

Trajectory of cause of death among brought dead neonates in tertiary care public facilities of Pakistan: A multicenter study

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Background: Considering the fact that Pakistan is amongst the countries with very high neonatal mortality rates, we conducted a research study to determine the possible causes and characteristics of neonates presenting dead to the emergency department of tertiary public health care facilities of Pakistan using verbal autopsies.

Methods: A descriptive case series study was conducted in emergency department/pediatrics ward/neonatal ward/nursery unit of ten tertiary care public health facilities, situated in seven major cities of Pakistan from November, 2011 to June, 2013. Precoded verbal autopsy proforma was used to collect information regarding cause of death, family narratives and other associated risks accountable for pathway to mortality.

Results: We identified 431 neonates presenting dead to the emergency department (238 males and 193 females). Sepsis (26.7%), birth asphyxia (18.8%) and persistent pulmonary arrest (17.2%) were main primary causes of brought death. Around 72% brought dead neonates were referred from doctors/health care facilities and more than

28% caregivers mentioned that they were not informed about the diagnosis/ailment of their deceased newborn.

Conclusions: Findings of our study suggest that infectious disease remains the main primary cause of neonatal mortality. Underweight in newborns (64%) was estimated as a leading associated risk. Delays in referrals to respective health care facility enlightened the concern of sub-standard prerequisites of neonatal care that could be one of the major contributing risk factor of high mortality rates.

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Introduction

Globally around 4-5 million babies die in the neonatal period every year and most of these deaths occur in low-income and middle-income countries; there has been minimal improvement in neonatal survival over the past 20 years.^[1-3]

Pakistan is the 6th most populous country,^[4] with the second highest infant mortality rate, reported as 78 (range 78 to 100) per 1000 live births.^[5-7] Although, most births occur at home, however since 1990 there has been about a 2.5 fold rise in the rate of births which occur in the health facility; an increase from 13.4% in 1990 to 34.3% in 2006/2007. Neonatal deaths may be averted assuming health care facilities provide evidence-based interventions such as provision of skilled maternal and immediate neonatal care, emergency obstetric care, antibiotics for preterm premature rupture of membranes, and antenatal corticosteroids for preterm labour during the intrapartum period.^[8] A population-based cohort study of urban Pakistani women with access to obstetric

and neonatal care reported a perinatal mortality of 70 per 1000 live births at 7 days and 47 per 1000 live births at 28 days.^[9] The proposed target set forth by Pakistan for infant mortality rates is 40 per 1000 live births (Evaluation of the USAID/Pakistan Maternal, Newborn & Child Health Program, 2009). According to "the state of the world's newborn," around 270 000 neonatal deaths occur annually and neonatal mortality is roughly 10 times higher in Pakistan as compared to developed countries.^[10] Earlier, higher perinatal mortality rates were reported, ranging from 54/1000 births in Karachi to 81/1000 births in Faisalabad and stillbirth accounts for 40-75% of all perinatal deaths.^[11-13]

The verbal autopsy is a technique whereby family members and other informants are interviewed to elicit the deceased's cause of death, to identify risk factors for the death and to assess the accessibility and quality of health care received by the deceased.^[14-16] The purpose of verbal autopsy is to identify ways to curtail unnecessary death toll, to provide data on mortality by cause, to evaluate health interventions aimed at reducing mortality and to facilitate research into factors associated with mortality from specific cause of death.

Considering high neonatal mortality rates in Pakistan and lack of proper birth and death registry in our existing health system, we focused on tertiary health facilities all around the country in public settings; and verbal autopsy responses were collected from caregivers of brought dead neonates and clinical diagnosis was recorded from attending clinicians of ten participating health care facilities situated in seven major cities of Pakistan.

Methods

This was a descriptive case series and non-probability purposive sampling technique was adopted to collect verbal information from care givers of brought dead neonates visiting ten participating leading public health care facilities situated in major cities of Pakistan. Clinical diagnosis of brought dead neonates was also recorded with the help of attending clinicians. Informed written/verbal consent was taken from potential participants after explaining purpose of the study before inclusion. The participants were given the right to disassociate from the study at any time. Ethical clearance was obtained from institutional ethical review committee (IERC) to conduct the study.

This study was conducted in emergency department, pediatrics ward, neonatal ward and nursery unit of ten tertiary care health facilities, situated in Karachi (NICH and Civil Hospital), Jamshoro (Liaquat University of Medical and Health Sciences), Quetta (Bolan Medical

Complex), Lahore (Fatima Jinnah Medical Complex), Multan (Nishtar Medical College, Hospital), Faisalabad (Allied Hospital and District Headquarter Hospital), Peshawar (Khyber Medical Hospital and Hyatabad Medical Hospital), Pakistan from October, 2011 to June, 2013.

Brought dead neonates (irrespective of their weight, height, birth place, gestational age, mode of delivery and birth weight) coming to emergency units of participating tertiary care public health facilities were included in the study. Babies admitted in emergency department, pediatric ward and neonatal ward, death without receiving any intervention within one hour were also included. Date of birth of babies was confirmed with accompanying documents including birth certificate or any other document; in case of absence of proof of birth, verbal confirmation regarding date of birth was done from parents/caregivers.

The research team and duty resident medical officers of all respective health care facilities were trained by principal investigator of the project to produce accurate data in linear order across the country. A semi-structured, close ended verbal autopsy proforma was used for collection of information from parents or caregivers of the brought dead neonates including age of baby, place of delivery, mode of delivery, treatment received at place of delivery, time taken in transportation to health care facility, mode of transport and parental education; clinical diagnosis as a cause of death from the history and examination of dead newborns was recorded with the help of attending clinician. Information was gathered from the parents/attendants who were accompanying the cases. The duty resident medical officers and experienced research team members in each participating center were responsible for collection of data with contact number of caregivers to validate the quality. As per protocol, co-investigators were responsible for each participating center to cross check all the filled responses before transfer to final data entry and analysis and random field checks to assure the quality of data. Every center was responsible for sending filled responses on monthly basis to address the possible deficiencies and deviations for linearity of data. PI rechecked at least 10% randomly selected filled responses received from each center to maintain the quality and homogeneity of data.

Results

A total of 431 filled responses from ten participating centers were received. Out of them 238 (55.2%) were males and 193 (44.8%) females. Table 1 shows the province wise distribution of received filled responses.

Highest percentage of neonatal deaths was recorded from tertiary health facilities of Sindh (40%), followed by Punjab (35%), Khyber Pakhtun-khwa (18%) and lowest percentage was from Baluchistan (7%). Sepsis (26.7%), birth asphyxia (18.8%), persistent pulmonary

arrest (17.2%), respiratory distress syndrome (7.4%) were reported as main possible primary causes of brought dead neonates (Fig. 1). Low birth weight (LBW, birth weight less than 2.5 Kg and more than 1.5 Kg) and very low birth weight (VLBW, birth weight less than 1.5 Kg) were the leading associated cause of death (63%).

Table 1. Province wise distribution of brought dead neonates

Participating center	Number	Percent
Sindh		
National Institute of Child Health, Karachi	84	19.5
Civil Hospital, Karachi	40	9.3
Liaquat University of Medical and Health Sciences (LUMHS), Jamshoro	48	11.1
Sub-total	172	39.9
Punjab		
Nishter Medical College (NMC), Multan	43	9.8
District Headquarters Hospital (DHQ), Faisalabad	27	6.3
Allied Hospital, Faisalabad	36	8.4
Fatima Jinnah Medical Complex (FJMC), Lahore	46	10.8
Sub-total	152	35.3
Khyber Pakhtun-Khwa		
Khyber Teaching Hospital (KTH), Peshawar	47	11.0
Hayatabad Medical Complex (HMC), Peshawar	31	7.2
Sub-total	78	18.2
Balochistan		
Bolan MC, Quetta	29	6.6
Total	431	100.0

Table 2 presents the socioeconomic status of families of brought dead babies. More than 42% of mothers and around 47% of fathers did not receive any formal education. Out of 431 families, only 7 mothers and 5 fathers had college level (at least 14 standard). Most (52%) of families belonged to low income labour or daily wages class. Average monthly income of half of the study population was up to 10 000 Pakistani rupees (100 USD approx.). Punjabi (32%), Pushto (24.6%), Urdu (19%), Sindhi (11.6%), Balochi (5.3) and Siraiki (5.3) were reported as most prevalent local languages in our target families. Around 17% brought dead neonates were from primiparous mothers. More than 79% of families were residing with their parents or with other elder family members.

Major findings out of verbal autopsies of brought

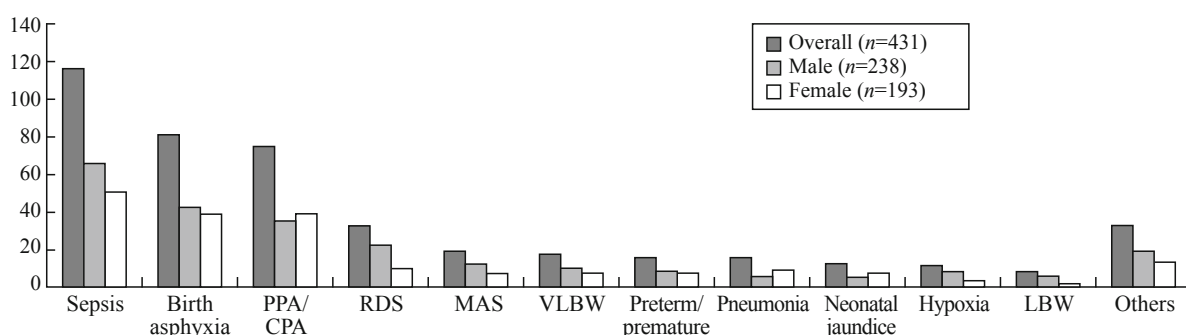


Fig. 1. Trejectory of brought dead neonates in tertiary health care facilities of Pakistan. PPA: primary pulmonary arrest; CPA: cardiac pulmonary arrest; RDS: respiratory distress syndrome; MAS: meconium aspiration syndrome; VLBW: very low birth weight; LBW: low birth weight.

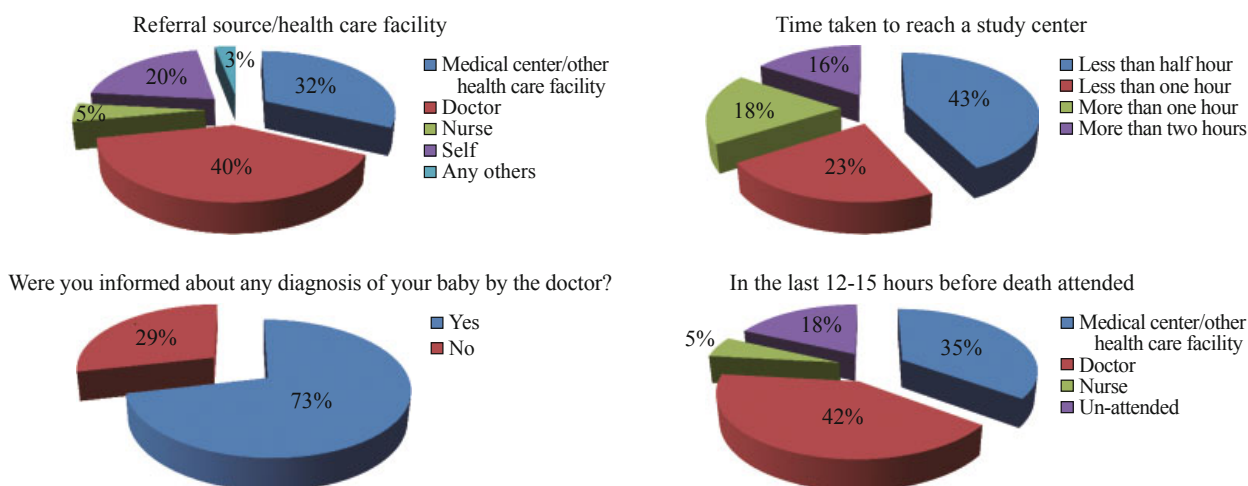


Fig. 2. Leading associated risks in emergency setting contributing to neonatal deaths.

Table 2. Socioeconomic status of neonates brought dead in emergency units of tertiary public health care facilities

Socioeconomic indicators	Overall (n=431)	
	No.	%
Education of father		
Illiterate	190	44.1
Primary	97	22.5
Secondary	94	21.8
Higher secondary	38	8.8
Graduate	12	2.8
Education of mother		
Illiterate	265	61.5
Primary	96	22.3
Secondary	52	12.1
Higher secondary	13	3.0
Graduate	5	1.1
Occupation of the head of family		
Labour	222	51.5
Government servant	43	10.0
Private Job	92	21.3
Technical worker	21	4.9
Business	38	8.8
Others	15	3.5
Family monthly income (in rupees)		
≤5000	119	27.6
5001-10 000	216	50.1
10 001-20 000	84	19.5
>20 000	12	2.8
Mother tongue		
Punjabi	138	32.0
Sindhi	50	11.6
Balochi	23	5.35
Pushto	106	24.6
Urdu	82	19.0
Siraiki	23	5.35
Others	9	2.1
Number of children		
None	73	16.9
1-3	241	55.9
4-6	96	22.3
>6	21	4.9
Number of elders		
None	87	20.2
1-3	199	46.2
4-6	112	26.0
>6	33	7.6

dead neonates were recorded from caregivers (Fig. 2). More than 79% babies died within 72 hours of their life. More than 23% babies did not visit any health care facility/doctor before death and 18% deceased babies were unattended in last 12-15 hours before death.

Ambulance service (17%), public transport (17%) and private taxi/personal vehicle (52.4%) were the most common modes to reach the health care facility, and more than 65% deceased babies reached within an hour to respective health care facility. Around 72% brought dead neonates were referred from doctor/health care facility and more than 28% caregivers mentioned that they were not informed about the diagnosis/ailment of their deceased newborn.

Discussion

The trajectory of brought dead neonates based on clinical findings suggested sepsis (26.7%) and birth asphyxia (18.8%) were leading primary causes of death in ten tertiary public health facilities of Pakistan. In compliance to our hypothesis and consistent to previously published data, early neonatal deaths account for more than 75% of deaths; and LBW/VLBW was the leading associated possible risk of death among brought dead neonates.

It is difficult to establish any association in between number of visits of neonates to health care provider and postnatal care as a contributing factor for death. But considerable delays to referrals between health providers from one system to another were reported, suggestive of insufficient local standard of neonatal care and possibility of inappropriate care-seeking behaviour. Similar to available data on tertiary care public health facilities of Pakistan, most of the parents of this study belonged to low socioeconomic strata with under 10 standard of formal education, single bread earner of the family with average monthly income up to 10,000 Pakistani rupees (approx. 100 USD).

Limitations of this study were: (1) brought dead neonates only visiting tertiary public health care facilities; (2) predictability, shortcomings in verbal autopsies due to lack of logical causal structure, and (3) and recall bias before death events by participating family members. Therefore, these technical inconsistencies may lead to misclassification of causes of death.^[17] On operational grounds, we were unable to conduct the trial the same time across the country. This was due to withdrawal of one of the leading tertiary care public health facility located in Lahore, the second largest city of the country after Karachi and capital city of most populous province Punjab. Later on another tertiary health care facility from the same city participated in the trial. Lastly, descriptive data from this study may be insufficient to completely explore the comprehensive, unswerving aspects to reach concrete conclusion related to provision of quality and standard neonatal healthcare.

In this study, sepsis and birth asphyxia were the leading primary causes of death with associated risks of LBW/VLBW and prematurity. Parallel to our findings neonatal sepsis, birth asphyxia, low birth weight and prematurity are reported as important causes of perinatal mortality.^[18] Respiratory disorders including persistent pulmonary arrest/ respiratory distress syndrome and cardiac respiratory arrest found to be the second most prevalent primary possible cause of brought dead neonates. It may be due to lack of antenatal care, home deliveries without a skilled birth attendant, unhygienic deliveries and care of umbilical

cord, birth trauma, lack of tetanus immunization in mothers, inability of care givers to recognize danger signs and unavailability/barriers to access the health care facilities.^[19,20]

Studies in Pakistan reported that LBW is the major cause of neonatal mortality;^[21-27] current data suggest LBW/VLBW contributing as possibly leading associated risk of brought dead neonates with another cause mostly infectious diseases. The high percentage of LBW/VLBW invokes the issue of maternal malnutrition as one of the key aspect. To further rationalize above argument, contextual, social, cultural and most importantly economic dynamics of the respective communities need to be examined in detail.

More than 70% deceased babies were referred from doctor/health care facility and more than 75% of babies visited once or more than one health centers/doctors in last 12-15 hours before death. These findings are suggestive of weak infrastructure, possible gaps in existing health system at transition of patient to other health system, prioritization, handling of emergencies and inadequate resources in both private and peripheral public health centers to manage serious neonatal illness as reported earlier.^[27-30]

Information regarding mode of delivery and birth weight was verified through birth certificates of brought dead neonates. However, underreporting of clinical risks also established.^[31-33] In compliance, more than 97% caregivers of brought dead babies shared birth weight proofs but clinical risks from referral sources were not reported. Surgical and instrumental vaginal deliveries (SIVD) including caesarean section, forceps assisted and vacuum assisted deliveries are well documented as one of the leading risk of maternal mortality.^[34,35] Our findings on mode of deliveries of deceased neonates with more than 75% of normal vaginal delivery and around 24% SIVD, unable us to establish positive statistically significant association among mode of delivery and neonatal deaths. Based on verbal autopsy response sheets, more than 23% deaths occurred at home and not visited health provider/center at all. Community awareness based on health education and mobilisation strategies for most susceptible and vulnerable families, especially for socially and economically marginalized groups as low users of existing health services can be helpful to address this issue. More than two-thirds of deceased babies were referred from health care facilities/doctors, predominantly related to the provision of substandard of care, and may be considerable reason for delay in referrals between health providers. More than 28% parents were not aware about the diagnosis of their died neonates, suggesting lack of awareness among parents of died babies; and hesitation or counseling difficulty

among health care providers regarding the disclosure of bad news to the parents. This behaviour of health care providers could be due to work load in the emergency department of respective health centers. Personal vehicle including mostly bicycle and motor bikes (26.6%), private taxis (25.9%), public transport (20.3%) and ambulance (17.4%) were the most common modes to reach the health care facility. More than 63% deceased babies reached within an hour to respective health care facility.

In conclusion, trajectory of brought dead neonates in major tertiary public health care facilities of Pakistan estimated sepsis (26.7%) and birth asphyxia (18.8%) as foremost possible primary causes; and LBW/VLBW (64%) as predominant associated risk of mortality. Around two-thirds of deceased babies referred from health care facilities/doctors, largely related to the provision of insufficient standard of care, and considerable reason for delay in referrals between health providers. More than 75% babies died during the first six days of life. Delay in referrals from one health care facility to another enlighten the concern of unavailability/sub-standard provision of neonatal care that could be one of the major contributing risk factor of high mortality rates.

Stringent efforts are required to establish standard operating procedures for early neonatal care and coordination between health care systems. Issues of maternal malnutrition, LBW and high infection rates need community mobilization using political and social resources over the country. Identification and facilitation of related perinatal and postnatal health issues with the help of international agencies like WHO, United Nations International Children Emergency Fund, etc may eventually help us to reduce the burden of neonatal mortality.

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Taseer I and Raza SJ contributed in preparation of final draft of manuscript. Arshad MS, Akhter T, Arain GM, Habibullah S, Safdar S, Firdous R, Adnan M contributed to the data collection and supervision as site coordinators of the study.

References

- Bartlett LA, Mawji S, Whitehead S, Crouse C, Dalil S, Ionete D, et al. Where giving birth is a forecast of death: maternal mortality in four districts of Afghanistan, 1999-2002. *Lancet* 2005;365:864-870.
- Black RE, Cousens S, Johnson HL, Lawn JE, Rudan I, Bassani DG, et al. Global, regional, and national causes of child mortality in 2008: a systematic analysis. *Lancet* 2010;375:1969-1987.
- Stoll BJ. The global impact of neonatal infection. *Clin Perinatol* 1997;24:1-21.
- College of Physicians and Surgeons, Pakistan. CPSP Reproductive health, a manual for physician. Karachi: CPSP, 2002.
- World Health Organization. Health action in crises: Pakistan, The present context. 2008. http://www.who.int/hac/crises/pak/Pakistan_Aug08.pdf (accessed December 30, 2014).
- Mahmood A, Sultan M. Child Health. Pakistan Demographic and Health Survey 2006-07. Islamabad, Pakistan: National Institute of Population Studies and Macro International Inc., 2008: 123-145.
- Bhutta ZA, Hyder AA, Ali N. Defining a new challenge for health systems: Perinatal health in Pakistan. In: Bhutta ZA, eds. Perinatal and newborn care in South Asia: Priorities and action. Pakistan: Oxford University Press, 2007: 1-30.
- Darmstadt GL, Bhutta ZA, Cousens S, Adam T, Walker N, de Bernis L, et al. Evidence-based, cost-effective interventions: how many newborn babies can we save? *Lancet* 2005;365:977-988.
- Jehan I, Harris H, Salat S, Zeb A, Mobeen N, Pasha O, et al. Neonatal mortality, risk factors and causes: a prospective population-based cohort study in urban Pakistan. *Bull. World Health Organ* 2009;87:130-138.
- Save the Children USA. Saving Newborns Lives Initiative. State of the World's Newborns. Save the Children USA: Washington, DC, 2001.
- Fikree FF, Gray RH. Demographic survey of the level and determinants of perinatal mortality in Karachi, Pakistan. *Paediatr Perinat Epidemiol* 1996;10:86-96.
- Jalil F, Lindblad BS, Hanson LÅ, Khan SR, Yaqoob M, Karlberg J. Early child health in Lahore, Pakistan: IX. Perinatal events. *Acta Paediatr Suppl* 1993;82:95-107.
- World Health Organization. World population data sheet. 2004. http://www.prb.org/pdf04/04worlddatasheet_eng.pdf (Accessed September 23, 2014).
- Black RE, Coldham C, Kalter H, Quigley MA, Ross D, Snow RW. A standard verbal autopsy method for investigating causes of death in infants and children. Geneva: World Health Organization, 1999.
- Bang AT, Bang RA. Diagnosis of causes of childhood deaths in developing countries by verbal autopsy: suggested criteria. The SEARCH Team. *Bull World Health Organ* 1992;70:499-507.
- World Health Organization. Technical consultation on verbal autopsy tools. Geneva: World Health Organization, 2005.
- Anker M. The effect of misclassification error on reported cause-specific mortality fractions from verbal autopsy. *Int J Epidemiol* 1997;26:1090-1096.
- Black RE, Morris SS, Bryce J. Where and why are 10 million children dying every year? *Lancet* 2003;361:2226-2234.
- Bhutta ZA. Epidemiology of neonatal sepsis in Pakistan: an analysis of available evidence and implications for care. *J Coll Physicians Surg Pak* 1996;6:12-17.
- Ahmed MF. Infant mortality in Bangladesh: a review of recent evidence. *J Biosoc Sci* 1991;23:327-336.
- Fauveau V, Wojtyniak B, Mostafa G, Sarder AM, Chakraborty J. Perinatal mortality in Matlab, Bangladesh: a community-based study. *Int J Epidemiol* 1990;19:606-612.
- Fikree FF, Berendes HW. Risk factors for term intrauterine growth retardation: a community-based study in Karachi. *Bull World Health Organ* 1994;72:581-587.
- UNDP. Infants with low birth weight. <http://hdrstats.undp.org/indicators/67.html> (accessed December 17, 2014).
- Najmi RS. Distribution of birth weights of hospital born Pakistani infants. *J Pak Med Assoc* 2000;50:121-124.
- Naheed I, Yasin A. Determinants of low birth weight babies (A prospective study of associated factors and outcome). *Ann King Edward Med Coll* 2000;6:361.
- Aziz S, Billoo AG, Samad NJ. Impact of socioeconomic conditions on prenatal mortality in Karachi. *J Pak Med Assoc* 2001;51:354-359.
- Mustufa MA, Korejo R, Shahid A, Nasim S. Infection remains a leading cause of neonatal mortality among infants delivered at a tertiary hospital in Karachi, Pakistan. *J Infect Dev Ctries* 2014;8:1470-1475.
- Das J, Hammer J, Leonard K. The quality of medical advice in low-income countries. *J Econ Perspect* 2008;22:93-114.
- Jashnani KD, Rupani AB, Wani RJ. Maternal mortality: an autopsy audit. *J Postgrad Med* 2009;55:12-16.
- Ramanathan M. Addressing the third delay in maternal mortality: need for reform. *Indian J Med Ethics* 2009;6:211-212.
- DiGiuseppe DL, Aron DC, Ranbom L, Harper DL, Rosenthal GE. Reliability of birth certificate data: a multi-hospital comparison to medical records information. *Matern Child Health J* 2002;6:169-179.
- Roohan PJ, Josberger RE, Acar J, Dabir P, Feder HM, Gagliano PJ. Validation of birth certificate data in New York State. *J Community Health* 2003;28:335-346.
- Lydon-Rochelle MT, Holt VL, Cárdenas V, Nelson JC, Easterling TR, Gardella C, et al. The reporting of pre-existing maternal medical conditions and complications of pregnancy on birth certificates and in hospital discharge data. *Am J Obstet Gynecol* 2005;193:125-134.
- Rossen J, Okland I, Nilsen OB, Eggebo TM. Is there an increase of postpartum hemorrhage, and is severe hemorrhage associated with more frequent use of obstetric interventions? *Acta Obstet Gynecol Scand* 2010;89:1248-1255.
- Shamsa A, Bai J, Raviraj P, Gyaneshwar R. Mode of delivery and its associated maternal and neonatal outcomes. *Open J Obstet Gynecol* 2013;3:307-312.

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