. While no relationship is seen between the age of the mother and level of completeness at the date of death, is is clear that the level of completeness increases the level of education of the woman at all TDHSs. The defect at the death date data is mainly caused by the inconsistency of the information with other data given by the mother. Although the problem of all information missing seems increased at TDHS-1998 and TDHS-2003, the inconsistency of the age at death data with other information is the main reason for the defect at data of the same surveys.

The heaping on the month 12 at the death date of the children is also studied at this chapter. Extent of the problem is evaluated with socio-demographic characteristic of the respondent. Although the overall heaping level is very low, the highest heaping among three surveys is seen at TDHS-1998. Rural data is estimated as being more vulnerable to the heaping with regard to urban. There is a negative relation between the education of the mother and the level of heaping. While the level of education of mother increases, heaping on month 12 decreases.

At the last section of the chapter the impact of the data quality on demographic rates are studied. The results of the exclusion of women at household data with the lower and upper boundary and the sleeping away factors on total fertility rate and under 5 mortality rates. By constructing simulations for different possibilities of fertility and

mortality of children, the boundary effects and sleeping away exclusion is tested on TFR and U5MR. The overall results show that the estimated problems at the household data in terms of exclusion of woman at eligible ages seems either no or negligible effect on TFR estimated for Turkey. One of the simulations to estimate the effect of exclusion of women from the last eligible age group on fertility results in high TFR only at East region.

The impact of the heaping on month 12 on infant and child mortality rates are also discussed at the last section of the chapter. After redistributing the excess deaths on month 12, new IMR and CMR are estimated for total, regions and urban and rural residential areas. The results indicate that insignificant changes are seen at the actual IMR and new estimations. The highest change is seen with a 2.9 change at TDHS-2003 at Central region. While IMR at urban areas changed less at the first two survey, for TDHS-2003 the change at IMR (although it is below 0.5 percent) is lower at rural areas. The change at CMR on the other hand is also not in high levels. In general, the change at CMR is below 10 % for all surveys. At some regions for TDHS-1993 (North and East), and at region North for TDHS-1998 the difference between the actual and the estimated CMR is above 10 %.

VI. CONCLUSION AND DISCUSSION

To obtain reliable and accurate information on the subject interested is valuable for all scientists. To estimate a rare event's frequency at nationwide, a large sample should be selected. The DHS model is one of the programs that collect socio-demographic data on various subjects including fertility and mortality. The success of DHS program lies under the meeting the broad range of information needs, producing results in a short time after the survey's fieldwork is done, and having standards starting from sampling procedures to report writing. Turkey carried out 3 surveys find place in DHS program. DHS core questionnaires are modified for the needs of the country. The standard modules like household list at the household questionnaire and basic characteristics of woman, reproduction, contraceptive use, anthropometric measurement etc. is kept at the questionnaires used and additional questions to supply the needs of the partner institutions and ministries in Turkey. Hacettepe University Institute of Population Studies (HUIPS) is the implementing institute in Turkey for the DHS. In 1993, 1998 and 2003 institute carried out Turkey Demographic and Heath Surveys with a nationwide sample with both the technical and economic support from the company responsible of DHS program all over the world. HUIPS has a spectacular and well known history of carrying out demographic surveys since 1968. After the establishment of the institute in 1967, institute held demographic and health surveys conveniently with one of its aims.

Taking technical assistance from the program company is crucial in terms of the overall quality of the survey and the data quality in particular. Collecting information on a wide range of family planning and health topics resulted in the long and complex questionnaires at TDHS. Therefore, the training period of the interviewers and the field staff is 3 weeks. During the training, while giving education of filling the questionnaires, health specialists give basic information about the reproduction

and other health related issues to the trainees. The last week of the training is mainly left for pilot studies where the trainees are living the actual field at different parts of the province. The quality of the training helps the quality of the data collected.

TDHS results are published by preliminary report where basic findings are presented and the main report where detailed results are presented. The results of the TDHS are frequently used by Ministry of Health, State Planning Organization and Turkish Statistical Institute. Many important demographic and health indicators like Total Fertility Rate, Infant, Child and Under Five Mortality Rates, Contraceptive Prevalence Rate etc. are only estimated at these surveys. The official statistics program based on the Statistics Law of Turkey No 5429, has been prepared for a 5-year-period in order to determine the basic principles and standards dealing with the production and dissemination of official statistics and to produce reliable, timely, transparent and impartial data required at national and international level (TURKSTAT, 2008) accepted and included some indicators on fertility and mortality supplied by TDHS.

The data quality of the TDHSs is commonly accepted as reliable and acceptable. However, in any large data-processing operation, it would be unrealistic to expect no errors. Despite the importance and frequently used characteristics of the TDHS data, the data quality of TDHS are not evaluated in a broad sense in terms of the quality of the data having direct effect on fertility and mortality indicators. The first aim of this study is to evaluate the data quality of TDHSs focusing on special information effective on mortality and fertility rates. To assess the quality of TDHSs data to expose the strength and weakness is important especially on evaluating the indicators estimated form the surveys. All three TDHSs are evaluated and a comparison of them is done to see the changes in the data quality.

Total Fertility Rate (TFR), Infant Mortality Rate (IMR), Child Mortality Rate (CMR) and Under-5 Mortality Rate are the vital measures of the wellbeing of the children and a good proxy indicator of the overall level of development of the country. The variables have direct effect on the estimation of mortality of children and fertility is

the primary concern of this study and evaluated by using different methods and indexes. The quality of the data evaluation starts with the quality of household data. The eligibility of the women starts with the information at the household list. Therefore, the starting point of the study is the quality of the age and usual residency information. These two have direct effect of the number of women to whom the individual questionnaire is applied. TDHS-1993, TDHS-1998 and TDHS-2003 member data is evaluated to understand the quality of data used for the eligibility of the women.

Two sections of the ever married woman questionnaire are evaluated at this study. Besides the quality of age information collected at the individual questionnaire, the birth and death information of the children ever born is assessed. Women's age have direct effect on TFR. The Age Specific Fertility Rates (ASFR) are estimated for conventional 5 year age groups of women which are summed to reach TFR. Birth history section of the TDHSs give information about the birth and date dates and ages of the live births. This study focuses on the data quality of birth history in terms of these variables.

The second aim of this study is to assess the impact of the data quality of the selected variables on the fertility and mortality rates estimated at TDHSs. The possible effect of displacement of eligible women to not eligible age groups and sleeping away exclusions of the eligible women is studied on TFR and U5MR by using different simulations. The simulations which add the presumed excluded women to the calculations of these two rates with different fertility and mortality characteristics. The impact of the age heaping on age at death month 12 on infant and child mortality rates are also evaluated at this study.

This study also aims to spot the common errors at TDHSs that need to be concentrated on and develop suggestions for further field surveys. The results estimated from TDHS experience will help researchers either studying the same topics or having other interest areas while they are carrying on surveys.

Study starts with the introduction chapter where the purpose of the study is discussed. The literature review chapter indicates the previous national and international studies dealing on the quality of the data at surveys, particularly WFS and DHS. The results of the quality of data of the variables used for the eligibility are evaluated at Chapter IV. The household interview results are considered on the topic of response rates which will create questions on the overall data quality of the survey if it is under an accepted level. The quality of age data is also assessed in terms of heaping, digit preference and boundary effect problem. The lower and upper boundary effect results in displacement of women in eligible ages to non eligible ages. In addition, the level of sleeping away exclusion of women at household data is also studied. The age data at individual questionnaire is also evaluated at this chapter of the study.

The quality of data collected at birth history section is evaluated in the division of birth related data and death related data. The completeness and the displacement of the birth dates of the children are brought into matter. In addition the age heaping problem and the miscalculation of the birth problematic is evaluated. The last assessments on the birth related data is done on the quality of coverage of live births. The estimations of the quality of death related data includes the comparison of date of birth of death and the surviving children. The age at death data is also evaluated in terms of completeness of the information and the heaping on certain months especially on the 12^{th} month.

The implication of the quality of the data used for the eligibility of individual questionnaire is assessed on TFR and U5MR. Using simulations based on the displacement of women with boundary effects and the sleeping away exclusion, TFR and U5MR are recalculated to measure the effect of these two data quality problems. The implication of the heaping at month 12 on IMR and CMR is estimated. The excess mortality at month 12 is redistributed to infancy and IMR and CMR is recalculated.

The quality of data of TDHS is evaluated under two main heading. The first assessment was done for the variables used for the eligibility of the women for individual questionnaire and the age data at ever married woman questionnaire. Evaluation starts with the household interview results. Although the response rates are high for all the three surveys, results indicate that the response rates are decreasing during the surveys. The rates are decreasing especially at the urban areas. Coming from Hacettepe University and collaboration of the study with Ministry of Health opens some doors for interview which cannot be opened by the interviewers coming from private companies. Mainly the transportation of the field team is supported by the official vehicles and this has a positive effect on nearly all areas. The collaboration with Ministry of Health and using the ministry of health's vehicles during the field improves the response rates. For nearly all areas of Turkey, the name of Hacettepe University brings the medical school in the mind of people. This also have positive effect on the response rates. The high response rates are important for East region. As this region has the highest fertility and mortality rates, to develop a policy to this region in terms of health, high response rates will strong the basis of the information collected at this area.

The overall quality of age reporting at household questionnaire seems at moderate level. The heaping on ages ending with 0 and 5 is nearly universal. The demographic surveys in Turkey is planned and applied to give intercensal demographic estimations. Therefore since 1968, 8 surveys were carried out at the years ending with 3 and 8. Although only the age not the birth month and year is asked at the household questionnaire, the respondent will mention the birth year for some of the members and this year of birth will vulnerable to heaping on 0 and 5. The heaping on 3 and will be a reflection of this kind of recoding the age of member calculated from the birth year. The results indicate that, heaping is seen at both sexes but higher at females.

Sex and Age are the two very important variables at the household data used for deciding the eligibility of the women for the individual questionnaire. The data quality of the female members at the household list is evaluated in details. Age and

sex ratios and Myers, Bachi, Whipple and United Nations indices for household data for total, regions residential difference is estimated for female members. The overall results indicate that the heaping problem at female age data is decreasing over the surveys. For the first two TDHS the level of heaping estimated by Myers index is at medium level, for TDHS-2003 this is estimated as low and acceptable. Over the surveys both at urban and rural areas the quality of the data increases. To select the best respondent to give quality data is important for the household interview. The member of the household who will give complete and accurate information should be selected. For nearly all surveys the percent of the situations where the age is unknown is below 1 %. This indicates that, at the field, most of the time interviewers are completing the household questionnaire with one of the members of the household giving complete age information. The results which take the Myers, Whipple and Bachi indices as basis for estimation indicate that the best information is taken from either household head or her/his spouse. Less heaping is seen at the data given by these people. In addition results show that the quality of the data is very low when the respondent is above age 55. The best answers were taken from the 35-54 aged respondents at TDHS-1993 and TDHS-2003; and from 15-34 at TDHS-1998.

The upper, lower and total boundary effect problems which are mainly sourced from the displacement of eligible women out of eligible ages are evaluated for all TDHSs at this study. Results indicate that there is no problem of displacement of women at the lower boundary. However, the upper boundary effect, which has more effect on the fertility and mortality indicators are quite common at TDHSs. Although the level of the problem decreased from TDHS-1993 to TDHS-1998, the upper boundary effect seems increased at the last TDHS. The regional difference is seen at the level of problem. The highest problem is seen at East region where the highest fertility is calculated for all three surveys. The exclusion of women at this region will have effect on TFR more than the other regions. The lowest upper boundary effect is seen at North region in general. Some selected background characteristics of the respondent is also taken into consider while estimating the boundary effects. It is

estimated that the household head's spouse who is mainly "female" gives low level of boundary effect scores.

It is interesting that the lowest boundary effect problem is seen at TDHS-1998. This may be a result of the training at this survey. While the quality of data at TDHSs is increasing over the surveys, the increase at the problem of boundary exclusion will be explained by the interviewer effect who will exclude the women to lessen their workload at the individual questionnaire.

The sleeping away exclusion of the women which is one of the important points for the completing the individual information is also evaluated. To estimate the level of exclusion, the difference between the number of overnight visitors and the usual residents sleep away is calculated. The three datasets seems have negligible problem on the exclusion of women by the reason sleeping away.

The eligibility process of the women does not finish at the household questionnaire. During the trainings of TDHS, the interviewers are well informed about the eligible ages and warned about a situation where the woman may be found eligible at the household list but may be found as out of eligible ages at individual questionnaire. The interviewer facing such kind of problem is educated to turn back to individual questionnaire and make the corrections and cancel the individual questionnaire started to filled.

The assessment of the age data in individual questionnaire is studied at this study with similar methods of evaluation used for the age data at household questionnaire. In addition the completeness of the information is evaluated by the selected background characteristics of woman. Myers index and the percent distribution of the ages of 20-49 women are estimated for the assessment of digit preference and heaping problem. The level of heaping at individual data is significantly high as compared to the household data. The information collected directly from the individual itself has low level of heaping than the data collected by a proxy informant. The digits "0", "3", "5" and "8" are the preferred ones like in household

data. It is seen that the digit preference seems decreased over the years at TDHSs. The structure of the age information at TDHS-1998 for different demographic characteristics of women seems exceptional. Data gives fluctuation nearly at all means of background characteristics. The results of TDHS-1993 and TDHS-2003 supports the previous studies implying the education of the women have positive effect on the decrement of the level of heaping.

The completeness of the birth date data at individual questionnaire is also studied with evaluating the level of imputation. The fertility rates will fluctuate with regarding to the level of imputation. The overall level of imputation is very limited for all three TDHSs. At TDHS-1998 the completeness of the age information is lowest among three surveys. Approximately 10 % lower completeness is seen at TDHS-1998 as compared to TDHS-1993 and TDHS-2003. The data collected from urban is estimated as more complete than rural. The age of the woman on the other hand seems related with the quality of the data. The level of imputation at the data collected from women aged 30 or more is higher. Education seems have positive effect on the completeness of the data. Both the education of the women and the completeness level of the birth data increases interrelated. Women having secondary or more education gave nearly complete birth date data.

The fertility and mortality rates at TDHS are calculated from the variables from the ever married women questionnaire. Age of the mother and the birth and death date of the children with relation to the interview date are used for the estimations. At that point the quality of the birth data is studied in terms of birth and death date of the children. The birth history section of the DHS questionnaire gives valuable information on all the live births of the mother. At this study the quality of birth and death information at birth history section is evaluated in terms of heaping, displacement and completeness.

In general, the quality of the data at birth history at all three TDHSs seems well. Especially for the last five years preceding the surveys almost complete birth date information is collected from the field. During the training interviewers are well

informed to get complete birth and death month and year information with birth and death age for five years preceding the survey.

The completeness of the birth history data seems not problematic in all three surveys. However, among three TDHSs, more problems are seen at the TDHS-1998 data set in terms of completeness of the data. Only 88.5 % of the women aged 45-49 gives complete information for the births happened within 5 years prior to survey date. On the contrary, results indicate that TDHS-2003 results give high level of complete information for both birth and death dates of the children. In addition, the urban data is seems better than the rural in terms of birth date. The common situation for the cases at which the data is not complete, the year and age is complete and the month is imputed. It is also seen that if the period where birth date of the children and the interview date is increasing the remembrance problem will affect the data quality.

The education of women has positive effect on the completeness of the birth date information. Women having secondary or more education gave almost complete information for all age group of children. On the other hand, the sex of the child seems not matter on the completeness of the information.

The Section 4 and 5 of the ever married woman questionnaire consists various and detailed questions on children born within 5 years before the survey. The previous studies on DHSs data quality argue that, the interviewers may displace the children out of this eligible time period to escape from asking question at section 4 and 5 (Arnold, 1990). It is seen that although the levels are not high the displacement of children to age 6 is quite common at TDHS. It is higher at TDHS-1998 and at urban areas for all three surveys. As the displacement is a problem sourced mainly by the interviewer, no relation between the characteristics of women is related.

The possible heaping problem at the birth data is also discussed. The displacement problem leads to heaping of age 6 which is common for all level of estimations. For the birth data although it is not very high heaping on “3”and “8” is also vivid. Calculating the age of children with a heaped year of birth ending with “0” and “5”

leads to a heaping on “3” and “8”. As first the month and year of the birth is collected than the age, the heaping is created by the years ending with “0” and “5”.

The incomplete birth date information may be resulted in the miscalculation of year of birth for child. At the situation where the age of the child is known but the year and month of the child is unknown, interviewer may just subtract the age from the year of interview and calculate the year of birth. It is true if the month of birth is earlier than the month of interview. However, if the month of interview is earlier than the month of birth, the year of birth will be overestimated for one year. At this study the difference between the imputed and the not imputed cases at the data entry is assessed to understand the level of miscalculation of year of birth at birth history data. It is clearly seen that, the imputed cases are more exposed to miscalculation of year of birth problem than the not imputed ones. As mentioned before the completeness of the all three surveys especially for the last 5 years is almost complete. Hence, the imputed data which is mostly out of ages where fertility and mortality rates are calculated from which have more possibility of miscalculation of year will have no effect on indicators calculated from TDHS.

The problem of miscalculation of year of birth by imputing the month of the birth before the survey month is almost same level at TDHS-1993 and TDHS-1998. These two surveys were carried out at the same months of the year. However, TDHS-2003 fieldwork started at the end of 2003 and continued to the mid 2004 with some breaks especially on winter months. Therefore the method to estimate the problem of imputation of months did not worked well for TDHS-2003. The results indicate that although the problem of imputing the birth month after the survey month is more or less same at the first two surveys, the number of imputed cases is remarkably high at TDHS-1998. Although this will create a problem if the number of cases where the month of the birth is misplaced, as the imputed cases are nearly at the ages 6 or more no effect will be on TFR or mortality rates.

The previous studies indicated that the coverage problem of the dead children is one of the data quality problems in DHS especially at undeveloped or developing

countries. The average number of children ever born by age of mother in groups is evaluated to catch the problem of coverage of live births. Results indicate that no coverage problem is seen for all TDHSs except a possibility at TDHS-2003 at the age group of 45-49 of mother.

The quality of the death data is also considered at this study starting with the completeness of the date of birth data of the dead children with the comparison of survivors. The completeness of the birth information of the dead children is lower than the living children at all TDHSs. The urban data is in better conditions as compared to the rural at first and the last TDHS. As the exceptional results are seen at TDHS-1998; the rural data is more complete than the urban at this survey. The education of the mother has positive effect of the completeness of the birth date regardless of survival status of the children. It is noticeable that women having secondary or higher education gave complete birth date information as compared to women having lower education.

The defect at the death date data is mainly caused by the inconsistency of the information with other data given by the mother. Although the date of death data for the last 5 years preceding the survey comes complete from the field, results indicate that for some cases the inconsistency of the information is seen as an for these cases the imputation is done during the data entry. The inconsistent data is mainly a problem of the data collected from the women having no education at all or did not complete the primary level. It is seen that the interviewers must be alert for the inconsistent dates at the birth history and if there is a problem of consistency it is better to solve the problem during the interview with the women herself. A good interviewer is not the person who asks the question as it is at the questionnaire and record the answer suitable for the filling instructions. Interviewer must be careful about the inconsistent answers of the women during the interview. The questions asked to mother are not always the matter of mother in her daily life. If the women have nothing to do with the birth date of the children and did not need to keep this information in her mind, it is possible for her to give either inconsistent or no information at all.

One of the common problems which will be effective on IMR and CMR is the heaping on month 12 at the age at data. The recording instructions of DHS wants the interviewer to record the death age in days if the answer is to one month, in months if the answer is lower than 2 year and in years if it is 2 year or more. Previous studies on DHS mention that a heaping on month 12 is expected because of the frequency of the answer of "1 year". Rounding the age at death information of the children to one year results in the heaping at 12 months at the dataset is a common problem. During the training, interviewers were told to probe the answer 1 year for age at death, whether it is exactly 12 months or not. The extent of the problem is evaluated with socio-demographic characteristic of the respondent. Although the general level of heaping seems negligible among three TDHSs, TDHS-1998 has the highest heaping among them. In addition, for all three surveys, the rural data is estimated as being more vulnerable to the heaping compared with urban. The positive effect of the higher education on the quality of age at death data in terms of heaping on month 12 is also seen. While the level of education of mother increases, heaping on month 12 decreases clearly.

One of the aims of the study is to evaluate the impact of the data quality on fertility and mortality rates. By constructing simulations the effect of displacement of women to non eligible ages and the women did not interviewed because of the sleeping away factor on TFR and U5MR is assessed. Three simulations to evaluate the impact of boundary effect exclusion and two simulations based on the exclusion of women by sleeping away factor is applied to fertility data for all three surveys. Different fertility patterns for the excluded women are taken into considers at these simulations seeing the change at TFR. The overall results show that the estimated problems at the household data in terms of exclusion of woman at eligible ages seems either no or negligible effect on TFR estimated for Turkey. As, lower boundary effect was calculated as insignificant in all three TDHS data, the effect of it on TFR is ignorable. On the other hand, upper boundary effect estimated to be effective on East region where the fertility of the women at last eligible group still continues. The simulation where the excluded women at the upper boundary are supposed to have

has twice ASFR than the women at the same age group resulted in remarkably high TFR at this region.

Three simulations are developed and applied to mortality data to evaluate the effects of sleeping away and lower and upper boundary effects on under-five mortality rate. Results indicate that simulation results based on upper boundary exclusion have no effect on U5MR. Likewise, minor increase on U5MR is seen with the simulations of lower boundary and sleeping away exclusion.

The impact of the heaping on month 12 at the age at death data on IMR and CMR is also studied. The excess deaths which are calculated for each survey on month 12 are redistributed to the infancy period and mortality rates are recalculated. Overall results indicate that unimportant changes are seen at IMR. The change at CMR on the other hand is also not in high levels. In general, the change at CMR is below 10 % for all surveys.

In general, the problems at the TDHS data seem negligible and have ignorable effect on fertility and mortality rates. Among all the data quality of individual data at TDHS-1998 seems problematic as compared to TDHS-1993 and TDHS-2003 in terms of the variables evaluated at this study. The number of questions at Section 4 and 5 is highest at this survey. Although the overall level of displacement is at acceptable levels, it is highest at this survey, the interviewers might exclude eligible children for sections 4 and 5 to avoid the workload at these sections. Despite the voluminous sections for the children born 5 years prior to survey, the average time to complete the individual questionnaire is lowest. It seems that interviewers filled the questionnaire in speed and the inconsistencies at the questionnaire are overlooked. The probing which is the most effective tool increasing the data quality seems not used at desirable levels at this survey.

The effect of long and divided fieldwork of TDHS-2003 will be effective on data quality. Two groups of interviewers were selected and educated at this survey at different dates. Although a standard education program is used, nearly 1.5 times

more interviewers were used at the field. This will lead to the increase the problems caused by the inexperience at the field. It is clear that although you give good quality training, the actual field experience adds knowledge and practice to the field staff.

Although the quality of the training of the interviewers is important, it does not solve the problems at the quality of the data. The problems in the field will have an impact on the work of interviewers. The important thing seems to give the training which will initial keep the enthusiasm of the staff high. The field staff feeling her/him as a part of the survey will behave different than the one aims just finishing “the job” as soon as possible. The value of probing should be well taught to the interviewer.

The interviewers should be controlled either by the field editors or the supervisors at the field either entering the interview with them or rechecking the basic information at the questionnaires by revisiting the households. During the training just to mention such kind of a control to the interviewers, they will keep the possibility of controlling for any of the interview in their mind.

Field check tables should be used effectively to improve the data quality. The interviewers who seems displacing the children or women to not eligible ages should be warned. The result codes for the household and individual questionnaires should be analyzed during the fieldwork. The teams where the response rates should be tracked and alternative methods to increase the response rates should be used. Revisiting the households where the household or individual questionnaire is not completed at some time later either by the same team at the field or constructing a new team will increase the response rates.

One of the alternative ways to increase the data quality seems using the Personnel Data Assistant (PDA) at the field instead of printed questionnaires. The data entry programs placed at PDA will give chance to interviewer to fill the questionnaire in a digital format which makes the skips automatically and controls the inconsistencies among the other responses. However, the system is new and the questions are coming one by one to the small screen of the PDA. This will be an obstacle for the

individual to see the questionnaires as a whole. The flow of the questionnaire will be disrupted by seeing the only one questionnaire at the screen. Another problem of using only PDA's at the field instead of printed questionnaires is the backup. As there is no paper questionnaires are filled, a problem on the software or hardware will result on the loss of data. Using PDAs or laptops for entering the questionnaires with the software prepared specifically on data entry purpose will help the field staff to catch the inconsistencies in a very short time so that interviewer may turn back to the dwelling and correct the mistakes or inconsistencies.

At this study no external data is used to evaluate the differences at the TDHS data and the registration system or other national studies. If the further studies on the quality of the data of TDHS include such a comparison, this will give chance to researchers make evaluation of the TDHS and external sources. The common and alike problems should be studied within the data sets.

The effect of displacement of children to age 6 to escape the workload at section 4 and 5 at ever married woman questionnaire on fertility or mortality rates is not the subject of this study. As the TFR is estimated for 3years preceding the survey the displacement of the child to age above 5 will have no effect on these indicators. The surveys where the TFR is estimated for 5 year period the impact of the displacement can be studied but not in TDHSs. The further studies should include an evaluation on the displacement of the age of children to age 6 or more on the TFR estimated for five year period.

The neonatal and post-neonatal mortality rates are also estimated at TDHSs. The ministry of health uses all mortality indicators for developing policy and plans. At this study the effect of data quality of age at death data on IMR and CMR is studied. The effect of data quality of age at death should be studied focusing on the neonatal and post-neonatal infant mortality rates.

Basic Data Quality tables are presented at Appendix section of each TDHS. Standard tables are published in a compact way. The only TDHS where the results are

discussed is TDHS-2003. In addition to the tables, a brief explanation of the tables and a short discussion is made. It is recommended that this section of the report should be more detailed and strengthen by making comparisons with the previous surveys.

VII. REFERENCES

Al Abdel, M. 1987. *Evaluation of Age Reporting in the 1983 Turkish Contraceptive Prevalence and Family Health Status Survey.* unpublished master thesis, HUIPS, Technical Demography Department.

Albayrak, F. 1991. *Yanlış Yaş Bildirimlerinin Türkiye Bazında Düzeltilmesi.* unpublished master thesis, HUIPS, Technical Demography Department.

Anderson, B. A., Katus, K., Puur , A. and Silver, B.D. 1994. "The Validity of Survey Responses on Abortion: Evidence from Estonia" *Demography*, Vol. 31; No.1, 115-132.

Araujo, E. and Sommer, L. (2002) "A summary history of eugenic theories and practices in the United States" in *Domain Errors: Cyberfeminist Practices!,* Maria Fernandez, Faith Wilding, Michelle M. Wright, eds , New York.

Arriaga, Eduardo E., and Associates. 1994. *Population Analysis with Microcomputers. Vol. 1: Presentation of Techniques.* Washington, D.C.: U.S. Bureau of the Census.

Arnold, F. 1990. Assesment of the Quality of Birth History Data in the Demographic and Health Surveys. In *An Assessment of DHS-I Data Quality*, Methodological Reports 1, Institute for Resource Development/Macro Systems, Inc. Columbia, Maryland USA, pp. 81-111.

Bailey, M. and Makannah, T.J. 1996. "An Evaluation of Age and Sex Data of the Population Censuses of Sierra Leone: 1963-1985" *GENUS*. Jan-Jun; 52(1-2):191-9.

Becker, S. and Sosa, D. 1992. "An Experiment Using a Month-by-Month Calendar in a Family Planning Survey in Costa Rica" *Studies in Family Planning*, Vol. 23, No. 6. (Nov. - Dec., 1992), pp. 386-391.

Becker, S.; Waheeb, Y.; El-Deeb, B.; Khallaf, N.; Black, R. 1996. "Estimating the Completeness of Under-5 Death Registration in Egypt" *Demography*, Vol. 33, No. 3. pp. 329-339.

Beckett, M.; Vanzo, J.D.; Sastry, N.; Panis, C.; Peterson, C. 2001. "The Quality of Retrospective Data: An Examination of Long-Term Recall in a Developing Country" *The Journal of Human Resources,* Vol. 36, No. 3. pp. 593-625.

Bixby, L.R., Céspedes J.H., Montero, D.A. and Seligson, M.A. 2005. *"Improving the Quality and Lowering Costs of Household Survey Data Using Personal Digital Assistants (PDAs). An Application for Costa Rica"* Centro Centroamericano de Población of the Universidad de Costa Rica, 2005 meeting of the Population Association of America. Philadelphia, March 31 to April 2, 2005.

Blake, J. 1983. "Book Review: E. Grebenik. World Fertility Survey Conference 1980: Record of Proceedings. 3 Vols. Voorburg, Netherlands, 1981. Vol. 1: 539 p.; Vol. 2: 769 p.; Vol. 3: 574. P." Population and Development Review, Vol. 9, No. 1, pp. 153-156

Brass, W. 1996. "Demographic Data Analysis in Less Developed Countries: 1946-1996" *Population Studies,* Volume 50, Number 3, November 1996, pp. 451-467(17)

Bowley, A.L. (1913) "Working-Class Households in Reading" *Journal of the Royal Statistical Society,* Vol. 76, No. 7, pp. 672-701.

Ewbank, D.C. 1981. *Age Misreporting and Age-Selective Underenumeration: Sources, Patterns and Consequences for Demographic Analysis*. Committee on Population and Demography, Report No. 4. Washington, D.C.: National Academy Press.

Canpolat, Ş. 2002. *"Seçilmiş 10 İlde Yaş Bildirim Kalitesinin Değerlendirilmesi: 1990-2000 Genel Nüfus Sayımları ve 1997 Genel Nüfus Tespiti",* unpublished. Statistics Days 2002. Hacettepe University, Department of Statistics, 16 – 18 May 2002.

Canpolat, Ş. 2003. *Türkiye'de Gerçekleştirilen Nüfus Sayımlarinda Yaş Bildirim Kalitesinin Analizi.* unpublished Expertness Thesis. State Institute of Statistics, Ankara.

Chidambaram, V.C. and Pullum T.W. (1981) "Estimating Fertility Trends from Retrospective Birth Histories: Sensitivity to Imputation of Missing Dates" *Population Studies*, Vol. 35, No. 2. pp. 307-320

Chidambaram, V.C., John G. Cleland, and Vijay Verma. 1980. *Some aspects of WFS Data Quality: A Preliminary Assessment.* WFS Comparative Studies, No. 16. Voorburg, Netherlands: International Statistical Institute.

Chidambaram, V.C. and Zeba A. Sathar. 1984. *Age and Date Reporting.* WFS Comparative Studies, No.5. Voorburg, Netherlands: International Statistical Institute.

Curtis, S.L. 1995. *Assesment of the Quality of the Data Used for the Direct Estimation of Infant and Child Mortality in the DHS-II Surveys*. Macro International Inc. Maryland.

Curtis, S.L. and Arnold, F. 1994. *An Evaluation of the Pakistan DHS Survey Based on the Reinterview Survey*. Occasional Papers 1. Macro International Inc. Calverton, Maryland.

Charles W. W. 1985. *An Analysis of the Quality of Data in the 1982 Puerto Rico Fertility and Family Planning Assessment.* pp.355-357.

Cleland , J. 1986. "Fertility and Family Planning Surveys: Future Priorities in the Light of Past Experiences" *International Family Planning Perspectives*, Vol. 12, No. 1. pp. 2-7.

Croft, T. 2004. *DHS Data Editing and Imputation.* www.macrodhs.com (04.12.2004)

Çavdar, T. ,F. Karadayı, H. Serinken, K.S. Srikantan, S. Timur, 1971. Türkiye'de Aile Yapısı ve Nüfus Sorunları Araştırmasının Veri Toplama Teknikleri (1968). Hacettepe Üniversitesi Yayınları: D-9. Ankara.

Das Gupta, P. 1975. "A General Method of Correction for Age Misreporting in Census Populations" *Demography*, Vol. 12, No. 2 (May, 1975), pp. 303-312

Demeny, P. and Shorter, F. 1968. *Estimating Turkish Mortality, Fertility and Age Structure.* Statistics Institute, Istanbul University.

Feeney, G. 1980. Estimating Infant Mortality Trends from Child Survivorship Data. Population Studies, 34 (1), March, pp. 102-128

Feeney, G. 1991. Child Survivorship Estimation: Methods and Data Analysis. *Asian and Pacific Population Forum*. Vol. 5, Nos. 2-3, Summer –Fall.

Goldman, Noreen, Shea O. Rutstein, and Susheela Singh. 1985. *Assessment of the Quality of Data in 41 WFS Surveys: A Comparative Approach.* WFS Comparative Studies, No. 44. Voorburg, Netherlands: International Statistical Institute.

Güneş, M. 1989, *Nüfus Sayımlarında Hatalı Yaş Beyanlarının Düzeltilme Yöntemleri*, Devlet İstatistik Enstitüsü Eğitim Merkezi Seminer Çalışması, Ankara.

Hacettepe Üniversitesi (1978) *Türkiye'de Nüfus Yapısı ve Nüfus Sorunları - 1973 Araştırması*. Hacettepe Üniversitesi Yayınları, Ankara.

Hacettepe University Institute of Population Studies (HUIPS) (1980) *1978 Turkish Fertility Survey*. Hacettepe University, Institute of Population Studies, Ankara.

Hacettepe University Institute of Population Studies (HUIPS) (1987) *1983 Turkish Population and Health Survey*. Hacettepe University Institute of Population Studies, Ankara.

Hacettepe University Institute of Population Studies (HUIPS) (1989) *1988 Turkish Population and Health Survey*. Hacettepe University Institute of Population Studies, Ankara.

Hacettepe University Institute of Population Studies (HUIPS) and Macro International Inc. 1999. *Turkey Demographic and Health Survey 1998,* Ankara.

Hacettepe University Institute of Population Studies (HUIPS) 2004. *Turkey Demographic and Health Survey, 2003,* Hacettepe University Institute of Population Studies, Ministry of Health General Drectorate of Mother and Child Health and Family Planning, State Planning Organization and European Union, Ankara, Turkey.

Hacettepe University Institute of Population Studies (HUIPS) 2008. *Surveys* http://www.hips.hacettepe.edu.tr/english/surveys.htm date on: 14.04.2008

Hancıoğlu, A. 1997. "Fertility Trends in Turkey: 1978-1993", *Fertility Trends, Women's Status, and Reproductive Expectations in Turkey*. HUIPS and Macro International Inc. Calverton, Maryland.

Hobcraft, J. N.; Goldman, N.; Chidambaram, V. C. 1982. "Advances in the P/F Ratio Method for the Analysis of Birth Histories" *Population Studies*, Vol. 36, No. 2. pp. 291-316.

Institute for Resource Development/Macro Systems, Inc. 1990. *An Assessment of DHS-I Data Quality*, Methodological Reports 1, Columbia, Maryland USA, pp. 113-137.

Ishak, M. 1999. "Regression methods to model incomplete population data" *Bulletin of the International Statistical Institute*, 52nd Session, Proceedings,Tome LVIII, Finland.

Kalton, G. (1998) *SIPP Quality Profile.* Survey of Income and Program Participation, SIPP Working Paper Number 230, 3rd Edition. U.S. Department of Commerce, Bureau of the Census.

Killion, R. A. (2004) *Survey of Income and Program Participation (SIPP) 2004 Panel: Source and Accuracy Statement for Wave 1 - Wave 7 (core) Public Use Files (S&A-7).* U.S. Department of Commerce, Bureau of the Census.

Kingkade, W.W.; Sawyer, C.C (2001) *"Infant Mortality in Eastern Europe and the Former Soviet Union Before and After the Breakup"* Prepared for presentation at the 2001 Meetings of the International Union for the Scientific Study of Population, Salvador de Bahia, Brazil, August 19-24.

Knodel, J.; Piampiti, S. 1977. "Response Reliability in a Longitudinal Survey in Thailand" *Studies in Family Planning*, Vol. 8, No. 3. pp. 55-66.

Koç, İ. 2004. "Appendix- D. Data Quality". *Turkey Demographic and Health Survey, 2003*, Hacettepe University Institute of Population Studies, Ministry of Health General Directorate of Mother and Child Health and Family Planning, State Planning Organization and European Union, Ankara, Turkey.

Loaiza, E. 2004. *Does data quality explain the differences in the current global estimates for mortality and education?* Committee for the Coordination of Statistical

Activities, Conference on Data Quality for International Organizations, Wiesbaden, Germany, 27 and 28 May 2004.

Marckwardt, A.M.; Rutstein S.O. 1996. *Accuracy of DHS-II Demographic Data: Gains and Lose in Comparison with Earlier Surveys*. DHS Working Papers Number 19. Macro International Inc. Calverton, Maryland, USA.

Macro International Inc. 2008. DHS Overview http://www.measuredhs.com/aboutsurveys/dhs/start.cfm date on: 04.07.2008.

Mauldin WP, Watson WB. and Noe LF.(1970) "KAP surveys and evaluation of family planning programs" *Proceedings of the Ford Foundation Conference on Evaluation*, Marino, Italy, April 20-24.

Ministry of Health (Turkey) (MOH), Hacettepe University Institute of Population Studies and Macro International Inc. 1994. *Turkey Demographic and Health Survey 1993,* Ankara, Turkey.

Mohammed, M. A. and Iqbal H. Shah. 2000. Sanctions and Childhood Mortality in Iraq. *The Lancet,* Vol 355, May 27. pp. 1851-1957.

Mukherjee B.N. and Mukhopadhyay B.K. 1988. "A Study of Digit Preference and Quality of Age Data in Turkish Censuses" *GENUS*. 1988 Jan-Jun;44(1-2):201-27.

Nadezhda A. and Redmond,G. 2003. *How High is Infant Mortality in Central and Eastern Europe and the CIS?* Innocenti Working Papers No. 95. UNICEF Innocenti Research Centre, Florence, Italy.

Nagi, Moni H., E.G. Stockwell, and L.M. Snavley. 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.

Ntozi J.P. 1978. "The Demeny-Shorter and Three-Census Methods for Correcting Age Data" *Demography*, Vol. 15, No. 4 (Nov., 1978), pp. 509-521

Poston, D.L.Jr., Iris Hye Jin Chu, Jaime M. Ginn, Godfrey Jin-Kai Li, Catherine Hong Vo, Carol S. Walther, Ping Wang, Julie Juan Wu, and Michael Ming Yuan. 2000. "An Analysis of the Quality of the Age and Sex Data of the Republic of Korea and Its Provinces, 1970 and 1995." pp. 3-47 in Han Gon Kim (editor), *International Conference on Projections and Policy Implications for the Issues of the Elderly in the 21st Century*. Taegu, South Korea: Institute of Gerontology, Yeungnam University.

Potter, Joseph E. 1997. Problems in Using Birth History Analysis to Estimate Trends in Fertility. Population Studies. 31(2): 335-364.

Preston, S. H., Elo, I.T. and Stewart, Q.. 1998. *Effects of Age Misreporting on Mortality Estimates at Older Ages*. PARC Working Paper Series, University of Pennsylvania, Population Aging Research Center.

Pullum, T.W.; Harpham, T. and Ozsever, N. 1986. "The Machine Editing of Large-Sample Surveys: The Experience of the World Fertility Survey" *International Statistical Review / Revue Internationale de Statistique*, Vol. 54, No. 3. pp. 311-326.

Pullum, T. 1991. "Statistical Methods to Adjust for Date and Age Misreporting to Improve Estimates of Vital Rates in Pakistan" *Statistics in Medicine*. Vol. 10' pp. 191-200.

Pullum, T.W. 2006. *An Assessment of Age and Date Reporting in the DHS Surveys, 1985-2003.* Methodological Reports No. 5 Calverton, Maryland: Macro International. Inc.

Retherford, R. D.; Mishra, V. K.; Prakasam, G. (2001) *How Much Has Fertility Declined in Uttar Pradesh?* National Family Health Survey Subject Reports,

Number 17, East-West Center, Population and Health Studies, Honolulu, Hawaii, U.S.A.

Retherford, R. D.; Mishra, V. K. (2001) *An Evaluation of Recent Estimates of Fertility Trends in India.* National Family Health Survey Subject Reports, Number 19, East-West Center, Population and Health Studies, Honolulu, Hawaii, U.S.A.

Rindfuss, Bumpass, L.L. and Palmore, J.A. 1987. "Analyzing Fertility Histories: Do Restrictions Bias Results?". *Demography* 24(1). pp. 113-122.

Rutstein and Bicego, 1990 "Assesment of the Quality of Data Used to Ascertain Eligibility and Age in the Demographic and Health Surveys" In *An Assessment of DHS-I Data Quality*, Methodological Reports 1, Institute for Resource Development/Macro Systems, Inc. Columbia, Maryland USA, pp. 113-137.

Rutstein, S.O. and Rojas, G. 2003. *Guide to DHS Statistics.* Demographic and Health Surveys, ORC Macro, Calverton, Maryland, USA.

Scott, Christopher and G. Sabagh. 1970. The Historical Calendar as a Method of Estimating Age: The Experience of the Moroccan Multi- Purpose Survey of 1961-63. *Population Studies*, 24(1): 93-109

Shryock, Henry S., Jacob S. Siegel, and Associates. 1976. *The Methods and Materials of Demography.* Condensed Edition by Edward G. Stockwell. New York: Academic Press.

Shryock, H.S. and Taeuber, C. 1976. *The Conventional Population Census*. Labaratories for Population Statistics, Scientific Report Series No. 25.

Stockwell, E.G. 1966. Patterns of Digit Preference and Avoidance in the Age Statistics of Some Recent Nation Censuses: A Test of the Turner Hypothesis. *Eugenics Quaterly*. 13(3):205-208

Sullivan, J.M., Bicego, G. and Rutstein. S.O. 1990. "Assesment of the Quality of Data Used for the Direct Estimation of Infant and Child Mortality in the Demographic and Health Surveys". In *An Assessment of DHS-I Data Quality*, Methodological Reports 1, Institute for Resource Development/Macro Systems, Inc. Columbia, Maryland USA, pp. 113-137.

Timur, S. (1972) *Türkiye'de Aile Yapısı*. Hacettepe University, D-15, Ankara.

Törüner, K. 2001. *Comparability of Data Collected in Turkish Demographic Surveys,* unpublished master thesis, HUIPS, Economic and Social Demography Department.

Tungul, B. 1995. Türkiye'de Yapılan Nüfus Sayımlarında Kapsam ve Cevaplama Hataları. Unpublished master thesis, HUIPS Technical Demography Department.

Turkish Statistical Institute (TURKSTAT), 2008. *"Genel Nüfus Sayımı"* http://www.die.gov.tr/nüfus_sayimi.htm date on: 03.02.2008

Turner, Stanley H. 1958. *Patterns of Heaping in Reporting of Numerical Data. Proceedings of the Social Statistics Section.* Washington, D.C.: American Statistical Association.

United Nations (UN), 1967. *Manual II. Methods of Appraisal of Quality of Basic Data for Population Estimates.* Population Studies, No. 23. New York: Dept. Of Economic and Social Affairs

United Nations (UN), 2004. *Handbook on the Collection of Fertility and Mortality Data.* Department of Economic and Social Affairs Statistics Division. Studies in Methods Series F No.92.

United Nations (UN), 1987. *A Comperative Evaluation of Data Quality in Thirty-Eight World Fertility Surveys.* New York: United Nations, Department of International Economic and Social Affairs.

United Nations Economic Commission for Europe (UNECE), 2008. http://www.unece.org/pau/ggp/keyfeatures.htm date on: 05.05.2008

Üner, S. 1983. *Evaluation of the Turkish Fertility Survey*, WFS Scientific Report No. 43, London: World Fertility Survey, International Statistical Institute, Netherlands.

Vaessen, M. 2008. "Demographic Surveys, History and Methodology of" http://www.novelguide.com/a/discover/epop_01/epop_01_00086.html, date on: 03.02.2008.

Warren, C.W. 1985.An Analysis of the Quality of Data in the 1982 Puerto Rico Fertility and Family Planning Assessment, *Proceedings of the Survey Research Methods Section*, American Statistical Association.

Yavuz S. and Coşkun Y., *"1935'den Günümüze Nüfus Sayımları ve 1997 Nüfus Tespitindeki Yaş ve Cinsiyet Verisinin Değerlendirilmesi"* unpublished. Statistics Days 2002. Hacettepe University, Department of Statistics, 16 – 18 May 2002.

VIII. ANNEXES

ANNEX VIII.1.

Table VIII.1. Nationwide Demographic Surveys of Turkey

Year and the name of the Survey	Institution	Size and Frame	Questionnaire Types
1963 Turkish Demographic Survey	SPH	9,701 households,	- household
		~8000 eligible women	- ever married women
1965-1968 Turkish Demographic Survey	SPH	240,000 households	- household
1968 Turkish Population Structure and Population	HUIPS	4505 househods	- household
Problems Survey		3303 eligible women	- married women
		2787 eligible husbands	- husband
			- general information of village and small town
1973 Turkish Population Structure and Population	HUIPS	6500 households	- household
Problems Survey		4580 eligible women	- currently married women
			- divorced/widow women
			- people employed abroad
			- general information of village and small town
1974-1975 Turkish Population Survey	SIS	17327 households	- household
			- individual
1978 Turkish Fertility Survey	HUIPS	5137 households	- household
		4769 eligible women	- individual
1983 Turkish Fertility and Health Survey	HUIPS	6545 households	- household
		5398 eligible women	- individual
1988 Turkish Population and Health Survey	HUIPS	6552 households	- household
		5257 eligible women	- women
		2264 eligible husbands	- husband
1989 Turkish Demographic Survey	SIS	17675 Households	- household
1993 Turkey Demographic and Health Survey	HUIPS	8619 households	- household
		6519 eligible women	- women
1998 Turkey Demographic and Health Survey	HUIPS	8059 households	- household
		8576 eligible women	- ever married women
		1971 eligible husbands	- never-married women
			- husband
2003 Turkey Demographic and Health Survey	HUIPS	10816 households	- household
		8075 eligible women	- ever married women

ANNEX VIII.2.

Table VIII.2.1. Myers, Bachi and Whipple Indices for Total Population at Household Data by Region and Type of Place of Residence, TDHS 1993, 1998 and 2003

	Myers Index (Total)	Bachi Index (Total)	Whipple Index (Total)
Region			
West			
1993	12.9	8.1	1.23
1998	6.3	3.2	1.03
2003	6.6	4.1	1.07
South			
1993	12.5	9.0	1.28
1998	11.4	6.8	1.21
2003	6.2	5.1	1.09
Central			
1993	16.1	11.1	1.33
1998	10.4	6.3	1.18
2003	8.0	5.3	1.12
North			
1993	17.6	11.2	1.41
1998	9.9	6.3	1.21
2003	8.6	5.6	1.05
East			
1993	25.8	20.5	1.94
1998	16.9	13.0	1.58
2003	10.5	7.8	1.31
Type of Place of Residence			
Urban			
1993	14.4	9.8	1.31
1998	8.0	4.5	1.10
2003	6.3	4.4	1.10
Rural			
1993	18.3	13.4	1.53
1998	15.4	9.8	1.36
2003	9.0	6.6	1.16
Total			
1993	16.2	10.9	1.39
1998	10.0	6.3	1.19
2003	7.4	5.1	1.12

Figure VIII.2.1. Bachi Preference by Digit, TDHS-1993

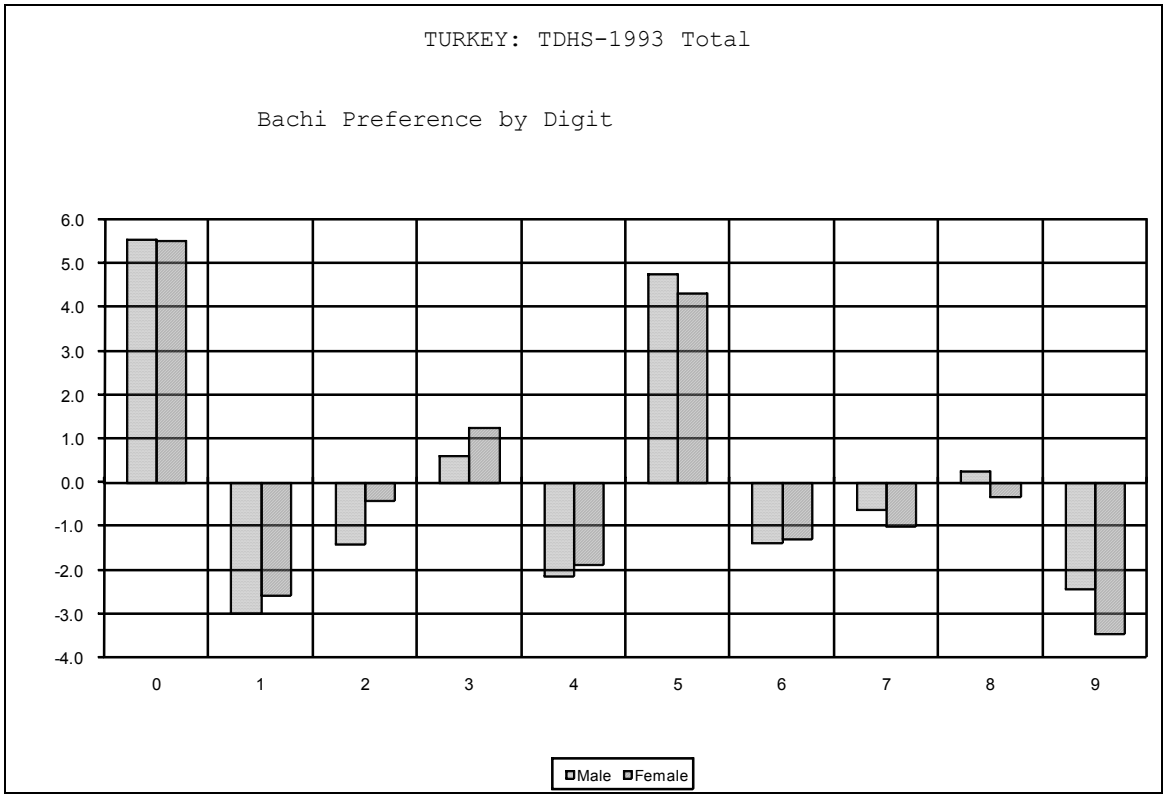


Figure VIII.2.2. Bachi Preference by Digit, TDHS-1998

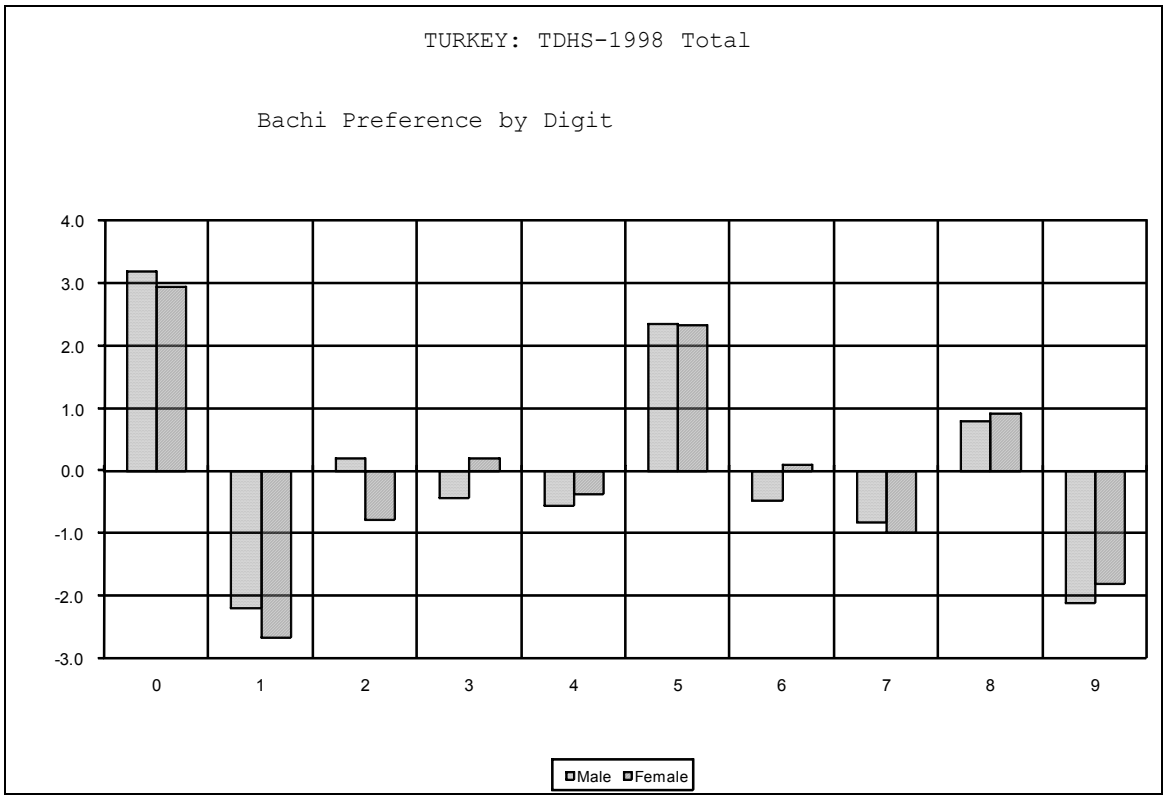
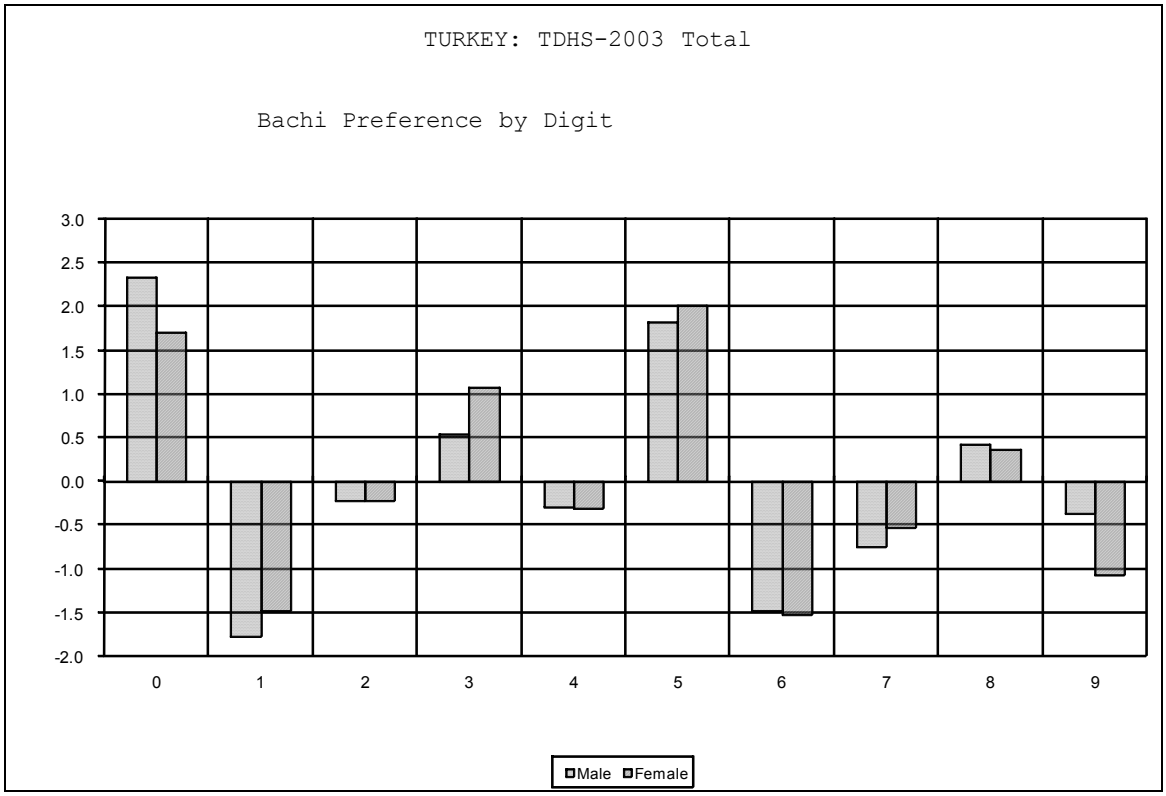


Figure VIII.2.3. Bachi Preference by Digit, TDHS-2003



ANNEX VIII.3.

Table VIII.3.1. Percentage of Children Whose Month of Birth Falls in the Month of Interview or Earlier by Demographic Characteristics of Women, TDHS 1993, 1998 and 2003

	Imputed Cases		Number of	Non-Imputed Cases		Number of
	Actual	Expected	Children	Actual	Expected	Children
Age						
15-19						
1993	-	-	-	80.9	74.5	177
1998	-	-	-	80.1	72.2	159
2003	-	-	-	59.4	61.2	140
20-24						
1993	84.4	77.9	14	77.8	73.1	1373
1998	94.9	71.9	24	77.0	72.4	1166
2003	25.7	46.9	9	51.1	52.8	1240
25-29						
1993	73.8	73.2	30	78.5	73.7	2674
1998	90.5	74.0	118	77.3	72.8	2266
2003	52.6	54.3	76	53.9	54.3	2770
30-34						
1993	92.4	75.2	73	78.6	73.4	3894
1998	85.1	73.4	306	76.1	72.7	2804
2003	42.1	49.7	169	55.2	54.2	3771
35-39						
1993	84.6	73.2	130	79.4	73.6	4045
1998	85.8	72.7	501	76.9	72.4	3036
2003	39.5	46.8	257	56.1	55.2	4082
40-44						
1993	82.8	72.2	226	80.7	73.3	3844
1998	90.2	73.4	707	75.9	73.1	2794
2003	45.9	50.9	401	57.4	56.5	4318
45-49						
1993	90.6	72.6	210	79.5	73.5	3136
1998	88.1	71.9	823	79.2	73.2	2504
2003	36.8	45.4	438	56.9	55.1	3563

Table VIII.3.1. Percentage of Children Whose Month of Birth Falls in the Month of Interview or Earlier by Demographic Characteristics of Women, TDHS 1993, 1998 and 2003 (Continued)

	Imputed Cases		Number of	Non-Imputed Cases		Number of
	Actual	Expected	Children	Actual	Expected	Children
Education						
No educ/Pri.Inc.	87.5	72.9	547	80.9	73.27	9495
1993	87.9	72.5	2007	77.4	72.1	5372
1998	39.0	46.5	1074	50.3	48.9	6362
2003						
Primary						
1993	80.7	73.5	134	77.7	73.7	8642
1998	88.4	73.8	464	76.3	73.1	8139
2003	50.6	55.3	273	57.6	57.1	11460
Secondary						
1993	100.0	70.8	2	77.4	73.3	1007
1998	100.0	73.1	9	80.3	73.9	1218
2003	100.0	84.4	2	62.7	62.7	2003
Total						
1993	86.2	72.9	683	19.3	73.5	19144
1998	88.1	72.8	2480	77.1	72.8	14729
2003	41.5	48.4	1349	55.8	55.0	19824

Table VIII.3.2. Percentage of Children Whose Month of Birth Falls in the Month of Interview or Earlier by time period of interviewer in the field, TDHS 1993, 1998 and 2003

	Imputed Cases		Number of	Non-Imputed Cases		Number of
	Actual	Expected	Children	Actual	Expected	Children
Time period of interviewer in the field						
1st week						
1993	78.5	66.7	96	72.5	66.9	2409
1998	78.8	66.8	298	73.1	67.0	1646
2003	91.5	91.2	92	94.7	94.6	2521
2nd week						
1993	79.3	66.7	110	71.3	66.7	2480
1998	82.8	66.8	282	70.5	66.9	1683
2003	81.9	82.7	125	94.3	94.3	2144
3rd week						
1993	91.4	69.6	112	75.5	69.2	2884
1998	85.7	67.1	323	72.1	67.3	2009
2003	88.2	8826	161	93.4	92.8	2286
4th week						
1993	93.8	75.0	82	82.0	75.0	2436
1998	85.8	68.5	359	74.3	69.2	1989
2003	83.3	86.2	131	96.7	96.7	2394
More						
1993	87.2	78.3	284	83.8	78.1	8934
1998	92.8	78.4	1218	81.5	77.9	7402
2003	14.5	25.0	840	20.9	19.7	10478
Total						
1993	86.2	72.9	683	19.3	73.5	19144
1998	88.1	72.8	2480	77.1	72.8	14729
2003	41.5	48.4	1349	55.8	55.0	19824

ANNEX VIII.4.

Figure VIII.4.1. Age at Death for Children died Less Than Two Years of Age, Turkey, TDHS-1993

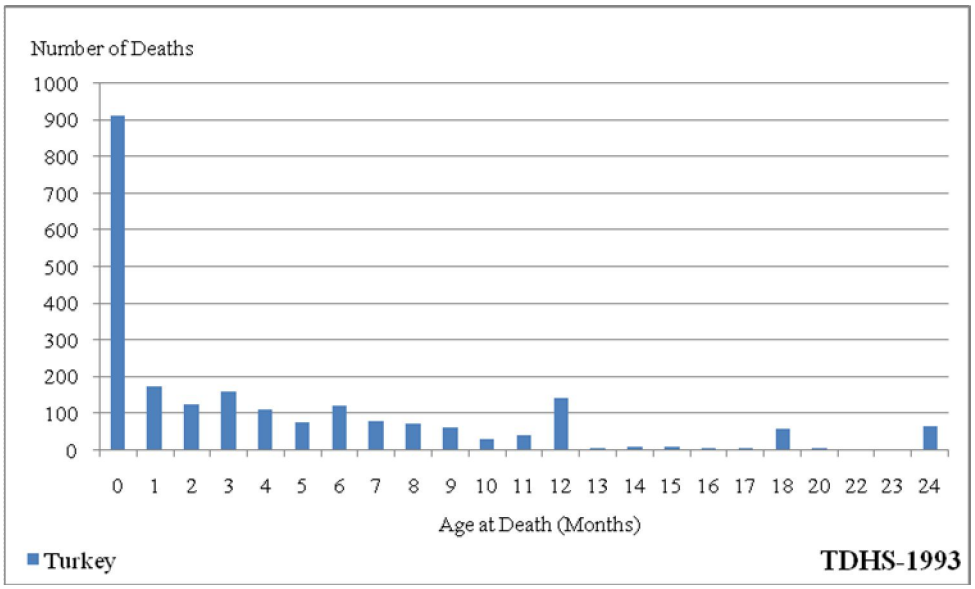


Figure VIII.4.2. Age at Death for Children died Less Than Two Years of Age by Region, TDHS-1993

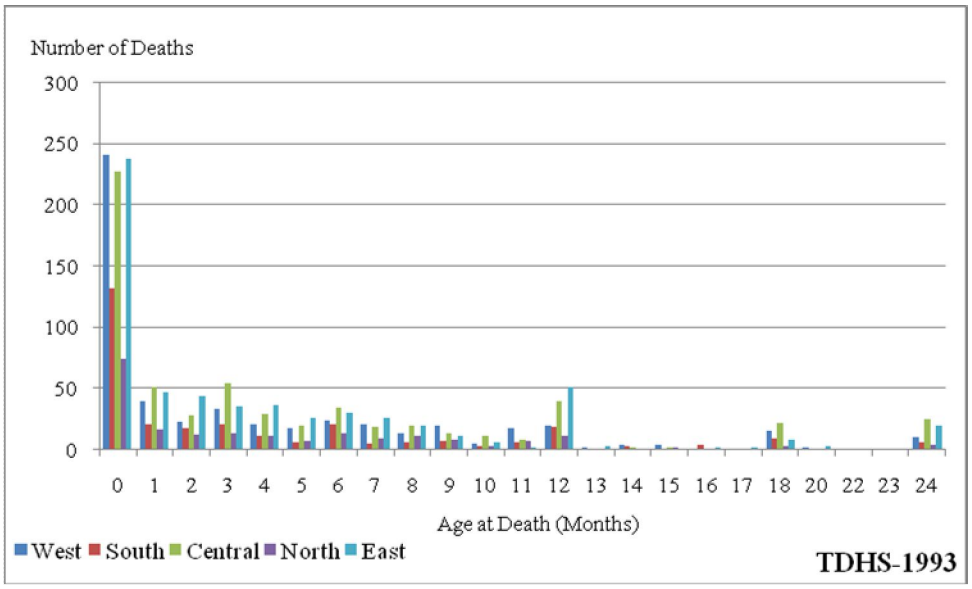


Figure VIII.4.3 Age at Death for Children died Less Than Two Years of Age by Type of Place of Residence, TDHS-1993

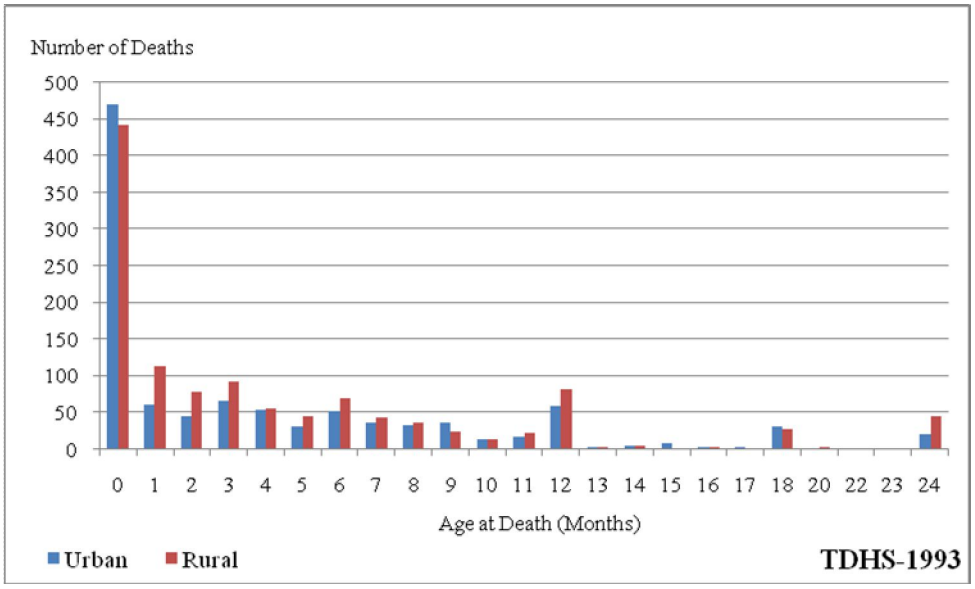


Figure VIII.4.4. Age at Death for Children died Less Than Two Years of Age by Education of Women, TDHS-1993

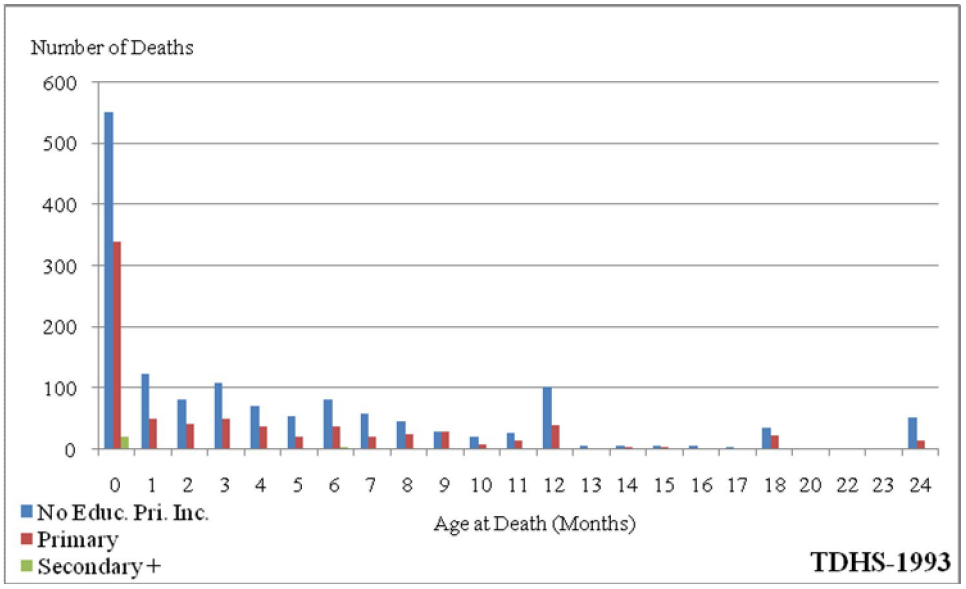


Figure VIII.4.5. Age at Death for Children died Less Than Two Years of Age, Turkey, TDHS-1998

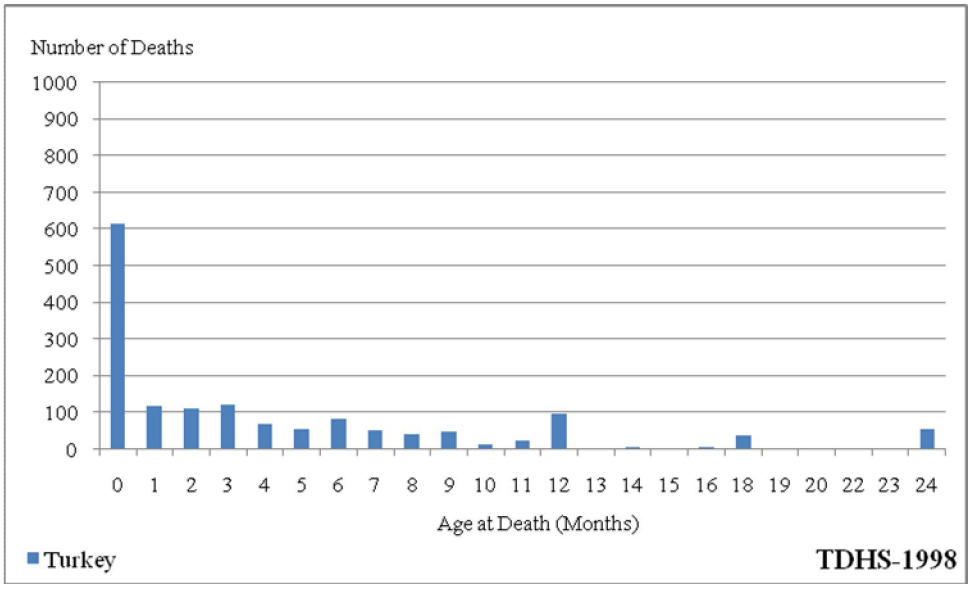


Figure VIII.4.6. Age at Death for Children died Less Than Two Years of Age by Region, TDHS-1998

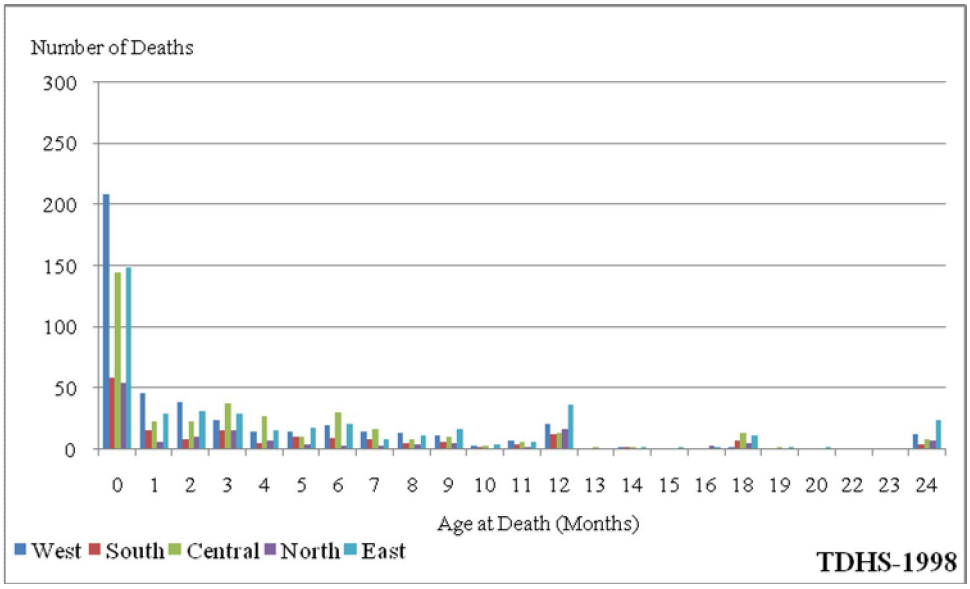


Figure VIII.4.7. Age at Death for Children died Less Than Two Years of Age by Type of Place of Residence, TDHS-1998

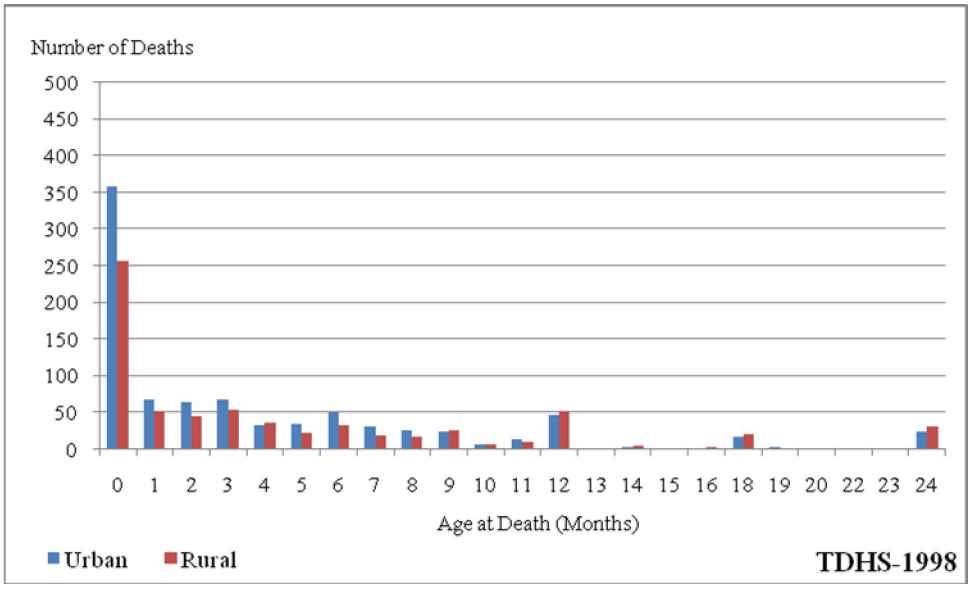


Figure VIII.4.8. Age at Death for Children died Less Than Two Years of Age by Education of Women, TDHS-1998

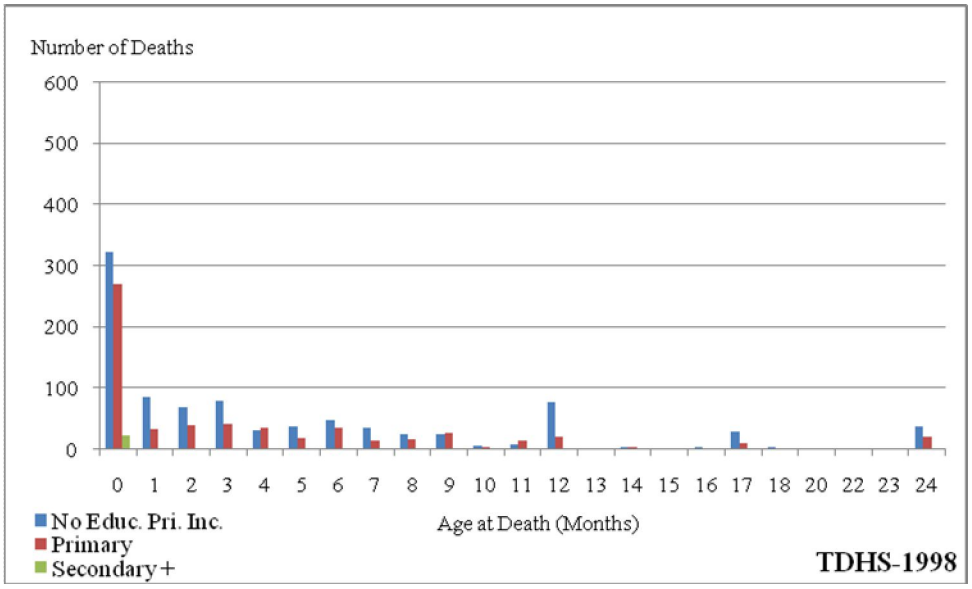


Figure VIII.4.3. Age at Death for Children died Less Than Two Years of Age, Turkey, TDHS-2003

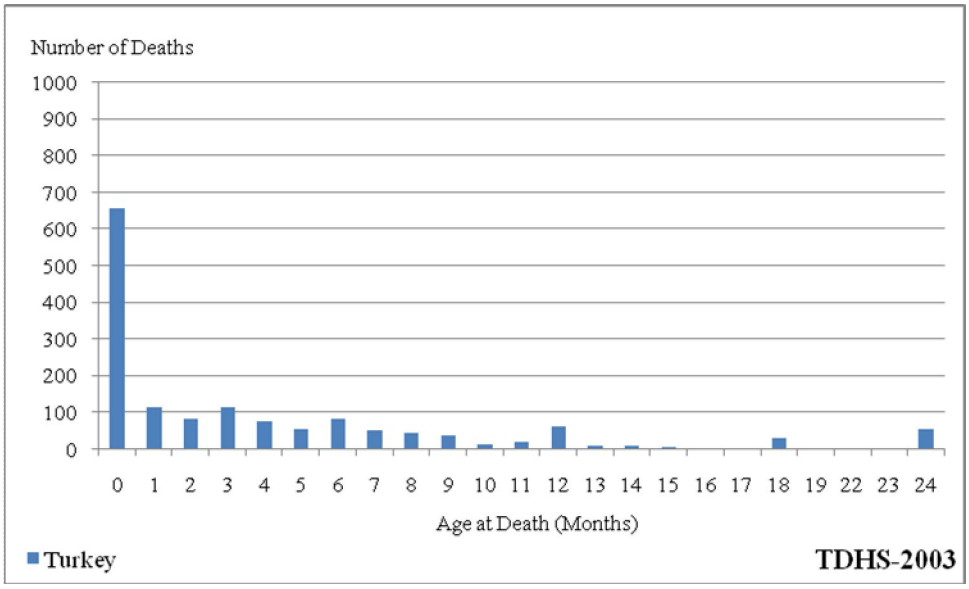


Figure VIII.4.10. Age at Death for Children died Less Than Two Years of Age by Region, TDHS-2003

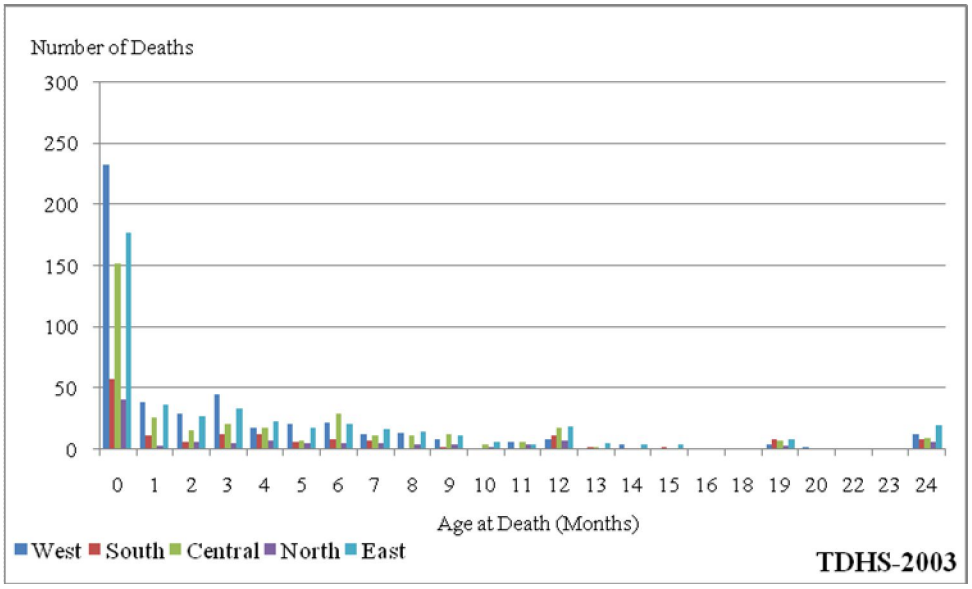


Figure VIII.4.11. Age at Death for Children died Less Than Two Years of Age by Type of Place of Residence, TDHS-2003

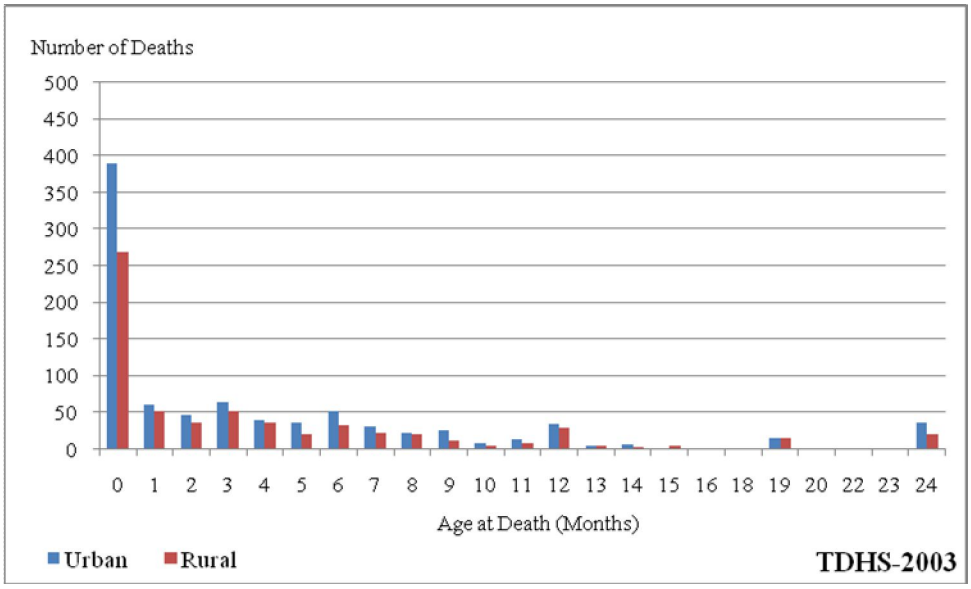
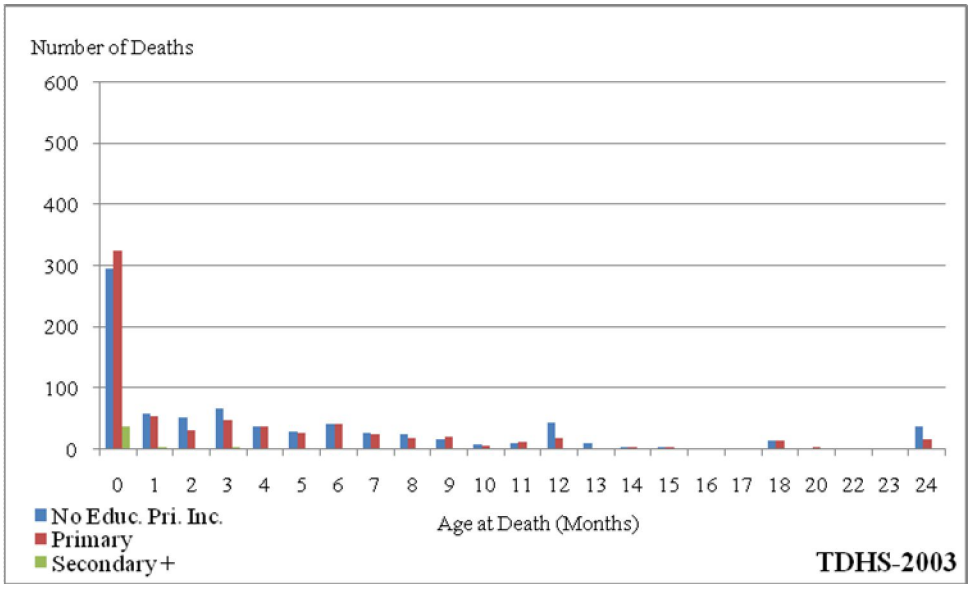


Figure VIII.4.12. Age at Death for Children died Less Than Two Years of Age by Education of Mother, TDHS-2003



ANNEX VIII.5.

Table VIII.5.1. Estimates of Infant and Child Mortality for the Five to Ten year Period before the Survey, Adjusted for Heaping of Deaths at Twelve Months of Age, by Region and Type of Place of Residence, TDHS 1993, 1998, 2003.

5-9 years	Infant Mortality (1q0)			Child Mortality (4q1)		
	Unadjusted Rate	Adjusted Rate	Percent Increase	Unadjusted Rate	Adjusted Rate	Percent Decrease
Region						
West						
1993	55.98	55.98	0.0	13.77	13.77	0.0
1998	51.83	52.81	1.9	11.74	10.73	8.6
2003	31.20	31.37	0.6	2.14	1.97	8.2
South						
1993	73.87	75.68	2.4	16.98	15.11	11.0
1998	48.40	48.65	0.5	10.66	10.42	2.3
2003	41.47	41.90	1.0	16.69	16.27	2.5
Central						
1993	84.43	85.14	0.8	18.70	17.97	3.9
1998	48.21	48.82	1.3	11.42	10.78	5.6
2003	35.58	35.58	0.0	8.48	8.48	0.0
North						
1993	88.57	89.05	0.5	17.38	16.88	2.9
1998	63.57	68.22	7.3	32.02	31.55	1.5
2003	45.78	47.92	4.7	10.35	8.08	21.9
East						
1993	106.20	106.84	0.6	18.72	18.02	3.7
1998	61.32	61.96	1.0	15.04	14.35	4.6
2003	76.88	77.16	0.4	17.68	17.38	1.7
Type of Place of Residence						
Urban						
1993	70.40	70.73	0.5	12.53	12.19	2.7
1998	49.05	49.79	1.5	11.58	10.81	6.6
2003	37.76	37.95	0.5	8.67	8.46	2.4
Rural						
1993	96.17	97.23	1.1	22.78	21.66	4.9
1998	62.27	63.54	2.0	17.97	16.64	7.4
2003	63.72	64.30	0.9	12.24	11.66	4.8
Total						
1993	83.71	84.37	0.8	17.01	16.33	4.0
1998	54.92	55.87	1.7	14.04	13.06	7.0
2003	47.23	47.56	0.7	9.91	9.58	3.4