TURKEY NATIONAL MATERNAL MORTALITY STUDY 2005

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SELECTED PROVINCES

The sample design of the study was a weighted, stratified probability sample, designed to provide national, urban/rural and 12 NUTS-1 regional estimates. Primarily 27 provinces were identified for NMMR field operations. The two provinces selected for the pilot and pre-test activities, Antalya and Erzurum, continued data collection on their own during the one year study period, so that eventually data were available for 29 provinces as shown below.

Overall in these 29 provinces, 16,139 settlements (285 urban; 15,854 rural) were included in the study, covering 54 percent of the country’s population which equals to approximately 39 million.
DEFINITIONS

A **female death** is defined as the death of a woman in 15-49 age group, irrespective the cause of the death.

A **pregnancy related death** is the death of a woman while pregnant or within 42 days of termination of the pregnancy, irrespective the cause of the death.

A **maternal death** is the death of a woman while she is pregnant or within 42 days of termination of the pregnancy, irrespective of the duration and the site of the pregnancy, from any cause related to (direct) or aggravated by (indirect) the pregnancy or its management, but *not* from a coincidental cause.

**Direct maternal causes** are those which are directly related to physiological and psychological conditions as they are initiated by the pregnancy. Typical examples are haemorrhage, sepsis, eclampsia, obstructed labour, unsafe abortion, ectopic, embolism, surgical or anaesthetic problems during C/S.

**Indirect maternal causes** are due to pre-existing or incidental (commencing during the pregnancy) conditions, which aggravate as a consequence of the physiological changes taking place in pregnancy. Examples are diabetes, HIV/AIDS, anaemia, heart disease, suicide.

**Coincidental (accidental)** are events which would have caused death even if the woman had not been pregnant, eg. a car accident.

Deaths from **accidental or coincidental** causes have historically been excluded from maternal mortality statistics. However, in practice, the distinction between coincidental and indirect causes of death is often difficult to make. To facilitate the identification of maternal deaths in circumstances where cause of death attribution is inadequate, ICD-10 introduced the category of *pregnancy-related death*. In order to make the results of the NMMS always comparable with international data, terms and definitions of the WHO/ICD 10 were used in the report. Unfortunately not all international publications are always explicit on their definitions, including some publications by UNICEF/UNFPA/WHO on maternal mortality ratio and maternal mortality rate as. From tables presented in this report it will be easy to distinguish the two values (pregnancy related deaths and maternal deaths) where it is useful. In the text both figures may be given alternatively.
## BACKGROUND CHARACTERISTICS OF FEMALE DEATHS AND PREGNANCY RELATED DEATHS

Data collected on age, marital status and other social indicators enable understanding the background characteristics of pregnancy related deaths and female (15-49) deaths.

### Age

<table>
<thead>
<tr>
<th>Age</th>
<th>Pregnancy related deaths</th>
<th>Female deaths</th>
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<tbody>
<tr>
<td>15-19</td>
<td>5.9</td>
<td>7.5</td>
</tr>
<tr>
<td>20-24</td>
<td>13.0</td>
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<tr>
<td>25-29</td>
<td>21.8</td>
<td>9.7</td>
</tr>
<tr>
<td>30-34</td>
<td>14.5</td>
<td>11.0</td>
</tr>
<tr>
<td>35-39</td>
<td>20.3</td>
<td>19.4</td>
</tr>
<tr>
<td>40-44</td>
<td>27.7</td>
<td>18.4</td>
</tr>
<tr>
<td>45-49</td>
<td>32.5</td>
<td>13.1</td>
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### Marital status

<table>
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<tr>
<th>Marital status</th>
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<tbody>
<tr>
<td>Never married</td>
<td>1.8</td>
<td>25.3</td>
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<tr>
<td>Married</td>
<td>98.2</td>
<td>66.0</td>
</tr>
<tr>
<td>Widowed</td>
<td>3.4</td>
<td></td>
</tr>
<tr>
<td>Divorced</td>
<td>3.6</td>
<td></td>
</tr>
<tr>
<td>Separated</td>
<td>1.7</td>
<td></td>
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### Type of residence

<table>
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<tr>
<th>Type of residence</th>
<th>Pregnancy related deaths</th>
<th>Female deaths</th>
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<tr>
<td>Urban</td>
<td>43.8</td>
<td>56.6</td>
</tr>
<tr>
<td>Rural</td>
<td>56.2</td>
<td>43.4</td>
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</table>

### Education level

<table>
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<th>Pregnancy related deaths</th>
<th>Female deaths</th>
</tr>
</thead>
<tbody>
<tr>
<td>No educ/Primary inc.</td>
<td>34.5</td>
<td>41.0</td>
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<tr>
<td>First level primary</td>
<td>41.0</td>
<td>44.0</td>
</tr>
<tr>
<td>Second level primary</td>
<td>6.4</td>
<td>12.6</td>
</tr>
<tr>
<td>High school &amp; higher</td>
<td>15.1</td>
<td>15.1</td>
</tr>
</tbody>
</table>

The age distribution of women who died due to pregnancy related causes shows an increase from 15-19 to 25-29 and a reduction in older age groups. Approximately one third of the pregnancy related deaths occurred in the 25-29 age group, 22 percent of women died between 30-34 years of age. In terms of all female (15-49) deaths, the proportion of age groups increases steadily from early ages to old ages. About half of all women died above 40 years of age.

Almost all women who died of maternal causes were found to be married at the time of their death. Also the majority of all female deaths (66 percent) occurred among married women. Only 2 percent of the women who died during maternity and 25 percent of all female deaths were never married.

In terms of place of residence, more than half of the women who died due to pregnancy related causes were rural residents as opposed to only approximately a third of all women. No significant difference between women age 15-49 who died of pregnancy related causes and all women existed in regard their educational status. In both the majority of the deaths were found to be higher among less educated women. Approximately, 80 percent of both pregnancy-related and female deaths occurred among the women who had first level primary education or less.
LEVELS OF MATERNAL MORTALITY

The Maternal Mortality Ratio (MMR) is the most important indicator that gives the level of maternal mortality in a country. The most significant outcome of this study is the estimation of pregnancy related and maternal mortality for Turkey broken down to NUTS-1 regions and type of settlements.

Pregnancy Related Mortality Ratios by NUTS-1 Region and Type of Settlements

The overall pregnancy related mortality ratio was 38.3 (± 2.8) per 100,000 live births. There were however wide variations among regions ranging from a low of 12.4 (± 5.0) per 100,000 live births in West Anatolia to a high of 93.3 (± 17.2) per 100,000 live births in Northeast Anatolia. The ratio for urban areas was 28.2 (± 3.1) per 100,000 live births, while for rural areas it was 53.7 (± 5.5) per 100,000 live births. Overall, pregnancy deaths constituted 4.3 percent of female deaths aged 15-49, again with a range of 2.0 percent in Istanbul to 13.0 percent in Northeast Anatolia.

Pregnancy related mortality ratio for Turkey was found to be 38.3 (± 2.8) per 100,000 live births. It was lowest in West Anatolia (12.4) and highest in Northeast Anatolia (93.3).
The national level maternal mortality ratio was quite low, 28.5 (± 2.5) per 100,000 live births, and suggests that a continuous increase in uptake of maternity care is paying off in terms of maternal mortality reduction. The lowest level was found for West Anatolia (7.4 per 100,000 live births) whereas it was highest for the East Black Sea Region and North East Anatolia (68.3 per 100,000 live births). The MMR for urban areas was 20.7 while for rural areas it was 40.3 per 100,000 live births.

Maternal mortality ratio for Turkey was found to be 28.5 per 100,000 live births, with the lowest level in West Anatolia (7.4) and the highest in Northeast Anatolia and East Black Sea. (68.3).
Pregnancy Related Mortality Ratio by Age of Deceased Women

Figures indicate that the oldest mothers (aged 40-44 and 45-49) are at the highest risk of death, as those are women are more likely of having a high order birth (4 and more pregnancies), which is considered to be the most serious biomedical risk factor for pregnant women. Pregnancy related and maternal mortality ratios for women aged 40-49 were over 100 per 100,000 live births. Young women below the age of 18 are however also facing higher risks. The age structure of pregnancy related deaths follows the well described J-shaped pattern of mortality. The oldest and the youngest age groups face the highest risk but are at the same time least likely to give birth. It is for this reason that the number of deaths was found to be greatest in the lowest risk period.

Maternal Mortality Ratio by Age of Deceased Women

Pregnancy related and maternal mortality ratios rapidly increased among the women who were over age 35 and was particularly high for the age group 40-49.
CAUSES OF MATERNAL DEATHS

Pregnancy Related Deaths by Cause of Death

Among the pregnancy related deaths, 74.2 percent of women died because of a maternal cause. The group of maternal deaths comprises 58.4 percent direct causes and 15.8 percent indirect causes. 23.2 percent had coincidental causes of death. 2.4 percent of the women were pregnant when they died, without further information on the pregnancy status, since the family of the deceased was not available for a verbal autopsy interview.

58.4 percent of all pregnant women died from direct, 15.8 percent from indirect maternal causes.
Maternal Deaths by Cause of Death

Almost one-quarter of maternal deaths occurred due to bleedings short before, during or after delivery. 15.7 percent of all maternal deaths were due to post partum haemorrhage, which amounts to more than 50 percent of all post-partum deaths. One third of these occurred during the first 12 hours after delivery. Atonic uterus and retained placenta were main causes.

The second most important cause of direct maternal death was eclampsy (18.4 percent of all maternal death, 13.7 percent of pregnancy related deaths), which includes conditions associated with oedema, proteinuria, hypertension and convulsions.

Other important specified obstetric causes amounted to 15.7 percent of the maternal deaths. Among the main ones was embolism (7.8 percent) which is more likely to occur after caesarean section, but also sudden cardiac, pulmonary or cerebral dysfunctions as can be associated with anaesthetic and surgical procedures. A ruptured uterus, which is normally the result of delayed management of obstructed labour, was in 1.4 percent cause of a maternal death. Pregnancy related infections, predominantly puerperal sepsis, caused death in 4.6 percent. 1.8 percent of the mothers died due to a problem of early pregnancy such as septic abortion or ectopic pregnancy.

In 10.1 percent the cause of maternal death remained unspecified due to a lack of more detailed information from patient file and/or family of the deceased.

Most maternal deaths are due to obstetric haemorrhage and eclampsy, conditions which usually occur short before, during or after delivery.
Female Deaths (15-49) According to Major Categories by Type of Settlement

The figure shows the situation of female deaths (15-49) according to major categories by type of settlements. Country wide 4.3 percent of female deaths (15-49) were pregnancy related. This was higher in rural (5.5 percent) and lower in urban (3.3 percent) areas. This resembles the percentage of maternal deaths, which was overall 3.2 percent, but 4.1 percent in rural as opposed to 2.4 percent in urban areas. Overall 2.5 percent died due to a direct maternal cause, for 0.7 percent the cause was indirect.

Among all female deaths (15-49) nationwide, 4.3 percent were pregnancy related, 3.2 percent had a maternal cause of death.
TIME OF MATERNAL DEATHS AND CONDITION FOR BABY/FETUS/EMBRYO

The time period during which pregnancy related deaths have occurred and the condition of the child are important to understand the potential risks of maternal deaths. Late pregnancy is the period during which the foetus has a realistic chance to survive if premature delivery takes place. The end of the 22nd week was chosen as this is the definition which is commonly used in Turkey. The death of any embryo before the end of week 22 was defined as abortion, irrespective whether it had actually been expelled or died with the mother. A foetus older than 22 weeks but never born due the death of the mother was defined as intra-uterine death. By far the majority of ante-partum deaths occurred due to accidents and other external conditions, hence were coincidental.

Time of Maternal Death by Type of Settlement

In Turkey, 37 percent of all mothers died during the ante-partum period, half of them before and half of them after the 22nd week of pregnancy. 9 percent of women died during the delivery, 54.1 percent post-partum. The share of postpartum deaths among all pregnancy related deaths was much higher in rural settings as compared to urban areas (61.1 and 46.1 percent respectively).
20.9 percent of the women died during the first postpartum day. Adding those whose death occurred during delivery brings the total deaths within 24 hours – the period during which most obstetric emergencies occur - to 29.8 percent, again significantly more in rural than in urban settings.

**In rural areas, where access to appropriate care is more difficult, post-partum death of a mother during the first 24 hours was more frequent than in urban settings.**
All early pregnancies ended with either an abortion or as ectopic. During late pregnancy 7 percent of the babies survived, 7 percent were stillbirths, almost 75 percent died in utero together with the mother. For mothers who died during delivery half of the babies survived. In the case of post-partum death of the mother two thirds of the babies were alive, independently of how long after delivery the mother had died.

Overall 47 percent of all pregnancies ended with a live birth. 4.5 percent of the babies died after they were born. 12 percent were delivered as stillbirths. 17 percent were intra-uterine deaths, 16 percent abortions, 1 percent ectopic pregnancies. In 8 percent the condition could not be established due to the lack of further information.
PLACE OF DELIVERY AND PLACE OF DEATH

Comparing data on place of delivery and place of death, it is important to recall that not all women who died from a pregnancy related cause could ever complete their pregnancy. It was found that 60 percent of the pregnancies ended with a delivery, either a live or a stillbirth.

Place of Delivery for Index Pregnancy

19 percent of the mothers delivered at home, 68 percent came to a health facility for delivery. For 13 percent no information on the exact place of delivery was available. Only a small number (3 percent) of those who had come to a health facility had their delivery in a primary level facility such as a health house, where no comprehensive obstetric emergency care provision exists. Most deliveries (50 percent of all pregnancy related deaths) took place on secondary care level in either a general state hospital or a specialized mother and child hospital. In 15 percent birth was given in a tertiary level teaching or university hospital.
Place of Maternal Death

For the place of death of the mother the overall pattern was quite similar: 21 percent died at home and 70 percent in a health facility. The distribution to the three levels of care however differed since in case of a problem mothers were often referred to the next higher level of care. Consequently none of the women died on primary level, 32 percent on secondary level and 28 percent on tertiary level. 10 percent died on the way to a health facility or during referral in an ambulance. 8 percent had an accident outside the house. All of these were women with a coincidental cause of pregnancy related death.
The type of delivery and the indication for caesarean section are other useful indicators which allow to understand the condition under which deliveries take place.

Out of the total number of deliveries, 50 percent were normal vaginal deliveries, in 49 percent a caesarean section was performed and 1 percent ended with a vacuum extraction. The study also collected information on the type of delivery for the pregnancy preceding the one during which the mother had died. The rate of caesarean sections for the previous pregnancy had been much lower, 15.6 percent vs. 84.4 percent normal vaginal deliveries. This was expected since the pregnancy which had ended with the death of the mother was likely to be more problematic. It was however also lower than what was found by TDHS-2003 (21.2 percent). This may indicate that unlike the average woman – as studied in the TDHS-2003 - the women who died due to maternal causes had generally less access to secondary and tertiary level care, the level where caesarean section can be performed.
Almost 70 percent of the caesarean sections were emergencies like eclampsy, foetal distress or severe ante-partum haemorrhage which did not allow for any delay, while in only 27 percent the caesarean section were elective.

Indications for Caesarean Section

The main indication was with 32.8 percent eclampsy, followed by foetal distress (15.2 percent) and ante-partum haemorrhage (11.9 percent). Other indications were twin deliveries (6.3 percent), previous caesarean section (5.0 percent), breech position of the baby (4.3 percent), prolonged labour (2.0 percent), other mother related problems like pre-existing chronic diseases (9.1 percent) and other child related problems such as pre-maturity (6.9 percent). In only 3.4 percent the decision was taken by choice.
BIOMEDICAL CONTRIBUTORS

Biomedical risk factors are conditions or habits present during pregnancy which might increase the risk of an adverse pregnancy outcome. The following factors were considered: Age less than 18 or greater than 34, parity greater than four, twin pregnancy, the presence of diseases including diseases of the circulatory system, endocrine or metabolic diseases, mental or behavioral disorder, neurological diseases, other diseases and conditions, or of previous or chronic hypertensive disorder, anemia, smoking, or obesity.

Biomedical Contributors for Maternal Deaths

65 percent of women who died from a maternal cause presented with at least one biomedical risk factor, 35 percent had no biomedical risks. The proportion of multiple risks was 38 percent. No major differences were seen between rural and urban populations.
Risk Factors for Pregnancy Related and Maternal Deaths Independent of Risk Category

A common biomedical risk factor is the age of the mother (below 18 or above 34). From the age of 35, a number of different patho-physiologies, like hypertensive or metabolic disorders, may develop or exist without being recognised. Among the 293 women who died during pregnancy, 29 percent belonged to one of the high risk age groups.

Another common risk factor is the parity of the woman i.e. the number of times she had previously already been pregnant. Above a parity of 4 the maternal organism may no longer easily adjust to the physiological changes which occur during pregnancy. The risk of severe post-partum haemorrhage increases with higher parity. More than 26 percent of all mothers who died during the period of the NMMR had a history of more than 4 previous pregnancies.

The next most prevalent biomedical risk factor was previous or chronic hypertensive disorder (13.0 percent). Other diseases of the circulatory system existed in 4.8 percent, usually heart problems which were congenital or had developed due to a previous infection. Endocrine and metabolic disorders like diabetes were reported in 5.5 percent, followed by anaemia (2.7 percent), obesity (1.7 percent) and smoking (2 percent).

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1 Risk factors were present among 293 pregnancy related deaths and 218 maternal deaths. The sum of percentages in both categories may exceed 100 percent, since the same woman may face more than one risk factor at a time.
AVOIDABLE FACTORS CONTRIBUTING TO MATERNAL DEATHS

Three categories of avoidable factors contributing to pregnancy related and maternal deaths were distinguished: Health service provider factors, health service supply factors and household and community factors. These factors are also called sub-standard care factors. One or more avoidable factors contributed in 49.3 percent to pregnancy related deaths as compared to 61.6 percent to maternal deaths. In urban areas, avoidable factors contributed to 46.3 percent of pregnancy related deaths, as opposed to 51.8 percent in the rural areas.

Percentage Distribution of Sub-standard Care Factors Contributing to Maternal Deaths

![Graph showing the percentage distribution of sub-standard care factors contributing to maternal deaths. The categories include total, household and community factors, health service provider factors, health service supply factors, and other risk factors. The total contribution is 61.6 percent, with household and community factors contributing 36.2 percent, health service provider factors 13.7 percent, health service supply factors 2.1 percent, and other risk factors 9.6 percent.]

A. ÇAYLİN BOZBEYÖGLU
Household and community factors were the most frequent avoidable factors in both urban and rural areas (26.1 and 32.7 percent respectively). Most significant were failures by the woman or her family to recognize pregnancy related problems and the delay in seeking medical care, contributing to 44.3 and 40.7 percent of pregnancy related deaths. Other important household and community factors were failure to utilise preventive measures, in particular the use of contraception to prevent unwanted pregnancy and the use of antenatal care. These conditions contributed to pregnancy related deaths in 22.3 percent and 11.6 percent respectively. Household and community factors appeared to be more frequent in rural areas (32.7 percent) as compared to urban areas (26.1 percent). When coincidental causes of pregnancy related deaths are eliminated, the contribution of all household and community factors to maternal deaths increases significantly to 36.2 percent.

Health service provider factors, such as poor diagnosis and management, contributed to 10.3 percent of pregnancy related deaths. When only maternal deaths are considered, the contribution increases to 13.7 percent. On the primary care level of the health house sub-standard care by general practitioners and by midwives were reported in 7-11 percent of pregnancy related deaths. Mis-diagnosis and mis-management on secondary care level was found in 15 or20 percent respectively of all pregnancies as compared to 2 or 6 percent respectively on tertiary care level.
Health service supply factors such as the availability of staff, diagnostic and treatment facilities, pharmaceuticals and medical supplies played a relatively minor role in contributing to both pregnancy-related and maternal deaths (1.8 percent and 2.1 percent respectively). Lack of back-up facilities contributed to 2 percent to pregnancy related deaths. Long distance to nearest hospital was the most important supply factor (7.9 percent), followed by lack of transportation between home and health facility (3.4 percent) and lack of surgical staff (2.7 percent). In rural areas, all health service supply factors contributed significantly more than those in urban areas.

failed recognition of an obstetric problem and delayed health care seeking by the family was by far the most frequent sub-standard care factor contributing to the death of the mother.
Avoidable Household and Community Factors Contributing to Pregnancy Related Deaths

Among women who died of pregnancy-related causes, relatives of the deceased reported that approximately 48 percent of pregnancies were unwanted or preferably delayed. 72 percent of women did not use any contraceptive method before the pregnancies that led to their death. 21 percent of them had no ANC at all, and a small number of women (2 percent) received ANC from unqualified persons such as traditional midwives, neighbors or relatives, rather than a medical staff.

The wantedness of a pregnancy, the use of contraceptives and the kind of ANC and delivery care may have significantly contributed to maternal deaths.
The figure presents the distribution of women who died by the total number of children ever born and the total number of children still alive in comparison with women interviewed in TDHS-2003. A woman who died due to causes related with the pregnancy had on average given birth to 2.8 children and 2.5 were still alive at the time of the NMMR.
Mean Number of Children Ever Born and Children Surviving According to Age Groups of Women, NMMR and TDHS-2003

The number of children that died increased directly with the age of the mother, reflecting the natural family building process. Women age 45-49 that died during pregnancy, had an average of 6.8 births, which reflects the high levels of fertility prevailing during the 30-years reproductive period. As expected, the proportion of surviving children declined with increasing age of the mother. In summary: Among women 45-49 who died, the mean number of children ever born is almost 2 children greater than the mean number of surviving children, indicating a high level of mortality among children to deceased women.
The figure shows the distribution of deceased women by the total number of abortions (induced or spontaneous) and stillbirths that women ever had during their reproductive lives. Figures imply that women who died with maternal causes were more likely to have spontaneous abortion and stillbirth, while they were less likely to have induced abortions as opposed to TDHS-2003 women in the control group.
CAUSES OF DEATH AMONG WOMEN AGED 15-49

The study population of 39 million which equals to 54 percent of the total population of the country, 6,887 women in the age group of 15-49 had died during the 12 months of data collection.

Percent Distribution of Female Deaths (15-49) by Cause

Almost one third (31.2 percent) of women had died of neoplasm, 18.2 percent had external causes of death such as road traffic or other accidents, suicide and murder, followed by diseases of the circulatory system (16.6 percent). Pregnancy related deaths ranked as fifth most frequent cause of female death (4.3 percent). For 4.1 percent there was no information. It is also possible to estimate cause-specific mortality rates for women aged 15-49 from NMMS data.

When comparing the findings for urban and rural areas, it is obvious that the number of neoplasms which were diagnosed in women from rural areas was significantly lower than for urban women (28.6 and 33.2 percent respectively). This confirms that the primary reason for an increase of detected cancer cases is improved access and quality of diagnostic facilities, as presumably is the case in urban areas.

Cancer cases represent almost one third of all female deaths aged 15-49.
LESSONS LEARNT AND RECOMMENDATIONS

MERNIS and MoH Systems

Village headmen (muhtars) play an important role in collecting mortality indicators and must cooperate with both, the MERNIS system and the MoH. They must have a sufficient level of education and frequently undergo in-service training.

Only 70 percent of deaths are reported into the MERNIS system. It is necessary to take measures to decrease under-reporting of deaths with a special emphasis on children and women death registration.

Turkey must make fast moves to adopt a widespread death report system based on its health institutions and to increase quality of data.

The MoH Maternal Mortality Notification System which exists since 2003 has shortcomings in regard to its comprehensiveness. The MoH should also concentrate on deaths which occur at home and determine the causes of maternal deaths through in-depth analysis of the health facility data.

National Maternal Mortality Study

The data collection system which was developed for the NMMS has many new features. Results of the research show that the NMMS system manages to keep deaths records and in particular maternal deaths records better than the other systems. The NMMS methodology has however also a few shortcomings.

The biggest problem faced within the province teams during the NMMS process was the high turnover of the health personnel in the teams, and in particular the district coordinators.

It was observed that due to their administrative duties some of the health staff in the province teams devoted limited time to NMMS activities.

The fact that health staff on province and district level is involved in the implementation of many different health related projects at the same time was another factor slowing down the NMMS activities.

Also the absence of revolving fund incentives for NMMS activities slowed down the pace of the study.
The heavy workload of the staff working in the province teams or failure to provide project researcher with a vehicle for transportation delayed certain activities such as hospital record review/verbal autopsy with the relatives of the deceased women was at times an obstacle.

Burying the dead body without a burial permit was realised during the survey as major problem. Since cemeteries are not controlled by the municipalities it was impossible for primary informants to keep records of such burials.

The village headmen and municipal officials didn’t want to work under the control of the province project teams who were the staff MoH.

Although village headmen were informed to send the forms every month regardless the existence of burials, they were reluctant to fill in forms and report for the months in which no burials took place.

Some of the project teams didn’t show much interest in the project at first due to false perception that the project was perceived more as a Hacettepe University study than one carried out by the MoH.

It took 16 months to obtain the full results of the 12-month fieldwork. Taking into consideration that NMMS was more a registry study than a survey/sampling study, it will be better understood how difficult the record keeping process is. It must be said that using the NMMS methodology as a routine – if not unfeasible – needs major commitment on central, provincial and district level.

Death Certification

Death certification and establishing cause(s) of death is not necessarily the same and should in the discussion be treated separately. Death certification is an administrative act in which different partners are involved. As a rule death should be certified by a medical doctor.

A death certificate must be issued which states details on the cause(s) of death. As important as examining the dead body is taking the history of conditions and events which were eventually leading to the death. For all cases a Verbal Autopsy tool should be applied during an interview with family members of the deceased. The interview can be conducted be done by a lay person.

It is important that causes of death are strictly formulated according to certain rules, as determined in WHO ICD-10 terminology.
Medical doctors must be trained on the importance of death certification as an essential medical service, the accurate procedure of death certification, incl. the use of a checklist, and on ICD-10 terminology, which is indispensable for the purpose of standardization.

The Ministry of Health must consider the issue of improved causes of death statistics a priority to be stipulated as a policy. Good knowledge on causes of death is an essential tool for policy makers.

The MoH may have to consider the introduction of an incentive for performing death certification as it exists for treating patients, since both are meaningful medical services.

At the same time, careful and systematic data collection should be made a criterion for performance evaluation.

**Measures for Reducing Maternal Mortality**

Measures must be taken to improve acceptance and in some places also accessibility for antenatal and obstetric care services. Families need to be able to recognize danger signs to ensure that care is sought promptly and from an appropriate facility.

Each hospital needs a follow-up committee to evaluate all fatal events as well as the more frequent near misses in order to understand the chain of events which contributed to the adverse outcome.

The MoH must emphasize efforts on increasing community and family awareness of warning signs of imminent suicide.

More efforts are also needed to reach women who do not want any more children, but who are not contracepting, in order to increase acceptance of family planning services in this risk group.

Due to insufficient level of acceptance and accessibility many mothers died because they reached a health facility either not at all or too late. Yet also a good number of lives of mothers who died in a hospital could probably have been saved if situations had been managed more appropriately by the health staff. Improving quality of care should be approached comprehensively, with an emphasis on, but not restricted to maternal care.
Flow Chart of Data Collection Activities in NMMR