

IPN-ACF-558

June 9, 1997

**LITERATURE REVIEW ON
MATERNAL AND NEONATAL MORTALITY AND MORBIDITY**

SUBMITTED TO

MOTHERCARE/EGYPT PROJECT

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**REVIEW OF PREVIOUS RESEARCH ON
MATERNAL AND NEONATAL MORTALITY AND MORBIDITY**

I INTRODUCTION

This review of research is presented by Social Planning, Analysis and Administration Consultants (SPAAC) for MotherCare Project as part of the terms of reference tasks to be completed under the Community Diagnosis, Situation Analysis and Training Needs Assessment Subcontract 5025 81 between John Snow, Inc and SPAAC

A number of activities were carried out to ensure adequate coverage of relevant research related to maternal and neonatal mortality and morbidity in Egypt. A number of steps were taken to thoroughly cover all recent research into the above topics which were relevant to the Egyptian scene

Two computer searches were carried out. The first was through "Popline" and the second through "Medline". Key words used were antenatal (prenatal) care, delivery (obstetric) care, postnatal care, maternal mortality, perinatal mortality, neonatal mortality, maternal morbidity, pregnancy losses, neonatal morbidity. Abstracts were obtained of relevant material.

Issues of the last eight years of "*Population Index*" found at SPAAC library were searched for relevant material under the same headings. The full text of all material found to be of importance was sought at the libraries of SPAAC, Fertility Care Society, Population Council, USAID, UNICEF and others.

Additionally, some documents were kindly provided by Dr O. Campbell of the London School of Tropical Medicine and Hygiene through DHL service after her departure at the end of the February 26th - March 2nd workshop.

II BACKGROUND

Broadly considered **Reproductive Health** encompasses the social, psychological and physical aspects of health of women as affected by the reproductive process. It is defined as "*the ability of women to live through the reproductive years and beyond with reproductive choice, dignity and successful childbearing, and to be free of gynecological disease and risk*" (Evans, 1987, Fathalla, 1988). This definition includes safe pregnancy and motherhood as important elements of reproductive health, it also highlights the concept of a woman's free choice and ability to exert control over her reproduction. The concept of dignity refers to the psychological and social well-being that the woman derives from reproduction. In addition the definition emphasizes another gender specific area, namely gynecological morbidities.

The concept of women's reproductive health is especially relevant to *developing countries* and to societies organized around a patriarchal system in which women have poor education and largely informal employment, so that they are powerless to improve the circumstances in which they live and are not in a position to attain and maintain health and well being. In spite of the physical strain that childbearing and caring for children places on women, they often put their family's needs before their own, at the expense of their own health (Younis, 1994)

Until very recently, reproductive health had not received sufficient attention. The tragically high levels of maternal mortality in the developing world started to receive attention in the middle eighties. International concern over this situation started to be emphasized in the conclusions and recommendations of the International Conference on Population, Mexico City, 1984 and the World Conference to Review the Achievements of the UN Decade for Women, 1985. Eminent scientists such as Malcolm Potts (1986) and Mahmoud Fathalla (1987) drew attention to it in articles which have since become classics of medical literature. A major international meeting, the Safe Motherhood Conference held in Nairobi in 1987 was devoted to the subject.

III MATERNAL MORTALITY

Definition

According to the International Statistical Classification of Diseases, Injuries and Causes of Death, Ninth Revision (ICD-9), (WHO, 1977) a **maternal death** is defined as

The death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the duration and the site of the pregnancy, from any cause related to, or aggravated by the pregnancy or its management but not from accidental or incidental causes

Maternal deaths are subdivided into two groups

- 1 Direct obstetric deaths those resulting from complications of pregnancy, labor and puerperium, from interventions, omissions, or incorrect treatment procedures
- 2 Indirect obstetric deaths those resulting from previous existing disease or disease that developed during pregnancy which was aggravated by the physiologic effects of pregnancy

Two sets of difficulties in measurement of maternal mortality relate to the time of death and the cause of death. As regards the appropriate postpartum time interval to be used, WHO recommends using the traditional puerperium of 42 days as the majority of maternal deaths will have occurred by then, while the American Medical Association Committee on Maternal and Child Care recommended using 90 days after delivery and some British studies use 12 months after delivery as the time limit. Irrespective of whether a 42-day, 90-day or 12-month time period is used, maternal deaths are often subdivided into time periods of occurrence such as antepartum, intrapartum and

postpartum or <28 weeks gestation, 28 weeks to 6 weeks postpartum and >6 weeks postpartum The most useful classifications are those which define categories and cross classify the data in several ways

As for the cause of death it may not be easy to distinguish between direct, indirect and incidental causes of death, since such classification necessitates obtaining detailed information on pathogenic causes of mortality

Measures of Maternal Mortality In Egypt

The most commonly used measure of maternal mortality is the **maternal mortality ratio (MMR)** which is the maternal deaths in a period per 100,000 live births in the same period Ideally the denominator should be the number of pregnancies and not live births as the population at risk is the total number of pregnant women and since some deaths are associated with abortions or stillbirths In the former case the MMR is a measure of obstetric risk while in the latter case it is a measure of risk per pregnancy It may be difficult, however, to ascertain the number of pregnancies

The **maternal mortality rate** is the number of maternal deaths in a period (usually a year) per 100,000 reproductive age women (usually 15-49 years) It is a true death rate which considers deaths per woman year of exposure within a specified time period

The **proportionate mortality ratio** is the percentage of deaths in the reproductive age period which are due to pregnancy-related causes This measure is a useful indicator of the importance of maternal mortality relative to other causes of mortality in the reproductive age period

The above measures of maternal mortality are related and can be calculated as mathematical equivalences of each other, thus the maternal mortality rate is the product of the maternal mortality ratio and the general fertility The maternal mortality rate is also the product of the adult female mortality rate and the proportionate mortality ratio (**Campbell, 1990**)

Determinants of Maternal Mortality

An understanding of the factors which affect maternal mortality (as well as maternal morbidity) and of the pathways through which each of these factors operate, is important to design strategies or interventions aimed at reducing maternal mortality and disability (serious or chronic morbidity) A conceptual framework for analyzing these determinants was devised by **McCarthy and Maine, 1992** According to this framework, all determinants of maternal mortality or disability must operate through a set of intermediate or proximate determinants

The **distant determinants** include socio-economic and cultural factors and can be classified into three categories *women's status in the family and community* including such factors as education,

occupation, income and autonomy, *family's status in the community* including education and occupation of other family members, income and property and *community's status* including community infrastructure, services and aggregate wealth

The **intermediate determinants** can be classified into factors belonging to four categories

(1) *health status factors* e g nutrition, infectious and parasitic diseases, other chronic conditions such as diabetes and hypertension and previous history of pregnancy complications,

(2) *reproductive status factors*, e g age, marital status and parity,

(3) *access to health services*, including location, cost, access of information about the service, range of services and their quality, and

(4) *health care behavior and use of health services* including use of family planning, prenatal care, modern delivery care and use of illegal induced abortion and harmful traditional practices

Through the interaction of all these factors, as well as other unpredictable factors, the **outcomes** will be either *uncomplicated pregnancy and childbirth*, or the *occurrence of complications*, and according to how these complications are dealt with, the possible *occurrence of maternal death or disability*

Magnitude of Maternal Mortality

Although accurate data on maternal mortality are not available, it is estimated that more than half a million women die each year from complications of pregnancy, abortion and childbirth. In many countries, maternal mortality is the leading cause of death among women in the reproductive ages.

Of all the maternal deaths occurring world-wide, it is estimated that 99 percent take place in the developing countries and only one percent in the developed countries. The discrepancy between maternal mortality rates in developing countries and those in the developed countries is greater than that of any other demographic indicator. Thus the maternal mortality ratio (MMR) in Bangladesh is more than 100 times that of the USA while the infant mortality rate in Bangladesh is only 10 times that of the USA.

According to **El-Hafez, 1990**, MMR in the Islamic countries of the Eastern Mediterranean Region of WHO is more than 500 per 100,000 livebirths in at least 3 countries and ranges between 200 and 500 in most of the other countries. These high rates are attributed to the fact that most deliveries do not take place in hospitals and that TBAs deliver most infants. In a more recent review (**Zurayk, 1994**) MMR was found to be greater than 100 per 100,000 in most Arab countries, compared to less than 10 in developed countries.

Official statistics of maternal mortality in Egypt based on vital registration provide MMR of 76/100,000 in 1981, and 48/100,000 in 1994. These figures are too low due to under-reporting, omission and misclassification of causes of death. Several studies of maternal mortality in Egypt have been implemented since the mid seventies, some of these studies were hospital based studies while others were community based studies. The hospital based studies are not representative of the population since the majority of deliveries do not take place in hospital and since cases arriving at hospital are self-selected. Both types of studies, however, have provided maternal mortality figures much higher than official statistics as shown in the following table.

Author	Locality	Period	Deliveries	Maternal Deaths	MMR
Hospital Based					
Younis et al, 1979	Al-Galaa Hosp	1975-76	7,489	82	1084
	Al-Hussem Hosp	1975-76	1,966	10	508
Abdullah et al, 1985	Assiut Hosp	1981-83	6,687	105	1570
	Sohag Hosp	1981-83	8,092	198	2450
	Qena Hosp	1981-83	5,022	83	1650
Younis et al, 1987	Al-Galaa Hosp	1984-85	6,794	43	670
Hussein et al, 1988	Kasr El-Ami H	1981-86	30,550	64	209
El-Kady et al, 1989	Bulak Dakrouh H	1985-86	6,667	17	255
Community Based					
El-Ghamry et al, 1984	Alexandria	1963-81	112,270	183	163
Saleh et al, 1987	Menofia Governorate	1981-83	202,630	385	190
Abdullah et al, 1985	Upper Egypt (3 cities)	1984-1985	24,391	73	299
Abdullah et al, 1992	Assiut City & 3 villages	1987	7,865	29	368
El-Kady et al, 1989	Giza City (5 districts)	1985-86	115,870	146	126
Saleh, 1992	Qena Governorate	1989-90	89,370	185	207

The Egyptian MCH Survey conducted within the Pan Arab Child Project (Abdel-Azeem, 1993) gave an estimate of MMR in Egypt for 1991 of 232 maternal deaths per 100,000 live births.

More recently, a **national maternal mortality study (NMMS)** was undertaken by the Ministry of Health **Child Survival Project (1994)**, which covered selected areas in 21 governorates (representing all Egyptian Governorates with the exception of the sparsely inhabited Frontier Governorates) The study traced and studied all female deaths in the reproductive ages (14-50 years) occurring between 1 March 1992 and 28 February 1993 in 122 health bureaus in the 21 governorates Female deaths were reported weekly by the selected health bureaus Maternal deaths were initially identified by a screening questionnaire at the health bureau and confirmed by an in depth home interview with relatives of the deceased woman Facility records, if any, were reviewed, physicians and/or TBAs involved were interviewed All questionnaires and records were then reviewed by a governorate level Local Advisory Group (LAG), causes of death were assigned and avoidable factors were identified and determined

The study reviewed 7487 deaths of females of reproductive age, 772 deaths were identified as maternal deaths **MMR was calculated to be 174 per 100,000 livebirths** (443,248 livebirths were registered by the selected health bureaus during the period of the study)

As expected, the MMR was higher in Upper Egypt (217) than in Lower Egypt (132) Surprisingly, however, it was highest in Urban Governorates (233) due to high figures in Suez and Alexandria By governorate, the highest figures were found to be in Suez (564), followed by Assiut (544) and Qena (386) while the lowest were found in Kafr El-Sheikh (96) followed by Qalyubia (103) and Daqhahia (112) (CSP/MOH, 1994)

More than half (57.1 %) of the fetuses/infants of the deceased women also died, one quarter (25.3%) of the deceased women who died together with the fetus, died either during early pregnancy (12 %) or before being delivered (13%) For the mothers who died during delivery (39.1 %) or at postpartum (35.5 %), less than half of the infants also died Nearly two thirds of maternal deaths (64 %) occurred in health facilities (59 % in hospital and 4 % in private clinics)

Causes of Maternal Mortality

In the NMMS, causes of death were determined for 718 deaths with completed questionnaires, direct causes were responsible for seven out of ten (69.5 %) and indirect causes for over one quarter (26.9%) while the cause could not be determined for 26 cases (3.6 %) out of the 718 cases with completed questionnaires

Hemorrhage (ante-partum or postpartum) was the leading **direct cause** (32 % of cases) followed by *hypertensive disease* (16 %), *genital sepsis* (8.4 %), *ruptured uterus* (6.7 %) and *cesarian section* (6.1 %) *Abortion*, either spontaneous or induced was responsible for 4.5 % deaths, *obstructed labor* for 3.1 %, while *anesthesia* contributed to death in 2.6 % of cases

The most common **indirect cause** of maternal mortality was *cardiovascular disease* (responsible for 12.8 % of the deaths), infectious and parasitic diseases (3.6 %), neurological diseases (2.4 %), neoplasms (1.7 %), digestive disease (1.3 %), diabetes (0.8 %) and anemia (0.6 %)

According to **Abdel-Razek, 1991**, post-partum hemorrhage caused 52 % of a total of 10,362 maternal deaths which occurred in Egypt from 1970 to 1978, while it accounted for 38% of maternal deaths from 1979 to 1982. On the other hand **Darwish, 1984**, found a high incidence of eclampsia and pre-eclamptic toxemia among the 10,600 deliveries which took place at Kasr El-Aini Hospital during 1981-1982, and attributed 50 % of the 34 maternal deaths which occurred during that period to eclampsia

From verbal TBA (Dayas reports on 43 maternal mortality cases (SPAAC 1989) reviewed by a Medical Review Committee for determination of causes of death, the major immediate cause of death was obstetric hemorrhage (60% of cases, n=26). Eight of these hemorrhage cases were diagnosed as post-partum hemorrhage, and eight as ante-partum hemorrhage. The stage in which hemorrhage occurred could not be identified in five of the hemorrhage cases and five were caused by uterine rupture. The second major immediate cause of death, as diagnosed was sepsis, which occurred in eight cases. Medical complications such as cardiovascular problems and respiratory conditions were responsible for five of the deaths. Operative procedures were the immediate cause of two of the deaths.

All the reported mortality cases of the above study, initiated the labor process at home with the assistance of a Daya. Two thirds of the cases (68%) were referred to a hospital or physician but the rest (32%) were said to have died at home. About one third of these cases (30%) were reported to have received an injection to speed up delivery. In 14% of the case, it was unknown whether or not an injection was given. Among the mortality cases were a number of high risk cases, most notably older multipara (51% of the cases). The most commonly encountered form of poor Daya practice in the mortality cases was that the Daya waited too long before she referred the case to hospital or physician.

The mode of transportation to hospital, according to the Dayas, was a taxi cab in more than half of the cases (57%) and a private car in about one fifth of cases (21%). The ambulance was used as a means of transfer in 11% of cases only, while 7% were said to have been transferred on foot. This demonstrates the extent of inadequacy of emergency transport services.

Avoidable factors in Maternal Mortality

In the NMMS, avoidable factors were assigned by LAGs and then reviewed by a Central Advisory Group. Only 8 percent of cases were considered to have been unavoidable with standard level care, while 92 percent of all maternal deaths had one or more avoidable factors. The leading avoidable factor, present in nearly half of maternal deaths was *sub-standard care from the obstetrician team* (47 %), *the general practitioner* (12 %) or *the traditional birth attendant* (12 %). The cause of death

could have been detected during ante-natal care in nearly half (47.5%) of maternal deaths, this was considered true in direct causes such as hypertensive disease and indirect causes such as rheumatic heart disease. In one third of the cases (33%), *having received no ante-natal care or poor quality of ante-natal care* was considered an avoidable factor. *Delay in seeking medical care* was considered a factor in 42 percent of cases. *Unavailability of blood banks* was a factor in 6 percent of cases while lack of transport was considered a factor in 4 percent and *lack of drugs, supplies and equipment* was a factor in 2 percent of cases.

Thus, two major avoidable factors emerge: *delays on the part of the woman's family* combined with *transport difficulties* and *substandard care on the part of service providers*. These two factors are likely to interact since delay in seeking care complicates management of the obstetric emergencies presenting at health facilities.

To significantly reduce maternal mortality in Egypt, these two major problems need to be tackled, but first priority should be given to improving the coverage and quality of primary health care and to tackling problems occurring within the first referral level, since it was found that over 70 percent of women attended a health facility at some point during the events which led to their deaths. Substandard care may occur because of the lack of protocols for the management of common obstetric emergencies, inadequate training for general practitioners and junior obstetricians in their management, unavailability of senior staff at night, or because of management problems, e.g. drugs, supplies and equipments may be present but under lock and key or in use elsewhere in the hospital. Lack of protocols may also mean that surgical intervention is often delayed because no one is prepared to make the decision (CSP/MOH, 1994).

The medical reviewers of the daya reported mortality cases (SPAAC 1989), considered 33 of the 43 deaths to have been avoidable by the dayas, nine as not avoidable by them, and one, unknown. Several deaths categorized as "not avoidable" once the delivery process began were to grand multiparas. Those deaths in fact might have been avoided by use of contraception or a pre-planned hospital delivery.

Daya Practices

The Giza study on daya practice (SPAAC 1989) has shown that dayas view their job only as delivery attendants, and their goal to help deliver a healthy baby. Dayas are rarely consulted for pre-natal care and usually the first time they examine the mother is at onset of labor. Dayas do not encourage mothers to seek pre-natal advice, nor are they knowledgeable about prenatal counseling or assessment of high risk pregnancies.

Dayas tend to neglect necessary hygienic practices during and after delivery. A number of practices were identified as serious and potentially leading to maternal morbidity and/or mortality. Some dayas help the delivery process by dilating the vaginal opening with their fingers, a few use oil for

dilatation. Around one third of dayas give injections to speed contractions. The dayas' management of the third stage of labor is particularly poor. They are not aware of the signs of the separation of the placenta and some resort to extensive massaging to release the placenta. Some may release the placenta by hand or by pulling the cord. Such practices may help explain the high incidence of obstetric hemorrhage encountered in the studied mortality cases.

Not all dayas are knowledgeable about danger signs for which they should immediately refer the mother, without attempting to interfere in the delivery process. Once they intervene in the delivery process, few are knowledgeable of the danger signs that necessitate immediate referral.

A number of factors have been identified that may delay referrals by the daya. Dayas may be reluctant to admit lack of competence and skill in difficult deliveries; they try everything they know before admitting failure. In addition, families themselves may encourage dayas to continue in their endeavors or refuse advice to refer a mother to hospital, for a number of reasons. One fourth of the Dayas also reported that they are not rewarded for their efforts if they refer the case. Perceptions of Dayas, mothers, and their families related to poor treatment at hospitals and/or by physicians may also delay some referrals.

IV MATERNAL HEALTH CARE (EDHS 1995)

The 1995 EDHS findings (El Zanaty et al 1996) indicated that only 39 percent of births in the five year period before the survey were reported receiving antenatal care and mainly from a doctor. In over two thirds (70%) of the births receiving antenatal care, the mothers reported four or more visits to the doctor. Mothers' educational level, urban residence, work stations, birth order of child, and age of mother are factors that affect probability of mothers receiving antenatal care.

Only about one third of deliveries take place in health facilities: 18 percent governmental facilities and 15 percent in private hospitals/clinics. Around one in ten (11%) of all deliveries took place at health facility without being preplanned because of the occurrence of problems at the time of delivery.

Less than half of all deliveries were assisted by doctors (39%) or trained nurse/midwife (7%). All other deliveries were assisted by dayas (49%), relatives/friends (4%) or were not assisted by anybody (1%).

Caesarian sections were performed on 7 percent of all deliveries. In 23 percent of births, mothers reported one or more delivery complications such as prolonged labor, excessive bleeding, vaginal infection, and/or convulsions. Prolonged labor was reported in 20 percent of births.

V REPRODUCTIVE MORBIDITY

Definition ·

A reproductive or gynecological morbidity is *any condition of ill-health which affects a woman's reproductive tract and which is not associated with a particular pregnancy*. Such conditions include among others, reproductive tract infections, cervical cell changes, genital prolapse, menstrual irregularities and infertility.

With the exception of reproductive tract infections and sexually transmitted diseases in particular, gynecological illnesses have not received emphasis or attention, partly because little was known about the magnitude and prevalence of such conditions. Recent work has documented complications such as infertility, physical discomfort, fatigue, chronic pain, fetal wastage and increased susceptibility to HIV transmission (Younis, 1994).

Moreover, the consequences have rarely been examined from the perspective of women themselves. The social and psychological impact they can have upon women's daily lives is great and devastating. Gynecological conditions can cause personal embarrassment and marital discord. Untreated infections often lead to infertility exposing a woman to divorce and even social ostracization. Genital prolapse can make intercourse painful. Giving more attention to these conditions will help penetrate the 'culture of silence' held by so many women regarding their health (Dixon-Mueller 1991, Khattab, 1992).

One of the very few studies dealing with reproductive morbidity was the study implemented in two villages of Giza governorate (Younis, 1993), in which 509 women were screened for different gynecological conditions. The results of the study revealed that *the women were carrying a very heavy disease burden, the magnitude of which had been unsuspected*. Only 24 women (4.7%) were found not to have any gynecological disease or related condition. Half of the women were suffering from two conditions at the same time, while almost one fifth were suffering from three or more conditions. The most commonly found conditions were **genital prolapse** (56%), **reproductive tract infections** (51%), cervical ectopy, (22%), urinary tract infection (14%) and suspicious cervical cell changes (11%). At the same time nearly two thirds (63%) suffered from anemia and nearly one fifth (17%) from severe anemia, 43 percent from obesity, while 18 percent suffered from hypertension.

As mentioned above most of these conditions cause a number of painful and distressing symptoms and may result in serious complications. There are different types and degrees of *genital prolapse*, depending on whether there is involvement of the anterior vaginal wall, usually with troublesome urinary symptoms, the posterior vaginal wall, with bowel movement difficulties, or the uterus itself may be prolapsed to varying degrees. In extreme cases the uterus, part of the bladder and part of the rectum may all protrude from the vaginal orifice and may become ulcerated and infection may ensue.

Reproductive tract infections (RTI) have potentially dangerous consequences on a woman's health,

her future ability to conceive and bear children and upon the health of the children. They can cause infertility, fetal loss through miscarriage or stillbirth, infant death through premature birth, low birth weight or congenital infection. They often have troublesome symptoms like vaginal discharge, pain during intercourse and abdominal pain. They can cause fatal peritonitis, may be associated with cervical cancer and a higher risk of AIDS transmission.

Other gynecological problems include *infertility, menstrual problems, gynecological cancers* including cancer of the breast, cervix, uterus, ovary, vulva and vagina. Related conditions include *urinary tract infection, syphilis and anemia*.

Although one study cannot be representative of the whole country, this research contributes unique information on reproductive morbidity conditions in the study villages which may suggest the possible magnitude and nature of this problem in similar communities in Egypt and elsewhere in the developing world (Zurayk, 1994).

Faundes, 1994, states that chronic sequelae of RTI, such as infertility, ectopic pregnancy and pelvic pain, are more common in developing countries and that RTI underlie some of maternal and perinatal mortality and cervical cancer. The proportion of maternal deaths due to RTI was 12 % in Menofia and 15 % in Giza.

VI STRATEGIES FOR SAFE MOTHERHOOD

Suggested Measures to Lower Maternal Mortality

Fayad, 1984 considered the persistence of high levels of maternal and perinatal mortality to be largely attributable to lack of technical expertise on the part of health care providers including TBAs and advocated the establishment of a model training center for TBAs and the development of training programs for them. Training of TBAs, nurse/midwives and physicians at primary health care level as well as the staff of the first referral level plays a role in improving maternal health and more and better training of these categories is advocated (Aly, Fahmy, Mourad, El-Kady 1988, Khattab 1988).

Maine et al, 1986, recommend 1) provision of family planning services, 2) on site access to obstetric first aid, 3) upgrading of rural hospitals, 4) expanding the role of mid-level health workers, 5) establishing maternity waiting homes near health centers and 6) provision of community education in risk assessment and discouragement of unsafe traditional practices.

In 1982, WHO developed the **Home-Based Maternal Record (HBMR)** as a system for improved continuity of care, to improve women's education about their own health status, to record risk factors and early signs of complications and record referrals and treatment of the mother and infant. The objectives were 1) to encourage continuity of care from pregnancy through inter-pregnancy periods,

2) to help identification of at-risk women and newborns, 3) to promote suitable referral, 4) to promote initiation of care according to needs, 5) to provide a practical record of care and 6) to provide a focus for health education about risk and health care during pregnancy and the inter-pregnancy period

Shah et al , 1993, evaluated the use of the HBMR in 13 developing countries including Egypt. The findings revealed that HBMR was an important asset in improving the quality and quantity of prenatal, postnatal and inter-pregnancy care of mothers and of neonatal health care. Other improvements were evident in mothers' knowledge about helpful practices, registration of mothers and infants at health centers, initiation of care, vaccination with tetanus toxoid, early identification of risk factors both before and after pregnancy and referrals of at risk persons

In 1986 WHO convened a Technical Working Group to define the essential obstetric care necessary at first referral level for the reduction of maternal mortality and morbidity, and to describe the staff, training, supervision, equipment and supplies needed. Based on their report, the **WHO, 1991** publication "*Essential Elements of Obstetric Care at First Referral Level*" identified the following essential elements of obstetric care which should be available at the first referral level, i.e. the district or sub-district level, usually covering a population of 100,000 or more

- 1 **Surgical obstetrics** including cesarian section, repair of vaginal and cervical tears, laparotomy for repair of uterine rupture, hysterectomy, evacuation of uterus in abortion, removal of ectopic pregnancy, amniotomy and oxytocin infusion to augment labor
- 2 **Medical treatment** of sepsis, shock, eclampsia and hypertensive disorders of pregnancy and severe anemia
- 3 **Anaesthesia**
- 4 **Blood replacement**
- 5 **Manual procedures and labor monitoring** including manual removal of placenta, exploration of labor, vacuum extraction and partograph
- 6 **Management of high risk women** through maternity waiting homes where high risk women can stay and be supervised during the last month of pregnancy
- 7 **Family planning support** including tubal ligation, vasectomy, IUDs, orals, injectables and implants
- 8 **Neonatal special care**

When there is complete coverage of the population with primary health care and the above essential elements of obstetric care are provided at the first referral level, maternal mortality, as well as

maternal morbidity, can both be reduced drastically. Examples are given of how the provision of basic maternal services in some developing countries where they had not existed before or where they existed but were poorly organized produced dramatic reduction in maternal mortality, in China from 1500 before 1948 to 50 per 100,000 in 1982, in Cuba from 118 before 1961 to 31 per 100,000 in 1984 and in Malaysia from 320 in 1957 to 107 per 100,000 in 1972.

Elements of a Safe Motherhood Program

As Outlined by **Campbell, 1995**, the main target set by the Safe Motherhood Initiative is to halve maternal deaths by the year 2000. Since three quarters of maternal deaths result from four direct obstetrical complications namely *hemorrhage, obstructed labor, sepsis and hypertensive disorders of pregnancy plus abortion*, an ideal safe motherhood program should aim first to prevent or reduce these five causes of mortality.

Such a program should consist of

- 1 **Information/Education and Communication strategy** aimed at
 - * increasing appropriate and timely *use of family planning, ante-natal and delivery services*
 - * increasing awareness of the danger signs in maternity
 - * enhancing the counselling skills of providers
 - * mobilizing communities for transporting women with obstetric complications
- 2 **Community based family planning and obstetrics service** with trained staff and/or outreach by such staff to provide
 - * family planning,
 - * prenatal screening,
 - * normal delivery, and
 - * obstetric first aid
- 3 **First referral level facilities** with 24 beds or more to provide the essential elements of obstetric care as defined by WHO Technical Group quoted above (**WHO, 1991**)
- 4 **Effective Referral** with
 - * A means of communicating between staff at the peripheral level and first referral level,
 - * A means of transporting complicated obstetrical cases to referral services,
 - * A means of coordinating care among levels of health providers (e.g. case management protocols for all levels and appropriate forms for transmitting information about cases),
 - * A means of ensuring the quality of care at all levels

VII NEONATAL MORTALITY

Definition

Neonatal mortality is defined as *the number of infants dying within 28 days of birth in a year per thousand live births in the same year*

Magnitude and Causes of Neonatal Mortality

According to the latest official estimates, the neonatal mortality rate (NNMR) declined from 12.2 per thousand live births in 1981 to 9.1 in 1992, while infant mortality rate (IMR) declined from 70 per thousand live births to 36 during the same period. These figures are considered to be underestimates, since the registration of infant deaths in Egypt is incomplete. This is probably due to the fact that registration of births occurring outside health facilities in rural and poor urban areas is often delayed for some weeks to some months. If the infant happens to die in the meanwhile, it is neither registered as a birth nor as a death and thus the neonatal and infant mortality rates are under-estimated. **El-Deeb, 1991** reports that deficiency in death registration was estimated, before the 1986 census, to be 19 %, resulting in 25 % deficiency in IMR. Estimates based on the 1986 census, vital registration data and retrospective field surveys of 1984 and 1988 suggest a deficiency in IMR of 11 % (9 % in urban and 15 % in rural areas).

A large scale national study reported by **Nawar et al., 1987** collected data about the outcomes of nearly 12,750 pregnancies which occurred in 1980 to determine levels of pregnancy losses and infant mortality. Findings of that study show NNMR in 1980 to be 53.6 per thousand live births and IMR to be 115.9 per thousand. By region of residence urban Lower Egypt had the lowest values of NNMR and IMR, 28.2 and 81.1 per thousand respectively, followed by urban governorates, 33.7 and 84.7 per thousand respectively, while rural Upper Egypt had the highest values, 87.5 and 150.9 per thousand respectively. By mother's age, the lowest values were those for mothers aged 20-29 years, namely 47.5 and 102.5 per thousand respectively. For mothers less than 20 years the rates were 73.6 and 148.6 per thousand respectively, while for mothers aged 40-49 years the rates were 54.5 and 146.5. By parity the lowest values were for second parity, namely 39.7 and 93 per thousand while the highest was for fifth or higher parity at 65.4 and 138.3 per thousand respectively. By the sex of the infant male infants' mortality rates were higher 62.2 and 118.7 compared to 44.4 and 113 for females.

Mohamed, 1990, found 25.5 % under-registration of deaths, in a village in Fayoum during 1987-1988. Under-registration was evident especially for neonatal deaths (72.7 %) compared with 12.5 % for post-neonatal deaths.

Several nationally representative surveys, (**Sayed 1989, Abdel-Azeem 1993 and El-Zanaty, 1993**)

have provided comparable estimates of IMR and NNMR. More recently, the 1995 demographic and health survey (El-Zanaty et al, 1996) again provided figures much higher than the official ones, namely NNMR 30.4 per thousand and IMR 62.6 per thousand for the five year period preceding the survey, i.e., for the years 1991 to 1995. Thus, the estimates from the survey provide values which are more than 3 times the official NNMR and nearly twice the official IMR. The same source provides estimates for successive five year periods preceding the survey which show a marked decline in both NNMR and IMR, as seen in the table

Years preceding survey	Approximate mid-point	Neonatal Mortality Rate	Post-Neonatal Mortality Rate	Infant Mortality Rate
0 - 4	1993	30.4	32.2	62.6
5 - 9	1988	43.5	38.8	82.3
10 - 14	1983	45.4	51.2	96.6
15 - 19	1978	53.3	63.1	116.6
20 - 24	1973	62.6	75.3	138.0

The leading causes of neonatal mortality were *prematurity and low birth weight* (36 %) and *acute respiratory diseases* (27 %). Diarrhea and dehydration caused only 9 % of neonatal mortality, while it was the leading cause of infant mortality being responsible for 59 % of infant deaths in the same period and locality. In a recent study in Qalyubia Governorate (Child Survival Project/MOH, 1995) nearly one sixth (15.7 %) of infants were found to be of low birth weight, i.e. less than 2500 grams.

To reduce neonatal mortality, the Ministry of Health Child Survival Project started the Egyptian National Neonatal Care Program (ENNCP) and established a system of neonatal care centers in general and district hospitals nationwide (they numbered 80 at the end of 1995). A book containing *Guidelines for Egyptian Hospital Nurseries* was issued (CSP, MOH/USAID, 1996).

IX. PERINATAL MORTALITY

Perinatal mortality is defined as *the number of fetal deaths at gestational age 22 weeks or more plus infant deaths within one week after birth per one thousand still and live births per year*. This corresponds to a fetus weighing approximately 500 grams and with crown heel length of about 25 centimeters (Sometimes the cutoff point is set at 24 or 26 weeks of gestation). Thus defined perinatal mortality includes stillbirths, fetal deaths during delivery and early neonatal mortality.

Statistics on pregnancy wastage and perinatal mortality in Egypt are scarce, since most stillbirths resulting from deliveries at home are not registered. In the previously cited national study by **Nawar et al, 1987**, the outcome of nearly 12,750 pregnancies was determined, pregnancy wastages were identified, and were classified into early and late pregnancy wastages, or abortions and stillbirths, stillbirths being defined as pregnancy losses which occurred at more than 6 completed months of gestation while abortions were considered to be those losses which occurred within the first six months of gestation. The abortion rate was found to be 108.1 per thousand pregnancies while the stillbirth rate was found to be 25.8 per thousand pregnancies. The highest stillbirth rate (34 per thousand) was found among women residing in urban Lower Egypt while the lowest (19.2) was found among women in urban governorates. By parity, the highest value was found among women who had no previous livebirths (28.6 per thousand) and among women who had 4 or more livebirths (27.6 per thousand). By mother's age the highest values were among women aged 35-39 years (36.6 per thousand) and 40-49 years (34.2 per thousand).

Hospital based studies provide rates which are not applicable to the community. In their study in two hospitals, (**Serour et al, 1981, Younis et al, 1981, Hefnawy, 1983**), out of total of 6794 mothers with 6990 births, present a peri-natal mortality rate of 85 per thousand live and stillbirths. According to this study peri-natal deaths are related positively with parity and maternal age and negatively with the mother's education. It was lower with the mothers who were booked at hospital and higher with those who came to hospital for the first time in labor or were referred in labor by a daya or physician. It bore no direct relationship with the number of antenatal visits but there was a definite relationship with the mother's condition at the first antenatal visit, thus it was higher among mothers with severe anemia (hemoglobin < 8 gms), toxemia of pregnancy, diabetes and ante-partum hemorrhage.

Less than half (45 %) the peri-natal deaths occurred in the prepartum period and could therefore be classified as stillbirths, 30 % occurred in the intra-partum period, i.e. during delivery while 25 % occurred post-partum, i.e. were early neonatal deaths. When analyzed most of the causes of peri-natal deaths were found to be preventable, slightly less than half (47.7 %) were caused by asphyxia, more than one quarter (28 %) were due to prematurity, nearly one in ten (9.4 %) to congenital malformations, 8.5 % to maternal disease and 1.9 % to birth trauma.

In a study to compare peri-natal mortality in public (governmental) and private hospitals in Egypt, **Aboulghar, 1984**, found MMR in public hospitals to be 88 and 83 per thousand live and still births.

in the two periods 1972-1977 and 1978-1981 compared to 16 and 14 per thousand live and stillbirths in private hospitals in the same 2 periods. The difference was attributed to lack of antenatal care monitoring among public hospital patients, delayed referral of patients in labor with the subsequent consequences of obstructed labor and intrauterine fetal death, patients being mostly referred as emergencies and being seen for the first time when attended for delivery, in addition to the poor socio-economic standards of the patients of the public hospitals. This is in contrast with private hospital patients being highly selective with early detection of risk factors and complications.

In an effort to reduce peri-natal mortality, Awad, 1991, applied a fetal biophysical profile score through routine ultrasound examination to all pregnant women (160) attending a private hospital in Cairo and who delivered between January 1990 and January 1991. Their pregnancy outcomes were compared with the outcomes of 159 pregnant women who were delivered before December 1989, i.e. before using ultrasound examination. There were no stillbirths among the 160 deliveries, compared to one stillbirth (6.3 per thousand) in the control group, neonatal mortality rate was 18.7 per thousand compared to 37.7 per thousand in the control group.

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