Maternal Mortality in Brazil: An Estimation to Pernambuco

by

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June, 2001

Introduction:

Deaths related to birth, before being considered a demographic or public health problem, was subject of concern and fear by doctors, people who assisted the women during their deliveries and especially by women. The doctors, trying to identify the cause of death at hospitals and women because of meanings of the death at delivery (Tanaka et all, 1991). Today, in spite of the presence of antibiotics to fight puerperal infection as well as advancing medical technology worldwide, maternal mortality remains high.

Among the 50 million women who had diseases or complications during pregnancy, abortion and childbirth, about 580,000 died in the last decade, with 95% occurring in developing countries (World Health Organization, 1993; United Nations Children's Fund, 1996; Potts, 1986, WHO, 1987). According to Maine and McCarthy (1992) the differentials observed among developed and developing countries are higher than other demographic indicators. Women who become pregnant in developing areas face a risk of death consequent to pregnancy that is 80 to 900 times higher than women in developed areas (United Nations, 1991). The growing disparities between those who live in wealth and poverty, advanced education and no education, sofisticated technology and lack of access to health care, can all contribute to that great differential, even at the end of millennium (Ravidran and Berger, 2000). Clearly, socioeconomic factors are directly related to maternal morbidity and mortality, evidenced by the failure and inadequacy of the health care systems, negligence of health workers and services and reinforced by traditional beliefs and women's inferior status in society.

Levels of maternal morality declined during the first part of the 20th century to become it a rare event in some developed regions. The improvements in living conditions, better nutrition, improvements in medical procedures (cesarean section, for instance), and use the drugs to combat the most common causes (such as infections and eclampsias); the legislation of abortion and greater autonomy among women should be considered responsible for this improvement. In this context, in developing countries the demographic phenomenon of higher female life expectancy is still altered by the avoidable and premature female death consequent to heavy reproductive process associated with poor socioeconomic status. These deaths are also hidden of the vital statistics, consequent of weak information systems, and require special researches about the magnitude of maternal death and the cause-effect relationships. Due the importance of the maternal mortality as a sensitive indicator of inequality and social development, the reduction of its levels has been established as a goal by World Health Organization and United Union and reinforced by the Nairobi, Cairo and Beijing International Conferences (Shen, Williamson, 1999)

In Brazil the maternal mortality ratio based on Vital Statistics (birth and death certificates) without any kind of correction to adjust its levels, was 65 per 100.000 live births (Manual dos Comitês de Mortalidade Materna, 2000). Although this level is consider low due to underreporting by the Ministry of Health, they have decided to use it until they can define correction factors that can be applied to capture all the differences among its regions (Maternal Mortality National Meeting, 2000).

The State Health Department of Pernambuco decided in 1995 that the Epidemiological Department should monitor all the deaths occurring to women between 10-49 years old. The presumed and declared maternal deaths should be investigated in the locality of its occurrence, such us hospitals, residences and autopsy/mortuary services.

This study examines the female mortality data in Pernambuco produced by the State Epidemiological Department after to be implanted the monitoring process of female death in 1996. These data will used to obtain estimates of maternal mortality in 1997-1998, based in RAMOS method (Reproductive Age Mortality Study). The accuracy of the new system and the level of underreporting between raw data and "adjusted data" after investigations also will be discussed.

Three issues drove this study: the maternal mortality as public health problem; maternal mortality as an underreported cause of death and maternal mortality as problem of low status women.

Concepts and Definitions

The International Classification of Diseases (10th Review, 1996) defines early maternal death as: "the death of a woman while pregnant, during an abortion or within 42 days of termination of pregnancy, from any cause related to or aggravated by pregnancy or its management, but not by accidental or incidental causes." Later maternal death occurs between 43 days to 1 year after delivery or abortion. The justifications to add this period are based on medical improvements that can extend the life, can pass over the classical 42 days of puerperium.

Most maternal mortality is classified under direct cause result from obstetric complications, such as eclampsia, hemorrhage, infections and unsafe abortions. These represent approximately 80% of maternal deaths in developing countries. The indirect causes are not necessarily obstetric conditions, but rather by aggravated circunstances of the pregnancy, such as cardiovascular diseases, diabetes, anemia, etc (World Health Organization, 1997).

Although there are advantages of using the "multiple cause-of-death perspective" to catch the complexity of mortality analysis, in this study the "basic cause of death" will be used to

identify maternal death among female death[1]. Basic cause of death according to ICD (10ª Review, 1996) represents a single condition or injury that initiated the chain of morbid events leading directly or indirectly to death (Nam, 1990). It should be recorded in the medical certification part on the death certificate, which has a universal pattern.

Another definition used in this study is maternal presumable cause of death. It is a cause of death recorded in the death certificate of women in the reproductive ages[2] where maternal death did not represent the basic cause, but a terminal or associated cause. Septicemia, for instance, is a terminal cause of death and can mask a puerperal infection, an abortion or an infection site in another part of the body.

Previous Literature

Maternal mortality, is a major problem in developing countries, which was often forgotten and sometimes neglected theme during the 1970's and early 1980's (AbouZahr, 2000). After 1987, Safe Motherhood Initiatives started to work with developing countries (Africa, Asia and Latin America) experimenting different techniques, direct and indirect, to provide an estimate of the magnitude of maternal mortality in some countries. According to the World Health Organization (1987), an accurate estimation of maternal death is the first step towards reducing maternal morbidity and mortality.

The World Summits for Children (1990) declared as a top priority a reduction in maternal mortality by al least 50% by year 2000. The ICPD (1994) redefined this goal in light of current levels of maternal mortality, suggesting those countries with high maternal mortality ratios aim by 2005 to have ratios below 125 per 100,000 live births. By 2015 this ratio should be further 75 per 100,000 live births. The Fourth World Conference on Woman (1995) again reinforced the necessity to reduce "ill health and maternal morbidity and achieve worldwide the agreed upon goal of reducing maternal mortality by at least 50 per cent of 1990 levels and a further one half by the year 2015" (World Population Monitoring, 2000).

A smaller, but significant literature has investigated maternal mortality as avoidable cause of death among young women in developing countries. They have focused on disparity observed in health indicators between developed and developing countries in addition to the medical, social and cultural causes (Shen, 1999; Hogberg, 1985; Royston and Armstrong, 1989; Ravidran 1990; Campbell and Grahan, 1990; Lynn and Maine, 1993). Hogberg (1985) discuss the

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[1] In Pernambuco for 1997, the multiple cause-of-death was only being adopted by SIM (Mortality and Information System).
[2] The State of Pernambuco considers reproductive ages from 10 to 49 years.

early death as invisible tragedy associated with neglected reproductive health, a lack of welfare care and unskilled professional assistance during the childbearing period. Shen and Willianson (1999) support the high fertility rates as an important factor in the maternal mortality process while Royston and Armstrong (1989) consider that a cumulative low status of women is directly associated to maternal mortality. All of them recognize the need to identify the magnitude of maternal mortality by uncovering the level of underreporting and that the Knowledge of the actual dimension of the problem demands urgent intervention at international, national and local levels.

These studies identified that the distribution of maternal mortality following the same pattern of the infant mortality[3]. That is, in poor areas, the direct obstetric causes are higher than indirect obstetric causes. Eclampsia, hemorrhage, infections and abortion constitute the causes of maternal mortality in developing areas. The indirect causes (gestational diabetes, cardiovascular diseases) make up 14-30% in these areas (Hogberg, 1985). While other studies are concern with statistics of maternal mortality and suggest different methods to improve estimates of the level of underreporting (Brass et all, 1988; Campbell, 1990; Wong, 1990 and 1995). These methods will be discussed in the methods section.

Other kind of information about maternal mortality is provided by international and national reports. There are periodic Safe Motherhood Program Reports (World Health Organization), World Population Monitoring Health and Mortality of the United Nations carried out important estimation on maternal mortality. They have no information from all countries and their estimations are limited due to different methodologies used. Therefore, we can assume them as a warning about the maternal mortality problem and level of underreporting.

In Brazil, the primary studies were based on case studies of women who gave birth at hospitals. Most of them have been conducted in hospitals-schools and advanced maternity units (Faúndes & Cecati, 1990; Costa, 1985; Guedes, 1990, Moreira at al, 1993). They had a medical approach focusing on the importance of eclampsia, bleeding and obstructed labor associated with anemia, parity and other demographic factors, such as age, marital status, etc.

The first study with "population representative" (the denominator was live births) in Brazil was conducted by Laurenti et al (1987) in the city of São Paulo and demonstrated a level of underreporting about of 50%, corresponding to a correction factor (K) of 2. Volochko (1992) and Tanaka (1991) also found similar underreporting levels in the same city. These researches were

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[3] In places with high levels of infant mortality, pos-neonatal causes are prevalent while places with low levels, neo-natal causes are prevalent

spread for the other places and the substantive undercounting found led the Ministry of Health at the beginning of 1990s incorporating correction factors to estimate maternal mortality.

Mitsuiki and Tanaka (1999) trying evaluate the correction factors studied 15 Brazilian cities (three in the Pará (North region); six in Rio Grande do Norte (Northeast region) and eight in Mato Grosso (West-Center region) a decade later, still obtained a correction factor of 2.3. It suggests that the current ratiowide in Brazil might be around 150 rather than 65/100,000 live births.

Theoretical and empirical background

1. Maternal mortality as a public health problem:

Maternal mortality is an event that occurs on young population in reproductive and also in productive ages. In most developing countries, between a third of the deaths of women in their reproductive years can be attributed to pregnancy-related causes (Royston and Armstrong, 1989; Shen and Williamson, 1999). These premature deaths are responsible by breaking the structure of unaccountable families since of role that the women play into their families and communities.

In 1995, estimates maternal mortality ratio span the range 870 per 100,000 live births in Africa; 390 per 100,000 live births in Asia and 190 per 100,000 live births in Latin America and Caribbean. In USA and Europe it is lower than 10 per 100,000 live births and Canada it is about 3.6 per 100,000 live births (Demographic Yearbook, 1998). While one of every 200 women who are pregnant died as a consequence of maternal problems in developing countries, in places such as Canada this risk is one maternal death to 13,000 among pregnant women.

In Brazil, during the 1970s and 1980s it was estimated 270 per 100,000 live births nationwide, with a concentration in the Northeast, about 600 per 100,000 live births. Laurenti (1987) placed the number at 200 deaths per 100.000 live births for 1980. The Maternal Mortality Committee of Paraná (1991) found maternal mortality ratios of 100 per 100,000 live births to Paraná. Another estimate was conducted by Wong (1996) using the DHS-96 in which maternal mortality ratio was 100 and 140 per 100,000 live births in Brazil and the Northeast, respectively.

In Pernambuco, state of Northeast of Brazil, epidemiological surveys carried out in hospitals, residences and autopsy services in 1994 found the maternal mortality ratios varied from 121 to 238 per 100.000 live births in the metropolitan region and 8th region[4], respectively (Valongueiro, 1996). Albuquerque (1992) also identified maternal mortality ratios of 71 and 84 per 100,000 live births for Recife. The most common causes of death were eclampsie,

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[4] The state is divided in ten heath administrative regions. The 8th region is located in the driest land.

haemorrhage, abortion and infections. One unexpected finding from these studies was the importance of abortion as the cause of death. In Salvador (State of Bahia's Capital) and Recife, abortion was found to be the first cause of maternal death for the year of 1994.

2. Maternal mortality as an underreported event

According to Tanaka et al (1991), there is a considerable underestimation of maternal mortality even in developed countries, which varyies from 15 to 50%. In developing countries (exceptions are Cuba, China and some Latin America countries), the vital registration system has a low coverage. Thus, the measurement of cause specific adult and infant mortality tends to be a complex and intensive structuring of numerator and denominator to construct an indicator. This weakness of the official system of information represents the first mechanism of underreporting maternal death. The second mechanism involved with underreport is the quality of information recorded in the death certificate. It may ever be worse in the case of maternal deaths due to abortions, because of its moral, cultural and religious implications. This lack of consistent data, measurement and analysis, create a cycle where the absence of information reduces the intervention and therefore maintained the high incidence of the mortality levels.

The most common way to measure maternal mortality is through the Maternal Mortality Ratio (MMR), which is expressed as a number of maternal deaths divided by the number of live births in a given population and in that period. Although the MMR reflects neither obstetric risk nor the relationship between maternal mortality and fertility (its denominator is not the population to the risk of death), it has been widely used because of its comparability among countries. The construction of the MMR presents problems in both, the numerator and denominator. The former (maternal deaths) because of the underreporting of maternal deaths on the death certificate associated with omission of the deaths in official vital registration and the latter (live births) because of the same level of underreporting.[5]

Another and more accurate measurement of maternal mortality is the Lifetime Risk, expressed as the number of maternal deaths divided by the female population in childbearing ages and multiplied by the estimated period of childbearing (35/39 years). Although this indicator is not widely known it can be found in epidemiological studies produced by London School Hygiene Tropical and Medicine, in the reports of WHO and PHO (Pan American Health Organization) and Safe Motherhood Initiatives.

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[5] In Brazil, since 1993 Ministry of Health became responsible for recording the live births (SINASC), a strategy to attempt to get better coverage.

Finally a question to point out (but that will not explore here) is the genesis of the underreporting of the maternal deaths in the death certificates by the doctors. This should be a consequence of the lack of the medical-hospital information system and a way to omit avoidable deaths or only unknown of how filling out a medical certificate section.

Maternal mortality as a problem of low status women

The maternal morality ratio seems to be inversely related to women's status. The status of a woman can be described in terms of her income, employment, education, health and fertility, and the role she plays within the family and community (Royston and Armstrong, 1989). The status of women also implies a comparison with the status of men and in societies where women have more autonomy, maternal mortality shoub be is lower. According to Maine (1993), the inferior status of specific groups of women (conservative religious population) increases mortality in both, in poor communities and urban areas of industrialized regions. Although the literature has consistent findings about socioeconomic status and maternal mortality, a direct association is still controversial. Some different factors including cultural behaviors can operate as intermediate variables to influence maternal mortality. In some societies , for instance, "female power" is a function of their reproductive outcomes and the competition among wives in relation to the number of children can exposure women to higher risk according their parity, pregnancy, delivery and puerperium condition. Different religious restrictions such as refusing medicine affect situations that should further expose women to risks of maternal deaths.
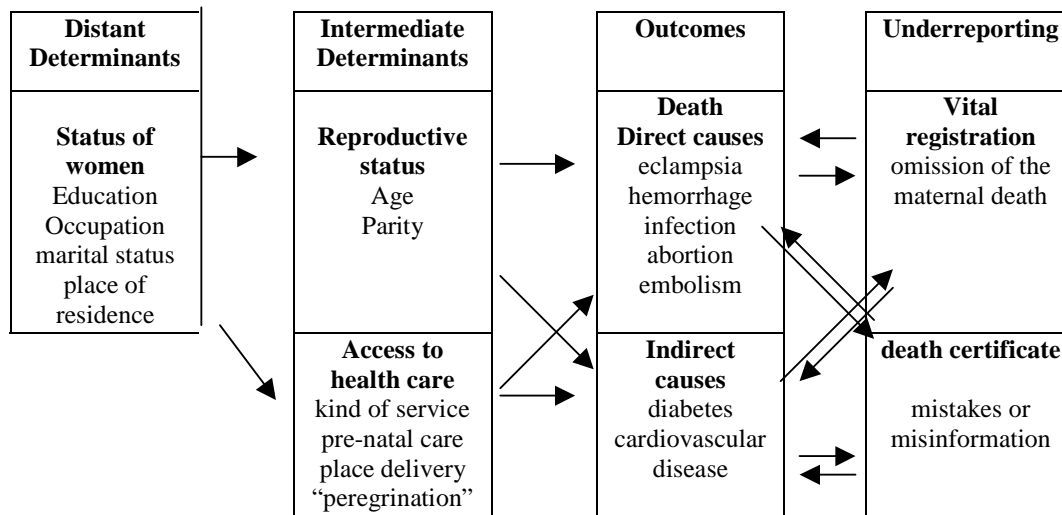
The most important indicators of women's status related to maternal mortality are access to education and health care. Education itself is extremely important in increasing women's status because affects other measurement of women's status such fertility rates, access to employment and health care. Education, according to Royston et al (1989) works as "medication against fatalism of maternal morbidity and mortality". Maine and McCarthey (1992) stressed that relation of women's education and maternal mortality works thought three mechanisms: its association with fertility rates, the perception about the process of illness-disease and improvement the quality of care. Education and health status in this way are intrinsically connected to maternal mortality and morbidity.

Maternal mortality occurs not only because the women have more pregnancies, some of them occur because that they have more pregnancies that they want. The illegality of abortion and The deaths resulted from unsafe abortion contribute to an increase in the hidden face of maternal mortality.

I used the framework for analyzing maternal mortality presented by McCarthey and Maine (1992) incorporating a new element, underreporting.

Figure 1. Framework to discuss maternal mortality in Pernambuco

Distant Determinants	**Intermediate Determinants**	**Outcomes**	**Underreporting**
Status of women Education Occupation marital status place of residence	**Reproductive status** Age Parity **Access to health care** kind of service pre-natal care place delivery "peregrination"	**Death** **Direct causes** eclampsia hemorrhage infection abortion embolism **Indirect causes** diabetes cardiovascular disease	**Vital registration** omission of the maternal death **death certificate** mistakes or misinformation

Methods:

Maternal mortality has been studied by direct and indirect methodologies that produce estimation based in different data sources. The source of the data is the most important factor in obtaining good estimation about mortality in general and the availability and quality of the source defines the method that should be used. Direct methods use information from vital statistics, hospital records, home interviews or a combination of them. Among them, Maternal Death Review (MDR), RAMOS (Reproductive Age Mortality Study), Sisterhood Method and the Verbal Autopsy are important to discuss briefly.

RAMOS method (Reproductive Age Mortality Study) involves the identification and investigation of causes of deaths of women in reproductive ages. The deaths should be identified according to records or source of information available, that is, vital registration (most common), hospital and health center records, autopsy services, community leaders, cemeteries, mass media, etc. In this study I will use the RAMOS method modified according to an epidemiological approach. Here is a brief description (tables 1 and 2) of the modified method used in this paper:

Table 1

RAMOS modified according the epidemiological approach

Steps	Description
1	Definition of the population and period of the research
2	Definition of the data sources (death certificate is a main data source)
3	**Notification process**[6]: Selection of the death of female between 10-49 years (presumable mortality deaths)
4	**Investigation** of the death according to local of occurrence
5	**Critique, Codification and Analysis**
6	Estimation of indicators
7	Availability of information

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[6] The bold words mean the epidemiological process included

Table 2

Modified RAMOS Method Development

Description	Development
Definition of the population and period of the research	The state of Pernambuco has 10 administrative health regions with decentralized epidemiology department in the majority of the regions and cities[7]. The epidemiologic group at the regional and municipal level collected all the death certificates since 1997. The data for 1998 had problems in the process of codification and only Recife, capital of Pernambuco, had data could be used. Here will used data from 1997 for Pernambuco and some data from 1998 for Recife
Definition the data sources	The main data source were the death certificates
Notification (Selecting) **process**	Since 1996, 80% of the municipalities were trained to conduct the *notification* process, which means to select all female deaths, who were resident in Pernambuco between 10-49 years old (*presumable* maternal deaths). The data were selected (notification process) in the epidemiological department of the cities under coordination of the health regions.
Investigation process	The investigation was conducted at hospitals, households, cemeteries and mortuary services, using a special instrument to record the information. Declared and presumable maternal deaths were investigated.
Critique, Codification and Analysis	After collecting the data, *presumable* maternal deaths were confirmed as maternal deaths or discarded. A technical group (epidemiologists and obstetricians) defined the definite cause of death after reviewing all deaths (maternal deaths and inconclusive cases) at a central level. In some cases were necessary to change previous codification (according to ICD 10ª Review). The following step was to enter the data of maternal death into a statistical program (epi-info) to get descriptive statistics.
Estimation of indicators	Maternal Mortality Ratios (numerators: maternal deaths and denominators: live births)
Availability of information	These results should be available in the Information Department of Health State Secretary

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[7] The IBGE (Statistics and Geography Brazilian Institute) has other kind of division: Recife's metropolitan area; zona da mata; agreste; sertão and sertão do São Francisco.

Results:

Underreporting of maternal mortality for Pernambuco inr 1997 and 1998

Among 6016 female death (10-49 years) occurred in 1997 and 1998, 1152 (about 20%) were investigated. After investigation, 254 maternal death were confirmed, 155 (61%) maternal death were declared as such on the death certificate while 99 (39%), were recuperated by the process of investigation (Figure 1). This difference between declared and presumable maternal deaths represents an underreporting about of 39% and corresponds to a correction factor of 1.63[8].

If this outcome (254 maternal deaths) are compared with the number of maternal deaths observed in 1996, which were 73 (SIM-PE, 1996), the adjusted maternal mortality ratio in 1996 after investigation would had been 119 (73 declared maternal death in 1996* 1.63). Although this underreporting can suffer annual fluctuation and innumerable problems related to incomplete investigation such as, low coverage and lost cases due to changes in address, these preliminary results prove the efficiency of the investigation process to correct the underreporting of maternal mortality in Pernambuco.

Figure 1

Source: DSM-DIEPI/SES-PE,1997-1998
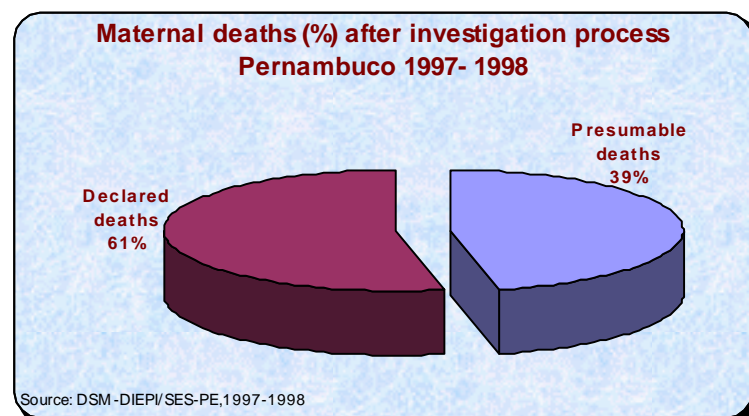
Levels and structure of maternal mortality

The Maternal Mortality Ratio (MMR) was calculated to each health region. The denominator used was live births from SINASC-MS,[9] available by region as well as a state. Figure 2 shows MMR by health region for the period, which varies from 46 to 181 per 100,000 live births. The total for state (number 11) is about 85 per 100,000 live births. Based on these results, it seems useful to classify the health regions according its levels of maternal mortality

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[8] 155 (declared maternal deaths) *1,63 = 254 (total after investigation)
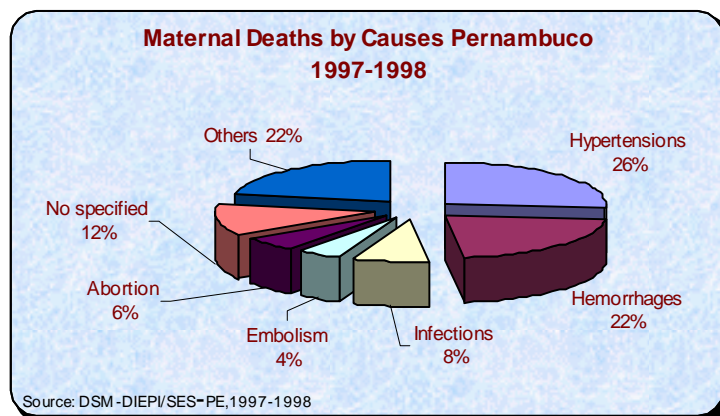[9]National System of Live Births of Minister of Health

from medium (20-60); high (60-100), very high (100-150) and extremely high (more than 150). There was no low level identified in that period. The region with the highest MMR was VII Health Region, Salgueiro (185 per 100,000 live births) followed by VIII Health Region, Petrolina (174 per 100,000 live births) and VI Health Region, Arcoverde (130 per 100,000 live births). On the other hand, the IX Health Region, Ouricuri (43 per 100,000 live births) and V Health Region and I Region presented the medium maternal mortality ratios. These differences are more explainable due to different level of coverage in the investigation activity than by an actual difference in the quality of the reproductive health services.

The structure of maternal deaths in 1997 and 1998 showed that 75% were resulted of direct maternal causes: eclampsia/hypertension (24%), hemorrhage (22%), abortion (6%) and infections (8%) showed in the figure 3. The indirect maternal causes constituted 25% of the maternal deaths, a classical pattern for areas with high levels of maternal mortality. The risk of dying for maternal mortality, estimated through the Lifetime Risk in Pernambuco during 1997-1998 was about 200, that is, one of every 200 women in their childbearing years is predicted to die from a maternal cause. If we put Pernambuco in a regional perspective, the Lifetime risk to Bolivia is 50 while to Cuba is 914 and Costa Rica 3200 (data from Yunes and Mora, 1991).

Figure 2

Maternal Mortality Ratio by Region and State of Pernambuco, 1997-1998

Source: DSM-DIEPI/SES-PE,1997-1998
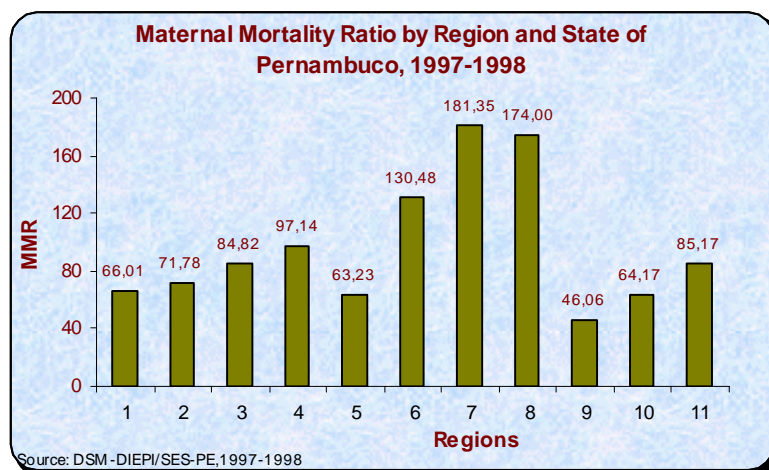
Figure 3

*Who is dying of maternal cause in Pernambuco?*

The women who died of maternal cause in 1997-1998 in Pernambuco were in general young, 62% of them are less than 30 years; 14% are less than 19 years old and one case under 14 years. The proportion of women older than 45 years represented only 2,4% of the maternal deaths occurred in the period.

The level of education was one the most undereported socieconomic data, that is 46% had no information; 15% had no education, 20% reached elementary school, 13% middle school and 1% reached a college degree. According to occupation, 52% were housewives, 26% agriculture workers, 7% students and 14% were distributed among other kinds of occupations. Among them 50% were single or had no fixed partner and 44% were married (Table 3 in annex). According to parity, 20% of the deaths occurred during the first pregnancy while 8% occurred among women with more than 8 pregnancies. 60% of them had between 2 and 4 pregnancies.

The proportion of women who attended pre-natal care (more than three consultations) was 50%. Although the State has a great coverage of public maternity services, there is no well-organized reference system to assure a place for delivery for all women who are covered by SUS (Public Health System), place of ocurrence of the most maternal deaths. About 35% of maternal deaths occurred after a "peregrination process" seeking a place to give birth[10]. In relation to local of occurrence, 83% ocurred at hospitals, 11% at home and 6% in others places like transports and public spaces (Figure 4). Cesarean section was the mode of delivery in 52% of maternal deaths while 48% was by vaginal birth (including forceps).

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[10] Peregrination is a term used to indicate the route of the women seeking a hospital to have birth.Tanaka (1993) found 40% peregrination in South Region of São Paulo city.

Figure 4
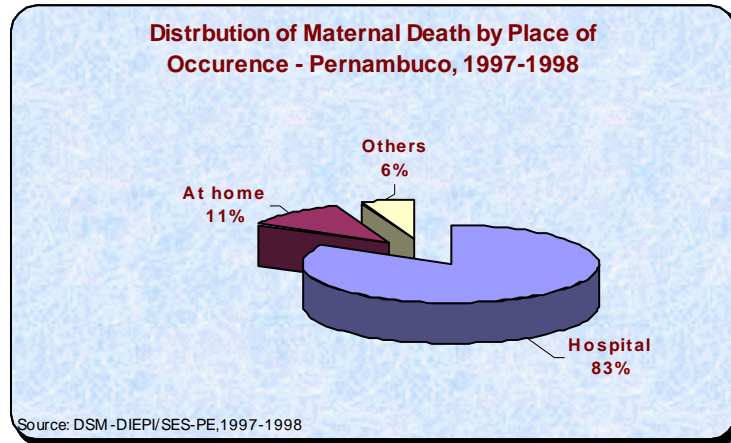
Using a conceptualization of "avoid causes of death of the Minister of Health - Brazil (Manual dos Comitês de Mortalidade Materna[11], 2000), which are related to heath system responsibility (tecnichal and institutional problems) socioeconomic factors, the role of women decision making (for instance, no attendance to pre-natal care if it is available), 81% of maternal deaths were avoid for preventive and curative interventions.

Discussion

The characteristics of to be preventive of the maternal mortality associated with a lack of acknowledge about its magnitude in Pernambuco justified that this study had been conducted based on small data set, however its limited generalizability.

This study shows the well-known relationship between women's status and maternal mortality. It confirms the reverse relationship between maternal mortality and development and also reinforces the importance of monitoring female mortality as the best way to estimate maternal mortality indicators in developing areas, like the Northeast of Brazil.

Since this data set was generated from an initial epidemiological routine process instead of a survey the data contain serious limitations. Limitations in terms of its coverage (sensibility to capture all female deaths), accuracy (specificity in capturing maternal deaths among female deaths) and because it covers only two annual periods. In spite of these restrictions, some inferences can be made.

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[11] Manual of Maternal Mortality Committtees

Based on the framework proposed by Maine and McCarthey (1992) and considering education level and occupation to construct the socioeconomic status [12]of women in Pernambuco, the majority of maternal deaths occurred among low status women. Even though we can not directly associate maternal death with education level and occupation, the literature has demonstrated that education can operate through some set of intermediate determinants that affect the pregnancy outcomes and its complications (Susan and Armstrong, 1989; Maine and McCarthey; Ravidran and Berger, 2000). The high percentage of maternal death among non-educated women and housewives, who supposedly have low income in Pernambuco (it was not measured here) demonstrates that the risk of dying for maternal cause has been influenced by their position in society.

If we work with the concept of determinant factors, the women who died were disadvantaged either in relation to their reproductive and health status or in their access to health care. The mortality that occurred in the 14 years old is an example of the absence of reproductive health services.

Although the low proportion of deaths due to abortion[13] resulting from unwanted pregnancies because its illegality is also a clear and complex interaction between the lack of reproductive right and failure of health coverage. Although the risk of pregnancy varies from woman to woman, the low coverage of pre-natal care associated with a public hospital delivery are not preventing complications which lead to maternal deaths in Pernambuco (sometimes resulting of unbalanced neglect care and interventionist assistance).

The other important and complex birth outcome of low women's status observed in Brazilian obstetric care is the lost of control by women over their delivery. The high rates of cesarean section are a good example. According to Faúndes and Cecatti (1991), for the doctors to perform a cesarean section is more convenient than attending a vaginal birth because they spend lesser time during a cesarean than a vaginal birth; they can control better the delivery process and also they can predict the outcomes. Carranza(1994) and Hopkins (1998) studying cesarean section in Brazil showed that doctor's attitude in relation the mode of delivery is a more decisive factor than the women's preference. According to Chacham (1999) the submission of medical authority is in part attributed of growing in technological knowledge and in medical

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[12] Income was not asked

[13] In Recife, studies carried out at hospitals have demostrated that more than 70% are induced (Silva, 1996).This low percentage of death for abortion is unexpected, because it was higher for years before.

specialization. This kind of low status is not a characteristic of the public system, but consequence of obstetric interventionist model spread in that country after 1970s[14].

Some authors discuss the relation between cesarean section and maternal mortality. The risk of maternal death during a cesarean is about 10 to 12 times more than a vaginal delivery (Faúndes and Cecatti, 1991). The risks of dying after a cesarean can be result from the intervention itself (hospital infection, anesthesia, etc) or because the indication of cesarean was consequent of one complication during a labor or pregnancy. Although 52% of maternal deaths in Pernambuco occurred after cesarean section there is no possible to explain these indices in terms of risk, since is impossible to understand what is cause or consequence without statistical analysis.

Finally, the underreporting estimated in Pernambuco (about 40%) is a consequence of different situations, whose we can briefly try to understand: First, the doctors[15] voluntarily omit the condition of pregnancy, abortion, delivery or puerperium when they are recording the cause of death on death certification. Second, they do not get to make any relationship among the causes of death and the condition of pregnancy, abortion, delivery or puerperium[16], then consider "terminal causes" or "sighs, symptoms or undefined diseases"[17] instead basic causes. This kind of misclassification represents a great proportion of cause of deaths in developing areas. In Pernambuco in 1997-1998 it represented 27% of the cause of deaths recorded in the female death certificates.

The other way to explain the underreporting is by omission of the death certificates on vital registrations system (we are not considering it in this paper). Although Pernambuco has improved its information system since 1990 (SIM-PE), the coverage remains in approximately 85% to the whole state, with regional differences (Paes, 1999). The metropolitan area presents the lower highest level of coverage while the *sertão* (dry land area) presents the lowest. The infant mortality is more underreported than adult and female mortality (SIM-PE, 1998).

These levels of underreporting associated with high incidence of maternal mortality, reinforce the need to make intervention in two ways. First, identifying the true maternal mortality ratio (correcting the underreporting) and second, combating its occurrence through a number of ways from macro level (improvement in education) intermediate level (improvement in access, coverage and quality of the health care) and micro level (discussing the adequacy of the current

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[14] There is a great differential in cesrean section rates between private and public sectors (Potter at ali, 2001, DHS-19966 and PNAD, 1998).

[15] Since the death certificate is a medical reponsability

[16] It is more common when the maternal death occurs in *Intensive Therapy Units* because the death event is far from any condition related to pregnancy, delivery and puerperal cycle.

obstetric model). In other way, the lack of consistent data necessary to evaluate the outcomes of health assistance (maternal morbidity and mortality, for example) provokes a cycle where the absence of information reduces the intervention and maintains the high incidence of maternal mortality and morbidity.

As conclusion, according to Ruben Alves (1998) sometimes, stories can say more than scientific analysis.

A.M.S. was 34 years old, married, she had no finished middle school and lived in Recife. She worked as a health agent of PACS[18], whose one important function is attract pregnant women at the beginning of the pregnancy and follow up them until their possible abortion or delivery.

A.M.S was pregnant and that was her 12th gestation. She got three abortions and had eight live births, which continue alive. When she reached her 9th month of pregnancy and her labor started she decided to seek a maternity closer her house (paid by SUS). She had a live birth by vaginal delivery and no problems were identified in that moment. Forty minutes latter she began to bleed. According to medical and nurse records right decisions were performed, but the bleeding remained. The health workers staff decided to transfer her for a reference maternity approximately 2 hours later. A.M.S died in the transport. Her body was sent to an autopsy service to proceed an autopsy and clarify the cause of death.

*This death was selected to investigation process because the cause recorded on the medical certificate was **undefined cause of death**. After the investigation process the group found as the result of autopsy: "**white autopsy**", which means that there was not justification to explain that death. After that, another unexpected finding: A.M.S. did not attend any consult of pre-natal. Even though she was a health agent, she did not fell "convinced" about the need to follow up the physiological process of pregnancy to avoid complications and support her future delivery. Similar to many women, who had many children successfully, she neglected possible risk of a multiparity.*

This is an extreme example of maternal death captured after investigation at hospital and autopsy service, resulted from an overlap underreporting on the death certificate given by doctors in two services.

Considering the framework proposed (Maine and McCathey) added the underreporting component, we can observe a complex chain among determinants factors over this maternal death. Although we can not proceed a good analysis about the *woman's status* (distant determinants) because limits in our data, is possible to observe the important role played by the *reproductive status* and *access to health care* (intermediate determinants). The low reproductive

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[17] In ICD has a special chapter that contains all these misclassifications

[18] Communitary Health Agents Program is a national program that tries to link health services and communities in oorder to increase the coverage of health assistance.

status represents by number of pregnancies associated with absence of pre-natal care, inadequate place to have baby[19] and "peregrination" (she died in transport, during "peregrination") led to a direct maternal death, resulting from obstetric complications. Finally, to close the cycle, doctors did not recognize or record the true sequence of facts occurred, showing a lack of commitment from the health services in different ways.

If the investigation process were not installed, this death would be classified as an *undefined causes of death*. If we can not knew about that, any intervention would also be made without take in account this extreme case of maternal death occurred in Recife, supposedly the most developed city of the State and one the most important city of the Northeast of Brazil.

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[19] Bleeding is the more expected complication after a delivery among multiparous women, but also among women who are having their first child ou abortion.

Annex 1

**Maternal deaths distribution according to demographic
    characteristics - Pernambuco, 1997 - 1998**

Characteristics	Number	%
Single	128	50,39
Married	111	43,70
Others	15	5,91
Total	254	100,00

Education Level	Number	%
No education	37	14,57
Elementary level	52	20,47
Middle school	32	12,60
High School	13	5,12
College	2	0,79
No information	118	46,46
Total	254	100,00

Occupation	Number	%
Housewives	133	52,36
Agricultural workers	67	26,38
Student	19	7,48
Others	35	13,78
Total	254	100,00

Source: DSM-DIEPI/SES-PE,1997-1998

References

Albuquerque, R. (1994). Estudo da Mortalidade Materna no Recife, 1992-1993. UNICAMP. São Paulo, Universidade de Campinas.

AbouZahr, C. (2000). "Measuring Maternal mortality: What do you need to know?" Reproductive Health Matters Critical Issues: 13-23.

Chacham, A. (1999). A medicalização do corpo feminino e a incidência do parto cesáreo em Belo Horizonte. CEDPLAR. Belo Horizonte - Brazil, Universidade Federal de Minas Gerais: 208.

Faúndes, A. and J. Cecatti (1991). "A Operação Cesariana no Brasil.Incidência, Tendências, Causas, consequências e Propostas de Ação." Cadernos de saúde Pública 7(2): 150-173.

Hogberg, U. (1985). "Maternal Mortality - A World Wide Problem." Journal of Gynecology & Obsterics 23: 463-470.

Hopkins, K. (1998). Are Brazilian Women Really Begging for Cesareans? XI Encontro de Políticas Populacionais, Caxambu - Minas Gerais.

World Health Organization International Classification of Diseases. 1996.10th Review.

McCarthey, J. and D. Maine (1992). "A Framework for Analyzing Determinants of Maternal Mortality." Studies in Family Planning 23(1): 23-33.

Nam, C. (1990). Mortality Differentials from a Multiple Cause of Death Perspective. Measurement and Analysis of Mortality. N. O. U. Press. New York: 328-342.

Ravidran, S. and M. Berger (2000). "Preventing maternal Mortality: Evidence, Resources, Leadership, Action." Reproductive Health Matters Critical Issues: 3-12.

Royston, E. and S. Armastrong (1989). Preventing Maternal Mortality. Geneva, World Health Organization.

Shen, C. and J. Williamson (1999). "Maternal mortality, womes's status, and economic dependency in less developing countries: a cross sectional analysis." Social Science and Medicine 49(2): 197-214.

Tanaka, A. and L. Mitsuiki (1999). Estudo da magnitude da mortalidade materna em 15 cidades brasileiras. São Paulo, Faculdade de Saúde Pública - São Paulo: 75.

Valongueiro-Alves, S. (1996). Mortalidade Materna em Pernambuco: um estudo quantitativo e qualitativo. CEDEPLAR. Belo Horizonte - Brazil, Universidade Federal de Minhas Gerais: 120.

World Health Organization (2000). Health and Mortality: Selected Aspects. New York, United Nations: 58-74.