

Perceptions of midwives regarding factors contributing to neonatal mortality in a District Hospital of Hammanskraal, South Africa

Mmapuso E. Mothokoa¹, Mary M. Madumo²

Abstract

The death of a newborn child has always been tragic to the mother, her family, health care providers and a concern in clinical practice. Neonatal mortality (NM) remains a challenge worldwide, particularly in developing countries. A need to understand contributing factors to NM is crucial for addressing appropriate mother and child health. Nurses are in close contact with mothers during pregnancy, intra-partum and during postpartum periods; hence their perceptions regarding factors contributing to NM are significant. The purpose of this study was to explore and describe perceptions of midwives regarding factors contributing to NM in a district hospital, in Tshwane district, South Africa. A qualitative, exploratory and descriptive design was used. Ten midwives working in labour and neonatal units were selected using purposive sampling and interviewed. The findings revealed that midwives perceived patient factors, obstetric complications, mother's condition in relation to pregnancy, lack of resources and organisational factors as contributing to NM. The findings of this study will assist the district hospital in planning for women and childcare in an effort to reduce NM.

Keywords: Perceptions, neonatal mortality, midwife, skills, factors, South Africa.

¹ Department of Nursing Science, Sefako Makgatho Health Sciences University

² Department of Nursing Science, Sefako Makgatho Health Sciences University
Email: mary.madumo@smu.ac.za

Introduction

The neonatal mortality (NM) of a region or a country is an indicator of the socio-economic conditions of the population, the quality of antenatal, intra-partum, and postpartum care as well as the extent to which the community utilises the health care services (Fraser et al, 2006). The neonatal period has one of the highest mortality rates of any period in life. Globally, over four million neonates die every year in the first four weeks of life and about 70% of all NM occurs in the developing countries (WHO, 2011).

Neonatal mortality rates (NMRs) and their causes differ from country to country. Globally NM has essentially remained unchanged, especially in low and middle-income countries (Lawoyin Onadeko, & Asekun-Olarinmoye, 2010). Nordquist (2006) indicated that in some developed countries NMRs have decreased. Countries such as Italy, Germany, France, and Australia, had NMRs of 3 in 1000 live births, whilst in the United Kingdom, the NMR was 3.3 per 1000 live births (Centre for Maternal & Child Enquiries, 2009). The most common causes of NM in developed countries according to Nordquist (2006) are congenital abnormalities (21%) and premature births (16%). The provision of quality antenatal care (ANC) was perceived as an important factor in reducing neonatal deaths (Khatun, 2010).

More than 98% of NM is occurring in low and middle-income countries (Engmann, 2011). The mean NMR in 2009 globally were as follows: Sub-Saharan Africa 37 deaths per 1000 live births, South Asia 35 deaths per 1000 live births, and East and North Africa 19 deaths per 1000 live births (Lawoyin et al., 2010). The most common causes of NM identified were low birth weight (25%), sepsis/fever (12.5%), birth asphyxia (9.4%), failure to thrive/maternal death (9.4%), congenital abnormality (3.1%), neonatal tetanus (3.1%) and diarrhoea (3.1%). About a third (34.4%) of neonatal deaths were recorded as unknown.

In South Africa, neonates continue to die from preventable causes such as premature births, congenital abnormalities, infections, and birth asphyxia (Black et al., 2010). Nursing care factors such as inadequate patient care during pregnancy, labour and post-partum, and the inappropriate management of complications during pregnancy and delivery have also been associated with NM. The common maternal complications identified include hypertensive disorders, HIV/AIDS and diabetes mellitus. In addition, health care workers at the primary and secondary levels of care are not competent to meet the needs of neonates. The experience and training of health care workers are limited, because developing countries have only just started

realising the importance of, and the need for further professional skills development (Black et al. 2010).

Due to the high NM rate, the South African government put some interventions and protocols in place to help reduce this. Such interventions include the Guidelines for Maternity Care (2007) and Guidelines for Neonatal Care (2008). A study conducted by Tyler and Odetayo (2005) on perceptions of nurses regarding factors contributing to NM found that *consanguinity* which is the union between close relatives, *cultural influences such as discouraging pregnant women to attend antenatal care social deprivation* which might result in poor diet leading to maternal malnutrition and anaemia, and *lack of knowledge* regarding correct diet during pregnancy and the importance of antenatal follow-up visits were the main factors contribution to NM.

Yengo (2009) argue that focused antenatal care (FANC) is one of the factors opposing NM. FANC entails the implementation of maternity guidelines by midwives as well as comprehensive health education of pregnant women. The implementation package of FANC includes the tests to be conducted, treatment to be given, information about the risks of alcohol and tobacco use during pregnancy, the prevention of infection before, during and after giving birth, the importance of good nutrition and breastfeeding, being prepared for birth and possible complications.

Guidelines for Maternity Care (2007) and Guidelines for Neonatal Care (2008) are available in the district hospital where the study was conducted. However, like in the rest of South Africa, NM remains a major service delivery concern yet the perceptions of midwives regarding factors contributing to NM have never been investigated. Therefore, the purpose of the study was to explore and describe perceptions of midwives regarding factors contributing to NM in order to devise strategies to reduce NM.

Methodology

Study design

A qualitative, exploratory and descriptive design was followed to enable an in-depth exploration and description of the perceptions of midwives regarding factors contributing to NM in a district hospital in Tshwane district, Gauteng Province, South Africa. Midwives were recruited from the labour and neonatal units using purposive sampling. All midwives who had an experience of six months and above in the labour and neonatal units were eligible to participate in the study as they had knowledge and experience to inform the objectives of the study.

Data collection

A semi-structured interview schedule was used to conduct one-to-one-in-depth interviews with participants who consented to participate in the study. The questions enabled participants to respond in their own words. Two quiet rooms were used, where no interruptions occurred and privacy and confidentiality could be ensured. The interviews were conducted in English, as this is the medium of communication among professionals in the units. The researcher obtained permission from the participants to audio record the interviews. Extensive field and interview notes were kept. The point of data saturation was reached after ten midwives were interviewed. Skills such as probing, paraphrasing, minimal verbal responses, responsive listening, and use of silence were used to ensure effective interviewing.

Data analysis

Data were analysed using qualitative thematic analysis. Data analysis was done simultaneously with data collection. Audio recordings were transcribed verbatim by the researchers. Transcripts were read several times by the researchers to identify emerging themes from data. The transcripts were further coded by an independent coder who is experienced in qualitative data analysis. Thereafter, consensus meetings were held between the researchers and the independent coder to discuss and agree on categories and sub-categories. Categories and sub-categories which emerged are presented as results and are validated by verbatim quotes from participants.

Trustworthiness

To ensure credibility of the study results, data were triangulated by conducting one-to-one interviews, collecting participants' biographical data, use of an audio recorder as well as taking

field notes. The purpose of the audio recorder was also to facilitate verbatim transcription and to ensure that data analysis reflected true perceptions of midwives regarding factors contributing to NM. The researchers also kept an audit trail of data collected and analysed in order to ensure dependability. Finally, the service of an independent coder was enlisted to reach inter-coder agreement on categories and subcategories (Polit & Beck, 2012).

Ethical approval

The study was reviewed and approved by the Medunsa Campus Ethics Committee of the University of Limpopo as well as the Research Ethics Committee of the Tshwane Metsweding Health District. The Chief Executive Officer of the District Hospital also gave permission for conducting the study. All participants signed informed consent before the interviews. Participants were also informed that participation is voluntary and that confidentiality will be ensured.

Results

Description of the sample

The sample consisted of ten midwives, five from labour and five from neonatal units. Participants' ages ranged between 29 and 59 years. Two participants were younger than 40 years whereas eight participants were older than 40 years. With regards to experience, five participants had less than three years and the other five more than three years working experience in the labour and neonatal units. Five of the ten participants had post-basic qualifications.

Categories and subcategories

Five categories emerged from data analysis namely: patient's factors, obstetric complications, mother's condition in relation to pregnancy, lack of resources, and organisational factors perceived by midwives as factors contributing to neonatal mortality and 14 sub-categories. The categories and sub-categories are reflected in Table 1.

Table 1: Categories and subcategories

Categories	Subcategories
Patient's factors	Lack of knowledge about preventive measures to reduce NM Lack of adherence to scheduled ANC services Late reporting to hospital when in labour
Obstetric complications	Prematurity Birth-asphyxia with meconium aspiration syndrome
Mother's condition in relation to pregnancy,	Hypertensive disorders Malnutrition and anaemia HIV and AIDS
Lack of resources	Shortage of adequate number of competent and experienced midwives and doctors
	Lack of Cardiotocography (CTG) machines Lack of Kangaroo Mother Care (KMC) unit Lack of admission beds at referral hospital
Organisational factors	Poor support and supervision for midwives Delayed transport for referred neonates

Patients' factors

Three subcategories that explained perceived patient factors contributing to NM included lack of knowledge about preventive measures to reduce NM, lack of adherence to scheduled ANC services and late reporting to hospital when in labour. Participants alluded to the fact that mothers lacked knowledge about preventive measures of NM. Participants further indicated non or irregular attendance of ANC by pregnant women who often report to the hospital already in advanced stages of labour.

'Mothers who did not attend ANC services have no knowledge about the importance of correct diet during pregnancy which will reduce preterm deliveries or giving birth to small for gestational babies' (Participant 7).

'Some pregnant mothers lack the information about the screening measures done for obstetric complications to prevent NM as they do not attend or attend ANC irregularly' (Participant 3).

'Some pregnant mothers are admitted with very high blood pressure. When you look in the patient's ANC card, there are only one or two ANC visits and the last visit was two months back' (Participant 1).

'Other pregnant mothers report late in the hospital when in labour. At times, they come when already in the advanced stage of labour, some already having obstetric complications and some deliver babies with low Apgar scores' (Participant 3).

Obstetric complications

One of the major contributing factor to NM reported by the participants is prematurity. They reported that they often admit premature babies who weigh less than 1000 grams in the neonatal unit. They also reported that some of the pregnant mothers were reported as arriving arrive in the labour unit draining meconium stained liquor, a sign of foetal distress, which needs immediate attention. However, due to inadequate resources, including the fact that there is only one medical doctor in the labour and neonatal units during weekends and at night, babies with birth asphyxia and prematurity are not promptly managed. The shortage of doctors in the unit was exacerbated by the fact that some midwives lack neonatal resuscitation skills.

'Most of the deaths occurring in this unit are from premature births. Premature babies mostly lack brown fat that generates heat to prevent hypothermia and as such they die' (Participant 7).

'I think one of the factors contributing to NM is intra-uterine asphyxia. There is one doctor in this unit and at times there is a delay in the management of some patients with obstetric problems needing caesarean section due to obstetric problems identified' (Participant 8).

Mother's condition in relation to pregnancy

Hypertensive disorders, such as pre-eclampsia and chronic hypertension were regarded as the common disorders in this subcategory contributing to NM. Some pregnant women come to hospital with elevated blood pressure while some women who reported in labour were reported to be malnourished and deliver premature and low birth weight babies. Participants further indicated that some of the HIV positive mothers who did not attend ANC services also deliver gross premature babies and most deaths occurring in the unit were due to prematurity. The following were some of the participants' quotes:

'Other pregnant mothers are admitted with elevated blood pressure and some are not booked to ANC services. When foetal condition is assessed there is foetal bradycardia' (Participant 10).

'Some mothers who are malnourished are more likely to have preterm labour' (Participant 3).

'Most HIV positive mothers who did not attend ANC services deliver gross-premature babies and most deaths occurring in this unit are due to prematurity' (Participant 6).

Lack of resources

Participants reported shortage of competent and experienced midwives and doctors as a factor in NM. Some of the midwives and doctors working in the labour and neonatal units were reported to be lacking the necessary obstetric skills. Lack of material resources such as insufficient CTG machines, lack of admission beds at the referral hospital and lack of KMC were also reported to contributing to NM. According to participants, there were one to three functional CTG machines in the unit at a time, with about five to six women needing continuous monitoring with the machine until they gave birth.

'Firstly, the midwives working in this unit are understaffed. You may find that one midwife is nursing four patients. It becomes very difficult for one midwife to monitor all these patients' (Participant 1).

'At times when a baby needs to be resuscitation, we need a medical doctor to help us, but most of the time you find that the doctor is busy in other wards. By the time the doctor reaches the unit, the baby is already dead' (Participant 7).

'Most of the time we would be having one functional Cardiotocography machine and with 6 mothers on induction of labour by Cytotec. All these mothers on Cytotec must be on continuous Cardiotocography monitoring' (Participant 1).

'We also lack facility or space for nursing stable premature babies in Kangaroo Mother Care. We nurse both sick and babies who need Kangaroo Mother Care together' (Participant 5).

Organisational Factors

The participants indicated that poor management support and supervision of newly qualified midwives resulted in delay in making proper decisions regarding the management of obstetric problems. The turnaround time for emergency transport for referred babies was too long, and

sometimes patients had to wait for more than four hours for transport to arrive to take them to a tertiary hospital. Sometimes the babies died whilst waiting for transport.

'The management is not supporting us in our needs such as in-service training and advocating for human and material resource improvement' (Participant 1).

'Another problem is the transportation of babies to tertiary hospital where we wait for a long time, usually three to four hours. At times when the transport arrives, the baby is already dead' (Participant 6).

'At times the doctor would transfer the neonate to tertiary hospital and doctors at tertiary hospital would refuse the neonate saying that they do not have admission beds' (Participant 2).

Discussion

The study endeavoured to uncover the perceptions of midwives regarding factors contributing to NM in a district hospital. The findings of the study revealed that midwives were of the views that patient factors, obstetric complications, the condition of the mother during pregnancy, lack of resources, and organisation factors contributed to NM in their hospital. Patient factors such as lack of knowledge about preventive measures to reduce NM, poor adherence to scheduled ANC services, and late reporting to hospital when in labour were the main factors contributing to NM.

The study findings are consistent with the findings of a study conducted in Ghana, Kenya and Malawi by Pell et al (2013) which indicated that measures that were performed in health facilities to prevent NM were not understood by pregnant women. The current study further found that when pregnant women did not attend ANC, the importance of correct diet during pregnancy to prevent obstetric complications was not known. Similarly, Hogue et al (2011) found that lack of knowledge regarding correct diet and lack of knowledge regarding nutrition were among the factors contributing to NM because malnutrition mostly results in low birth weight. It is well documented that maternal malnutrition and anaemia can be prevented or corrected during pregnancy if the mother attends ANC services.

The study also found that participants believed that seeking medical attention late during labour was one of the common patient-related factors contributing to NM. They indicated that neonatal resuscitation was not always successful in women who reported to the hospital in advanced stage of labour. According to Lloyd & de Witt (2013), reporting to the health facility

in the early stages of labour facilitates early recognition of obstetric problems and measures can be taken to prevent obstetric complications. A study by Bhutta et al (2009) further revealed that if pregnant women attended ANC services during pregnancy, malnutrition could be detected early and corrected to decrease obstetric complications associated with malnutrition.

Obstetric complications such as prematurity and birth asphyxia with meconium aspiration were highlighted by participants as some of the factors contributing to NM. The study findings are in line with previous studies, Sheoran et al (2011) also reported that premature babies as being at risk of developing asphyxia, sepsis, and hypothermia which result in NM. Velaphi and Rhoda (2012) argue that prematurity is the leading cause of NM as premature babies have a high risk of developing hypothermia due to insufficient energy stores and brown fat which produces heat. While, Waiswa et al (2010) identified birth asphyxia as a major contributory factor to NM. Both prematurity and intra-uterine growth restriction is associated with increased neonatal morbidity and mortality (Hermes et al., 2012; & McIntire & Leveno, 2008; Sheoran et al., 2011).

The findings of this study demonstrated that the condition of the mother during pregnancy contributed to NM, The most cited maternal conditions contributing to NM included pregnancy-induced hypertension, malnutrition, anaemia, and HIV and AIDS. The lack of human and material resources were other factors perceived by participants as contributing to NM. Participants were of the opinion that even when obstetric problems were identified in time, it was sometimes difficult to prevent those becoming complications because of the lack of doctors. They reported that there was only one doctor at a time to attend to emergency obstetric cases. Furthermore, some of the midwives and doctors were inexperienced and delayed the recognition and management of obstetric complications which resulted in NM. In addition, insufficient numbers of CTG machines negatively influenced management of high-risk mothers who were on induction of labour. While the unavailability of KMG resulted in some premature babies dying due to hypothermia. They also highlighted that periodic unavailability of admission beds at the tertiary hospital exacerbated the problem of NM. The participants were of the opinion that if there were enough resources to monitor the foetal conditions, some of the obstetric problems could have been identified earlier and the appropriate actions taken to prevent unnecessary NM.

While literature shows that the shortage of doctors is experienced world-wide, the problem is significantly critical in the developing countries (Neogi et al (2011). In rural Sub-Saharan

Africa, midwives and doctors are unable to monitor high-risk patients as closely as they are supposed to due to shortage of staff (Blank et al., 2013). The use of electronic foetal monitoring during labour is related to a substantial reduction of early NM because electronic foetal monitoring detects premature related complications such as hypoxia and acidosis early (Chen et al., 2012). Furthermore, KMC effectively reduces NM among babies with a birth weight of less than 2000 grams and is effective in reducing morbidity among premature babies (Lawn et al., 2010). The current study findings are in line with previous studies conducted in South African (McKerrow & Mulaudzi, 2010; Lloyd et al., 2013) that lack of access to high care beds with ventilators contributes to NM. The lack of beds in a tertiary hospital results in sick neonates being nursed in a level one hospital where the necessary resources are unavailable leading NM.

The participants cited lack of management as contributing to lack of essential equipment. The transport of mothers and babies within the health facilities was one of the factors that contributed to NM. The turnaround time for emergency transport for babies referred to tertiary hospital was too long, resulting in babies dying whilst waiting for transport. Managerial or electronic support for maternal and childcare could improve the poor quality of care, thus reducing maternal and neonatal deaths. Delayed transport to referral hospital transport is amongst the key areas that need urgent attention in order to reduce neonatal deaths at low level of care facilities (Storey and Russel, 2010).

Limitations

The study was limited to midwives working in one district hospital and as such, the findings cannot be generalised to all midwives across the entire province. The study focused on midwives, while the beneficiaries of the health services (pregnant women, families and the community) were excluded. Their inputs could have made the study more comprehensive in order to inform policy to improve ANC services to reduce NM.

Recommendations

There is a need to create community awareness about the importance of early booking and consistent attendance of ANC services by all pregnant women. This could be achieved through strengthening of Primary Health Care Re-Engineering program. The lack of skills to manage emergency obstetrical complications calls for the need for continuous professional development of doctors and midwives through workshops and in-service training. There is also

a need for concerted efforts to develop systems for the supervision of newly qualified midwives to enable them to gain experience and confidence in obstetric care. To facilitate referral of mothers and newborn babies in need of tertiary hospital care, it is critical that the referral system and emergency transport system is reviewed and improved.

Conclusion

The results of the study revealed that factors as contributing to NM are multifactorial and include organisational and factors related to the mother. While patient factors were highlighted as major contributing factors, the importance of adequate resources for management of women prenatally, intra-partum and post-partum were also emphasised. Furthermore, the need for support by management was perceived as a necessary tool that would enhance performance of midwives in ensuring positive mother and child outcomes.

Acknowledgements

The authors extend their sincere gratitude and recognition to the University-based Nursing Education South Africa and the Elma South Africa Foundation for granting the scholarship for this study.

References

- Black, R. E., Cousens, S., Johnson, H. L., Lawn, J. E., Rudan, I., Bassani, D. G., Jha, P., Campbell, H., Walker, C. F., Cibulskis, R., Elsele, T., Liu, L. & Mathers, C. (2010). *Global, regional, and national causes of child mortality in 2008: a systematic analysis*. The Lancet. 375 (9730) 1969 – 1987.
- Blank, A., Prytherch, H., Kaltschmidt, J., Krings, A., Sukums, F., Mensah, N., Zakane, A., Loukanova, S., Gustafsson, L., Sauerborn, R. & Haefeli, W. E. (2013). *Quality of Perinatal and maternal care: Bridging the know-do-gap: An electronic clinical decision support system for rural Sub-Saharan Africa*. United Kingdom: Biomed Central.
- Butta, Z. A., Darmstadt, G. L., Haws, R. A., Yakoob, M. Y. & Lawn, J. E. (2009). *Delivering interventions to reduce the global burden of stillbirths: Improving service supply and community demand*. United Kingdom: Biomed Central.
- Centre for Maternal and Child Enquiries. (2009). *Perinatal Mortality (2009)*. United Kingdom. CMACE: London.
- Chen, H. Y., Chauhan, S. P., Ananth, C. V., Vintzileos, A. M. & Abuhamad, A. Z. (2012). Electronic fetal heart rate monitoring and its relationship to neonatal and infant mortality in the United States. United States: *American Journal of Obstetrics & Gynaecology*. 204 (6) 491e1.-10.
- Engmann, C. (2011). Improving Neonatal Mortality in Sub-Saharan Africa: any cause for optimism. *Journal of Perinatology*. (31) 745-748.

- Fraser, D. M., Cooper, M. A. & Nolte, A. G. W. (2006). *Myles Textbook for midwives: African Edition*. Edinburgh: Churchill Livingstone.
- Hermes, W., Ket, J. C. F., Van Pampus, M.G., Franx, A., Veenendaal, M.V.E., Kolster, C., Tamsma, J. T., Bloemenkamp, K. W. M., Ponjee, G., Van der Hout, E., Ten Horn, H., Loix, S., Mol, B. W. & De Groot, C.J.M. (2012). Biochemical Cardiovascular Risk Factors After Hypertensive Pregnancy Disorders: A Systematic Review and Meta-analysis. Netherlands: *Obstetrical and Gynaecological Survey*. 67(12) 793-809.
- Hoque, M., Haag, S. & Islam, R. (2011). *Causes of neonatal admissions and deaths at a rural hospital in KwaZulu-Natal, South Africa*. KwaZulu-Natal: South African Journal Epidemiol Effect. 26(1) 26-29.
- Khatun, F. (2010). *Perceptions of Nurses and Pregnant Women Regarding Quality of Antenatal Care in Bangladesh*. Bangladesh. Prince of Songklar University: Banladesh.
- Lawn, J. E., Mwansa-Kambafwile, J., Horta, B. L., Barros, F. C. & Cousens, S. (2010). 'Kangaroo mother care' to prevent neonatal deaths due to preterm complications. Cape Town, *South Africa: International Journal of Epidemiology*. 39(1) 144-154.
- Lawoyin, T. U., Onadeko, M. O. & Asekun-Olarinmoye, E.O. (2010). Neonatal mortality and perinatal risk factors in rural south-western Nigeria: a community-based prospective study. *West African Journal of Medicine*. 29 (1) 19-23.
- Lloyd, L. G. & de Witt, T. W. (2013). Neonatal Mortality in South Africa: How are we doing and can we do better? Pretoria, South Africa: *The South African Medical Journal*. 103(8).
- McIntire, D. D. & Leveno, K.J. (2008). Neonatal Mortality and Morbidity Rates in Late Preterm Births Compared With Births at Term. United States of America: *Obstetrics & Gynaecology*. 111(1) 35-41.
- McKerrow, N. & Mulaudzi, M. (2010). *Child Mortality in South Africa: Using existing data*. South Africa: SAHR.
- Neogi, S. B., Malhotra, S., Zodpey, S. & Mohan, P. (2011). Assessment of Special Care Newborn Units in India. India: *Journal of Health Population and Nutrition*. 29(5): 500–509.
- Nordquist, C. (2006). *US Infant Survival Rates Lower Than Most Developed Nations*. United States of America: Medical News Today.
- Pell, C., Menaca, A., Were, F., Afrah, N. A., Chatro, S., Manda., Taylor, L., Hamel, M. J., Hodgson, A., Tagbor, H., Kalilani, L., Ouma, P. & Pool, R. (2013). *Factors affecting Antenatal Care Attendance: Results from qualitative studies in Ghana, Kenya and Malawi*. Plos One.
- Polit, D. F. & Beck, C. T. (2012). *Nursing Research Generating and Accessing Evidence for Nursing Practice*. 9th Edition. Lippincortt. Williams & Wilkins Health.
- Sheoran, P., Babu, M., Mandal, K. & Rai, K. (2011). *Effectiveness of Planned Health Education Programme regarding risk factors and care of low birth weight programme regarding babies in terms of knowledge and practice among mothers*. Delhi, India: Nursing and Midwives Research Journal.
- Storey, I. & Russel, A.B. (2010). Perinatal and Neonatal Mortality in the Advent of Neonatal Network. *British Journal of Hospital Medicine*. 71(4) 190-194.
- Tyler, S. & Odetayo, K. (2005). *Mapping Community Midwifery In Birmingham*. Warwick, England: Public Management Associates.

Velaphi, S. & Rhoda, N. (2012). Reducing neonatal deaths in South Africa: Are we there yet, and what can be done? Johannesburg, South Africa: *SA Journal of Child Health*. 6(3)

Waiswa, P., Kallander, K., Peterson, S., Tomson, G. & Pariyo, G. W. (2010). Using the three delays model to understand why newborn babies die in eastern Uganda. Uganda: *Tropical Medicine and International Health*. 15 (8) 964-72.

World Health Organization (WHO). (2011). *New-born deaths decrease but account for higher share of global child deaths*. Geneva: WHO.