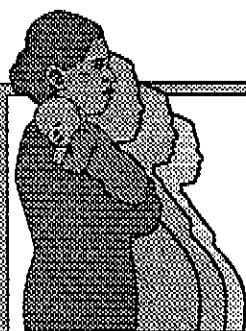


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**MATERNAL HEALTH
AND SAFE MOTHERHOOD PROGRAMME**

**INDICATORS TO MONITOR
MATERNAL HEALTH GOALS**

Report of a Technical Working Group
Geneva, 8-12 November 1993



World Health Organization
Division of Family Health
Geneva

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1. The first part of the document discusses the importance of maintaining accurate records of all transactions and the role of the accounting department in ensuring the integrity of the financial statements. It emphasizes the need for transparency and accountability in all financial reporting.

2. The second part of the document outlines the various methods used to collect and analyze financial data, including the use of statistical models and the application of advanced data analysis techniques. It highlights the importance of using reliable data sources and the need for rigorous quality control measures.

3. The third part of the document provides a detailed overview of the accounting system, including the various components and the flow of information between different departments. It also discusses the importance of maintaining accurate records of all transactions and the role of the accounting department in ensuring the integrity of the financial statements.

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1. INTRODUCTION

In order to maximize progress, interventions to improve maternal health require information on the adequacy and pace of their implementation and on their ultimate impact. During the World Summit for Children in 1990, WHO and UNICEF adopted two goals with direct relevance to safe motherhood, and subsequently proposed five indicators for national monitoring, programme management and international reporting (Table 1)⁽ⁱ⁾. Goals or objectives play an essential part in the formulation of rationales for implementing health policies, programmes and services. Indicators are the basic tools for monitoring progress towards these goals. They reflect the current understanding of achievements and the future directions programmes should take. Monitoring progress is essentially a process of comparison of indicators, over time and across populations.

It is the policy of WHO and UNICEF to support and promote health monitoring and indicator development. The two organizations have agreed a basic set of indicators to recommend to countries for monitoring the health goals of the World Summit for Children. Several of these indicators are related to women's health, notably those on maternal mortality, coverage of prenatal and delivery care, anaemia in women, low birth weight and contraceptive prevalence.

The objective of this Technical Working Group was to examine only the indicators directly related to maternal mortality and coverage of prenatal and delivery care and to provide further guidance to countries on the collection and utilization of these indicators. Guidelines on the collection of data for other maternal health goals will be made available at a later stage.

Table 1. Maternal health goals and indicators

Maternal health goal	Recommended indicators ⁽ⁱ⁾
Goal 2: "Between 1990 and the year 2000, reduction of maternal mortality rate by half"	Maternal mortality rate (ratio): Annual number of maternal deaths per 100 000 live births ⁽ⁱⁱ⁾ Annual number of maternal deaths
Goal 11: "Access by all pregnant women to prenatal care, trained attendants during child birth and referral facilities for high risk pregnancies and obstetric emergencies"	The proportion of women attended at least once during pregnancy by trained personnel ⁽ⁱⁱ⁾ The proportion of births attended by trained health personnel ⁽ⁱⁱ⁾ Number of facilities providing essential obstetric care per 500 000 population

Source: World Health Organization and United Nations Children's Fund (UNICEF). *Indicators for Monitoring Health Goals of the World Summit for Children*. 4 October 1993. Geneva.

- (i) Goals and indicators recommended by WHO and UNICEF for national monitoring and programme management, and international reporting
- (ii) Indicators also recommended by the Common Framework for monitoring the implementation of strategies for Health for All by the Year 2000

In order to assist countries in collecting and analysing data for monitoring maternal health goals, the Maternal Health and Safe Motherhood Programme convened a Technical Working Group to examine the goals related to maternal mortality and coverage of care and make recommendations for data collection methodologies.

The Technical Working Group brought together experts with relevant experience in monitoring maternal health, representing those collecting data or using indicators at international, national, subnational or programme levels. It was convened at a time of growing consensus on the content of programmes for improving maternal health, growing convergence on the essential package of indicators for monitoring progress, and growing need for guidance for the collection and utilization of these indicators.

The objectives of the meeting were:

- (1) to review experience with relevant safe motherhood indicators for national monitoring and for international reporting (including consideration of the adequacy of definitions, criteria, common data sources, data collection methods and formats for presentation of the indicators;
- (2) to suggest, in view of experience with these indicators, any necessary improvements in the definitions of the indicators and refinements in the methodologies for collection and presentation of the required data;
- (3) to consider the merits and shortcomings of possible alternative or proxy indicators to monitor the maternal health goals of the "World Summit for Children"; and
- (4) to make recommendations on a limited number of indicators that could be used at the subnational (regional and/or district) level to monitor changes in coverage and quality of maternal health care. These recommendations cover the same issues as those identified above, i.e. adequacy of definitions, criteria, common data sources, data collection methods and formats for presentation.

The list of participants at the meeting is given in Appendix 1. Dr M. Koblinsky and Ms V. Filippi were appointed chairman and rapporteur respectively. Several background papers were prepared for the meeting and are listed in Appendix 4. This report summarises the discussions of the participants and includes suggestions made by them for additional text following the meeting.

2. BACKGROUND

2.1 Type of indicators

Different classification and terminologies of indicators have been proposed and used by health planners. During the discussions, the Technical Working Group distinguished the two following groups of indicators:

- (1) those related to the impact or health outcome of maternal health programmes (e.g. the maternal mortality ratio and number of maternal deaths);

- (2) those related to the process or direct and intermediate outputs of programmes, describing the mechanisms by which interventions have an impact. Examples include the indicator of antenatal care attendance during pregnancy and the output indicator of number of facilities providing essential obstetric care (EOC) per 500 000 population.

These two groups of indicators essentially provide descriptive information on the performance and activities of maternal health programmes. Their main use is for assessment as opposed to problem diagnosis though they can also serve for the latter. Overall, indicators currently available focus on maternal mortality, rather than morbidity, disability or well-being. This is mainly because of the relative lack of experience in the conceptualization and utilization of maternal health status indicators outside mortality. The need to broaden outcome indicators beyond maternal mortality by testing and developing new indicators was emphasized during discussions, although the group felt this was outside the meeting's terms of reference. The importance of developing policy indicators, reflecting the commitment of health policy-makers to provide essential obstetric care at country level, was also discussed. Finally, the contraceptive prevalence rate was also endorsed by the Working Group as an indicator contributing to the understanding of maternal health issues and playing a particularly important role in the interpretation of trends of maternal mortality. However, this was not discussed in detail as it is not strictly an indicator for monitoring mortality or coverage of care.

2.2 Selection of indicators

The Working Group reviewed the appropriateness of the proposed indicators according to a combination of conceptual, scientific and contextual criteria.² Thus, it was agreed that, before endorsing a specific indicator, its place within the causal chain between programme inputs, outputs and eventual impact should be established, whether or not it has been scientifically proved (see Figure 1).

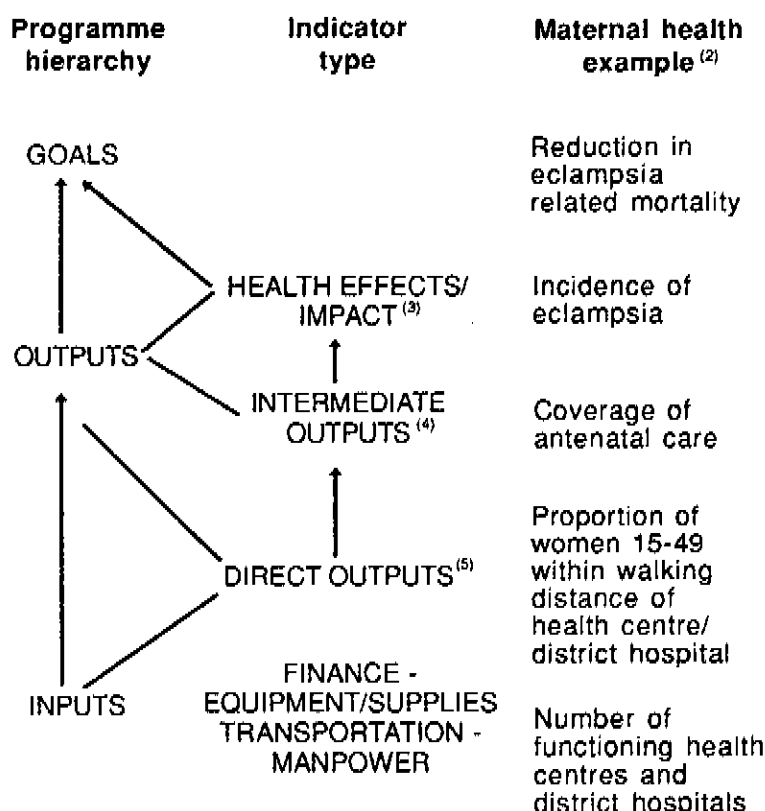
Members of the Working Group stressed the importance of having a complementary set of indicators reflecting diverse aspects of the programme from implementation to impact in order to achieve a more dynamic approach. As a general rule, indicators should be action-oriented and provide workable directions.

Table 2 displays the necessary scientific qualities against which indicators were reviewed.

Finally the Technical Working Group acknowledged that, for each country, contextual factors such as the availability, scope and quality of information, but also the intended use of the indicators, influence the choice and calculation of indicators at national and subnational levels.

Figure 1.

**TYPES OF INDICATORS ACCORDING TO
LOGICAL FRAMEWORK APPROACH TO
PROGRAMME HIERARCHY⁽¹⁾**



(1) Adapted from Payne (1985). See also Murnaghan (1981); Veney and Kaluzny (1984)

(2) This describes only one approach (i.e. family planning) to achieving the stated goal, and only one example of each indicator type. Other approaches and indicators are clearly possible

(3) Also referred to in literature as "health outcomes"

(4) Also referred to in literature as "intermediate effects" or "process indicators"

(5) Primarily comprising indicators of access and acceptability (Murnaghan, 1981)

Table 2. Desirable scientific qualities of health indicators

Quality	Meaning
Valid	Indicator actually measures the phenomenon it is intended to measure
Reliable	Indicator produces the same results when used more than once to measure precisely the same phenomenon
Specific	Indicator measures only the phenomenon it is intended to measure
Sensitive	Indicator reflects changes in the state of the phenomenon under study
Operational	Indicator is measurable (quantifiable). Definitions and reference standards have been developed and tested

Sources: Graham WJ. Health status indicators in developing countries: a selective review. London, Commonwealth Secretariat, 1986.

Murnaghan JH. Health indicators and information systems for the year 2000. Annual Review of Public Health, 1981;2, pp.299-361.

United Nations Children's Fund (UNICEF). A UNICEF guide for monitoring and evaluation. Making a difference? New York, Evaluation Office, UNICEF, 1991.

Veney JE. and Kaluzny, AD. Evaluation and decision-making for health services programs. New Jersey: Prentice-Hall Inc., 1984.

2.3 Framework adopted for discussing indicators

The Technical Working Group adopted the following framework for discussing the indicators:

A. Is the indicator aimed at maternal health or maternal mortality?

This relates to whether the indicator is directed towards (i) positive maternal health focusing on the well-being of the mother or negative outcomes such as morbidity and disability, or (ii) towards maternal mortality. Most of the indicators reviewed during the meeting focused on maternal mortality.

B. Causal relationship with outcome

Is there strong evidence of causal linkages if (process) output indicators are to be used as proxies for impact indicators?

C. Definition

Definition was discussed first in terms of clarity of the statistical definition with regard to the numerator and denominator of the indicator and also by considering the actual meaning of the indicator with a view to facilitate its interpretation. The validity, reliability and operationalization of the indicator were also discussed under this section of the framework (see Table 2).

D. Does the indicator help programme management?

The Technical Working Group was concerned that indicators should be action-oriented and should provide workable directions whether at subnational, national or international levels. Furthermore, it was felt unnecessary to propose new indicators not useful for programme management. The following levels of collection and utilization of indicators were identified: local (i.e. below district), district, national, international. Each indicator is reviewed in terms of its use at these various levels and its usefulness for programme management.

Because of the important role of indicators in drawing attention to whether the goals are on schedule, the ability to respond to changes of the indicator and the frequency of data collection (time-frame) were also discussed under this section.

E. Data sources/means of data collection

These include existing routine sources of information (civil registration, health service information systems), and also rapid epidemiological methods such as the rapid evaluation methodology, rapid assessments, household surveys and sentinel surveillance systems. The question of the usefulness of sentinel surveillance is an important one, and one which the working group was not able to address adequately, given the current ambiguity surrounding the definition of these systems³, and the lack of practical experience in using these for monitoring maternal health.

F. Recommended formats for presentation.

These were mostly discussed in terms of disaggregations necessary at subnational level to highlight issues of equity. In addition, suggestions for assessing scope and quality of data were also recorded.

3. INDICATORS FOR IMPLEMENTATION

There are eight indicators for immediate implementation (Table 3). Five of these were originally recommended by the World Summit for Children. The others arise from the field experience of members of the Working Group. Their principal characteristics are summarized in Table 4.

3.1 World Summit indicators

3.1.1 Annual number of maternal deaths and maternal mortality ratio⁽¹⁾

A. Are the indicators aimed at maternal health or maternal mortality?

They are aimed at measuring progress towards the decline of maternal mortality.

B. Causal relationship with outcome

These are maternal mortality indicators.

C. Definitions

These are indicators of impact or health outcomes.

Concerning the numerator, the *International Classification of Diseases* (ICD)-10 includes three definitions of maternal mortality: (i) a maternal death definition which is similar to that in ICD-9; (ii) a late maternal death definition which allows the recording of maternal deaths between 42 days and one year after the termination of the pregnancy; (iii) a pregnancy-related death which is irrespective of the cause of death and therefore includes incidental and accidental causes⁴.

With regard to the definition of late maternal deaths, the Technical Working Group anticipated that the more developed a country becomes, the more important it is to record those deaths because the availability of sophisticated technology will make it more possible to prolong life after the 42-day time limit.

One of the main advantages of the category of pregnancy-related deaths is that it avoids the determination of pathogenic causes of death, and therefore avoids the need for strong clinical inputs during data collection. The Technical Working Group paradoxically recommends, however, that when possible pregnancy-related deaths should be recorded by cause. Distinguishing violence as a cause may identify a substantial number of deaths that are not presently being reported as maternal deaths. These deaths have typically been thought of as accidental and hence fall outside the standard definition of direct or indirect maternal deaths. It was noted that the category of incidental deaths has been used by hospitals in a manner that makes their rates look better. If

(1) The Summit Goals refer to the maternal mortality rate stipulating the use of live births in the denominator. Strictly speaking this is a ratio. The maternal mortality rate uses women of reproductive age in the denominator. Because of the confusion created by the use of the two terms it is critical always to specify which denominator is being used. In this report the term ratio is always used when live births appear in the denominator.

these deaths were recorded as pregnancy-related deaths, this may provide a better estimate of a hospital maternal mortality ratio.

For the purpose of trend analysis, however, the Technical Working Group recommended that, as far as possible, the definition of the numerator be consistent across time.

With regard to the denominator of the maternal mortality ratio, the norm is to use the number of live births. As discussed elsewhere, this underestimates the total population of pregnant and delivering women at risk.⁵

D. Do the indicators help programme management?

These indicators are most useful for reporting at national and international levels. However, although they give an indication of the magnitude of the problem, they do not provide any information on the means to solve it. Collecting these indicators on their own, without supporting information, would not be useful for programme management.

The Technical Working Group discussed whether the number of maternal deaths should be included as an indicator since it has no denominator. The Technical Working Group recommended that it be excluded from the set of Safe Motherhood indicators for monitoring and comparison at national and international levels. At the local, district and service levels, however, it does focus attention on maternal deaths and can be used through case reviews towards improving action within programmes. However, it is important to be aware that where the total number of maternal deaths is small - as will be the case where the overall numbers of live births are low - there will inevitably be random fluctuations which greatly complicate any numerator analysis. Looking at the number of maternal deaths will show wide variations from year to year even at the national level (except perhaps in the most populous countries with high fertility and maternal mortality). In such cases it is advisable to examine trends using three or five-year moving averages.

Concerning the frequency of data collection, it was noted that the two indicators have a low sensitivity to change due to the relative rarity of the events. Because of this, when routine information is inadequate, *ad hoc* information should be collected only on a five-year or longer basis.

E. Data sources/means of data collection

Data sources and means of data collection for indicators of maternal mortality have been discussed in numerous papers^{5,6}. For the purpose of monitoring at population level, community-based information is the best source of information and the Working Group noted that hospital maternal mortality ratios are non-interpretable - except at national level when all births and deaths take place in hospitals and are properly classified - as it is not possible to know in which direction they may be biased.

With respect to improving vital registration of maternal deaths, the Technical Working Group recommended that countries adopt the notification of pregnancy status on death certificates.

F. Recommendation for presentation and format

To facilitate the interpretation of the data, whenever possible, additional information should be provided on the following :

- 1) **Place of death:** whether at home, in a health service setting, or on the way to the health service.
- *2) **Absolute numbers:** for both numerator and denominator, in order to enable calculation of the precision of the estimate.
- *3) **Definition of numerator:** whether the cases were defined according to the maternal death, late maternal death and pregnancy-related death definitions proposed in ICD-10, or coded according to an earlier version of ICD.
- *4) **Definition of denominator:** live births, all births or pregnancies. Including all pregnancies in the denominator would be more appropriate but live births are easier to collect. Where data on numbers of live births are not readily available, total estimated births can be calculated using census data on total population and crude birth rates in a specified area.
Total expected births = population x birth rate.
- *5) **Reference year and time-period:** number of years covered by the estimate and reference-year for the estimate.
- *6) **Definition of population:** population or sub-groups of population to which the data refers.
- *7) **Source of data:** routine data sources (vital registration, health services), special studies, empirical relationships or models, etc. If different sources have been used for the numerator and denominator, this should be stated.
- 8) **Quality of data:** The Working Group recognized the importance of having some indication of the quality of the information, especially for the purpose of international comparison, and that this demands the development of a systematic approach by WHO.
- 9) **Absolute numbers at all levels of disaggregation:** Suggested disaggregations include urban/rural and geographical or administrative divisions. Absolute numbers should be provided for both numerator and denominator.

* Suggested for international reporting

Table 3 Indicators for monitoring progress in the reduction of maternal mortality, proposed by the World Summit for Children (October 1993) and WHO Technical Working Group (November 1993)

Five World Summit Indicators for Implementation (WHO and UNICEF)	Eight Indicators for Implementation (Technical Working Group)	Three Indicators under study (Technical Working Group)
a. Maternal mortality rate: annual number of maternal deaths per 100 000 live births	a. Same but "maternal mortality ratio"	
b. Annual number of maternal deaths	b. Same*	
c. The proportion of women attended at least once during pregnancy by trained personnel	c. The proportion of women attended at least once during pregnancy by trained personnel for reasons related to the pregnancy with a new definition of trained health personnel: exclude trained and untrained TBAs with the exception of the TBA who has undergone extensive training (6-12 months) and is employed as a PHC worker in the formal system but who continues to deliver babies in her community	
d. The proportion of births attended by trained health personnel	d. Same with new definition of trained health personnel: exclude trained and untrained TBAs without exception	
e. Number of facilities providing EOC** per 500 000 population	e. Number of health facilities providing EOC** per 500 000 population	
	f. Number of district/first referral facilities providing EOC** per 500 000 population	
	g. Proportion of complicated obstetric cases managed at health centres and district hospitals providing EOC**	
	h. C-sections as a proportion of all live births in the population	
		i. Percentage of population within 1 hour travel time to health centre offering essential obstetric care EOC**
		j. Case-fatality rate for direct obstetric complications
		k. Perinatal mortality

* Because of the absence of a denominator and random fluctuations in small numbers, this indicator should be used with caution for comparative purposes and trend analysis

** At the health centre the essential elements of obstetric care include: parenteral antibiotics, parenteral oxytocic drugs, parenteral sedatives for eclampsia, manual removal of placenta, manual removal of retained products, and assisted delivery. At the district hospital (first referral level) the essential elements include all of the above, plus surgery, anaesthesia and blood transfusion.

3.1.2 Proportion of women attended at least once during pregnancy by trained personnel

A. Is the indicator aimed at maternal health or maternal mortality?

The indicator is aimed at maternal health.

B. Causal relationship with outcome

The causal relationship with maternal mortality is probably a weak one, given the absence of specification on the nature and type of care being provided and taking into account the current debate on the effectiveness of antenatal care to prevent maternal deaths^{7,8}. A stronger relationship exists, however, with maternal health.

C. Definition

This is an output or process indicator that provides information on the level of utilization of care by pregnant women. However, because the type of care provided is not specified, the indicator measures any contact during pregnancy, whether or not this was made for reasons related to the pregnancy.

If the indicator is to be useful to programme management, the underlying definition of care needs to be made more apparent and more precise. This would strengthen both the causal relationship with maternal health outcomes and the complementarity of the indicator with other safe motherhood indicators that are more tailored to evaluation needs.

Two recommendations can be made. The first is to add "for reasons related to her pregnancy" to the indicator statement. Thus, the indicator becomes:

"The proportion of women attended at least once during pregnancy by trained personnel for reasons related to the pregnancy."

The second recommendation is with regard to the definition of trained personnel, to include in this category only doctors (specialized or non-specialized) and persons with midwifery skills, excluding trained or untrained TBAs (with the caveat on exception for TBAs presented in Appendix 5). This reinforces the ability of the indicator to capture the coverage of professional antenatal care which has the capacity to handle difficult pregnancies.

The most commonly used denominator for this indicator is the number of live births which acts as proxy for the number of pregnant women. This, however, underestimates the total number of pregnancies by excluding those which end in stillbirth or spontaneous or induced abortion as well as ectopic and molar pregnancies. It has been suggested that applying a raising factor of 15% to the total number of live births would provide the approximate number of pregnant women in need of care⁵.

D. Does the indicator help programme management?

Because of the weak link of causality with maternal mortality, the World Summit/Health For All by the Year 2000 indicator is of little use to programme management, especially when programmes are strongly oriented towards

saving women's lives rather than general health. However the link to perinatal mortality and morbidity is much stronger and the indicator would certainly be useful in evaluating programmes in terms of newborn health and survival. Nonetheless, adopting the revised definition as proposed by the Technical Working Group would make it more useful in the context of monitoring maternal mortality and morbidity.

This indicator can be employed at subnational (local and district), national and international levels. For assisting health planning and programme management, information should be disaggregated according to geographical or administrative strata and women's characteristics. Local and national managers can ensure attention to equity by disaggregating the information according to high-risk groups. At international level, information should be disaggregated according to urban and rural areas.

This indicator is responsive to changes. For international comparisons, and following the Health For All by the Year 2000 specification, the situation should be reassessed every three years. However, countries may wish to reassess the situation annually for their own need. In any case data collection should not be less frequent than every five years.

E. Means of data collection

Routine health service information used on its own constitutes a poor source of statistics on coverage of care. Although it supplies data for the numerator, it usually fails to provide information on the total population in need of care (in the case of maternal health, because some pregnancies or births take place outside the health system) and therefore necessitates a crude derivation of the denominator from census projection and/or vital statistics. Another important drawback to health services statistics, is that they often exclude private sector information.

Household survey data are probably the most reliable method for providing coverage information and for disaggregation on non-user characteristics. However, these data are very often a non-continuous source of information and this constitutes a drawback.

F. Recommended formats for presentation.

See subsection D for suggestions for disaggregations. When utilising survey data, absolute numbers and confidence intervals should be reported.

Demographic and Health Surveys (DHS) and other survey programmes, which often collect information on maternity care, should be requested to produce indicators that refer only to most recent births for women with a birth in the last five years. This avoids double counting of women who had several births and therefore the over-representation of women with shorter birth intervals⁹.

3.1.3 Proportion of births attended by trained health personnel

A. Is the indicator aimed at maternal health or maternal mortality?

This indicator is aimed both at maternal health and, to a limited extent, at maternal mortality. Maternal mortality will be better addressed when the indicator stipulations are made more specific by excluding TBAs, whether trained or not, from the category of trained health personnel.

B. Causal relationship with outcome

This indicator has a stronger relationship with mortality, albeit still a weak one, than the indicator on antenatal care utilization discussed previously.

C. Definition

This is an intermediate output or process indicator that provides information on the actual coverage of assisted deliveries, both normal and complicated. Because the current World Summit/Health For All by the year 2000 (HFA) indicator defines trained health personnel broadly, it can be understood as a composite measure of different types of intrapartum care. The Working Group was concerned that this indicator should not be considered as advocating 100% delivery care coverage in institutional facilities and that it should be interpreted in function of national and subnational coverage targets and policies.

To make this indicator specific to skilled assistance, the utilization of the definition of trained personnel developed for the antenatal care indicator was recommended, but without the caveat on TBAs with extensive training (see Appendix 5). The Working Group adopted the rationale that, for reducing maternal mortality, "trained" health personnel should be able to perform essential obstetric functions appropriate to their level in the health system, as defined by WHO. It is not enough for trained health personnel to have general midwifery skills for conducting normal delivery; they also need to know life-saving obstetric skills.

The proposed change of definition of trained attendant may create difficulties in comparability over time, however, and programmes are encouraged to state which definition they use. Programmes may wish to subdivide the indicator by category of trained person (doctor, midwife etc.).

In theory, all births or deliveries in the community should be included in the denominator. In practice, live births only are most commonly used and, as a result, the coverage of delivery care may be overestimated. A denominator of live births underestimates the total number of pregnancies by excluding those which end in stillbirths, abortion, ectopic and molar pregnancies. It has been suggested that applying a raising factor of 15% to the total number of live births would provide the approximate number of pregnant women in need of care.

*Number of pregnant women attended by trained personnel
at least once during their pregnancy*

Number of live births x 1.15

Nonetheless, for the purposes of international comparisons and monitoring over time it is important to provide denominator data for live births.

D. Does the indicator help programme management?

The indicator helps programme management at district, national and international levels by indicating whether safe motherhood programmes are on target in the provision and utilization of professional assistance at delivery. At international level, the interpretation of comparisons should take into account differences in types of training between countries.

Because this indicator is responsive to change, programmes may re-assess it as often as each year. Otherwise, a three-year reassessment is recommended in accordance with HFA 2000 specifications.

E. Data sources/means of data collection

These are identical to those described in the previous section. In addition, a suggestion was made during the meeting to include type of personnel and place of delivery on the birth certificate in countries where coverage of vital registration is good.

F. Recommended formats for presentation.

Suggestions for basic disaggregations include high risk groups and place of contact at subnational and national levels, geographical strata at national level, and urban/rural differentials for international comparisons. Disaggregations according to type of trained health personnel are also important for programme implementation.

A recommendation was made to request survey programmes to construct the delivery care indicators they report according to the newly proposed definition of trained attendants.

Finally, when using survey data, absolute numbers and confidence intervals should be reported to facilitate the interpretation of trends and differentials.

3.1.4 Number of facilities providing essential obstetric care (EOC) per 500 000 population

A. Is the indicator aimed at maternal health or maternal mortality?

The indicator is aimed at measuring progress towards the reduction of maternal mortality.

B. Causal relationship with outcome

An adequate provision of EOC facilities is anticipated to be important to save mothers' lives.

C. Definition

This indicator measures the extent of the availability of health services providing essential obstetric care.

EOC is a concept developed by the World Health Organization¹⁰. For the purpose of operationalization of the indicators and to simplify data collection, the Working Group suggested the WHO definition be divided into two sections, each of which can be delivered at different levels of the health care system. It was also decided that, in view of recent guidelines on functions and equipments at health centre and hospital levels¹¹, two indicators should differentiate between the availability of EOC at each level. This would prove more useful to programme management than would one more general indicator.

The Working Group concurred that, at the health centre, services should be available for (though not restricted to) at least the following:

- (1) parenteral antibiotics,
- (2) parenteral oxytocic drugs,
- (3) parenteral sedatives for eclampsia,
- (4) manual removal of placenta,
- (5) manual removal of retained products.

At the district hospital, service should be available for all the above plus anaesthesia, surgery and blood transfusion. These essential obstetric functions are vital to manage the five most important causes of maternal deaths: sepsis, haemorrhage, eclampsia, obstructed labour and abortion.

In addition, the Working Group concurred that it was important for these indicators to focus on functioning facilities rather than on those with theoretical capacity. It was therefore proposed that an EOC facility should be considered as functioning only if it provides at least one of the elements of obstetric care in the six months prior to the time of data collection. Programme managers may wish to record separately "potential" facilities with the theoretical ability to provide essential obstetric care but where none has been provided during the last six months.

Concerning the construction of the denominators, the Working Group discussed whether births should replace the suggested 500 000 population to make these closer to the population at risk -i.e. pregnant and delivering women. This was nonetheless rejected because of the standard utilization of 500 000 general

population in the construction of health planning indicators. However, to compensate for the fact that populations may have sensibly different numbers of annual births, comparative analysis across geographical areas should be conducted in conjunction with crude birth rates.

D. Does the indicator help programme management?

The two newly proposed indicators would help programme management at national and subnational levels and, to a lesser extent, at international level. Because national summary measures may hide important subnational disparities, subnational disaggregations between geographical and administrative divisions are recommended. In the absence of information on population density and accessibility to health services (in terms of time and distance), these indicators should be used with caution at international level.

E. Data sources/means of data collection

Routine health services statistics are the obvious source of information. Possible means of data collection include maternity registers and health facility surveys. The Technical Working Group anticipated that data collection forms would need to be developed for facilitating the exploitation of maternity register information. With respect to health facility surveys, the UNICEF guidelines¹² provide useful examples of questionnaires and suggestions for study designs. The Technical Working Group stressed that information should be collected from both private and public facilities providing essential obstetric care.

The indicator could be analysed on an annual basis.

F. Recommended formats for presentation.

See subsection D for suggested disaggregations. Other useful levels of disaggregation include urban/rural areas, types of facility, and private/public sectors.

Mapping facilities were also proposed as a useful planning tool for presenting information at national level.

In this connection, it would be useful for programme managers to know which parts of the district have no facilities able to provide essential obstetric care. More important, for planning purposes it would be important to identify administrative areas with no "potential" facilities that could be rapidly upgraded to provide essential care.

3.2 Alternative indicators for monitoring maternal health goals

In addition to proposing two new, more specific, indicators of availability of EOC in place of a general indicator, the Technical Working Group discussed two further indicators as alternatives for immediate implementation. Both attempt to measure the level of management of complications.

3.2.1 Proportion of complicated obstetric cases managed at EOC health facilities

A. Is the indicator aimed at maternal health or maternal mortality?

The indicator is aimed at measuring progress towards the reduction of maternal mortality.

B. Causal relationship with outcome

There is a well-established causal connection between management of complicated cases at health facilities and improvements in maternal mortality and morbidity.

C. Definition

This indicator measures the amount of utilization of EOC facilities by women with complicated pregnancies and deliveries. They constitute an important target group for Safe Motherhood programme action. Although measuring process, this indicator can be regarded as a proxy indicator of health outcomes because of its strong linkages with maternal mortality².

Though presented in different terminology, this indicator has been recommended by both the UNICEF guidelines¹² and the WHO Mother-Baby Package¹¹. Whereas the Mother-Baby Package proposes collecting information on the "proportion of complicated obstetric cases managed at EOC health facilities", the UNICEF guidelines aim to measure "complicated cases in EOC facilities as a proportion of all births in the population". The Working Group defined the indicator as follows:

$$\frac{\text{Complicated}^{(a)} \text{ cases}^{(b)} \text{ in EOC}^{(c)} \text{ facilities during one year}}{\text{Estimated complications in the population/year}^{(d)}}$$

Where:

- (a) admissions for complications relate to the five major causes of death that should be treated by the selected health centre and first referral (district) level hospitals;
- (b) Cases are women not admissions;
- (c) EOC facilities include those provided both at the health centre and at the district hospital;
- (d) estimated complications are 15% of expected live births.

A number of issues or potential problems may affect this indicator, concerning mainly (i) the collection of matching information for the denominator and numerator, (ii) the rationale for assuming that 15% of births result in complications and (iii) the definition of complications.

- (i) Ideally, expected complications in the denominator and women whose admissions are included in the numerator should match or be reconciled. Data collection systems should take into account the fact that cases may originate from outside the established catchment area of the facility(ies) to which the denominator refers. Similarly, other cases may have gone outside the catchment area for treatment. In addition, problems of double counting of cases between EOC facilities may occur and mechanisms to avoid this should be established.

It was also noted that some cases may receive adequate treatment outside facilities fully qualifying as providing EOC, when for example these are equipped only with a subset of EOC functions, which are relevant for some of the complications.

The Technical Working Group discussed whether pregnancies rather than births should be used for calculating the number of expected complications for the denominator. It concluded that, as for other indicators, the calculation of the denominator should be based on live births for practical reasons.

- (ii) The rationale for estimating the number of expected complications is to establish a minimum acceptable level of provision of life-saving obstetric care. Accordingly, the number of admissions for complications treated at EOC facilities should not fall below the overall estimated number of complications at population level. The Working Group discussed whether the assumption made by the UNICEF guidelines¹² and the WHO Mother-Baby Package¹¹ that 15% of live births (or approximately 20% of pregnancies) in the community result in complications is valid and what evidence exists for it. It was agreed that this proportion is a "guesstimate" as good as any and may in fact be too low, as some women experience more than one complication. This assumption would need to be reviewed after trial of the indicator and when more information on prevalence of obstetric complications is released by morbidity surveys. In the meantime, it can be adopted for the provision of working estimates.

The Working Group also noted that, if the real proportion of complicated cases is above 15%, this could render the interpretation of the indicator difficult. It was also suggested that comparison among regions and over time is possible without introducing a standard that may be controversial. This issue was not satisfactorily resolved. The minimal standards should be used for general guidance only.

The possibility of variation in the proportion of complications between countries was also discussed. The Working Group concurred that the incidence of complications is likely to vary between regions and areas. Obstructed labour, for example, will be more of a problem in communities where short female stature is common together with malnutrition and early childbearing. Incidence of eclampsia is known to vary geographically and according to season. On the other hand, the Working Group was of the opinion that the incidence of postpartum haemorrhage is likely to be similar in different communities although case fatality will vary considerably with the underlying prevalence of anaemia. Nonetheless, pending more detailed local estimations, it was agreed that 15% could serve as a general guideline. In practice, countries will develop local calculations for incidence of complications.

WHO has estimated that at least 15% of all pregnancies develop complications which require rapid and skilled intervention if the woman is to survive without lifelong disabilities¹¹. This is a conservative estimate. A study in the United States found that hospitalization for pregnancy complications is far more common than is widely appreciated and that for every 100 hospitalizations involving a birth there were 22.2 non-delivery hospitalizations for non-delivery complications (14.6 antenatal complications, 7.6 pregnancy loss complications)¹³. In developing countries this proportion may be even higher, given the generally poor health and nutritional status of women. If the needed help is not available, those with the severest complications will die and countless others who survive will suffer from permanently impaired health and from a variety of disabilities.

- (iii) Finally the difficulty in collecting information on complications and in finding an operational definition for it was discussed. More guidance on this can be found in the Technical Supplement of the Mother-Baby Package¹¹.

D. Does the indicator help programme management?

This indicator is probably most useful at national and subnational levels, and in particular at district level. It should not be disaggregated further than district level, however, since it should encompass sufficient numbers of EOC facilities and cases.

The frequency of data collection should be annual although it was recognized that, given the constraints in most developing countries, in practice it would be difficult to engineer meaningful change in the indicator in the short term.

E. Data sources/means of data collection

As this indicator has been tested only in Bangladesh and India, the main recommendation is for programme managers in other countries to test the indicator for ease of collection. They are urged to report back on their experience, in particular to the Secretariat at WHO's Maternal Health and Safe Motherhood Programme.

The Working Group suggested that, in the first instance, the main means of data collection should probably be health services sampling and that this should provide a relatively high quality of information. Eventually, with experience building up, it was anticipated that the indicator would become a full part of statistics routinely reported by health services.

Table 4 Summary characteristics of safe motherhood indicators for implementation

Indicators	Measurement Goal	Interpretation	Level of Programme Management	Basic Disaggregation	Main Data Sources	Minimum Interval for Data Collection
a) Maternal mortality ratio	Maternal mortality	Health impact	National International	N/A	surveys routine statistics if good coverage	5 years
b) Annual number of maternal deaths*	Maternal mortality	Health impact	Local Services Small populations	urban/rural geographic and administrative strata	vital statistics if good coverage health service	1 year
c) Proportion of women attended at least once during pregnancy by trained health personnel for reasons related to the pregnancy	Maternal health	Actual coverage (utilization)	District National International	type of personnel place of contact urban/rural geographic strata women's characteristics	surveys	1 year
d) Proportion of births attended by trained health personnel	Maternal health and mortality	Actual coverage (utilization)	District National International	type of personnel place of contact urban/rural geographic strata women's characteristics	surveys	1 year
e) Number of health centres providing EOC per 500 000 population	Maternal mortality	Potential coverage (availability, functioning)	District National	administrative and geographic strata private/public	health facility sampling maternity register	1 year
f) Number of district hospitals providing EOC per 500 000 population	Maternal mortality	Potential coverage (availability, functioning)	District National	administrative and geographic strata private/public	health facility sampling maternity register	1 year
g) Proportion of complicated cases managed at health centres and district hospitals providing EOC facilities	Maternal mortality	Potential coverage (availability, functioning)	District National International	administrative and geographic strata private/public	health facility sampling maternity register	1 year
h) C-sections as a proportion of all births in the population	Maternal mortality	Coverage (availability, utilization)	District National International	administrative and geographic strata private/public	health services surveys	1 year

*Because this is an absolute number and has no numerator, it should be used with great care for comparative purposes and trend analysis.

3.2.2 C-sections as a percentage of all births in the population

A. Is the indicator aimed at maternal health or maternal mortality?

This indicator is aimed at measuring progress towards the reduction of maternal mortality. Some concerns were expressed, however, that insofar as caesarean sections are conducted for the sake of the fetus they are not necessarily interventions designed to benefit the mother primarily.

B. Causal relationship with outcome

Caesarean sections are life-saving procedures, part of the essential obstetric care functions, particularly important for cases of obstructed labour. WHO has estimated that obstructed labour accounts for about 8% of direct maternal deaths in developing country settings though the exact proportion varies from place to place. It is generally agreed that the incidence of obstructed labour is highest in some parts of Africa for a variety of physiological, social and cultural reasons.

C. Definition

The indicator divides the number of caesarean sections for a specified period of time by the total number of live births during the same period. It measures a variety of factors, including quality, accessibility, availability and utilization of maternity care. It provides complementary information to the indicator of availability of EOC per 500 000 population.

Numerator data should be provided through health service reporting (since caesarean deliveries can only be performed there). Denominator data should be total estimated births.

The Technical Working Group debated whether it was appropriate to suggest that the indicator be interpreted according to minimal and maximum acceptable standards. It has been suggested this national caesarean section rates should lie between 5% and 15% of births¹². A figure falling below 5%, indicates that a substantial proportion of women do not have access to surgical obstetric care and probably die as a result. A rate higher than 15% indicates over-utilization of the procedure for other than life-saving reasons. This is also dangerous for women's lives because of the unnecessary risk associated with any major surgical operation.

The interpretation of this indicator at national level should be carried out with caution as it may mask some disparities across subnational levels because of the geographical spread of essential obstetric care facilities, and also according to institutional levels of care and between public and private sectors.

D. Does the indicator help programme management?

The indicator helps programme management at district, national and international levels insofar as it provides information on the adequacy of provision of life-saving procedures. It can be collected as often as annually.

A rate falling outside the 5-15% range is indicative of inadequacy in the availability of or inappropriate use of caesarean delivery. However, an indicator

falling inside that range may still be associated with deficiencies in the services. Increasing the rate of caesarean deliveries to approach 5% of births may reflect fashion, increased numbers of complications, or improvements in services. On the other hand, where caesarean delivery rates appear to be falling the explanation could lie in any one of a number of factors including better obstetric practice, reduced incidence of complications such as eclampsia or reduced availability of services.

E. Data sources/ means of data collection

A caesarean delivery is a memorable event and most large survey programmes, such as the Demographic and Health Surveys and Papchild, already collect this information. It is also available and reliable through routine health service statistics.

F. Recommended format for presentation

To facilitate its interpretation, this indicator should be accompanied by further investigations at disaggregated levels, combined with case reviews, indicating reasons for caesarean sections and differentials according to geographic and institutional strata.

4. INDICATORS UNDER STUDY

4.1 Case fatality rate for direct obstetric complications

A. Is the indicator aimed at maternal health or maternal mortality?

The indicator is aimed at measuring progress towards the reduction of maternal mortality at health facility level.

B. Causal relationship with outcome

This is a health outcome indicator.

C. Definition

This indicator measures the quality of care provided within facilities. It is essentially an in-service indicator, particular to each facility. Its priority for collection is low because it cannot be readily aggregated across facilities as they provide different levels of services in different circumstances. However, it is a useful and appropriate indicator for monitoring facility performance and standards of care over time.

The indicator divides the total number of all direct obstetric deaths within one facility during a specific period of time by all direct complications in the same facility during the same period.

The rationale for putting together several complications is as follows: (i) some women have more than one complication; (ii) there may be preference reporting for some diseases in some settings; (iii) the numbers would be too small at facility level if complications were disaggregated.

However, there are a number of potential problems that may affect the interpretation. Firstly, case fatality rates vary according to complication. Secondly, aggregating complications may mask the effort to improve a case fatality for a particular condition. Finally, at facility level, one way of improving the indicator over time is by not accepting cases.

DEFINITION OF COMPLICATIONS:

A complicated obstetric case can be defined either in terms of the clinical condition or in terms of a procedure to be performed.

Clinical condition

There is a potential plethora of emergency obstetric conditions, many of them defying clear definition. Therefore only conditions which account for a significant amount of maternal mortality and need to be monitored for coverage are dealt with here. The following are proposed:

- antepartum haemorrhage
- postpartum haemorrhage
- eclampsia/pre-eclampsia
- sepsis
- obstructed/prolonged labour.

As clinical procedures

Three clinical procedures are proposed:

- manual removal of placenta
- assisted vaginal delivery (forceps/vacuum extraction)
- caesarean sections

The data on clinical procedures can serve as a measure of operationalized hospitals (if undertaking caesarean section) and operationalized health centre (if undertaking manual removal of placenta or forceps/vacuum extraction).

D. Does the indicator help programme management?

The indicator mostly helps service management at the level of each facility.

E. Data sources/means of data collection

Both the UNICEF guidelines¹² and the WHO Mother-Baby Package¹¹ provide useful guidance on this.

F. Recommended format for presentation

Interpretation requires comparison of indicators over time and not comparison between facilities. Suggestions for disaggregations include booked versus unbooked cases, or facility deliveries versus emergency admissions.

The effect of aggregating over several direct obstetric complications needs further study. In addition, attention should be given during field testing to the following:

- the effect of the time between admission and treatment;
- whether deaths occurring within the first hour should be excluded from the calculations for the indicator;
- the effect of distance from the facility on case fatality rates.

4.2 Perinatal mortality rate

A. Is the indicator aimed at maternal health or maternal mortality?

The perinatal mortality rate is, strictly speaking, an indicator of fetal health but it may also be useful for assessing improvements in maternal health and decline in maternal mortality.

B. Causal relationship with outcome

Essential obstetric functions clearly improve outcomes in both the mother and the child.

Some concerns were expressed, however, that the indicator is not sufficiently specific to maternal health (for example, improvements may focus mostly on newborn intensive care), that it concentrates attention on the newborn to the exclusion of the woman, and finally that the strength of causal links between maternal and perinatal mortality is still unclear because of lack of scientific evidence.

C. Definition

This indicator is suggested for utilization as a proxy indicator for maternal mortality and maternal health outcomes. In addition, it provides useful insight on the quality of intrapartum care.

One of its major advantages is that there are approximately 15 times more perinatal deaths than maternal deaths. Its ability to register changes is therefore probably superior to the maternal mortality ratio.

Traditionally, the perinatal mortality rate has been defined by dividing the number of stillbirths and deaths within one week of birth by the total number of births. However, members of the Working Group suggested that the link between perinatal and maternal mortality is stronger for stillbirths and one-day deaths. Focusing on early rather than overall perinatal mortality may therefore prove more useful for monitoring maternal health.

D. Does the indicator help programme management?

With regard to maternal health, this indicator is mainly useful at programme rather than population level. Interpretations of changes depend on the type of interventions being provided.

E. Data sources/means of data collection

There may be some difficulty in measuring perinatal mortality at population level. Guidance on data sources can be found in the WHO Mother-Baby Package¹¹.

F. Recommended format for presentation

As for the case-fatality rate, this indicator is recommended for further study before implementation. Research protocols should focus on strength of links between maternal deaths and macerated stillbirths, fresh stillbirths, deaths within a day and deaths within a week. This may allow later refinements in the indicator specifications.

4.3 Percentage of population within 1 hour travel time to health centre offering essential obstetric care facilities

A. Is the indicator aimed at maternal health or maternal mortality?

This newly proposed indicator is aimed at measuring progress towards the reduction of maternal mortality.

B. Causal relationship with outcome

A recent review of the literature has identified three types of delay for seeking care, all of which are ultimately responsible for a substantial proportion of maternal deaths. These three types are: (i) delays between the onset of symptoms and the decision to seek care; (ii) delays between the decision to seek care and reaching the facility; (iii) delays in receiving care at health facility¹⁴. This indicator accounts for the second type of delay.

C. Definition

This indicator measures the extent of the availability of emergency obstetric facilities. It answers issues of proximity rather than accessibility. Statistically, it divides the population within one hour travel time (by whatever means of transport are generally used) of a health centre providing obstetric care in a specific area by the total population in the same area.

D. Does the indicator help programme management?

This indicator would be useful for planning purposes at district, national and international levels, but difficult to disaggregate at and below district level.

E. Data sources/means of data collection

Survey programmes such as Demographic Health Surveys and Papchild, which sometimes include community amenities surveys are a potential source of information¹⁵. Health service information systems often produce maps showing facilities, or of villages with facilities, upgraded on a regular basis.

F. Recommended format for presentation

Depending on the level of utilization, mapping is probably one of the most efficient ways of presenting this information.

5. CONCLUSIONS AND RECOMMENDATIONS

5.1 Prioritizing indicators

Countries are being asked to collect the five World Summit indicators for monitoring UNICEF and WHO goals. However, there is a need to recognize that, at national and subnational levels, impact indicators are much less likely to be useful for programme management than process indicators and are insufficiently accurate for monitoring purposes. From an international perspective, impact indicators are probably still needed, principally for advocacy purposes, but the uncertainty over their usefulness at lower levels and the difficulties and cost in collecting the necessary information make it difficult to attach any sense of priority to the two mortality indicators. Consumer information is needed in order to enable countries and programme managers to make a decision on this issue. Some questions for this are provided in Appendix 6.

The usefulness of the antenatal care and delivery care indicators, as proposed by the Global Strategy for Health for All by the Year 2000 and the World Summit for Children, is also questionable - in particular for monitoring Safe Motherhood programmes which are strongly oriented towards the reduction of maternal mortality as opposed to the general improvement of maternal health.

The last four indicators suggested for implementation by the Technical Working Group are probably the most important for monitoring progress. Their implementation can be immediate but guidance on their utilization and interpretation is now needed.

The indicators under study have a different order of priority. The proximity indicator is probably the most useful and least controversial. In second place comes aggregated case-fatality for in-service information. Thirdly, the perinatal mortality rate may provide a useful insight into progress towards the reduction of maternal mortality.

Lastly, when selecting indicators at programme level, attention should be given to their complementarity as well as to their scientific qualities².

5.2 Recommendations

Recommendations were chiefly made with regard to data collection. For countries where the coverage of vital registration is good, the Working Group recommended that death certificates include a box on pregnancy status for women aged 15-49 in order to improve the identification of maternal deaths. Suggestions were also made to include information on place of delivery and type of personnel on birth certificates.

Surveys are very often the most appropriate source of information on coverage in developing country settings. Several requests were therefore made during the meeting to survey programmes. The proposals are, in particular: (i) to adopt the definitions of trained attendants, produced for the World Summit for Children or by the Technical Working Group, when providing statistics on coverage of maternity care; (ii) to construct woman-based rather than birth-based indicators of maternity care (sub-section F of section 3.1.2); and finally, (iii) to integrate questions on availability and proximity of EOC facilities in community questionnaires.

5.3 Follow-up actions

The Technical Working Group recommended that WHO undertake a number of activities focusing principally on the development of new indicators and the need for

tools to enable the prioritization of indicators. The activities should begin with the dissemination of the report of the meeting. Subsequent activities should include the following:

- a. Production of guidelines with consumer information on the selection of indicators for monitoring maternal mortality according to the user's needs. A synopsis of this consumer information should be published in the Safe Motherhood newsletter.
- b. Production of guidelines on the utilization and interpretation of the eight indicators identified for immediate implementation.
- c. Development of core testing protocols for indicators under study.
- d. Additional Technical Working Group meetings should be organized by WHO/MSM on indicators focusing on maternal health and on indicators for the newborn, including perinatal mortality.
- e. Preparation of recommendations on forms for maternity register, case reviews and vital registration.
- f. Production of simple guidelines/training manuals for medical staff and students to report on causes of maternal deaths.
- g. Collaboration with other agencies to provide interactive assistance to countries to review their health information systems.
- h. Encouragement of research into links between perinatal deaths (whether fresh or macerated stillbirths, or neonatal deaths) and outcomes in women (deaths or complications).
- i. Review of legislation and regulations governing EOC tasks (sample countries) with a view to developing policy indicators.

Appendix 1 List of Participants

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* Invited but unable to attend.

Appendix 2 Terms of reference

Technical Working Group on Indicators to Monitor Maternal Health Goals, Geneva, 8-12 November 1993

- (1) review experience with relevant safe motherhood indicators for national monitoring and for international reporting. This should include consideration of the adequacy of definitions, criteria, common data sources, data collection methods and formats for presentation of the indicators;
- (2) suggest, in view of experience with these indicators, any necessary improvements in the definitions of the indicators and refinements in the methodologies for collection and presentation of the required data;
- (3) consider the merits and shortcomings of possible alternative or proxy indicators to monitor the maternal health goals of the "World Summit for Children" (1990); and
- (4) make recommendations on a limited number of indicators which could be used at the sub-national (regional and/or district) level to monitor changes in coverage and quality of maternal health care. These recommendations should cover the same issues as those identified above, i.e. adequacy of definitions, criteria, common data sources, data collection methods and formats for presentation.

Appendix 3 Agenda**Technical Working Group on
Indicators to Monitor Maternal Health Goals,
Geneva, 8-12 November 1993**

1. Opening of the meeting
2. Selection of chairperson and rapporteur
3. Adoption of the agenda

2 days

4. Review of indicators explicitly recommended by WHO and UNICEF, to monitor maternal health goals at the national level and for international reporting

2 days

5. Review of possible additional or alternative indicators for monitoring maternal health goals at the national level and for international reporting

1 day

6. Review of indicators under study for monitoring maternal health goals at national and international levels

7. Close

Appendix 4 List of Background Papers

Technical Working Group on Indicators to Monitor Maternal Health Goals, Geneva, 8-12 November 1993

Graham W and Filippi V. *Monitoring maternal health goals: how well do the indicators perform?* Background paper prepared for the Technical Working Group on Indicators to Monitor Maternal Health Goals, Geneva, 8-12 November 1993. World Health Organization, Geneva, 1993.

Maine D, McCarthy J, and Ward VM. *Guidelines for monitoring progress in the reduction of maternal mortality [a work in progress]*. UNICEF Statistics and Monitoring Section. UNICEF, New York, 1992.

Stanton, M.E. *Elaboration of indicators for maternal health*. Paper prepared for the Division of Family Health, World Health Organization, Geneva, 1991.

Stanton, M.E. *Guidelines for the development, selection and use of MCH/FP indicators*. Paper prepared for the Division of Family Health, World Health Organization, Geneva 1991.

Appendix 5 Definition of Trained Attendants

The category "trained attendant" should comprise the following:

The Doctor (specialist or non-specialist), and/or the person with midwifery skills who can diagnose and manage obstetrical complications as well as normal deliveries - the latter is defined as the person who has successfully completed the prescribed course in midwifery and who is able to give the necessary supervision, care and advice to women during pregnancy, labour and the postpartum period, to conduct deliveries alone and to care for the newborn and the infant.

The category of "trained attendant" should exclude the following:

The trained traditional birth attendant - this comprises the TBA who initially acquired her skills by delivering babies herself or through apprenticeship to other TBAs but who has, in addition, received a short course of training (normally not more than one month though it may be spread over a longer period) through the modern health care sector to upgrade her skills: *[However, the TBA who has undergone extensive training (six months to one year) and is employed as a primary health care worker in the formal system but who continues to delivery babies in her community may be classified as a trained person as above](2).*

Other - this includes family members designated by an extended family to attend births in that family, and the traditional birth attendant who assists mothers during childbirth and initially acquired her skills by delivering babies herself or through apprenticeship to other traditional birth attendants.

(2). Criteria only for inclusion for antenatal care indicator.

Appendix 6 Consumer Framework on Maternal Mortality Checklist of Questions to Ask and Answer

1. How high is maternal mortality in our country now? (Baseline)

- * *What are the possible options for collecting the maternal mortality ratio at population level?*

- a. Vital statistics
- b. Retrospective household surveys
- c. Prospective studies (sentinel sites or multi-round surveys)
- d. Indirect estimation (Sisterhood Method)

- * *What are the required sample sizes for measuring the maternal mortality ratio?*

Taking the example of a fictitious country with a crude birth rate (CBR) of 45/1000, a total fertility rate (TFR) of 5, an average size of household of 4.5, and an average number of adults per household of 2.

Calculating the sample of households required for a 95% confidence interval with a tolerated error of 10%, for a given expected level of maternal mortality.

CURRENT MATERNAL MORTALITY RATIO					
METHOD	1000	800	600	400	200
Household Survey	195,556	244,939	327,243	491,852	985,679
Sisterhood Method	2,466	3,134	4,244	6,467	13,133

- * *What are the cost/benefits of data collection?*

Would it be worth using existing opportunities (piggyback) for data collection?

2. What areas and groups in our country have high/low maternal mortality?

- * *How much would the required sample size increase to enable disaggregation?*

For example, by 3 geographic areas and 3 age groups?

- * *Would there be any possible economy of scale for the cost of the study?*

3. Have we reduced our maternal mortality rates? (Follow-up)

- * *What are the sample sizes needed and what is the frequency of data collection for detecting statistically significant changes over time?*

Examples of sample sizes needed to demonstrate changes over time were

provided in the UNICEF guidelines. For example, the sisterhood method found a lifetime risk of one maternal death per 17 women of reproductive age. The 95% confidence limits ranged from one maternal death per 14 women to one maternal death per 22 women of reproductive age. Total sample size was 2,163 respondents and the estimate is for a 10-year period.

Maintaining the same sample size, and assuming a 25% decline in life-time risk, the point estimate for life-time risk would be one death per 23 women with 95% confidence limits ranging from one death in 18 women to one death in 31 women of reproductive age. Given this degree of overlap it is impossible to assert unequivocally that the interventions have led to a statistically significant decline in the life-time risk of maternal death. (See Figure 2)

Similar considerations apply in the case of household surveys. A direct household survey calculated a maternal mortality ratio of 490 per 100 000 live births, the 95% confidence limits indicating a range of between 350 and 630 per 100 000 live births. Assuming a 25% decline in the ratio and the same sample size the point estimate for the maternal mortality ratio would be 370 per 100 000 with 95% confidence limits of 240 and 490 per 100 000. (See Figure 3)

These examples illustrate the difficulty of monitoring maternal mortality on the basis of surveys, even where the sample size is large.

4. What do we need to do to reduce our maternal mortality ratio?

- * *What would be the direct and intermediate outputs of the programme and the ensuing process indicators to monitor actions to reduce mortality?*

5. Have we improved services to reduce maternal mortality? (Follow-up)

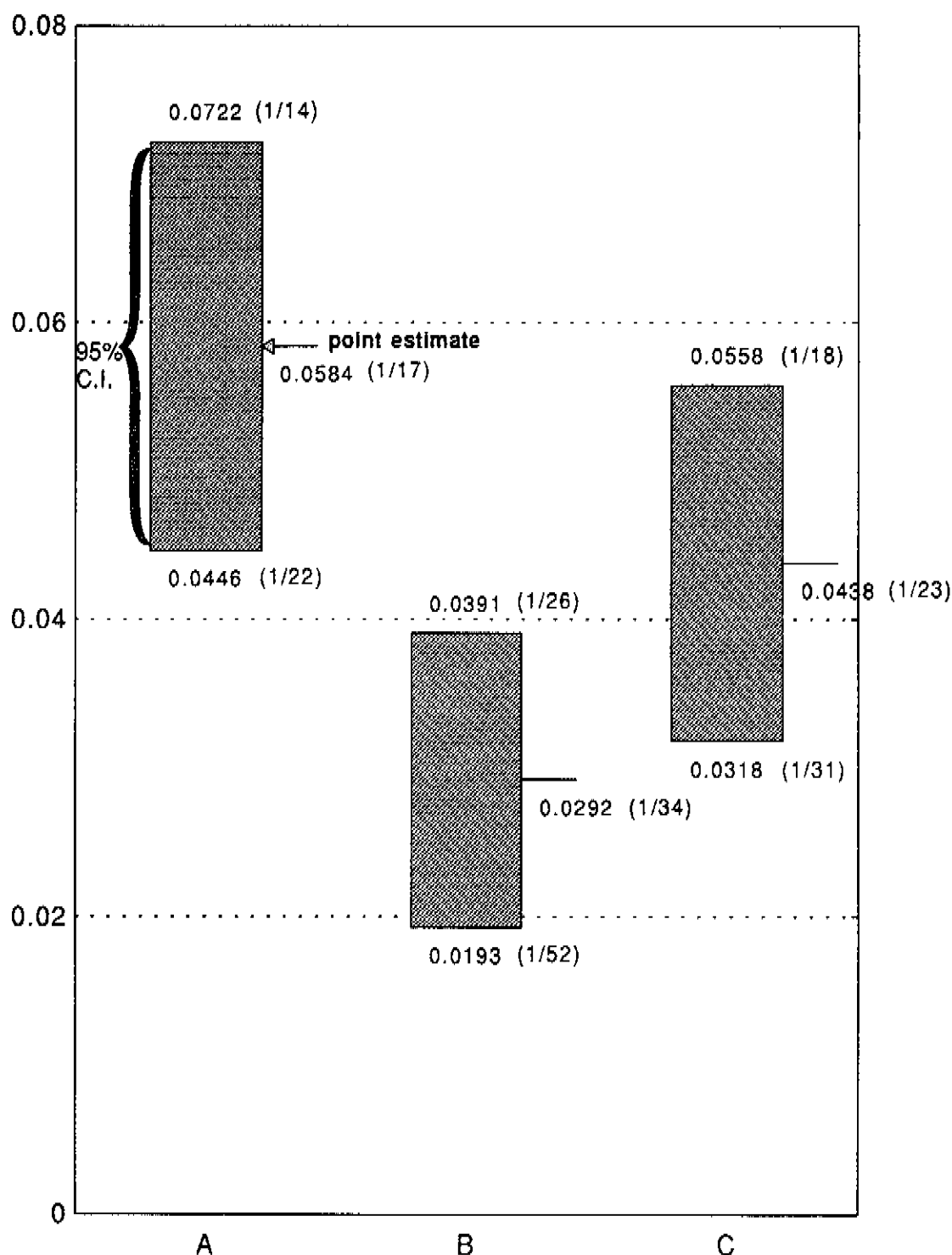
6. For advocacy, what are the alternatives to mortality indicators?

For example:

- Case studies of maternal deaths
- Lack of drugs
- Uneven distribution of essential obstetric care facilities
- Proportion of complicated cases not seen
- Hospitals not doing caesarean sections
- Hospitals without essential drugs
- Waiting times

Figure 2.

Lifetime risk of maternal death using the Sisterhood Method point estimates and 95% confidence intervals (C.I.)



NOTES: Sample size is 2,163 respondents per round
Estimate is for a 10-year period

KEY: A: Life-time risk reported in Graham et al., 1989: one maternal death per 17 women of reproductive age

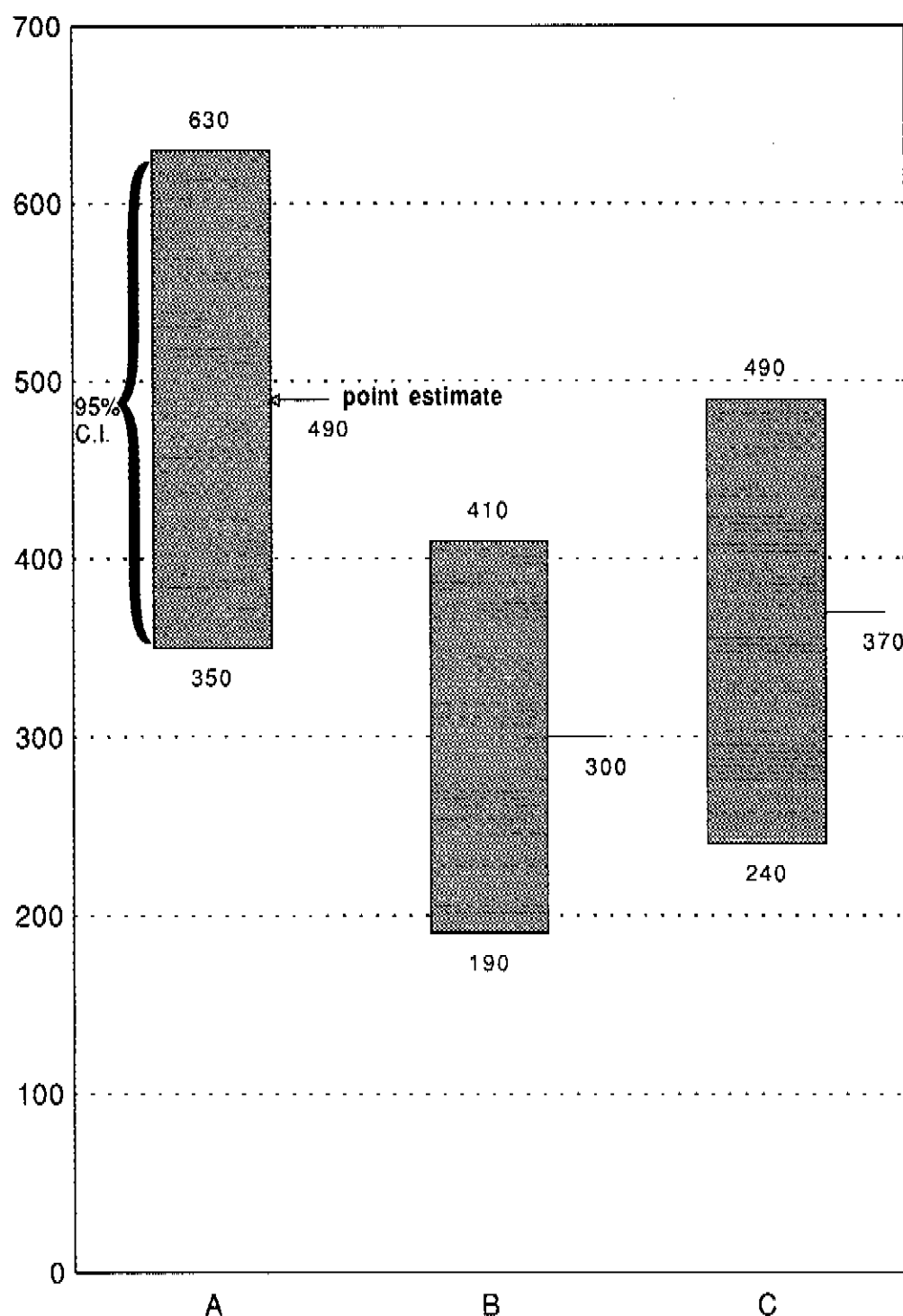
B: Confidence intervals calculated assuming 50% decline in life-time risk and same sample size

C: Confidence intervals calculated assuming 25% decline in life-time risk and same sample size

Source: Maine D, McCarthy J and Ward VM. *Guidelines for monitoring progress in the reduction of maternal mortality (a work in progress)*. UNICEF Statistics and Monitoring Section. New York, UNICEF, 1992

Figure 3.

Maternal mortality ratio using the Direct Household survey, point estimates and 95% confidence intervals (C.I.)



NOTES: Sample size is 9,315 respondents per round
Estimate is for a 2-year period

KEY: A: Ratio reported in Kwest et al., 1985: 490 maternal deaths per 100 000 births
B: Confidence intervals calculated assuming 50% decline in life-time risk and same sample size
C: Confidence intervals calculated assuming 25% decline in life-time risk and same sample size

Source: Maine D, McCarthy J and Ward VM. *Guidelines for monitoring progress in the reduction of maternal mortality (a work in progress)*. UNICEF Statistics and Monitoring Section. New York, UNICEF, 1992

Appendix 7 Definition of EOC at the health centre and the hospital

The Working Group recommended that EOC at the health centre includes:

- (1) parenteral antibiotics,
- (2) parenteral oxytocic drugs,
- (3) parenteral sedative for toxæmia,
- (4) manual removal of placenta,
- (5) manual removal of retained products.

The definition of EOC at the hospital (first referral level) includes all categories of EOC at the health centre, plus surgery and blood transfusion.

Appendix 8 Indicators for monitoring health goals of the world summit for children

INDICATORS FOR MONITORING HEALTH GOALS OF THE WORLD SUMMIT FOR CHILDREN Recommended By WHO and UNICEF for National Monitoring and Programme Management and International Reporting

HEALTH GOALS OF THE WORLD SUMMIT FOR CHILDREN	INDICATORS	COMMENTS AND ACTIONS
1. Between 1990 and the year 2000, reduction of infant and under-five child mortality rate by one-third or to 50 and 70 per 1000 live births respectively, whichever is less	Bold are Currently within the WHO HFA Framework (Except where otherwise noted, when there is more than one indicator proposed for a goal, the indicators are listed in order of preference) Infant mortality rate: the annual number of deaths of infants under one year of age per 1,000 live births Under-five mortality: the probability of children dying between birth and their fifth birthday, expressed per 1,000 children born alive	Indicators should be disaggregated by: male and female, rural, total urban and within countries, urban low income and by major sub-national geographic areas Guidelines will describe methods of calculating the infant mortality rate (ratio) which is (approximately) the probability of dying by the first birthday. Countries are urged to also report the number of live births, and the number of deaths under one year for the most recent 1 year period for which data are available. The guidelines describe various methods to calculate under-five mortality. Countries are urged to report the number of deaths in the ages 1 to exactly 5 years in the same one year period for which the number of infant deaths are reported. Both these indicators are equally important. A maternal death is the death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the duration and the site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management, but not from accidental or incidental causes.
2. Between 1990 and the year 2000, reduction of maternal mortality rate by half	Maternal mortality rate (ratio): Annual number of maternal deaths per 100,000 live births Annual number of maternal deaths	
3. Between 1990 and the year 2000, reduction of severe and moderate malnutrition among under-five children by half	i Underweight Prevalence: Proportion of preschool children (under 5 years of age) below -2 SD (moderate plus severe) and Severe Underweight Prevalence: Proportion of preschool children (under 5 years of age) below -3 SD from median weight-for-age of WHO/NCHS reference population ii Stunting Prevalence: Proportion of preschool children (under 5 years of age) below -2 SD (moderate plus severe) and Severe Stunting Prevalence: Proportion of preschool children (under 5 years of age) below -3SD from median height-for-age of WHO/NCHS reference population iii Wasting Prevalence: Proportion of preschool children (under 5 years of age) below -2SD (moderate plus severe) and Severe Wasting Prevalence: Proportion of preschool children (under 5 years of age) below -3SD from median weight-for-height of WHO/NCHS reference population	
4. Universal access to safe drinking water	Proportion of population "with access" to an "adequate amount" of "safe" drinking water in a dwelling or located within a "convenient distance" from the user's dwelling	The parameters in quotes should be defined at national level.
5. Universal access to sanitary means of excreta disposal	Proportion of population "with access" to a "sanitary facility" for human excreta disposal in a dwelling or located within a "convenient distance" from the user's dwelling	The parameters in quotes should be defined at national level.

HEALTH GOALS OF THE WORLD SUMMIT FOR CHILDREN	INDICATORS	COMMENTS AND ACTIONS
8. Improved protection of children in especially difficult circumstances	Bold are Currently within the WHO HFA Framework (Except where otherwise noted, when there is more than one indicator proposed for a goal, the indicators are listed in order of preference) The total number of persons with disability specifying the number having serious difficulty in seeing, hearing/speaking, moving, learning/ comprehending, or having strange or unusual behaviour, or other disability of a duration of at least six months or of an irreversible nature in the following age groups: 0-4, 5-14, 15-19 and 20 and over. The total disability rate (rate per 1,000 children aged 0-4, 5-14, 15-19, and adults 20 and over).	Indicators should be disaggregated by: male and female, rural, total urban and within countries, urban low income and by major sub-national geographic areas These indicators are under development. The estimation of the total number of persons with disability should be derived from the five categories of disability listed, and figures for each of those disabilities included, if available, along with the source of the data (including sample size of surveys). "Other" categories of disability should be specified. Break down of the specific disabilities by age, sex and urban-rural is also required. Recommended measurement methods are also encouraged to be described in the guidelines. Countries are also encouraged to report recent rehabilitation service coverage by type and age group.
9. Special attention to the health and nutrition of the female child and to pregnant and lactating women	Under five mortality rate - female (see Goal 1 indicator) Moderate and severe underweight prevalence - female (see Goal 3 indicator) Proportion of pregnant women attended by trained personnel (See Goal 11 indicator) Proportion of women aged 15 to 49 who are anaemic (see goal 13) HIV Prevalence, pregnant women	This indicator is under development. This indicator should be disaggregated by age of women. As a minimum two age groups should be provided: below 20 and 20-49. If possible provide the age-specific fertility rate for each year in the range 15-19. Criteria for training are available in the guidelines. The first and second indicators are equally important. Definition of essential obstetric care is provided in the guidelines.
10. Access by all couples to information and services to prevent pregnancies that are too early, too closely spaced, too late or too many	Proportion of women in childbearing age (15-49) currently using contraceptive methods (either modern or traditional) Fertility rate of women 15-19 years of age	
11. Access by all pregnant women to pre-natal care, trained attendants during childbirth and referral facilities for high-risk pregnancies and obstetric emergencies	The proportion of women attended at least once during pregnancy by trained health personnel The proportion of births attended by trained health personnel Number of facilities providing essential obstetric care per 500,000 population Proportion of live births that weigh below 2500 grams	
12. Reduction of the low birth weight (less than 2.5 kg) to less than 10 per cent		
13. Reduction of iron deficiency anaemia in women by one third of the 1990 levels	Proportion of women aged 15 to 49 years with haemoglobin levels below 12 grams/dl of blood for non-pregnant women and 11 grams/dl of blood for pregnant women	

HEALTH GOALS OF THE WORLD SUMMIT FOR CHILDREN	INDICATORS	COMMENTS AND ACTIONS
14. Virtual elimination of iodine deficiency disorders	Bold are Currently within the WHO HFA Framework (Except where otherwise noted, when there is more than one indicator proposed for a goal, the indicators are listed in order of preference) Iodized salt - Proportion of population in iodine deficient areas consuming adequately iodized salt Total Goitre Rate - Proportion of children 6 to 11 years of age with goitre of any grade (palpable and visible combined) Urinary Iodine - The median value of the concentration of urinary iodine in the population in iodine deficient areas (school children or general population) should be greater than 10 mcg per dl of urine. TSH - Proportion of newborn infants (cord blood or aged 3 days to 3 weeks) having serum TSH levels above 5mIU/L	Indicators should be disaggregated by: male and female, rural, total urban and within countries, urban low income and by major sub-national geographic areas Target: >95% population consuming adequately iodized salt. Adequately iodized salt infers consumption 150 mcg iodine per person per day. This is a critical programme monitoring indicator. TGR Target: <5% of population. Goitre rate is a useful indicator for initial assessment and progress but not sufficiently accurate for declaring elimination of IDD. For goitre rate, the age group 8-10 years of age is preferred where possible due to homogeneity. Either Urinary Iodine (UI) or Thyroid Stimulating Hormone (TSH) needs to be measured to declare elimination of IDD. UI Target: The median value of urinary iodine excretion is greater than 10 mcg/dl TSH Target: <3% above 5 mIU/L. Blood spot TSH needs to be multiplied by a factor of 2.2 to be expressed in terms of serum adjusted units.
15. Virtual elimination of vitamin A deficiency and its consequences, including blindness	Nightblindness - Proportion of preschool children (aged 2-6 years) who are nightblind Serum Vitamin A - Proportion of preschool children (6 months to 6 years) with serum vitamin A less than 20 mcg/dL Breastmilk Vitamin A - Proportion of lactating women with breastmilk vitamin A less than 30 mcg/dL (or less than 8 mcg/gm milk fat)	Target: < 1% of preschool age children A useful community indicator, but only reliable where a local term describing nightblindness exists. This indicator should be combined with either serum vitamin A or breast milk vitamin A. Target: < 10% of preschool children with serum vitamin A less than cut-off point. If local circumstances do not permit obtaining blood samples, breast milk vitamin A is an alternative. Target: < 25% of lactating women with values below cut-off points. Breastmilk vitamin A, though not yet widely used as an indicator, reflects the adequacy of the maternal diet as well as that of the infant. It is a predictor of the risk of deficiency in the early post-weaning period.

HEALTH GOALS OF THE WORLD SUMMIT FOR CHILDREN	INDICATORS	COMMENTS AND ACTIONS
16. Empowerment of all women to breast-feed their children exclusively for four to six months and to continue breast-feeding, with complementary food, well into the second year	Bold are Currently within the WHO HFA Framework (Except where otherwise noted, when there is more than one indicator proposed for a goal, the indicators are listed in order of preference) Exclusive breastfeeding rate: Proportion of infants less than 4 months (120 days) of age who are exclusively breastfed Continued breastfeeding rate at two years: Proportion of children 20 through 23 months of age who are breastfeeding Timely complementary feeding rate: Proportion of infants 6 to 9 months (180 to 299 days) of age who are receiving breastmilk and complementary food Baby friendly facility rate: Proportion of all hospitals and maternity facilities which are "baby friendly" according to the global BFHI criteria.	If possible, data should be presented separately by age in months (0 to 4) The global criteria for the WHO/UNICEF Baby Friendly Hospital Initiative are provided in the guidelines.
17. Growth promotion and its regular monitoring to be institutionalized in all countries by the end of the 1990s		Indicator under development.
19. Global eradication of poliomyelitis by the year 2000	Annual number of cases of polio	
20. Elimination of neonatal tetanus by 1995	Annual number of cases of neonatal tetanus	
21. Reduction by 95 per cent in measles deaths and reduction by 90 per cent of measles cases compared to pre-immunization levels by 1995, as a major step to the global eradication of measles in the longer run	Annual number of deaths of children under five years of age due to measles Annual number of cases of measles Proportion of children immunized against diphtheria, pertussis, and tetanus (DPT3) before their first birthday Proportion of children immunized against measles before their first birthday	Definition of what constitutes a measles case and death is in the guidelines.
22. Maintenance of a high level of immunization coverage (at least 90 per cent of children under one year of age by the year 2000) against diphtheria, pertussis, tetanus, measles, poliomyelitis, tuberculosis and against tetanus for women of child-bearing age	Proportion of children immunized against poliomyelitis (OPV3) before their first birthday Proportion of children immunized against pertussis before their first birthday Proportion of children immunized against measles before their first birthday Proportion of pregnant women immunized against tetanus (TT2 or booster) Proportion of children protected against neonatal tetanus through immunization of their mother	Criteria for "protected" are in the guidelines.

HEALTH GOALS OF THE WORLD SUMMIT FOR CHILDREN	INDICATORS Bold are Currently within the WHO HFA Framework (Except where otherwise noted, when there is more than one indicator proposed for a goal, the indicators are listed in order of preference)	COMMENTS AND ACTIONS Indicators should be disaggregated by: male and female, rural, total urban and within countries, urban low income and by major sub-national geographic areas
23. Reduction by 50 per cent in the deaths due to diarrhoea in children under the age of five years and 25 per cent reduction in the diarrhoea incidence rate	Annual number of deaths of children under five years of age due to diarrhoea Average annual number of cases (episodes) of diarrhoea per child under five years of age Proportion of diarrhoea episodes in children less than 5 years receiving ORT (increased fluids) and continued feeding Annual number of deaths of children under five years of age due to acute respiratory infections Proportion of pneumonia cases seen at health facilities who receive standard case management	Methods for estimating diarrhoea deaths from overall under-five deaths are in the guidelines.
24. Reduction by one third in the deaths due to acute respiratory infections in children under five years	Annual number of cases of dracunculiasis (guinea-worm) in the total population Number of villages which have any cases of dracunculiasis Proportion of children under 6 years of age participating in organized child development programmes.	Methods for estimating ARI deaths from overall under-five deaths are described in the guidelines. The indicator can be measured using the ARI health facility survey.
25. Elimination of guinea-worm disease (dracunculiasis) by the year 2000	Severe Stunting Prevalence: See Goal 3.	Under development and testing. Definition of organized child development programmes/ activities, including low cost family and community-based interventions will be defined by countries.
26. Expansion of early childhood development activities, including appropriate low-cost family and community-based interventions	Knowledge of HIV-related preventive practices - Proportion of people aged 15-49 and proportion of youth aged 15-19 citing at least two acceptable ways of protection from HIV infection.	This indicator for basic health knowledge of HIV is only one of the indicators addressed to the goal on Basic Education. UNESCO and UNICEF have developed a set of indicators for the full array of basic education goals, which are not listed here.
27. Basic Education - Increased acquisition by individuals and families of the knowledge, skills and values required for better living made available through all education channels including the mass media, other forms of modern and traditional communication and social action with effectiveness measured in terms of behavioural change.		

REFERENCES

1. World Health Organization, United Nations Children's Fund (UNICEF) *Indicators for monitoring health goals of the World Summit for Children*. 4 October 1993. Geneva.
2. Graham W and Filippi V. *Monitoring maternal health goals: how well do the indicators perform?* Background paper prepared for the Technical Working Group on Indicators to Monitor Maternal Health Goals, Geneva, 8-12 November 1993. World Health Organization, 1993.
3. Vernon AA and Stroh G. Experience with Sentinel Surveillance Systems in Sub-Saharan Africa. In: Boerma JT, *Measurement of maternal and child mortality, morbidity and health care: interdisciplinary approaches*. Editions Derouaux-Ordina. Liege, 1992.
4. Fortney JA. Implications of the ICD-10 definitions related death in pregnancy, childbirth and puerperium. *World Health Statistics Quarterly*. 1990, 43:246-248.
5. Campbell OMR and Graham WJ. *Measuring maternal mortality and morbidity: levels and trends*. Maternal and Child Epidemiology Unit Publication No. 2. London School of Hygiene and Tropical Medicine. London, 1990.
6. World Health Organization. *Studying maternal mortality in developing countries. Rates and causes. A guidebook*. WHO/FHE/87.7, Geneva, 1987.
7. Rooney C. *Antenatal care and maternal health: how effective is it? A review of the evidence*. WHO/MSM/92.4. Geneva, World Health Organization, 1992.
8. Maine D. *Safe Motherhood Programs: Options and Issues*. Columbia University School of Public Health, New York, 1991.
9. Filippi V, Graham W and Campbell, O. *Utilizing survey data on maternity care in developing countries: an illustrative study*. Maternal and Child Epidemiology Unit Publication No. 3. London School of Hygiene and Tropical Medicine. London, 1990.
10. World Health Organization. *Essential obstetric functions at first referral level*. ISBN 92 4 154424 4. Geneva, 1991.
11. World Health Organization. *Mother-Baby Package. A safe motherhood planning guide*. WHO/FHE/MSM/94.11. Geneva, 1994.
12. Maine D, McCarthy J and Ward VM. *Guidelines for monitoring progress in the reduction of maternal mortality [a work in progress]*. UNICEF Statistics and Monitoring Section. New York, UNICEF, 1992.
13. Franks AL. et al. Hospitalization for pregnancy complications, United States, 1986 and 1987. *American Journal of Obstetrics and Gynecology*. 1992, 166:1339-44.
14. Thaddeus S and Maine D. *Too far to walk: maternal mortality in context*. Prevention of Maternal Mortality Program, Center for Population and Family Health, Columbia University, 1990.
15. Ministry of Finance/Zimbabwe and Institute for Resource Development/Macro International, Inc. *Zimbabwe service availability survey 1989/1990*. Columbia: IRD. 1991.