De Nevo Data Collection Strategy in Maternal Mortality Study in Turkey

Complications during pregnancy, delivery and puerperium are the most widespread causes of death and disability among women of reproductive age in developing countries; it is estimated that approximately 528,000 maternal deaths occur in the world each year. The rare event, from a statistical point of view, is difficult to observe using conventional research tools such as sample surveys-- a research strategy often employed when routine data are absent or incomplete. Consequently, estimates of maternal mortality are lacking in most developing countries. However, even in industrialized countries where vital registration systems are complete, measured levels of maternal mortality often underestimate true levels, primarily due to the problematic nature of classifying causes of maternal death.

The case of Turkey is no exception to the dearth of information on maternal deaths. Prior to our research, only a few empirical studies provided estimates of the maternal mortality ratio on a national basis, albeit with varying degrees of precision and quality.

The earliest national study was the Turkish Population Survey, 1974-75, which used a dual-record design and produced a maternal mortality ratio estimate (MMR) of 208 maternal deaths per 100,000 life births (ref). The survey produced erratic demographic and health estimates in general and was discontinued, although the initial plan was to set up a dual-record system to compensate for the lack of information on vital events from the vital registration system. The Turkish Demographic Survey, 1989 employed the indirect sisterhood method and produced an MMR of 132 deaths per 100,000 for the year centred on 1981. Due to the nature of the estimation method and the sample size neither study delivered information on disparities or risk factors. In 1999, a study in 615 hospitals in 53 provinces of Turkey estimated a hospital MMR of 49 deaths per 100,000 live births. Although this suffers from the biased nature of hospital-based estimates and is not altogether national in coverage, it nevertheless had the advantage of collecting information on causes of death. In summary, and in spite of a range of community and hospital-based studies carried out at the local level, the levels and components of, and disparities in maternal mortality in Turkey remained to be understood.

Ministry of Health in collaboration with the Europen Union made a decision to conduct a project aiming to estimate maternal mortality indicators and to propose a data collection system on death registration in particular to maternal mortality data in Turkey. The project "*National Maternal Mortality Study* (NMMS) for the Reproductive Health Programme in Turkey" provides an opportunity to fill information gaps on maternal mortality by providing accurate data on the current situation in Turkey, with a focus on differences by regions and between urban and rural areas. Project results can be used as a powerful advocacy tool to ascertain the commitment of administrators to improving the existing recording and reporting systems. The study also aims to present the levels of maternal mortality and major causes of maternal death in Turkey. More importantly, it also examines the avoidable factors which contributed to these deaths and identifies risk factors, so that existing programs can be improved. In addition, the study also includes the causes and risk factors of deaths in reproductive-age women. This study done in a context which evaluates the current Turkish death registration procedures and proposes methods for a new death registration system.

The National Maternal Mortality Study was conducted within the framework of the European Union funded National Programme for Reproductive Health, and implemented by the Consortium of ICON-INSTITUTE Public Sector Gmbh (Germany), Institute of Population Studies, Hacettepe University (Turkey) and BNB Consulting (Turkey).

The main quantitative data collection activity of the project was the implementation of a National Maternal Mortality Research (NMMR) using a Reproductive Age Mortality Study (RAMOS)

data-collection strategy. Conventionally, RAMOS involves identifying and investigating the causes-of-death of all women of reproductive age. This method has been applied successfully in countries with and without good vital registration systems. Successful studies in countries lacking complete vital registration use varied and sometimes multiple sources of information to identify deaths of women of reproductive age. Interviews with household members, health care providers, and reviews of facility records are then used to classify the deaths as pregnancy-related or maternal or otherwise.

Burials are the only potential source of data on female deaths in Turkey that meets the criteria of completeness necessary for an initial data source in a RAMOS design. For the NMMR, burial data by age and sex were collected prospectively over a 12 month period, with more detailed information obtained on females aged 12-50 years.

Turkey is divided administratively into 81 provinces, designated as NUTS-3 regions. These can be aggregated into 26 NUTS-2 regions. NUTS-1 regions are in turn formed by aggregating NUTS-2 regions into 12 regions. The sample design of the NMMR was a weighted, stratified probability sample, designed to provide national, urban/rural and 12 regional estimates. The sample selection process made possible to select 29 provinces for NMMR field operations. Once a province was selected, no further sampling procedure was necessary since all districts, sub-districts, villages and settlements of the province were included in the study. Therefore, the coverage of the population in particular, but also the coverage of settlements, is outstanding., since it reflects data collected from a population of almost 39 million, corresponding to approximately 54 percent of Turkey's population. Hence, if the data attained in NMM are not biased in the sense of urban-rural distribution, it has been found that the analyses within the scope of the study will be carried out irrespective of the coverage rates.

Primary informants were designated for all cemeteries in the selected provinces. They were cemetery officials in places of settlement where burial permits are compulsory, typically urban areas with municipalities and village headmen in rural settlements. The primary informants were asked to complete the Cemetery Burial List (CBL) and the Female Death Notification Form (FDNF) to obtain basic information on the deceased from their relatives, including name, age, sex, home address and place-of-death, telephone numbers and names of the relatives living in the same household as the deceased, and in cases where possible and relevant, a question on whether the death was pregnancy-related. Copies of the CBL and FDNF were sent to the District Coordinator at monthly basis and then passed on to the Province Coordinators. Primary informants from province centres provided their forms directly to the Province Project Coordinator, again usually at monthly intervals. Province Project Teams, in collaboration with District Coordinators, either a) reviewed the health facility records of the deceased and/or interviewed doctors/health staff in charge if death occurred in a health facility or was attended by trained health staff, or b) performed verbal autopsies with the families of the deceased to ascertain the cause-of-death, if death was not attended by trained health staff, or could not be ascertained from a).

Province Project Teams sent the results of verbal autopsies and/or health facility record reviews to Hacettepe University Institute of Population Studies (HUIPS), where deaths were reviewed by two doctors. The Central Review Committee scrutinized a sample of female deaths and all maternal deaths to establish final causes-of-death.

The field results show that coverage rates in terms of settlements was at the level of 80 percent. Burial data were collected from 79 percent of rural settlements and from 80 percent of the rural population respectively. Since the rural settlements least likely to comply with the study requirements were small, coverage is much higher when looked at in terms of population where data were collected for settlements covering 93 percent of the target population.

During data collection process, some data quality measures were developed to check the quality of the data. The first step of checking the quality of the NMMR data was to calculate the Crude Burial Rate - number of burials per 1,000 population, which approximates the Crude Death Rate. The value of the Crude Burial Rate as calculated from the NMMR data is 3.9 per 1,000. According to estimates, Crude Death Rate changes between 4 and 6 per thousand in project provinces. For Turkey as a whole and for many project provinces, Crude Burial Rates from NMMR data are close to lower boundary of the expected ranges and suggest the survey design used in NMMR is mostly successful in collecting burial data although it is somewhat lower that anticipated and may underestimate deaths.

The second check on data quality of the NMMR was to examine the proportion of female burials over total burials. The theoretical calculations done before data collection started indicated that the percentage of female burials out of total burials cold be expected to be between 40 to 47 percent. The actual NMMR data show a percentage of female burials out of total burials of 43 percent, which is within the expected range in Turkey as a whole. The proportion also lays within the expected range in most of the project provinces, although in some provinces however it is beyond that.

The third check was to calculate the proportion of female burials age 15-49 to total burials and to compare these to the expected percentages. According to the NMMR data, the percentage of female burials age 15-49 out of total burials is approximately 8 while the theoretically expected range is between 9 and 15. The result obtained is thus just below the lower limit for the total of Turkey. The same applies for the majority of the project provinces.

As a result of these three checks, we concluded that the NMMR design appears able to collect the information on male and female burials; however it may underreport female burials in the 15-49 age group

By the end of our field work, we had measured the proportion of maternal deaths aged 12-50 among female deaths aged 12-50. In order transform these observed data into national and NUTS-1 estimates of the maternal mortality ratio, several steps needed to be taken:

1. Disproportional allocation rescaling: We had to weight the sample to rescale the disproportionate allocation of the selected provinces. The same procedures are also employed for rescaling the projected numbers of women (15-49) and births in the NUTS-1 regions.

2. Non-sending adjustment: We also had to correct for the fact that not all settlements sent data each month. We calculated a proportion of completed settlement-months of reporting for each urban and rural area within each province. For example, if a settlement only sent nine months worth of data, we assumed this represented 75 percent of its deaths and so adjusted upwards by cumulating settlement-based adjusted deaths to get urban and rural adjusted estimates for each province. There were a total of 58 non-sending adjustment factors (29 provinces times 2 (urban and rural)).

3. Underreporting correction: The third step was the correction of the under reporting of deaths that may have occurred despite sending reports. This was done for each province by using a correction factor calculating for all project provinces. This factor was calculated using a standard demographic technique (Bennet and Horiuchi Technique) that corrected for under-reporting of deaths. The factor for underreporting adjustment was found to be 1.35, implying a completeness rate at the level of 74 percent. The level of underreporting was assumed to be the same for all provinces.

These there procedures were applied to the collected data and then analysis for tabulations were performed together with report-writing activities for final report. In the late October 2006, a

series of national and regional meetings will be held to disseminate the results of the NMMS. Based on the findings and fieldwork experiences of the NMMS, it is expected that NMMS will provide a basis for policy developments for improving the current systems of maternal mortality and population registration.