

Burden of perinatal conditions in Yemen: a 12-year hospital-based study

S.M. Banajeh,¹ A.M. Al-Rabee² and I.H. Al-Arashi³

عبء الظروف المحيطة بالولادة في اليمن: دراسة مستشفوية على مدى 12 عاماً
سالم محمد باناجه، أروى محمد الربيع، إبتسام حسن العرشي

الخلاصة: قام الباحثون بإجراء تحليل استعادي على مدى 12 عاماً، لخصائص الظروف المحيطة بالولادة بمستشفى السبعين في صنعاء، حيث تمت 62 168 حالة ولادة في ذلك المستشفى، 2936 منها ولد فيها الطفل ميتاً و5434 توفي فيها الطفل في الفترة المحيطة بالولادة. ومن بين هذه الولادات، كان هناك 14 576 (24.6%) خديجاً ناقص الوزن، وكان معدل الوفيات المبكرة للولدان 42.2 لكل ألف مولود حي. ومن بين 10 546 ولیداً قُبِلوا في وحدة الرعاية الخاصة للولدان، كان 40.1% منهم خديجاً ناقص الوزن ومات منهم 2147 (20.4%) (كان 80.6% منهم خديجاً ناقص الوزن). وقد أظهرت السنوات الأربع الأخيرة وجود زيادة بمقدار 17.2% في عدد حالات الإملاص stillbirth (ولادة مولود ميت)، وانخفاض بنسبة 40.5% في الوفيات المبكرة للولدان، وذلك مقارنة مع السنوات الأربع الأولى. وكان معدل الانخفاض في الوفيات المبكرة للولدان في وحدة الرعاية الخاصة للولدان <70%. وكانت متلازمة الضائقة التنفسية مسؤولة عن 63.8% من الوفيات التي حدثت في وحدة الرعاية الخاصة للولدان، كما كان الاختناق أثناء الولادة مسؤولاً عن 15.0% من الوفيات. ويتجلى من النتائج التي توصلنا إليها مدى ضعف خدمات رعاية الحمل والولادة في اليمن.

ABSTRACT We conducted a 12-year retrospective analysis of perinatal characteristics at Al-Sabeen Hospital, Sana'a. There were 62 168 births, 2936 stillbirths and 5434 perinatal deaths. There were 14 576 (24.6%) preterm low-birth-weight (LBW) babies. Early neonatal death (ENND) rate was 42.2/1000 live births. Of the 10 546 neonates admitted to the special baby care unit (SBCU), 40.1% were preterm LBW and 2147 (20.4%) died (80.6% were preterm LBW). The last 4 years showed a 17.2% increase in stillbirths and a 40.5% reduction in ENND compared with the first 4 years. In the SBCU, reduction in ENND was > 70%. Respiratory distress accounted for 63.8% of deaths in the SBCU and birth asphyxia 15.0%. Our results reflect the poor antenatal and delivery care services in Yemen.

Charge des affections périnatales au Yémen : étude hospitalière sur 12 ans

RÉSUMÉ Nous avons réalisé une analyse rétrospective sur 12 années des caractéristiques périnatales à l'hôpital Al-Sabeen de Sanaa. On a dénombré 62 168 naissances, 2936 mortinaissances et 5434 décès périnataux. Il y a eu 14 576 (24,6 %) prématurés de faible poids de naissance. Le taux de mortalité néonatale précoce était de 42,2 pour 1000 naissances vivantes. Sur les 10 546 enfants hospitalisés dans l'Unité de soins infantiles spécialisés, 40,1 % étaient des prématurés de faible poids de naissance et 2147 enfants (20,4 %) sont décédés (80,6 % étaient des prématurés de faible poids de naissance). On a noté dans les 4 dernières années une augmentation de 17,2 % des mortinaissances et une réduction de 40,5 % des décès néonataux précoces par rapport aux 4 premières années. La diminution des décès néonataux précoces était supérieure à 70 % dans l'Unité de soins infantiles spécialisés. La détresse respiratoire intervenait pour 63,8 % des décès dans cette Unité et l'asphyxie à la naissance pour 15,0 %. Nos résultats reflètent le faible niveau des services de soins prénataux et obstétricaux au Yémen.

¹Department of Paediatrics, Sana'a University, Sana'a, Yemen (Correspondence to S.M. Banajeh: sbanaj@yemen.net.ye).

²Department of Obstetrics; ³Department of Paediatrics, Al Sabeen Hospital for Women and Children, Sana'a, Yemen.

Introduction

Mortality due to perinatal conditions was the leading cause of death for children under 5 years in 2001. It accounted for 23.2% of the 10.8 million deaths worldwide, and 52.2% of the 0.6 million deaths among children under 5 in the Eastern Mediterranean Region [1,2]. Yemen remains one of many countries in this Region with high child mortality and is categorized in group D in terms of mortality strata [1].

There has been an astonishing lack of awareness of the scale of the burden of perinatal conditions and their contribution to perinatal and early neonatal mortality in developing countries. This is because many births are not registered and policy-makers are therefore not aware of the scale of perinatal deaths.

Perinatal mortality raises global concern since many of its causes, such as obstructed labour, eclampsia, abnormal intrapartum bleeding and maternal infection, may also kill mothers. In low-income countries, perinatal mortality has been more difficult to prevent than infant mortality and continues to present a huge problem.

Mortality arising from perinatal conditions is a major health problem in Yemen. In 2 previous demographic and health surveys in 1992 and 1997, neonatal mortality was reported to be 37 and 34 per 1000 live births respectively, with only 8% reduction in the neonatal mortality rate over the 5-year period [3,4]. Neither survey reported on stillbirths or on early neonatal mortality, both important indicators of prenatal services, delivery care and early neonatal care. This has negatively influenced the health policy plans in Yemen, where the health system has no programmes that target perinatal health at the community or health facility level. These appear to be neglected in terms of allocation of resources and research activities.

The population of Yemen (19.1 million in 2001) is among the poorest in the world: the most recent available data (1998–2001) showed that 42% of households live below the national poverty line, only 69% are using improved drinking water and only 38% have adequate sanitation facilities. The under-5 mortality rate is reported to be 107/1000 live births; 46% of Yemeni children under 5 years old are malnourished. Infant mortality is estimated at 76/1000 live births, and 26% of infants are born with birth weight < 2500 g. The illiteracy rate for Yemeni women is 75%. Total fertility rate is 7.6%. Only 34% of pregnant women receive antenatal care, and skilled attendants attend only 22% of deliveries. Maternal mortality rate is estimated at 350/100 000 live births [2,5].

Although hospital-based studies may not be helpful in estimating the actual burden in the community because of selection bias, reporting perinatal conditions from hospital data provides important information on fetal and early neonatal morbidity and mortality. Hospital records are reported to be useful in communities where perinatal registration records are inadequate or lacking [6].

Information on perinatal conditions in Yemen is scarce and has not been reported before. The objectives of this study were to document the perinatal characteristics in a single hospital setting in Yemen, to identify the main causes of early neonatal death (ENND), and to review the trends in perinatal mortality and mortality of preterm low-birth-weight (LBW) infants over a 12-year period.

Methods

This study was carried out in Al-Sabeen Hospital for Women and Children, Sana'a, Yemen. This government-run hospital pro-

vides both primary and secondary care to the urban and rural population of Sana'a province and the surrounding areas (approximately 2 million inhabitants) in the mountainous region of Yemen. It has walk-in outpatient clinics, including antenatal service. It also has emergency obstetric (including 2 large labour wards), neonatal and paediatric services that are provided free of charge, 24 hours a day. The hospital performs 4000–6000 deliveries per year.

Owing to the open access policy in all public health facilities in Yemen, this hospital receives both normal and complicated deliveries, and most patients use these services as their first contact point. Normal deliveries are usually managed by skilled midwives who are also trained to diagnose obstetric complications, in which case the resident obstetrician will intervene. At any time there are at least 2 skilled midwives and 2 obstetricians available in the unit. Delivery complications are managed according to the guidelines provided by the Reproductive Health Department of the Ministry of Health [7]. These are derived from a World Health Organization document [8].

Complicated, preterm, instrumental and other at-risk deliveries are performed by experienced obstetricians. Most caesarean sections are done as an emergency procedure in the operating theatre, adjacent to the labour wards. A trained paediatrician attends all at-risk deliveries to resuscitate the newborn infant.

All neonates have their weight measured in the labour room using a portable scale. Gestational age is usually estimated from the mother's expected date of delivery and the assessment of the attending paediatrician using maturity assessment charts posted on the wall of the delivery room and the special baby care unit (SBCU). Both birth weight and gestational age are record-

ed in the mother's case notes and in the labour room logbook. The method of delivery, specific delivery complications, and birth outcome, including stillbirths, are also recorded. Neonates are usually examined several hours after delivery and healthy, full-term babies are then discharged. All preterm LBW infants, those who have had instrumental/difficult or complicated delivery, and other at-risk neonates are kept in hospital with their mothers till they are breastfeeding well and have stable vital signs. Those who need special care are admitted to the SBCU adjacent to the labour wards, where basic care is provided. This includes minimal and hygienic handling, incubator care, keeping babies warm, oxygen supplementation by nasal catheter when indicated, intravenous antibiotics for suspected septicaemia, careful intravenous fluids when necessary, encouraging breastfeeding when tolerated, and tube feeding of expressed breast milk when required. The mother of a discharged newborn, healthy or otherwise, is instructed to bring the baby back to the emergency room if the baby is unable to suck well, breathless, lethargic or not active, and/or the mother is not happy with the baby's general condition. The baby is usually examined in the emergency room and admitted to the SBCU if indicated.

This was a retrospective, descriptive study. Perinatal data for the 12-year period 1990–2001 were obtained from the labour ward and SBCU records. For this period, data were available on total births, stillbirths, total ENND, and SBCU admissions and deaths, including deaths of preterm LBW infants. The 12-year study period was grouped into 3 periods of 4 years. Data for the first 4-year period (1990–93) were compared with those of the second (1994–97) and the last (1998–2001).

Data on the method of delivery and specific delivery complications were available from 1996 onward. Delivery complications included abnormal intrapartum vaginal bleeding, pre-eclampsia/eclampsia, prolonged/obstructed delivery and ruptured uterus. Definitions and emergency management of these complications are clearly outlined in the Ministry of Health guidelines [7]. Data on cause-specific morbidity and mortality of newborns admitted to the SBCU have been available only since 1997. Antenatal information was not available in the records. The information we obtained from the hospital records was carefully scrutinized for accuracy, and records of 12 cases with incomplete information on specific complications of delivery were not included in the analysis of delivery complications.

Statistical analysis was done using *Epi-Info* (version 6.3). The chi-squared test was applied for linear trend in proportions, and odds ratio with 95% confidence limit (Cornfield) was used to detect differences between these periods.

Definitions

- Stillbirth: the complete expulsion from the mother of a fetus weighing ≥ 500 g and/or with gestational age > 25 weeks that shows no sign of life at or after birth.
- Early neonatal death (ENND): the delivery of a live baby weighing ≥ 500 g at birth who dies during the first 7 completed days of life.
- Low birth weight (LBW): birth weight ≤ 2499 g, regardless of gestational age.
- Preterm delivery: gestation at birth < 37 completed weeks.
- Perinatal mortality rate: the number of stillbirths and early neonatal deaths per 1000 births.

Results

During the period January 1990–December 2001, there were 62 168 births in the hospital, of which 2936 were stillbirths (47.2/1000 births), and 2498 ENNDs (42.2/1000 live births); 2121 (84.9%) of the ENND were preterm LBW, accounting for 39.0% of the 5434 perinatal deaths. Stillbirths accounted for 54% of perinatal deaths (Table 1). There were 2121 deaths among the 14 576 live, preterm LBW infants, (145.5/1000 preterm LBW births), compared to 377 in the 44 656 non-LBW infants (8.4/1000).

In the last 6 years of the study period, 3985 (11.4%) of the 34 941 deliveries were complicated, with pre-eclampsia/eclampsia accounting for 39.4% of these, prolonged/

Table 1 Characteristics of delivery and perinatal mortality in Al-Sabeen Hospital, Sana'a, 1990–2001 (rate per 1000 births unless otherwise stated)

Characteristic	No.	Rate
1990–2001 (N = 62 168)		
Perinatal deaths	5 434	87.4
Preterm LBW deaths	2 121	84.9 ^a
Stillbirths	2 936	47.2
Early neonatal deaths	2 498	42.2 ^b
Live preterm LBW	14 576	24.6 ^b
1996–2001 (n = 34 941)		
Total delivery complications	3 985	114.0
Caesarean section	4 380	125.4
Pre eclampsia/eclampsia	1 572	45.0
Prolonged/obstructed labour	1 040	29.8
Breech delivery	1 026	29.4
Intrapartum bleeding	889	25.4
Ruptured uterus	195	5.6

LBW = low birth weight.

^aPer 1000 early neonatal deaths.

^bPer 1000 live births.

obstructed labour 26.1%, abnormal intra-partum bleeding 22.3%, and ruptured uterus 4.9% (Table 1).

There were 10 546 neonates who needed special care (17.8% of total live births), of which 4227 (40.1%) were preterm LBW; 2147 died within the first 7 days (20.4%), of which 1731 (80.6%) were preterm LBW.

Between the first 4-year period and the last, there was a 17.2% increase in stillbirths, a 13.3% reduction in perinatal deaths, and a 40.5% reduction in the total early neonatal deaths (Table 2). Furthermore, in the SBCU there was a reduction of 74.4% in ENND between the first 4-year period and the last. This may have been in part affected by the significant reduction in the proportion of preterm LBW babies admitted to the SBCU in the last 4 years of the study period (Table 3).

During the last 5 years of the study period (1997–2001), 6440 neonates were admitted to the SBCU with known causes of morbidity, of which 713 died (Table 4). The main causes of death were: respiratory

distress, birth asphyxia and congenital anomaly.

Discussion

In this study, information on perinatal conditions in Yemen is reported for the first time. The 17.2% increase in stillbirths over the 12-year study and the perinatal mortality rate remaining unchanged over the last 2 4-year periods (Table 1) is a reflection of the poor antenatal and delivery care services, the absence of perinatal public health activities and the deteriorating socioeconomic conditions in Yemen.

The demographic and health surveys of 1991/92 and 1997 showed only 25% of pregnant women made at least 1 antenatal care visit to a health facility, and the majority attended only to confirm the pregnancy [3,4]. In Al-Sabeen Hospital, outpatient antenatal attendance makes up 21%–25% of the total outpatient visits (unpublished reports, Al-Sabeen Hospital, 1996–2000). However, antenatal attendance of hospital

Table 2 Four-yearly trend of stillbirth, early neonatal death (ENND) and perinatal mortality in Al-Sabeen Hospital, Sana'a, 1990–2001

Period	Stillbirths ^a		ENND ^b		Perinatal deaths ^c	
	No.	Rate ^d	No.	Rate ^e	No.	Rate ^d
1990–93 (<i>n</i> = 22 618)	1024	45.3	1136	52.6	2160	95.5
1994–97 (<i>n</i> = 16 124)	667	41.4	668	43.3	1335	82.8
OR (95% CI)	0.91 (0.82–1.01)		0.82 (0.74–0.90)		0.85 (0.80–0.92)	
1998–2001 (<i>n</i> = 23 426)	1245	53.1	694	31.3	1939	82.8
OR (95% CI)	1.18 (1.09–1.29)		0.58 (0.53–0.64)		0.85 (0.80–0.91)	
Total	2936		2498		5434	

^a χ^2 for linear trend = 16.

^b χ^2 for linear trend = 123.

^c χ^2 for linear trend = 23.

^dRate per 1000 births.

^eRate per 1000 live births.

OR = odds ratio; CI = confidence interval.

Table 3 Four-yearly trend of the proportion of preterm low-birth-weight (LBW) babies admitted to the special baby care unit, and contribution to the total early neonatal deaths (ENND) in Al-Sabeen Hospital, Sana'a, 1990–2001

Period	Preterm LBW babies ^a		Total ENND ^b		Preterm LBW deaths ^c	
	No.	% ^d	No.	% ^d	No.	% ^e
1990–93 (<i>n</i> = 2509)	1347	53.7	1018	40.6	884	86.8
1994–97 (<i>n</i> = 2119)	924	43.6	565	26.7	410	72.6
OR (95% CL)	0.67 (0.59–0.75)		0.51 (0.47–0.60)		0.40 (0.31–0.52)	
1998–2001 (<i>n</i> = 5918)	1956	34.8	564	10.4	437	77.5
OR (95% CL)	0.43 (0.39–0.47)		0.15 (0.14–0.17)		0.52 (0.40–0.69)	
Total	4227		2147		1731	

^a χ^2 for linear trend = 326.

^b χ^2 for linear trend = 1109.

^c χ^2 for linear trend = 28.

^dAs % of total admissions.

^eAs % of total ENND.

births was not recorded to study its effect on birth outcome.

The majority of deliveries in Yemen occur at home, and only 22% of births are attended by a skilled health attendant [9]. Most of the deliveries in Al-Sabeen Hospital are unbooked. Many women attend as emergencies after failed delivery attempts at home, and with labour complications, a

situation where both mother and fetus arrive to the labour ward in a critical condition. Perinatal mortality was reported to be 3–4 times higher among the unbooked deliveries, with increased incidence of complications during labour [10]. Also, 25% of Yemeni mothers have been reported to be underweight; this increased to 31% in the catchment areas of Al-Sabeen Hospital [4].

Table 4 Main causes of early neonatal morbidity and death in the special baby care unit, Al Sabeen Hospital, 1997–2001

Cause	Total admitted (<i>n</i> = 6440)		Total deaths (<i>n</i> = 713)	
	No.	%	No.	%
Preterm LBW	2293	35.6	508	71.2
Respiratory distress	3081	47.8	455	63.8
Birth asphyxia	1114	17.3	107	15.0
Congenital anomaly	107	2.1	38	5.3
Difficult instrumental delivery	1325	20.5	16	2.2

LBW = low birth weight.

All these factors may have contributed, in this study, to preventing a significant reduction in the perinatal mortality rate. Lack of antenatal care, maternal nutritional status and complications during labour have been reported to be independently associated with substantially increased risk of perinatal death [11].

In this study, 2.9% of the total deliveries over the last 6 years of the study period were breech presentation (Table 1), compared to 3.3% recently reported in a hospital-based study from Saudi Arabia [12]. Breech delivery has been reported to account for 19% of stillbirths and 12% of early neonatal deaths, in a hospital-based study in India [11]. In the Matlab study, a high risk community-based study in Bangladesh [13], breech delivery accounted for 13% of perinatal deaths and delivery complications 30%. The rate of delivery complications (12%) in the Matlab study was similar to that in our study (11.4%), although ours was hospital-based. It is worth noting that both Yemen and Bangladesh belong to group D mortality strata, with high adult and child mortality [1].

Data on delivery complications in a health facility add important information regarding maternal access to obstetric care as well as its quality. It has recently been suggested that the ratio of observed specific obstetric complications in a hospital to the number expected in the target population could offer a simple approach for assessing the need for obstetric care, and is an important indicator of the unmet need for obstetric care [14].

The perinatal mortality rate for Yemen has been estimated at 70/1000 births, with a proviso that this was not the actual country data [15]. Our results indicate the perinatal mortality rate to be 87.4/1000 births, based on data over a 12-year period. In Yemen, a low-income country with a high

poverty rate and deteriorating socioeconomic conditions, the true rate may be higher than this. Although complicated home births that attend the hospital are at a high risk of death, the risk would be even higher if the delivery took place at home. This is of particular importance in Yemen, where more than 80% of births occur at home, usually attended by a senior female relative or a traditional birth attendant, and 44% of home births develop delivery complications. Half of the women who had home births were unable to attend a health facility because of poverty (37.8%) or transport problems (50.2%) [4]. A study in Tanzania showed that perinatal mortality in home births without a trained attendant was 3 times higher than that for hospital births [16]. Recent health data from Indonesia showed that economic crisis had a negative effect on childhood survival and rising infant mortality rates, especially in low-income households [17].

In contrast to the minimal reduction in perinatal mortality rate, our study reported a significant 40.5% reduction in early neonatal deaths in the last 4 years compared with the first 4 years, which is in line with the trend in the community where neonatal death rate dropped from 67 per 1000 live births to 34 per 1000 live birth over a 20-year period [4]. Inter-hospital factors may have contributed to this reduction. A standing practice has been established whereby trained paediatricians attended the delivery of at-risk pregnancies, and several paediatricians have been trained locally and abroad on intensive neonatal care in the past 5 years.

During the last 4 years of the study period, mortality of neonates admitted to SBCU dropped significantly to 10.4% of the total admissions, compared with 40.6% in the first 4 years. This could be a result of better management of emergency neonatal

conditions. Over the same period, however, there was a significant reduction in the proportion of admissions who were preterm LBW (Table 3). This may have significantly contributed in reducing the neonatal mortality rate.

In our study, preterm LBW deaths accounted for 84.9% of the total neonatal deaths, similar to reports from both industrialized [18] and poor countries [19]. Preterm LBW was the most important factor affecting early neonatal mortality in our study: preterm LBW babies were 17 times more likely to die than those with birth weight ≥ 2500 g. Complications of prematurity have been estimated to account for 24% of neonatal deaths, and LBW was an important factor in 40%–80% [20]. This is of particular importance in Yemen, where the LBW rate is estimated at 26% [2], and our study showed that $> 80\%$ of the hospital's early neonatal deaths were preterm LBW and 39.0% of perinatal deaths were in LBW babies. A recent community-based study reported that preterm LBW was the strongest independent predictor of both perinatal and neonatal mortality, with population-attributable risk of 65% and 68% respectively [21].

Prevention of preterm delivery may prove to be an important and cost-effective strategy for reducing perinatal mortality in countries with limited resources such as Yemen. Recent studies have suggested that genital infection could be the cause of preterm delivery in a large proportion of cases [22–24], which supports the need to investigate and test cost-effective, feasible interventions to prevent preterm delivery. In addition, interventions that reduce intrauterine growth retardation need to be adopt-

ed, including health care, health education, and nutritional supplementation. Pregnant women in Yemen should be offered home visits by trained health attendants since the majority of births occur at home. Practices such as immediate, exclusive breastfeeding; keeping babies warm; skilled attendance at birth in a hygienic environment; and mothers receiving basic health care and advice are simple measures that can prevent thousands of unnecessary neonatal deaths [25].

This study, being hospital-based, has some limitations. A high proportion of difficult cases are usually admitted to hospital, and results of hospital perinatal studies may not reflect the true burden in the community. In countries such as Yemen, where more than 80% of births occur at home, and information of birth registration is inadequate or lacking, hospital perinatal reports provide important information that can be used in improving perinatal health services at the community level.

A second limitation is that our study was a retrospective rather than a prospective observation of delivery and perinatal events. The retrospective method has, however, been reported to be appropriate for estimating rates of causes and adverse events in hospital-based studies with large sample size [26].

In the absence of population-based, perinatal data in Yemen, our study may help in providing research and clinical service priorities. It showed for the first time, and over a 12-year period, the distribution and causes of fetal and early neonatal deaths in Yemen, data which may be useful in the development of cost-effective strategies to reduce perinatal mortality.

References

1. *World health report 2002. Reducing risks, promoting healthy life*. Geneva, World Health Organization, 2002.
2. *The state of the world's children 2003, statistical tables*. New York, United Nations Children's Fund, 2003.

3. Central Statistical Organization, Yemen, Pan Arab Project for Child Development, Macro International Inc. *Demographic and maternal and child health survey 1991/1992*. Calverton, Maryland, Macro International Inc., 1994.
4. Central Statistical Organization, Yemen, Macro International Inc. *Demographic and maternal and child health survey 1997*. Calverton, Maryland, Macro International Inc., 1998.
5. Middle East and North Africa Social and Economic Group. *Republic of Yemen poverty update*. Washington DC, World Bank, 2002 (Report no. 2422-Yemen).
6. Schramm JM, Szwarcwald CL. Sistema hospitalar como fonte de informações para estimar a mortalidade neonatal e a natimortalidade [Hospital system as a source of information to estimate stillbirth and neonatal mortality rates]. *Revista de saúde pública*, 2000, 34(3): 272–9.
7. Reproductive Health Department. *Doctor's guidelines for the emergency obstetric services*. Sana'a, Yemen, Ministry of Health, (in Arabic).
8. *Mother-baby package: implementing safe motherhood in countries: practical guide*. Geneva, World Health Organization, 1994 (WHO/FHE/MSM/94.11).
9. *World development indicators 2002*. New York, World Bank, 2002.
10. Kumar MR, Bhat BV, Oumachigui A. Perinatal mortality trends in a referral hospital. *Indian journal of pediatrics*, 1996, 63(3):357–61.
11. Mavalankar DV, Trivedi CR, Gray RH. Levels and risk factors for perinatal mortality in Ahmedabad, India. *Bulletin of the World Health Organization*, 1991, 69(4): 435–42.
12. Sobande AA et al. Changing patterns in the management and outcome of breech presentation over a 7-year period. Review from a referral hospital in Saudi Arabia. *Journal of obstetrics and gynaecology*, 2003, 23(1):34–7.
13. Kusiako T, Ronsmans C, Van der Paal L. Perinatal mortality attributable to complications of childbirth in Matlab, Bangladesh. *Bulletin of the World Health Organization*, 2000, 78(5):621–7.
14. Ronsmans C et al. Questioning the indicators of need for obstetric care. *Bulletin of the World Health Organization*, 2002, 80(4):317–24.
15. *Perinatal mortality: a listing of available information*. Geneva, World Health Organization, 1996 (WHO/FRH/MSM/96.7).
16. Walraven GE et al. Perinatal mortality in home births in rural Tanzania. *European journal of obstetrics, gynecology and reproductive biology*, 1995, 58(2):131–4.
17. Simms C, Rowson M. Reassessment of health effects of the Indonesian economic crisis: donors versus the data. *Lancet*, 2003, 361(9366):1382–5.
18. Scottish Programme for Clinical Effectiveness in Reproductive Health and Information and Statistics Division. *Scottish stillbirth and infant death report 1996*. Edinburgh, National Health Service in Scotland, 1997.
19. Gray RH et al. Levels and determinants of early neonatal mortality in Natal, northeastern Brazil: results of a surveillance and case-control study. *International journal of epidemiology*, 1991, 20(2):467–73.
20. *World health report 2001. Mental health: new understanding, new hope*. Geneva, World Health Organization, 2001.
21. Kulmala T et al. The importance of preterm births for peri- and neonatal mortality in rural Malawi. *Pediatric and*

- perinatal epidemiology*, 2000, 14(3): 219–26.
22. Hillier SL et al. Association between bacterial vaginosis and preterm delivery of a low-birth-weight infant. The vaginal infections and prematurity study group. *New England journal of medicine*, 1995, 333(26):1737–42.
 23. Subtil D et al. The role of bacterial vaginosis in preterm labor and preterm birth: a case-control study. *European journal of obstetrics, gynecology and reproductive biology*, 2002, 101(1):41–6.
 24. Ugwumadu AH. Bacterial vaginosis in pregnancy. *Current opinion in obstetrics & gynecology*, 2002, 14(2):115–8.
 25. *State of the world's newborns, 2001*. Washington DC, Save the Children, 2002.
 26. Michel P et al. Comparison of three methods for estimating rates of adverse events and rates of preventable adverse events in acute care hospitals. *British medical journal*, 2004, 328(7433):199–204.

The Regional Office selected a number of WHO guidelines of Integrated Management of Pregnancy and Childbirth (IMPAC) and initiated their translation into Arabic and expanded their dissemination to Member States. The following guidelines were included: "Beyond the numbers", "Pregnancy, childbirth, postpartum and newborn care: a guide to essential practice", "Managing complications of pregnancy and childbirth" and "Managing newborn problems", "Improving access to quality care of family planning: medical eligibility criteria for contraceptive use", "Selected practice recommendations for contraceptive use", and "Decision-making tool for family planning clients and providers". The Regional Office also formulated a plan of action to introduce and provide technical support for adaptation of these guidelines in countries with high maternal mortality levels.

Source: The work of WHO in the Eastern Mediterranean Region. Annual Report of the Regional Director 1 January–31 December 2004