

## Causes of Maternal Deaths in Tanta University Hospital

M.N. El-Gharib, S.F. Rakha, A.M. Awara, A.E. Mahfouz and T.S. Elhawary

Department of Obstetrics and Gynecology, Tanta Faculty of Medicine, Tanta University, Tanta, Egypt.

Corresponding author email: mohgharib@hotmail.com

---

### Abstract

**Objective:** To assess the etiology, trends and causes of maternal mortality in Tanta University Hospital.

**Study design:** Retrospective study of files for each case of maternal mortality during the years 2007–2009.

**Results:** There were 21 maternal deaths out of 16,944 deliveries, yielding a rate of 123.94 deaths per 100,000 live births. The main causes of maternal mortality were Caesarean section (19.05%), postpartum hemorrhage (19.05%), pre-eclampsia/eclampsia (19.05%), sepsis (14.29%) and embolic phenomena (9.52%).

**Conclusion:** Maternal mortality in Tanta University Hospital is higher than the national figure, probably because high quality obstetric health care is lacking and because of deficient therapeutic protocols. Nevertheless, the maternal mortality rate may possibly be reduced by eliminating the preventable causes.

**Keywords:** MMRate; MMRatio; maternal deaths; maternal mortality

---

*Clinical Medicine Reviews in Women's Health* 2010:2 79–83

doi: 10.4137/CMRWH.S5907

This article is available from <http://www.la-press.com>.

© Libertas Academica Ltd.



## Introduction

*Maternal death* is the death of a woman while she is pregnant or within 42 days of termination of pregnancy, irrespective of the duration and sites of the pregnancy, for any cause related to or aggravated by the pregnancy or its management, but not from accidental or incidental causes. On the other hand, *pregnancy-related death* is the death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the cause of death.<sup>1</sup>

*Direct obstetric death* is the death of a woman resulting from obstetric complications of pregnancy, labor and puerperium; from interventions, omissions or incorrect treatment; or from a chain of events resulting from any of the above. It includes conditions such as pregnancy-related hypertensive diseases, hemorrhage, dystocia, genital tract sepsis, and spontaneous or induced abortion. *Indirect obstetric death* is the death of a woman resulting from a previously existing disease or a disease that developed during pregnancy and was not due to direct obstetric causes but was aggravated by the physiological effects of pregnancy.<sup>2</sup>

Obstetric complications continue to represent the major cause of death among women of childbearing age.<sup>3</sup> While developed countries have made enormous progress in bringing down the huge death rates associated with pregnancy, women in developing countries continue to face very high risks of death and disability as a result of pregnancy.<sup>4</sup>

Maternal mortality is usually expressed in two different ways: the maternal mortality rate and the maternal mortality ratio. The maternal mortality rate (MMRate) is the number of maternal deaths in a period per number of women of reproductive age during the same period expressed per 100,000 women. The maternal mortality ratio (MMRatio) refers to maternal deaths to the numbers of live births.<sup>5</sup>

Worldwide, every minute, a woman dies in pregnancy or childbirth; this is more than half a million women a year worldwide.<sup>6</sup> Of these estimated maternal deaths worldwide in 2005, developing countries accounted for more than 99%. About half of the maternal deaths occurred in sub-Saharan Africa alone, and a third of them occurred in South Asia. Thus sub-Saharan Africa and South Asia accounted for 84% of global maternal deaths, with hemorrhage the leading cause of death in these regions. Moreover, just 10 countries account for almost two-thirds of all maternal deaths.<sup>7</sup>

In Egypt, the maternal mortality ratio dropped by 52% from 174 in 1992–93 to 84 in 2000. This drop has been attributed to the increased use of health services, use of modern contraceptives, hospital deliveries and use of trained birth attendants.<sup>8</sup>

## Aim of the Work

The aim of this research was to assess the etiology, trends and causes of maternal mortality in Tanta University Hospital.

## Material and Methods

This work is a retrospective study carried out on the records of all patients admitted to the Department of Obstetrics and Gynecology of Tanta University Hospital, Egypt, during 2007–2009.

Analysis of the main causes of death and categorization of care into standard or substandard was carried out by the author's team according to the following definitions. Direct causes refer to deaths resulting from obstetric complications of the pregnant state (pregnancy, labor and puerperium); from interventions, omissions or incorrect treatment; or from a chain of events resulting from any of the above. Indirect causes refer to death resulting from a previously existing disease or a disease that developed during pregnancy that was not due to direct obstetric causes, but was aggravated by the physiological effects of pregnancy. Care was considered substandard when different management would have been expected to alter the outcome.<sup>9</sup> All available data were analyzed.

## Results

- The number of all admissions was 18,450 women of which 16,944 cases (91.84%) were obstetric and the remaining 1506 cases (8.16%) were gynaecological cases.
- The number of maternal deaths was 21 cases only; this means that the maternal mortality ratio in Tanta University Hospital was 123.94 per 100,000 live births during the years 2007–2009.
- The most common causes of maternal mortality were Caesarean section complications (19.05%), postpartum hemorrhage (19.05%), pre-eclampsia/eclampsia (19.05%), sepsis (14.29%) and embolic phenomena (9.52%).



## Discussion

Maternal mortality is one of the world's most neglected problems. Every day, around 1600 women die due to complications of pregnancy. Eighty percent of these deaths are largely preventable or treatable at little or no extra cost, even in resource-poor settings.<sup>10</sup>

The current study exposed that the maternal mortality ratio in Tanta University Hospital was 123.94/100,000 births. In Egypt, the national maternal mortality ratio in 2000 was 130; in the year 2005 it was 84. In 2009, the maternal mortality ratio in Egypt was 59, compared with 12 in Qatar, 15 in Saudi Arabia, 20 in Palestine, 86 in Lebanon and 366 in Yemen.<sup>11</sup>

Tanta is Egypt's fifth largest city, with an estimated 429,000 inhabitants (2008). It is the capital of the Algharbiah Governorate and the main railroad hub of the Nile Delta. Tanta is surrounded by villages and rural areas where *dayas* attend deliveries at home and complicated cases are referred to Tanta University Hospital.

We have found that direct causes are responsible for 85.71% of all maternal deaths in Tanta University Hospital compared to 80% of maternal deaths worldwide.<sup>12</sup> In France, Direct obstetric causes largely dominate (73%), mostly hemorrhage (25%) and amniotic embolism (11%).<sup>13</sup>

The majority of maternal deaths in developing countries are caused by five major direct obstetric complications: hemorrhage, infection, unsafe

abortion, hypertensive disorders of pregnancy and obstructed labor. Obstetrical hemorrhage represents 30% of all causes of maternal death, and hypertensive crises are the origin of another 15%. Callister (2005) established that the most frequent direct causes of global maternal deaths were hemorrhage, infection, unsafe abortion, pregnancy-induced hypertension, and obstructed labor.<sup>6</sup>

In this investigation, we found that postpartum hemorrhage formed the biggest single cause of maternal mortality, responsible for 19.05% of all deaths. This concurs with the finding of Khan et al who reported that hemorrhage was the leading cause of death in Africa (33.9%) and in Asia 30.8%.<sup>5</sup> Likewise, it has been estimated that approximately 25% of maternal deaths are caused by hemorrhage, 15% by infection, 13% by unsafe abortion, 12% by pregnancy-induced hypertension, 8% by obstructed labor and 8% by other direct causes. Twenty percent are ascribed to indirect causes, including malaria and iron deficiency anemia.<sup>12,14-16</sup> In addition, several studies also confirmed that postpartum hemorrhage is the most important single cause of maternal death, with 88% of deaths from hemorrhage occurring within four hours of giving birth.<sup>14</sup>

In the United States, the most common causes of maternal death vary somewhat from region to region. They include pulmonary thromboembolism, amniotic fluid embolism, primary postpartum uterine hemorrhage, infection and complications of hypertension, including preeclampsia and eclampsia.<sup>17</sup>

The maternal mortality ratio in Gharbyia Governorate was 213 during 1992 compared with 200 in Cairo, 281 in Alexandria and 544 in Assiut. The national maternal mortality ratio during this period was 174 maternal deaths per 100,000.<sup>18</sup>

We found that hypertensive diseases complicating pregnancy (pre-eclampsia and eclampsia) accounted for 19.05% of all maternal deaths. This is in agreement with the results of studies done in Colombia, where up to 42% of maternal deaths are from pre-eclampsia or eclampsia.<sup>19</sup> Pre-eclampsia and eclampsia probably account for more than 50,000 maternal deaths worldwide each year.<sup>19,20</sup> Murray and Lopez stated that pre-eclampsia and eclampsia remain two of the most common reasons for women dying during pregnancy worldwide, as 12% of all maternal deaths are caused by eclampsia.<sup>21</sup>

**Table 1.** Causes of maternal deaths in Tanta University Hospital.

	No	%	% of total
<b>Direct causes</b>	<b>18</b>		<b>85.71%</b>
Caesarean section complications (hemorrhage, thromboembolism, infection, and anesthesia)	4		19.05
Postpartum hemorrhage	4		19.05
Ruptured uterus	1		4.76
Pulmonary embolism	1		4.76
Amniotic fluid embolism	1		4.76
Septic abortion	1		4.76
Puerperal sepsis	2		9.52
Severe pre-eclampsia	3		14.29
Eclampsia	1		4.76
<b>Indirect causes</b>	<b>3</b>		<b>14.29%</b>
Liver disease	1		4.76
Heart disease	1		4.76
Renal disease	1		4.76



In Bahrain, hypertensive disease was the second most common cause of maternal deaths and the leading direct cause of death.<sup>22</sup>

Sepsis was responsible for 14.29% of maternal deaths in Tanta University Hospital. Sepsis remains a primary cause of maternal mortality in the developing world, mostly as a result of illegal abortions. According to the World Health Organization, about 68,000 women die each year from complications from unsafe abortions, with sepsis being the main cause of death.<sup>23</sup> Vinita et al reported that maternal mortality caused by septic abortion in India was 23.21%.<sup>24</sup>

Pulmonary embolism is among the most common causes of morbidity and mortality during pregnancy. It constitutes 14.29% of total maternal deaths<sup>25</sup> compared with 4.76% in our study cases.

Maternal mortality from pregnancy-related amniotic fluid embolism in Sweden was 1.0, 1.1 and 0.5 per 100,000 live births during the 1970s, 1980s and 1990s, respectively.<sup>26</sup>

Liver failure, heart disease and renal disease each constituted 4.76% of total maternal deaths in Tanta University Hospital. In Malaysia, 2.15% of maternal deaths were caused by liver disease.<sup>28</sup>

In the United States, mortality from septic abortion rapidly declined after legalization of abortion. Death now occurs in less than one per 100,000 abortions. In the present study, septic abortion accounted for 14.29% of all maternal deaths.

Today, the desire to show progress in reducing the burden of mortality is universal: across developing and developed countries; at international, national and local levels; and for all causes and conditions.<sup>28</sup>

We attribute the increased MMR in Tanta University, compared with the national and regional figures, to several factors, the first of which is that our study is a hospital-based study and in such a study, maternal mortality usually under- or overestimates real levels, depending upon patient population and coverage. The second most important cause is that we are a referral hospital that receives complicated cases from villages. The third cause is that many of our patients give birth under the supervision of untrained personnel (*dayas*). The other causes of increased maternal deaths include deficient antenatal care, deficient emergency obstetrics, an increase in the rate of Caesarean sections and absence of therapeutic protocols.

We conclude that vital managerial change is required; including formulation of therapeutic protocols for primary obstetric health care services. Without these, our efforts will be useless, with little impact on saving women's lives.

## Disclosure

This manuscript has been read and approved by all authors. This paper is unique and is not under consideration by any other publication and has not been published elsewhere. The authors and peer reviewers of this paper report no conflicts of interest. The authors confirm that they have permission to reproduce any copyrighted material.

## References

- Campbell OMR, Graham W. *Measuring Maternal Mortality and Morbidity: Levels and Trends*. Maternal and Child Epidemiology Unit Publication No. 2. London: London School of Tropical Medicine and Hygiene; 1991.
- Ronsmans C, Walraven G, Etard JF. Verbal autopsies: learning from reviewing deaths in the community. In: *Beyond The Numbers. Reviewing Maternal Deaths and Complications to Make Pregnancy Safer*. Geneva: World Health Organization; 2004.
- World Health Organization. *World Health Report 2005. Make Every Mother and Child Count*. Geneva; World Health Organization.
- Ronsmans C, Graham WJ; Lancet Maternal Survival Series Steering Group. *Maternal Mortality: Who, When, Where, and Why*. 2006;368:1189–200.
- Khan KS, Wojdyla D, Say L, Gulmezoglu AM, van Look P. WHO systematic review of causes of maternal deaths. *Lancet*. 2006;367:1066–74.
- Callister LC. Global Maternal mortality: contributing factors and strategies for change. *The American Journal of Maternal/Child Nursing*. 2005;30(3):184–92.
- World Health Organization, UNICEF, UN Population Fund. *Maternal mortality in 2000: estimates developed by WHO, UNICEF, UNFPA*. Geneva; WHO.
- Gipson R, Mohandes A, Campbell O, Issa A, Matta N, Mansour E. The trend of maternal mortality in Egypt from 1992–2000: An Emphasis on Regional Differences. *Matern Child Hlth J*. 2005;9(1):71–82.
- Why Mothers Die 1997–99. The Confidential Enquires into Maternal Deaths in the United Kingdom*. London: Department of Health; 2001.
- Lewis G. Reviewing maternal deaths to make pregnancy safer. *Best Practice and Res Clin Obstet Gynaecol*. 2008;22(3):447–63.
- World Health Organization, Regional Office for the Eastern Mediterranean. *Country Profiles: Egypt*. Geneva: WHO; 2009.
- World Health Organization. *Reduction of Maternal Mortality: A Joint WHO/UNFPA/UNIEF World Bank Statement*. Geneva: WHO; 1999.
- Saucedo M, Deneux-Tharax C, Bouvier-Colle MH. Epidemiologie des morts maternelles en France 2001–2006 (Epidemiology of maternal deaths in France 2001–2006). *Bulletin Epidemiologique Hebdomadaire*. 2010; 2(3):10–14.
- World Health Organization. *Postpartum Care of the Mother and Newborn: A Practical Guide*. Geneva: WHO; 1998.
- World Health Organization. *Regional and Global Incidence of and Mortality Due to Unsafe Abortion*. Geneva: WHO; 1997.
- World Health Organization. *Safe Motherhood*. Geneva: WHO; 2000.
- Lydia CR, Kim CA. Pregnancy-associated deaths: a 15-year retrospective study and overall review of maternal pathophysiology. *Am J Foren Med Path*. 2006;27(1):11–9.
- Kassas M, Hefni A, Campbell O. The national maternal mortality study of Egypt 1992–1994. *Int J Gynecol Obstet*. 1995;50(2):101–8.



19. Lopez-Jaramillo P, Casas JP, Serrano N. Preeclampsia: from epidemiological observations to molecular mechanisms. *Braz J Med Biol Res.* 2001;34(10): 1227–35.
20. Which anticonvulsant for women with eclampsia? Evidence from the Collaborative Eclampsia Trial. *Lancet.* 1995;345(8963):1455–63.
21. Murray CJL, Lopez AD. *Health Dimensions of Sex and Reproduction.* Global Burden of Disease and Injury Series. Cambridge, MA: Harvard School of Public Health; 1998.
22. Sandhu AK, Mustafa FE. Maternal mortality in Bahrain 1987–2004: an audit of causes of avoidable death. *La Revue de Santé de la Méditerranée Orientale.* 2008;14(3):720–30.
23. Saultes TA, Devita D, Heiner JD. The back alley revisited: sepsis after attempted self-induced abortion. *West J Emerg Med.* 2009 Nov;10(4): 278–80.
24. Vinita D, Anjoo A, Amita M, Preetam D. Septic abortion. *J Obstet Gynecol India.* 2006;56(3):236–9.
25. Anca C. The incidence of pulmonary embolism in pregnant women. *International Symposia Risk Factors for Environment and Food Safety and Natural Resources and Sustainable Development, Faculty of Environmental Protection, November 6–7 Oradea 2009.*
26. Samuelsson E, Hellgren M, Högberg U. Pregnancy-related deaths due to pulmonary embolism in Sweden. *Acta Obstet Gyn Scan.* 2007;86(4):435–43.
27. Ravindran J, Jayadev R, Lachmanan SR, Merican I. Maternal deaths due to liver disease in Malaysia. *Med J Malaysia.* 2000;55(2):209–19.
28. Hill K. Making deaths count. Editorial. *Bull World Health Organ.* 2006; 84:162.