Reproductive Age Mortality Survey (RAMOS) in West Azerbaijan province, Iran: an examination of the National Maternal Mortality Surveillance System

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RAMOS

in West Azerbaijan province, Iran

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RAMOS in West Azerbaijan province, Iran: an examination of the National Maternal Mortality Surveillance System

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ABSTRACT

Maternal mortality is believed to be the most sensitive indicator of women's status in the society and the capacity of a health system to respond maternal health needs. High quality data on maternal mortality is the only

way to ensure that its reduction remains a public health priority. However, the precise level of maternal mortality ratio (MMR) in Iran is not accurately known, since the officially reported statistics is based on the country level Maternal Mortality Surveillance System (MMSS) which is highly prone to under-reporting. The reproductive age mortality survey (RAMOS) represented a reliable measurement of maternal mortality eventual upon the availability of vital registration systems to ascertain deaths of women of reproductive age.

The main objective of this study was to investigate the causes of deaths among the identified maternal deaths at the community level using the RAMOS in all households in which a women of reproductive age died and to determine all direct, indirect, late and pregnancy related maternal mortality in the West Azerbaijan Province of Iran during one year (March 2013 to March 2014).

A cross-sectional study was undertaken to identify all reproductive aged women deaths occurring from 21 March 2013 to 20 March 2014. Using the RAMOS methodology, all possible deaths among women of reproductive age using multiple sources to identify the cause of death were identified and then which of those decedents died during pregnancy or in the year after pregnancy were determined.

Data sources included "Death Registration System of the Urmia University of Medical Sciences", "National Organization of Civil Registration", "Legal Medicine Organization", "Cemeteries", "Rural and Urban Health

Centers" and "Hospitals" in all 18 townships of the province.

Of 35 maternal deaths identified, 12 (34.0%) were unregistered. Among unregistered deaths, six cases were intended self harm by burn during pregnancy, four of them were coroners' cases and two were abortion related cases. Therefore, only 23 (65.7%) registered maternal deaths had been coded as maternal deaths, yielding an MMR of 36.5 per 100 000 live births, which was 34.4% lower than the actual MMR of 55.6.

It is included that the National Maternal Mortality Surveillance System is not functional and is prone to underreporting. Under-reporting of maternal deaths in West Azerbaijan province of Iran in 2014 was attributable to misclassification and delayed registration of coroners' cases.

BACKGROUND

Maternal mortality is believed to be the most sensitive indicator of women's status in the society and the capacity of a health system to respond maternal health needs. The overall lack of reliable data on maternal mortality at the regional level hinders prevention efforts, prioritization, and budget allocation [1]. Reduction of the Maternal Mortality Ratio (MMR) by three quarters between 1990 and 2015 is one of the indicators used to evaluate the progress of 5th MDG [2]. Based on official reports, MMR in Iran is significantly decreasing, i.e. it reduced from 90.6 maternal deaths per 100,000 live births in 1988 to 22.8 in 2008, but with remarkable inequalities between provinces [3, 4]. In addition, the World Health Organization (WHO) reported that Iran achieved an average annual decline of 5.5% or more in MMR between 1990 and 2008 and achieved an estimated level of 30 (from 18 to 50) maternal deaths per 100000 live births so are "on track" [5]. Both the national reports and the WHO estimates show that maternal mortality reduction is rapid and the country is likely to meet the 5thMDG by 2015.

In many developing countries, progress toward reducing maternal mortality cannot be adequately measured with the current level of existing statistics. Despite a long tradition of vital registration in Iran and establishment of national maternal mortality surveillance system (MMSS), the completeness of data officially reported had been repeatedly scrutinized and, at least for maternal mortality, had been proven inadequate. In the World

Health Statistics 2010, two different estimates have been provided for Iran; one country reported and one inter-agency estimate. Those estimates for Iran (reference year: 2005) are 25 and 140 (95 CI: 95-190) respectively [6].

Evidence-based health policies and decision making rely on accurate data, and incorrectly collected data can lead public health programs down suboptimal paths. However, the precise level of MMR in Iran is not accurately known, since the officially reported statistics is based on the country level Maternal Mortality Surveillance System (MMSS) which is highly prone to under-registration. The MMSS has been implemented in to the Iranian national health system throughout the country since 2001 and provides ongoing surveillance of all pregnancy-related deaths reported through health care settings and hospitals [7]. This method is known to miss a significant proportion of actual cases because events in early pregnancy related to for example, ectopic pregnancy or unsafe induced abortion are particularly prone to underreporting by relatives and providers. In addition, the MMSS utilize the International classification of diseases, 9th revision (ICD-9) definition of maternal death instead of ICD-10. It does not include "late maternal death; i.e., the death of a woman from direct or indirect obstetric causes, more than 42 days, but less than one year after termination of pregnancy." and "pregnancy related death; i.e., the death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the cause of death." as the potential causes of maternal deaths, which can be a source of underreporting of maternal deaths. Meanwhile, because of lacking well complete registration data in Iran, WHO`s estimation has been done based on a model using the three selected covariates: the Gross Domestic Product per capita

(GDP), the Total Fertility Rate (TFR), and the proportion of Skilled Attendants at Birth (SAB). At least two of them were improved dramatically during recent two decades, (TFR was decreased from 5.5 in 1988 to around 1.7 in 2012 and SAB increased from 70% to around 97.3% from 1989 to 2007) [8]. Whilst, a recent study showed that substandard care and medical error, especially in the hospitals was the major contributing factor leading to the maternal mortality in Iran [9].

The question arose whether maternal mortality was underreported in the official statistics in Iran. It is crucial to find consistently effective ways to identify, report, and investigate maternal deaths at the community level. Periodic population-based studies–RAMOS or census-based mortality studies–are valid alternatives to measure maternal mortality and can be a source of more detailed information about the circumstances of maternal deaths. The RAMOS involves identifying and investigating the causes of all deaths of women of reproductive age in a defined population via multiple data sources [10]. It represented a reliable measurement of maternal mortality eventual upon the availability of vital registration systems to ascertain deaths of women of reproductive age. In order to improve upon the measurement of births and deaths in low-resource settings, the WHO advises countries to prioritize the development of vital registration programs [11]. National death certification processes are fully implemented in both rural and urban areas in Iran.

High quality data on maternal mortality is the only way to ensure that maternal mortality reduction as a public health priority is on track or not. Both the Iranian national reports and the WHO estimates show that the country is likely to meet the

5th Millennium Development Goal (MDG) by 2015. However, the precise level of MMR in Iran is not accurately known, since the officially reported statistics are based on the country level MMSS which is highly prone to under-reporting. The question arose whether maternal mortality was underreported in the official statistics in Iran.

This is the first provincial RAMOS study in Iran that will employ a full investigation of all deaths to women of reproductive age (15- 49 years of age) rather than a sample-based data collection. In addition, the aim of present study is to determine all direct, indirect, late and pregnancy related maternal mortality in the West Azerbaijan Province of Iran during one year.

The aim of present study is to investigate the identification of maternal deaths at the community level using the RAMOS to determine all modalities of maternal mortality based on the ICD-10 definitions in the West Azerbaijan Province of Iran during one year (March 2013 to March 2014). The study consists of two phases of data collection: death identification among reproductive age women using multiple community-based data sources and interviews of respondents from the deceased household using a standard verbal autopsy questionnaire. Maternal mortality review committee will review data from the investigation to establish a final diagnosis of maternal mortality and to determine causes and underlying issues that may have contributed to the death.

Specific objectives of the research project

1.   To identify the magnitude of maternal deaths using RAMOS method in the West Azerbaijan Province, Iran;

2.   To evaluate existing national Maternal Mortality Surveillance System in Iran, with particular focus on the certification of the cause of death;

3.   To carry out a detailed analysis of causes of maternal deaths (directs/indirect, late and pregnancy related maternal mortality) in the West Azerbaijan, Iran;

4.   To estimate cause-specific mortality fractions and life-time risk of maternal deaths among women 15-49 years old;

5.   To recommend evidence-based approaches that can improve the maternal health situation and its measurement in Iran.

LITERATURE REVIEW

The reproductive age mortality survey (RAMOS) represented a reliable measurement of maternal mortality at national and subnational level. The RAMOS has been used in assessments of maternal mortality in countries worldwide especially several low-resource countries, including Afghanistan [12], Pakistan [13], Jamaica [14], Vietnam [15], Mozambique [16], Ghana [17]. In all of these studies, the use of the RAMOS increased the identification of maternal deaths compared with official government estimates. The RAMOS was used in Ghana in 2002; the survey identified almost twice the number of maternal deaths as the officially reported number of maternal deaths [17]. In Mozambique, use of the RAMOS increased the identification of maternal deaths in hospital, but it did not include the outcomes of the 60% of deliveries that occurred outside the healthcare facilities [16]. Likewise, in Surinam, use of the RAMOS into deaths in 5 hospitals over 9 years found that the number of maternal deaths identified was 30 percent higher than the officially reported number of maternal deaths for the whole country [17].

METHODOLOGY

Research Design

The research has the overall goal of investigating the identification of maternal deaths at the community level using the RAMOS in the West Azerbaijan Province of Iran during one year (March 2013 to March 2014).

During the first five months of research, administrative infrastructure needed for the research has been put into place, 20 interviewers have been selected, the professional Maternal Mortality Review Committee has been appointed and held its first meeting, and the initial Survey Quality Management Plan has been developed. Work to address planning and design of the research has involved following steps:

● Team formation: Building a team of interviewers began with enlisting the potential mid-level health workers through the whole public health sector. Next, a team of 20 interviewers was

established by invitation, inclusive of subject matter experts from all townships involved in providing health care to pregnant women and infants.

● Training research teams: Interviewers underwent a 2-days training course. They were oriented on the methodology and how to complete the questionnaire. The interviewers piloted the forms under the supervision of the principal investigator who worked individually with each interviewer to identify and correct gaps in understanding and skills needed to carry out the work.

● Formation of Maternal Mortality Review Committee: Two obstetricians with formal training in obstetrics reviewed each of the verbal autopsies to classify individual cases as direct or indirect maternal deaths. Agreement of both reviewers was sufficient to make the classification. In the event that they had different opinions, the project leader facilitated a discussion with the reviewers to arrive at consensus. International Statistical Classification of Diseases (ICD)-10 definitions and classifications of causes of maternal death were used.

● Preparing the questionnaire: The verbal autopsy questionnaire was adjusted to the local (Persian) language. Pilot study principals on 10 cases applied to finalize the questionnaire (Attached as Annex 1).

● Monitoring: All 20 interviewers received at least one random monitoring visit during their fieldwork. Those identified as having difficulty received more frequent monitoring. Additionally, repeat proxy interviews were conducted for 5% of all deaths to check for the reliability of the completed interviews.

Study setting / data sources

The West Azerbaijan is a north western province of Iran which has higher fertility, lower level of socio-economic development than other provinces and is populated mainly by two large ethnic and religious groups namely Turks (Shiite Muslims) and Kurds (Sunni Muslims).

Reproductive health services delivers through a nation-wide network that composed of a referral system, starting at primary care centers in the periphery going through secondary-level hospitals in the provincial capital and tertiary hospitals in major cities. Reproductive health services are integrated into primary health services and provided through primary health care facilities and hospitals. Maternal health is monitoring through the following national policies and programs: national Maternal Mortality Surveillance System (MMSS), integrated management of pregnancy and childbirth, and training skilled birth attendants for deprived and remote regions.

Sample size

The records from all reproductive age mortality cases detected by the RAMOS during study time period will be consider, in addition to maternal mortality cases from the MMSS. Based on the country-specific life expectancy data published by the WHO, death rate for 15-49 years old Iranian women was 0.008 in 2012. Therefore, it is estimated that sample size for verbal autopsy for deceased women will be about 820 reproductive age women [18].

Sampling method

All reproductive age deaths as well as all maternal deaths identified in West Azerbaijan province during study time period will be reviewed. Therefore, we need no sampling method in this study.

Data management plan

Both data collected during the field work and the causes of death assigned by the review committee will be computerized. A database will create and analyze using SPSS software ver. 20 (IBM, Armonk, NY, USA) and STATA (Stata Corp, College Station, TX, USA). All maternal deaths identified in the West Azerbaijan province will compare with the National Maternal Mortality Surveillance System (MMSS) database. The MMR (plus 95% CI) will calculate using capture–recapture from RAMOS and MMSS data [19]. Cases meeting the ICD-10 will qualify for this investigation. The MMR will define as the number of maternal deaths divided by the number of live births in the same category per 100,000.

Case Identification

The target population for the RAMOS study included all women ages 15 to 49 with a
permanent residence in the West Azerbaijan Province who died in a year (March 2013 to March 2014). Six sources of data were used for the identification of deaths to women of reproductive age:

- Death Registration System of the Urmia University of Medical Sciences;

- National Organization of Civil Registration;
- Legal Medicine Organization;
- medical death certificates from Rural and Urban Health Centers;
- medical death certificates from Hospitals; and
- community informants contacted during the field work of known death cases.

Briefly, the process of identifying women of reproductive age who died during March 2013 to March 2014 included the following steps:

- First, an electronic subset of death records from the Death Registration System of the Urmia University of Medical Sciences was reviewed by the investigators. The review found that the electronic database included information on 833 deaths to women of reproductive age during March 2013 to March 2014. The database provided a limited number of variables that could help identify the families of the deceased.
- Next, a manual review of the medical death certificates from health centers and hospitals was used to verify and complement the information for records already included in the electronic database. This process also identified 22 additional deaths to women of reproductive age that did not appear to have been included in the electronic database.
- Next, the National Organization of Civil Registration issued a request for assistance from the regional governors, who usually maintain documents of mortality data; after excluding cases already identified, 25 additional deaths were retained in the study group.
- Next, a review of the Legal Medicine Organization yielded another 29 potential eligible deaths.

- Three more deaths to women of reproductive age were found in the course of the field work investigation. Trained interviewers were given instructions to record any additional eligible deaths they might come across during the data collection.

Overall, 918 deaths were originally identified as meeting the eligibility criteria through vital records and registry reviews and three deaths were identified during household visits to conduct scheduled verbal autopsies.

Figure 1 shows the distribution of the 921 eligible deaths (women of reproductive age who died during March 2013 to March 2014), by source of data used for case identification. The vast majority of eligible cases (90.4%) were identified through the review of the Death Registration System of the Urmia University of Medical Sciences. An additional 2.7% of deaths were identified through review of the National Organization of Civil Registration data, 3.1% through information received from the Legal Medicine Organization and 2.4% from medical death certificates of the Health Centers and Hospitals. Only 0.3% of deaths were identified during the field work investigations.

This indicates that 8.6% of all eligible deaths were unaccounted for in the major health system vital registration related for mortality statistics for women of reproductive age.

Figure 1. Case identification of eligible deaths by source of
mortality data
(N=1064 deaths to women 15-49)
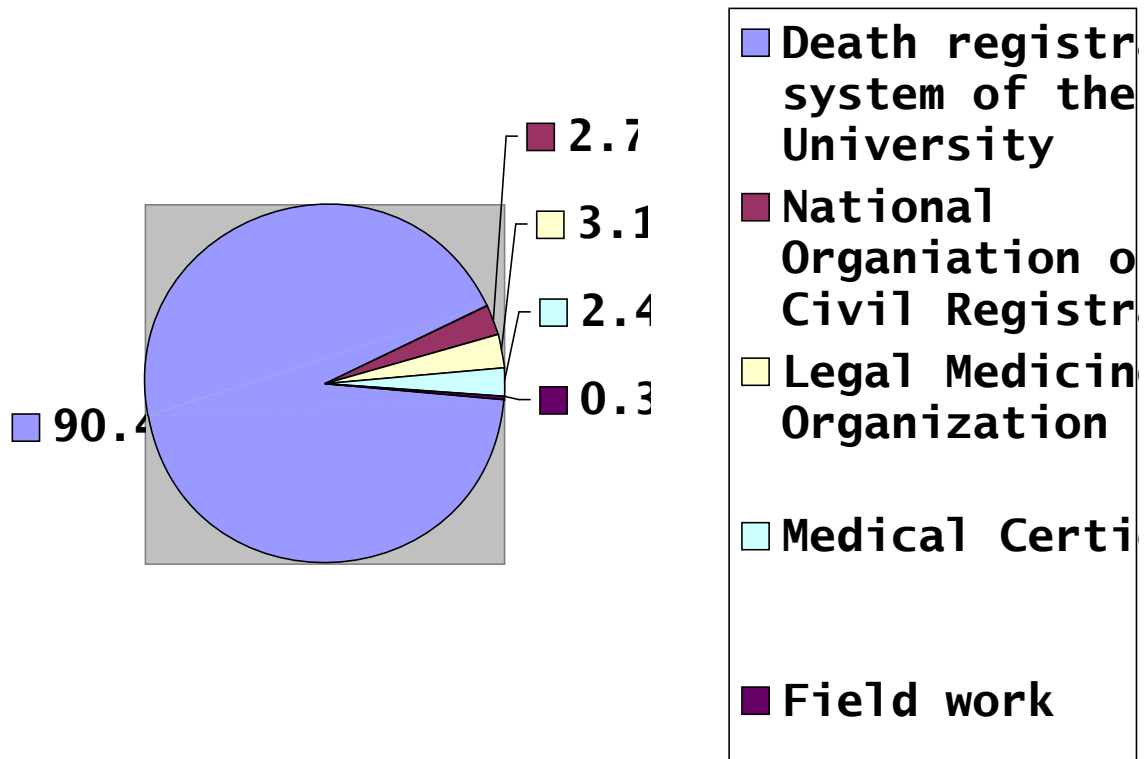
Data Collection and Management

Work to address phase two of data gathering has involved the verbal autopsies in which trained interviewers visited the households of the deceased and interview with predetermined key respondents using the translated verbal autopsy questionnaire. The field work was conducted by 20 female interviewers specially trained in interview techniques, field work procedures, and questionnaire content before the beginning of fieldwork. Interviewers were also trained in procedures related to record reviews in health facilities. Interviewer training took place at the Health Deputy headquarter of the Urmia University of Medical Sciences in Urmia just before data collection. All deaths to women of reproductive age were investigated by performing household visits and completing detailed interviews with relatives of the deceased women.

Field work was conducted between May 15, 2015 and June 30, 2015, for the preparing final list of the maternal deaths, between July 10, 2015 and October 30, 2015 for the verbal autopsies, and November–December 2015 for the records review. A total of 921 deaths were short-listed. In the urban areas, address of 24 death cases was not accessible. Therefore, access rate to the death cases was 97.4% (Table 1). The access rates of family interviews for eligible deaths varied slightly by townships.

Table 1: Distribution of the reproductive age deaths cases by townships in the West Azerbaijan Province, Iran

Row	Name of the townships	No. of extracted death cases	No. of cases with completed questioning (accessed cases)	Access rate (%)
1	Urmia	294	282	95.9
2	Oshnavieh	14	14	100
3	Bookan	54	51	94.4

4	Poldasht	18	18	100
5	Piranshahr	38	37	97.4
6	Tekab	22	22	100
7	Chaldoran	20	20	100
8	Chaypareh	16	16	100
9	Khoy	90	87	96.7
10	Sardasht	50	50	100
11	Salmas	72	71	98.6
12	Shahindejh	19	19	100
13	Shot	19	19	100
14	Makou	28	28	100
15	Mahabad	50	49	98
16	Miandoab	73	71	97.3
17	Naghadeh	44	43	97.7
PROVINCE		921	897	97.4

Data collected during the field work were reviewed by the Maternal Mortality Review Committee who established the most probable cause of each death. Because it is not always possible to make a precise determination of interacting diseases or conditions or to make a judgment as to the chain of events leading to death, each questionnaire was reviewed by two physicians, who completed independently (blinded) the cause of death certification, using the WHO standard death certificate form. An expert coder assigned ICD-10 codes to all immediate and antecedent causes of death. Deaths to women while pregnant or within one year from the pregnancy termination were reviewed by the committee with experience in classification of pregnancy-related causes of death.

Definition of Terms

Definition of deaths in pregnancy, childbirth and the puerperium: ICD-10 [20]

The World Health Organization defines maternal death as: *Death occurring during pregnancy, childbirth and the puerperium* is the death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the cause of death (obstetric and non-obstetric), but not from accidental or incidental causes.

Maternal deaths are subdivided into two groups:

• *direct obstetric deaths:* direct obstetric deaths are those resulting from obstetric complications of the pregnancy state (pregnancy, labour and the puerperium), from interventions, omissions,

incorrect treatment, or from a chain of events resulting from any of the above.

• *indirect obstetric deaths:* indirect obstetric deaths are those resulting from previous existing disease or disease that developed during pregnancy and which was not due to direct obstetric causes, but which was aggravated by physiologic effects of pregnancy.

The ICD-10 revision of disease classification system introduced the concept of late maternal death, in recognition of the advancements in medical technologies and the ability of life-support systems to prolong life beyond 42 days postpartum.

Late maternal death

A late maternal death is the death of a woman from direct or indirect causes more than 42 days but less than one year after termination of pregnancy.

In addition, the CDC and American College of Obstetricians and Gynecologists (ACOG) has introduced the definition of "pregnancy-associated death" as one that includes all deaths of women while pregnant or within 1 year of termination of pregnancy, from any cause, duration or site of the pregnancy.

Coincidental causes

These deaths occur in pregnancy, childbirth, or the puerperium but are not by definition are considered maternal deaths, such as motor vehicle accident, external causes of accidental injury, assault, and so on.

RESULTS

Background Characteristics of Women Who Died during Pregnancy or within 1 Year of Pregnancy

The characteristics of women who died while pregnant or postpartum and those who died due to maternal causes are shown in Table 2. Most deaths occurred among women aged below 34, reflecting the high age-specific fertility rates experienced by these women. More women with pregnancy associated death and with maternal deaths were living in rural areas than in urban areas and the vast majority were married at the time of death.

Although most pregnancy associated deaths and maternal deaths were among women of Sunni ethnic background, one in six deaths occurred among Azeri women. Maternal death differences by place of residence and ethnic background are likely the result of multiple and interrelated factors, including socio-economic disparities and high pregnancy rates among minorities.

Table 2
Deaths during March 2013 to March 2014 to Currently or Recently Pregnant Women Aged 15–49 Years by Selected Characteristics Reproductive Age Mortality Study: Iran, 2015

Characteristics	N	%
Residence		
Urban	18	43.9
Rural	23	56.1
Age group		
15–24	18	43.9
25–34	15	36.6
35–44	6	14.6
45+	2	4.9
Marital status		
Married	40	97.6
Divorced	0	0.0
Dead of husband	0	0.0
Never married	1	2.4
Education		
Illiterate	14	34.1
Secondary incomplete or less	16	39.0
Secondary complete	9	21.9
University	2	4.9
Ethnic (religious) group		
Azeri (Shiites Muslims)	15	36.6
Kurd (Sunni Muslims)	26	63.4
Others	0	0.0
Total	41	100.0

Distribution of Deaths by Characteristics

Table 3 shows the percent distribution of deaths to women 15–49 years in West Azerbaijan, Iran during March 2013 to March 2014 by selected geographic and socioeconomic characteristics. Approximately 50% of deaths occurred to women who lived in rural areas. As expected, deaths are concentrated at older ages; two times more deaths occurred among women aged 45–49 than among women aged 15–19. More than two-thirds of deaths occurred among married women. Near to one-half of deaths (49.5%) were among illiterate women.

The distribution of women aged 15–44 who died during March 2013 to March 2014 by most individual characteristics is comparable with the distribution of the population of women of reproductive age as a whole (data not shown). However, approximately about 30% of the province population lives in the rural areas.

Table 3 Percent Distribution of Women Aged 15–49 Years Who Died during March 2013 to March 2014 by Selected Characteristics Reproductive Age Mortality Study: Iran, 2015	
Characteristics	**%**
Residence	
Urban	52.3
Rural	47.7
Age at last birthday	
15–19	10.7
20–24	14.2
25–29	11.9
30–34	12.3
35–39	13.5
40–44	16.1
45–49	21.3
Marital status	
Married	69.1
Divorced	2.7
Dead of husband	4.5
Never married	23.7
Education	
Illiterate	45.3
Secondary incomplete or less	35.5
Secondary complete	12.7
University	6.5
Ethnic (religious) group	
Azeri (Shiites Muslims)	49.5
Kurd (Sunni Muslims)	49.5
Others	1.0
Total	100.0
No. of deaths	897

Cause-Specific Mortality Fractions among Women 15-49

As identified by the verbal autopsy, neoplasm was by far the most common cause of death for women 15-49 in West Azerbaijan, Iran during March 2013 to March 2014 (Table 4). After grouping the underlying cause of death by ICD-10 chapter codes, neoplasm accounted for 33.9% of all eligible deaths. External causes were the second-most common underlying cause of death (22.8%), followed by diseases of the circulatory system (17.5%).

Table 4 Underlying Cause of Death Coded by the ICD-10 Chapter Deaths during March 2013 to March 2014 to Women Aged 15-49 Years Reproductive Age Mortality Study: Iran, 2015	
ICD-10 Chapter	Deaths to Women Aged 15-49
	N %
II. Neoplasm	304 33.9
XX. External causes of morbidity and mortality	205 22.8
IX. Diseases of the circulatory system	157 17.5
VI. Diseases of the nervous system	74 8.2
XV. Pregnancy, childbirth and the puerperium	41 4.6
I. Certain infectious and parasitic diseases	32 3.6
XI. Diseases of the digestive system	27 3.0
XVIII. Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified	16 1.8
All other classified	41 4.6
Total	897

Table 5, shows percent distributions of deaths by cause within 5-year age groups of the deceased women. As expected, deaths due to neoplasm increased with age, whereas pregnancy, childbirth and the puerperium- related deaths and deaths due to external causes of morbidity and mortality decreased with age. Age specific mortality rates for the main causes of death are shown in Table 6.

Table 5
Cause-Specific Mortality Fractions by Age Group by the ICD-10 Chapter
Deaths during March 2013 to March 2014 to Women Aged 15–49 Years
Reproductive Age Mortality Study: Iran, 2015

ICD-10 Chapter		Age group						
		15–19	20–24	25–29	30–34	35–39	40–44	45–49
I.	Certain infectious and parasitic diseases	0.0	1.8	3.7	5.9	6.0	4.8	1.9
II.	Neoplasm	21.8	18.0	26.6	30.7	38.0	38.7	45.4
VI.	Diseases of the nervous system	1.4	8.1	11.9	10.9	7.5	8.3	7.8
IX.	Diseases of the circulatory system	14.6	10.8	16.5	17.8	17.9	19.6	20.0
XI.	Diseases of the digestive system	2.9	0.0	1.8	3.0	3.0	4.8	4.4
XV.	Pregnancy, childbirth and the puerperium	1.4	9.9	7.3	4.9	5.2	4.2	1.0
XVII.	Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified	1.4	0.9	0.0	2.0	1.5	2.4	2.9
XX.	External causes of morbidity and mortality	49.3	44.2	28.4	21.8	14.9	10.7	15.1
All other classified		7.2	6.3	3.7	3.0	6.0	6.5	1.5
Total		100.	100.	100.	100.	100.	100.	100.

	0	0	0	0	0	0	0
No. of cases	69	111	109	101	134	168	205

Table 6
Age-Specific Cause-Specific Mortality Rates per 100,000 Women Aged 15–49 Years by the ICD–10 Chapter
Deaths during March 2013 to March 2014 to Women Aged 15–49 Years
Reproductive Age Mortality Study: Iran, 2015

ICD–10 Chapter		Age-specific Cause-specific Mortality Rates (5-year Age Groups)*						
		15-19	20-24	25-29	30-34	35-39	40-44	45-49
I.	Certain infectious and parasitic diseases	0.0	0.2	0.4	0.7	0.9	0.9	0.4
II.	Neoplasm	1.7	2.2	3.2	3.4	6.0	7.2	10.3
VI.	Diseases of the nervous system	0.1	1.0	1.4	1.2	1.1	1.5	1.8
IX.	Diseases of the circulatory system	1.1	1.3	2.1	2.0	2.7	3.7	4.9
XI.	Diseases of the digestive system	0.2	0.0	0.2	0.3	0.3	1.0	1.0
XV.	Pregnancy, childbirth and the puerperium	0.1	1.2	0.9	0.5	0.8	0.8	0.2
XVII.	Symptoms, signs and abnormal clinical and laboratory findings,	0.1	0.1	0.0	0.2	0.2	0.4	0.7

	not elsewhere classified							
XX.	External causes of morbidity and mortality	3.8	5.4	3.4	2.4	2.2	2.0	3.4
	All other classified	0.5	0.8	0.4	0.3	0.9	1.2	0.3
	Crude Mortality Rate	7.6	12.2	12.0	11.0	15.1	18.7	23.0

* Per 100,000 women aged 15–49 using the population census for 2011

The underlying cause of death identified from the verbal autopsy was further categorized using the WHO 103-cause Condensed Adult Mortality List, which provides more detail than using the broad ICD chapter codes. Table 7 shows the number of deaths, percent distributions, and unadjusted mortality rates for the most common causes of death for the study population using the Condensed List. The all-cause crude mortality rate was 99.3 per 100,000 women aged 15–49 years. Proportionally, Cardiovascular diseases was the largest killer (11.4%) of women of reproductive age. About 134 deaths in the study population were due to Cardiovascular diseases. Transport accidents caused 10.7% of deaths, followed by Intentional self harms (9.1%) and Other CNS and mental diseases (8.2%). Eighty-one suicides were reported among women 15–49 in the West Azerbaijan, Iran during March 2013 to March 2014. The underlying cause of death could not be determined for 1.3% of deaths, which is considered within a reasonable range when using retrospective verbal autopsy methodologies.

Table 7
Leading Underlying Cause of Death: Women 15–49 Years (Percent Distribution) and Crude Cause-Specific Mortality Rates Tabulated

to WHO Adult Condensed Tabulation List Reproductive Age Mortality Study: Iran, 2015			
Underlying Cause of Death according to WHO Adult Condensed Tabulation List	Deaths to Women Aged 15–49 years		Crude Cause-Specific Mortality Rate*
	N	%	(per 100,000)
Cardiovascular diseases	102	11.4	11.3
Transport accidents	95	10.7	10.5
Intentional self harms	81	9.1	9.0
Other CNS and mental diseases	74	8.2	8.2
Malignant neoplasm of breast	73	8.1	8.1
Reminder of malignant neoplasms	59	6.6	6.5
Cerebro-vascular diseases	55	6.1	6.1
Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified	45	5.0	5.0
Other unintentional harms	41	4.6	4.5
Malignant neoplasm of trachea, bronchus and lung	34	3.8	3.8
Leukemia	26	2.9	2.9
Malignant neoplasm of meninges, brain and other parts of central nervous system	25	2.8	2.8
Malignant neoplasm of colon and rectum	23	2.6	2.5
Malignant neoplasm of pelvic organs	22	2.4	2.4
Malignant neoplasm of stomach	22	2.4	2.4
Malignant neoplasm of esophagus	20	2.2	2.2
All other classified	88	9.8	9.8
Unknown	12	1.3	1.3
Total	897	100	99.3

* Per 100,000 women aged 15–49 using the population census for 2011

Deaths to women while pregnant and postpartum

Between March 2013 to March 2014, the RAMOS study identified 41 women who died while pregnant or within one year from their last pregnancy. These deaths were investigated in household interviews with the family members and with facility-based record review and summary forms completed for health services that provided care immediately prior to death. As a result, 25 deaths were classified as directly or indirectly caused by pregnancy while 12 were deemed as coincidental deaths (six of coincidental cases was related to the suicide, therefore classified as possible direct maternal mortality) and four as late maternal deaths. Since different terminologies and definitions are used in maternal mortality measurements, the definitions used in the RAMOS study are presented below.

Type of Death and Time Interval between Pregnancy and Death

Table 8 shows the distribution of deaths to women while pregnant or postpartum by the time interval between pregnancy and death. Combining maternal and late maternal deaths as defined by the World Health Organization (WHO), we redefined maternal mortality as deaths among women of reproductive age (15–49 years) from any cause related to pregnancy or its management within 1 year of pregnancy outcome, irrespective of the duration or site of the pregnancy, but not from accidental or incidental causes.

Deaths resulting from obstetric complications during pregnancy, labour, or the puerperium from interventions, omissions, incorrect treatment, or from a chain of events resulting from any of the above were classified as direct obstetric deaths. This category includes deaths due to obstetric hemorrhage–placenta

praevia (4 cases), retained placenta (1 case), uterine rupture (1 case), and abruptio placentae (1 case)–puerperal or post-abortion sepsis (2 cases), pregnancy induced hypertension (PIH) (6 cases), and pulmonary embolism (3 cases).

Deaths resulting from previously existing diseases or diseases that developed during pregnancy and were not directly related to pregnancy but were aggravated by the physiological effects of pregnancy were classified as indirect obstetric deaths. Most indirect deaths were due to aggravation of previous diseases or conditions during pregnancy or after delivery, such as congenital cardiac diseases (4), Diabetes Mellitus (2), and epilepsy (1 case). Two indirect deaths were due to cerebrovascular accidents during the early postpartum period. The indirect death category also includes 3 deaths due to neoplasms–diagnosed during the pregnancy and not treated until after delivery or pregnancy termination–and 5 suicides during pregnancy. Deaths that were linked to pregnancy only by a temporal association (i.e. they occurred during pregnancy or within 1 year after the pregnancy had ended) were classified as incidental deaths.

Of the 41 deaths to women while pregnant or within 1 year from the end of pregnancy, 34 (82.9%) occurred during pregnancy or within the first 42 days after pregnancy (Table 8). Thirty-five maternal deaths were due to direct or indirect obstetric causes, including five due to suicide during pregnancy; the other 6 pregnancy-associated deaths were due to incidental causes (i.e. causes unrelated to pregnancy). Of the 35 maternal deaths, 31 deaths (88.6%) were early maternal deaths and 4 (11.1%) were late maternal deaths (occurred between 43–365 days after the end of pregnancy), including one death to women who died of direct obstetric causes.

Table 8
Main Cause of Death by the Time of Death in Relation to Pregnancy Termination deaths during March 2013 to March 2014 to Currently or Recently Pregnant Women Aged 15-49 Years
Reproductive Age Mortality Study: Iran, 2015

RAMOS Classification	Total		Time of Death in Relation to Pregnancy Termination			
	All Deaths 0-365 days	Early Deaths 0-42 days	During Pregnancy	During Delivery	After Pregnancy Had Ended	
					0-42 days	43-365 days
Direct obstetric death*	18 (100.0)	17 (94.4)	7 (38.9)	5 (27.8)	5 (27.8)	1 (5.5)
Indirect obstetric death§	12 (100.0)	9 (75.0)	3 (25.0)	1 (8.3)	5 (41.7)	3 (25.0)
Possible indirect (Suicide)∞	5 (100.0)	5 (100.0)	4 (80.0)	0.0	1 (20.0)	0.0
Total maternal deaths	35 (100.0)	31 (88.6)	14 (40.0)	6 (17.1)	11 (31.4)	4 (11.4)
Incidental death	6 (100.0)	3 (50.0)	2 (33.3)	0.0	1 (16.7)	3 (50.0)
All deaths to currently or recently pregnant Women	41 (100.0)	34 (82.9)	16 (39.0)	6 (14.6)	12 (29.3)	7 (17.1)

* The death of a woman resulting from obstetric complications of the pregnant state (pregnancy, labour and the puerperium), from interventions, omissions, incorrect treatment, or from a chain of events resulting from any of the above.
§ The death of a woman resulting from previous existing disease or disease that developed during pregnancy and which was not due to direct obstetric causes, but was aggravated by physiologic effects of pregnancy.
∞ The death of a woman while pregnant or within one year of termination of pregnancy due to a cause unrelated to pregnancy.

Main Causes of Maternal Death

Overall, direct obstetric causes accounted for 52.8% of maternal deaths and 88.9% of the maternal deaths that occurred 0–42 days postpartum (i.e. early maternal deaths). The most common direct obstetric causes were hemorrhage in the antepartum, intrapartum, or postpartum period (6 cases) and severe pregnancy induced hypertension (PIH) (6 cases), sepsis (2 cases), and pulmonary embolism (3 cases) (Table 9). Most of the early maternal deaths were due to direct obstetric causes, whereas most deaths that occurred after 42 days postpartum were due to indirect causes.

Table 9
Causes of Maternal Death by the Time of Death in Relation to Pregnancy Termination
Reproductive Age Mortality Study: Iran, 2015

Cause of Death	All Maternal Deaths (N=36)	Early Maternal Deaths (0–42 days) (N=32)	Late Maternal Deaths (43–365 days) (N=4)
	%	%	%
Hemorrhage	16.7	18.7	0.0
Infection	5.6	6.2	0.0
PIH	16.7	18.7	0.0
Embolism	8.3	9.4	0.0
Other direct	5.5	3.1	25.0
Indirect causes	47.2	43.7	75.0
Total	100.0	100.0	100.0

Comparison with Official Statistics (current Maternal Mortality Surveillance System)

Not all deaths included in the RAMOS investigation were officially reported in the current Maternal Mortality Surveillance System (Table 10, left panel). Overall, 23 (56%) of the RAMOS deaths to women while pregnant or within 1 year of pregnancy were reported in the official sources while 18 deaths (44%) were identified by manual review of medical death certificates, review of the regional death registries, and other sources. Among those, 11 deaths were early maternal and another seven were late maternal deaths.

Of 35 maternal deaths identified, 12 (34.3%) were unregistered. Among unregistered deaths, five cases were intended self harm by burn during pregnancy, five of them were coroners' cases and two were abortion related cases. Therefore, only 23 (65.7%) registered maternal deaths had been coded as maternal deaths, yielding an MMR of 36.5 per 100 000 live births, which was 34.4% lower than the actual MMR of 55.6. These results showed more than 34% underreporting in current maternal mortality surveillance system. This result was the subject of the second specific objective of this project as: to evaluate existing national Maternal Mortality Surveillance System in Iran.

RAMOS Classification	Pregnancy-associated Deaths	Maternal Deaths

Table 10
Death Reported in the RAMOS Study and the current Maternal Mortality Surveillance System Deaths to Currently or Recently Pregnant Women Aged 15–49 during March 2013 to March 2014 Reproductive Age Mortality Study: Iran, 2015

	RAMOS	Official Statistics	% Officially Reported	RAMOS	Official Statistics	% Officially Reported
	N	N		N	N	
Total	41	23	56.1	35	23	65.7
Early deaths (0–42 days)	34	23	67.6	31	23	74.2
Direct obstetric death	17	14	82.3	17	14	82.4
Indirect obstetric death	14	9	64.3	14	9	64.3
Incidental deaths	3	0	0.0	≠	≠	≠
Late deaths (43–365)	7	0	0.0	4	0	0.0
Direct obstetric death	1	0	0.0	1	0	0.0
Indirect obstetric death	3	0	0.0	3	0	0.0
Incidental deaths	3	0	0.0	≠	≠	≠

≠ Not applicable

DISCUSSION

The underlying causes of Maternal mortality can be in the form of social, cultural and gender equity disadvantages that women experience and the capacity of a health system to respond maternal health needs [21]. Reduction of the Maternal Mortality Ratio (MMR) by three quarters between 1990 and 2015 is one of the indicators used to evaluate the progress of 5th Millennium Development Goal [22]. Latest WHO estimates show that an estimated 287000 tragic loss of mothers occurred worldwide in 2010 [23]. Recent researches on maternal mortality trend analysis confirm that the MMR would be decreasing if governments take a strategic plan to quality safe motherhood care and providing obstetrics emergency care, but there is more work to be done.

Despite marked decreases during the past three decades, maternal deaths remain devastating women's health in Iran. However, the precise level of maternal mortality is not accurately known. Based on official reports, MMR in Iran is significantly decreasing, i.e. it reduced from 90.6 maternal deaths per 100,000 live births in 1988 to 24.6 in 2005 and to 22.8 in 2008, but with remarkable differences between provinces [24]. However, the accuracy of MMR is uncertain, since the reported statistics is based on the country level Maternal Mortality Surveillance System (MMSS) which is highly prone to under-registration. The WHO reported that Iran achieved an average annual decline of 5.5% or more in MMR between 1990 and 2008 and reached to estimated level of 30 (from 18 to 50) maternal deaths per 100000 live births so are "on track" [25]. Because of lacking well complete registration data in Iran, this estimation has been done based on a model using the three selected covariates: the Gross Domestic Product per capita (GDP), the Total Fertility Rate (TFR), and the

proportion of Skilled Attendants at Birth (SAB). At least two of them were improved dramatically during recent two decades, (TFR was decreased from 5.5 in 1988 to around 1.7 in 2012 and SAB increased from 70% to around 97.3% from 1989 to 2007) [26, 27]. However in Iran, MMR is lower than in neighboring countries but it is elevated when compared with other national indicators (low TFR, high coverage of prenatal care and high percentage of hospital deliveries).

In the absence of complete death registration and good attribution of causes of death, several techniques have been proposed to enhance the reporting of maternal deaths. The reproductive age mortality study (RAMOS) using multiple sources to identify deaths is considered one of the most complete and timely investigation of maternal death, a "gold standard" in maternal mortality research. It had been implemented both in countries with good and poor vital registration.

CONCLUSION AND RECOMMENDATIONS

The present Iranian RAMOS study provided measurements for major maternal mortality indicator needed to monitor progress and evaluate the overall effectiveness of the maternal health care systems: maternal mortality ratio (55.6 deaths per 100,000 live births). Since it included the investigation of all deaths, the study in Iran helped identify other main causes of death for women of reproductive age (i.e. cancer, injuries, and cardiovascular diseases) and priorities for prevention and health system strengthening. Additionally, Iran RAMOS collected information on a wide array of risk factors and behaviors that may have contributed to death and identified main barriers to

accessing quality health care services. Because it documented differentials in maternal mortality among various demographic groups including the geographical distribution of mortality, the study could be used to design and implement targeted interventions. Lastly, the study provided direct evidence of the degree of underreporting in vital records and the need for strengthening vital registration systems. The RAMOS-based maternal mortality ratio of 55.6 deaths per 100,000 live births during March 2013 to March 2014was higher than the MMR of 36.5/100,000 officially reported for the same year.

The present research demonstrates how under-reporting of maternal death occurs in Iran. Among 35 maternal deaths in a year (2013–2014), 23 (65.7%) had not been registered. The present findings indicate that a correction factor is needed when using National Maternal Mortality Surveillance System to estimate maternal mortality in Iran (23 of 35 maternal deaths were accurately recorded by Surveillance System).

Results of the RAMOS study can serve as a baseline for efforts aimed at enhanced mortality reporting, particularly maternal death reporting. They can complement other maternal mortality assessments or can be adapted to start up an active surveillance system of maternal mortality. Acting upon the RAMOS findings will ultimately result in improvements in the standards of care, promotion of integrated services, and the development of a new research agenda in safe motherhood in Iran.

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ANNEX 1

(Verbal Autopsy Questionnaire-
Persian language)

*مرکز تحقق*قات به‌داشت باور*

پرسشنامه کاربلد شکاف شفاه*
طرح بررس* مرگ زنان 15-49 سال
است‌ان آذربا*جان غرب*

***********کد م*ل* فرد متوف* *

بخش اول: اطلاعات عموم*

*در.ف	متغ*ر*	کد
101	نام است‌ان:	* (از 1 ت‌ا 9)
102	نام شهرست‌ان:	**
103	نوع منطقه: 1- شهر *روست‌ا* 2- *روست‌ا اصل* -3 روست‌ا *قمر* *روست‌ا* *سا*ر* -4	*

104	نام مرکز بهداشت* درمان* شهر* نام پایگاه .... بهداشت* نام مرکز بهداشت* درمان* نام خانه ....روستايي. بهداشت ....
105	***	شماره خانوار دارا* زن *متوف:
106	** / ** / **	تار*خ انجام مصاحبه :
107	نام و نام خانواده* فرد* که مورد مصاحبه قرار گرفت .... :
108	نسبت مصاحبه شونده با فرد متوف*: ....
109	*	آیا مصاحبه شونده در طول دوره بارداره منجر به فوت همراه با متوف* زندگ* م* کرده است؟ 1- بل* 2-خیر
110	نام پرسشگر: .... نام کنترل کننده:
111	آدرس محل سکونت: .... تلفن: ....
112	**	تعداد افراد خانوار: ....
113	*	د*ن و مذهب 1- ش*عه اثن* عش*ر 2-سن* 3- آشور* و کلدان* 4- ارمن* 5- *هود* 6- زرتشت*

بخش دوم: اطلاعات* در مورد متوف*، تار*خ و محل فوت

در* ف	کد	متغ*ر
201		نام و نام خانوادگ* متوف: ....
202	** روز ** ماه **** سال	تار*خ تولد متوف*:
203	**	سن متوف* در زمان فوت: .... سال
204	*	کدام*ک از مقاطع تحص*ل* را به اتمام رسانده بود؟ 1-ب* سواد 2- ابتدای* ای نهضت* سواد آموز*

	3- راهنمايي 4- دبيرستان 5- دانشگاه (مقطع و رشته تحص*ل*ي را نام بب*ر.)	
205	شغل متوف*ه چه بود؟ (اي ب*شتر*ن کار *که انجام م* داد.) 1- شاغل داخل منزل 2- شغل خارج منزل 3- خانه دار 9- ساير .... (نام بب*رد)	*
206	1- هرگز ازدواج نکرده بود. 3- مطلقه ب*وه	4- ازدواج کر
207	تار*خ فوت: روز ** ماه ** سال ****	
208	2- ساير مکانها*ه *ب*دشت*نامه 1- ب*مارستان ب*مارستان *محل* درمان	4-

ب*خش سوم: د*گاه مصاحبه شونده در مورد دل*ل* منجر به فوت

301	لطفآ در مورد ب*مار* *ا *حوادث* که منجر به فوت شد، توض*ح ده*د:
302	دل*ل مرگ از نظر فرد مصاحبه شونده: ....

ب*خش چهارم: شرح حال وقا*ع*ات* پ*شک* شناخته شده قبل*

دک	م*غتر	*در ف
	ب*مار*ها* *قبل* *متوف* و *مدآمان* که داشته است، م* پرسم. ب*خر* از *ا* *ن* سؤالات ممکن است مرتبط با *م*قتسم* فوت نباشد. پاس* خ شما با*شد. همه *ا* *ن* سؤالات ب*م* کمک کند تومر *روشن* از دل*ال* منجر به مرگ ب*دست آور*م.		
*	ب*مار* *قلب* وعروق* 1- ب*ل 2- *خ*ر 3- *من* ن*ادند	400
*	فشار خون ب*الا 1- ب*ل 2- *خ*ر 3- *من* ن*ادند	401
*	د*ابت* 1- ب*ل 2- *خ*ر 3- *من* ن*ادند	402
*	آسم* 1- ب*ل 2- *خ*ر 3- *من* ن*ادند	403

404	2- صرع 1- *لب 3- من* *داند	*
405	2- سوء تغذ*ه 1- *لب 3- من* *داند	*
406	سرطان (نوع آن را م* *داند؟ ....) 2- خ*ر 1- *لب 3- من* *داند	*
407	سل 2- خ*ر 1- *لب 3- من* *داند	*
408	ا*ا از ب*مار* د*گر رنج م* جنگ *برد؟ (لطفا نام ببر*د: ....) 2- خ*ر 1- *لب 3- من* *داند	*

بخش پنجم: تار*خچه حوادث و مدمات

کد	متغ*ر	*در ف
*	ا*ا حادثه ا* مدمه ا* منجر به فوت شد؟ 1- *لب 2- خ*ر 3- من* *داند (ارجاع به سؤال 504) (ارجاع به سؤال 504)	501
	چه نوع حادثه ا* مدمه ا* منجر به فوت شد 1- تمادف 2- افتادن از بلند* 3- خفگ* در آ*ا 5- *سوختگ* 4- سوختگ* 6- سا*ر (نام ببر*د. ....)	502
	ا*ا حادثه منجر به فوت بسورت عمد* توسط فرد د*گر* اعمال شد؟ 1- *لب 2- خ*ر 3- من* *داند	503
	آ*ا بنظر شما حادثه منجر به فوت به دل*ل خودکشک* بود؟ 1- *لب 2- خ*ر 3- من* *داند	504
*	ا*ا حادثه منجر به فوت به دل*ل گازگرفتگ* توسط ح*وان* ا ن*ش حشره ا* اتفاق افتاد؟ (نام ببر*د) .... 1- *لب 2- خ*ر 3- من* داند	505

بخش ششم: نشانه ها و علائم همراه با *مار* (قبل از
مار منجر به مرگ)

کد	متغ*ر	*در ف
	ا*ا *متوف* زخم ا* تورم* در *بدن پستان داشت؟ ....(چه مدت؟) 1- *لب 2- خ*ر	601

		3- *من *داد	
602	*	آ*ا متوف* در زمان قاعد*گ، خونر*ز *ب*ش از حد داشت؟ 1- *ل*ب (چه مد*تن؟..............) 2- خ*ر 3- من* داد	
603	*	آ*ا متوف* در فا*هله ب*ن قاعد*گ اه ن*ز خونر*ز* وا*ژ*نال داشت؟ 1- *ل*ب 2- خ*ر 3- من* داد	
604		آ*ا متوف* ترشحات وا*ژ*نال غ*ر طب*ع* داشت؟ 1- *ل*ب (چه مد*تن؟..............) 2- خ*ر 3- من* داد	*
605	*	آ*ا متوف* درزمان فوت باردار بود؟ 1- *ل*ب (مراجعه ب*ه سؤال 610) 3- من* داد (مراجعه ب*ه سؤال 610)	
606	*	سن باردار* متوف* چقدر بود؟ 1- .... هفته 2- 3- من* داد .... ماه	
607	**	با احتساب باردار* در زمان فوت، تاکنون چند بار باردار شده بود؟ من* داد=99	
608	آ*ا در س* ماه اخر باردار* عوار*ض ز*ر وجود داشت؟ 1- خونر*ز* وا*ژ*نال 1- *ل*ب 2- ترشحات وا*ژ*نال بد بو 2- خ*ر 2- سورت متورم خ*ر 4- سردرد 2- خ*ر 5- تار *د*د 2- خ*ر 6- تشنج 2- خ*ر 7- شکم درد ش*د*د 2- خ*ر 8- رنگ پر*د*گ* و تنگ* نفس 2- خ*ر 9- سا*ر *ل*ب 1- 2- خ*ر		1- *ل*ب 3- من* داد 2- 3- من* داد 1- *ل*ب 3- من* داد 1- *ل*ب 3- من* داد 1- *ل*ب 3- من* داد 1- *ل*ب 3- من* داد 1- *ل*ب 3- من* داد 2- 3- من* داد 9- .... (نام ببر*د) 3- من* داد	
609	*	آ*ا گرم در زمان دوره درد قبل از از*مان* (Labor) و قبل از وقوع از*مان* اتفاق افتاد؟ 1- *ل*ب 2- 3- من* داد خ*ر	
610	*	آ*ا قبل از فوت از*مان* کرده بود؟ 1- *ل*ب (مراجعه ب*ه سؤال 3- من* داد (مراجعه ب*ه سؤال 620) 2- خ*ر (620	
611	**	چند روز بعد از از*مان* فوت شد؟ من* داد=99	
612	*	آ*ا در *زور* که درد قبل از از*مان (Labor) شروع شده بود قبل از خروج جن*ن، خونر*ز* وا*ژ*نال ز*ا*د داشت؟ 1- *ل*ب 2- خ*ر 3- من* داد	
613	*	آ*ا بعد از خروج جن*ن، خونر*ز* وا*ژ*نال ز*ا*د داشت؟ 1- *ل*ب 2- خ*ر 3- من* داد	

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614	ا*ا در از*مان جفت تفت مشکل* وجود داشت؟ 1- بل* 2-خ*ر 3- من* دان*	*
615	ا*ا زمان بشت*رن* (ب*ش از 4 ساعت) در دوره درد درد قبل از مان* (Labor) قرار داشت؟ 1- بل* 2-خ*ر 3- من* دان*	*
616	نوع از*مان چگونه بود؟ 1- واژ*نال (طب*ع*) 2-سزار*ن 3- با فورسپس *ا واک*وم	
617	ا*ا ترشحات بد بو *واژ*نال وجود داشت؟ 1- بل* 2-خ*ر 3- من* دان*	*
618	از *مان در کجا انجام شد؟ 1- ب*مارستان 2- سا* ر واحده* بهداشت*درمان* 3- منزل 4- سا* ر (نام ببر*د)	*
619	عامل از *مان چه کس* بود؟ 1- بزشک 2- امام *مامح* 3- من* دان* 5- من* دان* 4-سا* ر (نام ببر*د) اطراف*ان	*
620	ا*ا در ک* سال اخ*ر، سقط جن*ن انجام داده بود؟ 1- بل* 2-خ*ر (اجرا به سؤال 3- من* دان* (اجرا به سؤال 701) (701	*
621	او در ح*ن در ج*ن سقط توف* شد؟ 1- بل* (اجرا به سؤال623) 2-خ*ر 3- من* دان* (اجرا به سؤال 623)	*
622	چند روز قبل از توف*، سقط ج*ن انجام شده بود؟ من* دان*=99	**
623	در زمان انجام سقط ج*ن، چند ماهه حامله بود؟ من* دان*=99	**
624	ا*ا بعد از سقط ج*ن، خونر*ز* واژ*نال شد*د وجود داشت؟ 1- بل* 2-خ*ر 3- من* دان*	*
625	ا*ا سقط ج*ن از نوع خودبخود* بود؟ 1- بل* (اجرا به سؤال 701) 2- 3- من* دان* (اجرا به سؤال 701)	*
626	ا*ا برا* انجام سقط ج*ن از اقدام* دارو *ا دارو* خاص* استفاده شده بود؟ 1- بل* (نام ببر*د) 2-خ*ر 3- من* دان*	*

بخش ش*خص*: و*فعت اجتماع*-اقت*صاد* خانوار متوف*

ف* در*	متغ*ر	دک
701	نحوه ت*رف حمل سکونت 1- *ملک* 2- اجاره 3- رهن و اجاره 4- در برابر خدمت 5- ار*گان(منزل پدر*،مادر* و سا* ر اقوام) 6- سا* ر با ذکر نام	*

702			نوع اسکلت بنا* محل سکونت 1- بتون آرمه و نرچ*ه بلوک 2- قلز*(ن*آرهن) 2- خشت و چوب 4- سنگ و چوب 5- بلوک س*ما*ن
703	*		مساحت ز*ربنا* واحد مسکون* 1- 100 متر مربع و کمتر 2- 100 ات 150 متر مربع 3- 151 ات 200 متر مربع 4- 200 متر و ب*شتر
704	*		تعداد اطاق در اخت*ار خانوار
705	*		نوع سوخت عمده مص*رف خانوار 1- گاز شهر* 2- گاز ما*ع(کپس*ول) 3- گازوئ*ل 4- نفت سف*د 5- ه*زم و زغال 6- فرآوله*ات حوا*ن
706	ب: آب لوله کش* ج:توالت بهد*اشن* د: تلفن ثابت ه: س*ستم گرم حرارت مرکز(شوفاژ و پک*ج)		امکانات و تس*هلات واحد 1-ب*ل ب*ل

*در ف	دک	متغ*ر	
707	الف: اتوم*بل ش*خص* ب: را*انه ش*خص*		ا*ا خانوار امکانات ز*ر را در ب*ل ب*ل ب*ل-1 د: استفاده از ا*نترنت توسط حداقل *ک* از افـ*راد خانوار

708		ا*ا خانوار از لوازم ز*ر استفا. الف: تل*ز : 1-ب*ل ب: انواع و*دئ،VCD،DVD ج: : 1-ب*ل د: 1-ب*ل ه: ماش*ن لباسشو** ب*ل و: ماش*ن ظرفشو** ب*ل ز: 1-ب*ل

| 709 | ✳

✳

✳ | عمده ت*ن منبع درامد خانوار
الف: مزد و حقوق دول*ت(بازنشستگ*،وظ*فه و ...)
ب: ف*ال*ت* صنعت* و خدمات*
ج: داد و ستد
د: کشاورز*- دامدار*
ه: کار روز مزد*
و: مستمر*
ز: سود سرما*ه و س*ام و ....
ح: اجاره محل کسب،مستغلات و زم*ن |

| 710 | ✳ | درامد ماه*انه خانوار در سال گذشته چقدر
بوده است؟
1- از 200 هزار توم*ان ا* کمتر
2- از 200 ات 400 هزار توم*ان
3- از 400 ات 600 هزار توم*ان
4- از 600 هزار توم*ان و ب*شتر
5- نم* دان*د ا* تما*ل* به پاسخ خ*دادن |

بخش هشتم: مراقبت*ها درمان* در*امان* درد اتف*اق شده در ب*مار* منجر به

دک	متغ*ر	در* ف
✳	آ*ا متوف* مراقبت*ها درمان* در*امان در ارتباط با ب*مار* منجر به فوت در*افت کرده بود؟ 1- بل* 2- خ*ر (ارجاع به سؤال 806) 3- نم* دان*د (ارجاع به سؤال 806)	801

802	در ب*مار* منجر به فوت، مراقبت*ها*ا پزشک* را در کدام از مکان*ها ز*ر در*افت نموده بود؟	
	1- منزل	1- *ب*ل 3- نم* داند
	2- مطب س*نت*	2- خ*ر 1- *ب*ل 3- نم* داند
	2- کل*ن*ک دولت*	2- خ*ر 1- *ب*ل 3- نم* داند
	4- *ب*مارستان دولت*	2- خ*ر 1- *ب*ل 3- نم* داند
	5- کل*ن*ک خصوص*	1- *ب*ل 2- خ*ر 2- 3- نم* داند
	6- *ب*مارستان خصوص*	1- *ب*ل 2- خ*ر 2- 3- نم* داند
	7- داروخانه	1- *ب*ل 2- خ*ر 3- نم* داند
	8- سا*ر (نام بربد*د............)	1- *ب*ل 2- خ*ر 3- نم* داند
803	در ک* ماه آخر عمر، چند بار به مراکز ارائه خدمات مراجعه کرده است؟ نم* داند=99	**
804	ا*ا علت فوت را کارکنان مراکز ارائه خدمات به شما اطلاع دادند؟ 1- *ب*ل (نام بربد*د:................................. 2- خ*ر 3- نم* داند	*
805	آ*ا متوف* به دل*ل ب*مار* منجر به فوت خود عمل جراح* شده بود؟ 1- *ب*ل (چه مدت قبل؟ ....) 2- خ*ر 3- نم* داند	*
806	اگر پاسخ سؤال قبل* مثبت بود، جراح* رو* کدام قسمت از بدن صورت گرفته بود؟ 1- شکم 2- قفسه س*نه 3- سر 4- سا*ر (نام بربد*د:...............................) 5- نم* داند.	

بخش نهم: داده *ها* بدرست آمده از گواه* فوت

ف ردر	مت*غ*ر	کد
901	آ*ا گواه* فوت وجود دارد؟ 1- *ب*ل 2- خ*ر (اجراع به سؤال 1001) 3- نم* داند (اجراع به سؤال 1001)	*
902	علت فوت ذکر شده در خط اول گواه* فوت را ق*د نما*ئد:	
903	علت فوت ذکر شده در خط دوم گواه* فوت را ق*د نما*ئد:	
904	علت فوت ذکر شده در خط سوم گواه* فوت را ق*د نما*ئد:	

بخش دهم: داده‌ها*ی بدست آمده از مستندات ثبت متوف*یان

علت فوت		دک	متغ*یر	*در ف
*			ا*یا مستندات فرد متوف* در نظام ثبت مرگ مرکز بهداشت شهرستان موجود است؟ 1- بل* 2- خ*ر	100 1
*			ا*یا مستندات فرد متوف* در ب*مارستان موجود است؟ 1- بل* 2- خ*ر	100 2
*			ا*یا مستندات فرد متوف* در سازمان پزشک* قانون* موجود است؟ 1- بل* 2- خ*ر	100 3
*			ا*یا مستندات فرد متوف* در سازمان ثبت احوال موجود است؟ 1- بل* 2- خ*ر	100 4
*			ا*یا مستندات فرد متوف* در سازمان شهرداری*(ارامستان) موجود است؟ 1- بل* 2- خ*ر	100 5

بخش *ازدهم:کدگذار* ب*مار*ها، سدمات و ا*وف*ت*ن که به طور مستق*م سبب مرگ شده اند

دک (Verbal Autopsy)	دک ICD-10	متغ*یر	*در ف
		آخر*ن ب*مار* ا* و*وفع*ت*ن که منجر به فوت شده است:	100 6
		سا*ر و*وفع*ت**ها** که به طور مستق*م در وقوع مرگ موثر بوده است:	100 7

خلاصه مصاحبه
بعد از تکم*ل مصاحبه کامل نما*ید

....
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....

نام و نام خانوادگ* فرد* که مورد مصاحبه قرار گرفت

....

امضاء