Scientific Reports in Medicine

Research Article

Causes of maternal mortality and the effectiveness of healthcare services: a retrospective analysis in Adana province

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DOI: 10.37609/srinmed.69

Abstract

Objective: This study aims to retrospectively analyze maternal deaths occurring in Adana province between 2011 and 2016, evaluating the causes of death, demographic and clinical characteristics, and access to healthcare services.

Method: A total of 105 maternal death cases were analyzed. The majority of the cases were married, had low education levels, and were covered by the Social Security Institution or the "Green Card" system. Syrian refugees accounted for 9.5% of maternal deaths, with partial differences observed in their access to healthcare services.

Result: The majority of maternal deaths resulted from direct (34.3%) and indirect (50.5%) causes. It was determined that the number of consultations with an obstetrician was higher in direct maternal deaths and lower in coincidental deaths. The cesarean section rate was high (72.4%), and deaths predominantly occurred during the postpartum period (72.4%). Most deaths took place in tertiary healthcare institutions, with an increase in mortality rates observed during shift hours.

Conclusion: To reduce maternal mortality, it is recommended to strengthen primary healthcare services, control cesarean section rates, and develop more inclusive health policies for refugees. This study provides significant data for determining policies to prevent maternal mortality and increasing the effectiveness of healthcare services.

Keywords: Maternal death, Mortality, Refugee, Health Care, Pregnancy, Public Health

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Recieved: 2026-02-24
Accepted: 2026-02-28

INTRODUCTION

It is a fundamental right for every woman to experience a healthy pregnancy and childbirth process and to receive the necessary support during this period. Maternal mortality is a critical indicator of a society's overall health and welfare level and reflects the quality of women's health services. Maternal death is defined as the death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the duration and site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management (1).

The World Health Organization (WHO) and its partner organizations have published a historic consensus text and strategy document to end preventable maternal deaths. The primary goal set in this document is to reduce the global maternal mortality ratio to less than 70 per 100,000 live births by 2030 (2). Turkey is among the countries that have achieved this goal. Although the maternal mortality rate in Turkey has shown a downward trend in recent years, it remains at significant levels. In Turkey, 12.6 mothers lose their lives per 100,000 live births (3).

Most maternal deaths are preventable, with the most common causes including hemorrhage (37%), infections (22%), and preeclampsia/eclampsia (14%) (4). Early diagnosis and timely access to effective treatment can prevent pregnancy-related complications. The objective is to increase social awareness, continue the training of the community and healthcare professionals, and maximize the quality of healthcare services (5).

As part of the program implemented by the Ministry of Health of the Republic of Turkey starting in 2007, all maternal deaths occurring throughout the country have been meticulously reported, and each case has been evaluated in detail by scientific commissions established at the provincial and national levels according to the World Health Organization's three-degree delay model.

Due to the civil war that started in Syria in 2011, people who were forced to migrate from the country began to seek refuge in Turkey. By 2016, the number of Syrian refugees in Turkey reached 2,800,000, with approximately 224,000 of them residing in Adana (6). Refugee women face difficulties accessing healthcare in every country, and this affects maternal mortality and morbidity (7).

The aim of this study is to determine the causes of pregnancy-related deaths in Adana between 2011 and 2016, based on the total number of live births and maternal deaths in the last 5 years.

METHOD

All pregnancy-related deaths occurring in health institutions under the responsibility of the Adana Provincial Health Directorate between January 1, 2011, and December 31, 2016, were examined retrospectively. In our study, causes of death were categorized according to the International Classification of Diseases, 10th Revision (ICD-10) codes.

The definition of pregnancy-related death is the loss of life due to causes directly or indirectly related to pregnancy, regardless of the cause of death, within 42 days of the termination of pregnancy. This definition includes not only sudden and underlying causes of death, but also factors such as anemia, pregnancy or childbirth-related complications, and serious maternal morbidity that may have contributed to death.

Maternal Mortality Rate is estimated per 100,000 live births and is calculated by dividing the number of maternal deaths by 100,000.

* Direct maternal deaths are defined as obstetric complications resulting from interventions, omissions, incorrect treatment, or a chain of events resulting from any of the above.

* Indirect maternal deaths are classified as deaths 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 the physiological effects of pregnancy.

However, the physiological effects of pregnancy can worsen the situation. Maternal deaths are

defined as the death of a woman during pregnancy, childbirth, or within 42 days after childbirth due to obstetric causes directly or indirectly related to pregnancy, childbirth, or the puerperium. Late maternal deaths are defined as deaths occurring between 42 days and one year after childbirth.

These deaths are not considered work-related. To classify a maternal death as preventable, at least one degree of preventability probability involving patient, family, nurse, facility, system, and/or societal factors is required. If at least one identifiable change in these factors exists, the death is considered preventable.

Permission to collect data was obtained from healthcare facilities under the responsibility of the Adana Provincial Health Directorate within the scope of the research.

Data were analyzed using descriptive statistical methods. SPSS 22.0 (SPSS Inc., Chicago, IL, USA) was used for data analysis. Findings are presented as frequency, percentage, and descriptive summary statistics. Chi-Square or Fisher's Exact tests were employed for comparing categorical variables.

The procedures were followed in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1975, as revised in 2000.

RESULT

Among the 105 cases analyzed, 95.2% were married and 4.8% were single. 90.5% were citizens of the Republic of Turkey, while 9.5% had Syrian refugee status. Regarding education, 48.6% of the cases had a primary school education or lower.

* Clinical Indicators: 58.1% of the cases had a Body Mass Index (BMI) between 25-30. Autoimmune diseases (8.6%), diabetes (8.6%), and a history of infertility (13.3%) were observed. The cesarean section rate was remarkably high at 72.4%. Hypertension is absent in 76.2% of cases. The rate of cases with rare blood types is 6.7%. The rate of multiple pregnancies is 5.72%.

* Timing and Location: 72.4% of deaths occurred in the postpartum period. 61.9% of deaths took place during shift hours (evenings and weekends). The highest number of deaths occurred on Friday (19%), and the lowest number of deaths occurred on Tuesday (4.8%). 74.3% of maternal deaths were brought to the hospital by ambulance, and 1.0% by private vehicle. In 64.8% of deaths, the cause of death was consistent with the diagnosis at admission. Tertiary health institutions accounted for approximately 80% of total maternal deaths.

* Access to Care: In direct maternal deaths, the average number of visits to an obstetrician during pregnancy was 7.8, compared to 7.0 in indirect deaths and 3.4 in coincidental deaths ($p < 0.05$).

Maternal deaths were classified as direct (34.3%; n=36), indirect (50.5%; n=53), and accidental (15.2%; n=16). The mean age in direct maternal deaths was 32.7, in indirect maternal deaths 30.2, and in accidental maternal deaths 24.9. The age difference between the groups was statistically significant ($p=0.002$).

No statistically significant difference was found between height, body weight, BMI, gravida, and parity and maternal deaths. The postpartum period was 7.4 days on average in direct maternal deaths, 12.8 days in indirect maternal deaths, and 11.9 days in accidental maternal deaths (statistically significant).

In direct maternal deaths, the average number of visits to the gynecologist during pregnancy was 7.8. This number was 7.0 in indirect maternal deaths and 3.4 in accidental maternal deaths. A statistically significant relationship was found between the number of gynecological visits and maternal deaths ($p<0.05$).

In direct maternal deaths, the average number of visits to the family physician from the 28th week of pregnancy onwards was 4.6. This value was found to be 4.5 in indirect maternal deaths and 2.5 in accidental maternal deaths. The lower number of visits to the family physician in accidental maternal deaths was found to be statistically significant

($p<0.05$).

In addition, the average number of gynecological visits to the pregnant woman before her death was 3.3 in direct maternal deaths, while this number was 3.0 in indirect maternal deaths and 1.9 in accidental maternal deaths. This difference is statistically significant ($p=0.047$).

This study evaluated the differences in health indicators and demographic characteristics between Syrian refugees and Turkish citizens. Overall, no statistically significant differences were found between the two groups in terms of many parameters. However, significant differences were observed in some parameters such as the number of visits to an obstetrician during pregnancy, the number of visits to different obstetricians, and stillbirth weeks. These findings indicate significant differences in access to and utilization of healthcare services, and further research is needed in this area.

This study also examines the distribution and significant differences of various demographic and clinical variables at different levels of healthcare. These findings can help understand demographic and clinical differences in healthcare delivery and contribute to the development of health policies. While maternal deaths in primary care institutions consist only of Turkish citizens, maternal deaths in secondary and tertiary healthcare institutions also include Syrian refugees. Maternal deaths among Syrian refugees are particularly concentrated in secondary healthcare facilities. The distribution between nationality and healthcare institution is not random, indicating that policies regarding access to healthcare services need to be evaluated.

No patient transfers were made to primary care institutions (85.7%), ambulance use was low (14.3%), and no use of private vehicles was observed (0%). In transfers to secondary and tertiary care institutions, ambulance use was quite high (80% and 78.3%), the rate of cases where no transfer was made was lower (20% and 20.5%), and the use of private vehicles was rare (0% and 1.2%).

In primary care settings, the vast majority of deaths occurred outside the healthcare facility (85.7%), while the rate of deaths occurring within the healthcare facility was low (14.3%). In secondary and tertiary healthcare facilities, all deaths occurred within the healthcare facility (100%).

In primary care settings, the vast majority of deaths occurred during pregnancy (85.7%), while the mortality rate during the postpartum period was lower (14.3%). In secondary and tertiary healthcare settings, deaths mostly occurred during the postpartum period (66.7% in secondary care and 78.3% in tertiary care), while the mortality rate during pregnancy was lower (33.3% in secondary care and 21.7% in tertiary care).

No significant differences were found between healthcare levels among the following variables: marital status ($p=0.790$), education level ($p=0.114$), social security ($p=0.344$), BMI ($p=0.546$), autoimmune disease ($p=0.403$), history of diabetes ($p=0.625$), history of infertility ($p=0.371$), hypertension status ($p=0.877$), rare blood group ($p=0.336$), multiple pregnancy ($p=0.946$), mode of delivery ($p=0.817$), diagnosis causing death ($p=0.723$ and $p=0.116$), time of death ($p=0.167$), and time of postpartum maternal death ($p=0.775$). The distribution of these variables was similar across institutions. Although maternal deaths occurred at different rates in different time periods, these differences were not statistically significant. This indicates that maternal deaths occur at similar rates during nighttime, working hours, and evening periods. Therefore, there is insufficient evidence to say that maternal deaths are more or less frequent during any given time period.

There is no statistically significant difference in the distribution of nationality and maternal deaths according to time periods. For both Turkish citizens and Syrian refugees, deaths occur at similar rates during night, working hours, and evening hours. This indicates that there is insufficient evidence to say that deaths are more frequent or less frequent in any given time period. Similarly, there is no

statistically significant difference in the distribution of institutional and maternal deaths according to time periods. In primary, secondary, and tertiary care institutions, deaths occur at similar rates during night, working hours, and evening hours. This also reveals that there is insufficient evidence to say that deaths are more frequent or less frequent in any given time period.

DISCUSSION

This study examines maternal mortality in Adana province in detail, considering demographic, clinical, and healthcare access aspects. The findings of this study, when compared with international literature, contribute to understanding the strengths and weaknesses of the current state of maternal health in Turkey.

Demographic and Clinical Factors:

Consistent with WHO data, low socioeconomic status and low education levels remain significant risk factors (1). This study found that a large proportion of maternal deaths occurred among individuals with low levels of education, and 9.5% were Syrian refugees. Similarly, studies in Europe and America show that immigrant women experience difficulties accessing healthcare services, and this is a factor that increases maternal mortality (8, 9).

Health Status and Pregnancy Complications:

When clinical factors associated with maternal deaths are examined, chronic diseases such as hypertension and diabetes are seen to play a significant role. The literature reports that diseases such as gestational diabetes and preeclampsia are among the main causes of maternal mortality (4). Hypertension was absent in 76.2% of the cases, while diabetes was present in 8.6% in this study. However, it should be emphasized that obesity is a significant risk factor, as a large proportion of the cases were in the overweight category in terms of Body Mass Index. Obesity is a significant factor that increases cesarean section rates and raises the risk of postpartum complications (10).

Delivery Method and Maternal Mortality:

In our study, the cesarean section rate was found to be quite high (72.4%). Although the WHO recommends a cesarean section rate of 10-15%, cesarean births are increasing in many countries (2). Previous studies have shown that cesarean section rates are also high in Turkey and that this situation may be related to maternal mortality (11). Cesarean births can increase the risk of maternal death, especially due to postoperative complications.

Maternal Mortality Types and Access to Healthcare:

When maternal deaths were classified as direct, indirect, and accidental, our study found that indirect maternal deaths were the most frequent (50.5%). Similarly, indirect deaths constitute a large portion of maternal mortality in developed countries, but direct deaths are more common in developing countries (12). Considering the factor of access to healthcare, the number of prenatal check-ups was found to be related to the types of maternal death. Previous research has indicated that inadequate prenatal care particularly increases indirect maternal deaths (13).

In our study, it was observed that a large proportion of maternal deaths were concentrated in tertiary healthcare facilities. This finding suggests that, as shown in previous studies, high-risk pregnancies are generally referred to better-equipped centers (9). However, it was found that the vast majority of maternal deaths, especially those occurring in primary healthcare facilities, took place outside of hospitals. The literature also indicates that primary healthcare services need to be strengthened and that early intervention plays a critical role in reducing maternal mortality (5).

Syrian Refugees and Access to Healthcare Services:

There may be differences in access to healthcare services for Syrian refugee women. International literature also indicates that refugee women have less access to prenatal care services and therefore carry

a higher risk of maternal mortality (14). However, our study found no statistically significant difference in maternal mortality between Syrian refugees and Turkish citizens. This suggests that the healthcare services provided by Turkey to its refugee population may be effective. Nevertheless, the differences in some parameters (number of gynecologist visits, week of delivery, etc.) indicate the need for further research to improve access to healthcare services for women in this group.

Time of Death and Healthcare Services:

IT was found in this study that maternal deaths most frequently occurred during the postpartum period (72.4%) and were particularly concentrated within the first 42 days after delivery. Literature states that the postpartum period is the most critical period for maternal mortality and that women should be closely monitored during this time (15). Furthermore, it was found that the times of death largely coincided with shift hours (61.9%). This finding indicates that the adequacy of healthcare services during shift hours should be questioned. Previous studies have shown that maternal deaths occurring during shift hours may be related to increased workload, limited specialist staff, and lack of resources (16).

Service Delivery and Timing: The concentration of deaths in tertiary centers suggests that high-risk pregnancies are correctly referred to equipped centers, but it also highlights the critical nature of these cases. The fact that 61.9% of deaths occurred during shift hours warrants an investigation into the adequacy of specialist staffing and resource availability during these periods (16).

A civil war in a region leads to refugee migration, affecting the public health of neighboring countries. It does this by impacting maternal mortality, which is a key indicator of the development of health systems. This study has shown us this.

Conclusion

The findings of this study are largely consistent with the international literature. However, some strategies need to be developed to reduce maternal mortality:

* Strengthening Primary Care: Enhancing prenatal care for early detection of high-risk pregnancies.

* Optimizing Shift Services: Ensuring adequate specialist staff during night and weekend shifts.

* Controlling Cesarean Rates: Encouraging cesarean sections only when medically necessary.

* Inclusive Refugee Policies: Developing targeted policies to facilitate access to prenatal care for refugee women.

* Improved Monitoring of Maternal Health Data: Data collection processes related to maternal deaths should be improved, and risk factors should be analyzed more thoroughly.

In conclusion, this study presents important findings regarding maternal mortality in Adana and, when compared with similar studies in the international literature, demonstrates the need to improve health policies for maternal health in Turkey. Increasing access to healthcare services and early detection of high-risk pregnancies are crucial for reducing maternal mortality.

ACKNOWLEDGEMENT

Peer-Review

Double blind both externally and Internally Peer Reviewed

Conflict of Interest

The authors declare that they have no conflict of interests regarding content of this article..

Financial Support

The Authors report no financial support regarding content of this article.

Ethical Declaration

Ethical permission was obtained from the Çukurova University, Medical Faculty Clinical Research Ethics Committee for this study with date 07.10.2016 and number 24, and Helsinki Declaration rules were followed to conduct this study.

Authorship Contributions

Concept: MS, Design: MS, Supervising: FİU, Financing and equipment: Data collection and entry: MS, FİU, Analysis and interpretation: MS, FİU, Literature search: MS, Writing: MS, FİU, Critical review: MS

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