REVIEW ARTICLE

# Maternal Mortality in Malaysia: Progress Made Towards Millennium Development Goal (MDG) 5 – An Analysis of Published Data

Siva Achanna, Gauri Krishnaswamy, Paramjothy Ponnampalam, Anath Bondhu Chattopadhyay

**Affiliation** Mahsa University, Kuala Lumpur, Malaysia.

*** Correspondence author:** Prof. Dr. Siva Achanna AMN, KMN, MBBS, FRCOG, FICS, FAMM HOD, Department of O & G, Mahsa University, Kuala Lumpur

***Abstract***

Maternal health and well-being have extended to international consideration since the global launching of WHO's Safe Motherhood Initiative in 1987. In 1990, Malaysia set itself an ambitious vision to achieve high income and developed status by 2020. A relatively low maternal mortality rate (23.2 in 2012), noteworthy increase in the proportion of safe deliveries and antenatal coverage have been achieved. Introduction of Confidential Enquiries into Maternal Deaths (CEMD) in 1991 was an important step towards a full-fledged audit taking into consideration the identification of shortfalls in the care of pregnant mothers and taking cognizance of the remedial measures set forth, thus improving standards of care.

The High-Risk Approach system, the introduction of a colour coding system for identification of pregnancies that were at greater risk than average risk, the strengthening of referral systems, and home based maternity assessment cards kept by the patient present at any level of antenatal care were used as additional tools.

Swift development of rural infrastructure, increase in skilled personnel to attend deliveries, and recruitment of traditional birth attendants (TBAs) as a short-gap measure was undertaken. In addition, midwives in rural areas were allowed to administer heparin as thromboprophylaxis, antenatal steroids to mothers with preterm labour and intramuscular magnesium sulphate to mothers with hypertension. These drugs are given under guidance by the Ministry of Health protocols and given before transfer to tertiary centres.

In addition, partograph use, protocol development and creation of a "red alert system" in hospitals to mobilize specialists and other healthcare personnel were deployed to reinforce existing measures. In 1985, MOH initiated a national quality assurance programme (QAP). This programme was used as a managerial tool to justify the needs for further resources in terms of money, manpower, machinery and materials.

Malaysia's significant decline in maternal mortality has been as a result of development of rural health services (introduction of maternal and child health programmes and TBAs) , adopting specific approaches (strengthening of referral system and colour coding system), assuring quality of care by tracking progress (outcome), providing standardize care, and identifying outliers that needed further improvement.

**Key words:** Global Initiatives on maternal reproductive health, Traditional Birth Attendants, Colour coding for risk stratification

## ***Introduction***

In September 2000, the United Nations held the Millennium Summit in New York. During this meeting, the eight Millennium Development Goals (MDGs) were formulated with the incorporation of maternal health into the MDGs as MDG 5. The World Health Organization (WHO) defines a maternal death as the death of women during pregnancy, childbirth, or in the 42 days after delivery, irrespective of the duration and site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management but not from accidental or incidental causes. **(1).** It remains a major challenge to health systems worldwide. Obstetric mothers are generally young and healthy. Pregnancy induces a multitude of profound physiological and haemodynamic alterations, notably substantial increase in total blood volume, cardiac output and uterine blood flow **(2).** These along with pathologies unique to pregnancy, most importantly pre-eclampsia, and certain medical disorders contribute additional challenges.

In the developing world, postpartum haemorrhage (PPH) accounts for up to half of all maternal deaths. The wife of the Moghul Emperor Shah Jahan of India, Empress Mumtaz, had 14 children and died after her last childbirth of PPH in 1630. So great was the Emperor's love for his wife that he built the world's most beautiful tomb in her memory-the Taj Mahal **(3).**

## ***Global Initiatives and Malaysian CEMD***

Safe Motherhood Initiative (SMI), launched at a Safe Motherhood Conference in Nairobi in 1987, was another policy intervention to reduce maternal mortality **(4).** Malaysia too adopted this initiative, but the progress made was disappointing. In Malaysia, an important step was the introduction of the Confidential Enquiry into Maternal Deaths (CEMD) in 1991. This initiative is based on that of the triennial reports of England and Wales. Individual case notes are audited at the hospital, state and national levels and feedback sent to the source of maternal death. The objective is to identify shortfalls in the care in totality and recommend remedial measures to improve standards of care.

The focus on maternal mortality was further strengthened when maternal mortality was made one of the eight goals of the Millennium Development Goals (MDGs). In September 2000, the United Nations held the Millennium Summit in New York. During this meeting MDG 5 incorporated two indicators: reduction of maternal mortality ratio (MMR) to three-quarters between 1990 and 2015 and the proportion of births attended by skilled health personnel. Malaysia made significant strides in maternal mortality **(5,6)** since Independence in 1957 to 2010. This is largely attributed to the introduction of various strategies and the development of progressive health care services in the country in order to achieve universal access to reproductive health by 2015.

## ***Decline in maternal mortality in Malaysia-Historical background***

Malaysia is a multiethnic country with the Malays being the majority, followed by Chinese and Indians. There are also several other indigenous people in Sabah, such as Kadazans, Muruts, Bajaus and Ibans, whilst in Sarawak we have the Melanaus, Bidayuh, Penan and so on. The official state religion is Islam whilst other religions such as Christianity, Buddhism, Hinduism, Sikhism are freely allowed to practice. The head of state in Malaysia is the *Yang di Pertuan Agong* (King of Malaysia). The Ministry of Health (MOH) is responsible for all matters relating to health in the country **(7).** Obstetric patients are comparatively young and well. Nonetheless, they too are prone for calamitous complications that can occur during pregnancy, labour or during the puerperium despite therapeutic advances in the last few decades.

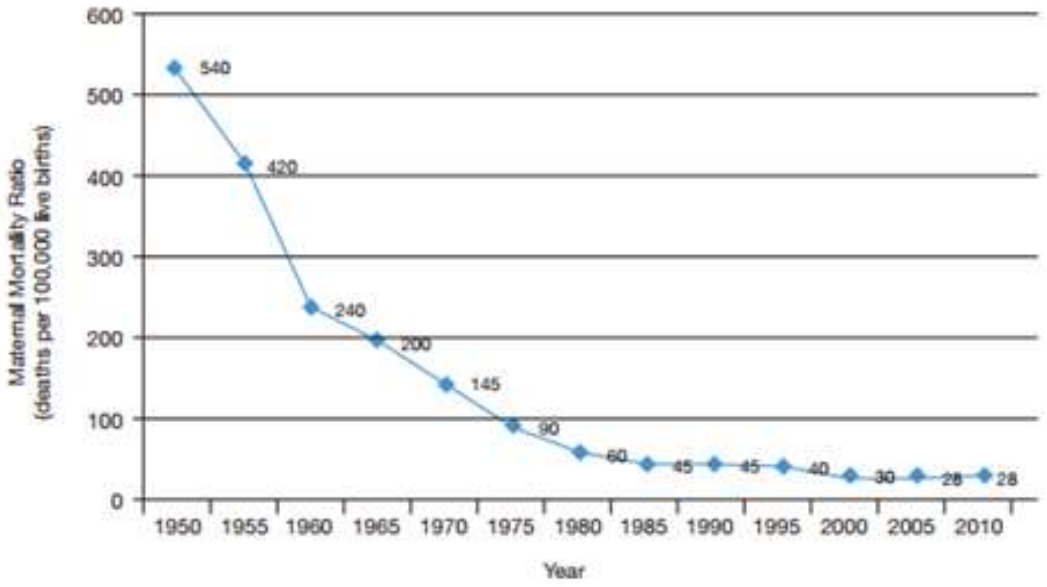



Figure 1 : Maternal Mortality Ratio (per 100, 000 live births) in Malaysia, 1950 - 2010

**Source:**

Indra Pathmanathan, Jerker Liljestrand, Jo. M. Martin, et al. Investing in Maternal Health: Learning from Malaysia and Sri Lanka. The World Bank. Washington D.C, 2003.

Division of Family Health Development. Report on the Confidential Enquiries into Maternal Deaths in Malaysia, 1997-2000. Ministry of Health, 2005.

Division of Family Health Development. Report on the Confidential Enquiries into Maternal Deaths in Malaysia, 2001-2005. Ministry of Health Malaysia, 2008.

Decline in maternal mortality in Malaysia can be approximately classified into three phases (Figure 1). The *first phase* was from 1933-1957 when Malaya was under the colonial rule. Maternal mortality then was high and was recognized as a major health issue. With strong political will and public commitment, development of Maternal and Child Health services (MCH) had begun. Midwives Ordinance was established in 1954 with subsequent revisions. In 1957, there were only 66 hospitals (10 general and 56 district hospitals) and no primary care health centers **(7).** The *second phase* was from 1958 - 1975. During this period the drop in maternal mortality was significant (78.6%) and this is mainly due to the introduction of the Maternal and Child Health programmes in the health centres and midwife clinics. The health centres and midwife clinics were regrouped as primary care centres; the district hospitals without specialist services as secondary care centres; and general and university hopitals with specialist services as tertiary care centres. Rural health infrastructure was further set up, primarily serving the rural poor amounting to 75% of the total population then. The aim of the rural health infrastructure was to enhance the promotion of optimal health care **(8).** In Sabah and Sarawak, the flying doctor service also serves the rural and remote regions of the states. Also, the Obstetric Flying Squad (OFS) has been operating in Peninsular Malaysia for over three decades **(9).** This study found the OFS service can be completely replaced by the ambulance services (with training of ambulance drivers in first aid) in the local setting. A similar study **(10)** found OFS catered for domiciliary deliveries especially in the East coast states of Kelantan and Terengganu. Urban OFS was started in

Seremban in 1997, catering to private sector cases within a 30 minutes distance. In this study, it was found to be a good initiative for hospitals frequently receiving ill cases from private maternity homes.

Historically, the OFS was pioneered in Bellshill, Lanarkshire in 1933. It is a form of medical retrieval team that is composed of an obstetrician, anaesthetist, midwife and other health care personnel who are on call to attend to mothers with major obstetric complications occurring in the country. The most common major problems are postpartum haemorrhage, retained placenta and obstructed labour. The last decade has witnessed a remarkable decrease in home deliveries, a higher proportion of high risk cases delivering under medical supervision, and a dramatic increase in the availability of telecommunication, transport and rural medical facilities. The OFS callout rate has significantly fallen. In East Malaysia (Sabah and Sarawak) (Figure 2) access by land transport is extremely difficult, hence OFS may still have a small role to play.


Figure 2: West (Peninsular) and East Malaysia

The *third phase* began since 1976 and continues today. The High-Risk Approach system of antenatal care was introduced into the MCH which led to a further drop in maternal mortality by 50%. Another significant milestone was the introduction of the colour coding system: a process for identification of pregnancies that are at greater risk than average risk **(11).** The referral system was strengthened so that the high-risk mothers were referred to the higher levels for care. This system ensured appropriate level of care. In the 1980s, home based maternity assessment cards were introduced. This became a common document to record the antenatal progress at any level of MCH care and is kept with the patient. In 1991, Confidential Enquiry into Maternal Deaths (CEMD) was introduced. It became a full-fledged national maternal mortality audit. In addition, during this period, urban and rural birthing centres were

established. The former was to decongest the urban labour suites whilst the latter served low risk pregnant mothers, who were not keen on any form of interventions and desired a homely environment and family members around **(Ref 10).** Rural birthing centres **(11)** were manned by resident medical officers with transport services should an emergency occur. By the 2010s, there were 2,833 health clinics and 165 mobile clinics, 131 hospitals and 13 flying squad services in East Malaysia **(Ref 12).** These services rendered preventive, promotive, curative and rehabilitative health care in the rural areas.

**Table 1: Vital Statistics for Malaysia (1957-2005**

| Year | 1957 | 1970 | 1980 | 1990 | 2001 | 2005 | % (+ or -) |
|---|---|---|---|---|---|---|---|
| Population | 6.3 mil | 10.3 mil | 13.8 mil | 18.0 mil | 24.0 mil | 26.1 mil | +314 % |
| Growth rate | NA | 2.7 | 2.4 | 2.3 | 2.2 | 2.1 | - 22.0 % |
| Life expectancy | | | | | | | |
| Male<br>Female | 56<br>58 | 64<br>68 | 66<br>70 | 69<br>73 | 70.3<br>75.2 | 70.6<br>76.4 | +26.0%<br>+31.7% |
| Crude birth rate | 46.2 | 32.5 | 30.3 | 26.8 | 22.3 | 19.6 | -57.8% |
| Crude death rate | 12.4 | 7.0 | 5.5 | 4.8 | 4.4 | 4.4 | -64.5% |
| Infant mortality rate | 75.5 | 40.8 | 23.9 | 12.1 | 6.3 | 5.1 | -93.2% |
| Toddler mortality rate | 10.7 | 4.2 | 2.1 | 0.9 | 0.6 | 0.5 | -95.3% |
| Maternal mortality rate | 3.2 | 1.5 | 0.6 | 0.2 | 0.3 | 0.4 | -87.5% |
| Literacy rate (10 years and above) | NA | 58.0% | 72.0% | 85.0%<br>(1991)@ | NA | 95.1%*<br>(2004) | +37.1 (1970-2004) |
| Health clinics | NA | NA | 373<br>(1985) | 772<br>(1998) | 858<br>(2002) | 859<br>(2004) | +130% (1980-2004) |
| Midwife or rural clinics (Klinik Desa+MCH clinic) | NA | NA | 1629<br>(1985) | 2009<br>(1998) | 2028<br>(2002) | 2017<br>(2004) | +23.8% (1985-2004) |
| Public General and District Hospitals | 66 | NA | NA | 111<br>(1996) | 116<br>(2002) | 119<br>(2004) | +80% 1957-2004) |
| Poverty level | NA | 49.3 %** | NA | NA | 5.1%<br>(2002) | NA | -44.2% (1970-2001) |

Source: Health in Malaysia Achievements & Challenges, Ministry of Health 2000
Health Facts 2001, 2002, 2004, 2005, Ministry of Health IDS Unit

- *MOH Indicators for monitoring & evaluation of Strategies for All Planning & Development Division 2005
- **Malaysia Economic Planning Unit Five year plans (1970 data for Peninsular Malaysia only)
- @ ( ) specific year

Concurrently, there was an increase in deliveries by skilled trained personnel and Traditional Birth Attendants (TBAs). The TBAs were given training (avoiding harmful practices), provided with a delivery kit, registered in a special registry and were required to report to the government midwife about the deliveries conducted. TBAs are respected members of their community, perform important cultural rituals and provide essential social support to women during childbirth. The registration of TBAs was allowed for 10 years and was phased out due to financial constraints and increased training of skilled healthcare personnel.

***Factors behind the current maternal health trends in Malaysia***

***Developments in rural health services:***

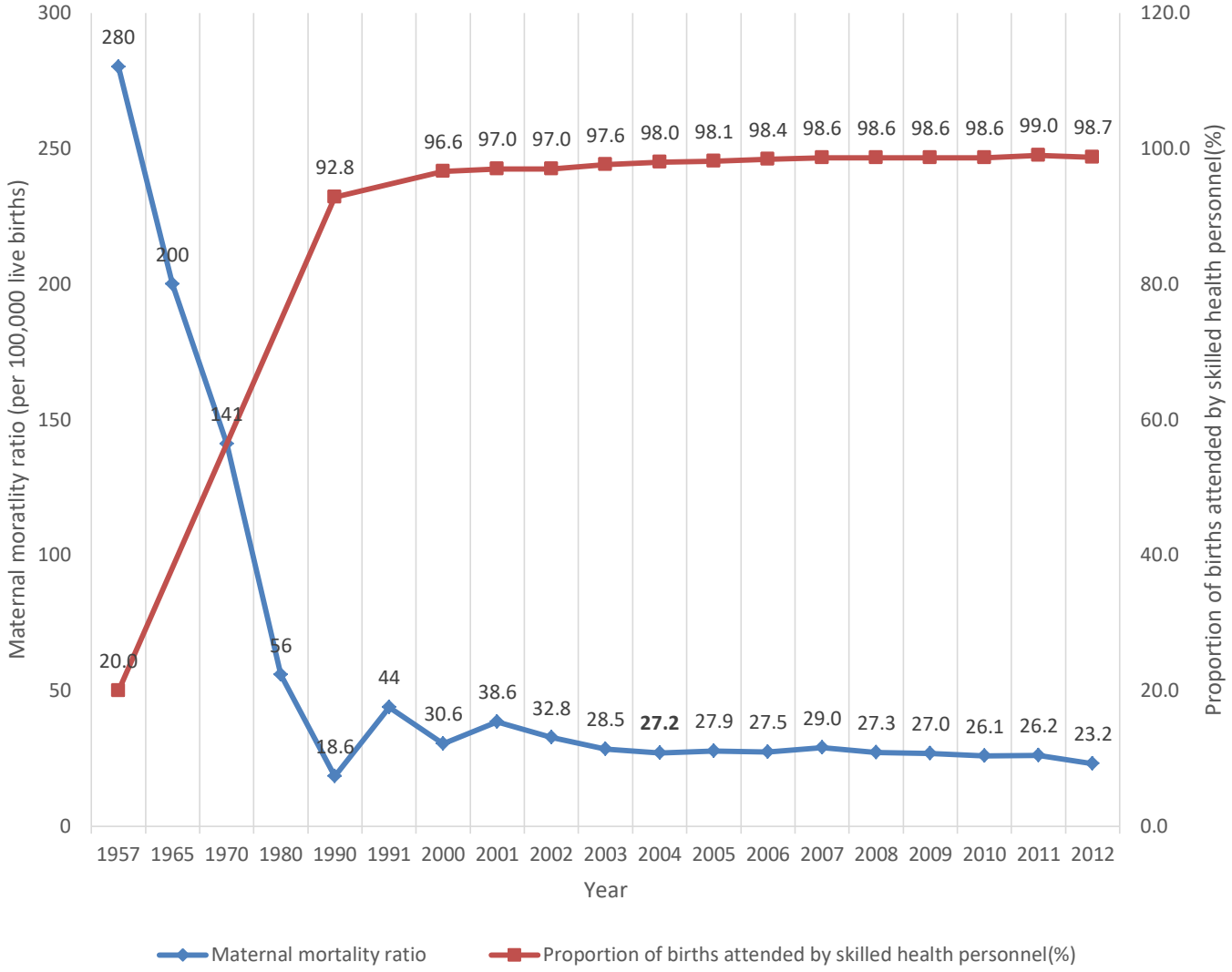
The swift development of rural health services led to the drop in maternal mortality between 1960 and 1980s. This is largely due to increase in skilled personnel to attend deliveries and introduction of Maternal and Child Health (MCH) Programme in health centres and midwife clinics. Additionally, efforts to expand accessibility to MCH care for remote populations were increased with improvement in better roads and bridges.

Throughout history, traditional birth attendants (TBAs) **(13)** have been the main human resource for women during childbirth in rural areas in the developing countries. Partnerships with TBAs, including training were strengthened, as an interim short-term measure whilst adequate numbers of skilled birth attendants (doctors, community nurses and midwives) were trained. However, at present in Malaysia, training TBAs is given a low priority. Instead, priority is given to ensure developing relevant obstetric care services and upgrading referral services by skilled birth attendants to facilitate prompt and effective management of complications. This diversification is seen in the light of implementation of MCH programmes, high risk approach strategies, colour coding system, etc. (Figure 3)

***Adopting interim and well-envisioned specific approaches***

In the seventies, the High-Risk Approach in MCH service was introduced after a pilot study in Krian District in Perak state. This was mainly to identify the high risk mothers and make special provision for them in hospitals or health centres. Partnerships with TBAs, including training, were also strengthened while simultaneously adequate numbers of skilled birth attendants (community nurses and midwives) were also being trained and the former cohort of TBAs were then phased out gradually. Also, the colour coding system was introduced to code mothers according to their level of risk to ensure appropriate level of care and referral to centres with higher level of care. *The* referral system was strengthened to compliment this measure. A red code signifies a life threatening condition and the patient required immediate hospital referral and admission without any hindrance or question asked. Yellow coding indicates that patient requires antenatal monitoring by a doctor. A green code is referred to a senior nurse whilst the white coded patients are assigned to community nurse or a midwife.




Source: 2000–2012 Malaysia, Department of Statistics, various years; 1991–1995, Malaysia, Ministry of Health, Family Health Development Division

**Figure 3: Maternal mortality ratio (deaths per 100,000 live births) compared to proportion of births attended by skilled health personnel (1991-2012)**

Midwives are allowed to administer heparin for thromboprophylaxis, give antenatal steroids to mothers with preterm labour and intramuscular magnesium sulphate under guidance from protocols issued by Ministry of Health **(14).** In addition, partograph use, protocol development and creation of a red alert system to mobilize specialists and other healthcare personnel were designed to reinforce existing protocols.

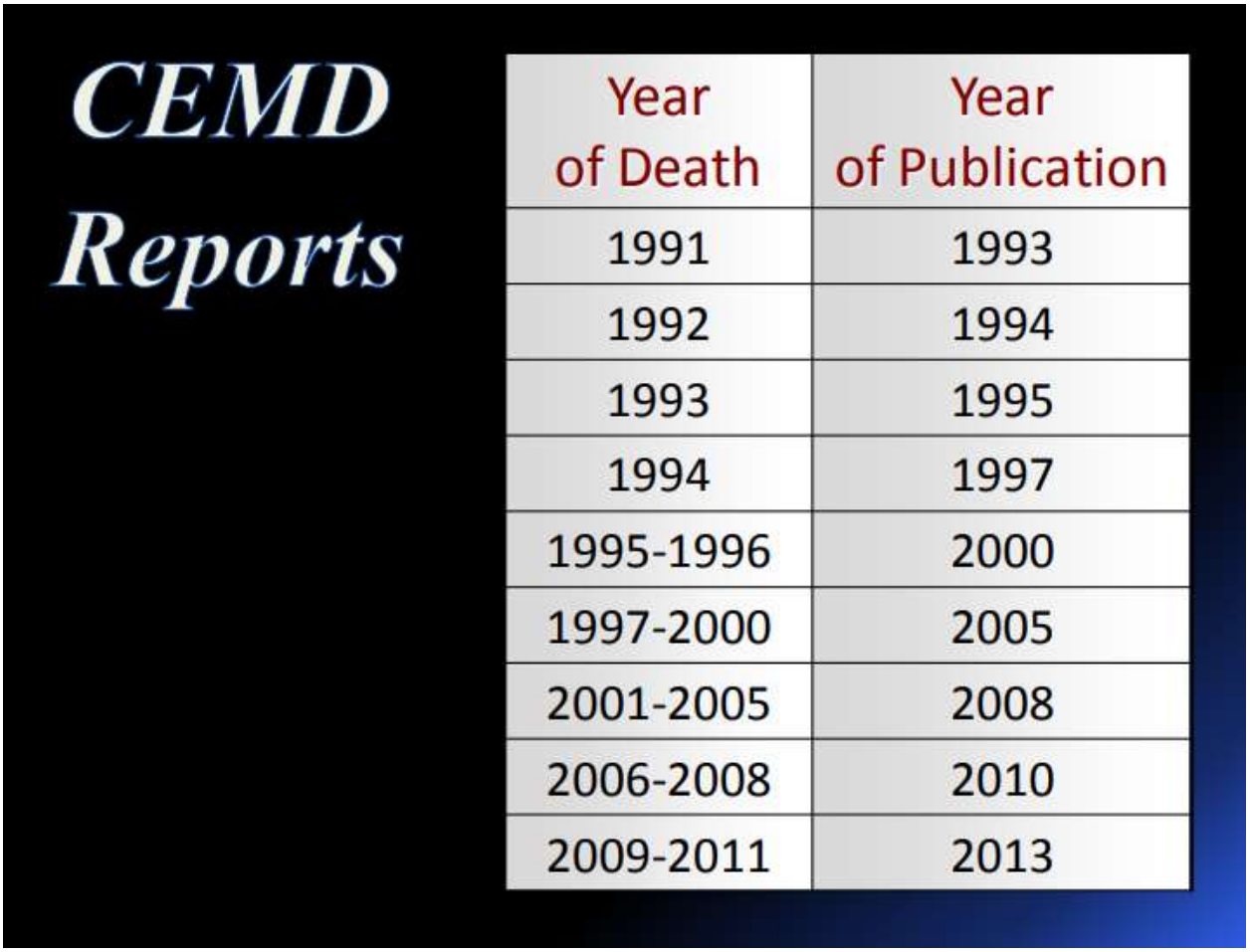
***Implementing Quality Assurance Programme in the Ministry of Health***

In 1985, Ministry of Health of Malaysia (MOH) initiated a national quality programme with patient-care services. The plan was to develop a Quality Assurance Programme *(QAP*) to enable the medical services to systematically evaluate its clinical programmes, to improve and upgrade the services, all within the limits of the resources provided or available to the ministry.

The aim of the QAP was to establish a mechanism to monitor the quality of the various services provided, to detect shortfalls in quality, to investigate the causes for the shortfalls and to take remedial measures to improve quality or eliminate shortcomings in the system or process

of care. The QAP was used as a managerial tool to justify the need for more resources in terms of money, manpower, machinery (equipment) and materials (drugs, consumables). On the basis of the QAP concept, the Confidential Enquiry into Maternal Deaths (CEMD) was able to systematically and uniformly collect data along with information from newly launched Perioperative Mortality surveys. (Figure 4).




| Year of Death | Year of Publication |
|---|---|
| 1991 | 1993 |
| 1992 | 1994 |
| 1993 | 1995 |
| 1994 | 1997 |
| 1995-1996 | 2000 |
| 1997-2000 | 2005 |
| 2001-2005 | 2008 |
| 2006-2008 | 2010 |
| 2009-2011 | 2013 |

Figure 4 : CEMD Reports

Maternal mortality rates are generally used to gauge the quality of maternal care. In recent years, there has been increased recognition that reducing maternal mortality is not just an issue of development, but also an issue of human rights. Compromising in the prevention of maternal mortality and morbidity is tantamount to violation of a woman's right to life. This translates into inequalities between men and women in their enjoyment of the right to the highest attainable quality of health. Maternal mortality rates in North American and European ICUs range from 3% to 20%, whereas this may be doubled in less developed countries of the world. This is partly due to scanty application of prenatal services and a delay of more than 24 hours between onset of acute illness and ICU admission **(15).** The changes and programmes implemented can be summarized into three time zones.

**1950s to 1980s**

- Introduction of the Maternal and Child Health programmes (MCH) in the health centres and midwife clinics
- Increase in skilled birth attendants (community nurses and midwives) to attend to supervised deliveries
- Engagement of traditional birth attendants (TBAs) as an interim short-

term measure of partners of health, leading to successful deliveries by TBAs and increased hospital deliveries
- Implementation of risk approach to antenatal management and introduction of colour coding system that tag mothers according to their level of risk
- Quality Assessment Programme (QAP)

**1990s**
- Confidential Enquiry into Maternal Deaths (CEMD)
- Alternative Birthing Centres in Rural and Urban Areas
- Introduction of partogram training to nurses
- Introduced HIV screening for pregnant mothers
- Home-based, patient-carried red maternal record with a colour-coded sticker on the right upper corner of the card

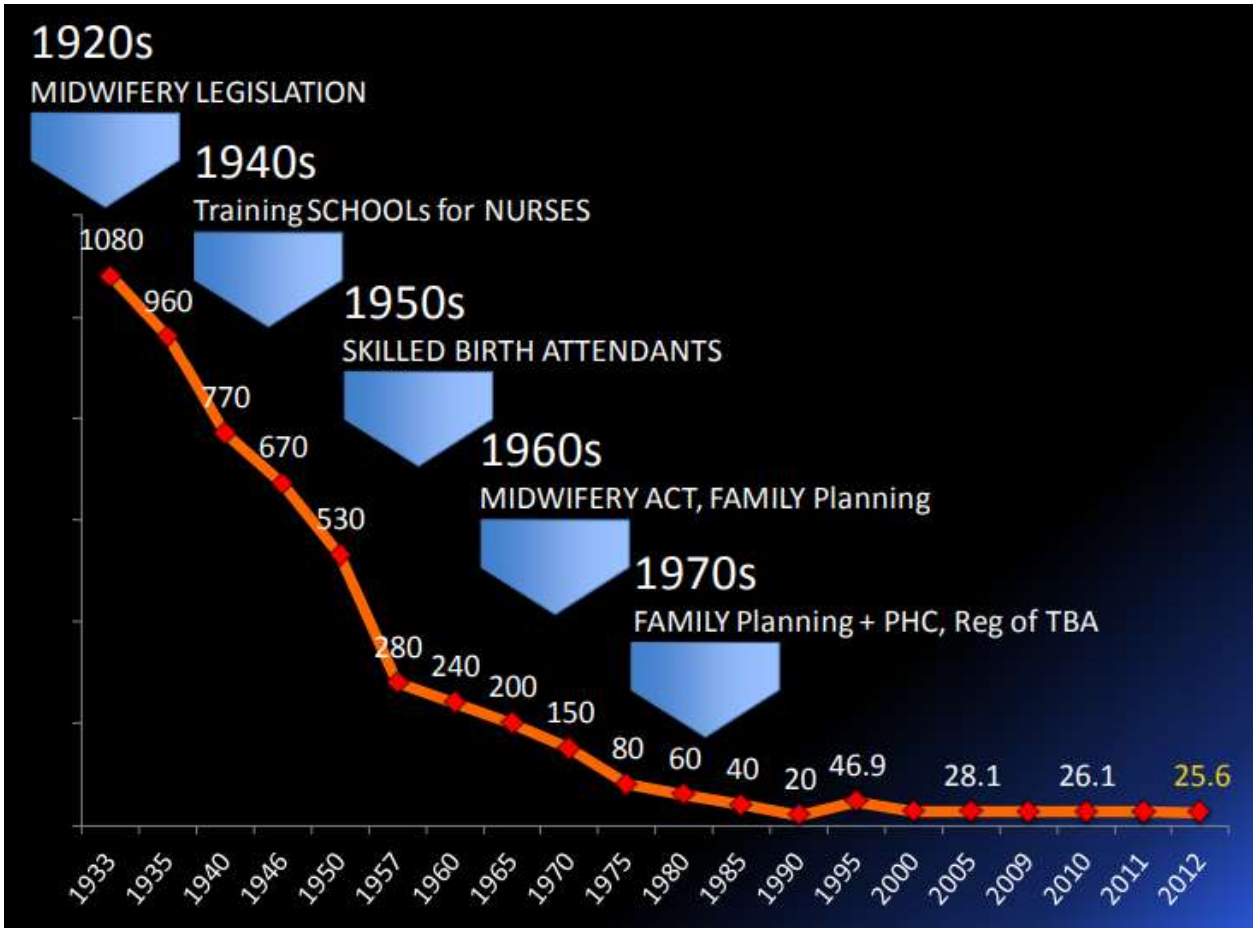


Figure 5 : Various Services since 1920s

**2000s**
- Training manuals in PPH, hypertension, heart disease, management of venous thromboembolism with heparin
- Midwives: Training conducted on how to give a slow intramuscular magnesium sulphate (MgSO4) for eclampsia
- Revised Health Management and Information systems

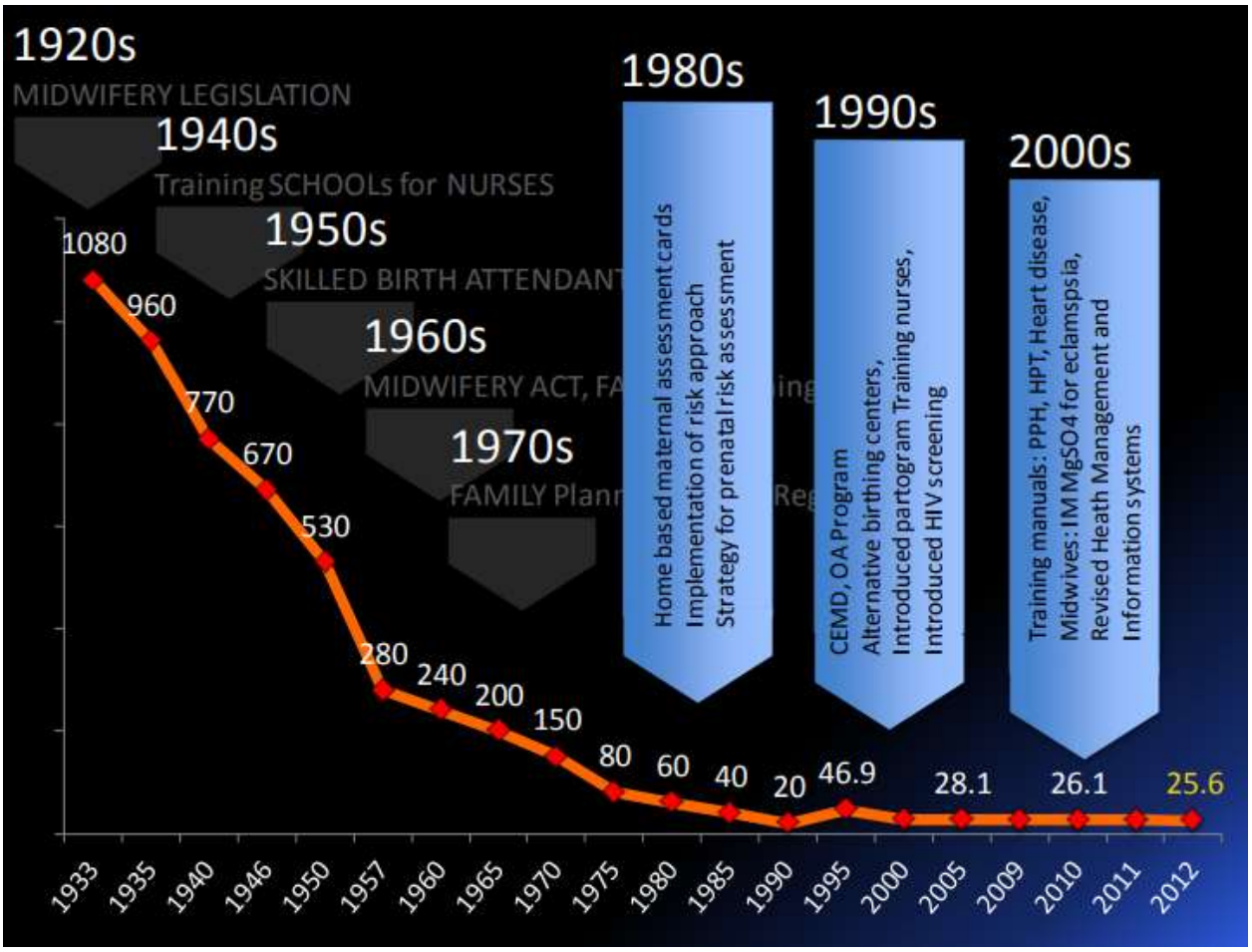


Figure 6 : Various Documents and Programmes since 1920s

***The role of family planning***

*Family Planning Services* (FPS) has been available in Malaysia since 1930s. A comprehensive and nationwide programme was established in 1966 after the gazettement of Family Planning Act. Since 1970s, FPS has been integrated into the Primary Care Services of Ministry of Health (MOH) in phases with a significant improvement. This is in line with the national and global vision to ensure optimum quality of individual and family life **(16).**There is full integration of family planning services into every community health clinic in Malaysia. Being a majority based Muslim country, Malaysia embarked on family "spacing" to family "limitation" policy as a health perspective to ensure both maternal and child health care spacing (Figure 5).

Modern methods include female and male sterilization, oral hormonal pills, the intra--uterine device (IUD), the male condom, injectables, the implant (Norplant), vaginal barrier methods, the female condom and emergency contraception. Traditional methods include the rhythm (periodic abstinence), withdrawal, lactational amenorrhoea method and folk methods (Table 2).

Contraceptive prevalence is one of the proxy indicators for access to reproductive health. Since 1974, the National Population and Family Development Board conduct Malaysian Population and Family Surveys (MPFS) every ten years. It reported contraceptive prevalence rate (CPR) of 26.3 percent then. This doubled to 52 percent in 1984 and has remained around 50 percent since then. In the most recent MPFS,

CPR of 54 percent was reported for the whole of Malaysia in 2014. This is lower than the neighboring countries and other countries in the East Asia-Pacific region.

To this effect, the Director General of Health Malaysia, Datuk Dr. Noor Hisham Abdullah, issued a letter dated 11.04.2013 to further promote contraceptive services in both government and private health facilities **(17**) throughout the country.

**Table 2: Contraceptive prevalence (any method) and unmet need for family planning by selected characteristics, 2004 and 2014**

| Year | 2004 (Peninsular Malaysia) | 2014p (Malaysia) |
|---|---|---|
| Contraceptive prevalence rate (Any Method) | 51.8% | 54.0% |
| Unmet need for family planning | | 15.9% |
| *Limiting | 24.7% | 12.6% |
| *Spacing | NA | 3.3% |

Note: 1.The 2000 survey did not ask about delaying childbirth. The data refer only to women who wanted to stop childbearing

2. Data for 2014 are the preliminary findings of the 2014 MPFS

Source: Malaysia, National Population and Family Development Board, Malaysian Population and Family Survey 2004 and 2014

## ***The way forward towards better maternal health care***

### Antenatal care coverage

Antenatal care monitors the safety of the mother and the fetus. The antenatal period offers opportunities for interventions that maybe pivotal for their progress and well-being. The antenatal first-visit coverage increased from 78 per cent in 1990 to 94.4 per cent in 2007. The average number of antenatal visits was nine in 2007.

### Maternal mortality

Noteworthy pockets of vulnerable and socially disadvantaged groups of patients still face inequalities to health care. All forms of barriers in the form of physical, social and financial inequalities are common. Failure of healthcare workers to appreciate the severity of the problem, wrong diagnosis, lack of communication skills and poor teamwork spirit is rife.

The policies must include early detection of high-risk mothers, recognize problems, and provision for training and handling obstetric emergencies. Availability of contingency plans to transfer patients early with community participation should be ensured. Collaboration among primary, secondary and tertiary care needs to be strengthened to reduce the referral bureaucracy (Figure 6).

Education and empowerment of women are essential to increase their demand for health services. Importance is given to family planning services. Pre-conception care is given to the high risk couples to space and limit childbearing.

### Adolescent sexual and reproductive health

Small scale data available on sexual activity among unmarried adolescent and young people is not uncommon. Data illustrates young men and women need the skills to abstain from sexual activity until marriage. Those who are sexually-active should be well informed about the sexual and reproductive health issues, including sexually transmitted infections. Sex education is a vital tool to enable them to manage their sexual and reproductive lives. Also, emphasis on adolescent awareness of

healthy lifestyles and living skills to prevent teenage pregnancy should be created.

**The adolescent birth rate**

The adolescent birth rate measures the annual number of births among those 15-19 years of age per 1,000 adolescents in that age group. Adolescent pregnancies are a major health concern. It is a time of vulnerability and a period of profound biological, social and emotional changes. The implications are enormous. Prevention alone may be insufficient as it remains culturally acceptable in certain parts of the world. **(18)** These mothers face reduced access to higher education and those who are unmarried face myriads of social and economic problems. The adolescent birth rate declined from 28 births per 1,000 adolescents aged 15-19 in 1991 to 13 births per 1,000 in 2007. One of the reasons for the low adolescent birth rates in Malaysia is the increased mean age of marriage from 22 years in 1970 to 25.1 years in 2000.

***Poverty and maternal health***

The decline in poverty has been an important factor in the reduction of maternal mortality in Malaysia. Poverty has been aggressively addressed since 1970 after the introduction of the New Economic Policy (NEP) which saw the reduction of poverty and restructuring of society. Poverty has declined from 49.7 percent in 1970 to 5.1 percent in 2002. By 2014, the poverty rate had further declined to 0.6 percent. This made a direct impact on the health status of the poor and translated into direct reduction of maternal mortality **(19).** Figure 7 shows Malaysia's achievements in poverty eradication since 1970.

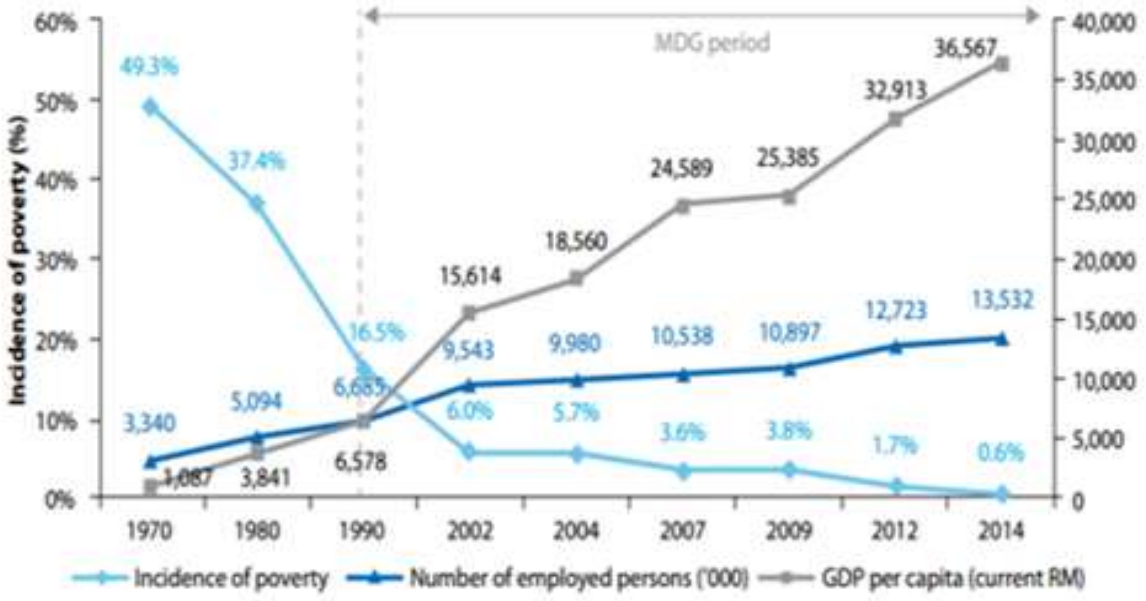



**Figure 7 : Incidence of Poverty, Number of Employed Persons and GDP per Capita, 1970 – 2014**

Source : Malaysia, DOSM, Malaysia Economics Statistics, Time Series 2013. Malaysia, DOSM, Labour Force Survey, 2014.

***Conclusion***

Sustained political will and commitments have been instrumental in Malaysia's multi-disciplinary approach to reduce maternal mortality. The CEMD had been a platform to provide information to support MOH budget allocations that ensured meeting and strengthening target services. Budget had been allocated to alternative birthing centres and skills training for most causes of maternal

mortality as well as meeting specific interventions such as partograph use, protocol development and designing the red alert system to mobilize key personnel in obstetric emergencies.

Major causes of maternal deaths were identified in the CEMD exercises; these were utilized to devise key indicators and protocols and to address obstetric calamities. The provision of emergency obstetric services, early recognition and management or referral of complicated cases is pivotal. Additional public health activities, such as immunization campaigns, nutritional programmes, family planning services, alleviation of poverty, provision of education and empowerment, access to housing, have made significant impact on maternal health and reproductive services.

***Disclosure of interests***

The first three authors were previously employees by Ministry of Health, Malaysia. At some point of their service, they were actively involved in maternal care and reproductive health. The fourth author, who is from Pune, Maharashtra, India, also has great insight into maternal health and issues regarding the empowerment of women.

There are no conflicts of interest.

***Contribution to authorship***

All four authors planned, drafted, revised and approved the final draft

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