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Maternal mortality in Campinas: Evolution, under-registration and avoidanc

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ABSTRACT

INTRODUCTION

Context: Up until a few years ago, maternal mortality did not merit much attention as a worldwide public health issue. The health and social development indicator almost exclusively used was infant death.

Objective: To study the number, characteristics, basic causes and avoidance of maternal mortality (MM) among women living in the city of Campinas, which occurred between 1985 and 1991, identified from all death certificates of women aged 10 through 49 years.

Design: Retrospective and descriptive population-based study.

Setting: University Referral Center.

Samples: All eligible death certificates classified as declared and presumed maternal deaths according to the Laurenti criteria for the cause of death were selected and complementary studies of the clinical records were performed.

Main measures: Day of the week and place of occurrence of death; period of occurrence; transfer from another hospital; number of days from delivery/abortion to death; blood transfusion; opportunity for transfusion; complications; autopsy; basic cause of death.

Results: Initially 39 declared maternal deaths were identified and a total of 62 were confirmed by the end of the study. This corresponds to an under-registration rate of 37.1% and to an MM ratio of 45.5 per 100,000 live births. Around three-fourths of these maternal deaths were due to a direct obstetrical cause and were considered avoidable.

Conclusion: Maternal mortality still is high in the municipality of Campinas, although lower than the mean estimated for Brazil. The predominance of direct obstetric causes and avoidable deaths reinforces the need for public health interventions directed towards avoiding them.

Key words: Maternal Death. Reproductive Health. Mother and Child Health. Vital Registration.

Up until a few years ago, maternal mortality did not merit much attention as a worldwide public health issue. The health and social development indicator almost exclusively used was infant death.¹ Internationally, concern about the problem of MM only began to materialize in the mid 80s, when the World Health Organization launched its "Safe Motherhood Initiative",² and it made its mark at the International Conference on Safe Motherhood in Nairobi, Kenya, in 1987.³

In the case of Brazil, the first important step was taken with the organization of a national meeting on the theme in 1984, in the city of São Paulo. A group of researchers from the School of Public Health of the University of São Paulo, directed by Laurenti, also had an important role in its study here. However, the first official initiative only appeared in 1987, when the São Paulo State Secretariat of Health launched its Program for Maternal Death Prevention which, among other measures, created seven maternal mortality committees in important regions of the state, the first ones to function in this country.⁴ Later on, this interest spread throughout Brazil, being officially accepted as a public health problem by the Ministry of Health, which started to make efforts to stimulate

its promotion throughout the nation.⁵ The achievements obtained through the implementation of the program for prevention of maternal deaths in Paraná, currently the state where this program is best developed, deserve to be recognized.^{6,7}

Maternal mortality in Brazil is quite high, especially when compared to that of developed countries. However, the acquisition of reliable data is a hard task. Official statistics are far from reflecting the real situation in the country.^{5,8,9} A study carried out in the Municipality of Campinas showed that, over a period of 5 years (1979-1983), only 40.4% of maternal deaths were registered at the registry office, and found a Maternal Mortality Ratio (MMR) of 57 per 100,000 live births (LB).¹⁰

Correlation of regional data obtained from death certificates with local, carefully registered detailed information clearly shows the unreality of the official data. A carelessness can be observed in this country regarding the filling out of death certificates, which ought to be a source of correct information. A tendency towards attributing a specific organic cause to a maternal death, without considering the moment in the woman's reproductive life, can be noted.^{11,12,13}

This hampers the use of this source of death information in obtaining a faithful scenario of maternal mortality in the country. However the problem is not exclusive to Brazil nor to underdevelopment. Developed countries with well-

structured health systems, such as the United States of America and France, face similar situations, with percentages of official registration of maternal deaths varying from 46 to 85% of the real numbers.^{10,14,15,16}

Thus, in a general way, maternal mortality is little known in our country. The majority of the data available is based on statistics from hospital institutions, or even from cities, that normally receive a large number of women referred from other places, with pregnancy, delivery and post-partum complications, greatly increasing the number of deaths registered there. On the other hand, it is supposed that official statistics based on the analysis of death certificates are under-registered.

In spite of these difficulties, the information available allows us to affirm that maternal mortality is still too high when compared to that of developed countries, and the highest percentage of maternal deaths are due to direct causes, and therefore avoidable in the majority of cases.^{12,17}

In the specific case of Campinas city, whose tertiary level hospital network functions as the referral center for all the region, maternal deaths among women residing in neighboring cities or districts are very frequent. Consequently, the occurrence of the event in Campinas itself is artificially increased.

The need to know the real magnitude of maternal mortality over recent years among women living only in this city, the characteristics of these deaths and the quality of their registration, as well

Table 1 - Identification and under-registration of maternal deaths in the municipality of Campinas during the period from 1985 to 1991.

Year	Deaths of Women 10-49	Maternal Deaths			Total of Confirmed	% of Under-registration
		Declared	Presumable	Identified in the study		
1985	275	9	28	2	11	18.2
1986	248	6	31	3	9	33.3
1987	297	3	37	3	6	50.0
1988	315	6	26	6	12	50.0
1989	284	5	18	2	7	28.6
1990	332	6	28	1	7	14.3
1991	311	4	36	6	10	60.0
TOTAL	2062	39	204	23	62	37.1

as the non-existence of consistent official data, justify this study. The results obtained will allow a more realistic diagnosis of the state of maternal mortality in this period, besides making it possible to direct health actions and interventions in order to reduce mortalities.

The purpose of this study was to evaluate the number and the characteristics of maternal deaths among women living in the city of Campinas during the period from 1985 to 1991, identified among all death certificates of women aged between 10 through 49 years old, after complementary investigation. The study was also aimed at determining the percentage of under registration of maternal mortality, its causes and avoidance.

METHODS

Maternal deaths among women living in the city of Campinas occurring in the period from January 1985 to December 1991 were studied. The intention was to try to identify these deaths starting from a systematic analysis of all death certificates of women aged between 10 to 49 years in this city, and then to perform a more detailed study of each case. Initially, copies of all death certificates were obtained from the SEADE Foundation (State Data Analysis System) of São Paulo State. The certificates were separated according to the hospital where the death had

occurred. The clinical director or administrator of each hospital was contacted to obtain authorization for access to the clinical records and laboratory data of each case.

The death certificates were divided into three groups: declared maternal death, presumed maternal death, and death not related to pregnancy, delivery or puerperium. The criteria proposed by Laurenti were used for differentiating cases into these three groups.⁹ The method of screening each case for a maternal cause was the same as recommended by the São Paulo State Secretariat of Health for the maternal mortality committees.

An in-depth analysis of cases classified as declared or presumed maternal deaths was carried out, regarding the conditions leading to death, via detailed observation of clinical records, complementary laboratory tests, additional information provided by hospital personnel, and autopsy when available. A special form was filled out for each case confirmed as maternal death, which constituted the data base for this study.

Only deaths from a declared maternal cause or a presumed one which was later confirmed were included in this study. Cases of confirmed maternal death with incomplete information, for instance when the clinical record had been lost, were also included. In these cases some of the information had to be considered as unknown.

The main variables studied were: day of the

Table 2 - Estimate of official and confirmed maternal mortality ratios for the municipality of Campinas during the period from 1985 to 1991

Year	Declared Maternal Deaths	Confirmed Maternal Deaths	Number of Live Births*	Official MMR/ 100,000 LB	Confirmed MMR/ 100,000 LB
1985	9	11	17,587	51.2	62.5
1986	6	9	17,975	33.4	50.1
1987	3	6	19,591	15.3	30.6
1988	6	12	20,022	29.9	59.9
1989	5	7	20,719	24.1	33.8
1990	6	7	20,098	29.8	34.8
1991	4	10	20,405	19.6	49.0
TOTAL	39	62	136,397	28.6	45.5

* Data from SEADE Foundation

week and place of occurrence of death (hospital, transportation, home, public places); period of occurrence (pregnancy, labor, post-partum); transfer from another hospital; number of days from delivery/abortion to death; blood transfusion; opportunity for transfusion; complications (hemorrhage, post-partum infection; convulsion, none); autopsy; and basic cause of death after investigation according to the International Classification of Diseases (ICD, 9th revision), i.e. direct obstetric deaths (pregnancy specific diseases: ICD 630 to 679), indirect obstetric deaths (non-pregnancy specific diseases but worsened by pregnancy: ICD 222) and deaths from unknown basic causes (ICD 999). The WHO definition of maternal death, with an extension of the post-partum period to one year, was adopted.¹⁸ The avoidance of a death was defined based on the detailed analysis of each case and considering whether any intervention could have been taken to prevent the death, at any time during pregnancy, labor or post-partum, either by the woman herself, the physician or the health system. Deaths derived from unwanted or contraindicated pregnancies, that occurred as a result of lack of contraceptive information or access to services were also included.

Statistical Methods. All data was input into a computer file for later tabulation and analysis. The descriptive analysis of all maternal deaths identified is presented in this paper in the form of percentage distribution and mean, with its

standard deviation in the case of quantitative variables.

RESULTS

A total of 2062 death certificates were identified as corresponding to women aged 10 through 49, living in Campinas, who died during the period. Thirty-nine of these were declared as maternal deaths, and 204 were classified as presumed maternal deaths, corresponding respectively to 1.9 and 9.9% of all certificates reviewed. After the systematic analysis of clinical records, 23 of the presumed maternal deaths and all of the declared ones were confirmed, giving a total of 62 confirmed maternal deaths. This means that during the study period there was an under-registration of maternal deaths of 37.1% in the official statistics based on the data from death certificates. Comparing this rate year by year over the period, no trend in improving or worsening of the under-reporting was observed (Table 1).

Considering that there were 136,397 live births in Campinas during the same period, according to data provided by the SEADE Foundation, the "official" MMR was 28.6/100,000 LB including only declared maternal deaths. Adding the presumed maternal deaths that were confirmed, an MMR of 45.5/100,000 LB was reached. The greatest MMR was observed in 1985, with 62.5, and the lowest, of 30.6 in 1987 (Table 2). There were 38 confirmed maternal deaths and 75,175 LB during the first four years from 1985 through 1988, with a MMR of 50.5. In the last three years of the study (1989-1991) there were 24 maternal deaths and 61,222 LB, with an MMR of 39.2, showing an apparent decrease in maternal mortality of 22% during the period.

The mean age of the women who had maternal death was 27.2 years (± 6.0) and the mean number of years of schooling was 5.4 years (± 3.3). Approximately three-quarters of them lived in a stable union with a partner and did not have paid work. The mean parity was 1.5 (± 1.9) children. About 90% of these women had had prenatal care and almost 60% had had public sector medical care. Only one third had a vaginal delivery.

Table 3 - Distribution of maternal deaths according to the day of the week when death occurred, Campinas, 1985-1991

DAY	N	%
Sunday	5	8.1
Monday	9	14.5
Tuesday	9	14.5
Wednesday	11	17.7
Thursday	8	12.9
Friday	9	14.5
Saturday	11	17.7
TOTAL	62	100.0

Only 8% of the maternal deaths occurred on Sundays, about half as many as on Saturdays and Wednesdays (18%) (Table 3). All the maternal deaths occurred in a hospital, but at least 14.5% of cases had been transferred from one hospital to another.

Death occurred during pregnancy (before abortion or delivery) in only five women (8%). Among the other maternal deaths, the number of days from outcome of pregnancy to death varied from 0 through 63, with an average of 7.4 days. Only two women died after the 42nd day post-partum period originally defined by WHO. Only 15 women (24%) had an autopsy for the purpose of confirming the cause of death.

The classification of causes of maternal deaths showed a complete predominance (81%) of direct obstetric causes (Table 4). The most frequent basic cause of death identified was hypertension (31%), followed by post-partum hemorrhage with 15%. It is also interesting to notice that only 3% of deaths were due to an abortion.

Maternal deaths were considered as avoidable in three-quarters of the cases (Table 5). The responsibility for the avoidable deaths lay mostly with the hospital and physician care. Blood transfusion was carried out in almost half of the women who died (for whom the information was available), and in 14% of them it was performed later than required. Finally, five of the women (8%) had been discharged from the hospital from some time after the outcome of pregnancy until the onset of complications that led to death.

DISCUSSION

This study confirms how difficult it is to obtain reliable data on the number of maternal deaths. Having managed to identify virtually all the maternal deaths during a period of seven years in the city of Campinas, the confirmed MMR of 45.5/100,000 LB seems relatively low, in the context of the present situation of maternal health in Brazil.

Twenty-three out of the 62 confirmed maternal deaths were identified only after review of the medical records and other clinical information. This corresponds to an under-registration of 37.1% of the maternal deaths in the official statistics. In other

words, more than one in every three maternal deaths did not appear in the official statistics, if it is considered that our procedures were efficient enough to identify all or almost all maternal deaths. In this sense it should be considered that the "confirmed" MMR does not necessarily mean "real" MMR, as it is impossible to be sure that all maternal deaths were identified. It is clear, however, that official statistics on maternal deaths continued to be unreliable during the period of the study.

Although in Brazil data on maternal deaths is not systematically collected by an epidemiological surveillance system for routine statistics, it is evident that the MMR estimated by the Brazilian Ministry of Health, or by the SEADE Foundation for São Paulo, based on causes stated on death certificates, gives a general picture well below the reality, when compared with studies that used the same method as described in this paper.^{8,10,19} On the other hand, if the correction factor recommended for southeastern Brazil by the Ministry of Health were applied to the Campinas data⁵, the results would be an overestimate of the MMR in this specific case.

Thus, the MMR corresponding to the "declared" maternal deaths in Campinas, of 28.6/100,000 LB, could be wrongly interpreted as being very close to

Table 4 - Distribution of maternal deaths according to the identified basic cause of death and its classification, Campinas, 1985-1991

BASIC CAUSE	n	%
Direct obstetric	50	81
Abortion	2	3
Ectopic pregnancy	2	3
Hemorrhage	5	8
Hypertension	19	31
Other pregnancy complication	4	6
Placental and fetal problem	1	2
Post-partum hemorrhage	9	15
Puerperal infection	6	10
Other puerperal complication	1	2
Placental retention	1	2
Indirect obstetric	11	18
Ignored	1	2
TOTAL	62	100.00

the ratio for developed countries. It is obvious that such wrong interpretation of data would have implications for the strategies to be adopted and the interventions to be implemented for improving the maternal health status of this population.

Another point to be considered is a possible temporal trend regarding the occurrence of maternal deaths, as the study includes a period of seven years. The "confirmed" MMR for each year varied from 30.6 in 1987 to 62.5/100,000 LB in 1985. Considering the retrospective character of this study, it should be taken into account that, the further away in time an event is, the more difficult it is to obtain information on it.

This, however, would be concordant with obtaining sequentially greater MMRs, which was not observed, allowing us to suspect there may be some trend towards reduction in the MMRs. Contributing to this hypothesis, comparison with the "confirmed" MMR of 57/100,000 LB in Campinas for the period 1979-1983, which is close to the MMR of 1985 in this study, shows that it is more than 10 points higher than the levels for the period 1985-1991.¹⁰ This idea is also reinforced by the fact that the MMR of 50.5/100,000 LB for the first part of this study period, from 1985 to 1988, changed to 39.2/100,000 LB in the second part of the period, from 1989 to 1991.

Perhaps it would also be important to bear in mind that regular activities of the Maternal Mortality Committee of Campinas started in 1988. In spite of discontinuities and problems with its functioning, it is probable that the concept of maternal death began to be more disseminated,

Table 5 - Distribution of maternal deaths according to avoidance and responsibility (Campinas, 1985-1991).

AVOIDANCE/RESPONSIBILITY	n	%
Avoidable	46	74.2
Hospital care	22	35.5
Medical care	15	24.2
Social	2	3.2
Ignored	7	11.3
Not avoidable	12	19.4
Ignored	4	6.5
TOTAL	62	100.0

discussed and known in the region from that time. This could be a partial explanation for the apparent uniformity or stabilization of the number of maternal deaths identified from 1989 onwards, at a level apparently inferior to that observed in 1985-1986.

Although the hospitals were generally extremely cooperative in giving access to their clinical files, there were access difficulties with institutions located outside the city and those no longer operating. Even finding the clinical records did not always signify access to the information needed. The state of some institutions regarding the quality of their records and files is lamentable. With few exceptions, the doctor does not log down the clinical history, anamnesis, daily evolution, comments, diagnostic hypotheses or therapeutic propositions in the clinical record. Often the only available data was from the death certificate and administrative records filled for hospitalization or financial purposes.

Another problem that could alter the results is the fact that the doctor, facing a serious clinical status and without knowing the case well, has a natural tendency to associate the death to the immediate causes and not to the basic one. When the death occurs within a period of 24 hours from the beginning of clinical care, the death certificate should be issued by the Institute of Legal Medicine or by the Death Verification Service. In the first situation the problem of the identification of maternal death is practically solved. In the second, however, the only available data is what is written on the death certificate, which does not allow complete elucidation of the cause of death.

Regarding the circumstances and characteristics of the deaths, initially it was thought that there was a relationship between the day of the week and the occurrence of the maternal death, based on the supposition that there may be greater difficulties in obtaining appropriate care for serious cases that evolved to death during weekends. The relatively small number of cases did not allow us to clarify this point. It is noticeable, however, that the smallest proportion of maternal deaths occurred on Sundays.

Just as in less developed populations, there is an absolute predominance of direct obstetric causes and among them, in order of prevalence, hypertension and post-partum hemorrhage. It is worth remembering that the prevalence of

hypertension over hemorrhage is a characteristic of populations with an intermediary development situation, which demonstrates the greater need for actions at the prenatal level. Considering that the majority of women had prenatal care, the emphasis should be placed on its quality, on the opportunities for referring them to a secondary or tertiary level and on the facilities for their reception there.

In addition, the fact that delayed blood transfusion occurred in 6% of the cases of death, and in 14% of the cases that had blood transfusion, demonstrates an institutional difficulty in obtaining hemotherapy services, which is not in accordance with the city's health situation.

Another important point is the fact that 3% of the cases had an abortion as the basic cause of death, confirming some recent publications that suggested that maternal mortality due to abortion in Brazil is less than was suspected for this period. The percentage of maternal deaths from abortion was even lower than the 7.6% identified for all maternal mortality committees of Paraná state in 1990.⁷ It could also be argued that with a privileged health and socioeconomic situation, Campinas, as well as Paraná state, would not be representative of the whole country. However, similar findings are reported from other studies throughout the country.^{8,12,19}

Concerning the incidence of abortion, the spread and generalized use of misoprostol, a synthetic prostaglandin which stimulates uterine activity and which is empirically used by women as an abortifacient, substituting other more dangerous methods, should be taken into account, although there is very little data available on it. But it does seem to have highly reduced the profile of morbidity and mortality from induced abortion in Brazil. It should also be noted that the use of this prostaglandin was particularly frequent in the final five years included in the present study.

The most important result from this study probably relates to the avoidance of and responsibility for maternal deaths. While it is possible to conclude that three-quarters of these deaths could have been avoided with some kind of measures, it is also possible to have a clearer idea of the significance of these deaths and of measures directed towards reducing them. Although the total number

of maternal deaths in Campinas city, as well as its MMR, are not very high in a Brazilian context, and moreover, considering the relatively privileged situation of the municipality in terms of health and socioeconomic factors, it is inadmissible that this prevalence of avoidable direct obstetric maternal deaths should continue. It is important to consider, however, that the smaller the number of maternal deaths, the more difficult it will be to reduce them further.

In a retrospective study like this, based on review of clinical records, often incomplete, it is an extremely difficult task to attribute responsibilities for the deaths, especially when the responsibility is shared, as is the case for the majority of them. With these provisos, the predominance of hospital and physician responsibility over social causes suggests that avoidance should be even easier and almost exclusively dependent on the health sector.

CONCLUSIONS

Within the study period, 39 maternal deaths were identified through death certificates and another 23 after the complementary investigation process, giving a total of 62 maternal deaths for the municipality during a seven year period. This corresponded to an average percentage of under-registration of maternal deaths of 37.1% and to an estimate of the confirmed MMR of 45.5 maternal deaths per 100,000 LB, as opposed to the official MMR of 28.6 per 100,000 LB.

The majority of the maternal deaths identified had as their basic cause a direct obstetric factor and, among them, hypertension was the most frequent and

Table 6 - distribution of maternal deaths according to blood transfusion and opportunities for it, Campinas, 1985-1991

BLOOD TRANSFUSION	n	%
Yes	28	45
Opportune	24	39
Not opportune	4	6
No	21	34
Ignored	13	21
TOTAL	62	100

responsible for around one third of all deaths. Three-quarters of these deaths were considered as avoidable, especially via measures at the level of hospital and medical care, reinforcing the importance of strategies to be taken at the public health level for improving the quality of care and, consequently, reducing these avoidable maternal deaths.

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RESUMO

Objetivos: Estudar o número e as características das mortes maternas, suas causas e evitabilidade, entre mulheres residentes no município de Campinas no período de 1985 a 1991, identificadas entre todas as declarações de óbito de mulheres com idade entre 10 e 49 anos.

Tipo de estudo: Estudo descritivo de base populacional, retrospectivo.

Método: Selecionaram-se, dentre todas as D.O. elegíveis ao estudo, as classificadas quanto à causa básica do óbito como mortes maternas declaradas e presumíveis, segundo os critérios de Laurenti, que foram complementarmente estudadas através de seus prontuários clínicos.

Resultados: Identificaram-se 39 mortes maternas declaradas e um total de 62 confirmadas ao fim do estudo, correspondendo a uma subenumeração de 37,1% e a uma RMM de 45,5 por 100.000 NV. Cerca de três quartos dos óbitos maternos aconteceram por uma causa obstétrica direta e foram considerados evitáveis.

Conclusão: A mortalidade materna ainda é elevada no município de Campinas, embora bem menor que a média estimada para o Brasil. O predomínio de causas obstétricas diretas e de óbitos evitáveis reforça a necessidade de medidas de saúde pública para evitá-los.