ScienceForecast
A digital science library

Research Article
Published: 21 Sep, 2020

Journal of Clinical Case Reports

Trends of Pregnancy Outcomes from 2013 to 2017 at a Primary Health Care Facility in Durban, South Africa

Hoque AM[1]*, Hoque ME[2] and Van Hal G[3]

[1]Medical Manager, Kwadabeka Community Health Centre, South Africa

[2]Senior Research Associate, Management College of Southern Africa, Durban, South Africa

[3]Social Epidemiology and Health Policy, University of Antwerp, Belgium

Abstract

Background: Maternal and child health is a priority in low- and middle-income countries including South Africa. Despite efforts taken to optimize pregnancy outcomes nationally and locally, higher than expected incidences of maternal and perinatal mortality are observed. This study measured the trends of demographic and delivery outcomes from 2013 to 2017 of a Midwife run Obstetric Unit setting.

Method: A retrospective cohort study was conducted targeting all pregnant women who delivered at Kwadabeka Community Health Center between January 2013 and December 2017. Data were collected from the labour ward delivery register (birth register).

Results: A significant decline was found in teenage pregnancies (age below 20 years) from 14.5% (2013) to 9.5% (2017) (p=0.034). The ratio for the newborns for male to female was 1:1. There was a gradual decline in the low birth weight (livebirth) rate from 8.4% (2013) to 7.8% (2017) (p=0.788). Binary logistic regression analysis showed that it was 22 times (OR=21.959) more likely to have a Low Birth Weight (LBW) if gestational age decreased by a week. Similarly, for Fresh Still Birth, it was found that decrease in gestational age by a week increased the risk of FSB by 23 times.

Conclusion: There are declining trends of teenage delivery, low birth weight and still birth rates at this health facility. This should be seen as positive on achieving the Millennium Development Goals. Further studies are encouraged to identify the antenatal care and delivery practices implemented; those may be associated with improving maternity service delivery indicators at the facility.

Keywords: Pregnant woman; Teenage pregnancy; Pregnancy outcome; Low birth weight delivery; Still birth; Kwadabeka CHC

OPEN ACCESS

Correspondence:
AKM Monjurul Hoque, Medical Manager, Kwadabeka Community Health Centre, Westville, South Africa.
Tel: *+27317143704*
Fax: *+27317143710*
E-mail: *mhoque75@gmail.com/ monjurul.hoque@kznhealth.gov.za*

Received Date: *14 Aug 2020*
Accepted Date: *17 Sep 2020*
Published Date: *21 Sep 2020*

Citation: *Hoque AM, Hoque ME, Van Hal G. Trends of Pregnancy Outcomes from 2013 to 2017 at a Primary Health Care Facility in Durban, South Africa. J Clin Case Rep. 2020; 3(2): 1028.*

ISSN 2643-8194

Background

Maternal and child health is a priority in low- and middle-income countries as it reflects the general level of living of a society. It was estimated that approximately 99% of the global maternal deaths occurred in developing countries in 2015 and sub-Saharan Africa accounting for 66% [1]. In spite of efforts taken to optimize pregnancy and its outcomes nationally and locally, higher incidence of maternal mortality and Perinatal Mortality Rates (PNMR) are observed in South Africa (SA). For example, the estimated maternal mortality rate for SA is estimated at 138 per 100 000 live births and it is higher (180 per 100 000) for Kwazulu-Natal province (KZN) for the year 2015 [2]. It has also been reported that SA did not progress significantly towards the millennium developmental goals [2]. Similarly, the PNMR for SA is high of 63 per 1000 live births and higher for KZN [3].

Birth weight is an important determinant of perinatal, neonatal and post neonatal outcomes. Preterm delivery is the most important cause of perinatal mortality in the developing world [3]. It is considered the leading cause of death among children under five years of age [3]. In 2015, preterm births were responsible for approximately 1 million deaths [3,4]. A variety of factors including demographic, socioeconomic status and pregnancy related conditions have been reported to be associated with preterm birth such as maternal age, parity, previous preterm birth, multiple gestation, pregnancy induced hypertension, antepartum hemorrhage, prolonged pre-labor rupture of membranes, and urinary tract infections [4,5]. A number of other medical conditions have also been associated with preterm birth which include diabetes mellitus, urinary and genital tract infections, HIV infection and psychological stress [5].

Low Birth Weight (LBW) is another major health problem. According to WHO, LBW is defined as a birth weight of less than 2500 g. Risk factors for LBW were reported to be preterm birth, Intrauterine Growth Restriction (IUGR), or both [6]. It is reported that babies who are born preterm are prone to neonatal problems such as infection, which may require longer hospital stay, lead to increase cost to the family and hospital, the government, and increased mortality rate [7].

Personal (genetic, prior premature birth, age), social, environmental and medical risk factors e.g., shorter pregnancy intervals, HIV infection, poor maternal nutrition and maternal habit of smoking are found for low-birth-weight deliveries in different parts of the world [8]. WHO has estimated that globally more than 20 million LBW infants are born annually [6]. These LBW infants are at an increased risk of several health problems such as growth retardation, infectious diseases, and developmental delay [9].

In 2015, an estimated 2.6 million stillbirths occurred worldwide, with almost all of them occurring in developing countries [10]. Multiple factors have been found to be associated with stillbirths including maternal age, non-communicable diseases, and infectious diseases like malaria, Group B Streptococcus, and syphilis particularly in sub-Saharan Africa [10-12]. It has been estimated that, in low-income countries almost half of stillbirths occur during or around the time of delivery and nearly three quarters of neonatal deaths take place within the first few days following birth [13,14]. Thus, the period around delivery is thought to be the time when the woman and her fetus or infant are at the highest risk of dying.

In low-income countries, one half to two thirds of births occur either at home or in community health clinics, often without a skilled health-care worker being present at the time of delivery [15,16]. In these situations, it may not always be possible to transfer a woman to an emergency obstetric care facility in time to perform a life-saving procedure should the need arise [17,18]. Furthermore, as more emphasis is placed on delivery at health-care facilities and as women become more aware of the benefits, there has been an increase in the workload at referral hospitals in low-resource areas, many of which are underequipped and understaffed [19-21]. Thus, even when a referral is made, the quality of care is often inadequate, especially for women who arrive late with a complication [18].

Maternal health programme efforts in developing countries are found with serious deficiencies particularly in rural areas [8]. Access to maternal health services was a major problem for rural and black communities in SA. Few studies particularly from rural KZN reported the trend of birth outcomes. Therefore, the objective of this study was to determine the trends of demographic and delivery outcomes of pregnant women from a rural Primary Health Care (PHC) setting during 2013 to 2017.

Materials and Method

Setting and population

Kwadebeka Community Health Center (KCHC) is a PHC facility for the people living in the community of Kwadebeka and Clermont, a residence of over 150,000 black people. These communities are situated within the municipal boundaries of eThekweni (Durban). The City of Durban is featuring South Africa's largest port and is situated in the province of KZN. Most of the residences of Kwadebeka and Clermont are poor, unemployed, living in formal and informal types of dwellings and mainly reliant on public health services at KCHC as a first contact of health care based on the principles of the District Health System implemented in 1994 after democratization of SA. Maternity services at KCHC are available 24 hours a day and are run by trained midwives and it is known as a Midwife Obstetric Unit (MOU). The main functions of this unit (according to national guidelines) are to: provide antenatal care for low and intermediate risk women, treatment of common problems of pregnancy, management of labor and delivery services for low risk women, postnatal check-ups, management of emergencies during antenatal and delivery services and referral to appropriate hospitals (requiring level one care to district and level two care to regional hospitals) [22]. Three midwives during day time (7 am to 4 pm) and 2 midwives during after hours (4 pm to 7 am) are allocated together with other support staff to conduct deliveries and care for mothers and newborns. Antenatal care and delivery services are rendered at KCHC according to the national protocol and guidelines developed and implemented since 2002. During antenatal care, pregnancy complications are identified and referred to secondary and tertiary care hospitals thus those are not included in this study.

Definition of terms

Babies can be born preterm or premature (<37 weeks) or they can be small for their gestational age (37 weeks but weigh<2500 grams).

Preterm Delivery (PTD) was considered when mothers delivered a new livebirth baby between 28 weeks and 36 weeks of gestational age and the baby weights above 1000 g. The "term delivery" was considered between 37 and 41 weeks of gestation. Any delivery that occurred at 42 completed weeks or afterwards was considered as "post term delivery".

Stillbirth Rate (SBR) referred to the birth of a dead fetus weighing more than 1000 g or after 28 weeks of gestational age. It is conventionally divided into two categories: (a) Macerated Still Births (MSB) when a fetus died before the onset of labour and (b) Fresh Still Birth (FSB) when fetus died during labour. Low birth weight was defined as the birth of a baby with a weight of less than 2500 g irrespective of gestational age.

Study design, sample selection and data collection

A retrospective descriptive study was conducted targeting all pregnant women who delivered at KCHC from January of 2013 to December of 2017. Data from the delivery register (or birth register) of all pregnant women were collected from the labour ward during the months of June to December 2018. This is the official register for all deliveries at KCHC. The register contained minimum variables e. g., the age, parity, gestational age, time of admission, time of delivery, number of infants (single/multiple), APGAR score of babies, perineal injuries of mothers and delivery outcomes (Live births/still births) of pregnant mothers. The dependent variables included for this study was demographic and pregnancy outcomes. Prior approval was obtained from the hospital management team for utilizing the delivery register to conduct the study. No identification of patients or staff was utilized during the analysis and presentation of results.

Data analysis

Data were entered into Microsoft Excel 2003 program and thereafter imported into SPSS 22.0.1 (SPSS Inc, Chicago, IL, USA) for analysis. The analysis results of patient's demographic and baseline outcome variables were summarized using descriptive summary measures: expressed as mean, standard deviation, for continuous variables and percent for categorical variables. Binary logistic

Table 1: Frequency distribution of demographic and outcome variables.

Variables	2013	2014	2015	2016	2017
Age group in years					
<20	138 (14.5%)	137 (13.2%)	147 (12.7%)	164 (12.6%)	104 (9.5%)
20-24	320 (33.5%)	366 (35.3%)	415 (36%)	492 (37.7%)	402 (36.9%)
25-29	243 (25.5%)	264 (25.5%)	326 (28%)	333 (25.5%)	333 (30.6%)
30-34	169 (17.7%)	179 (17.3%)	163 (14%)	201 (15.4%)	176 (16%)
35-39	68 (7.1%)	76 (7.3%)	88 (7.6%)	91 (7.0%)	64 (5.9%)
≥40	16 (1.7%)	14 (1.4%)	15 (1.3%)	23 (1.8%)	11 (1.0%)
Gestational age					
Term>36 weeks	927 (97.1%)	979 (96.0%)	1077 (95%)	1239 (95.5%)	1055 (97%)
Preterm <37 weeks	28 (2.9%)	41 (4.0%)	60 (5.3%)	58 (4.5%)	31 (2.9%)
Parity (Previous pregnancy)					
Nulliparous	292 (30.4%)	262 (25.8%)	295 (26.2%)	309 (24.0%)	227 (20.9%)
Multiparous	659 (68.7%)	746 (73.6%)	822 (72.9%)	970 (75.4%)	856 (78.8%)
Grand multiparous	8 (0.8%)	6 (0.6%)	10 (0.9%)	8 (0.6%)	3 (0.3%)
Day admission rate	419 (54.7%)	405 (51.7%)	502 (53%)	581 (52.4%)	508 (53.9%)
Day delivery rate	356 (52.0%)	397 (48.1%)	474 (48%)	562 (49.7%)	501 (50.1%)
Sex ratio of babies					
Female	471 (49.5%)	479 (49.6%)	563 (49.8%)	650 (50.5%)	548 (50.0%)
Male	480 (50.5%)	487 (50.4%)	568 (50.2%)	636 (49.5%)	547 (50.0%)
ANC Booking	912 (99.9%)	931 (99.9%)	1113 (99.1%)	1269 (99.4%)	1085 (99.7%)
Low birth rate	80 (8.4%)	77 (8.2%)	76 (6.7%)	92 (7.1%)	85 (7.8%)
Still birth rate	12 (1.2%)	12 (1.1%)	4 (0.3%)	7 (0.5%)	7 (0.6%)

regression analysis was carried out to identify possible predictors for outcome variables. For regression models, the results were expressed as odds ratios, corresponding two-sided 95% confidence intervals and associated p-values. *P*-values were reported to three decimal places with values less than 0.001 reported as<0.001. Variables considered for analysis included: age of the pregnant woman, gestational age, parity, gender of the baby, antenatal booking, LBW, MSB, FSB.

Results

A total of 5538 expectant mothers delivered at KCHC MOU for a period of 5 years from 2013 to 2017.The number of deliveries at the base year 2013 was 954 which increased to 1091 (+20%) in 2016. There was a gradual increase in deliveries from 2013 to 2016, but a decline was observed during 2017. The ages of the mothers ranged from 13 to 45 years with the majority (36%) of women falling into the 19 to 23 years age category. There were only 1% reported deliveries in the age group above 38 years. There was a significant decline in teenage pregnancy (age below 20 years) from 14.5% (2013) to 9.5% (2017) (p=0.034). In contrary to that for the same study period, a moderate increase from 33.5% (2013) to 36.9% (2017) was reported for mothers in the 20 to 24 years age group.

A similar trend was demonstrated in the 25 to 29 years age category where the number of pregnancies increased from 25.5% (2013) to 30.6% (2017). A steady decline in pregnant mothers was shown in the 30 to 34 years age category, a decrease from 17.7% (2013) to 16.1% (2017). In the 35 to 39 years age group a decline from 7.1% (2013) to 5.9% (2017) was clearly observed. Fewer pregnancies were reported among women who were 40 years or over (from 1.7% in 2013 to 1% in 2017).

It is worth noting that there was a decrease in the number of primigravida from 30.4% in 2013 to 20.4% in 2017. Among the multiparous women who delivered at the MOU during the study period, there has been a steady rise in the number of deliveries from 69% (2013) to 79% (2017). In the grand multiparous women, a plateau effect was noted in (2015-2016) with a sudden decline in 2017.

During the same period, regarding the women delivering preterm babies, there was a pattern of a gradual increase and then a decline, from 2.9% (2013) to 5.3% (2015) and then to 2.9% (2017).

The daytime admission and delivery rates (to compare daytime and nighttime admission and delivery rates) for the study period remained constant with the daytime delivery rate showing very small variation from year to year. This demonstrates insensitivity to diurnal variation to labour and delivery. There were equal numbers of male and female births for the study period. This was even found constant from year to year. The ratio for this newborn population for male to female babies remained 1:1.

The rate of unbooked pregnancies was very negligible with the number of booked cases approximating 100% for the period 2013 to 2017. This denotes a high uptake of Antenatal Care (ANC) visits among the women of this community. Notably there was a gradual decline in the LBW (delivery) rate from 8.4% (2013) to 7.8% (2017). This reduction of 8% could be attributed to a very high uptake of ANC visits in this population. Similarly, there was a gradual decline in the still birth rate from 1.2% (2013) to 0.6% (2017).

Still birth rate was also found to show a similar evolution during the study period. Highest SBR was found in the year 2013 (1.2%) and

Table 2: Logistic regression output for LBW.

Variables	B	Wald	Sig.	OR	95.0% C.I. for OR	
					Lower	Upper
Age group	-	7.071	0.215	-	-	-
<20 years	-0.553	1.105	0.293	0.575	0.205	1.613
20-24 years	-0.618	1.561	0.211	0.539	0.204	1.421
25-29 years	-0.825	2.779	0.095	0.438	0.166	1.156
30-34 years 35-39 years	-1.057	4.205	0.040	0.347	0.127	0.954
≥40 years	-0.626	1.364	0.243	0.535	0.187	1.528
Day delivery	-0.058	0.143	0.706	0.943	0.698	1.276
Gestational age	3.089	285.215	0.000	21.959	15.343	31.428
Parity	0.035	0.040	0.841	1.036	0.736	1.456
Sex of baby	-0.049	0.122	0.727	0.952	0.722	1.255
ANC Booking	0.806	0.476	0.490	2.238	0.227	22.048
Constant	-3.092	5.816	0.016	0.045	-	-

Variable(s) entered on step 1: Age group, Day, gestational age, parity, day delivery, Sex, ANC booking.

Table 3: Logistic regression output for still birth.

Variables	B	Wald	Sig.	OR	95.0% C.I. for OR	
					Lower	Upper
Age group	-	2.842	0.724	-	-	-
<20 years	0.511	0.376	0.540	1.668	0.325	8.556
20-24 years	0.897	1.004	0.316	2.451	0.425	14.151
25-29 years	1.325	2.037	0.153	3.762	0.610	23.198
30-34 years	1.337	1.590	0.207	3.808	0.476	30.430
25-39 years	-14.745	0.000	0.998	0.000	0.000	-
Day admission	-0.419	0.765	0.382	0.658	0.257	1.682
Gestational age	3.154	53.663	0.000	23.430	10.076	54.482
Parity	-0.688	1.762	0.184	0.503	0.182	1.388
Day delivery	0.897	3.254	0.071	2.453	0.925	6.504
Sex of baby	0.779	3.061	0.080	2.180	0.911	5.219
Booked	16.225	0.000	0.999	11123223.269	0.000	-
Constant	-23.008	0.000	0.998	0.000	-	-

Variable(s) entered on step 1: Age group, day, gestational age, parity, day delivery, sex, booking status.

lowest was found in the year 2015 (0.3%).

Binary logistic regression analysis showed that LBW was significantly associated with gestational age of the mother. It was found that it was 22 times (OR=21.959) more likely to have a LBW delivery if gestational age decreases by a week. Similarly, for FSB, it was found that decrease in gestational age increases FSB by 23 times.

Discussion

This study was confined to pregnant women who delivered at KCHC for the years 2013 to 2017. A period of five years was considered appropriate in terms of getting adequate data to serve the purpose of comparison and measuring trends. These data reflected large delivery information of the population of Kwadabeka and Clermont population since it is believed that the majority of deliveries under the public health facilities are conducted at KCHC. The coverage of key maternal health interventions in South Africa is good when compared with other countries in sub-Saharan Africa with 92% of women attending at least once for antenatal care and 91% having a facility birth with a skilled birth attendant [22].

However, the proportion of pregnant women who delivered at public health facilities was not known. Since the maternity care is free in public health facilities of SA and strategies are designed to encourage pregnant women to utilize public health facilities for deliveries, one could expect a higher rate of utilization of such services by the target population.

The retrospective review of records limited the availability of some study variables and consequently led to information bias. For instance, records keeping on HIV infection and maternal deaths were not registered properly; thus, maternal mortality rates could not be analyzed.

In our study population, we found that the average ages of the mothers were similar over the years. Teenage pregnancy significantly decreased over the years between 2013 and 2017. It could be due to a number of factors. The conventional wisdom is that the healthy and young population tends to go less to the health care facilities

than any other group thus the teen group of our study population might utilize less public health care facilities which could led to decreased reporting of teen pregnancy. It was mentioned earlier that the complicated pregnancy cases were transferred to secondary and tertiary care hospitals during antenatal period thus probably decreasing the reported number of teenage pregnancy cases in our area (though this number is unknown to the authors). It warrants further investigation to determine what proportions of pregnant mothers are being transferred to other hospitals due to pregnancy complications during the antenatal period. Another explanation of actual decrease of teenage pregnancy rate in our communities could be a good health education and affording educational opportunities for future development compared to the past.

Teenage pregnancy is a stigma for a girl in South African society thus it is not always reported. After democratization of SA, education facilities are becoming more accessible to the black population thus more teen girls are interested to complete school to attain a successful career. This aspiration impedes the girls to get pregnant. Another possible factor could be the high cost of upbringing a child. To raise a child, a teen mother needs to supply not only food and shelter (let alone the cost of diapers and baby foods) but also she requires maintaining the burden of possible sickness. The government started subsidizing the mothers (child support grant) but it is not enough for one person to look after herself and at the same time look after the newborn with the same amount of money.

Pregnancy at advanced age (>34 years) has also decreased which led to decreased risk of Down syndrome. Authors reported that advanced age increases the risk of Down syndrome hence, this trend decreased the health care cost [23,24]. The decreased pregnancy rate in advanced age was a success of the PHC with its ANC programmes. As we observed from our current study that most of the births occur in the 18 to 24 age group, it could be that most of the women already completed the family growth. The current study has also demonstrated a decreased primigravid birth rate. This could be indicative of a new trend in South African society. The advent of electronic media (e.g. satellite TV, internet, electronic social media, email, phone using internet technology-Skype) puts the country to be exposed more than ever before, to Western countries thus increased interest to be a part of individualistic society which leads to decreased interest to be pregnant. The current study showed that preterm birth rate was 3.9%. This rate was lower than other studies conducted in Abu Dhabi (6%), Saudi Arabia (6.5%), Oman, 9.7%, Kenya, 18.3%, and Mali 4.7% [4,25-28]. The low rate of PTD could be due to fewer primigravidae who were<20 years old. Other large studies reported that young maternal age was associated with increased odds of PTD [29,30].

The current study illustrated an overall rate for LBW of 7.6%. A recent study conducted in Abu Dhabi reported 9.4% LBW rate [31]. A similar LBW rate of 9.4% was reported in Iran [32]. The rate of LBW in the current study is higher than what was previously reported by UNICEF, namely, the country estimate was 6.1% [33]. However, the current LBW rate is lower when compared to other African Countries such as Oman, 13.7% [27], Ethiopia 10.4% [34], Sudan, 12.5% [35], and Nigeria, 16% [27,34-36]. The differences in rates could be explained by the nature of the studies, for instance, delivery at tertiary hospitals [35,36] may be associated with high preterm births due to dealing with complicated pregnancies, such as preterm birth, unlike the current study, which was community-based. Maternal smoking and recreational drug use are some of the most important factors for low birth weight deliveries found in earlier studies [37,38]. As the low birth weight rate decreased, it could be assumed that the maternal smoking and recreational drug use rate decreased in the study area as well, though the exact statistics for these two factors were beyond the scope of this study.

The overall still birth rate was found to be 0.7% which was lower in our study population in comparison to a study conducted among low-middle-income countries. The recent study reported a still birth rate of 1.41% in Argentina and 6.51% in Pakistan [38,39]. Maternal bacterial infections, diabetes, high blood pressure, recreational drug use are some of the contributing factors for still birth [40]. In order to decrease the still birth rate, these factors need to be controlled which occurred in the study area by PHC's increased ANC visits. Birth defects or umbilical cord accidents could also lead to still born babies. With the advent of sonographic diagnostic methods and maternal serum assays, it is now easier to diagnose the birth defect more than before. As more mothers were coming to the PHC, certainly, they were advised to utilize these investigative methods if they were at high risk pregnancy thus decreased the still birth rate from 2013 to 2017.

Conclusion

The study found a constantly decreasing trend of teenage pregnancy among these pregnant women in KCHC over the study period. There are declining trends of low birth weight and still birth rates observed at this health facility. This should be seen as positive on achieving the MDG goals. Further studies are encouraged to identify the antenatal care and delivery practices implemented: those may be associated with improving maternity service delivery indicators at the facility.

References

1. WHO, UNICEF, UNFPA, World Bank Group and the United Nations Population Division. Trends in maternal mortality: 1990 to 2015. 2015.
2. Moodley J, Pattinson RC, Fawcus S, Schoon MG, Moran N, Shweni PM, et al. The confidential enquiry into maternal deaths in South Africa: a case study. BJOG. 2014; 121: 53-60.
3. Liu L, Oza S, Hogan D, Chu Y, Perin J, Zhu J, et al. Global, regional, and national causes of under-5 mortality in 2000-15: an updated systematic analysis with implications for the sustainable development goals. Lancet. 2016; 388: 3027-3035.
4. Wagura P, Wasunna A, Laving A, Wamalwa D, Ng'ang'a P. Prevalence and factors associated with preterm birth at kenyatta national hospital. BMC Pregnancy Childbirth. 2018; 18: 1-8.
5. Althabe F, Moore JL, Gibbons L, Berrueta M, Goudar SS, Chomba E, et al. Adverse maternal and perinatal outcomes in adolescent pregnancies: The Global Network's Maternal Newborn Health Registry study. Reprod Health. 2015; 12: S8.
6. Kramer MS. Determinants of low birth weight: methodological assessment and meta-analysis. Bull World Health Organ. 1987; 65: 663-737.
7. Khlat M, Ronsmans C. Deaths attributable to childbearing in Matlab, Bangladesh: indirect causes of maternal mortality questioned. Am J Epidemiol. 2000; 151: 300-306.
8. Ezechi OC, Makinde ON, Kalu BE, Nnatu SN. Risk factors for preterm delivery in South Western Nigeria. J Obstet Gynaecol. 2003; 23: 387-391.
9. Bartlett LA, Mawji S, Whitehead S, Crouse C, Dalil S, Ionete D, et al. Afghan Maternal Mortality Study Team. Where giving birth is a forecast of death: maternal mortality in four districts of Afghanistan, 1999-2002. Lancet. 2005; 365: 864-870.
10. Hogan MC, Foreman KJ, Naghavi M, Ahn SY, Wang M, Makela SM, et

al. Maternal mortality for 181 countries, 1980-2008: a systematic analysis of progress towards Millennium Development Goal 5. Lancet. 2010; 375: 1609-1623.

11. Khan KS, Wojdyla D, Say L, Gülmezoglu AM, Van Look PF. WHO analysis of causes of maternal death: a systematic review. Lancet. 2006; 367: 1066-1074.

12. Hill K, You D, Inoue M, Oestergaard MZ, Technical Advisory Group of United Nations Inter-agency Group for Child Mortality Estimation. Child mortality estimation: accelerated progress in reducing global child mortality, 1990-2010. PLoS Med. 2012; 9: e1001303.

13. Belizán JM, McClure EM, Goudar SS, Pasha O, Esamai F, Patel A, et al. Neonatal death in low- to middle-income countries: a global network study. Am J Perinatol. 2012; 29: 649-656.

14. Goudar SS, Carlo WA, McClure EM, Pasha O, Patel A, Esamai F, et al. The Maternal and Newborn Health Registry Study of the Global Network for Women's and Children's Health Research. Int J Gynaecol Obstet. 2012; 118: 190-193.

15. Darmstadt GL, Lee AC, Cousens S, Sibley L, Bhutta ZA, Donnay F, et al. 60 Million non-facility births: who can deliver in community settings to reduce intrapartum-related deaths? Int J Gynaecol Obstet. 2009; 107: 89-112.

16. Garces A, McClure EM, Chomba E, Patel A, Pasha O, Tshefu A, et al. Home birth attendants in low income countries: who are they and what do they do? BMC Pregnancy Childbirth. 2012; 12: 34.

17. Hussein J, Newlands D, D'Ambruoso L, Thaver I, Talukder R, Besana G. Identifying practices and ideas to improve the implementation of maternal mortality reduction programmes: findings from five South Asian countries. BJOG. 2010; 117: 304-313.

18. Bhutta ZA, Darmstadt GL, Haws RA, Yakoob MY, Lawn JE. Delivering interventions to reduce the global burden of stillbirths: improving service supply and community demand. BMC Pregnancy Childbirth. 2009; 9: 1-37.

19. Shah A, Fawole B, M'imunya JM, Amokrane F, Nafiou I, Wolomby JJ, et al. Cesarean delivery outcomes from the WHO global survey on maternal and perinatal health in Africa. Int J Gynaecol Obstet. 2009; 107: 191-197.

20. Althabe F, Sosa C, Belizán JM, Gibbons L, Jacquerioz F, Bergel E. Cesarean section rates and maternal and neonatal mortality in low-, medium-, and high-income countries: an ecological study. Birth. 2006; 33: 270-277.

21. Lassey AT, Obed SA. Trends in concurrent maternal and perinatal deaths at a teaching hospital in Ghana: the facts and prevention strategies. J Obstet Gynaecol Can. 2004; 26: 799-804.

22. Department of Health. Guidelines for Maternity Care in South Africa: A Manual for Clinics, Community Health Centers and District Hospitals. 2016.

23. Trimble BK, Baird PA, Opitz JM. Maternal age and Down syndrome: age-specific incidence rates by single-year intervals. Am J Med Genet. 1978; 2: 1-5.

24. Erickson JD. Down syndrome, paternal age, maternal age and birth order. Ann Hum Genet. 1978; 41: 289-298.

25. Taha Z, Garemo M, Nanda J. Patterns of breastfeeding practices among infants and young children in Abu Dhabi, United Arab Emirates. Int Breastfeed J. 2018; 13: 48.

26. Chawanpaiboon S, Vogel JP, Moller AB, Lumbiganon P, et al. Global, regional, and national estimates of levels of preterm birth in 2014: a systematic review and modelling analysis. Lancet Glob Health. 2019; 7: 37-46.

27. Islam MM, Bakheit CS. Advanced Maternal Age and Risks for Adverse Pregnancy Outcomes: A Population-Based Study in Oman. Health Care Women Int. 2015; 36: 1081-1103.

28. Andemel N, Gaoussou S, Barry A, Issiaka D, Mahamar A, Traore M, et al. Adverse pregnancy outcomes among women presenting at antenatal clinics in Ouélessébougou, Mali. Reprod Health. 2020; 17: 1-8.

29. Althabe F, Moore JL, Gibbons L, Berrueta M, Goudar SS, Chomba E, et al. Adverse maternal and perinatal outcomes in adolescent pregnancies: The Global Network's Maternal Newborn Health Registry study. Reprod Health. 2015; 12: S8.

30. Parker AL, Parker DM, Zan BN, Min AM, Gilder ME, Ringringulu M, et al. Trends and birth outcomes in adolescent refugees and migrants on the Thailand-Myanmar border, 1986-2016: an observational study. Wellcome Open Res. 2018; 3: 62.

31. Taha Z, Ali Hassan A, Wikkeling-Scott L, Papandreou D. Factors Associated with Preterm Birth and Low Birth Weight in Abu Dhabi, the United Arab Emirates. Int J Environ Res Public Health. 2020; 17: 1382.

32. Momeni M, Danaei M, Kermani AJ, et al. Prevalence and Risk Factors of Low Birth Weight in the Southeast of Iran. Int J Prev Med. 2017; 8: 12.

33. UNICEF. United Arab Emirates, Statistics. 2013.

34. Tali A, Taddele M, Alemayehu M. Magnitude of Low Birth Weight and Associated Factors among Newborns Delivered in Dangla Primary Hospital, Amhara Regional State, Northwest Ethiopia, 2017. J Pregnancy. 2019; 35: 723-729.

35. Hassan AA, Abubaker MS, Radi EA, Adam I. Education, prenatal care, and poor perinatal outcome in Khartoum, Sudan. Int J Gynaecol Obstet. 2009; 105: 66-67.

36. Zini ME, Omo-Aghoja LO. Clinical and sociodemographic correlates of preterm deliveries in two tertiary hospitals in southern Nigeria. Ghana Med J. 2019; 53: 20-28.

37. Chomitz VR, Cheung LW, Lieberman E. The role of lifestyle in preventing low birth weight. Future Child. 1995; 1: 121-138.

38. Kon ER, Lackan N. Ethnic disparities in access to care in post-apartheid South Africa. Am J Pub Health. 2008; 98: 2272-2277.

39. Saleem S, McClure EM, Shivaprasad S, Archana P, Fabian E, Anaa G, et al. A prospective study of maternal, fetal and neonatal deaths in low- and middle-income countries. Bull World Health Organ. 2014; 92: 605-612.

40. Harrison A, Montgomery ET, Laurie M, Wilkinson D. Barriers to implementing South Africa's Termination of Pregnancy Act in rural KwaZulu-Natal. Health Policy Plan. 2000; 15: 424-431.