Pregnancies with an outcome of fetal death present higher risk of delays in obstetric care: A case-control study

Marley Carvalho Feitosa Martins¹, Francisco Edson de Lucena Feitosa², Antonio Brazil Viana Júnior², Luciano Lima Correia¹, Flávio Lúcio Pontes Ibiapina³, Rodolfo de Carvalho Pacagnella⁴, Francisco Herlânio Costa Carvalho¹,²*¹

¹ Department of Community Health, Federal University of Ceará, Fortaleza, Ceará, Brazil, ² Department of Maternal and Child Health, Federal University of Ceará, Fortaleza, Ceará, Brazil, ³ Center for Health Sciences, University of Fortaleza, Fortaleza, Ceará, Brazil, ⁴ Department of Tocoginecology, State University of Campinas, Campinas, São Paulo, Brazil

* herlaniocosta@uol.com.br

Abstract

The objective of this study was identify the association between delays in the care provided to pregnant women and the fetal death outcome, in a tertiary reference maternity hospital in the Northeastern Brazil. A case-control study, with 72 cases of fetal death and 144 controls (live births) in women admitted to the Obstetrics Service of the Assis Chateaubriand Teaching Maternity Hospital, in Fortaleza, Ceará. Controls were matched (2:1) by the approximate gestational age of the case. The groups were compared using the three delays model of obstetric care. The Pearson’s Chi-square test and the Fisher’s exact test were used to compare the groups. P < 0.05 was considered statistically significant. The Group with fetal death had a smaller number of prenatal consultations (> 6 consultations: 27.8% in cases, 40.3% in controls, p = 0.003), less risk classification of pregnancy (41.7% vs 55.9%, p = 0.048), less guidance about the health facility for delivery (44.5% vs 64%, p = 0.009), lower frequency of cesarean sections (25.4% vs 65.7%) and higher frequency of hemorrhagic syndromes (33.3% vs 19.4%, p = 0.024) and syphilis (15.3% vs 4.2%, p = 0.004). Variables that persisted significantly associated with fetal death in the logistic regression were: Refusal of assistance (OR = 4.07, IC 95%: 1.08–15.3), Absence or inadequacy of prenatal care (OR = 2.69, IC 95%: 1.08–15.3), Delay in diagnosis (OR = 10.3, IC 95%: 2.58–41.4) and Inadequate patient conduct (OR = 4.88; IC 95%: 1.43–16.6). Despite of having a higher frequency of obstetric complications, gestations with fetal death are more prone to delays in obstetric care.

Introduction

According to international estimates, Brazil is in an intermediate range of fetal mortality rate: five to 14.9 deaths per thousand births. However, the low quality of the information and the under-registration of fetal deaths in the official systems compromise the real dimensioning of
the problem. In many health services, there are still no routines for the analysis of the occurrence of fetal death, as well as lack of specific investments for its reduction. This reality results in the difficulty of knowing the factors that cause the death of these fetuses, making it difficult to develop intervention measures [1].

Data from the Brazilian Northeastern region, in addition to identifying deficiencies in prenatal care and delivery, showed that 25% of pregnant women had to seek more than one maternity at the time of delivery, a problem that poses a potential risk to maternal and fetal life. About 95% of all fetal deaths occurred in this region were codified in Chapter XVI of the International Classification of Diseases (ICD-10) as "Some conditions originating in the perinatal period", which are strongly influenced by the access and quality of care offered to women during pregnancy and childbirth [1].

In case of obstetric emergency, each moment of delay in the search for appropriated care, increases the risk of maternal and fetal death [2]. The assistance assessment approach, [3] known as "Three Delays", applied to stillbirths, was utilized in the current study [4]. This model links mortality to a series of delays in obstetric care, which prevent women from having access to skilled and effective care in a timely manner [5].

In Brazil, generally, the "Three Delays" model has been utilized for analysis of maternal mortality data and cases with severe maternal outcomes (Near miss) [5]. In the international literature, three studies of perinatal deaths were carried out using the analysis of three delays: one carried out in Rwanda [6], other in Tanzania [7], and a meta-analysis of delays in obtaining effective care during labor and at birth [2].

The objective of this study was to identify the association between delays in the care provided to pregnant women and the fetal death outcome, in a tertiary reference maternity hospital in the Northeastern Brazil.

Materials and methods

A case-control study was carried out from the prospective surveillance of cases of fetal death and live births in women admitted to the Obstetrics Service of the Assis Chateaubriand Teaching Maternity Hospital of the—Federal University of Ceará.

This tertiary reference hospital provides specialized care for high-risk pregnant women living in the state of Ceará, Northeastern Brazil, performing about 5,000 births per year. It has Fetal Medicine Services and a Maternal and Neonatal Intensive Care Unit, being considered by the Ministry of Health as Reference Center for Good Obstetric and Neonatal Care Practices.

The study sample size comprised 72 cases and 144 controls. The cases of fetal death occurred from January to November, 2017, were recruited for the group of cases, while the controls were select among the live births occurred in the same period, paired by gestational age, following an 1:2 ratio. The inclusion criteria used for the cases were: diagnosis of fetal death confirmed by ultrasound (before or after hospital admission) occurring from the 22nd full week of gestation, with birth weight equal to or greater than 500g. For the controls, the criterion was being born alive, with maternal hospitalization, in the same period of the cases. Women who had any physical and/or mental incapacity, that made the interview unfeasible, and women under 18 years of age who were not accompanied by their parents, were excluded. The criterion of eligibility common to the cases and controls was that the births were performed in the maternity hospital.

Cases and controls were identified from the daily birth register of maternity hospital neonatology unit. Once eligibility was ascertained, the women were invited to participate in the
study and those who agreed to participate (or their legal guardian) signed an Informed Consent Term.

The variables selected for the study were collected through interview after birth, using a standardized questionnaire that included sociodemographic and obstetric data, and factors related to delays in the provision of obstetric care. The history of the fetal loss was also collected from the beginning of the problem until the arrival at the maternity, for the group of cases. The criteria for the analysis of the "Three Delays" were defined based on the criteria standardized by World Health Organization (WHO) [8]. These involved questions related to the delay in recognizing the need for care (Delay in seeking care, not knowing the signs of risk, refusal of care), delay in access to care (absence or inadequacy of prenatal care, difficulty with transportation, geographical difficulty) and delay in receiving quality care in the unit (delay in diagnosis, difficulty in communication between hospital and regulatory center, lack of trained personnel, delay in the referral / transfer of the case, delay in starting treatment, inadequate conduct with the patient).

Information on third phase delays was collected from medical records and other registers such as Death Certificate and pregnancy card. To define delays in medical conduct ("delay in diagnosis" and "delay in initiating treatment") two specialists in high-risk gestation monitoring at the maternity had to agree, after analyzing the medical records without any prior knowledge of the final outcome (as to which group was involved: cases or controls).

In the analysis cases and controls were compared using the Pearson Chi-square test. The value of $p < 0.05$ was considered statistically significant. Next, to determine the strength of association of the factors of the "Three Delays" with the outcome (fetal death), multiple logistic regression was performed, calculating the crude and adjusted Odds Ratio (OR) with their respective 95% confidence intervals (CI). The Statistical Package for the Social Science (SPSS) version 24 software and R 3.31 software were used to proceed the data analysis. The research was approved by the Ethics Committee in Research / National Commission of Ethics in Research, of the Assis Chateaubriand Teaching Maternity Hospital with the approval n° 2,144,962.

**Results**

In 2017 there were 5,038 births, of which, 4,929 were born alive and 109 stillborn; yielding a rate of 21.6 stillbirths per 1,000 births. Of the cases analyzed, 86.1% occurred in the antepartum period (before labor) and 13.9% in the intrapartum period (during labor and delivery).

Regarding gestational age, 25% of fetal deaths occurred before the 28th week of gestation and 75% occurred after the 28th week of pregnancy, considered as "late fetal death".

The socio demographic and obstetric characteristics of the cases of fetal death and live births are presented in Table 1. As regards prenatal care, it was observed that 12.5% of the women who had stillbirths did not have prenatal consultations, compared to only 1.4% among women who had live births ($p = 0.003$). Among the stillbirth mothers, 41.7% reported that the gestation was classified as high risk and only 27.7% had prenatal consultations in specialized care services. Regarding childbirth care factors, less than half of the women who had fetal deaths (45%) received guidance on the place where the delivery should be performed and 56.9% of these women had to go to more than one maternity hospital before receiving assistance. Among women with fetal deaths, 25.4% had a cesarean delivery compared to 65.7% of women who had live births ($P < 0.001$). The main maternal complications associated with a cesarean indication were hemorrhagic syndromes in intrapartum deaths and syphilis in antepartum deaths.
Table 2 presents the analysis of factors associated with the "Three Delays" in obstetric care. The analysis found a higher frequency of the three types of delays reported by women who had fetal losses compared to those who had live children.

The delays with the significant differences between cases and controls were: absence or inadequacy of prenatal care (81.9% in the cases and 36.1% in the controls), delayed treatment initiation (72.2% vs 35.4% %) and delayed diagnosis (51.4% vs 3.5%). All factors associated with the first "delay in seeking care" and the third delay "receiving adequate care in the unit" was strongly associated with the fetal death outcome. In relation to the second delay, only absence or inadequacy of prenatal care was associated.
The multivariate logistic regression presented in Table 3 was performed to determine the strength of the association between risk factors of the "Three Delays" and the occurrence of fetal deaths. After adjusted analysis, the variables that persisted significantly associated with fetal death were: refusal of care (OR = 4.07, 95% CI: 1.08–15.3), absence or inadequacy of pre-natal care (OR = 8.19, 95% CI: 2.94–22.8), and delayed onset of treatment (OR = 2.22, 95% CI: 1.06–4.67).

The multivariate logistic regression presented in Table 3 was performed to determine the strength of the association between risk factors of the "Three Delays" and the occurrence of fetal deaths. After adjusted analysis, the variables that persisted significantly associated with fetal death were: refusal of care (OR = 4.07, 95% CI: 1.08–15.3), absence or inadequacy of pre-natal care (OR = 8.19, 95% CI: 2.94–22.8), and delayed onset of treatment (OR = 2.22, 95% CI: 1.06–4.67).
Discussion

The present study indicates that despite having a higher prevalence of obstetric complications women with fetal death are more likely to refuse obstetric care and are subject to further delays in obstetric care, especially delays in diagnosis and inadequate conducts for their health problem.

These results support the current effort of the World Health Organization and the International Stillbirth Alliance (ISA) to promote evidence-based strategies with the objective of preventing fetal death. The study is also aligned to the guide Making Every Baby Count: Audit and Review of Stillbirths and Neonatal Deaths which recommends the use of the “Three Delays” Model to obtain an in-depth analysis of the determinants and modifiable factors in obstetric care. The study looked at delays in three phases defined from the criteria standardized by the World Health Organization (WHO): phase one, related to women and their relatives, refers to the delay in the decision to seek care; stage two, to the difficulty in gaining access to appropriate care; and phase three, related to the delay in receiving adequate care at the health facility, which may result in adverse maternal and fetal outcomes [8].

Although the study did not find a significant association between fetal deaths and sociodemographic factors, the results reflect the differentiated access to health care that still exists among the less favored population. Delays in seeking care are influenced by socioeconomic factors and the organization of the health care network, in contrast to public policy objectives to promote the systemic integration of health actions and services with the provision of continuous, integral and quality care [9].

Studies confirm that in all countries the risk of stillbirth is higher among marginalized populations; access to health services is lower and quality is affected by social inequalities [10–11]. An approach based on the right to universal health care must include the poorest women and their families.

The refusal of care by women and families is an important risk factor included in the first delay group that remained statistically associated with the occurrence of fetal death. This delay was demonstrated by the refusal to attend prenatal appointments being justified by "unknown

| Measures | Crude OR | CI 95% | P Value | Adjusted OR | CI 95% | P Value |
|----------|----------|--------|---------|-------------|--------|---------|
| Delay 1: Delay in recognizing the need for care | | | | | | |
| Delay in seeking care | 19.5 | 7.60–49.8 | <0.001 | 3.42 | 0.76–15.3 | 0.108 |
| Did not know the signs of risk | 28.2 | 8.16–97.3 | <0.001 | 3.21 | 0.50–20.4 | 0.216 |
| Refusal of Care | 7.94 | 2.77–22.7 | <0.001 | 4.07 | 1.08–15.3 | 0.038 |
| Delay 2: Access to the appropriate health facility | | | | | | |
| Absence or inadequacy of prenatal care | 8.03 | 4.02–16.0 | <0.001 | 2.69 | 1.07–6.75 | 0.034 |
| Delay 3: Delays in receiving quality care in the Unit | | | | | | |
| Delay in diagnosis | 29.3 | 10.7–80.2 | <0.001 | 10.3 | 2.58–41.4 | 0.001 |
| Difficulty of regulation | 2.05 | 1.11–3.8 | 0.020 | 1.13 | 0.39–3.26 | 0.820 |
| Lack of trained staff | 4.63 | 1.94–11.0 | 0.001 | 0.64 | 0.10–3.82 | 0.628 |
| Delay in case transfer | 4.45 | 2.34–8.47 | <0.001 | 0.55 | 0.15–1.92 | 0.348 |
| Delayed onset of treatment | 4.74 | 2.55–8.80 | <0.001 | 1.43 | 0.48–4.25 | 0.520 |
| Inadequate conduct with the patient | 10.8 | 4.59–25.4 | <0.001 | 4.88 | 1.43–16.6 | 0.011 |

https://doi.org/10.1371/journal.pone.0216037.t003
gestation”, “unwanted pregnancy” and “lack of interest”. It was noted that a significant proportion of these women presented an overlapping of risk factors and social vulnerability as: unstable marital relationships, used alcohol and/or smoked during pregnancy. A study conducted in Tanzania suggests that the first delay usually occurs with women with unwanted pregnancies and their prevention could have prevented perinatal damage. Similar results were observed in another Brazilian study that reinforces the need for services with mechanisms to identify these women, who would greatly benefit from early and adequate follow-up [12].

In this study, some women in the presence of risk signs adopted passive behavior, considering the complications as a ‘normal’ process of pregnancy, resulting in worsening of the situation and consequently in fetal death. It is apparent that the current culture determines that pregnant women only seek care when they are in an advanced stage of labor or in emergency situations, thus reflecting, in addition to a strong determinant of fetal death, the failure of the healthcare network in the essential sense of guaranteeing access, connection and accountability, thus increasing the risks of negative outcomes [13].

The analysis evidenced the absence of prenatal appointments as a determinant factor associated with the occurrence of fetal death, confirmed in other studies as a potentially modifiable factor, with interventions towards increasing access and availability of these services that surely would attenuate the stillbirth rates [14–15]. It also indicates the fragility with the principle of universality of access, guaranteed by Brazilian legislation that advocates that basic services, such prenatal care, should cover the entire target population [16].

In order of importance, the delay in the early diagnosis of morbidities and the detection of risk during prenatal appointments was strongly associated with the occurrence of stillbirths, which reflected in the delay to timely treatment to avoid the outcome. A large proportion of women who had fetal loss had complications such as hemorrhage, severe pre eclampsia, urinary tract infection (UTI), syphilis, and diabetes, which may not have been diagnosed in a timely manner to provide adequate treatment. One guideline advocated by Brazilian public policies is that at the start of prenatal care, the pregnant woman must have tests and receive the results in a timely manner, which will support the risk assessment and the specific therapeutic plan for the case [16].

In this present study, a significant association between fetal death and care in other maternity units was observed in the 24 hours prior to the admission of the pregnant woman. It is worth noting the proportion of women (57%) who sought care in other maternity hospitals, surpassing the proportion registered in the “Born in Brazil” Survey [12, 17–18]. Even when the pregnant women seek access to the indicated hospitals they were not promptly attended to. Many of these patients were in preterm labor and/or obstetric complications. This factor was also evidenced by other studies that emphasize that the complication becomes more serious if emergency obstetric care is not accessible [7, 19].

The problem of inequality in the distribution of obstetric beds is reinforced by the greater concentration of health services in large urban centers, with cities in the interior lacking qualified care, thus increasing demand on maternity hospitals in the capital [20]. These delays in care were also found in other studies that established that the expectation of hospitalization not being met, in addition to identifying inadequacies in care, may represent a potential risk to maternal and fetal life. This is configured as an institutional violence [15].

Another factor observed in the research was the delay in transferring the pregnant woman to appropriate hospital, associated with late diagnosis and incorrect action by the health team. All these deficiencies in the quality of health care delay and limit individuals’ access to procedures that could prevent death [3]. Another study reinforces that one reason for the high rates of stillbirths in low- and middle-income countries is the delay that many women experience in receiving adequate care, including delays in recognizing high-risk maternal disorders,
providing transportation and inadequate care facilities [21]. The misinterpretation of clinical
signs and mismanagement are also an important contributing factor for intrapartum deaths
[7]. Difficulty in accessing health services at different levels, as well as inadequate care, rein-
forces pregnant women’s lack of trust and affects their decision to seek care until the severity
of their condition overcomes all barriers. On the other hand, professionals are also affected by
the disorganization of the health system and delay the decision to refer the pregnant women to
the appropriate care in each case.

The high percentage of cases of fetal deaths related to vaginal deliveries (74.6%) was appar-
ent in the present study. This result corresponds to the recommendation of the Brazilian Fed-
eration of Associations of Gynecology and Obstetrics and other global organizations, which
indicate the route of vaginal delivery as preferential for pregnant women with fetal death [22].
According to the literature, fetal death is not indicative of cesarean section and should be
reserved for specific conditions, such as complete-total placenta previa, repeated cesarean sec-
tions placenta detachment [23].

The frequency of cesarean deliveries has increased in high-income countries and in many
middle-income countries, in part because of growing concern about the risk of fetal death.
Many studies point to cesarean as a protective factor and recommend access to cesarean sec-
tions to reduce intrapartum fetal death. However, the reduction in fetal mortality is more
related to the quality of obstetric care than to the way of delivery [7,21,24–25]. When the death
has already been confirmed, the best mode of delivery is usually through the vaginal route due
to the lower rates of complications in this procedure [10]. Many adverse events or incidents
may have their origin in the inadequate application or even the non-application of evidence-
based best practices to deal with specific situations. Therefore, the development and imple-
mentation of clinical guidelines and optimized protocols should be part of the actions of a pro-
gram to promote quality in maternal and perinatal care [16].

It was considered as one of the limitations of this study the possibility of selection bias, as it
was carried out in a reference maternity hospital for high-risk population with high rates of
obstetric and fetal complications. However it was possible to obtain information on all levels
of health care and acquire a sample size calculated to verify the differences between groups.
The possibility of inadequate registration of miscarriages classified as fetal death was verified
by the research team and duly corrected.

It is important to emphasize the importance of this study to reaffirm fetal mortality as a sen-
sitive marker of the quality of care provided to pregnancy and delivery, the health system’s res-
olution and a direct measure of access and quality of intrapartum care [4]. We recognize the
recent advances in Brazil related to the improvement of maternal and child indicators, how-
ever, the challenge that remains is to transform recommendations into practices, with the ser-
dices adopting protocols based on scientific evidence, with treatment that is dignified and
respectful to women. Improvements are necessary, especially in the sense of promoting the
safety and protection of pregnant women throughout the puerperal gestation cycle, thereby
regaining the health services’ credibility [7,9,15,17].

The prevention of stillbirth can’t be an individualized theme, strategies to reduce these
deaths require coordinated and continuous actions at the various levels of attention. It is
proven that family-centered approaches and women supported by health care providers can
encourage continuity of care. These are some improvements that should be pushed forward
with substantial results for both maternal health and the reduction of preventable fetal deaths,
thereby reducing the impact of the “three delays”.

Fetal death present more delays in obstetric care
Acknowledgments

We would like to thank the patients who participated in the study, to the team of the Hospital Epidemiology Nucleus, professionals of the Secretariat of Medical Residency, the Regulation of patients and the maternity nursing team.

Author Contributions

Conceptualization: Marley Carvalho Feitosa Martins, Antonio Brazil Viana Júnior, Luciano Lima Correia, Francisco Herlânio Costa Carvalho.

Data curation: Flávio Lúcio Pontes Ibiapina, Rodolfo de Carvalho Pacagnella.

Formal analysis: Marley Carvalho Feitosa Martins, Francisco Edson de Lucena Feitosa, Antonio Brazil Viana Júnior, Luciano Lima Correia.

Investigation: Marley Carvalho Feitosa Martins, Francisco Edson de Lucena Feitosa, Antonio Brazil Viana Júnior, Flávio Lúcio Pontes Ibiapina, Francisco Herlânio Costa Carvalho.

Methodology: Francisco Edson de Lucena Feitosa, Antonio Brazil Viana Júnior, Luciano Lima Correia, Rodolfo de Carvalho Pacagnella, Francisco Herlânio Costa Carvalho.

Supervision: Luciano Lima Correia, Flávio Lúcio Pontes Ibiapina, Rodolfo de Carvalho Pacagnella.

Validation: Antonio Brazil Viana Júnior, Rodolfo de Carvalho Pacagnella, Francisco Herlânio Costa Carvalho.

Writing – original draft: Marley Carvalho Feitosa Martins, Francisco Herlânio Costa Carvalho.

Writing – review & editing: Marley Carvalho Feitosa Martins, Francisco Edson de Lucena Feitosa, Luciano Lima Correia, Flávio Lúcio Pontes Ibiapina, Rodolfo de Carvalho Pacagnella.

References

1. Lansky S, Friche AAL, Silva AAM, Campos D, Bittencourt SDA, Carvalho ML, et al. Birth in Brazil survey: neonatal mortality, pregnancy and childbirth quality of care. Cad. Saúde Pública. 2014; 30 (Suppl 1): S192–S207.

2. Lee AC, Lawn JE, Cousens S, Kamara V, Osirind D, Bhutta ZA, et al. Linking families and facilities for care at birth: what works to avert intrapartum-related deaths? Int J Gynaecol Obstet 2009; 107 (Suppl 1): S65–S88. https://doi.org/10.1016/j.ijgo.2009.07.012 PMID: 19815201

3. Thaddeus S, Maine D. Too far to walk: maternal mortality in context. Soc Sci Med 1994; 38(8):1091–110. PMID: 8042057

4. Lawn JE, Blencowe H, Waiswa P, Amouzou A, Mathers C, Hogan D, et al. Ending preventable stillbirths: rates, risk factors, and acceleration towards 2030. Lancet 2016; 387(10018):587–603. https://doi.org/10.1016/S0140-6736(15)00837-5 PMID: 26794078

5. Pacagnella RC, Cecatti JG, Parpinelli MA, Sousa MH, Haddad SM, Costa ML, et al. Delays in receiving obstetric care and poor maternal outcomes: results from a national multicentre cross-sectional study. BMC Pregnancy Childbirth 2014; 14:159. https://doi.org/10.1186/1471-2393-14-159 PMID: 24886330

6. Aimable M. Review of perinatal deaths with application of a three-delay analysis of hospitals in Kigali, Rwanda. Universidade de Uppsala, Department of International Maternal and Child Health (IMCH). http://www.diva-portal.org/smash/record. Last updated: 2015-09-04.

7. Mbaruku G, Van Roosmalen J, Kimondo I, Bilango F, Bergström S. Perinatal audit using the 3-delays model in western Tanzania. Godfrey. Int J Gynaecol Obstet 2009; 106(1):85–8. http://dx.doi.org/10.1016/j.ijgo.2009.04.008
8. World Health Organization. Making every baby count: audit and review of stillbirths and neonatal deaths. Geneva: WHO; 2016. 136p [cited 2018 Jun 26]. Available from: http://www.who.int/maternal_child_adolescent/documents/stillbirth-neonatal-death-review/en/

9. Lansky S, Franca E, Leal MC. Mortalidade perinatal e evitabilidade: revisão da literatura. Rev Saúde Pública 2002; 36(6):759–72. http://dx.doi.org/10.1590/S0034-89102002000700017.

10. Hamid S, Malik AU, Richard F. Stillbirth—a neglected priority: understanding its social meaning in Pakistan. J Pak Med Assoc [internet]. 2014 [cited 2018 Jun 26]; 64(3):313–3. Available from: http://jpma.org.pk/PdfDownload/6125.pdf PMID: 24864610

11. Heazell AE, Whitworth MK, Whitcombe J, Glover SW, Bevan C, Brewin J, et al. Research priorities for stillbirth: process overview and results from UK Stillbirth Priority Setting. Ultrasound Obstet Gynecol 2015; 46(6):641–7. http://dx.doi.org/10.1002/uog.15738

12. Vieillas EF, Domingues RM, Dias MA, Gama SGN, Filha MMT, Costa JVC, et al. Assistência pré-natal no Brasil Cad Saúde Pública 2014; 30 (suppl.1):S85–100. http://dx.doi.org/10.1590/0102-311X00126013

13. Rodrigues DP, Alves VH, Penna LH, Pereira AV, Branco MB, Silva LA. The pilgrimage in reproductive period: a violence in the field of obstetrics. Esc. Anna Nery 2015; 19(4):614–20. http://dx.doi.org/10.5935/1414-8145.20150082

14. Zhu J, Liang J, Mu Y, Li X, Guo S, Scherpnier R, et al. Socio-demographic and obstetric characteristics of stillbirths in China: a census of nearly 4 million health facility births between 2012 and 2014. Lancet Glob Health 2016; 4(2):e109–18. https://doi.org/10.1016/S2214-109X(15)00271-5 PMID: 26795603

15. Mazotti BR, Silva RM, Zilly A, Ferreira H, Caldeira S. Fatores epidemiológicos correlacionados ao risco para morte fetal: revisão integrativa da literatura. Arq Ciênc Saúde 2016; 23(2):9–15. http://dx.doi.org/10.17696/2318-3691.2016.221

16. Brasil. Ministério da Saúde. Manual prático para implementação da Rede Cegonha. Brasília: Ministério da Saúde; 2011. 45p [cited 2018 Jun 26]. Available from: www.saude.mt.gov.br/arquivo/3062

17. Ashish KC, Nelin V, Wrammert J, Ewald U. Risk factors for antepartum stillbirth: a case-control study in Nepal. BMC Pregnancy Childbirth 2015; 15:146. https://doi.org/10.1186/s12884-015-0567-3 PMID: 26143456

18. Andrade LG, Amorim MM, Cunha AS, Leite SG, Vital SA. Fatores associados à natimortalidade em uma maternidade escola em Pernambuco: estudo caso-controle. Rev Bras Ginecol Obstet 2009; 31 (6):285–92. http://dx.doi.org/10.1590/S0100-72032009000600004 PMID: 19684963

19. Mgawadere F, Unkels R, Kazembe A, Van den Broek N. Factors associated with maternal mortality in Malawi: application of the three delays model. BMC Pregnancy Childbirth 2017; 17(1):219. https://doi.org/10.1186/s12884-017-1406-5 PMID: 28697794

20. Menezes DC, Leite IC, Schramm JM, Leal MC. Avaliação da peregrinação ante parto numa amostra de puérperas no Município do Rio de Janeiro, Brasil, 1999/2001. Cad. Saúde Pública. 2006; 22(3):553–9. http://dx.doi.org/10.1590/S0102-311X2006000300010

21. Goldenberg RL, McClure EM, Bhutta ZA, Belizán JM, Reddy UM, Rubens CE, et al. Stillbirths: the vision for 2020. Lancet 2011; 377(9779):1798–805. https://doi.org/10.1016/S0140-6736(10)62235-0 PMID: 21496912

22. Sampaio AG, Souza ASR. Indicação de cesarianas em óbito fetal. Rev Bras Ginecol Obstet 2010; 32 (4):169–75. http://dx.doi.org/10.1590/S0100-72032010000400004 PMID: 20625685

23. Nascimento MI, Cunha AA, Oliveira SRSRM. Clinical management of the induction of labor in intrauterine fetal death: evaluation of incidence of cesarean section and related conditions. Rev bras Epidemiol 2014; 17(1):203–16. https://doi.org/10.1415-790X201400100106. PMID: 24896793

24. Goldenberg RL, Saleem S, Pasha O, Harrison MS, Mcclure EM. Reducing stillbirths in low-income countries. Acta Obstet Gynecol Scand 2016; 95(2):135–43. https://doi.org/10.1111/aogs.12817 PMID: 26577070

25. Bhutta ZA, Darmstadt GL, Haws RA, Yakoob MY, Lawn J. Delivering interventions to reduce the global burden of stillbirths: improving service supply and community demand. BMC Pregnancy Childbirth 2009; 9 (Suppl 1):S7. https://doi.org/10.1186/1471-2399-9-S1-S7. Downloaded from: http://researchonline.lshtm.ac.uk/878743/