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Underreporting of maternal and neonatal complications: A comparison of information in maternity registers and client charts at a rural community hospital in Malawi

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ABSTRACT

Aim: To determine the rate and types of unreported maternal and neonatal complications in a rural community hospital in Malawi.

Background: The problem of maternal and neonatal morbidity and mortality may be underestimated, with underreporting of complications often noted. Reliable data is needed to make key decisions at the local, district, and national level. This study investigated whether there were unreported complications among women receiving intrapartum care at a rural community hospital in Malawi.

Methods: A retrospective cross-sectional study was conducted comparing maternity register records to client charts from January-March 2018. Descriptive data analysis using SPSS v20 was performed to calculate percentages and frequencies.

Results: 360 client cases were identified, of which 33 cases were excluded from analysis due to missing charts. Of the remaining 327 cases included in the final analysis, only 34% (n = 31) of maternal and 34% (n = 33) of neonatal complications were recorded in both the maternity register and the chart. When the additional complications found in the chart review were included, the rates of maternal and neonatal complications tripled from 9.5% (n = 31) and 10% (n = 33) to 28% (n = 90) and 30% (n = 98), respectively.

Conclusions: There was poor record keeping, underreporting of maternal and neonatal complications, and discrepancies between the data recorded in the monthly maternity register and client charts in the first quarter of 2018. The actual rate of complications suggests a need to verify data at the facility level to prevent release and reporting of inaccurate data. Measures are needed to mitigate the gaps in data reporting.

1. Introduction

Maternal and neonatal complications, many of which are life-threatening, are a major cause of concern globally as they contribute to maternal and neonatal morbidity and mortality. Geller et al. (2018) reported an increase in severe maternal morbidity in both high-income and middle-and low-income countries (LMIC) despite the global reduction in maternal mortality rates. The problem of maternal and neonatal morbidity and mortality may be underestimated, with underreporting of complications or adverse events often noted. In New Zealand, one study showed that more than 91% of maternal and perinatal adverse events were missed in the official documents published by the Health Equity and Safety Commission (Farquhar et al., 2015). Similarly in Taiwan, two-thirds of maternal deaths were unreported in the officially published mortality data (Wu et al., 2015) while in India, two studies reporting on severe maternal morbidity estimated differences in reported complications ranging from 9.6 to 120 per 1,000 live births (Pandey et al., 2014; Purandare et al., 2014). In Malawi, uncaptured

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data, data errors, lack of accurate, complete, consistent and timely data has been noted in some facilities (Kasambala et al., 2017; Khwima et al., 2017; Tough & Lihoma, 2018).

The World Health Organisation (2007) recognizes a strong health information system as one of the building blocks of a functional health system. Similarly, the Malawi Ministry of Health (2015) acknowledges the need for reliable data in order to make rational decisions. Health management information systems (HMIS) registers and client records have been identified as the basic tools that guide clinical decision-making by healthcare workers, as well as enable systems to collect data, report, and plan for improving the quality and coverage of health services (Dwivedi et al., 2017).

Malawi, a low-income country in southeast Africa, has a total population of 17,563,749 (National Statistical Office (NSO), 2018) and a maternal mortality ratio of 439/100,000 live births and neonatal mortality of 27/1,000 live births (National Statistical Office (NSO) & ICF International, 2017). By way of comparison with other similar settings, the maternal mortality ratio ranged from 7 deaths per 100,000 live births in Cabo Verde to 1360 per 100,000 live births in Sierra Leone (Girum & Wasie, 2017). In 2010, the Central Monitoring and Evaluation Division in the Malawi MoH began using the District Health Information Software 2 (DHIS2) platform to collect information from maternity registers where clients' data for intrapartum care are recorded to standardize the documentation of relevant information at the facility level (O'Hagan et al., 2017). The maternity register, which is generally paper based, captures variables including the name of the client, age, date of admission and delivery, mode of delivery, HIV status, obstetric and neonatal complications and corresponding medical interventions, and maternal and neonatal survival outcomes. Obstetric complications stipulated in the register include antepartum hemorrhage (APH), postpartum hemorrhage (PPH), obstructed or prolonged labor (OPL), pre-eclampsia or eclampsia, sepsis, ruptured uterus, and "other". Neonatal complications include birth asphyxia, neonatal sepsis, prematurity and low birth weight, and "other".

Despite adoption of the HMIS platform in 2002 in Malawi, the data system is facing challenges such as missing and poorly recorded data (Kasambala et al., 2017). We conducted a comparison of the maternity register and client charts to investigate whether there were unreported complications among women receiving intrapartum care at a rural community hospital in Malawi. Our aim was to determine the rate of unreported cases of maternal and neonatal complications, as well as the type of complications missed, in the maternity register in a rural community hospital during the first quarter of 2018.

2. Material and methods

2.1. Study design

We used a retrospective descriptive cross-sectional design to determine how many complications were missing from the maternity register when compared to client charts and, of those, the types of unrecorded complications. Data from maternity registers and client charts from the first quarter of 2018 were reviewed by a nurse-midwife member of the study team. The primary outcome measure was the proportion of maternal and neonatal complications identified in the maternity register compared with the complications identified in the client charts with a secondary outcome of types of complications unrecorded.

2.2. Setting

We conducted the review in a community hospital which is located in a rural mountainous district with a population of 138,000 (Neno (District, Malawi) - Population Statistics, Charts, Map and Location, n.d.). A total of 1,120 deliveries were recorded in the maternity registers at the study community hospital in 2017. The district is enriched by the presence of a large international non-governmental organization which supports the operations of the health facilities with human and material resources. The district has a district hospital, a community hospital, and 14 health centers. The community hospital has nine nurse-midwives assigned to the maternity/neonatal department as well as nine clinical officers and one medical officer who rotate through the department on call. The community hospital serves as a referral facility for six health centers. The hospital has an operating theatre and maternity department consisting of the maternity waiting home, labor ward and postnatal ward. All clients who require further management are referred to the district hospital. Paper-based client case records, (referred to as client charts in this paper), including the Malawian national partograph, are used for all women during the intrapartum and postpartum period. The data from each client are recorded in the maternity and postnatal registers during hospitalization. Summaries of maternal and neonatal complications and outcomes from the maternity and postnatal registers are uploaded by a facility staff member on a monthly basis directly from the facility to DHIS 2, which is managed by the District Health Management Information office and later fed into the national system by the district health team.

2.3. Sample size and selection of sample

All maternity registers and client charts for maternity clients seen at the community hospital between January and March of 2018 were eligible for inclusion. Based on average number of deliveries in the hospital, we anticipated access to records from approximately 300 births. Any client chart without a corresponding record in the maternity register was omitted from analysis.

2.4. Data collection

All data was collected by an expert nurse midwife leading a nurse midwifery training program in the district. Prior to the study, no specific training was given to facility-based nurses and midwives on documentation protocol.

The maternal complications reviewed included APH/PPH, OPL, pre-eclampsia/eclampsia, and "other", which included malpresentation and previous scar. The neonatal complications reviewed included neonatal sepsis, preterm, low birth weight (LBW), asphyxia and "other", which included congenital abnormalities and meconium aspiration.

The national maternity register (version 3), used during the time our study was conducted, required the reporter to choose one leading complication for mother and neonate; however, the register was revised in 2017 (version 4) to allow reporting of multiple complications as well as the inclusion of other complications such as retained placenta and preterm labor, but the facility was still using the earlier version through the second quarter of 2018.

2.5. Data analysis

Data were extracted from the maternity registries and client charts into an excel spreadsheet, cleaned, and then imported into a statistical software platform, Statistical Package for Social Studies (SPSS) version 20 (IBM SPSS Statistics, 2011). Maternal and neonatal complications described above were examined using descriptive techniques, e.g. frequency distributions and percentages. For each month, unreported complications found in client charts were compared to those recorded in the monthly maternity register.

2.6. Statement of ethics approval

While this maternity register and chart review was within the scope of routine clinical data monitoring and evaluation and quality improvement activities, approval was received from the district research committee overseen by the district health officer (District approval #5640 376). All information was first de-identified and then aggregated,

therefore there was no ability to connect outcomes with specific clients.

3. Results

Of the 360 births from January to March 2018, 33 were excluded from study analysis because they did not have an associated chart. Of the remaining 327 cases included in the study analysis, 255 were recorded both in the maternity register and had an associated client chart and 72 had a client chart but were not recorded in the maternity register (Fig. 1).

There were 31 (34%) maternal complications reported in the maternity register during this period. However, an additional 59 maternal complications were identified in client charts from the same period. Those 59 complications included APH/PPH, 11.9% (n = 7); OPL, 49% (n = 29); pre-eclampsia or eclampsia 8.5% (n = 5); sepsis 5.1% (n = 3) and other, 30% (n = 15). These unreported complications bring the total maternal complications during this period to 90 (Table 1).

Similarly, only 33 (34%) neonatal complications were reported in the monthly maternity register, but an additional 63 unreported complications were found in the client charts, bringing the true number of neonatal complications to 96. The 63 unreported neonatal complications included: neonatal sepsis, 46% (n = 29), LBW, 21% (n = 13), preterm birth, 19% (n = 12); asphyxia 11% (n = 7); and other, 6.3% (n = 4) (Table 2).

Overall, only 34% of maternal (n = 31) and neonatal (n = 33) complications were recorded in both the maternity register and the chart. When the additional complications found on chart review were included, the calculated maternal and neonatal complication rates roughly tripled from 9.5% (n = 31) and 10% (n = 33) to 28% (n = 90) and 30% (n = 98), respectively.

4. Discussion

Over the three-month study period, information on 72 women and their newborns was missing from the maternity register that is aggregated into monthly total maternal and neonatal complications and reported to the Ministry. This means that on average, 25 women and their newborns are not recorded in the maternity register each month, and each year approximately 27% of the births (300 out of 1,120 births) at the community hospital are not captured.

This study revealed major discrepancies between the recording of maternal and neonatal complications in monthly maternity registries and what is found in client charts. Our analysis found that a third of the clients' charts were either not recorded in the monthly maternity register or missing from the labor ward archive. In fact, there were at least twice as many complications found in the client charts than were

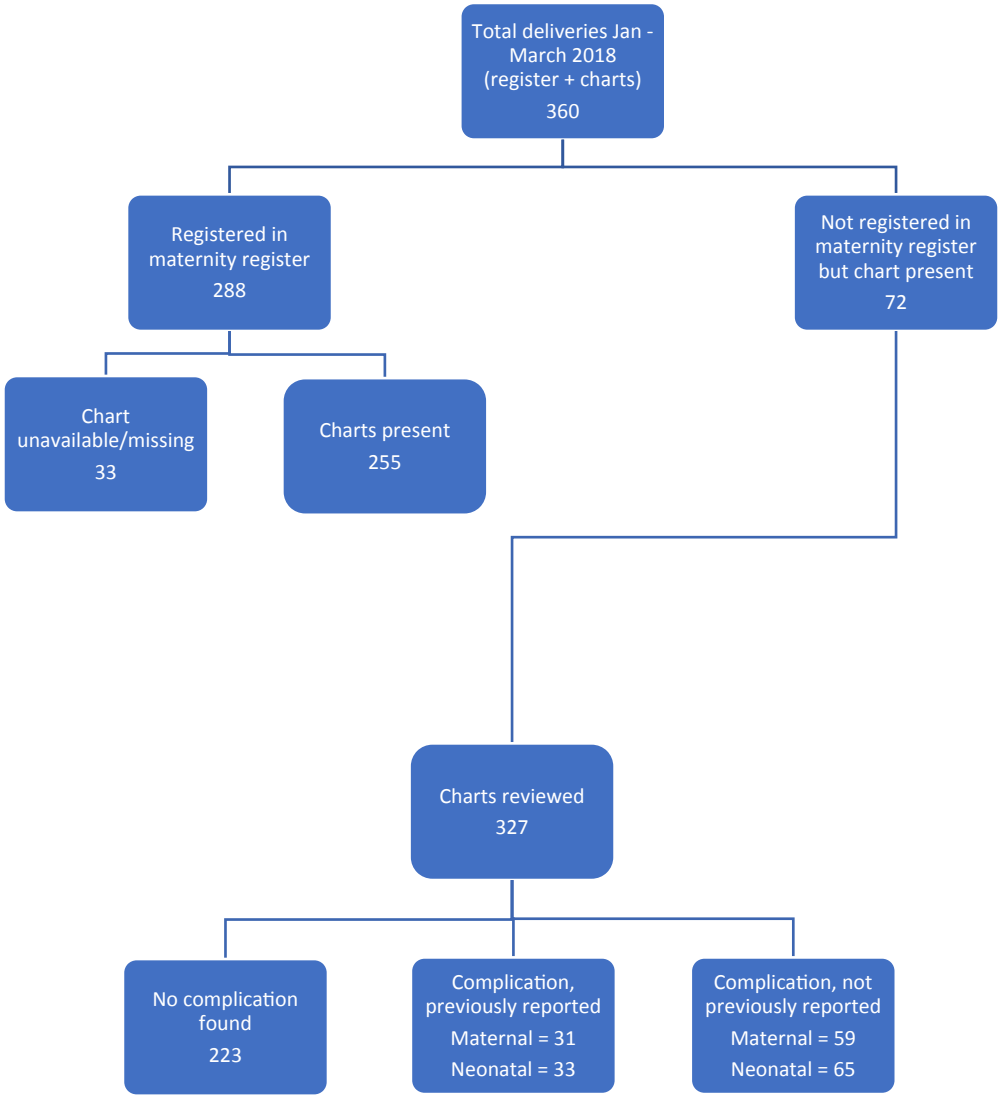

Fig. 1. Flow diagram indicating the number of charts reviewed.

Table 1
Discrepancy in maternal complications reported in either the maternity register or client charts from January to March 2018, in a community hospital in Malawi.

	Captured in maternity register only (%)	Missing from maternity register (recorded in client chart only) (%)	Total captured in either maternity register or client chart
Maternal complication			
OPL	15 (34)	29 (66)	44
Other	3 (17)	15 (83)	18
PPH	7 (58)	5 (42)	12
(Pre)Eclampsia	2 (29)	5 (71)	7
Sepsis	2 (40)	3 (60)	5
APH	2 (50)	2 (50)	4
Ruptured uterus	0 (0)	0 (0)	0
Total complications	31 (34)	59 (66)	90

Table 2
Discrepancy in neonatal complications reported in either the maternity register or client charts from January to March 2018, in a community hospital in Malawi.

	Captured in maternity register only (%)	Missing from maternity register (recorded in client chart only) (%)	Total captured in either maternity register or client chart
Neonatal complication			
Sepsis	2 (7)	27 (93)	29
Low birth weight (<2.5 kg)	13 (50)	13 (50)	26
Prematurity	10 (45)	12 (55)	22
Asphyxia	5 (42)	7 (58)	12
Other	3 (43)	4 (57)	7
Total complications	33 (34)	63 (66)	96

reported in the monthly maternity register and two-thirds of maternal and neonatal complications were missing from the maternity register.

The nurses and midwives at this hospital are responsible for entering client chart information in the maternity register. However, due to staffing shortages, only two nurse-midwives are allocated to each shift to care for antepartum, intrapartum, postpartum including post-caesarian section clients and both healthy and sick neonates. Considering the high number of deliveries and frequent understaffing, it is understandable that nurses prioritize giving care to clients over recordkeeping and maintaining the register. In addition, there is a high turnover of nurse-midwives which, apart from creating shortages of staff, creates the loss of experienced staff, which affects the documentation and recording of data. High staff turnover was also noted in other resource constrained facilities in Kenya and Uganda where challenges were observed in data completeness during an intervention to improve data quality in preterm birth measurement (Keating et al., 2019). This results in failure to capture every client record in the register. Similar findings were noted in other parts of Malawi where nurses and midwives, among other healthcare workers, complained of having increased workload which resulted in committing data errors (Kasambala et al., 2017; Tough & Lihoma, 2018).

Under-reporting of cases affects equitable distribution of resources, especially in low resource settings like Malawi, where decisions about resource allocation depends solely on aggregated data from maternity registers such as the ones used in this study. Therefore, a facility may be misclassified and hence allocated inadequate resources based on under-reporting of cases. For example, a comparison was made between pharmacy registers and monthly aggregates of drug consumption in six districts in Malawi (Tweya et al., 2012). Results indicated a mismatch between expenditures and consumption rates. Conversely, a study by Kasambala et al. (2017) found safe motherhood coordinators in some facilities were inflating figures in their reports in order to receive more resources.

Given the workload and chronic understaffing in such settings, the use of non-clinical staff such as ward clerks may ensure that all client visits are accurately recorded in a timely fashion. This model is used in some facilities in Malawi, especially at district hospitals, where ward clerks are allocated to capture data for the hospital. Ward clerks are commonly used in central and district hospitals and are responsible for entering all clients in the register, ensuring that all charts are well-secured, and establishing good filing system for the charts. Therefore, the presence of a ward clerk may improve data recording in both the register and client charts.

Importantly, monthly data reports at the facility level informs the district which, in turn, informs the national information system. Therefore, under-reporting at the facility level may affect national statistics. It is unclear whether the reported data is checked for quality at the facility level as per guidelines in the 2015 Malawi National Health Information System policy. The policy mandates that health facilities perform their own independent data quality assessments on a regular basis as part of the continuous quality improvement efforts (Malawi Ministry of Health, 2015). In their study on assessment of implementation of HMIS at the district level, Kasambala et al. (2017) found that there were no structures for authentication of data at facility level. A study in Pakistan led to the development of a standard and simplified reporting procedure based on WHO definitions of complications to manage under-reporting of stillbirths (Zakar et al., 2018). Similar efforts can be done at the facility level in Malawi to help providers by standardizing definitions of complications, reinforce the importance of consistent documentation, thereby preventing under-reporting of maternal and neonatal complications. Mechanisms for verification and approval of facility level data are needed prior to release and report to the district health office. For instance, building a team comprising clinical and data management staff to validate the data for completeness and accuracy would ensure improved quality of data before reporting is finalized.

Many of the maternal complications missed during this study period are the common causes of maternal morbidity in Africa (Khan et al., 2006); Combs Thorsen et al., 2012) and often lead to death if not well managed – or managed in a timely fashion. It is essential that all maternal and neonatal complications are captured in the registers and client charts in order to develop remedial measures to prevent complications and manage clients effectively. A study in a similar setting in Malawi revealed that most maternal deaths resulted from a delay in accessing the right care or treatment among clients who had already reported to the facility for management (Mgawadere et al., 2017). Once a client presents at a facility, accurately identifying and documenting complications and care are critical for better outcomes. Underreporting of maternal and neonatal complications may undermine efforts to monitor the magnitude and quality of maternity services and prevent improvement in management of such conditions. At a national level, accurate reporting is key for resource allocation and priority-setting for ministries of health.

CRediT authorship contribution statement

Conceptualization, Writing - review & editing.

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Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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References

Combs Thorsen, V., Sundby, J., & Malata, A. (2012). Piercing together the maternal detah puzzle through narratives: The three delays model revisited. *PLoS ONE, 7*(12), Article e52090.

Dwivedi, V., Drake, M., Rawlins, B., Strachan, M., Monga, T., & Unfried, K. (2017). *A Review of the Maternal and Newborn Health Content of National Health Management Information Systems in.* MCHIP: Sub-Saharan Africa and South Asia.

Farquhar, C., Armstrong, S., Kim, B., Masson, V., & Sadler, L. (2015). Under-reporting of maternal and perinatal adverse events in New Zealand. *BMJ Open, 5*(7), e007970. https://doi.org/10.1136/bmjopen-2015-007970.

Geller, S. E., Koch, A. R., Garland, C. E., MacDonald, E. J., Storey, F., & Lawton, B. (2018). A global view of severe maternal morbidity: Moving beyond maternal mortality. *Reproductive Health, 15*(1), 98. https://doi.org/10.1186/s12978-018-0527-2.

Girum, T., & Wasie, A. (2017). Correlates of maternal mortality in developing countries: An ecological study in 82 countries. *Maternal Health, Neonatology and Perinatology, 3*(1), 19. https://doi.org/10.1186/s40748-017-0059-8.

IBM SPSS Statistics (20.0). (2011). [Mac]. IBM Corp.

Kasambala, A., Kumwenda, S., Kalulu, K., Lungu, K., Beattie, T., Masangwi, S., … Morse, T. (2017). Assessment of implementation of health management information sysyem at district level in Southern Malawi. *Malawi Medical Journal: The Journal of Medical Association of Malawi, 29*(3), 240–246.

Keating, R., Merai, R., Mubiri, P., Kajjo, D., Otare, C., Mugume, D., Weissglas, F., Waiswa, P., Otieno, P., Kirumbi, L., Wanyoro, A., Namazzi, G., Achola, K., Myrick, R., Butrick, E., & Walker, D. (2019). Assessing effects of a data quality strengthening campaign on completeness of key fields in facility-based maternity registers in Kenya and Uganda. East African Journal of Applied Health Monitoring and Evaluation, 3. http://eajahme.com/assessing-effects-of-a-data-quality-strengthening-campaign-on-completeness-of-key-fields-in-facility-based-maternity-registers-in-kenya-and-uganda/.

Khan, K. S., Wojdyla, D., Say, L., Gülmezoglu, A. M., & Van Look, P. F. (2006). WHO analysis of causes of maternal death: A systematic review. *Lancet (London, England), 367*(9516), 1066–1074. https://doi.org/10.1016/S0140-6736(06)68397-9.

Khwima, E., Msiska, N., Kumitawa, A., & Kumwenda, B. (2017). Factors affecting utilization of electronic medical records system in Malawian central hospital. *Malawi Medical Journal: The Journal of Medical Association of Malawi, 29*(3), 247–253.

Malawi Ministry of Health. (2015). Malawi National Health Information System Policy. MOH.

Mgawadere, F., Unkels, R., Kazembe, A., & van den Broek, N. (2017). Factors associated with maternal mortality in Malawi: Application of the three delays model. *BMC Pregnancy and Childbirth, 17*(1). https://doi.org/10.1186/s12884-017-1406-5.

National Statistical Office (NSO). (2018). 2018 Population and Housing Census Preliminary Report. Government of Malawi.

National Statistical Office (NSO), & ICF International. (2017). Malawi Demographic Health Survey 2015-16 [Final Report]. http://www.nsomalawi.mw/images/stories/data_on_line/demography/mdhs2015_16/MDHS%202015-16%20Final%20Report.pdf.

Neno (District, Malawi)—Population Statistics, Charts, Map and Location. (n.d.). Retrieved December 2, 2020, from https://www.citypopulation.de/en/malawi/admin/southern/MW313_neno/.

O'Hagan, R., Marx, M. A., Finnegan, K. E., Naphini, P., Ng'ambi, K., Laija, K., … Yosefe, S. (2017). National Assessment of Data Quality and Associated Systems-Level Factors in Malawi. *Global Health: Science and Practice, 5*(3), 367–381. https://doi.org/10.9745/GHSP-D-17-00177.

Pandey, A., Das, V., Agarwal, A., Agrawal, S., Misra, D., & Jaiswal, N. (2014). Evaluation of Obstetric Near Miss and Maternal Deaths in a Tertiary Care Hospital in North India: Shifting Focus from Mortality to Morbidity. *Journal of Obstetrics and Gynaecology of India, 64*(6), 394–399. https://doi.org/10.1007/s13224-014-0552-1.

Purandare, C., Bhardwaj, A., Malhotra, M., Bhushan, H., Chhabra, S., & Shivkumar, P. (2014). Maternal near-miss reviews: Lessons from a pilot programme in India. - PubMed - NCBI. *BJOG: An International Journal of Obstetrics & Gynaecology, 121*, 105–111.

Tough, A. G., & Lihoma, P. (2018). Medical record keeping sysytems in Malawi: Is there a case for hybrid systems and intermediate technologies? *Records Management Journal, 28*(3), 265–277.

Tweya, H., Feldacker, C., Ben-Smith, A., Harries, A. D., Komatsu, R., Jahn, A., … Tassie, J.-M. (2012). Simplifying ART cohort monitoring: Can pharmacy stocks provide accurate estimates of patients retained on antiretroviral therapy in Malawi? *BMC Health Services Research, 12*(1). https://doi.org/10.1186/1472-6963-12-210.

World Health Organisation. (2007). Everybody's Business: Strengthening Health Systems to Improve Health Outcomes: WHO's Framework for Action. WHO. http://www.who.int/ healthsystems/strategy/everybodys_business.pdf.

Wu, T.-P., Huang, Y.-L., Liang, F.-W., & Lu, T.-H. (2015). Underreporting of maternal mortality in Taiwan: A data linkage study. *Taiwanese Journal of Obstetrics and Gynecology, 54*(6), 705–708. https://doi.org/10.1016/j.tjog.2015.10.002.

Zakar, M. Z., Zakar, R., Mustafa, M., Jalil, A., & Fischer, F. (2018). Under-reporting of stillbirths in Pakistan: Perspectives of the parents, community and healthcare providers. *BMC Pregnancy and Childbirth, 18*(1). https://doi.org/10.1186/s12884-018-1924-9.