

Volume 9, Number 1, 2005



**Make every mother  
and child count**

Regional Health Forum

WHO South-East Asia Region

Volume 9, Number 1, 2005



# REGIONAL HEALTH FORUM

WHO South-East Asia Region



**World Health Organization**  
Regional Office for South-East Asia  
New Delhi



**World Health Organization**  
Regional Office for South-East Asia  
New Delhi

Regional Health Forum  
WHO South-East Asia Region

ISSN 1020 4237

© World Health Organization 2005

Publications of the World Health Organization enjoy copyright protection in accordance with the provisions of Protocol 2 of the Universal Copyright Convention. For rights of reproduction or translation, in part or in toto, of publications issued by the WHO Regional Office for South-East Asia, application should be made to the Regional Office for South-East Asia, World Health House, Indraprastha Estate, New Delhi 110002, India.

The designations employed and the presentation of the material in this publication do not imply the expression of any opinion whatsoever on the part of the Secretariat of the World Health Organization concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries.

The views expressed in this publication are those of the author(s) and do not necessarily reflect the decisions or stated policy of the World Health Organization; however they focus on issues that have been recognized by the Organization and Member States as being of high priority.

Printed in India

## Editorial

*The main objective of the Regional Health Forum is the exchange of information, experiences, ideas and opinions on all aspects of public health and health development. The publication is intended to serve as a platform where people can express their views, observations and experiences rather than as an official medium of the World Health Organization's policy or as reference material.*

*The focus of this issue is "make every mother and child count", the theme of World Health Day 2005. We have tried to include articles on various aspects of maternal and child health, which may be of interest to readers.*

*Other subjects covered include Indoor Air Pollution: Impact of Intervention on Acute Respiratory Infection (ARI) in Under-five Children and Russell's viper Bite: Correlation of Different Clinical Criteria to Peritoneal Dialysis and Clinical Outcome. The section on Notes and News and Book Reviews may also be of interest.*

*Readers are invited to forward their contributions in the form of articles, essays, letters, or comments written in an informal, anecdotal style. Suggestions on improving the Forum are also welcome.*

## World Health Day Message from the Director-General

Parenthood brings with it the strong desire to see our children grow up happily and in good health. This is one of the few constants in life in all parts of the world. Yet, even in the 21<sup>st</sup> century, we still allow well over 10 million children and half a million mothers to die each year, although most of these deaths can be avoided. Seventy million mothers and their newborn babies, as well as countless children, are excluded from the health care to which they are entitled. Even more numerous are those who remain without protection against the poverty that ill-health can cause.

Leaders readily agree that we cannot allow this to continue, but in many countries the situation is either improving too slowly or not improving at all, and in some it is getting worse. Mothers, the newborn and children represent the well-being of a society and its potential for the future. Their health needs cannot be left unmet without harming the whole of society.

Families and communities themselves can do a great deal to change this situation. They can improve, for example, the position of women in society, parenting, disease prevention, care for the sick, and uptake of services. But this area of health is also a public responsibility.

Public health programmes need to work together so that all families have access to a continuum of care that extends from pregnancy (and even before), through childbirth and on into childhood, instead of the often fragmented services available at present. It makes no sense to provide care for a child while ignoring the mother's health, or to assist a mother giving birth but not the newborn child.

To ensure that all families have access to care, governments must accelerate the building up of coherent, integrated and effective health systems. This means tackling the health workforce crisis, which in turn calls for a much higher level of funding and better organization of it for these aspects of health. The objective must be health systems that can respond to these needs, eliminate financial barriers to care, and protect people from the poverty that is both a cause and an effect of ill-health.

The world needs to support countries striving to achieve universal access and financial protection for all mothers and children. Only by doing so can we make sure that every mother, newborn baby and child in need of care can obtain it, and no one is driven into poverty by the cost of that care. In this way we can move not only towards the Millennium Development Goals but beyond them.



LEE Jong-wook  
Director-General

## World Health Day Message from the Regional Director

Women and children are the most vulnerable assets on earth. It is therefore vital to improve their health and well-being in order to achieve complete development of overall human resources. It is for this reason that the Millennium Development Goals call for a two third reduction in child mortality and three fourth in maternal mortality by 2015. World Health Day this year, with its slogan, 'Make Every Mother and Child Count', provides a timely opportunity to redouble our efforts to promote health, survival and development of women and children.

According to the current estimates, Member States of WHO South-East Asia Region account for 170,000 maternal and 3 million child deaths annually. This is absolutely unacceptable and seriously tragic because we have the knowledge and technology to prevent a large majority of these deaths. Apart from the high mortality, women and children also bear a heavy burden of disease.

The common communicable diseases children are exposed to include pneumonia, diarrhoea and measles. In some countries, malaria and dengue are added problems. Over 50 per cent of the cases are preceded and complicated by malnutrition. As for women, they are not only subject to inequities in access to health care, but also exposed to several maternity-related adverse conditions. In most countries in the Region, pregnancy occurs at a young age and is also too frequent. Because of the poor nutritional status and high burden of disease in women as well as lack of skilled care during pregnancy and childbirth, the decline in maternal and neonatal mortality over the past decade has been insignificant.

There is, however, enough evidence today to suggest that over 60 per cent of all child deaths and a large proportion of maternal morbidity and mortality may be prevented. This can be achieved by ensuring equitable access to effective public health interventions to all segments of the population, with emphasis on mothers and children.

Apart from some conditions specific to maternity and childhood, mothers and children are also exposed to several communicable and noncommunicable diseases. These include malnutrition, malaria, tuberculosis, HIV/AIDS, mental disorders and so on. I, therefore, urge that health ministries place maternal and child health high on their development agenda.

Past experience shows that a focused attention by all partners pays rich dividends. Initiatives covering immunization, oral rehydration, control of acute respiratory infections, and the more recent Integrated Management of Childhood Illness strategy have contributed to the impressive decline in under-five and infant mortality rates across the Region. The incidence of vaccine preventable diseases like diphtheria, neonatal tetanus and measles has also shown a sharp reduction. We are on the verge of eradicating poliomyelitis. There has been a steady, though slow, improvement in the nutritional status of children. Blindness due to vitamin "A" deficiency has declined

significantly. Progress in maternal and neonatal mortality reduction, however, has been more modest. This further highlights the need for improving skilled care at birth.

World Health Day provides a unique opportunity to accelerate concerted efforts to improve the health of mothers and children. We also need to strengthen efforts in countries to fill information gaps, document best practices and monitoring and evaluation of ongoing initiatives. At the same time, we can use the occasion to work with partners and ministries of health to mobilize additional resources for ensuring equitable access to effective maternal and child health interventions.

On this World Health Day let us resolve to re-double our efforts to “Make Every Mother and Child Count”



Samlee Plianbangchang, M.D., Dr.P.H.  
Regional Director

---

# Contents

---

## Maternal and Child Health

- Maternal, Newborn and Under-five Child Health in the South-East Asia Region 1
- Malaria During Pregnancy, A Priority Area of Malaria Research and Control In South-East Asia 7  
Neeru Singh, S.B. Awadhia, A.P. Dash, Rita Shrivastava
- Process Documentation of the Initiative to “Improve the Quality of Maternal Health through Implementation of Facility-based Review of Maternal Deaths” 19  
Sudha Salhan
- Reviewing Maternal Deaths and Complications to Make Pregnancy and Childbirth Safer 27  
Matthews Mathai
- Indoor Air Pollution: Impact of Intervention on Acute Respiratory Infection (ARI) in Under-five Children 30  
Khin Myat Tun, Han Win, Ohnmar, Aung Kyaw Zaw, Thuzar Myint, Khin Khin Swe Myat, Sandar Kyi, Than Than Lwin

- 
- Russell’s Viper Bite: Correlation of Different Clinical Criteria to Peritoneal Dialysis and Clinical Outcome 37  
Paing Soe

---

## Comment

- Notes and News 43
- Book Review 53

- Guidelines for Contributors 56

---

# Maternal and Child Health

## Maternal, Newborn and Under-five Child Health in the South-East Asia Region\*

### Introduction

The WHO South-East Asia Region (SEAR) accounts for nearly one fourth of the world's population. Interestingly, most countries in the Region have very young populations, with nearly 50% in the reproductive age group. Consequently, the numbers of pregnant women and the numbers of babies born annually are very large. An estimated 37 million childbirths take place annually. The Region has about 180 million children under the age of five. Unfortunately, the Region also accounts for more than 170,000 maternal deaths and over 3 million child deaths annually. These statistics make the issue of maternal, newborn and child health a major priority for the Region.

A document released on the occasion of World Health Day 2005, provides an overview of the current maternal, newborn and under-five child health in the 11 Member States of the WHO South-East Asia Region. It also highlights some of the efforts currently underway to improve the maternal and child health indicators in countries of the Region. While including the lessons learnt, the document shows not only the rich diversity, but also the different challenges faced by Member Countries, and the innovative ways to overcome them. Each of the country profiles is based on reports specifically prepared for the launch of the World Health Report on World Health Day

2005 with the theme of Maternal and Child Health and the slogan: Make Every Mother and Child Count.

The country profiles clearly show how each of the Member Countries is addressing the issues of making pregnancy and childbirth safer and protecting the health and well-being of newborns and ensuring a healthier life for all children in the Region.

As is well recognized, making reproduction and childbirth safer, benefits not only women, but also newborns, children, families and ultimately the communities and nations.

To enable women to contribute to national development and for children to achieve their full potential, the health of women and children and family-friendly policies must receive higher priority.

Member Countries have committed themselves to reach the Millennium Development Goals. These include targets not only for maternal and child health, but also for other critical areas including nutrition, communicable diseases, access to essential drugs and safe water and improved sanitation. Improving access to education and empowerment of women, are also necessary to improve maternal and child health. Intensified collaboration among partners and efficient use of resources is needed to realize these goals. The following is a broad description of the efforts currently under way in the Member Countries of the

---

\* Excerpted from document No. SEA-MCH-228

South-East Asia Region in the area of maternal and child health.

## Issues in maternal, newborn and under-five child health in South-East Asia

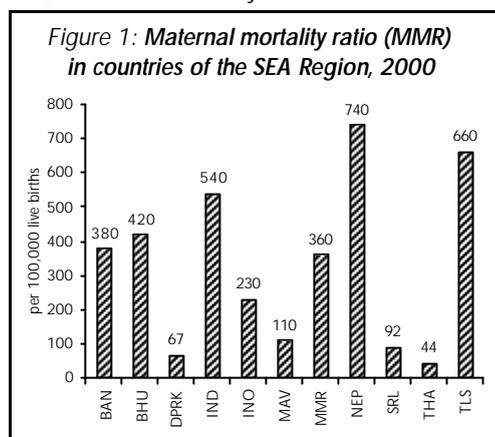
In most countries of WHO's South-East Asia Region, between 31-50% of the population is under 15 years of age. Since they will be reaching their reproductive years soon, it is likely that maternal, newborn and child health will continue to be one of the top priorities for health planners. Even if fertility rates fall, as reported in a few countries, the numbers of pregnant women and children born each year will continue to rise, at least in the foreseeable future.

Additionally, as the following country profiles show, with the exception of the Democratic People's Republic of Korea, more than 50% of the population in Member Countries lives in rural areas. This is a big challenge, calling for innovative ways to provide a strong network of health services to meet the needs of mothers, newborns and children. This becomes even more critical in countries with different geographic, climatic and socio-economic situations. Further, as per social norms, in several countries, the process of childbirth is perceived to be unclean, which in turn, leads to the seclusion of women and newborns during birth and the postpartum period. Family and community practices related to infant and young child feeding and health seeking behaviour during illness are not always optimal in some countries.

The Region carries a heavy burden of global maternal and child mortality. WHO, UNICEF, UNFPA estimates for 2000 suggest the total number of maternal deaths in the Region (173 000 in 2000), account for almost 33% of all maternal deaths worldwide. These deaths, however, are not spread equally across the Region, and there are vast intra-country and as well as intra-Region variations (Figure 1), especially in

terms of inequity in access to skilled care at birth.

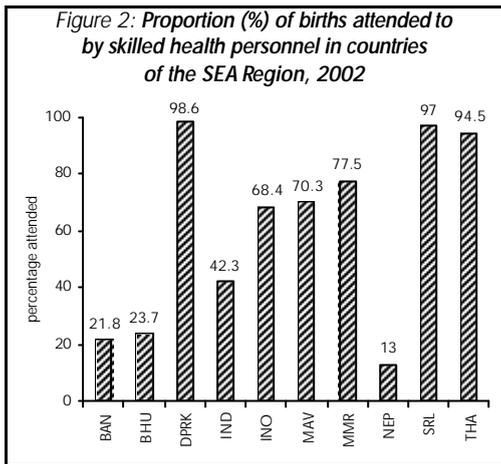
Equally, the proportion of newborn deaths is enormous – of the estimated 4 million neonatal deaths annually, 1.4 million newborns die in the first month after birth in countries of the SEA Region. Very few countries in the Region have good birth registration systems. The exact numbers of newborns who die in and around birth and in the first month of life is therefore difficult to ascertain. What is clear, however, is, that neonatal mortality rates are not declining in almost all countries of the Region, or if they are, the decline is very slow.



Source: Joint WHO-UNICEF-UNFPA estimates of MMR, 2000

## Skilled care at every birth

The high number of maternal and newborn deaths is not surprising, given that the interventions required to ensure the life of the newborn at and around birth, are the same as for mothers – skilled care at every birth, which is sadly still lacking in many countries of the Region (Figure 2). Although skilled care at and around birth is imperative for saving newborn lives, it is acknowledged that newborn health also requires other interventions. Most of these equally benefit the mothers. These include: good nutrition, especially for the girl child and prior to



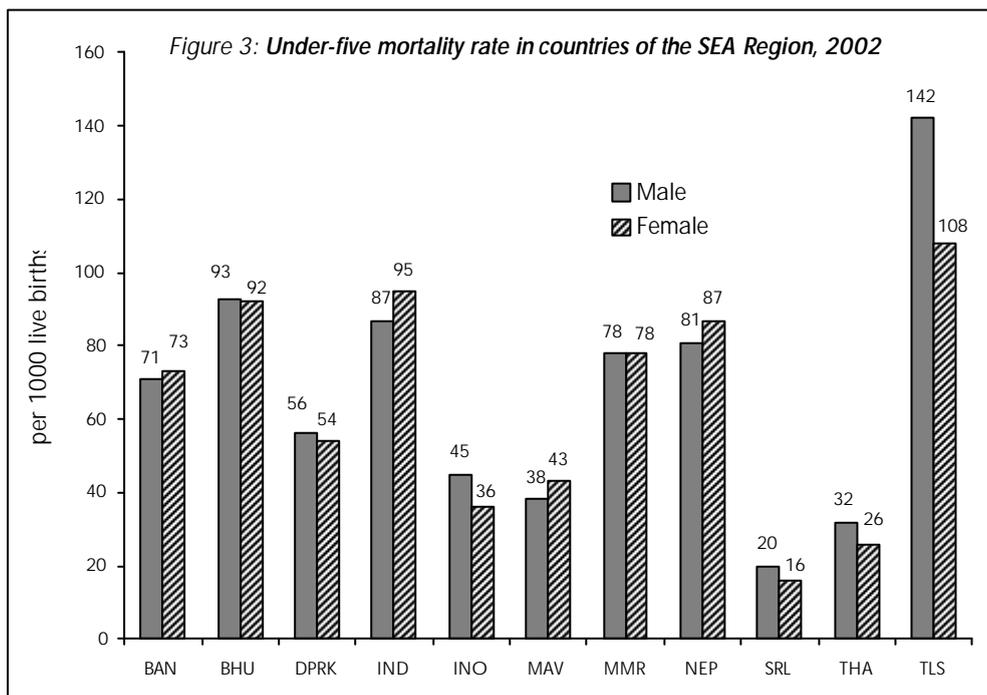
Source: WHO/SEARO: 2004 "Basic Indicators" brochure

pregnancy; protection from infectious diseases, which requires, in part, a strong immunization programme; quality antenatal care that focuses on the identification and treatment of underlying medical conditions such as malaria, hypertension, STIs, and others such as diabetes in pregnancy; increased education opportunities for girls

and young women; good parenting, including health education for healthy families and recognition of danger signs in neonates; access to family planning for birth spacing and limiting the size of families according to their wishes; and finally, early and exclusive breastfeeding, which is still not the common practice in many countries in the Region.

### Child mortality

Over 3.1 million children under the age of 5 years die every year in the Region. The health indicators for children under five in most countries of the Region are, however, improving. Under-five mortality rates are declining in some countries, but remain high in several others. In addition there are marked gender differentials in mortality rates in several countries (Figure 3). Neonatal mortality accounts for about 40% of under-five mortality. Further reductions in under-five mortality would be dependent on the attention given to neonatal health and survival.



Source: WHO/SEARO: 2004 "Basic Indicators" brochure

## Immunization coverage

Over the years immunization coverage has improved, although there are still pockets where more needs to be done (Figure 4). The reported incidence of vaccine preventable diseases like diphtheria, pertussis, and measles has been significant. There has been a marked decline in neonatal tetanus across the Region (Figure 5). Bhutan, DPR Korea, Maldives, Sri Lanka and Thailand are considered to have reached the neonatal tetanus elimination goal of less than 1 case per 1,000 live births at district level. The Region is very close to eradicating poliomyelitis.

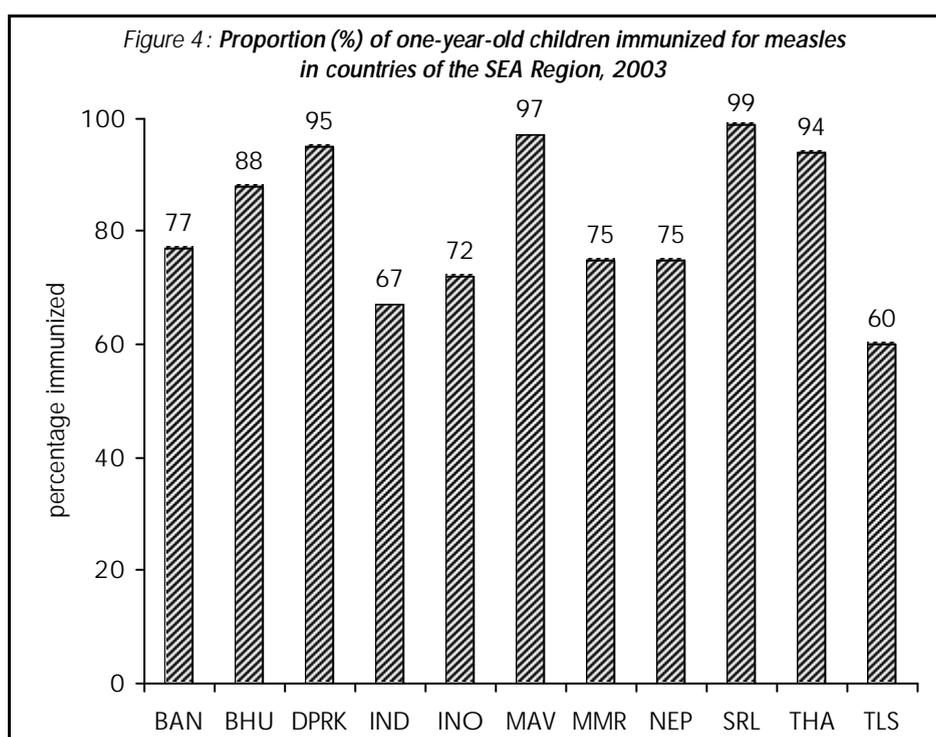
## Malnutrition

Malnutrition in children remains a problem. The proportion of underweight children

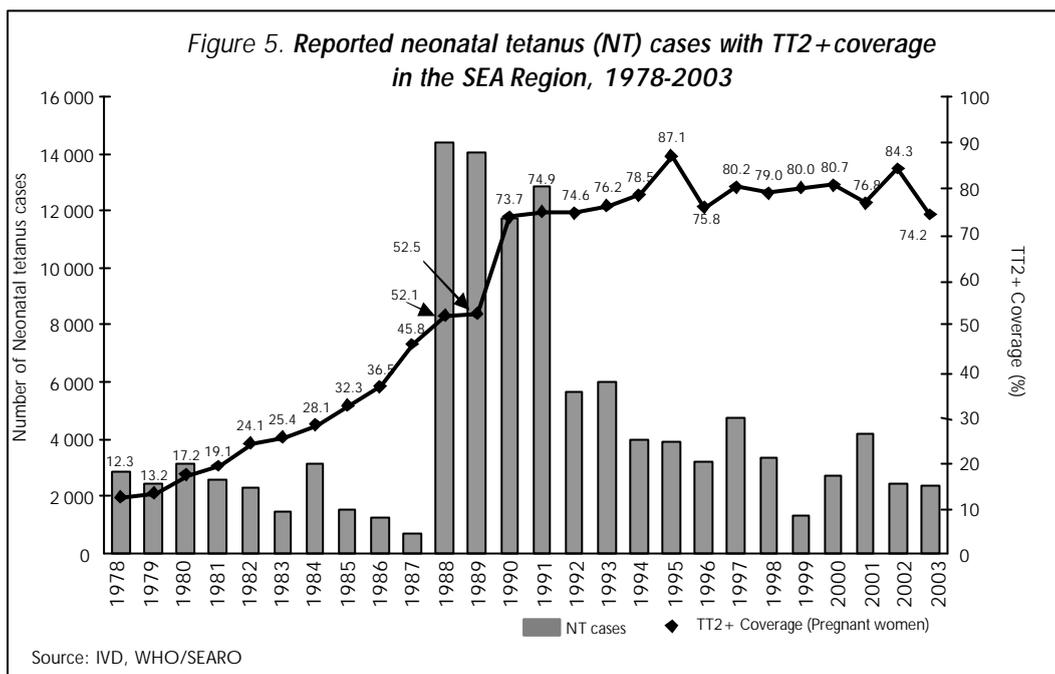
under five years, ranges from 20-60 per cent in the countries. On the other hand, in some parts of the Region, child obesity is emerging as a new challenge. Some countries in the Region have the highest incidence of low birth weight babies in the world. In many countries, almost a third of the newborns weigh less than 2 500gms. This poses a special challenge for their survival and development.

## Improving child survival

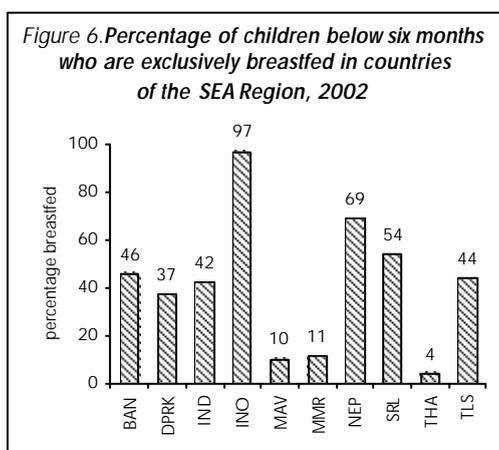
Evidence suggests that exclusive breastfeeding up to six months of age and Oral Rehydration Therapy for preventing/treating dehydration due to diarrhoea has a great potential for preventing child deaths.



Source: WHO/SEARO: 2004 "Basic Indicators" brochure



While trends suggest that exclusive breastfeeding and ORT use rates are increasing, much more remains to be done (Figure 6).



The Integrated Management of Childhood Illness (IMCI) strategy addresses the principal causes of child mortality –

diarrhoeal disease, acute respiratory infection, measles, malaria and underlying malnutrition. Nine of the 11 Member States in the Region have adapted the global IMCI strategy in order to meet local needs. Several countries have added neonatal care in the national adaptations. Coverage with IMCI within countries, however, remains low. Rapid expansion of IMCI has the potential of not only improving the quality of care for sick children, but also of accelerating the decline in child mortality

### Success stories

The South-East Asia Region has at least two of the most successful countries globally who have managed to dramatically reduce their maternal mortality ratios in recent years. These two countries, Sri Lanka and Thailand, have shown that with political will and determination, much can be done to make pregnancy safer and give all newborns a healthy start in life. Also, the

Democratic People's Republic of Korea, with its mass urbanization has also increased the proportion of births attended by a skilled attendant to 98%, by ensuring that most births take place in a facility where skilled professional care is readily available.

Therefore, all countries, from the most populous – India, to the country with least population – Maldives, are making tremendous efforts to reduce the unacceptable and tragic loss of life around pregnancy and birth, and in the precious early years of childhood. India, Indonesia, Nepal and Bangladesh for example, have major efforts under way to reduce maternal and newborn deaths. Current evidence indicates, however, that over 60% of the 3.1 million children who die every year in the Region could be saved, if all children had access to a handful of preventive and promotive interventions.

Although different approaches are being taken and countries are at different stages of implementation, they all have some similarities. Each has, or is making efforts to ensure that maternal, newborn and child health is highlighted in their national health and development plans. All are making investments, just as Thailand and Sri Lanka did, to ensure that quality skilled care, especially at and around birth, is available at the community level; that the community health services have strong links to and support from quality hospital services, for the management of complications; and finally, that all these services (community and hospital), are accessible and affordable to all women and children. Equally, a number of countries, Bangladesh, DPR Korea, India,

Indonesia, Maldives, Sri Lanka and Thailand, are showing good progress in terms of improving child health, which also requires a *comprehensive and integrated network of primary health care services and back-up hospital care*, to ensure that every child reaches its fullest potential and can make its own contribution to the future development of the world.

## Conclusion

In conclusion, it may be stated that countries of the Region have made significant progress in improving child health. Progress in maternal and neonatal health has however been slower. But there are positive signs.

Many countries have developed reproductive and neonatal health strategies, or are in the process of doing so. Several countries have initiated or strengthened action for ensuring skilled care at every birth. Effective and efficient implementation of both these actions will accelerate the pace of improvement in the status of maternal and child health in the Region.

The reasons for high maternal and young child mortality are not only medical but also have social and economic dimensions. Due attention to health systems strengthening, attention to family and community practices and coordinated initiatives across several social sectors to meet local specific imperatives, are therefore needed for accelerating progress towards meeting the Millennium Development Goals.



# Malaria During Pregnancy: A Priority Area for Malaria Research and Control in South-East Asia

Neeru Singh\*, S.B. Awadhia\*\*, A.P. Dash#, Rita Shrivastava##

## Abstract

Pregnant women and their unborn children are highly susceptible to malaria infection. Yet, authoritative documents barely mention malaria as a threat for pregnancy and normal fetal development in countries of the South-East Asia (SEA) Region. Almost all the published literature on the subject refers to Africa by presenting data principally related to *Plasmodium falciparum* which is supposed to cause a variety of adverse consequences, such as anaemia, cerebral malaria and deaths, etc. of both the mother and the baby. However, in some countries of the SEA Region, such as India and Sri Lanka, the dominant species is *P.vivax*, while in Myanmar and Thailand *P.falciparum* is the prevalent infection. *P.malariae* is also recorded in dense forests of countries of the Region. This article reviews 16 studies from India, 13 from Thailand, three from Sri Lanka, three from Myanmar and one from Indonesia, to estimate the burden of malaria-related adverse outcomes in the vulnerable group of pregnant women and their unborn children, in areas of stable and unstable (epidemic prone) transmission.

The aim of the review is to strengthen the capacity of the Region to address the burden of malaria in pregnancy through science-based policies for decision-makers in ministries of health, and in the public and private sectors.

## Introduction

Pregnant women are especially prone to severe attacks of malaria which may cause abortion, premature labour and still birth.<sup>1,2</sup> Despite the widespread concern for high risk due to malaria in pregnancy for nearly a century, the recognition that malaria in pregnancy is a significant health problem in the SEA Region requires systematic studies. Almost all the published literature on the topic refers to Africa and presents data referring principally to *P.falciparum* which may cause a variety of adverse consequences including maternal death, anaemia, accumulation of parasites in

placenta, low birth weight, fetal parasites exposure, congenital infection, infant anaemia, infant morbidity and mortality<sup>3</sup>. The paucity of precise information on the burden of malaria among pregnant women in countries of the SEA Region has hampered effective lobbying for the inclusion of malaria prevention among the top government priorities in these countries. Renewed interest and availability of new and effective interventions and strategies,<sup>4,5</sup> as well as global commitment<sup>6,7,8</sup> have re-generated interest in malaria in pregnancy since the turn of this century. This article reviews the evidence on the risks of malaria during pregnancy and attempts to estimate the probable burden of malaria-related

\* Dy. Director (Sr. Grade), Malaria Research Centre Field Station (ICMR), RMRCT Campus, Nagpur Road, Garha Jabalpur.

\*\* Sr. Medical Officer, Civil Hospital, Maihar, District Satna, MP

# Director, Malaria Research Centre (ICMR), 22, Sham Nath Marg, Delhi-54

## Sr. Medical Officer, District Hospital, Mandla, MP.

adverse outcome in this vulnerable group. The aim of the review is to strengthen the capacity of the SEA Region to address the burden of malaria in pregnancy through research and science-based policies and action. This documentation will serve as an information and resource tool for decision-makers in ministries of health and in the public and private sectors.

## Methodology

A literature search was undertaken for obtaining data on malaria in pregnant women in the SEA Region via Pub Med and MEDLINE search engines using the following key words – malaria in pregnancy, placental malaria, falciparum malaria and anaemia. Manual searches of pre-digital dates relevant to major tropical journals were also made for possible data sources. The bibliographies of all articles collected were checked for additional references. This paper reviews the surveys carried out over a period of 93 years between 1911 to 2004 to examine cases of malaria during pregnancy in the SEA Region.

A total of 36 studies were considered for this review: 16 from India; 13 from Thailand; three from Sri Lanka; three from Myanmar, and one from Indonesia. The study group sizes ranged from 21 to 4 600 persons. Most studies were largely hospital-based, and only a few were community studies. Further, in some countries of the Region, such as India and Sri Lanka, the dominant species is *P. vivax*<sup>9,10</sup>, while in others particularly in Myanmar and Thailand, *P. falciparum* is the dominant type of infection.<sup>11,12</sup> Moreover, the clinical epidemiology of the two species is very different. Further, *P. malariae* and *P. ovale* are also recorded<sup>13</sup>. Since the species,

incidence and severity of infection depend on the relative frequency of the different species of *Plasmodium*, an attempt was made to cover all available information on prevalent species of malaria.

## Observations

The problem of malaria infection in pregnant women was initially described nearly 95 years ago in India during the Punjab epidemics in 1908. In Amritsar, out of 4 600 pregnant women, malaria caused 300 premature births, and 1 100 still births, miscarriages and abortions, which amounted to 30% interrupted pregnancies<sup>14</sup>.

This is further supported by studies conducted in Sri Lanka, during an epidemic in 1934-1935, in which the case fatality rate in pregnant women was 13% (47/358) and foetal loss or neonatal death rate was 67% (178/266) at the Colombo General Hospital<sup>15</sup>. In India, the hazards of this disease have been estimated and recorded recently in some hospital-based studies in different states of the country.<sup>16,17,18,19,20,21,22,23,24</sup> The summary of information from these studies suggests that in pregnant women, *P. falciparum* malaria, anaemia and adverse outcomes are very common (Table 1).

The prevalence and adverse outcome were significantly higher in primigravidae as compared to multigravidae<sup>17,23,24</sup>. The *P. falciparum* prevalence was also found to be the highest in the second trimester<sup>24,25</sup>. However, the studies that were reviewed here were mostly hospital-based and focused on sample groups of hospitalized subjects. Thus, their findings are liable to distort the estimates of incidence rates and the seriousness of clinical cases observed among pregnant women.

**Table 1. Adverse effects of malaria on the mother and foetus in India**  
(Summary of hospital-based studies)

	Gujarat (Surat) L <sup>17</sup>	Orissa		Madhya Pradesh (Jabalpur) M <sup>20,21</sup>	Rajasthan (Bikaner) L <sup>23</sup>	Assam (Digboi) H <sup>19</sup>	Uttar Pradesh (Jhansi) L <sup>18</sup>	Chandigarh L <sup>16</sup>
		Rourkela H <sup>24</sup>	Koraput H <sup>33</sup>					
<b>Number</b>	322	55	209	365	45	206	256	78
<b>SPR(%)</b>								
PG	58.0 (Pf: 62; Pv:38)	-	11.6	17.0 (Pf: 67; Pv:33)	-	1.1 (Pf: 62; Pv: 32; Pm: 0.4; Pf+Pv: 5.6)	- (Pf: 82; Pv: 18)	- (Pf: 58; Pv: 40; Pf+Pv: 2)
Control	19.0	-		8.0	-	-	-	-
<b>High Parasitaemia(%)</b>								
PG	-	1- 70	-	6- 69	-	-	-	-
Control	-	0.5- 11		2- 9	-	-	-	-
<b>Cerebral malaria(%)</b>								
PG	-	60.0	-	7.0	76.0	-	-	7.0
Control	-	30.0		0	33.0	-	-	-
<b>Anaemia(%)</b>								
PG	90.0	-	8.6	60.0	20.0	-	-	60.0
Control	81.0	-		10.0	4.0	-	-	-
<b>Maternal Mortality(%)</b>								
PG	33.0	31.0	-	7.0	38.0	66.6	-	4.0
Control	0	14.0		0	15.0	-	-	-
<b>Placental Malaria(%)</b>								
PG	-	-	-	29.0	-	-	18.0	-
<b>Other Complications (%)</b>								
PG	-	25.0	-	-	20.0	-	-	4.0
Control	-	10.5		-	6.0	-	-	-
<b>Abortion(%)</b>								
PG	10.0	7.2	4.2	2.0	11.0	5.3	-	1.2
Control	2.0	-	5.4	0.7	-	-	-	-
<b>IUFD(%)</b>								
PG	2.0	7.2	20.8	-	31.0	-	-	5.0
Control	0	-	1.6	-	-	-	-	-

	Gujarat (Surat) L <sup>17</sup>	Orissa		Madhya Pradesh (Jabalpur) M <sup>20,21</sup>	Rajasthan (Bikaner) L <sup>23</sup>	Assam (Digboi) H <sup>19</sup>	Uttar Pradesh (Jhansi) L <sup>18</sup>	Chandigarh L <sup>16</sup>
		Rourkela H <sup>24</sup>	Koraput H <sup>33</sup>					
<b>Stillbirth (%)</b>								
PG	6.0	-	12.5	2.0	13.0	7.2	-	-
Control	0	-	1.6	0.7	-	-	-	-
<b>Pre-term (%)</b>								
PG	60.0	9.0	4.2	-	20.0	11.0	-	9.0
Control	15.0	-	2.7	-	-	-	-	-
Cord Blood	4.0	-		10.0	-	-	13.0	-
<b>Low Birth Weight (%)</b>								
PG	82.0	5.4	25.0	89.0	-	-	83.0	-
Control	40.0	-		38.0	-	-	26.0	-

- Information not available, PG: Pregnant women, Control: Non-infected pregnant women/Infected non-Pregnant women, IUFD - Intrauterine fetus death. H - High transmission (Hyper-endemic); M - Low-to-high transmission (meso-endemic); L - Low transmission (non-endemic)

In Myanmar, a scrutiny of records revealed that in Taunggyi Shan State,<sup>11</sup> in 52 patients with *P. falciparum* infection, the prevalence of malaria was highest among primigravidae (40%). The maternal death rate was found to be 2.4%, with the overall foetal wastage rate of 64%. In Tavoy Civil Hospital in 50 inpatient pregnant women with malaria, the case fatality rate was high (20%) and prematurity was as high as 86%<sup>26</sup>. Premature birth results commonly from symptomatic malaria and is usual in severe malaria. It is, therefore, common in low transmission areas, as well as in epidemics<sup>27</sup>. Another hospital in Thaton Mon State, Mya Thida<sup>28</sup> recently recorded that out of 958 asymptomatic pregnant women attending the antenatal clinic, the overall parasite prevalence was 12.3% (*P. falciparum* 63%, *P. vivax* 34% and remaining were mixed infections). Besides, maternal death (36%); miscarriages (4%); intrauterine fetus death and still birth (3.4%); neonatal malaria (1%); low birth weight (25%); neonatal para-sitaemia (3.2%); cord blood parasitaemia (4.2%), and placental malaria (7.3%) were common complications. A direct relationship between maternal

malaria, anaemia and mortality was also observed, e.g. 98 deaths/ thousand live births with moderate anaemia (7-10g%) and 467 deaths/ thousand live births with severe anaemia (<7g%). The major adverse effect of malaria in pregnancy on the mother is anaemia. However, the causes of anaemia during pregnancy are multifactorial. They include an iron-and-folate-deficient diet; haemoglobinopathies, and infections such as malaria and hookworm. Thus, the interpretation must be treated with some caution, because anaemia is clearly affected by a number of factors which may also be interdependent.

Similarly, at the Thai-Kampuchean border, in Kap Choeng hospital, the case fatality rate due to malaria is 10% for pregnant women (Table 2). Besides, spontaneous abortions and still births are common including pre-term babies who die<sup>29</sup>. In Thailand, severe malaria was reported to be three times more common in pregnant women than in non-pregnant women<sup>30</sup>. In a prospective study in Thailand<sup>31</sup>, the proportion of women having malaria during pregnancy was quite high (*P. falciparum* 80%, *P. vivax* 17% and remain-

ing were mixed infections). Asymptomatic parasitaemia was very common. Primi-gravidae were infected more commonly (47.5%) than multigravidae (33.3%), while anaemia was observed in more than 30% pregnant women which was proportional to the number of parasitaemic episodes. Low birth weight was commonly recorded in all gravid women. Nosten *et al*,<sup>31,32</sup> were of the opinion that in areas where pregnant women were often symptomatic, low birth weight resulted mainly from intrauterine growth retardation rather than from pre-term delivery.

**Table 2.** Adverse effects of malaria on the mother and fetus in Thailand

Complications	Kap Choeng Hospital Thai-Kampuchean Border <sup>29</sup>	Shoklo Camp, Hospital Thailand <sup>30</sup>	Thai-Myanmar Border <sup>31</sup>
Number	193	30	1358
SPR			37
Pv and Pf	100% Pf	100% Pf	80% Pf 17% Pv and 2.7 mixed
Severe malaria		20/29 (60)	
Convulsions		5/20 (17)	
Anaemia		13/20 (43)	31
High parasitaemia		9/20 (30)	
Hypoglycaemia		1/11 (9)	
Mortality	10	8/30 (27)	
Abortion	56.3	1/30 (3.3)	3.5
Stillbirth	5	4/30 (13.3)	3.2
Pre-term	4	1/30 (3.3)	
Low birth weight			0
Infant mortality		2*/30 (6.6) (Twins)	

A community-based study conducted in Mandla (Central India), in an inaccessible terrain during a malaria epidemic revealed that 55% pregnant women were infected with malaria, of which 88% were due to *P. falciparum*; 7% due to *P. vivax*, and the remaining were mixed infections<sup>25</sup>. All primigravidae (42%), secundigravidae (68%) or multigravidae (54%) were at great risk of developing severe malaria especially in the second trimester. Moderate anaemia was recorded in 100% pregnant women (7.5-11g%). Of the women found infected with *P. falciparum*, 3% had abortions, 4% still births and 2% neonatal deaths.

Of the babies born, 85% were of low birth weight. On the contrary, no significant difference in the outcome of pregnancies in women with or without malaria parasites in their peripheral blood was recorded in Koraput district, India<sup>33</sup>. Further, we were unable to estimate the association between *P. vivax* infection and adverse pregnancy outcomes in Mandla<sup>25</sup>, even though *P. vivax* malaria during pregnancy had been associated with maternal anaemia and low birth weight according to an earlier study carried out in a tertiary hospital facility in Central India<sup>21</sup> and in Thailand<sup>12,27</sup>. On the contrary, a study conducted in a predominantly *P. vivax*-endemic region of Sri Lanka failed to detect a significant impact of malaria on pregnancy or the newborn<sup>34</sup>. Clearly, there is a need to understand whether there is any association between increasing levels of malaria transmission and disease outcome during pregnancy. Surprisingly, very little is known about placental infection with *P. falciparum* or *P. vivax* from countries of the SEA Region. Recently, in the District Hospital, Mandla, 29% placental infection (93% *P. falciparum*; 2% *P. vivax*, and 5% mixed infection of *P. vivax* and *P. falciparum*) cases were found during the transmission season (Meso-endemic area) in patients who came for

delivery with or without fever<sup>22</sup>, while peripheral smears were positive in only 12% of mothers. Parasitaemia of *P. vivax*, *P. falciparum* and their mixed infections were also recorded in 10% umbilical cord blood smears, even with very scanty infection (Singh, unpublished data). From Jhansi Medical College Hospital (low endemic area), Uttar Pradesh, placental infection was reported to be 18% histopathologically and cord blood smears were positive in 13% of *P. falciparum* infected placentas (Table 1). The presence of cord blood parasitaemia probably reflected a recent active transmission. Interestingly, in Thailand, researchers did not come across a positive placenta with negative blood smears, which suggested that most malaria infections in pregnancy were associated with placental parasitaemia<sup>31,35</sup>. Interestingly, in Mandla, India, we recorded that most placentas had scanty parasitaemia and were peripheral smear-negative, even in women with clinical symptoms. Babies born from infected placentas were of significantly low birth weight as compared to babies from uninfected placentas. Though mortality was rare, these babies remained underweight till six months after their birth (Singh, unpublished data). On the contrary, Das<sup>33</sup> recorded 17.7% neonatal and perinatal mortality in Koraput, India though he did not record birthweights of newborns. Further, it is stated that malaria during pregnancy is not associated directly with increase in infant mortality. However, as low birth weight is a major determinant of infant mortality<sup>36</sup>, it is assumed that malaria and anaemia during pregnancy would increase infant mortality indirectly by lowering the birth weight. In Thailand, severe maternal anaemia was found to be associated with an increased risk of infant death in the postnatal period<sup>37,32</sup>. It is thus concluded that, malaria and anaemia are likely to act together to reduce the birth weight<sup>27</sup>. However, their indepen-

dent effects are difficult to distinguish. Further, in a highly endemic area of Bengal, India, Strickland and Sengupta<sup>38</sup> calculated that the average age of infants undergoing their first attack of malaria was about two months. In Mandla, India, we recorded that during an outbreak, 30% infants were infected with malaria at the age of two months with *P. vivax* representing >50% of infections<sup>25</sup>. Similarly in Koraput, India, Das<sup>33</sup> recorded about 18% malaria prevalence in neonates (*P. vivax* 30%; *P. falciparum* 60%, and 10% mixed infection of *P. vivax* and *P. falciparum*). In Thailand, maternal infection within the week before delivery was a risk factor for infant deaths from one to three months of age<sup>27</sup>. It is noted that no single study has been conducted to observe the full sequence of events from maternal malaria infection to infant mortality.

Further, the complications of malaria during pregnancy are due to the direct effect of parasitaemia, to high fever as an accompanying symptom and to anaemia. Up to 70% parasitaemia (Table 1) was recorded in India<sup>20,24</sup>. Control programmes need to tackle these factors singly or in combination. Ideally, all preventive and control programmes should start early during the first half of pregnancy, which is the time of peak prevalence of malaria and anaemia<sup>39</sup>. The relationship between anaemia and its treatment with iron and folate, and malaria was studied in Thailand recently<sup>40</sup>. The results showed that while there was no association with *P. falciparum*, infection with *P. vivax* had a predilection for young erythrocytes. Thus in *P. vivax*-endemic areas, systematic iron and folate supplementation confers both benefit and risk in pregnancy.

The Global Malaria Control Strategy of the World Health Organization<sup>42</sup> advocates that all pregnant women living in high-risk

areas should receive malaria chemoprophylaxis. Only one hospital-based study carried out in Surat, India described the potential benefit of weekly Chloroquine (CQ) chemoprophylaxis during pregnancy in terms of an increase in birth weight of newborns<sup>17</sup>. However, the study had limited value because of the low numbers involved (n=53). On the contrary, Singh and Shukla<sup>41</sup> in central India had problems in conducting the field study involving delivering of weekly CQ chemoprophylaxis due to strong socio-cultural practices prevailing in the peri-urban community. The characteristics of urban/ peri-urban malaria may differ because of access to medication and health services.

In practice, effective antenatal coverage is very limited as most pregnant women seek care in the middle of the second trimester or in the third trimester of pregnancy. The effect of antimalarial drug use for malaria control is difficult to evaluate as there is widespread use of incomplete treatment course from outside sources<sup>43</sup>, probably leading to frequent recrudescence infections of *falciparum* malaria with repeated production of gametocytes after a single infective mosquito bite. The common problems are that provision in government health facilities are limited, antenatal care attendance is inadequate, and compliance with therapy is poor. This indicates that all preventive and control programmes should first address the means of facilitating early reporting for antenatal care. Regular attendance of all pregnant women with or without clinical signs and symptoms in antenatal clinics is required, in order to implement the intervention strategy. It is possible that if wide coverage of ANC services is not attainable, community-based health workers such as *anganwadi* workers (mother and child care unit) or village-based malaria link workers (MLVs), could collect blood smears and deliver intervention. MLVs were found to

be an effective and appropriate channel for providing antimalarials in central India (unpublished report, NVBDCP Bhopal, India). Furthermore, antimalarial medications for prophylaxis must also be acceptable to pregnant women as chloroquine is also considered a potent abortifacient as compared to any other drug. Thus, good quality socio-cultural research is needed to find ways of improving and maintaining compliance. Further, while delivery and compliance are extremely important, an effective and safe drug is equally critical. While poor compliance will reduce the effectiveness of the regimen, good compliance cannot improve the benefits of an ineffective regimen. A very high level of drug resistance has already been recorded in pregnant women of Mandla district, India,<sup>44</sup> though the study itself suffers from a limitation because of the small sample size (n=21).

The problem of drug resistance in *P. falciparum* is particularly acute on the Thai-Myanmar border where even mefloquine and quinine give unsatisfactory treatment response when used as single agents in pregnancy<sup>45</sup>. Consequently, the options for treatment of a pregnant woman and her baby are restricted because of the unknown effects of antimalarials on the fetus. Mefloquine antimalarial prophylaxis in pregnancy was given on the Thai-Myanmar border<sup>32</sup>. This drug gave >85% protection against *P. falciparum* and complete protection against *P. vivax*. Mefloquine is safe and effective for antimalarial prophylaxis in the second half of pregnancy. Furthermore, the most rapidly acting and effective of all antimalarial drugs are artemisinin derivatives (artesunate and artemether). These were also used for treatment of multidrug-resistant malaria in pregnant women in Thailand. Both artesunate and artemether were well tolerated, and there were no drug-related side-effects<sup>46,47,48</sup>.

## Limitations, Scope and Strategies

This review has several limitations. First and foremost, while some studies were prospective, others were retrospective and some were case studies. They were carried out in different geographic terrains covering a wide range of intensity of malaria transmission in different racial groups. Different studies presented different outcomes and different classification of outcomes. In most cases these studies had small sample sizes. Some studies did not observe a statistically significant association between outcomes.

The second limitation is that there was vast heterogeneity in the measurement techniques for haemoglobin estimation and there was no indication of the true exposure of each woman from each study site. Third, the accuracy of the values shown in Table 1 relied heavily on the correct diagnosis of malaria infection status. Because these studies defined infection status as the presence of parasitaemia in a peripheral blood smear, it is probable that many women who harboured sequestered placental infections were misclassified. It is therefore likely that the values shown in Table 1 represented an underestimation of the proportion of adverse outcomes due to malaria. Lastly, these adverse outcomes were attributed to malaria, thereby but not exclusively due to malaria suggesting that they contributed to only a proportion of an event and that they were not the only cause of that event. Nevertheless, the relative consistency of findings and estimates across the studies suggests that malaria infection in pregnancy does present a real and quantifiable risk for both the mother and her baby, which needs to be estimated. Therefore, the recognition that malaria in pregnancy is a significant health problem in countries of the SEA Region requires systematic studies. In this context, almost nothing is known from Bangladesh and Indonesia. The only information available

from Indonesia is that 56% pregnant women receive prenatal care, and that there has been a reduction in the prevalence of anaemia during pregnancy<sup>49</sup>. The ratio of *P. falciparum* and *P. vivax* in pregnant women is 41.4% and 58.6% respectively, while in non-pregnant women the corresponding figures were 51.4% and 48.5% respectively, (Gita Maya, unpublished data). Therefore, an extensive field research project needs to be undertaken in the SEA Region in order to: address some important issues; understand the epidemiology of malaria in pregnancy; determine the effect of maternal malaria on birth weight and infant mortality; determine the association of malaria and anaemia, and assess the different impacts of *P. vivax* and *P. falciparum* on pregnancy and their frequently different susceptibility to commonly-used antimalarials. This requires regular follow-up of pregnant women during pregnancy, delivery and post-delivery. All aspects of epidemiology of *P. vivax* and *P. falciparum* malaria in pregnancy should be well defined in order to develop malaria prevention strategies.

Effective measures to reduce the burden of malaria in unstable transmission settings would differ from those recommended for high-transmission areas. For instance, insecticide treated bednets (ITN) were found to be not effective for preventing anaemia in pregnancy in a high-transmission area in Kenya<sup>50</sup>, while they reduced anaemia in an area of low transmission on the Thai-Myanmar border<sup>37</sup>. The current strategies to prevent and control malaria in pregnancy promote a package of interventions which include the use of ITN, and intermittent preventive treatment (IPT) with full curative doses of an effective antimalarial, which currently is Sulfadoxine-pyrimethamine (SP), delivered through a routinely scheduled antenatal clinic visit and appropriate case management<sup>6,51</sup>. An important aspect of the renewed strategy is partnership with reproductive health services and the

recognition of antenatal care services as the focal point to prevent malaria during pregnancy<sup>51</sup>. In most countries of the SEA Region, the intensity of transmission varies considerably over short geographical distances. However, although microfoci of intense transmission are present, in general they are both low (<1 infection/year) and seasonal. Thus, premonition does not develop fully with the result that symptomatic and sometime life-threatening disease is seen at all ages. The challenges for the Region are to determine what interventions are appropriate, both for areas where transmission is more or less perennial but of relatively low intensity, and for areas with unstable transmission (epidemic prone). In some countries indoor residual spraying (IRS) of dichlorodiphenyl-trichloroethane (DDT) is still being used for reducing and controlling malaria. This intervention is continually under scrutiny for its harmful effects on the environment, and on mothers and newborn babies<sup>52</sup>. Chen and Rogan<sup>53</sup> claimed that DDT causes reduced duration of lactation and increased incidence of pre-term births. However, the validity of their arguments requires evidence-based confirmation. Therefore, the Sri Lanka data on deaths attributed to malaria and to premature births in the years before DDT was used, and in the years when DDT IRS was used, in<sup>21</sup> districts of varying malaria endemicity was examined<sup>54</sup>. After DDT was introduced in 1946, malaria deaths declined greatly. However, deaths attributable to premature births increased slightly. Investigators attributed this to improvement in reporting and diagnosis rather than to any decline in the health of expectant mothers, which, according to all other criteria, showed improvement. Thus, this evidence did not support the idea that the reported increase in premature births was a side-effect of DDT use<sup>55</sup>. Further, maternal infection with anaemia at delivery was an additional contributor to neonatal death, as

well as to inducing premature birth<sup>32</sup>. Thus, focusing on the prevention of malaria near delivery would have the greatest overall benefit in resource-poor areas<sup>27</sup>.

## Conclusion

To work in an area of unstable and seasonal malaria transmission requires patience on the part of both the sponsors and the scientist. However, this approach is expensive and not very scientifically productive at times. In such areas, the routine use of chemoprophylaxis may be inappropriate because of the very low prevalence of parasitaemia in a non-epidemic year. However, its association with adverse outcomes for pregnant women who become ill with malaria in such regions is unexpectedly strong<sup>24,23</sup>. There is, therefore, an urgent need to evaluate the magnitude of the burden of malaria during pregnancy during an epidemic, in order to examine the prevention and intervention opportunities. If the finding of such a study shows a significant burden of malaria during pregnancy during an epidemic, then the challenge will be to design an effective and acceptable intervention. Clearly, there is need for a strategy that is based on prevention. At the same time, however, the strategy should limit the use of unnecessary antimalarials so as to check the spread of drug resistance.

It is thus concluded that malaria in pregnancy is a problem which warrants increased research and investment. A workable policy needs to be put in place, based on a multicentric study covering areas of different endemicity. In addition, collaboration between the scientist and the control programmes should be strengthened, and community-level research needs to be carried out to guide programmes and to monitor and evaluate the markers of success.

## References

1. Clark, HC, The diagnostic value of the placental blood film in aestivoautumn malaria. *Journal of Experimental Medicine* 1915, 22: 427-445.
2. Blacklock DB & Gordon RM, Malaria infection as it occurs in late pregnancy, its relationship to labour and early infancy. *Annals of Tropical Medicine and Parasitology* 1925, 19:327-365.
3. Steketee RW, Nahlen BL, Parise ME & Menezes C, The burden of malaria in pregnancy in malaria endemic areas. *American Journal of Tropical Medicine & Hygiene* 2001, 64: 28-35.
4. Parise ME, Ayisi K, Nahlen BL. et al., Efficacy of sulfadoxine-pyremethamine for prevention of placental malaria in an area of Kenya with a high prevalence of malaria and human immunodeficiency virus infections. *American Journal of Tropical Medicine & Hygiene* 1998, 59: 813-22.
5. D' Alessandro U, Langerock P, Ben nett S, Francis N, Cham K, Greenwood BM, The impact of a national impregnated bed net programme on the outcome of pregnancy in primigravidae in The Gambia. *Transactions of the Royal Society of Tropical Medicine & Hygiene* 1996, 90: 487-492.
6. WHO expert committee on Malaria. Twentieth report. Geneva, World Health Organization, 2000 (WHO technical report series No. 892).
7. Anon. 2000A, Millennium Development goals. United Nations Millennium Summit. September 2000. <http://www.adb.org/MDGS/about.asp#global>.
8. Anon 2000, The African Summit on Roll Back Malaria, Abuja, Nigeria, 25 April 2000, World Health Organization, 2000 (WHO/CPS/RBM/2000.17).
9. NVBDCP, Epidemiology situation report 2003. Directorate of National vector borne diseases control programme, 22-Sham Nath Marg, Delhi 110054.
10. Mendis K, Sina BJ, Marchesini P and Carter R, The neglected burden of Plasmodium vivax malaria. *American Journal of Tropical Medicine & Hygiene* 2001, 64 (Suppl). 97-106.
11. Naing T, Win H, New YY, Falciparum malaria and pregnancy. Relationship and treatment response. *South East Asian Journal Tropical Medicine & Public Health* 1988, 19:253-8.
12. Nosten F, McGready R, Singpson JA Thawai KL, Balkan S, Cho T, Hkijaroen LS, Looareesuan S and White NJ, Effects of Plasmodium vivax malaria in pregnancy. *The Lancet* 1999, 354: 546-9.
13. Kawamoto F, Liu Q, Ferreira MU, Tantular IS, How prevalent are Plasmodium ovale and P. malariae in East Asia. *Parasitology Today* 1999, 15: 422-426.
14. Christopher SR. 1911, *Sci. Mem. Off Med. Sanit Depts. Govt. India* (n.s.). 46:197.
15. Wickaramsuria GAW. 1937, Clinical features of malaria in pregnancy. *Malaria and Ankylostomiasis in pregnant women*. London Oxford University Press UK, 5-90.
16. Sholapurkar SL, Gupta AN, Mahajan RC, Clinical course of malaria in pregnancy a prospective controlled study from India. *Transactions of the Royal Society of Tropical Medicine & Hygiene* 1988, 82: 376-379.
17. Nair LS and Nair AS, Effects of malaria infection on pregnancy. *Indian Journal Malarology* 1993, 30: 207-214.
18. Kaushik A, Sharma VK, Sadhana and Kumar R, Malaria placental infection and low birth weight babies. *Journal of Communicable Diseases* 1992, 24: 65-69.
19. Saikia PK, Battacharjee NK and Baruah KD. 1994, Malaria in pregnancy. A clinical study in an industrial hospital. Abstract published in *Journal of Association of Physician of India*. 50th Golden Jubilee Conference, Madras.
20. Singh Neeru, Shukla MM and Neena Valecha, Malaria parasite density in pregnant women of District, Jabalpur, Madhya Pradesh. *Indian Journal of Malarology* 1996, 33(1): 41-47.
21. Singh Neeru, Shukla MM and Sharma VP, Epidemiology of malaria in Pregnancy. *Bulletin of World Health Organization* 1999, 77(7). 567-571.
22. Singh Neeru, Saxena A. and Srivastava R, Plasmodium vivax infection in placenta and congenital malaria in central India. *Annals of Tropical Medicine & Parasitology* 2003, 97(8): 875-878.
23. Kochar DK, Thanvi I, Joshi A, Shubhakaran, Agarwal N and Jain N, Mortality trends in falciparum malaria effects of gender difference and pregnancy. *Journal of Association of Physicians of India* 1999, 47 (8): 774-778.
24. Mishra SK, Mohanty S, Satpathy SK and Patnaik JK, Complicated falciparum malaria during pregnancy. *Journal of Obstetrics & Gynaecology* 1998, 48: 31-34.
25. Singh N, Mehra RK and Srivastava N, Malaria during pregnancy and infancy in an area of intense malaria transmission in central India. *Annals of Tropical Medicine & Parasitology* 2001, 95: 19-29.

26. Khin Ye Myint, A clinical study of malaria in pregnancy. *Myanmar Medical Journal* 1992, 37: 1-4; 41-52.
27. Luxemburger C, McGready R, Khan A, Morison L, Cho T, Chongsuphajsiddhi T, White NJ, Nosten F, Effects of malaria during pregnancy on infant mortality in an area of low malaria transmission. *American Journal of Epidemiology* 2001, 1, 154: 459-65.
28. Mya Thida. 2002, A thesis for the degree of Dr. Med. Sc. (O & G).
29. Meek SR, Epidemiology of malaria in displaced Khmers on the Thai-Kampuchean border. *South East Asian Journal of Tropical Medicine & Public Health* 1988, 19: 243-252.
30. Luxemburger C, Ricci F, Nosten F, Raimond D, Bathet S and White NJ, The epidemiology of severe malaria in an area of low transmission in Thailand. *Transactions of the Royal Society of Tropical Medicine & Hygiene* 1997, 91(3): 256-62.
31. Nosten F, ter Kulie F, Maelankiri L, Decludt B, White NJ, Malaria during pregnancy in an area of unstable endemicity. *Transactions of the Royal Society of Tropical Medicine & Hygiene* 1991, 85: 424-429.
32. Nosten F, ter Kulie F, Maelankiri L, Chongsuphajsiddhi T, Nopdonrattakoon L, Tangkitcho S, Boudreau E, Bunnag D and White NJ, Mefloquine prophylaxis prevents malaria during pregnancy. A double blind placebo controlled study. *Journal of Infectious Diseases* 1995, 169: 595-603.
33. Das, LK, Malaria during pregnancy and its effects on foetus in a tribal area of Koraput district, Orissa. *Indian Journal of Malariology* 2000, 37: 11-17.
34. Wickremasinghe AR, Gunawardena DM, Goonewardene R, Carter R and Mendis KN 1995, Malaria in pregnancy its occurrence and severity. *Proceedings of the academic series No. 29, Colombo, Sri Lanka Medical Association.*
35. McGready R, Brockman A, Cho T, Martin Levesque A, Tkachuk Ariana N, Meshnick SR, Nosten F, Haemozoin as a marker of placental parasitization. *Transactions of the Royal Society of Tropical Medicine & Hygiene* 2002, 96: 644-646.
36. Ashworth A, Effect of intrauterine growth retardation on mortality and morbidity in infants and young children. *European Journal of Clinical Nutrition* 1998, 52 (Suppl 1): 34-42.
37. Dolan G, ter Kulie FO, Jacoutot U, White NJ, Luxemburger C, Maelankiri I, Chongsuphajsiddhi T and Nosten F, Bednets for the prevention of malaria and anaemia in pregnancy. *Transactions of the Royal Society of Tropical Medicine & Hygiene* 1993, 87: 620-626.
38. Strickland C and Sengupta SC, The seasonal infectivity of mosquitoes as determined by a study of the incidence of infantile malaria. *Transactions of the Royal Society of Tropical Medicine & Hygiene* 1936, 2: 245-250.
39. Mutabingwa TK, Malaria and pregnancy. Epidemiology, pathophysiology and control options. *Acta Tropica* 1994, 52: 239-254.
40. Nacher M, McGready R, Stepniewska K, Chot, Looareesuwan S, White NJ, Nosten F, Haematinic treatment of anaemia increases the risk of *Plasmodium vivax* malaria in pregnancy. *Transactions of the Royal Society of Tropical Medicine & Hygiene* 2003, 97: 273-276.
41. Singh Neeru and Shukla MM, Socio-cultural barriers in accepting Malaria chemoprophylaxis by pregnant women in central India, a pilot study. *Journal of Health Population and Nutrition* 2002, 20(1): 93-95.
42. WHO 1993. Implementation of the global malaria control strategy. Report of a WHO study group on the implementation of the global plan of action for malaria control 1993-2000. Geneva, Switzerland. World Health Organization. WHO technical report series. 839.
43. Singh N, Singh MP, Saxena A, Sharma VP, Kalra NL, Knowledge, attitude, beliefs and practices (KABP) study related to malaria and intervention strategies in ethnic tribals of Mandla (Madhya Pradesh). *Current Science* 1998, 75: 1386-1390.
44. Singh Neeru, Saxena Ajay and Sharma VP, Status of chloroquine efficacy against *Plasmodium falciparum* in pregnant women in tribal area of Central India (M.P.). *Current Science* 2001, 80(5): 101-103.
45. McGready R, Cho T, Hkirijaroen L, Simpson J, Chongsuphajsiddhi T, White NJ, Nosten F, Quinine and mefloquine in the treatment of multidrug-resistant *Plasmodium falciparum* malaria in Pregnancy. *Annals of Tropical Medicine & Parasitology* 1998, 92: 643-653.
46. Bounyasong S, Randomized trial of artesunate and mefloquine in comparison with quinine sulphate to treat *P. falciparum* malaria pregnant women. *Journal of Medical Association Thailand* 2001, 84: 1289-1299.

47. McGready R. and Nosten F, The Thai Burmese border: drug studies of Plasmodium falciparum in pregnancy. *Annals of Tropical Medicine & Parasitology* 1999, 1: s, 19-23.
48. McGready, R, Cho, T, Cho, JJ, Simpson JA, Luxemburger C, Dubowitz L, Looareesuwan S, White NJ and Nosten F, Artemisinin derivatives in the treatment of falciparum malaria in pregnancy. *Transactions of the Royal Society of Tropical Medicine & Hygiene* 1998, 92: 430-433.
49. Kosen S and Gunawan S, Health services in Indonesia. *Medical Journal of Australia* 1996, 165: 11-12.
50. Sulman CE, Dorman EK, Talisuma AO, Lowe BS, Nevill C, Snow RW, Jilo H, Peshu N, Bulmer JN, Graham S, Marsh K, A community randomized controlled trial of insecticide treated bednets for the prevention of malaria and anaemia among primigravid women on the Kenyan coast. *Tropical Medicine & International Health* 1998, 3: 197-204.
51. WHO 2003. Strategic frame work for malaria control during pregnancy in the WHO Africa region, Geneva. World Health Organization, 2003 (in press).
52. Longnecker MP, Klebanoff MA, Zhou H, Brock JW, Association between maternal serum concentration of the DDT metabolite DDE and preterm and small for gestational age babies at birth. *The Lancet* 2001, 358: 110-114.
53. Chen A, Rogan WJ, Nonmalarial infant death and DDT use for malaria control. *Emerging Infectious Diseases* 2003, 9: 960-964.
54. Newman P. Malaria eradication and population growth the special reference to Ceylon and British Guiana. School of Public Health, Ann Arbor, Michigan. The University of Michigan. Bureau of Public Health Economics. Research Series No. 10. 1965. P – 250.
55. Roberts D. Curtis C, Tren R, Sharp B, Shiff C, Bate R, Malaria control and public health. *Emerging Infectious Diseases* 2004, 10: 1170-1171.



# Process Documentation of the Initiative to “Improve the Quality of Maternal Health through Implementation of Facility-Based Review of Maternal Deaths”

Sudha Salhan\*

## Introduction

Every year some eight million women suffer pregnancy-related complications and over half a million die. In developing countries, one woman in 11 may die of pregnancy-related complications compared to one in 5000 in developed countries (WHO 2004). India accounts for over 20% of the world's maternal deaths (SRS, GOI 1998). The maternal mortality ratio in India is 407 maternal deaths per 100 000 live births. This implies that more than 100 000 women die each year due to pregnancy-related complications. A large number of these deaths are preventable.

The Department of Obstetrics and Gynaecology, Safdarjung Hospital caters to all obstetric and gynaecological emergencies. No patient requiring admission is refused. Over the years, obstetrics admissions have recorded a considerable increase. In 2003 alone the Department conducted approximately 21 000 deliveries. With this quantum of obstetric services, the Department inevitably faces the situation of maternal deaths. The Department has been conducting maternal death reviews since 1996. With each learning it has also adopted a number of preventive measures. In 2003, in order to further gain

a better understanding of the causes of such deaths that occurred in the precincts of the Hospital, it decided to pilot an exercise of conducting facility-based review of each maternal death.

An analysis of deaths that occurred between 1 July 2003 and 30 June 2004 indicated that there are no simple answers for maternal deaths. Many inter-related factors contribute to maternal mortality. These include women's low status and lack of decision-making power, lack of information among women and their families on the signs of complications, inability to access care when complications arise, lack of resources to reach an appropriate care facility in time and medical service factors such as delay in treatment, lack of blood and errors of judgement.<sup>1</sup>

This article focuses on:

- Factors that led to conducting facility-based reviews;
- Processes involved in operationalizing these reviews;
- Description of the progression of activities, and
- Lessons Learnt.

\* Head, Department of Obstetrics and Gynaecology, Safdarjung Hospital, New Delhi

<sup>1</sup> Adapted from Berer and Ravindran 1999

## Definition of Maternal Death

A maternal death, as defined by the ninth and tenth revisions of the International Statistical Classification of Diseases and Related Health Problems (ICD), is "the death of a woman while pregnant or within 42 days of the end of the pregnancy, irrespective of the duration and the site of 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 direct maternal deaths and indirect maternal deaths. *Direct maternal deaths* are those resulting from conditions or complications or their management, which are unique to pregnancy and occur during the antenatal, intrapartum or postpartum period. *Indirect maternal deaths* are those resulting from previously existing disease or disease developing during pregnancy which is not due to direct obstetric causes, but which is aggravated by physiologic effects of pregnancy. Examples of indirect deaths include epilepsy, diabetes, cardiac disease and hormone dependent malignancies. *Incidental deaths* are deaths from unrelated causes which happen to occur in pregnancy or the puerperium. (WHO 2004).

## Department of Obstetrics and Gynaecology, Safdarjang Hospital

Safdarjang Hospital, New Delhi is a 1531 bedded tertiary care hospital. The Obstetrics division of the Department of Obstetrics and Gynaecology provides a range of services. These include:

- OPD (antenatal, postnatal and family welfare services);
- Labour and delivery services;

- Indoor facilities for investigations and treatment;
- Surgical procedures and post-operative care, and
- 24-hour emergency services.

The department has three units<sup>2</sup>, two labour rooms (high and low risk), two nurseries (high and low risk), two operation theatres (maternity, family welfare) and a small departmental laboratory. There is a common intensive care unit (ICU) for the entire hospital.

## Obstetric Emergency Services

The Department caters to all emergencies: booked and un-booked. On one visit the patient is deemed registered and on three visits booked. Un-booked cases are those which do not have any prior contact with the hospital in relation with the current pregnancy i.e. they have not come to Safdarjung for antenatal check-ups. HIV-positive expectant mothers are also referred to the hospital.

The Department has a separate emergency unit to avoid delays. It is called Emergency Receiving Room *alias* Gynaecology Receiving Room (GRR). It is equipped with all the facilities for resuscitation. It also has a minor operation theatre to conduct minor emergency surgeries related with abortions. It provides emergency services round the clock.

All pregnant women and women suffering from emergency gynaecological

---

<sup>2</sup> Each unit has three wards. There are a total of 313 beds (198 obstetric, 95 gynaecologic and 20 family welfare). Each unit has a separate team of medical, nursing and paramedical staff. The medical staff consists of one consultant, five specialists, six senior residents and six junior residents.

problems are first received in the GRR. Expert opinion is given on the spot. After examination patients requiring admission are assigned to a unit. The staff posted in GRR includes a senior resident<sup>3</sup>, a junior resident, intern, nurses and paramedics. Specialists are on call from each unit. Earlier a junior resident was posted in the GRR. A senior resident was on call. In order to rule out the possibility of error in examining serious cases it was decided to post a senior resident instead.

### Case Load

As mentioned in the above section, the Department caters to all emergencies: booked and un-booked. No patient requiring admission is refused, even when all Department beds are fully occupied. This gets reflected in bed occupancy rate in obstetrics wards which ranges between 110% to 120%.<sup>4</sup> The hospital obstetric services are not confined only to women from Delhi. It receives cases from other states as well. Predominant among them are the states of Haryana, Uttar Pradesh, Rajasthan and Bihar.

Over a period of time the obstetric-related admissions have seen an increase. Between 1991 and 2003, approximately 41% increase has been recorded. In 1991, obstetric-related admissions were 17436 and in 2003, 24539. The number of deliveries conducted at the Hospital has also seen a considerable increase. According to Hospital statistics, the number of deliveries conducted in 1991 was 14035 as compared to 20974 in 2003. This constitutes an approximate increase of 50%.

---

<sup>3</sup> Senior resident has postgraduate qualifications in Obstetrics and Gynaecology.

<sup>4</sup> As per the guidelines the bed occupancy of obstetrics wards should be between 70% and 80%.

### History of Maternal Mortality Review at the Hospital

Since 1996, the Department has been reviewing maternal deaths in the hospital with the aim of bringing improvements in the hospital's obstetric services. This exercise is conducted at three levels: by an audit committee<sup>5</sup> and at the departmental level on a monthly basis. All the teaching staff and students participate in the departmental meeting. The hospital maternal review meeting is also held twice a year. The hospital mortality meeting is inter-departmental. It is attended by an anaesthetist, pathologist, senior doctor from the blood bank and a physician.

Earlier, the resident doctor on duty at the time of death had to fill up a maternal mortality performa. This information included personal information, education status of the patient and her husband, duration of hospital stay, whether patient was booked or un-booked, obstetric history, diagnosis at the time of admission, condition in which the patient was admitted to the hospital, process chart during hospital stay, interventions, problems encountered and cause of death. It also contained a column in which death was classified as avoidable or non-avoidable.

### Introduction of Facility-based Review

The Head of the Department of Obstetrics and Gynaecology participated in a regional workshop organized by the World Health Organization (WHO) on improving maternal health situation through a review of maternal deaths in June 2003. Consequently, it was decided that the Department in collaboration with WHO

---

<sup>5</sup> The Audit Committee has six members (senior faculty): Two from each unit.

would pilot an exercise of conducting a facility-based review of each maternal death that took place in the Department. This was done in order to uncover both social and medical factors that led her on her road to death.

**Initiation of the Review:** The following steps were taken to initiate the facility-based review:

**Obtaining Permissions from the Hospital Administration:** Necessary permissions and clearances were obtained from the Medical Superintendent of the Hospital.

**Defining the Scope of the Review and Division of Responsibilities:** All three units of the Department participate in the process. The responsibility of conducting these reviews rests with the Audit Committee that was already conducting the maternal death reviews.<sup>6</sup> The Head of the Department of Obstetrics and Gynaecology is responsible for overall coordination.

**Field-testing and Modification of Facility-based Review Forms:** The facility-based review forms provided by WHO were field-tested in June 2003. This process involved sharing the forms with the postgraduates. Their opinions were sought during lectures. Forms were filled for two cases in each unit on an experimental basis. Subsequently, the forms were modified. The changes in the original forms included deletion of the assessors' form. This was done because it was felt that there was an overlap between it and the assessors' control sheet. The coding system to protect the identity of staff recommended in the original form was not followed. This was found to be cumbersome. Instead, a section for summary of facility staff interview was added to the assessors' control sheet. Some interviews

proposed in the original form were found to be unfeasible. These included interviews with family members after the event of death. It was found difficult to conduct these interviews given the sensitivity of the situation.

In addition to the information provided previously, information on social factors and logistical systems was also included.

**Identification of Data Sources:** Other sources of information include ward and operating theatre registers, antenatal check-up card, outpatient department slip, case sheet and interviews.

**Orientation of Residents:** All residents in the Department were given training in data collection and filling up of the forms.

**Operationalizing the Review:** The facility-based review involves assessment at two levels. The first level of assessment is done by the specialist and consultant of the concerned unit. The resident doctor on duty fills up the maternal death notification form. The second level of assessment is done by members of the faculty from the three units. They fill up the assessors' control sheet in consultation with one another. The assessors' control sheet is filled after a thorough review of the case and required interviews with doctors and other staff.

**Difficulties in Operationalizing the Review:** Initially, there was resistance from the resident doctors since this review entailed additional work. This was overcome with the passage of time. The sections that contain personal information are the most difficult. Eliciting personal information depends on the personal communication skills of the doctor. Given the sensitivity of the situation after death has occurred and the pressure of work during an emergency, sometimes the sections on personal information cannot be completed.

---

<sup>6</sup> The Audit Committee was divided into two teams of three members each.

## Analysis of Maternal Deaths using Facility-based Reviews

During the period 1 July 2003 and 30 June 2004 a total of 120 maternal deaths took place within the precincts of the Hospital. Facility-based reviews were conducted for 89 deaths that occurred in the three units of the Department. Approximately 79 cases or 89% were un-booked, while 10 cases or approximately 11% were booked.

As indicated in Table 1, 67% of these 89 deaths were direct maternal deaths, 25% were indirect and 8% incidental.

**Table 1.** Distribution of maternal deaths by cause

	Direct	Indirect	Incidental
Total Number	60	22	7
Percentage	67%	25%	8%

As can be seen in Table 2, postpartum haemorrhage was the leading direct cause of death. It accounted for approximately 26% of direct deaths. This was followed by eclampsia and abortion-related complications that accounted for approximately 12% of direct deaths.

**Table 2.** Distribution of direct maternal deaths by cause

Direct cause	Total number	Percentage distribution
Postpartum Haemorrhage	16	26%
Pregnancy-induced Hypertension	6	10%
Ante-Partum Haemorrhage	4	7%
Postpartum Septicimia	3	5%
Eclampsia	7	12%

Direct cause	Total number	Percentage distribution
Peurperal Fever Sepsis	2	3%
Ruptured Uterus	3	5%
Hypovolemic Shock	2	3%
Amniotic Fluid Embolism	2	3%
Molar Pregnancy	1	2%
Abortion-related	7	12%
Ectopic Pregnancy	3	5%
Non-determinable	4	7%
Total	60	100

Jaundice constitutes the leading indirect cause of deaths accounting for approximately 55% of indirect deaths. It is followed by anaemia that accounts for approximately 27% of indirect deaths.

### Lessons Learnt

The following factors have been found to be common to several deaths.

### Factors Related to Transportation and Primary Aid

Experience suggests that most of the patients come in private transport without any life care support. This holds true even when these patients have been taken to a district/ government or a private health facility. Lack of proper referrals lead to a further loss of critical time.

*Radha<sup>7</sup> was referred from the District Hospital. She came in a private transport. There was no referral slip. It appears that she was not given primary resuscitation or IV*

<sup>7</sup> Pseudonyms have been used in order to preserve the privacy of the patient. Hindu names have been used because they constitute the majority. However, the use of these names does not have any religious connotation.

fluids. By the time she arrived she was critical. She died within three hours of admission.

Seema had a full-term normal delivery at a private nursing home. She was referred to the hospital after suffering from postpartum haemorrhage due to extensive cervical tears. She was brought in a private transport. No primary aid was administered. By the time she arrived at the hospital she was already in a hypovolemic shock. She died of cardiac arrest on way to the operation theatre. Some emergency management like tight vaginal packing during transportation could have averted this outcome.

### **Importance of ANC**

Forty four of the 79 un-booked cases did not undergo antenatal check-up. This constitutes almost 56% of the non-booked patients. This points towards a broader policy issue of raising awareness about the importance of antenatal check-up and its components. Experience suggests that even when a woman is aware of the concept her understanding of it is limited to getting the tetanus vaccination. This is deemed equivalent of an antenatal check-up. She is unaware of other equally important components.

Maya was resident of a village from the neighbouring district. She was admitted with severe pregnancy-induced hypertension resulting in eclampsia and cerebrovascular accident. At the time of admission she was in labour. She did not undergo any antenatal check-up. As a result she missed warning signs of oedema that preceded the convulsions by a few days (as per the description provided by relatives). With active management of labour she delivered a live baby of 2.3 kg within four hours of her

arrival at the hospital. However, despite all efforts she could not be saved.

Meena was admitted with antepartum eclampsia. She had no antenatal check-up. She died within three hours of admission.

### **Need for Skilled Birth Attendant**

Almost 15% of deliveries were conducted by unskilled birth attendants. This underlines the need of the presence of skilled birth attendants at the time of delivery.

Lata was admitted with obstructed labour and intrauterine death of fetus. She suffered from severe anaemia. She was diagnosed as a case of ruptured uterus. A laprotomy was performed without any further loss of time. It revealed an old ruptured uterus, highly infected fetus and peritoneal fluid. In spite of hysterectomy the patient could not survive due to septicaemic shock. Despite a history of three previous stillbirths, the patient went to an unskilled birth attendant for delivery.

Madhu was fourth gravida third para. She had not undergone any antenatal check-up. She delivered at home assisted by a dai. She developed distension of abdomen and fever after delivery. She was admitted to hospital after six days of delivery, and was diagnosed with pyoperitonitis puerperal sepsis. Following a laprotomy, two litres of pus was drained. Despite all treatment there was no relief from fever. Madhu died on the fifth day after operation.

Meeta delivered at home. An untrained birth attendant conducted the delivery. Following a postpartum haemorrhage, she was brought to the hospital. By the time she arrived, she was already critical. She was unconscious, was gasping and her pupils were dilated. Non-availability of blood further compounded her critical condition. Within an hour of admission she died.

Tara was admitted with atonic postpartum haemorrhage. The delivery was conducted at home by a dai. It is not clear whether the dai was trained or untrained. The number of hours Tara

bled after delivery also cannot be determined. However, by the time medical help was sought at the hospital she was gasping. She died within 25 minutes of admission.

### Need for Safe Abortion

Abortion-related deaths account for almost 12%. This underlines the importance of safe abortions. Efforts to achieve this would include raising the awareness about going for a medical termination of pregnancy (MTP) to a recognized centre and precautions after MTP.

*Neela had got an MTP done from a private clinic in a neighbouring district. She developed septicaemia. Despite all efforts she could not be saved.*

### Family-related Factors

Family-related factors include sensitization of family members on pregnancy-related issues. Their lack of awareness becomes a major impediment particularly when there is need for blood donation. The myth that blood donation causes weakness leads them to either decline from donating blood straightaway or finding a way around it.

*Geeta was admitted in a critical condition. She was diagnosed with molar pregnancy, severe anaemia and respiratory distress. She had no antenatal check-up. The treatment planned for her was blood transfusion along with suction evacuation or hysterectomy. However, no relative was willing to donate blood. Neither the patient, nor her husband gave consent for surgery despite repeated counselling. The patient started bleeding profusely. Despite blood transfusion she could not be saved.*

### Medical Service Factors

In approximately 5% deaths the Department also identified medical service-related factors. These include factors such as lack of

blood, institutional delay in treatment, inappropriate treatment and post-delivery monitoring.

### Way Forward

If the Department has witnessed maternal deaths, experience has also led to a saving of lives. This is illustrated by the cases below.

*Shweta, a para 1, had delivered two months ago. She was referred to the surgical emergency by another city hospital offering specialist services. The referral slip indicated that the patient was suffering from cardiac failure, a result of severe anaemia. When she arrived at the Hospital general emergency, she was already gasping with severe pallour. She had no palpable pulse and the blood pressure was not recordable. Clinical examination by the gynaecologist on duty revealed tense and tender abdomen. This finding and the poor condition of the patient led the gynaecologist to suspect an intra-peritoneal haemorrhage. This was despite the fact that the patient was still in lactational ammenohrea, had no history of bleeding or spotting PV and did not present complaints of pain in the abdomen. On repeated questioning she did give a history of pain in the abdomen approximately twelve hours before admission to the Hospital. An abdominal paracentesis revealed blood that did not clot. Immediately a urine pregnancy test was performed, which was positive. A provisional diagnosis of ruptured ectopic pregnancy was made. The patient was resuscitated on lines of hypovolemic shock. IV fluids were rapidly transfused after a venous cut open. Six units of blood were arranged and the patient was rushed for laprotomy. It confirmed the diagnosis of ectopic pregnancy. Shweta went back home healthy.*

*Rita, 34 years, unbooked G4L5P2, came to the gynaecology emergency as FTP in early labour. In the labour room the patient was propped up and oxygen by mask was administered. She was given injection Lasix 40 mg IV. This was followed by exchange transfusion. Approximately 350 cc of blood was removed slowly. Two units of packed cells were transfused over the next six hours. The cell*

component of the blood that was removed initially was also re-transfused. This process saved the patient. Since she was already undergoing heart failure, giving her whole blood would have exerted an extra load on her heart and this would have led to further deterioration in her condition. A few hours after exchange transfusion, the patient delivered a healthy baby girl. She went back home in a healthy condition.

## Actions Taken

### Medical Service Factors:

**Increased Stress of Post-delivery and Post-operative Monitoring:** Doctors and nurses have been counselled by senior faculty members on the importance of strict post-delivery and post-operative monitoring. The Deputy Nursing Superintendent has been asked to direct all staff nurses to maintain strict bedside vital charting of patients.

**Lack of Blood:** The high-risk expectant mothers are made to donate blood or arrange for such donation during antenatal check-ups. This is to rule out the possibility of loss of time, should such an eventuality arise. Doctors on duty are also asked to take history of the donors. This is to prevent them

from finding excuses for not donating blood, such as claims of having history of BP, jaundice, alcohol consumption etc. Discussions are on with the Blood Bank to give priority to obstetric cases.

**Advocacy at Institutional Level for more Infrastructure:** Requests have been made for additional emergency operation tables.

**Coordination Between Other Departments:** In order to avoid misdiagnosis of ectopic pregnancy, the Casualty department has been asked to refer women in reproductive age group complaining about abdominal pain to the Department.

### Development of Protocols

**Distribution of Iron Folic:** Earlier the hospital used to provide fifteen days' stock of iron tablets. This has been increased to a month's supply.

**Networking for Transportation:** The Chief Medical Officer of PHC, Najafgarh, and District Hospitals, Gurgaon and Faridabad have been requested to send proper referral slips and provide life care support during transportation of critical cases.



# Reviewing Maternal Deaths and Complications to Make Pregnancy and Childbirth Safer

*Matthews Mathai\**

Pregnancy is a normal, healthy state that most women aspire at some point in their lives. Yet while pregnancy and childbirth should be an occasion for rejoicing, life-threatening complications may occur, which if inappropriately managed, could lead to maternal death or disability. Most of these deaths (99%) occur in developing countries. Every minute, one maternal death occurs somewhere in the developing world. Every year over half a million women die during pregnancy and following childbirth – 174 000 of these in the South-East Asia (SEA) Region of WHO<sup>1</sup>. The maternal mortality ratio (MMR) in the SEA Region in 2000 was estimated at 460 per 100 000 live births<sup>1</sup>. The lifetime risk of maternal death is 1 in 58 in this Region<sup>1</sup>. Maternal mortality is the proverbial tip of the iceberg. For every maternal death, there are 20-30 women who suffer severe morbidity. Difficult childbirth is also a major cause of death among newborn children.

The MMR is an indicator of the quality of health care available during pregnancy, childbirth and in the postpartum period. Of all maternal deaths, 80% can be potentially avoided by interventions during pregnancy, childbirth and the postpartum period, that are feasible in most countries. The common causes of maternal death include haemorrhage, hypertension, infection, obstructed labour and unsafe abortion. Unfortunately, national MMRs do not tell us

the real reasons why mothers die. Also one cannot identify which women or which groups of women or areas within a country have higher rates of maternal mortality.

It is therefore important to look beyond the numbers. Any planned action to reduce mortality needs a clear understanding of factors leading to death and the right kind of information on which to base remediable action. Each maternal death has a story to tell and can provide indications on practical ways to address the problem.

## Looking Beyond the Numbers

"Beyond the Numbers: reviewing maternal deaths and complications to make pregnancy safer"<sup>2</sup> published by WHO provides information about methodologies to help understand why women die. These methods include community-based death reviews (verbal autopsy), facility-based death reviews, and confidential enquiries/reviews into maternal deaths. In addition to mortality reviews, the manual deals with "near miss" surveys and evidence-based clinical audits. Also included are practical tools and questionnaires that can be modified for local use.

While all methodologies proposed are founded on common principles, they also have their own specific objectives and requirements. The purpose of these

---

\* Making Pregnancy Safer, WHO/HQ

approaches is to stimulate action to reduce maternal deaths and morbidity. Actions proposed may involve community interventions as well as clinical or health service issues. It is therefore essential that those persons with the ability to promote and effect the necessary changes be involved from the start of the review process.

These approaches follow the audit cycle: identify and review local cases confidentially, look for avoidable factors, promote change in practices, and review the outcome of these changes. As no names are included, confidentiality is assured. There is no attribution of blame. The information is not used for litigation or punitive action.

## Methodologies

*Verbal autopsy* aims to find the medical causes of death and ascertain personal, family or community factors that may have contributed to the death of women who died outside a medical facility. In settings where most women die in the community, this approach may be the only way to study and help avoid maternal deaths. This approach enables community awareness and advocacy for change. However, the precise medical cause of death may not be determined.

*Facility-based death reviews* provide an in-depth investigation of the causes and circumstances surrounding maternal deaths occurring in health facilities. If possible this should be supplemented by information about any community factors which may have played a part in maternal death. This exercise can lead to improvements in individual professional practices and development of locally applicable guidelines or standards. However, it does not cover deaths in the community and is not as rigorous as clinical audit.

*Confidential enquiries or reviews* into maternal deaths is a systematic, multi-disciplinary and anonymous investigation of all or a representative sample of maternal deaths occurring in an area, region or a country, which identifies the numbers, causes and avoidable or remediable factors associated with them. Confidential reviews provide a more complete picture of maternal mortality than generally available from maternal health records. Therefore, unlike the previous two methods, this method allows for general recommendations and guidelines to be made which are applicable at regional or national level.

A "*near miss*" refers to any pregnant or "recently-delivered" woman in whom immediate survival was threatened and who survived by chance or because of the hospital care that she received. Severe maternal morbidity or "near misses" occur in larger numbers than maternal deaths. Larger numbers provide stronger evidence and more robust conclusions. It is also possible to speak to the woman to obtain her views about what happened and the care she received. Since this can also be regarded as a "great save", it is less threatening to staff. However, case definition can be difficult and requires local agreement. Case ascertainment involves time and resources. There is no right or wrong definition of a "near miss". What is important is that the definitions used in any review are appropriate to local circumstances to enable local improvements to be made in maternal care.

Clinical audit is a quality improvement process that seeks to improve patient care and outcomes by a systematic review of care against explicit criteria, and through the implementation of change, based on the findings. It can be used for all maternity care, and not only for deaths and "near misses". It informs managers about the need for organizational changes or investments. It

helps to ensure that mothers receive the best possible care in the given circumstances. The Integrated Management of Pregnancy and Childbirth (IMPAC) clinical guidelines<sup>3,4</sup> can be used during the process of enquiry.

### Implementation of "Beyond the Numbers" in South Asia

The formal global launch of Beyond the Numbers was in late 2004. However, the WHO Regional Office for South-East Asia had been active even before the formal launch in promoting this tool for improvement of maternal health. A regional meeting of Member States of the SEA Region was held in New Delhi in February 2003. Participants from Bangladesh, Bhutan, India, Indonesia, Maldives, Myanmar, Nepal, Sri Lanka, Thailand and Timor-Leste were asked to develop plans for maternal death reviews. While most countries proposed facility-based reviews, confidential reviews were planned for Sri Lanka and Thailand. Confidential reviews were also proposed for Kerala state and

Vellore district in Tamil Nadu, India. Seed money was provided by the Regional Office. The proposals have since been implemented in many countries and results are awaited.

### Points to Remember

Each maternal death has a story to tell and can provide indications on practical ways of addressing the problem. Even a simple review of one maternal death can help save another's life. Every health worker can be self-reflective about why a mother died. This can bring about a change in attitudes and practices.

Knowing MMR is not enough. We need to know the underlying causes and determinants. A commitment to act upon the findings of these reviews is a key prerequisite to success.

Every maternal death is a tragedy. What is an even greater tragedy is failing to learn from why a mother died.

### References

1. Maternal Mortality in 2000. Estimates developed by WHO, UNICEF and UNFPA. World Health Organization, Geneva, 2004.
2. Beyond the Numbers: Reviewing maternal deaths and complications to make pregnancy safer. World Health Organization, Geneva 2004.
3. Integrated Management of Pregnancy and Childbirth: Managing complications in pregnancy and childbirth: a guide for midwives and doctors. World Health Organization, Geneva 2003.
4. Integrated Management of Pregnancy and Childbirth: Pregnancy, childbirth, postpartum and newborn care: a guide for essential practice. World Health Organization, Geneva 2003.



# Indoor Air Pollution: Impact of Intervention on Acute Respiratory Infection (ARI) in Under-five Children

*Khin Myat Tun<sup>\*</sup>, Han Win<sup>\*</sup>, Ohnmar<sup>\*\*</sup>, Aung Kyaw Zaw<sup>\*\*</sup>, Thuzar Myint<sup>\*</sup>,  
Khin Khin Swe Myat<sup>\*</sup>, Sandar Kyi<sup>\*</sup>, Than Than Lwin<sup>\*</sup>*

## Abstract

A community-based intervention study was conducted in a peri-urban township of Yangon during March 2002 to January 2003 with the aim of reducing acute respiratory infection (ARI) in under-five children through the use of information, education and communication (IEC) materials focusing on indoor air pollution, and to assess the impact of intervention. A total of 669 under-five children, 331 and 338 from intervention and control areas respectively, were recruited for the study. Baseline data on the incidence of ARI; knowledge and attitude of mothers, and practices enhancing indoor air pollution, were recorded in both areas. The IEC materials were developed and distributed in an intervention area. Three months after the intervention, the study populations were followed once a month for six consecutive months. Base line data on incidence of ARI was 0.18 episodes per 100 child-days at risk in both areas. At post intervention assessment ARI incidence was lower in the intervention area but the difference was not statistically significant (0.32 Vs 0.37 episodes per 100 child-days). Maternal knowledge on cause of ARI and attitude towards indoor air pollution and ill health were significantly improved in the intervention area but not the change in practice. Further studies with the use of IEC materials coupled with other behavioural impact approaches may enhance the change in practice and reduction of ARI incidence.

## Introduction

Acute respiratory infections (ARI) are the leading cause of the global burden of disease and have been causally linked with exposure to pollutants from domestic biomass fuels in developing countries. During the last two decades the potential significance for child health of exposures to air pollutants in indoor environments has also been recognized<sup>1,2</sup>.

Nearly half of the world continues to use biomass fuels - mostly wood, charcoal and crop residue for household cooking and heating<sup>3</sup>. These are typically burnt indoors in open fires or poorly functioning stoves. Every day, and for hours at a time, women and their children in particular are subjected

to levels of smoke in their homes that far exceed international safety standards.

The indoor concentration of health-damaging pollutants from a typical wood-fired cooking stove creates carbon monoxide and other noxious fumes at anywhere between seven and 500 times over the allowable limits<sup>3</sup>. Components of these mixtures have been shown to adversely affect host defenses against respiratory infections. Various studies in developing countries have reported on the association between exposure to indoor air pollution and acute lower respiratory infections<sup>4,5,6,7</sup>, upper respiratory infections and middle ear infections.<sup>8</sup> Coal is one of the major types of fuel for cooking in peri-urban areas of Yangon in Myanmar.

<sup>\*</sup> Clinical Research Division, Department of Medical Research (Lower Myanmar)

<sup>\*\*</sup> Epidemiology Research Division, Department of Medical Research (Lower Myanmar)

<sup>\*\*\*</sup> Department of Medical Research (Central Myanmar)

The aim of the study was to compare the effect of intervention relating to indoor pollution between intervention and control areas in terms of reduction in ARI incidence, changes in knowledge on ARI and avoidance of practices enhancing indoor air pollution.

## Methodology

### Study area and population

A community-based intervention study was conducted in a peri-urban area of Yangon Division. Ward 1 and Ward A from North Okkalapa Township are similar in geographic and socioeconomic conditions and thus these areas were purposely selected as control and intervention areas respectively. Moreover, these two wards are far enough so as to eliminate the spillover of the educational message from intervention to control communities. All households with one or more under-five children were enumerated in these areas and used for recruitment of the study population. A total of 669 under-five children with their mothers/guardians from all households, and with 331 and 338 being from the intervention and control areas respectively, participated in this study. In households with more than one child, random selection was performed to select a child.

### Baseline data collection

A house-to-house survey was carried out in both areas in March 2002. Informed written consent was obtained from mothers/guardians of the study children and baseline data was collected through face-to-face interviews using pre-tested structured questionnaire on knowledge, attitude and practices on indoor air pollution and ARI. In addition, history of ARI during the last 30 days was also assessed by asking if the child had been ill with cough accompanied by short, rapid breathing among other signs of ARI. The questionnaire can be provided on request.

*Upper respiratory infection (URI)* was defined to include *any combination* of the following symptoms: cough with or without fever, blocked or running nose, sore throat, and/ or ear discharge. *Acute lower respiratory infection (ALRI)* included any of the above symptoms of URI with the addition of rapid breathing and/ or chest indrawing and/ or stridor<sup>(9)</sup>.

### Development of IEC materials and educational intervention

After baseline data collection, three sessions of Focus Group Discussions (FGDs) were conducted on mothers/guardians in the intervention area, for information regarding the type and choice of IEC materials. Based on their opinion, wall posters and pamphlets were developed and pre-tested. Pamphlets included messages on causes and prevention of ARI with special emphasis on avoidance of indoor air pollution. In May 2002, pamphlets were distributed to all study households by a local midwife and study team members in the intervention area. The information was explained to mothers/ guardians. Illustrated wall posters (containing key message on avoidance of indoor air pollution) were placed at strategic locations in the market place, teashops and Ward-authorities' office.

In the control area, no special interventions were instituted for ARI control except for routine measures like child immunization.

### Follow-up visits and assessment

From August 2002 to January 2003, monthly follow-up visits were made in both areas to record ARI episodes. At the end of follow-up visits, mothers of 223 and 254 under-five children were assessed on their KAP on indoor air pollution and ARI respectively, on the basis of the questionnaire used in baseline survey.

## Data management

Epi-data software was used for data entry and stata version 6 was used for data analysis. *Incidence* was calculated as number of new episodes divided by person time at risk. Time at risk was defined as number of days with no recorded symptoms including the first day of any episode, but excluding the seven consecutive days without symptoms following an episode (WHO, 1991).

## Results

### Socio-demographic characteristics

Table 1 shows baseline socio-demographic characteristics of 331 and 338 mothers for intervention and control areas respectively. They were comparable with respect to important characteristics such as ages of mothers, education, occupation and family income. The mean age of children in the intervention and control areas was  $26.96 \pm 15.33$  and  $24.52 \pm 15.07$  months respectively ( $p > 0.05$ ). Sex distribution was almost equal in both areas (males representing 50.1% in intervention, 51.7% in control).

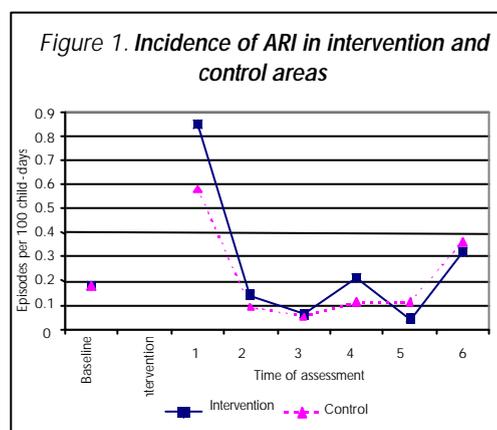
### Incidence of ARI

The baseline data showed that the incidence of ARI (URI) was 0.18 episodes per 100 child days in both areas. The ARI incidence during follow-up visits also showed a more or less similar trend (Figure 1). On the last follow-up visit, the incidence was slightly lower in the intervention area than the control area although the difference was not statistically significant. (0.32 Vs 0.36 episodes per 100 child days,  $p = 0.67$ ) (Table 2).

**Table 1.** Baseline socio-demographic variables of the intervention and control areas

Variable	Intervention Area (n=331)	Control Area (n=338)	p-value
Age groups of mothers			0.95
< 25 years	70 (21.1%)	69 (20.3%)	
26- 35 years	169 (51.1%)	180 (53.3%)	
36- 45 years	62 (18.7%)	60 (17.8%)	
> 46 years	30 (9.1%)	29 (8.6%)	
Education of mothers			0.64
No formal education	9 (2.7%)	9 (2.7%)	
Primary school	53 (16.0%)	66 (19.5%)	
Middle school	120 (36.3%)	112 (33.1%)	
High school	100 (30.4%)	109 (32.2%)	
College	49 (14.8%)	42 (12.4%)	
Occupation of mothers			0.53
Own business	8 (2.4%)	6 (1.8%)	
Unskilled labour	47 (14.2%)	39 (11.5%)	
Government employee	18 (5.4%)	7 (2.1%)	
Employee at private	12 (3.6%)	267 (79.0%)	
Dependent	246 (74.3%)		
Family income per month			0.47
< 10,000 kyats	82 (24.9%)	85 (25.1%)	
10,001-20,000 kyats	133 (40.4%)	150 (44.4%)	
>20,001 kyats	114 (34.7%)	103 (30.5%)	

**Figure 1. Incidence of ARI in intervention and control areas**



**Table 2.** Incidence of ARI at baseline, and during the period of six months of follow-up after intervention

Months	Intervention			Control		
	No of ARI episodes	Days at risk	Incidence per 100 child days	No of ARI episodes	Days at risk	Incidence per 100 child days
Baseline	17	9675	0.18	18	9870	0.18
1	63	7335	0.85	47	8085	0.58
2	12	8054	0.14	8	8790	0.09
3	5	8055	0.06	5	8895	0.05
4	17	8160	0.21	10	9202	0.11
5	4	8120	0.04	10	9109	0.11
6	21	6476	0.32	27	7359	0.37

### Knowledge and attitude of mothers on ARI and indoor air pollution

The knowledge of ARI and attitude towards the impact of indoor air pollution on health was comparable in both areas to levels during the pre-intervention period.

After intervention, significant improvement in knowledge on the cause of ARI was seen in respondents from the intervention area, as compared to the control area. Significant improvement in attitudes was seen in the intervention area regarding the fact that indoor air pollution could cause ill-health (Table 3).

### Practices enhancing indoor air pollution

The existence of practices/factors enhancing indoor air pollution was shown in Table 4. The use of scented sticks and mosquito coils was significantly higher in the control area at the baseline.

After intervention, the practice of mothers on the use of scented sticks in their living rooms was significantly higher in the control area, as it was during the pre-intervention period. The use of mosquito coils in the bedroom was found to be decreased relatively to baseline in both groups, but the difference was not significant at the post-intervention assessment (Table 4).

**Table 3.** Knowledge and attitude of mothers on indoor air pollution and ARI, before and after intervention

Knowledge	Before Intervention		P value	After Intervention		P value
	Intervention area (n=331)	Control area (n=338)		Intervention area (n=223)	Control area (n=254)	
Cause of ARI	73.0	75.6	0.49	81.6	72.4	0.02
Relationship of smoking and respiratory infections	87.9	89.7	0.99	94.2	91.3	0.24
Relationship of passive smoking and ARI	81.6	87.1	0.11	83.4	84.6	0.71
Attitude						
Agree indoor air pollution can cause ill-health	84.3	89.5	0.12	92.3	85	0.001
Agree indoor air pollution and ARI are preventable	87.6	88.1	0.9	91.1	89.8	0.64

**Table 4.** Maternal practices enhancing indoor air pollution, before and after intervention

Practices	Before Intervention		P value	After Intervention		P value
	Intervention area (n=331)	Control area (n=338)		Intervention area (n=223)	Control area (n=254)	
Cooking place						
In living room	40.5	45.9	0.34	33.5	32.9	0.37
Kitchen	41.7	39.1		42.7	47.8	
Outside the house	8.8	15.0		23.9	19.2	
Type of fuel for cooking						
No-smoke-forming <sup>1</sup>	4.5	7.7	0.09	21.2	28.6	0.06
Smoke-forming <sup>2</sup>	95.5	92.3		78.8	71.4	
Use of scented stick	63.7	75.3	0.001	60.4	72.9	0.002
Use of mosquito coil	71.3	82.4	0.001	64.9	69.8	0.2
Use of smoke to drive out mosquitos	50.6	48.8	0.62	61.3	59.1	0.61

<sup>1</sup> Electric/ gas

<sup>2</sup> Wood/ coal

## Discussion

The ARI incidence was found to be increased in both groups, but to a greater extent in the control group at the post-intervention assessment. In our study, baseline data was collected during summer and the post-intervention assessment was carried out at the end of the rainy season. The seasonal variation of ARI incidence may be responsible for the increased incidence of ARI in both areas during the post-intervention assessment. Nevertheless, the ARI incidence was found to be slightly lower in the intervention area at the last two assessments.

Nevertheless, ARI incidence was found to be slightly lower in the intervention area at the last two assessments. Lye et al.<sup>10</sup> reported a significant reduction in the incidence of severe ARI cases after health education at the end of a one-year follow-

up. In the present study, we followed our subjects for only six months. This might explain the lack of significant reduction in the ARI incidence at post-intervention assessment. Additionally, inadequate sample size could also have precluded the detection of a statistical difference in the incidence rates of ARI.

The incidence rates were lower than previous similar studies.<sup>10,11,12</sup> The strict use of the case definition on combination of symptoms may be the main reason. The common symptom, nasal discharge alone was excluded. Other reasons for lower incidence rates may include under-reporting of mild symptoms by mothers as well as a few survey team members. The incidence rates derived from the reported episodes of each month for 6 month follow-up period cannot be meant for the whole year. Moreover, being in capital city of Myanmar, it is less likely to include the misdiagnosed

cases of malaria in this study. ALRI cases were not recognized during the study period, however, there is still the possibility of under-reporting such severe cases. Rudan et al<sup>12</sup> reported that the global estimate of the median incidence of clinical pneumonia from analysis of previous community-based studies was 0.28 episodes per child-year and the 25-75% inter-quartile range was 0.21-0.71. That study may also reflect the fact that the incidence rates in our study may only account for moderate cases of ARI.

After health education, mothers' knowledge on the cause of ARI, as well as their attitude towards indoor air pollution and ill-health were found to be higher. It reflected the beneficial effect of IEC materials on improving the knowledge and attitude of mothers. Maternal practices on the use of scented sticks and mosquito coils were not comparable at the baseline period. The reduced use of scented sticks not only in the intervention area but also in the control area after intervention may not reflect the real improvement attributable to the effectiveness of intervention. It may take time for changes to occur in practice.

Although there were changes in knowledge and attitude, there was a lack of change in practice. This may be due to potential limitations in this study. The study team visited the households only once at the beginning of the intervention to distribute pamphlets and to explain about them to mothers/guardians. Although monthly follow-up visits were undertaken to record ARI episodes, the educational message was not reinforced at these subsequent visits.

Another limitation was that only the ARI episodes reported by mothers/guardians

could be taken into account to calculate the incidence of ARI. Moreover, the study children could be followed up only once a month, an explanation for the possibility of recall bias.

Finally, while no specific attempt was made to monitor for "spillover" of the educational messages from intervention to control communities, the distance and large numbers of persons separating the communities made such an occurrence unlikely.

## Conclusion

The present study was conducted on a small-scale and its duration was short. Our study found that the intervention improved knowledge and attitude of mothers, however, it did not show the change in practice. Further studies with the use of IEC materials coupled with other behavioural impact approaches may enhance the change in practice and reduction of ARI incidence.

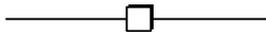
## Acknowledgements

This study was funded by WHO. The authors are indebted to Professor Dr Paing Soe, Director-General, Department of Medical Research (Lower Myanmar) for his permission to carry out the study. We also like to express our appreciation to the Township Medical Officer of North Okkalapa Township and to all Staff. We are grateful to Dr Aung Thu, and the staff of the Clinical Research Division for their help in data entry and analysis.

## References

1. Bruce N., Perez-Padilla R., Albalak R. Indoor air pollution in developing countries: a major environmental and public health challenge. *Bulletin of the World Health Organization* 2000, 78 (9); 1078-1092.
2. Collings D.A., Sithole S.D., Martin. Indoor woodsmoke causing lower respiratory disease in children. *Tropical Doctor* 1990, 20; 151-155.

3. Joint statement WHO/UNDP/5. Indoor air pollution – the killer in the kitchen. World Health Organization 2004, 1-2.
4. Armstrong, J.R. & Campbell, H. Indoor air pollution exposure and lower respiratory infections in young Gambian children. *Int J Epidemiol* 1991; 20: 424-29.
5. Collings, D.A., Sithole, S.D. & Martin, K.S. Indoor woodsmoke pollution causing lower respiratory disease in children. *Tropical Doctor* 1999; 20: 151-55.
6. Campbell, H., Armstrong, J.R. & Byass, P. Indoor air pollution in developing countries and acute respiratory infections in children. *Lancet* 1989; 1: 1012.
7. Smith, K et. al. Indoor air pollution in developing countries and acute respiratory infections in children. *Thorax* 2000; 55: 518-32.
8. Daigler, G.E., Markello, S.J. & Cummings, K.M. The effects of Indoor air pollutants on otitis media and asthma in children. *Laryngoscope* 1991; 101: 293-96.
9. World Health Organization (WHO). Technical basis for the WHO recommendations on the management of pneumonia in children at first-level health facilities. Geneva: WHO 1991.
10. Lye, M.S., Nair, R.C., Choo, K.E et al. Acute respiratory tract infection: a community- based intervention study in Malaysia. *J Trop Paediatrics* 1996; 42: 138- 143.
11. Koch, A., Sorensen, P., Homoe, P et al. Acute respiratory infections in children, Greenland. *Emerg Infect Dis* 2002 Jun;8 (6):586-593.
12. Rudan, I., Tomaskovic, L., Boschi-Pinto, C et al. Global estimate of the incidence of clinical pneumonia among under five years of age. *Bulletin of the World Health Organization* 2004 Dec, 82 (12); 895-903.



# Russell's Viper Bite: Correlation of Different Clinical Criteria to Peritoneal Dialysis and Clinical Outcome

Paing Soe\*

## Abstract

A total of 107 Russell's viper bite victims admitted to the Renal Dialysis Unit of Yangon General Hospital in Myanmar during a one-year period were studied. The study aimed at correlating different clinical criteria to the requirement of peritoneal dialysis (PD) and to the clinical outcome. Subconjunctival haemorrhage and gross haematuria were significantly associated with the requirement of PD. Mental changes, oedema, septicaemia, shock and the presence of PD indication(s) turned out to be significant correlates of poor clinical outcome (death).

The causes of death in patients with and without PD were also analysed. The major causes of death in cases who died after PD were septicaemia; cerebral cause (coma, convulsions, confusion), and disseminated intravascular coagulation. In patients without PD, shock was the number one killer, followed by pulmonary oedema, and cardiac arrhythmias.

**Key Words:** Russell's viper; Peritoneal dialysis; Clinical outcome; Myanmar; Renal failure.

## Introduction

Russell's viper bite is an important cause of morbidity and mortality in Myanmar and ranks high in the priority health problems identified in successive People's Health Plans. Acute renal failure is the major cause of death in Russell's viper bite patients who survive the early effects of envenoming. Acute tubular necrosis was observed in renal biopsy and autopsy specimens of human victims as well as in experimental animals<sup>1</sup>.

But the factors associated with requirement of peritoneal dialysis (PD) and with clinical outcome in Russell's viper bite victims had previously been little known. This study was aimed to correlate different clinical features to the requirement of PD and to the clinical outcome (death or discharge) in viper bite patients. Moreover, survival of patients who required treatment

with PD, and those without, were compared and their causes of death were also analysed.

## Methodology

### Study area and population

A hospital-based prospective study was carried out during the one-year study period (1 September 1993 to 30 August 1994) at the Renal Dialysis Unit, Yangon General Hospital, Myanmar. A total of 107 patients with Russell's viper bite admitted to the Renal Dialysis Unit directly or referred from other medical units of Yangon General Hospital or other hospitals in Yangon and district hospitals (secondary referral centres) were included in the study. Viper bite was proven by the dead snake brought along on admission, and/or by the features of systemic envenoming (Box 1). Clinical

\*Professor/Head, Nephrology Department, Renal and dialysis Units, Yangon General Hospital, Director General, Department of Medical Research (Lower Myanmar) e-mail [dmrlowerm@mptmail.net.mm](mailto:dmrlowerm@mptmail.net.mm) Fax 095-01-251514

assessment and history-taking were done on admission. A detailed history regarding first-aid treatment, time of anti-snake venom (ASV) administration, and the nature of health care received was recorded. Clinical features were noted and the progress was recorded daily. The cause of death was verified by the senior medical officer concerned, which was further confirmed by the postmortem examination.

**Box 1. Features of systemic envenoming in Russell's viper bite<sup>8</sup>**

Spontaneous systemic bleeding especially from gums, gastrointestinal tract, haematuria and blood-stained sputum

- Non-clotting blood
- Haemodynamic instabilities like hypotension, tachycardia and shock
- Epigastric pain/ renal angle pain
- Oliguria/ anuria
- Heavy proteinuria ( $\geq + + +$ )
- Conjunctival and periorbital oedema
- Regional lymph node enlargement and tenderness

### Statistical analysis

Multiple logistic regression analyses were performed with survival status (death or discharge) as the dichotomous outcome (dependent variable) and other variables, such as age; sex; time lapse before ASV; first-aid; mental changes; oedema; haematuria; and subconjunctival haemorrhage, as independent variables. Additionally, multiple logistic regression analyses were also used to investigate the factors associated with requirement for PD. In these analyses, PD requirement was the dichotomous dependent variable, while others such as age, sex, time lapse before ASV, first aid and other clinical criteria were the independent variables. All statistical analyses were performed using SPSS

software.  $P < 0.05$  was used as the definition of statistical significance.

### Ethical consideration

A written informed consent was obtained from patients after explanation of the nature of the study. This study was approved by the Medical Ethics Committee of the Department of Medical Research, Yangon, Myanmar.

## Results

### Background characteristics of patients

Among the study population, 91 (85%) were males and 16 (15%) were females. Their mean age was 29.78 years (range: 13 to 68 years). About 80% of them were within the age range of 16 to 45 years with 16-25 years age group (37%) comprising the major victims of viper bite. Of the total incidents 49.5% occurred between 06:00 hrs and 17:30 hrs, and 50.5% between 18:00 hrs and 05:30 hrs. The median time lapse before ASV was three hours (range: 1 to 4 hours). About 56% patients did not receive any form of first-aid therapy. In the remainder, incisions were made at the site of bite (15.2%) or acupuncture performed over the whole limb (21%). A small percentage (1.9%) applied tourniquet proximal to the site of the bite. The clinical manifestations of Russell's viper bite cases on admission to the dialysis unit are summarized in Table 1.

### Correlation of different clinical criteria with the requirement of peritoneal dialysis

Multivariate logistic regression analysis revealed that the presence of haematuria had a definite relationship with PD requirement. Patients with gross and persistent haematuria within the first week of illness were more likely to require PD during

their course of illness. Subconjunctival haemorrhage was also found to have a significant relationship to the requirement of PD (Table 2).

**Table 1.** Clinical manifestations on admission to dialysis unit

Clinical manifestation	No. (n= 107)	Per cent
Mental changes	38	35.5%
Local reaction (local swelling/cellulitis)	49	46.1%
Periorbital oedema	71	66.4%
Subconjunctival haemorrhage	48	45.8%
Chemosis	40	37.4%
Circulatory Overload *	10	9.3%
Shock **	16	14.8%
Heart failure	4	3.7%
Septicaemia	19	17.8%
Oliguria (less than 100 cc/day)	71	66.0%
Gross haematuria	62	58.0%
Urinary tract infection	16	15.0%

\* Orthopnoea, raised jugular venous pressure (JVP), basal crackles,  $\pm$  triple rhythm  $\pm$  generalised oedema

\*\* Systolic blood pressure (SBP) =60 mm Hg

**Table 2.** Correlates of peritoneal dialysis: results of multiple logistic regression analysis

Variable <sup>a</sup>	Reference category	Odds ratio (95% CI) <sup>b</sup>	p-value
Sub-conjunctival haemorrhage	No sub-conjunctival haemorrhage	2.46 (1.35-7.13)	0.04
Gross haematuria	No gross haematuria	11.73 (2.97-46.32)	0.001

<sup>a</sup> Other variables which were considered but not statistically significant included age, sex, time lapse before ASV, first aid measure, local reaction, mental changes, chemosis, shock, oliguria and septicaemia.

<sup>b</sup> 95% Confidence Interval

### Correlation of different clinical criteria to clinical outcome of patients

The results of multivariate logistic regression models that examined the correlates of clinical outcome (death or discharge) are presented in Table 3. Patients who developed mental disturbances either in the form of twitching, fits or coma usually ended in a fatal outcome. When oedema, either in the form of puffy face or generalized oedema was calculated against the clinical outcome, it was found that, those patients with oedema had a more serious prognosis than those who did not develop oedema.

**Table 3.** Correlates of poor clinical outcome (death): results of multiple logistic regression analysis

Variable <sup>a</sup>	Reference category	Odds ratio (95% CI) <sup>b</sup>	p-value
Mental changes	No mental changes	4.62 (1.08-19.81)	0.002
Oedema	No oedema	16.17 (3.04-85.91)	0.004
Septicaemia	No septicaemia	12.13 (1.99-32.5)	0.008
Shock (SBP < 60 mmHg)	SBP >60 mmHg	9.46 (1.73-51.77)	0.004
Presence of PD indication(s)	No PD indication	4.18 (1.19-14.63)	0.02

<sup>a</sup> Other variables which were considered but not statistically significant included age, sex, time lapse before ASV, first aid measure, subconjunctival haemorrhage, chemosis and haematuria

<sup>b</sup> 95% Confidence Interval

Other factors that were associated with increased odds of poor clinical outcome (death) were septicaemia, shock and presence of PD indication(s).

## PD requirement vs survival

Nearly half of the viper bite victims (49%) were helped to recover and discharged. The rest of them (51%) either succumbed, or signed and left the hospital. Those who left were critically ill and their likely outcome was very poor. Peritoneal dialysis was not required in all patients. Peritoneal dialysis was usually needed and undertaken when biochemical or clinical indications (Box 2) arose in a viper bite patient (44 patients). Very rarely PD was not performed although it was indicated on the basis of biochemical parameters as the patient's general well-being was good, and the urine output was satisfactory. So the patient was kept under observation with daily monitoring of urea and electrolytes. There was one such case in this study who survived with conservative treatment. The impact of peritoneal dialysis on patient survival is shown in Table 4. It was found that those with PD had less chances of survival.

**Box 2. Indications for peritoneal dialysis in Russell's viper bite cases at renal and dialysis units, Yangon General Hospital<sup>8,9</sup>**

**Biochemical**

- Plasma urea > 35 mmol/L
- Plasma creatinine > 800 µmol/L
- Plasma K > 7 mmol/L or hyperkalaemic ECG changes
- Plasma HCO<sub>3</sub> < 12 mmol/L

**Clinical**

- Acute pulmonary oedema, incipient heart failure with or without intractable fluid overload
- Clinical uraemia (uraemic pericarditis, uraemic bleeding)
- Unexplained clinical deterioration of patient

**Table 4. The impact of peritoneal dialysis on patient survival in Russell's viper bite cases**

PD status	Survival number	Survival percent
Needed and undertaken	17/ 44	38.6
Needed, not undertaken	1/ 1	100
Not needed, not undertaken	45/ 62	72.5
Not needed, undertaken	-	-

## Causes of death in patients with and without PD

The major causes of death in cases that died after peritoneal dialysis were septicaemia, cerebral cause (coma, convulsions, confusion) and disseminated intravascular coagulation. In those patients without peritoneal dialysis, shock was the number one killer, followed by pulmonary oedema, and cardiac arrhythmias (Fig 1).

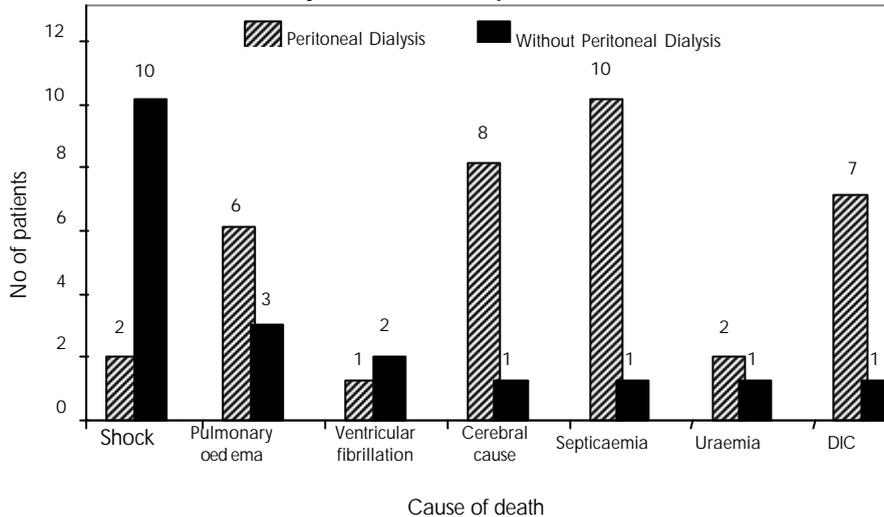
Patients with shock usually died during the first week of viper bite before the level of blood urea rose enough to require PD.

## Discussion

The major victims of viper bites were between the age group of 16 to 35 years of age in this study. Men were more commonly exposed to vipers as evidenced by the predominant sex ratio of 6: 1. It was due to the fact that men were the breadwinners of the family and they went out to work in rural communities, whatever their occupations.

There seemed to be little difference between day and night regarding the time of viper bite (49.5% of the incidents occurred in daytime Vs 50.4% during the night). Farmers were exposed to snakes in the paddy fields during the day, but they were also at risk when they returned home at dusk.

Figure 1. Causes of death in patients with and without peritoneal dialysis in Russell's viper bite cases



Local reactions did not prove to have any influence in predicting the prognosis of viper bite victims in this study. Although they were found to have influenced the prognosis in 50% of the cases, they were statistically found unrelated to the requirement of PD as well as to the clinical outcome (death or discharge). Contrary to the present finding, some authors reported that the extent of local swelling and the percentage circumference increase of the bitten limb were found to correlate with the length of the snake. There was a strong correlation between the venom yield and the length of the viper. The incidence of systemic envenoming increased with the extent of local swelling and lymphadenopathy.<sup>2, 3</sup> But it was stated in another report that, even in fatal patients with systemic envenomation, there were no local reactions at all<sup>4</sup>. Also in Anuradhapura (Sri Lanka), 27% of patients with systemic envenomation had mild or

negligible local swelling when admitted to hospital<sup>5</sup>.

In this study, more than half of the cases did not apply any first-aid measures over the site of bite. Multiple puncture (a traditional practice) seemed to be a popular practice (21%) followed by incisions over the site of bite (15.2%). Whatever the nature of first-aid measures may be, it was found that these measures had no influence on PD requirement or clinical outcome of viper bite victims.

According to previous studies, subconjunctival haemorrhage and chemosis occurred in patients with severe systemic envenoming and their presence indicated serious prognosis<sup>6</sup>. In the present study, subconjunctival haemorrhage had a significant relationship to the requirement of PD. But they were not proved to be

important indicators, which pointed towards a fatal clinical outcome.

Shock can develop at any time during the first week after the bite. Early shock is probably explained by vasodilatation and late shock is precipitated by massive GI haemorrhage or acute pituitary and adrenal insufficiency<sup>7</sup>. Shock (systolic blood pressure = 60 mmHg) was seen in 14.8% of study patients, and it was found to have a significant relationship to poor clinical outcome.

Mg Mg Aye et al. reported that oliguria may develop rapidly within 24 hours after the bite or during the first two to three days. The signs of uraemia may develop within three to seven days of the bite. Another important and reliable sign was gross haematuria<sup>6</sup>. It was in agreement with our finding that if haematuria was persistently

found on naked eye examination within the first week of illness, it was likely that the patient would require peritoneal dialysis.

This study might contribute to a better understanding of the importance of clinical criteria in predicting the requirement of PD or clinical outcome in Russell's viper bite patients, and could be helpful in the management of such cases.

## Acknowledgement

The author would like to thank the doctors and nursing staff at the Renal Dialysis Unit, and the Laboratory staff at the Yangon General Hospital, for their help and support in conducting this study.

## References

1. Aung Khin. Histological and ultrastructural changes of the kidney in renal failure after viper envenomation. *Toxicon*, 1978; 16: 71-75.
2. Tun Pe, Ba Aye, Aye Aye Myint, Tin Nu Swe, Warrel DA. Bites by Russell's viper (*Vipera russelli siamensis*) in Myanmar: effect of the snake's length and recent feeding on venom antigenaemia and severity of envenoming. *Transactions of the Royal Society of Tropical Medicine & Hygiene*, 1991; 85: 804-808.
3. Myint Lwin, Phillips RE, Tun Pe, Warrel DA., Tin Nu Swe, Mg Mg Lay. Bites by Russell's viper (*Vipera russelli siamensis*) in Burma: Haemostatic, vascular and renal disturbances and response to treatment. *Lancet*, 1985; ii: 1259-63.
4. Maung Maung Aye. Snakes of Burma with venomology and envenomation. M.Sc (Zoology) Thesis 1976, Rangoon Arts and Science University; Pg 52-56.
5. Phillips RE, Theakston RD, Warrel DA. Paralysis, rhabdomyolysis and haemolysis caused by bites of Russell's viper (*Vipera russelli puchella*) in Sri Lanka; Failure of Indian (Haffkine) antivenom. *Lancet*, 1998; ii: 691-716
6. Maung Maung Aye. Some experience in the management of snake-bite. *Burma Medical Journal*, 1972; 20: 33-40.
7. Tun Pe, Phillips RE, Warrel DA, Moore RA, Tin Nu Swe, Myint Lwin. Acute and chronic pituitary failure resembling Sheehan's syndrome following bites by Russell's viper in Burma. *Lancet*, 1987; ii: 1259-63.
8. Warrel DA. WHO/ SEARO guidelines for the clinical management of snakebites in South-East Asia Region. *Southeast Asian J Trop Med Pub Health*, 1999; 30, supplement 1: 38.
9. Paing Soe & Saw Naung. A guide to management of Russell's viper bite, 2003. (Unpublished)



## Notes and News

### Facts and Figures from the World Health Report 2005

*“Public health programmes need to work together so that all families have access to a continuum of care that extends from pregnancy (and even before), through childbirth, and on into childhood, instead of the often fragmented services available at present”.*

- Dr LEE Jong-wook,  
Director-General, WHO

### The Global Picture

- Pregnancy and childbirth and their consequences are still the leading causes of death, disease and disability among women of reproductive age in developing countries.
- Over 300 million women in the developing world suffer from short-term or long-term illness brought about by pregnancy and childbirth; 529 000 die each year.
- Maternal mortality is highest by far in Africa, where the lifetime risk of maternal death is 1 in 16, compared with 1 in 2800 in rich countries.
- More than 50% of all child deaths occur in just six countries: China,

the Democratic Republic of the Congo, Ethiopia, India, Nigeria and Pakistan.

- Less than 1% of maternal deaths occur in high-income countries.
- Towards the turn of the millennium, the overall downward trend in under-5 mortality rates worldwide was showing signs of slowing.
- Globally, the average number of children per woman stands at 2.69, compared with 4.97 in the early 1960s.
- Across the world, around 2.2 million women living with HIV/AIDS give birth each year.
- There are currently 136 million births per year, including 3.3 million stillbirths. Worldwide, the number of live births will peak at 137 million per year towards 2015.

### Pregnancy

- A substantial proportion of maternal deaths – perhaps as many as one in four – occur during pregnancy.
- Each year, approximately 50 million women living in malaria-endemic countries throughout the world become pregnant. Around 10 000 of these women and 200 000 of

their infants die as a result of malaria infection.

- Of the estimated 211 million pregnancies that occur every year, about 46 million end in induced abortion, of which only approximately 60% are carried out under safe conditions.
- More than 18 million induced abortions each year are performed by people lacking the necessary skills or in an environment lacking the minimal medical standards, or both.
- With 34 unsafe abortions per 1000 women, South America has the highest ratio, closely followed by eastern Africa (31 per 1000 women), western Africa (25 per 1000 women), central Africa (22 per 1000 women), and south Asia (22 per 1000 women).
- Unsafe abortion causes 68 000 deaths each year.
- It is estimated that up to 100 000 maternal deaths could be avoided each year if women who did not want children used effective contraception.

### Childbirth and Maternal Mortality

- Maternal mortality is currently estimated to be 529 000 deaths per year, a global ratio of 400 maternal deaths per 100 000 live births.
- Between 11% and 17% of maternal deaths happen during childbirth itself and between 50% and 71% in the postpartum period.
- About 45% of postpartum maternal deaths occur during the first 24 hours, and more than two thirds during the first week.

- Maternal deaths are even more inequitably spread than newborn or child death rates. Maternal mortality rates range from 830 per 100 000 births in African countries to 24 per 100 000 births in European countries.
- Of the 20 countries with the highest maternal mortality ratios, 19 are in sub-Saharan Africa.
- The most common cause of maternal death overall is severe bleeding. Postpartum bleeding can kill even a healthy woman within two hours, if unattended. The second most frequent direct cause of death is sepsis; the third is unsafe abortion.

### Newborns

- One out of five African women loses a baby during her lifetime, compared with 1 in 125 in rich countries.
- Each year nearly 3.3 million babies are stillborn, and more than four million others die within 28 days of being born.
- Newborn deaths now contribute to about 40% of all deaths in children under five years of age globally, and more than half of infant mortality.
- The largest numbers of babies die in the South-East Asia Region: 1.4 million newborn deaths and a further 1.3 million stillbirths each year.
- While the actual number of deaths is highest in Asia, the rates for both neonatal deaths and stillbirths are greatest in sub-Saharan Africa. Of the 20 countries with the highest

neonatal mortality rates, 16 are in this part of the world.

- It is estimated that each year over a million children who survive birth asphyxia develop problems such as cerebral palsy, learning difficulties and other disabilities.
- Nearly three quarters of all neonatal deaths could be prevented if women were adequately nourished and received appropriate care during pregnancy, childbirth and the postnatal period.

### Child Mortality

- Unless progress is accelerated significantly, there is little hope of reducing maternal mortality by three quarters and child mortality by two thirds by the target date of 2015 – the targets set by the Millennium Declaration.
  - 51 countries are showing slower progress: the number of deaths among children under 5 years of age is going down and the mortality rates are dropping, but not fast enough to reach one third of their 1990 level by 2015 unless they significantly accelerate progress during the coming 10 years.
  - 93 countries, including most of those in the high income bracket, are “on track” to reduce their 1990 under-5 mortality rates by 2015 or sooner.
  - More problematic are the 29 countries where mortality rates are “stagnating” – where the number of deaths continues to grow, because modest reductions of mortality rates are

too small to keep up with the increasing numbers of births.

- Finally, there are 14 “reversal” countries, where under-five mortality rates went down to an average of 111 in 1990 but have increased since.

### Child Care

- Around 10.6 million children still die every year before reaching their 5th birthday. Almost all of these deaths occur in low-income and middle-income countries.
- Most deaths among under-fives are still attributable to just a handful of conditions and are avoidable through existing interventions. These are: acute lower respiratory infections, mostly pneumonia (19% of all deaths), diarrhoea (18%), malaria (8%), measles (4%), HIV/AIDS (3%), and neonatal conditions, mainly preterm birth, birth asphyxia, and infections (37%).
- In 1988 there were some 350 000 polio cases worldwide; by January 2005 there were only 1185 cases reported.
- Thanks to sustained efforts to promote immunization, deaths from measles decreased by 39% between 1999 and 2003; compared to levels in 1980, measles mortality has declined by 80%.
- In 1990, less than one fifth of mothers gave exclusive breastfeeding for four months; by 2002 that figure had doubled to 38%.
- Poor or delayed care-seeking contributes to up to 70% of child deaths.

## Health System Issues

- In a study of 2.7 million deliveries in seven developing countries, only 32% of women who needed major life-saving intervention received it.
- Worldwide, 61.1% of births are attended by a professional who, at least in principle, has the skills to do so. However, in sub-Saharan Africa, 60% of women still give birth without a skilled attendant.
- Childbirth is an event that easily lends itself to overmedicalization. The worldwide epidemic of unnecessary caesarean sections is a typical example. While in many rich countries such unnecessary interventions carry little risk, elsewhere the potential for unintended adverse consequences for both infant and mother are real.
- In many sub-Saharan African countries, less than 25% of the needed human resources for obstetric care are available. Sustainable ways will have to be devised of offering competitive remuneration and incentive packages that can attract, motivate and retain competent and effective health workers.
- Each year, about 100 million people in the world are pushed into poverty by catastrophic payments for health care.
- In the 75 countries that account for most child mortality, US\$ 52.4 billion, in addition to current expenditure, is required to reach all children with a package of essential child health interventions within the next decade.
- For maternal and newborn care, universal access is further away. However, scenarios for scaling up

services to provide a full package of first-level and back-up care to 101 million mothers and their babies in 2015 would cost in the region of US\$ 39 billion additional to current expenditure to implement.

- Projected staffing requirements for extending coverage of maternal and newborn care assumes the production in the coming 10 years of at least 334 000 additional midwives – or their equivalents – as well as the upgrading of 140 000 health professionals who are currently providing first-level maternal care and of 27 000 doctors who currently do not have the competencies to provide back-up care.

“Children are the future of society and their mothers are guardians of that future. Yet this year, almost 11 million children under five years of age will die from causes that are largely preventable. Among them are four million babies who will not survive the first month of life. On top of that 3.3 million babies will be stillborn. At the same time, about half a million women will die in pregnancy, childbirth or soon after.”

- *The World Health Report 2005*

### 115<sup>th</sup> EB Session, 17-25 January 2005

At the 115<sup>th</sup> session of WHO's Executive Board which opened in Geneva on 17 January, the Regional Director, Dr Samlee Plianbangchang, made a statement on the tsunami disaster. Dr Samlee said, “The 26<sup>th</sup> of December 2004 will forever haunt our memory, because of the terrible earthquake that occurred in the Indian Ocean. The destructive waves of tsunami battered the shores of many countries and the WHO South-East Asia Region bore the brunt of it. Among our Member States, Indonesia, Sri

Lanka, Thailand, India and Maldives were affected the most while Bangladesh and Myanmar were the least affected. In response to this disaster, I immediately established a Tsunami Task Force, and activated our Operations Room to function round the clock. The Task Force is operating in close coordination and consultation with the Headquarters Health Action in Crisis team. A SEARO website on the tsunami disaster was developed from the second day itself. It features a daily situation report and provides access to a range of key technical guidelines and manuals for the management of emergency situations. Daily teleconferences are held between affected countries, headquarters and the Regional Office to ensure consistent communication, joint decisions and coordinated efforts. Satellite communication has also been established with Sri Lanka, Maldives and Aceh in Indonesia," elaborated the Regional Director.

Dr Samlee went on to add, "The main focus of WHO's work now is to coordinate with other international agencies in assessing the damage to health infrastructure; support the restoration of basic health services; and provide technical advice in the formulation of plans for rehabilitation and rebuilding. A Tsunami Health Bulletin will be issued regularly to report on the health situation in the affected areas. A strategy for health action in emergencies during the first 100 days is in place. We now have a strategic plan for rehabilitation. As we enter the second phase, WHO will further refine this plan in close consultation with the World Bank and other key partners," asserted the Regional Director. Praising the efforts of the whole UN family, Dr Samlee said, "Never before, have the organizations of the UN system demonstrated such an ability to respond to the immediate needs during a crisis with

unity, professionalism and speed. We have mounted an unprecedented response to this disaster. I would like to take this opportunity to thank the Director-General and all the Regional Directors of WHO for their sympathy, concern and solidarity. Their support to the South-East Asia Region in this difficult time is very much appreciated. We must thank the donors who have provided necessary funds to make the WHO mission during this crisis possible. In conclusion, I may say that every disaster presents opportunities to further improve the health services for the people. We are facing a huge challenge, but I am convinced that we will succeed through our united efforts," concluded Dr Samlee.

### **Third Regional Consultation on the Proposed Revision of International Health Regulations**

Inaugurating the Third Regional Consultation on the Proposed Revision of International Health Regulations, which opened in SEARO on 27 January 2005, the Regional Director, Dr Samlee Plianbangchang said, "This consultation is taking place at a critical time in the process of the IHR revision. It follows the first meeting of the Intergovernmental Working Group (IGWG) held between 1 and 12 November 2004; and it precedes the second meeting of this Working Group to be held next month.

The IGWG extensively debated all the 67 articles and 9 annexes of the draft document. However, due to lack of consensus among participants from Member States, it was not possible to reach a unanimous decision on any of the articles or annexures. Delegates, nonetheless, expressed their support to the guiding principles underlying the revision proposals, and supported the process adopted to finalize the revision. Some WHO regions, including

ours, decided to hold another consultation, with the view to arriving at a regional consensus, in order to help further facilitate the revision process at the second IGWG meeting," stated Dr Samlee.

The Regional Director went on to add, "We felt that there was a need for meaningful participation of affected countries in the determination of what constitutes Public Health Emergencies of International Concern. The participation by affected countries was important, since it would safeguard the interests of those countries from the negative consequences of temporary or time-bound recommendations.

We, from the South-East Asia Region, recommended that at least one member of the Emergency Committee should be an expert nominated by the affected country. The role of the Emergency Committee is to advise the Director-General of WHO in determining whether a given event constitutes a Public Health Emergency of International Concern; and to advise the DG in issuing recommendations regarding the emergency. Lack of adequate resources, both human and financial, is an issue of overriding concern for us. We feel that we will need appropriate means and ways to address these issues and concerns, and these ways and means should be incorporated into the revised IHR. This consultation provides an opportunity for us to review, once again, the contents of the improved text of IGWG Chairperson, which contains all the important issues raised by Member States at the first meeting of IGWG," asserted the Regional Director.

### **WHO Assists 40 000 Pregnant Women Affected by the Tsunami**

An estimated 40 000 pregnant women were among those left homeless as a result of the

earthquake and tsunami in South Asia. As part of its emergency response, WHO quickly dispatched medical professionals and essential supplies to the areas affected, for care of these women. Now, WHO is collaborating with respective national authorities and other international agencies to ensure pregnant women, particularly those who were displaced, have access to safe childbirth services.

Dr Samlee Plianbangchang, Regional Director for WHO's South-East Asia Region, cautioned that, "In a post-disaster situation where entire families and neighbourhoods have been lost, mothers, newborns and young children are the most vulnerable of the displaced persons and WHO is working with health ministries to ensure that they get the extra care they need and are not neglected." According to Dr Samlee, "Even under normal circumstances, maternal and child health is a matter of major concern in the Region. Maternal deaths in this Region account for one third of the total number of global deaths, and over three million children die below the age of five in this Region annually, mostly from preventable causes. The tsunami has further added to the pressure," asserted the Regional Director.

WHO, in its role as the technical coordinator for all health assistance in the affected countries has stressed the need for every camp to have a pregnancy and childbirth care site that provides antenatal, childbirth and postpartum and newborn care. In Aceh, Indonesia, WHO is assisting the Provincial Health Office to re-establish midwifery services in an integrated manner with other primary health care services in the affected areas. In India, WHO is assisting the government in organizing health facilities through partnerships with professional associations. The Organization is also involved in training health care

providers for management of complications of pregnancy and childbirth, and care of the newborn and young children. In Sri Lanka, WHO is providing technical support to the government and is collaborating with the Family Health Bureau and the Child Protection Authority on these issues. In Maldives, WHO continues to support primary health care throughout the country. The Organization has offered to provide technical assistance on pregnancy, newborn infants, nutrition and related matters in partnership with UNFPA. WHO recognizes that women are particularly vulnerable in the aftermath of the tsunami disaster, and that there is an urgent need to address all issues related to women's health. WHO will continue to work closely with its partners towards this endeavour.

### **PB 2006-2007 Workplan Development**

A meeting of SEAR Country Office Planning Focal Points for PB 2006-2007 Workplan Development was held in the Regional Office from 23-25 February 2005. Addressing the opening session, the Regional Director, Dr Samlee Plianbangchang, called for special attention to be paid to the mechanism and process for the preparation of workplans for the 2006-2007 biennium. "There is a need for effecting a change in the preparation of such workplans. Among other things, to ensure a rational process in finalizing these workplans, I would like the first draft to be completed by the end of May this year. Then, we will refine and improve the workplans in June, to ensure quality implementation. The workplans will be finalized at the 42<sup>nd</sup> meeting of the CCPDM, in July 2005. At this CCPDM meeting, workplans of each country will be reviewed in detail between the country team and senior staff of the Regional Office. After the CCPDM meeting, there may be some

modifications and changes in the workplans. Then, the workplans will be submitted to the 58<sup>th</sup> session of the Regional Committee for endorsement. With this process, I am confident that the quality of the workplans will be substantially improved, and thereby their implementation," the Regional Director said.

As was already known, 75% of the Regional Regular Budget was already in the WHO country programmes; about 70% of this amount was for programme activities to provide direct support to countries. Therefore, WHO Regional and country staff and concerned national health officials had to work closely in the preparation and implementation of the country workplans. Furthermore, there was a recent development, which was very important. The 115<sup>th</sup> session of the WHO Executive Board passed a resolution to effect a change in the Organization's financial regulations and financial rules. As per the change, there will be no carry over of the obligated budget across the biennium. It means that the obligated budget will have to be completely liquidated within the biennium concerned, otherwise the money will lapse.

Emphasizing the importance of joint planning, Dr Samlee said that almost all resources for direct support to countries were at the country level. The Regional Office staff had to help countries in the development and implementation of WHO country programme budgets, including the workplans. The involvement of Regional Office staff in such a manner should be clearly reflected in the country workplans, in both technical and financial terms. "In unison, let our endeavours in this regard ensure the maximal utilization of all WHO available resources to support the countries' health development, in the most efficient and effective manner," concluded Dr Samlee.

## Evidence-Based Clinical Practice Guidelines In Obstetrics and Gynaecology

The Regional Director, Dr Samlee Plianbangchang, addressed the inaugural session of the National Annual Conference of the All India Coordination Committee, Royal College of Obstetricians and Gynaecologists on "Evidence-Based Clinical Practice Guidelines in Obstetrics and Gynaecology" held in New Delhi from 5-6 March 2005. The Regional Director emphasized that the World Health Organization was committed to the promotion and implementation of evidence-based practices in health care. "It is, therefore, most encouraging to note that your deliberations will cover many contemporary issues in evidence-based guidelines in such practices. These practices include identifying evidence, promoting research where evidence is lacking, and developing the guidelines based on the best evidence" he added. Dr Samlee said that maternal mortality was a cause of serious concern in our Region. "As you may be aware, the theme of the World Health Day this year is, "Make every mother and child count". We have to do something meaningful on this occasion for the health of mothers and children" he stated. The Regional Director said that reduction of maternal mortality was one of the key targets of the UN Millennium Development Goals. "It is ranked the highest in WHO's priority list. As we all know, most maternal deaths are caused by conditions that are either preventable or amenable through timely interventions. WHO has supported many collaborative studies which have contributed significantly to the body of knowledge that is available today for addressing maternal mortality. As new evidence emerges, shifts in the approaches to interventions in this regard become imperative" he added. Dr Samlee explained that not very long ago, many international

agencies, including WHO, promoted antenatal screening for high risk pregnancies. "However, it has become evident today that every pregnancy carries a risk; and therefore relevant provisions have to be made to meet the needs of all pregnant women. Hence, it is recommended that every pregnant woman should have access to skilled care, with the availability of a skilled birth attendant, linked to a functional health care delivery system in order to ensure effective referral services" he said.

## Physio-anthropometric Study of the Lower Extremity

*We have received the following summary report of an interesting project carried out under the direction of Dr Balu Sankaran, former Director, Division of Diagnostic, Therapeutic and Rehabilitation Technology, WHO/HQ.*

"Physio-anthropometric study of lower Extremity" was undertaken to see if there are any variations in the anatomical structure of the bone and joints of the lower extremity in comparison to the Western population. This is also to suit the social, economic and cultural differences that exist in the Indian population (mainly squatting, sitting on the ground cross-legged for activities of daily living).

The study covered 929 individuals throughout the country in 36 centres and observations were made on each segment of the lower extremity viz. hip and femur, knee and tibia.

The following features were studied:

### Hip and Femur

- (a) Measurement of acetabular index
- (b) Neck shaft angle of the femur

- (c) C.E. angle of Wiburg
- (d) Breadth and depth and curvature of the acetabulum
- (e) Medial offset of the head of the femur (mid axial and greater trochanteric planes)
- (f) Radius of curvature of the femoral head
- (g) Intramedullary diameters of the neck of femur
- (h) Cortical thickness of the neck of the femur
- (i) Intramedullary diameters of the proximal shaft of the femur
- (j) Cortical thickness of the proximal femur
- (k) Acetabular depth and curvature (ct images)
- (l) Radius of curvature of the femoral head (ct images)
- (m) Thickness of articular cartilage of femoral head and acetabulum (ct images)
- (n) Medullary diameters and cortical thickness of femur (ct images)
- (o) Femoral neck anteversion
- (p) Acetabular anteversion
- (q) Measurements of the length of femur
- (r) Radiological Q angle
- (s) Measurements of the length of the neck of femur
- (t) Length of dynamic compression screws (hip).
- (b) Supra condylar morphology (angle of articular surface and medial, lateral condyle)
- (c) Sulcus morphology
- (d) Patellar morphology (1)
- (e) Patellar morphology (angle of patella)
- (f) 3-D reconstruction of knee joint (angulation of the posterior segment of the medial condyle of the tibia)
- (g) Upper tibial articular surface morphology
- (h) Longitudinal angle between tibia and femur
- (i) Medullary canal diameters of tibia, cortical thickness of tibia medial and lateral
- (j) Tibial torsion
- (k) Length of tibia
- (l) Transverse coronal CT cuts of upper end of tibia
- (m) Anterior angulation of the femur (proximal, mid and distal) shaft
- (n) Study of knee in acute flexion and internal rotation of the tibia on the femur.

In addition, the densitometry of the head, neck, basicervical, greater trochanter of the femur, length of tibia femur, and femur height of the individual were also measured.

These observations and findings would help manufacturers to make implants (prosthesis, plates screws) to suit the Indian population needs.

This would, therefore, be useful for approximately 3.5 billion people, particularly in the developing countries, and their orthopaedic surgeons.

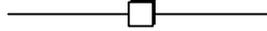
## Knee and Ankle

- (a) Supra condylar morphology (1)

A separate study has been done on the fractured neck of femur:

We conducted twenty-nine cases of CT scan studies and 84 Dynamic MRI to pre-operatively determine the kind of the fixation to be used for the fracture or replacement arthroplasty with the sacrifice of the femoral

head and neck. We are also doing tetracycline labelling three days before the operation to find out the amount of tetracycline absorption by the head and neck to confirm the existence of vascularity of the femoral head.



## Book Review

### PUBLICATIONS CORNER

#### **Maternal Mortality in 2000 – Estimates developed by WHO, UNICEF and UNFPA**

[ISBN 92 4 156270 6; CHF 20.00/US\$ 18.00]

Reduction of maternal mortality is one of the major goals of several recent international conferences and has been included in the Millennium Development Goals. However, measuring maternal mortality is difficult and complex. Reliable estimates of the dimensions of the problem are not generally available and it is difficult to compare the data obtained from different sources and to assess the overall magnitude of the problem.

In response to these challenges, WHO, UNICEF and UNFPA have developed an approach that seeks both to generate estimates for countries with no data and to correct available data for underreporting and misclassification. The approach, with some variations, was used to develop estimates for maternal mortality in 1990 and 1995 and has been used again for generating these estimates for the year 2000.

#### **Global Status Report: Alcohol Policy**

[ISBN 92 4 158035 6; CHF 60.-/US\$ 54.00]

The World Health Organization estimates that there are about two billion people worldwide consuming alcoholic beverages and 76.3 million with diagnosed alcohol-use disorders. From a public health perspective, the global burden of alcohol, both in terms of morbidity and mortality, is considerable; alcohol consumption causes

3.2% of deaths (1.8 million) and 4.0% of Disability-Adjusted Life Years (58.3 million). Overall, there are causal relationships between alcohol consumption and more than 60 types of disease and injury.

The Global Status Report: Alcohol Policy is another publication in the WHO Global Status Report series (Global Status Report on Alcohol, 1999 and Global Status Report: Young People and Alcohol, 2001). The primary aim of the report is to describe the status of existing alcohol policies worldwide. It also addresses briefly what is known about the effectiveness of different alcohol policy measures. This report is based on a review of existing policies in 118 countries.

The report is a valuable resource for decision-makers, researchers, journalists, students and teachers, and the general public interested in alcohol policy issues.

#### **Long-term Care in Developing Countries – Ten country case-studies**

[ISBN 92 4 156249 8; Sw.fr.50-/US\$45.-; In developing countries: Sw.fr. 35.-]

This volume describes the changing realities determining the need and resources for long-term care in ten developing countries. Considered together, these case-studies provide examples to illustrate many of the lessons learned, key policy issues confronted, and current and future needs discussed in other volumes in this series. Represented in this first of two volumes are case-studies of China, Costa Rica, Indonesia, Lebanon, Lithuania, Mexico, Republic of Korea, Sri Lanka, Thailand, and

Ukraine. Each has been prepared by health systems/LTC experts from that country, in collaboration with the World Health Organization and its Collaborating Centre for Health and Long-Term Care Policy and Research, the JDC-Brookdale Institute. This book is part of the World Health Organization's Initiative on Long-Term Care led by the JDC-Brookdale WHO Collaborating Centre for Health and Long-term Care Policy and Research.

### **WHO Model Formulary 2004 – Based on the 13th Model List of Essential Medicines 2003**

[ISBN 92 4 154631 X; Sw.fr.40-/US\$36.00; In developing countries: Sw.fr.20.-]

Since its first publication in 2002, the WHO Model Formulary has become an indispensable source of independent information on essential medicines for pharmaceutical policy-makers and prescribers worldwide. The Model Formulary is the authoritative guide on how to make effective use of medicines on the WHO Model List of Essential Medicines, so improving patient safety, and limiting unnecessary medical spending. For each medicine, the Model Formulary provides information on use, dosage, adverse effects, contraindications and warnings, supplemented by guidance on selecting the right medicine for a range of conditions. This new edition details changes made to the WHO Model List of Essential Medicines 2003, with updated therapeutic information on existing medicines reflecting new clinical knowledge.

### **Neuroscience of Psychoactive Substance Use and Dependence**

[ISBN 92 4 156235 8; Sw.fr. 50-/US\$45.-; In developing countries: SW.fr.35.-]

*Neuroscience of Psychoactive Substance Use and Dependence* provides an authoritative

summary of current knowledge of the biological basis of substance use behaviours, including their relationship with environmental factors. The report focuses on a wide range of psychoactive substances, including tobacco, alcohol and illicit drugs. New developments in neuroscience research are discussed (e.g. mechanisms governing craving, tolerance, neuroadaptation, immunotherapies and the concept of dependence) as well as the ethical implications of these developments. As the product of consultations with and contributions from many international experts and partners, the best available evidence is provided from the various schools of thought and areas of research in the field of neuroscience.

*Neuroscience of Psychoactive Substance Use and Dependence* is targeted at individuals with more than a basic knowledge of neuroscience, including scientists from a number of disciplines. It is expected that this publication will be of interest to health care workers, clinicians, social workers, university students, science teachers and policy-makers.

"...Many gaps remain to be filled in our understanding of the issues related to substance use and dependence but this report shows that we already know a great deal about the nature of these problems that can be used to shape policy responses." – LEE Jong-wook, Director-General, WHO

### **Global Strategy for Infant and Young Child Feeding**

[ISBN 92 4 156221 8; Sw.fr.10-/US\$9.00; In developing countries: Sw.fr.5.-]

WHO and UNICEF jointly developed this global strategy to focus world attention on the impact that feeding practices have on the nutritional status, growth and development, health, and thus the very survival of infants and young children. The

strategy is the result of a comprehensive two-year participatory process. It is based on the evidence of nutrition's significance in the early months and years of life, and of the crucial role that appropriate feeding practices play in achieving optimal health outcomes. The strategy is intended as a guide for action; it identifies interventions with a proven positive impact, it emphasizes providing mothers and families the support they need to carry out their crucial roles, and it explicitly defines the obligations and responsibilities in this regard of governments, international organizations and other concerned parties.

**AIDS in Asia** (Edited by Dr Jai P. Narain, Director, Department of Communicable Diseases, WHO/SEARO) [ISBN 0-7619-3225-9, INR 295]

This important and comprehensive volume focuses on the epidemiological and programmatic aspects of the HIV/AIDS epidemic in Asia. The contributors discuss the dynamics and determinants of HIV and cover a wide range of pertinent topics related to its prevention, care and treatment. These include:

- The health, economic, socio-cultural and security dimensions of HIV/AIDS;

- Antiretroviral treatment and the '3x5' Initiative;
- Management of HIV and sexually-transmitted infections;
- Drug-related HIV;
- HIV vaccine development, and
- The role played by NGOs.

In addition, the volume provides country-specific HIV reports. The contributors highlight the success stories in both prevention and cure as also the lessons learnt from the Asian response to the challenge. They argue that facilitating access to care, including antiretroviral treatment, is now a matter of crucial importance as is scaling up innovative practices that have proved effective in Asia.

Covering a large number of Asian countries and based on actual experiences from the field, this volume will be invaluable for all those engaged in combating HIV throughout the world. In particular, it will be of immense use to all those involved in HIV/AIDS control programmes, public health professionals, health care workers and health administrators, as also to international agencies, NGOs and community-based organizations dealing with AIDS.



# Guidelines for Contributors

THE Regional Health Forum seeks to inform and to act as a platform for debate by health personnel including policy-makers, health administrators, health educators and health communicators.

Contributions on current events, issues, theories and activities in all aspects of health development are welcome. Contributions should be original and contain something of interest to those engaged in health policy and practice, some lesson to be learned, some idea, something that worked, something that didn't work, in fact anything that needs to be communicated and discussed on a broader scale. Articles, essays, notes, news and views across the spectrum of health development will be published.

Every year, the April issue of the Forum is dedicated to the World Health Day theme of the year. Readers may send contributions relating to the theme for inclusion in the special issue.

Papers for submission should be forwarded to the Editor, Regional Health Forum, World Health Organization, Regional Office for South-East Asia, World Health House, Indraprastha Estate, Mahatma Gandhi Road, New Delhi 110002, India (e.mail address: editor@whosea.org).

Contributions should:

- be in English;
- be written in an anecdotal, informal, lively and readable style (so that sophisticated technologies, for example, may be easily understood);
- be in MS Word and sent with a diskette and a printout in double space, and
- not normally exceed 3 000 words with an abstract (approx. 250 words) and a maximum of 30 references.

Letters to the editor should normally be between 500-1 000 words with a maximum of six references.

## Responsibility of the Authors

Authors are responsible for:

- ensuring that their contributions contain accurate data and references (and are requested to check the accuracy of both before submission);
- obtaining permission to use copyrighted material (if used). The letter granting such permission should be attached to the manuscript when submitted;
- obtaining permission from appropriate governmental authorities if the contribution pertains to a government programme/project and contains material/statistics/data derived from government sources;
- ensuring that all abbreviations (if used) are explained;

- giving their full names, the name and address of their institutions, and an exact description of their posts;
- declaring sources of funding for the work undertaken, and
- disclosing at the time of submission, information on financial conflict of interest that may influence the manuscript. They may also choose to declare other interests that could influence the results of the study or the conclusions of the manuscript. Such information will be held in confidence while the paper is under review, and if the article is accepted for publication the editors will usually discuss with the authors the manner in which such information is to be communicated to the reader.

## Tables and Illustrations

- The use of tables and illustrations should be restricted to those that clarify points in the text.
- All illustrations and tables should be numbered consecutively and should be lightly marked on the back with the figure number, and the author's name indicated.
- Graphs and figures should be clearly drawn and all data identified.
- Photographs should be on glossy paper, preferably in black and white.
- Each table should be submitted on a separate sheet of paper.

## References

- References should be numbered consecutively as they occur in the text.
- Journal titles should be written out in full (i.e. not abbreviated).
- A reference to a contribution in a book should include the chapter title and page range.

## Reprints

Reprints of contributions are not produced but five printed copies of the issue will be supplied to the respective authors. An electronic version of the article in PDF format may also be made available to authors if they provide their e-mail addresses.



## *How to order WHO Publications*

New WHO publications are issued frequently. Requests for information about WHO publications and orders should be addressed to the nearest sales agent (listed below) or to WHO, New Delhi. Orders sent to New Delhi must be accompanied by payment in the form of a demand draft/Indian postal order/money order (prices include handling and postage charges). Orders from countries other than India can be addressed to the Sales agent or WHO Representative in that country and are payable in local currency:

### **INDIA**

#### **Southern India**

M/s New Century Book House (P) Ltd.  
136 Anna Salai  
Chennai 600 002, TAMIL NADU

#### **Western India**

M/s Consumer Communications  
52, Shafi Estate, Amar Mahal  
Chembur  
Mumbai 400 089, MAHARASHTRA

M/s K.M. Varghese & Company  
Medical Book Distributors & Publishers  
104 Hind Rajasthan Building  
Dadasaheb Phalke Road, Dadar  
Mumbai 400 014, MAHARASHTRA

#### **Eastern India**

M/s Insales India (P) Ltd.  
1C/1&2, Camac Court  
25-B, Camac Street  
Calcutta 700 016, WEST BENGAL

### **BANGLADESH**

Ahsania Mission Book Distribution House  
House No. 1/A, Road No. 13,  
Dhanmondi R.A. (Mirpur Road) 1st Floor,  
Dhaka - 1209  
Email: dam@drik.bgd.toolnet.org

### **INDONESIA**

M/s C.V. Sagung Seto  
Jalan Pramuka No. 27  
P.O. Box 4661  
Jakarta 10001

### **NEPAL**

Everest Media International Services (P) Ltd.  
Shanti Nagar-34  
Block No. Kha-1-248  
New Baneswar, Kathmandu

### **THAILAND**

Suksit Siam Co. Ltd  
113, 115 Fung Nakhon Road  
Opp. Wat Rajbopith  
Bangkok 10200

World Health Organization  
Regional Office for South-East Asia  
Indraprastha Estate  
New Delhi 110 002, India  
Attn: Publications (Sales)  
Telephone: 2337-0804  
Telefax: 2337-9395 / 2337-9507  
Email : [publications@whosea.org](mailto:publications@whosea.org)