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Child survival and population growth

In brief

The world's population doubled to 5 billion between 1950 and 1987, and is expected to reach 6.3 billion by the year 2000. Thereafter, global population could reach anywhere between 8 and 14 billion, depending on how quickly the world arrives at the level of replacement fertility, before stabilizing sometime in the late twenty-first or early twenty-second century.

Contrary to popular belief, accelerated child survival strategies, when combined with direct family planning measures, actually result in slower population growth, thereby making a stable and lower total world population attainable earlier.

The effects of major improvements in child survival on world population growth are often misunderstood. One assumption is that any reduction in child mortality rates must automatically add to population and population growth rates and that any reduction in the number of children dying each year would increase total world population, now and in the future.

In fact, the opposite is the case. Actions which extend child and maternal health services and expand educational opportunities for girls and women help to both increase child survival and reduce fertility, making for lower population growth rates in the longer run.

When combined with direct family planning efforts, actions to accelerate child survival are likely to lead to *slower* population growth and, therefore, the earlier attainment of a stable and lower world population than would be the case if family planning or child survival measures were taken independently of each other.

This interactive relationship is the essential logic for stressing the complementarity of vigorously pursuing child survival and family planning as key elements of maternal child health and human advancement.

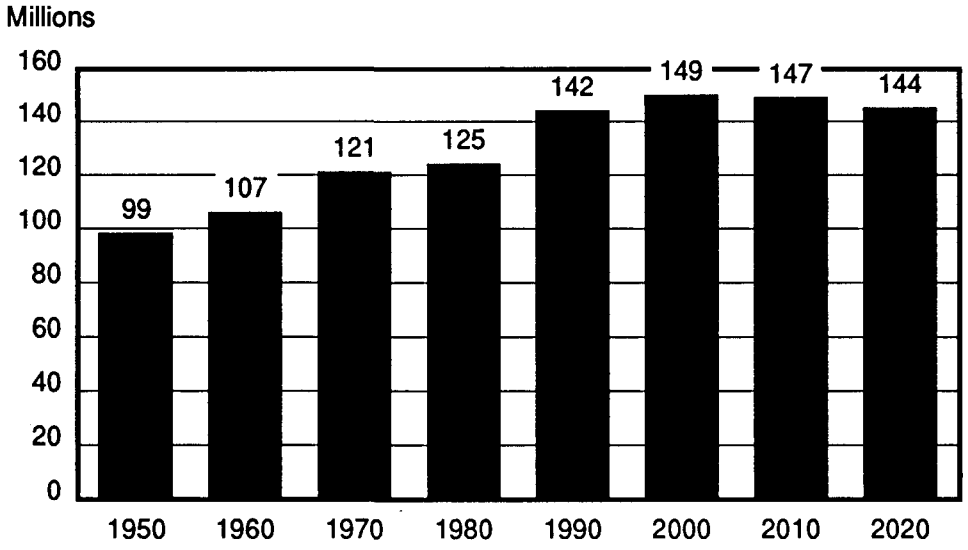
Population growth – the facts and figures

World population was about 300 million 2,000 years ago. It then took some 1,500 years for population to double. By 1750, world population began to rise steadily at the then unprecedented rate of about 0.5 per cent per year. The most rapid increase occurred in what are today's developed countries, mainly in Europe. Growth was slower elsewhere. By 1900, world population had doubled again, reaching 1.7 billion.

Population growth continued to accelerate in the course of the present century, reaching a 1.5 per cent annual growth rate by 1950 and a peak rate of 2 per cent around 1965. Total population doubled yet again, going from 2.5 billion in 1950 to 5 billion in 1987. Developing countries accounted for 85 per cent of that growth.

The 1990 estimated population of 5.3 billion is expected to reach 6.3 billion by the year 2000. Thereafter, the numbers of children being born will decline, leading to ever slowing rates of population growth until the world's fertility rate falls to the replacement rate and the numbers level off (see graph below).

Annual number of child births, world, 1950-2020



Note: estimates for 1950-80, and projections (medium varient) for 1990-2020.
Sources: UN Population Division, World Population Prospects 1988.*

The United Nations Population Division has projected three estimates for population growth and possible dates for the eventual levelling off of world population.

The medium variant assumes that the world will reach replacement fertility by the year 2035, in which case population will stablize at 10.2 billion—double today's figure—towards the end of the twenty-first century.

If replacement fertility, however, is reached 30 years later, eventual world population would be over 14 billion—the Population Division's high variant. This figure would be attained only in the twenty-second century and would be almost three times today's population.

In the low variant projection, if replacement fertility is achieved more quickly—by the year 2015—global population would level out at around 8 billion, 6 billion lower than the high variant projection.

The synergism between child survival actions and effective family planning programmes means that the two together can bring about population stabilization at an earlier date and at a lower level than either acting alone.

A vigorous programme of child survival and family planning interventions pursued over the next 10 years and into the early years of the next century would make an outcome between the lower and the medium variants more likely.

The interaction of child survival and fertility

The role that child health interventions can play in reducing birth rates and the role family planning interventions can play in reducing child mortality depend on the settings in which the interventions are applied.

The actual fertility consequences of a particular health intervention depend not only on the type of intervention, but also on the prevalent family-building strategy and the nature and scope of family-planning programmes in the particular location in question. Specifically, the ready availability of family-planning services was found to intensify any fertility decline resulting from improvements in child survival in most settings by providing parents with greater control over their fertility.

In order to enhance the fertility-reducing effects of child survival improvements, programme managers must, therefore, vary the mix of programmatic components in an integrated child health/family-planning policy to suit local circumstances.

Child survival factors that affect fertility

Child survival can influence fertility levels because of four closely related and interacting factors, identified as the physiological, replacement, insurance, and confidence factors.

The *physiological* factor arises when an infant dies which, more often than not, means an end to breastfeeding and its inherent "natural contraceptive" effects.

The *replacement* factor arises following the death of a young child, which prompts many couples to replace the loss of a child by a new pregnancy. Studies in Bangladesh show that an infant death reduces the average interval between births from more than three years to less than two. Families which experience the death of a child are much less likely to use any method of birth planning.

The *insurance* factor occurs when child death rates are high, since parents often insure against an anticipated loss by having more children. Not being aware of the statistical probability of their next child's living or dying, people tend to plan on the basis of the worst that could happen. This often means they over-compensate, making the average family size greater than desired.

The *confidence* factor is the realization by parents that they have the power to take important decisions to improve their own lives. This is probably the most important prerequisite for the acceptance of family planning. Any change that reinforces parents' confidence in their ability to improve their own circumstances, therefore, makes the acceptance of family planning more likely. As almost all the main strategies of the child survival revolution offer parents more control, they all increase the likelihood of parents opting for smaller families.

Child survival strategies that directly reduce births

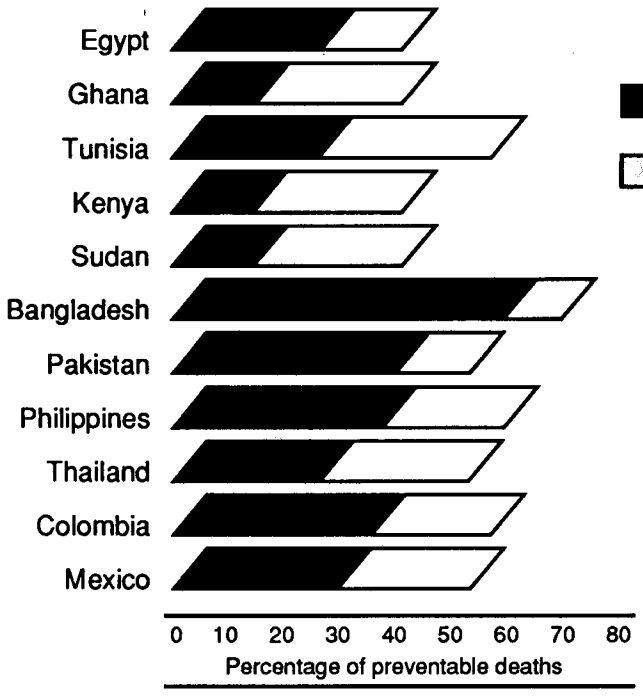
Some of the most important means now available for reducing child deaths are also among the most powerful means of reducing births.

Exclusive breastfeeding has a demonstrably significant effect on fertility rates, and WHO studies show a clear relationship between the length of time a woman breastfeeds and birth intervals. In population groups with a contraceptive prevalence of less than 10 per cent, there is an almost linear relationship between the proportion of mothers who breastfeed for 18 months and birth intervals that are greater than 2.5 years.

Promoting knowledge about the importance of timing births and providing the means to act on it is one of the most powerful child survival strategies and also reduces birth rates. Most child deaths happen to mothers who are younger than 18 or older than 35, or who have had more than four children already, or who give birth less than two years after a previous delivery. Children born in developing countries at the end of a birth interval of less than two years are, on average, twice as likely to die in infancy as are children born after a longer interval. According to some studies, as many as a quarter of all infant deaths and a quarter of all maternal deaths could be prevented by the well-informed timing of births (see chart on the following page).

Female empowerment, particularly in terms of education, not only benefits women, but also improves child health and survival. Educated mothers are also more likely to opt for smaller families.

Percentage of maternal deaths potentially preventable through timing births, selected countries



* Married women who want no more children but are not using an effective family spacing method.

Source: Barbara Herz and Anthony R. Measham, "The safe motherhood initiative: proposals for action". Washington, D.C., World Bank, 1987, based on data provided by Deborah Maine, Columbia University, as reproduced in The State of the World's Children 1989.

As Dr.Nafis Sadik, Executive Director of the UNFPA, says in *The State of World Population 1990*: "The surest way to achieve a sustained decline in fertility is to give a new priority to 'social' or 'women's resources' investment, to improving mother and child health, women's status and education, and to making family planning as widely available as possible to both women and men."

Over one third of the 140 million women in the developing world who became pregnant in the last 12 months wanted to postpone, delay, or limit their childbearing. And an estimated 200,000 of them died in the desperate attempt to terminate those pregnancies by means of illegal abortion.

Enabling those women to exercise their preferences, by safe means, would have brought benefits to both parents and children out of all proportion to the costs involved.

The spread of birth spacing has already been referred to as one of the great social advances of recent years. And it remains one of the greatest opportunities for obvious low-cost action in the years ahead. On maternal and child health grounds alone, the promotion of the knowledge to control the number and timing of births would claim an automatic place among the priorities of real development.

The fact that birth spacing also helps to lower rates of population growth, through people themselves choosing to have fewer children, is an enormous dividend for the development effort. But the fundamental case for making birth spacing available to all couples over the next five years is that it gives people significantly more control over their own lives—and that is what real development is about.

Stabilizing the population earlier

The synergism between this array of child survival actions and effective family planning programmes means that the two together can bring about population stabilization at an earlier date and at a lower level than either acting alone. The 1990s offer a remarkable opportunity to use this synergism—as many developing countries are now at the critical "point of parental confidence" where further reductions in child deaths are likely to bring even greater reductions in births.

The experience of individual countries shows the power of this combination. If all countries were to achieve the same under-five death rates and the same birth rates as Chile or Sri Lanka, for example, then the world would see approximately 10 million fewer deaths each year—and approximately 20 million fewer births.

Further Reading

The State of World Population 1990, Dr.Nafis Sadik, Executive Director, UNFPA.

PART TWO:

The health of mothers and children

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Primary Health Care

In brief

The goal of health for all by the year 2000 was set more than 12 years ago. The Primary Health Care (PHC) approach, adopted at the Alma-Ata conference in 1978, is widely recognized as the key to effective health programmes for children and mothers, and two major initiatives taken in the 1980s have strengthened prospects for success in the 1990s.

The first is the Child Survival and Development Revolution (CSDR), which has been the leading edge for PHC development internationally. CSDR has saved millions of young lives, primarily through the promotion of Universal Child Immunization (UCI) and oral rehydration therapy (ORT).

The second is the Bamako Initiative, which was endorsed by Health Ministers in sub-Saharan Africa in 1987. The Bamako Initiative is addressing the health care crisis in the region with a strategy focused on, among other things, the decentralization of health services, community participation in PHC management, and the financing of reliable and rational drug supply systems which are accessible to all.

Despite the remarkable post war resurgence of economic and social development in the 1950s and 1960s, it became obvious by the mid 1970s that the gap in health status between the "haves" and the "have-nots" in many countries was widening. The technical knowledge to ensure basic health care for all existed, but health resources were grossly misallocated towards technically complex, urban-based medical care, while large groups, who lived in rural and remote areas as well as in urban slums, remained beyond the reach of any permanent form of health care. It was against this background that a global conference was hosted by WHO, UNICEF, and the USSR at Alma-Ata in 1978.

Alma-Ata and primary health care

The Alma-Ata conference adopted PHC as a strategy to achieve acceptable levels of health for all. PHC was defined as "essential health care, based on practical, scientifically sound, and socially acceptable methods and technology made universally accessible to individuals and families in the community through their full participation and at a cost that the community and country can afford to maintain at every stage of their development in a spirit of self-reliance and self-determination."

The conference recommended that PHC include at least the following: 1.Education concerning prevailing health problems and the methods of identifying, preventing, and controlling them; 2. Promotion of food supply and proper nutrition, and adequate supply of safe water and basic sanitation; 3. Maternal and child health care, including family planning; 4. Immunization against the major infectious diseases; 5. Prevention and control of locally endemic diseases; 6. Appropriate treatment of common diseases; 7. Promotion of mental health; 8. Provision of essential drugs.

The Bamako Initiative responded to a decade of opportunities and constraints since Alma-Ata, and Africa's especially difficult economic situation, with a reemphasis on PHC focusing particularly on women and children.

Alma-Ata set the stage for a revolution in which the concepts of PHC and health for all would become an integral part of social development. The World Health Assembly and the UNICEF Executive Board endorsed the strategy of PHC in 1979, and in 1980 the United Nations General Assembly added its weight to the Alma-Ata resolution by linking Alma-Ata's objectives to the goals of the Third Development Decade in the 1980s. United Nations Member States were urged to show their solidarity by making the necessary resources for PHC available to poorer nations in the spirit of national and community self-reliance.

The resolution at Alma-Ata recognized the critical role of community participation, of intersectoral co-ordination of health care, and of the need to ensure universal coverage with the basic elements of PHC. These basic interventions were to be directed principally towards the health needs of young children and mothers in developing countries, in recognition of their inordinately high morbidity and mortality rates.

Progress in PHC

The 12 years since Alma Ata have brought significant advances in the application of PHC in many countries—both developing and industrialized. As health care and social systems have reduced disparities and increased their service coverage, morbidity and mortality rates due to infectious and parasitic diseases in particular, have declined significantly. Fertility rates have also been reduced.

Major successes in developing countries have occurred where there has been the political will to provide services emphasizing universal coverage, especially in the area of maternal and child health; where there has been increased community participation and local autonomy in health care; and where women's education and a knowledge of health care have significantly transformed health behaviour in the home. Emphasis on PHC has also improved health management systems in areas where communities share responsibility with formal government health authorities for delivering health services.

Where achievements have fallen short, the main causes have been political, social, or administrative constraints on the decentralization of power. Another stumbling block has been economic decline and its impact on systems of financing for PHC.

Effects of economic crisis

While the importance of health care financing was recognized at Alma-Ata, discussion on this subject in the final report was rather inconclusive, in part because the effects on the world economy of the oil shocks of 1973 and 1979 and the third world debt crisis had not fully registered among the international health leadership. It quickly became apparent, however, that the 1980s was a period of stagnation and recession affecting the poorest countries most severely, particularly those of sub-Saharan Africa, South Asia, and Latin America.

The global economic crisis highlighted basic social and developmental problems stemming from population growth, increasing urbanization, and environmental degradation, in these regions. In many countries, the motivation of health workers declined, and significant numbers migrated to richer countries. There was a virtual breakdown of health management systems, especially at the periphery. Supplies of basic medical requirements became spasmodic and attendance at clinics fell.

The overall deterioration raised the alarm that the goals of health for all through PHC would not be achieved without further urgent international action.

The child survival and development revolution (CSDR)

UNICEF's response in the 1980s was to appeal for CSDR as the leading edge for PHC development and the means of dealing directly with some major childhood diseases and the needs of pregnant women. It was recognized that modern communications had the potential to mobilize communities everywhere and empower families to become more involved in child survival. More effective communications were also seen as a means of improving intersectoral action for health.

There have been many achievements under the CSDR, especially in the field of immunization, and in the use of ORT to prevent deaths from

diarrhoeal diseases. Successful advocacy for UCI not only saved many thousands of lives, but served to raise national consciousness to improve and extend PHC.

Many lessons have been learned from this intensification of efforts under CSDR. The great potential to harness community resources for social goals has been clearly demonstrated. And the relative ease with which coverage can be raised in countries with extensive health infrastructure has highlighted the urgent need to extend the PHC system in countries with poor infrastructure. The latter need to increase both the number and capacity of their health workers and to make them more accessible to underserved communities.

These lessons have profound implications in the 1990s for attaining the goal of health for all by the year 2000. And the lessons are especially important for the countries of Africa, south Asia and Latin America that have serious economic problems.

Countries in economic and social difficulties

The health of children and mothers in sub-Saharan Africa is especially precarious. Health care systems reach less than 40 per cent of the population and a significant number of the systems need rehabilitation. There is a shortage of medical supplies and the volume of resources directed to health is either stagnant or has declined in most countries.

Health care workers are very poorly paid and motivation is low. The managerial, supervisory, information, and training components of health care are quite weak in most countries, and new health problems such as AIDS and chloroquine-resistant malaria have increased the burden on communities and health care systems at large. At the same time, new attempts are under way to combat old scourges such as dracunculiasis, onchocerciasis, and micronutrient deficiences.

Faced with these challenges, many countries have demonstrated a will to improve their PHC systems. Political leaders throughout sub-Saharan Africa have become sensitized to the special problems affecting children and women; to the seriousness of population issues; to environmental degradation; and to the need to restructure their economies and health and social systems in ways that foster a genuine partnership between communities and government. A turning point in this regard was the Lusaka Declaration of 1985 which targeted 1986 as the Year of Immunization for the region.

The Bamako Initiative

In September 1987, African Health Ministers attending the 37th regional meeting of WHO in Bamako, Mali, addressed the need to redefine African health policies to meet the goal of health for all by the year 2000.

The Bamako Initiative responded to a decade of opportunities and constraints since Alma-Ata, and Africa's especially difficult economic

situation, with a reemphasis on PHC focusing particularly on women and children. The strategy focused on community participation and the need to make the fullest use of local, national, and other available resources. It aims to achieve universal access to PHC through decentralized services and management, from national to district and local levels. It also stressed: the importance of community involvement in financing health care and services in partnership with the central government; community management of the resources generated; the critical importance of regular drug and medical supplies, and their rational use; and of ensuring the availability of essential drugs and services to the poorest members of society.

Many African countries have taken up this challenge to restructure their health systems. External support agencies need to recognize the significance of the Initiative and to offer timely assistance.

Goals for the 1990s

The principal goal of the 1990s is to reduce mortality among young children and mothers. To achieve that, families need ready access to functioning PHC systems and personnel who are competent to handle most of their basic needs and refer more serious problems to people with higher qualifications.

Health workers should always be on hand to "heal sometimes and to comfort always." They should be able to deal effectively with common life-threatening conditions and to prevent them by supporting protective measures such as community health education, the provision of safe water supply and sanitation, antenatal care, immunization, breastfeeding and sound weaning practices, and family planning.

These interventions help to establish the credibility of health workers in the community and to guarantee the achievement of their goals.

Programme strategies

The strategy for the 1990s should be to emphasize the convergence of interventions to solve epidemiologically significant problems through the development and extension of PHC to all communities. There should be advocacy for intensified political action; for the flow of resources from the more privileged to the less privileged; and for the empowerment of people and communities with the knowledge, information, and technical support for decision making. District-level roles must be strengthened to deal effectively with a range of basic technical problems and surveillance, and to remain sensitive to community needs. Families and communities must have sufficient health knowledge to take charge of their own needs and to adjust their behaviour as necessary. This last is perhaps the most critical of all requirements for achieving the goal of health for all through PHC.

Prospects for the 1990s

This last decade of the twentieth century offers the greatest potential in modern times for the achievement of social objectives. The virtual end of

the Cold War has opened the door to genuine collaboration among all nations to deal with major social problems, including the health needs of the poorest nations.

At the heart of this fundamental change in global relations is the desire for all nations and communities to be in charge of their own destinies—a desire totally in tune with PHC.

In the field of science and technology, there has never been such a variety of effective interventions that can be applied to the majority of health problems. The PHC strategy is the means for integrating these applications and technologies for the benefit of all. What is required now is the political commitment to make this happen in every country.

Further reading

Alma-Ata 1978: Primary Health Care. Report of the International Conference on Primary Health Care, Alma-Ata, USSR, September 6-12, 1978. WHO. Geneva. 1978.

"Annotated Bibliography on Community Financing for Local Health Services," by Pierre E. Mandl, UNICEF Staff Working Paper No. 3, November, 1988.

Halving maternal mortality

In brief

The Goal: Between 1990 and the year 2000, reduction of the maternal mortality rate (MMR) by one half.

The health of infants and children and the health of mothers are intimately linked. Every year, more than half a million women die during pregnancy or childbirth, the vast majority of them in developing countries, doomed by poverty and social inequity. The conditions that take such a toll on women affect their infants and children also. Women debilitated by anaemia, malnutrition, and disease bear infants ill-prepared to withstand the traumas of unskilled deliveries, infections, and low birth weight. The toll in mothers' lives is matched by high infant mortality rates (IMRs). And infants who survive inherit a legacy of ill health.

The problem, however, is far from intractable: the MMR drops when mothers are monitored during pregnancy and those at particular risk of complication—between 5 per cent and 10 per cent of women—are identified and given skilled obstetric care; when communities offer mothers the services of trained birth attendants and accessible facilities; when family planning advice is available and the problems of women's social inequity are addressed.

More than 500,000 women die each year as a result of pregnancy or childbirth, all but 6,000 of them in developing countries. In the developing world overall, nearly 1 in every 200 pregnancies results in the death of the mother, a MMR of 450 per 100,000 live births. In those cases where there is no care or only unskilled care, as many as 1 in every 75 pregnancies results in the death of the mother.

Among certain subgroups, the risk of maternal death is particularly high. Young adolescents in Africa and Asia receiving no prenatal care may stand a 5 per cent chance of dying. An African woman's lifetime risk of dying from pregnancy or childbirth may be 1 chance in 15. A South Asian

woman may have a 1 in 18 chance of dying. By comparison, the risk for women in industrialized countries, and even in a few developing countries in East Asia, has been reduced to the point where pregnant women carry only one two-hundredth to one five-hundredth that of women in less developed countries.

Maternal health is intimately linked with infant health and the risks of infant mortality. In the least advantaged countries, one half of infant deaths occur during the first month of life, linked to such factors as neonatal tetanus, low birth weight, prematurity, lack of oxygen, birth trauma, and infections—conditions also associated with poverty and high maternal mortality rates.

Furthermore, among infants who survive birth, the ill health and poor nutrition of their mothers, and the poor quality of health care they receive foreshadow a childhood of disease, nutritional deficiencies, and equally poor health care.

Without skilled prenatal and delivery care, even well-nourished and educated women will continue to run a high risk of pregnancy-related death. In the industrialized countries, maternal mortality remained between 200 and 300 per 100,000 live births through the 1930s, and did not fall to fewer than 10 per 100,000 until quality obstetric care became widely available, including improved standards for managing labour and delivery, better handling of complications, the use of antibiotics and blood transfusions, and the skilled performance of Caesarian section.

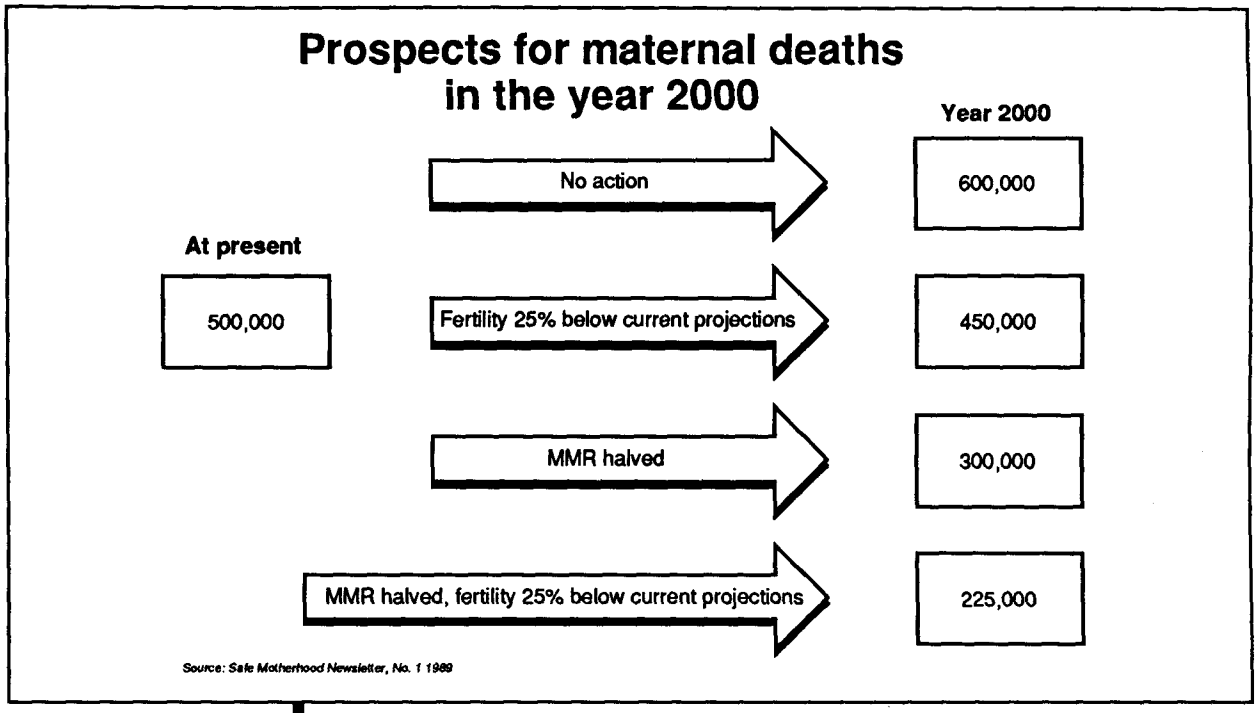
However, the reduction of maternal deaths need not be the exclusive privilege of the developed world. In Sri Lanka, where annual maternal mortality between 1950 and 1955 was 550 per 100,000, the rate was halved to 260 per 100,000 per year from 1960 to 1965, and by 1975 to 1980 was down to 80.

If the current MMRs remain unchanged, by the year 2000 there will be 600,000 maternal deaths per year. Yet, if Sri Lanka's example can be followed, that figure could be reduced to 300,000 or less.

Underlying causes

The risk of a maternal death begins with the health and nutrition of the future mother during childhood. A childhood legacy of short stature, low body-weight, and anaemia, coupled with early marriage and childbearing before social and biological maturity, are major contributors to maternal death. The geographic and cultural inaccessibility of family planning services and the erosion of traditional mechanisms of child spacing all contribute to the mother's risk.

Only slightly more than half of all deliveries in the developing world (excluding China) are supervised by a trained birth attendant, and no more than 30 per cent take place in an institutional setting. Even when women have physical access to essential and emergency obstetric care, they may



not use those services for a variety of social, cultural, or economic reasons. Or, too often, they call upon them too late. At least 5 to 10 per cent of women require skilled obstetric care when delivering. If they do not receive it in a timely fashion, they will die or suffer serious consequences. In such circumstances, the infant is often stillborn or seriously damaged.

What needs to be done

A large percentage of the maternal deaths in many countries are preventable with attainable resources and skills. If the facilities are made available, timely action and referral are usually possible. At the same time, increased literacy among women and their involvement in their own health care increases their understanding of their own health needs and their willingness to use maternal health services.

To have a significant impact on the levels of maternal mortality and morbidity, it is essential to have an integrated strategy that encompasses the four elements of maternal health and safe motherhood:

- redressing the social inequities confronting women;
- ensuring that couples have access to family planning;
- developing community-based maternity care; and
- providing back-up and support at the first level of referral for those women who require skilled obstetric care.

Some activities must clearly be seen as long-term investments for the benefit of women and society. Other activities will yield results in the

medium term, paying dividends in the next generation on the investments made in the next few years. Others may produce results almost from the very beginning.

In the long term, the combination of education, improvement in the social status of women, and full access to family planning information and services would have a large effect on maternal mortality by decreasing the risk attributable to unwanted pregnancy and child-bearing during adolescence or at older ages among women who have already given birth several times. Such fertility variables may account for between 15 and 30 per cent of maternal mortality.

Governments can adopt the theme that "safe motherhood" and "child survival and development" are two sides of the same coin. They can endorse the fourfold strategy of the global movement for maternal health and safe motherhood: equity, primary health care, essential obstetric care for those at risk, and family planning.

In the short term, however, efforts to improve community-based family planning, prenatal care, and the training of traditional birth attendants (TBAs) would reduce maternal mortality by 8 to 22 per cent, i.e. to 350 per 100,000. This estimate is based on the expected effect of partially decreasing the infection component of maternal mortality and providing family planning to avoid a proportion of the abortion deaths.

TBAs can be taught simple techniques of identifying women with severe anaemia as well as increased risk of haemorrhage or eclampsia, which together account for 40 to 60 per cent of maternal deaths. These cases, however, require referral to a health centre or district hospital for the needed care.

By strengthening the district level to provide such obstetric functions as anaesthesia, blood for transfusions, vacuum extraction, and Caesarian sections, and if peripheral care were linked to and supervised from that level, maternal mortality could be reduced by 50 to 85 per cent, i.e. to 64 per 100,000 live births.

One major remaining obstacle to reducing maternal deaths is the logistical problem of transporting a woman in need of skilled care. A risk-conscious approach can, in part, overcome that obstacle, since many women who require higher-level care can be identified before they go into labour, and, depending on the degree of risk anticipated, can be sent to a district hospital or maternity waiting home in advance of their expected delivery dates. Communities can be involved in constructing and maintaining such maternity waiting homes.

The impact of such community-based interventions is far greater on neonatal health than on maternal health. Cleanliness during delivery and

immunization of all women of child-bearing age with tetanus toxoid have been shown to reduce neonatal tetanus by 90 per cent to 95 per cent (virtually 100 per cent with immunization). The training of TBAs has reduced perinatal infant deaths from trauma, asphyxia, and sepsis by 40 per cent to 60 per cent.

Cost of halving maternal deaths

According to World Bank estimates, the cost of an integrated approach to maternal health care is $1.50 per capita per year, in addition to the cost of child health care and essential-drugs programmes. The maternal care component includes community-based prenatal care and family planning, health centres, and the strengthening of first-level referral for essential obstetric care. The latter would involve minimal upgrading and equipping of district hospitals, serving communities of from 100,000 to 200,000 persons.

In many countries the resources for such measures, whether from national, bilateral, international, or non-governmental sources, already exist or are attainable. The problem has been that the resources in question have neither been targeted to an integrated strategy nor allocated on the basis of risk.

Estimates can only be made on a country basis for the capital costs of up-grading and equipping the necessary facilities and of strengthening training programmes for midwives and other health workers.

WHO, World Bank, UNFPA, UNDP, and UNICEF have all made policy commitments to maternal health and safe motherhood. Limited funds have been made available by various multilateral and bilateral agencies and foundations for global-level research, training, and advocacy on this question. In a few countries, the agencies concerned have given priority to collaborating in and providing funding to programme development for maternal health.

Research needs

Operational and health systems research on the organization of maternal health services is a major priority if maternal health services are to be improved.

Operational research issues can be approached from three angles:

- **The organization and management of services.** Examples of research needed include examination of integrated programmes and community participation; studies of relative cost-effectiveness and acceptability of different combinations of maternal health, nutrition, and family planning interventions; studies on how social supports affect women's work, nutrition, and energy expenditure; research into distributing maternal health technologies, such as iron folate and antimalarials.

- **Development and adaptation of specific technologies.** Priorities would include research into such topics as plasma substitutes for replacing blood loss in shock; the home-based mother's record (HBMR) in self-identification and referral of women at high risk of complications during pregnancy or delivery; the use of the partograph to identify the need for referral or operative intervention; and devices for detecting severe anemia.
- **Case and programme management of specific conditions.** Topics to be studied would include the use of routine antibiotics in cases of prolonged labour or premature rupture of membranes and the training of TBAs and primary health care (PHC) workers in the use of a simple screening tool for hypertensive disease of pregnancy.

Contribution of this goal to sustainable national development

Maternal mortality is an indicator of social inequity and discrimination against women. It is an impediment to development and contributes to infant and child mortality. While many actions that could lower maternal death rates fall within the realm of the health sector, all sectors of society bear a responsibility for creating a social climate in which women's needs are accorded a high priority and in which simple but crucial preventive measures are no longer withheld through neglect.

What world leaders can do to help achieve this goal

Governments can adopt the theme that "safe motherhood" and "child survival and development" are two sides of the same coin. They can endorse the fourfold strategy of the global movement for maternal health and safe motherhood: equity, PHC, essential obstetric care for those at risk, and family planning. Leaders can commit themselves to take decisive steps to improve maternal health within their countries, drawing upon all funding sources — national, bilateral and international — and all sectors concerned.

Further reading

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The Safe Motherhood Initiative: Prospects for Action, by Barbara Herz and Anthony R. Measham. World Bank. Washington. 1987.

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MATERNAL HEALTH

	Pregnant women immunized against tetanus (%) 1987-88	Births attended by trained health personnel (%)* 1983-88	Maternal mortality rate** 1980-87
LATIN AMERICA & CARIBBEAN	**27**	**57**	**72**
Argentina			69
Bolivia	25	36	480
Brazil		95	120
Chile		98	47
Colombia	40	51	110
Costa Rica	90	93	36
Cuba			34
Dominican Rep.	87	57	74
Ecuador	5	27	190
El Salvador	19	35	70
Guatemala	18	34	110
Guyana	57	96	
Haiti	56	40	230
Honduras	16	50	50
Jamaica	50	89	110
Mexico		94	82
Nicaragua	25	41	47
Panama	27	89	57
Paraguay	64	22	380
Peru	8	44	88
Trinidad & Tobago	60	98	54
Uruguay	13	97	38
Venezuela		82	59
MIDDLE EAST & NORTH AFRICA	**34**	**64**	**210**
Algeria		15	140
Egypt	88	47	320
Iran, Islamic Rep.	50	82	
Iraq		56	50
Jordan	54	83	
Kuwait	2	99	6
Lebanon			
Libyan Arab Jamairiya	12	76	80
Morocco	33	29	300
Oman	70	60	
Saudi Arabia	50	74	
Syria	40	37	280
Tunisia	34	68	310
Turkey	7	78	210
United Arab Emirates		96	
Yemen	3	12	
Yemen, Dem.	5	10	
AFRICA SOUTH OF THE SAHARA	**25**	**35**	**420**
Angola	19	15	
Benin	7	45	
Botswana	61	77	250
Burkina Faso	15	30	810
Burundi	69	21	
Cameroon	26		300
Central African Rep.	20	66	600
Chad	10	24	860
Congo	47		1000
Côte d'Ivoire	46	20	
Ethiopia	7	14	
Gabon	60	92	
Ghana	19	40	1000
Guinea	6	25	
Kenya	62	28	170
Lesotho		40	
Liberia	20	87	
Madagascar	6	62	240
Malawi	63	45	100
Mali	17	27	
Mauritania		20	
Mauritius	65	85	100
Mozambique	43	28	
Namibia			
Niger	8	47	420
Nigeria	20	40	800
Rwanda	43	22	210
Senegal	24	50	600
Sierra Leone	50	25	450

MATERNAL HEALTH

	Pregnant women immunized against tetanus (%) 1987-88	Births attended by trained health personnel (%)* 1983-88	Maternal mortality rate** 1980-87
AFRICA SOUTH OF THE SAHARA (continued)			
Somalia	26	2	1100
South Africa			83
Sudan	20	20	660
Tanzania	54	60	340
Togo	72	15	
Uganda	14	45	300
Zaire	43		
Zambia	45		150
Zimbabwe	22	69	480
ASIA			
Afghanistan	**33**	**52**	**140**
Bangladesh	6	8	690
Bhutan	11	5	600
China	42	7	1710
Hong Kong			44
India	90	92	5
Indonesia	56	33	340
Kampuchea	33	31	450
Korea, Dem.	3	47	
Korea, Rep.		65	41
Laos		70	26
Malaysia	7		
Mongolia	53	82	59
Myanmar		99	100
Nepal	24	57	140
Pakistan	31	6	830
Papua New Guinea	26	24	500
Philippines	17	34	900
Singapore	37	57	93
Sri Lanka	90	100	5
Thailand	38	87	60
Viet Nam	61	40	
		99	140
INDUSTRIAL COUNTRIES			
Albania		**100**	**10**
Australia			
Austria		99	8
Belgium			7
Bulgaria		100	9
Canada		100	13
Czechoslovakia		99	3
Denmark		100	10
Finland		100	4
France		100	6
Germany, Dem.		99	14
Germany, Fed.		99	16
Greece		100	11
Hungary		97	9
Ireland		99	26
Israel			12
Italy		100	5
Japan		100	10
Netherlands		100	16
New Zealand		100	5
Norway		99	6
Poland		100	2
Portugal		100	11
Romania		87	12
Spain		100	150
Sweden		96	11
Switzerland		100	5
United Kingdom		99	5
USSR		100	9
USA		98	48
Yugoslavia		99	8
		86	22

Source: The State of the World's Children 1990, Table 7.
(For explanations and qualifications of specific figures, see notes there.)

* Percentage of births attended by physicians,nurses, midwives, trained primary health care workers or trained traditional birth attendants.

** Annual number of deaths of women from pregnancy related causes per 100,000 live births.
Figures for country groupings are median values.

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Immunization goals in the 1990s

In brief

Nearly 3 million children in developing countries have been dying each year from measles, tuberculosis, whooping cough, tetanus, polio, and diphtheria, all diseases easily prevented by immunization. When Universal Child Immunization (UCI) is attained, hopefully by the end of 1990, this toll will be reduced to 1.8 million annual child deaths.

The extraordinary success of UCI can be extended even further, reducing the annual death toll to 150,000 by achieving the following goals by the year 2000:

- **Maintenance of a high level of immunization coverage (at least 90 per cent of children under one year of age) against diphtheria, pertussis, tetanus, measles, poliomyelitis, tuberculosis, and against tetanus for women of childbearing age.**
- **Global eradication of poliomyelitis by the year 2000.**
- **Elimination of neonatal tetanus by 1995.**
- **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 toward the global eradication of measles in the longer run.**

In the 1970s, smallpox, a disease that had decimated and disfigured entire populations across the centuries, was finally eradicated from the earth, through a comprehensive campaign of global immunization.

For the first time, the world united to wipe out a fearsome disease and six other major killers–measles, tuberculosis, whooping cough, tetanus, polio, and diphtheria–no longer seemed invincible. Encouraged by the unprecedented success of the global campaign against smallpox, WHO established the Expanded Programme on Immunization (EPI) to extend the protection against preventable diseases widely available to children in the developed world to children all over the globe.

Still, in the mid-1980s, more than three million children, primarily in developing countries, were still dying annually from those same diseases. The interlocking problems of poverty and malnutrition complicate the solution. Yet the diseases and the enormous toll they take on the most vulnerable children, families, and nations of the world, can all easily be prevented by vaccination:

- Nearly two million children have been dying each year from such complications of measles as pneumonia, diarrhoea, and encephalitis. One immunization at nine months of age (or as early as at six months, with a newly developed vaccine) can prevent measles.
- Neonatal tetanus kills over three quarters of a million babies in the developing world each year. Unsterile practices at birth cause the nearly always fatal infection of the umbilical cord. Mothers who are immunized against tetanus either during pregnancy or prior to becoming pregnant pass immunity to the disease on to their newborns. An infant can later receive lasting immunity through combined diphtheria/pertussis/tetanus (DPT) vaccinations around 6, 10, and 14 weeks of age.
- Whooping cough, or pertussis, has been claiming the lives of some 600,000 young children each year. It can be prevented by three doses of the DPT vaccine around 6, 10, and 14 weeks of age.
- About 200,000 children contract poliomyelitis each year and 20,000 die from it. It can be prevented by three doses of a vaccine given during the first year of life.
- Two million children under five years of age get tuberculosis and an estimated 30,000 die from it. Immunization is achieved with one dose of BCG (anti-tuberculosis) vaccine given after birth.

Universal child immunization

In 1977, three years after EPI was launched, the World Health Assembly challenged the countries of the world to achieve UCI by the year 1990. The goal eventually set was coverage of 80 per cent of the world's children by their first birthday with one dose of BCG, three doses of DPT, three doses of polio, and one dose of measles vaccines. The ministers of health in Africa set a regional target of 75 per cent, and China set 85 per cent as their level of coverage.

Many considered such levels of immunization unattainable in 1977. Between 1984 and 1988, however, a great international groundswell pushed the world substantially closer to realizing the goal. In 1985, the UNICEF Executive Board and the United Nations General Assembly affirmed full support to the goal of UCI 1990. They were joined by 74 governments and more than 400 voluntary organizations who pledged to support

UCI 1990 in commemoration of the fortieth anniversary of the United Nations.

Out of these commitments grew high-level international political support and co-operation between ministries of health, voluntary organizations, and other diverse talents, all necessary to marshall the required resources both nationally and internationally to complete national cold chains and delivery systems and to generate sufficient understanding and motivation by the public to seek out immunization for their children.

By the end of 1989, BCG coverage for tuberculosis had reached 81 per cent; 75 per cent of children received the third dose of polio vaccine; 73 per cent received their third DPT dose. Coverage against measles was at 71 per cent.

By 1987, most countries had established accelerated immunization programmes and were using a variety of strategies to improve immunization coverage. National mass campaigns were conducted to promote immunization, involving religious leaders, teachers, and other community leaders in advocating immunization. National immunization days, with intensive publicity and media support, protected millions of children. And meanwhile, health services made immunization a regular component of children's contacts with the health system. In some countries, immunization became a prerequisite for admission to schools or for other government services.

The immunization challenge for 1990s

A breakthrough–reducing the number of children's lives lost to diseases preventable by immunization to 150,000–is possible by the year 2000.

The World Health Assembly and the UNICEF Executive Board, targeting the diseases that exact the heaviest price in children's lives, have endorsed the following immunization goals to be achieved during the decade of the 1990s.

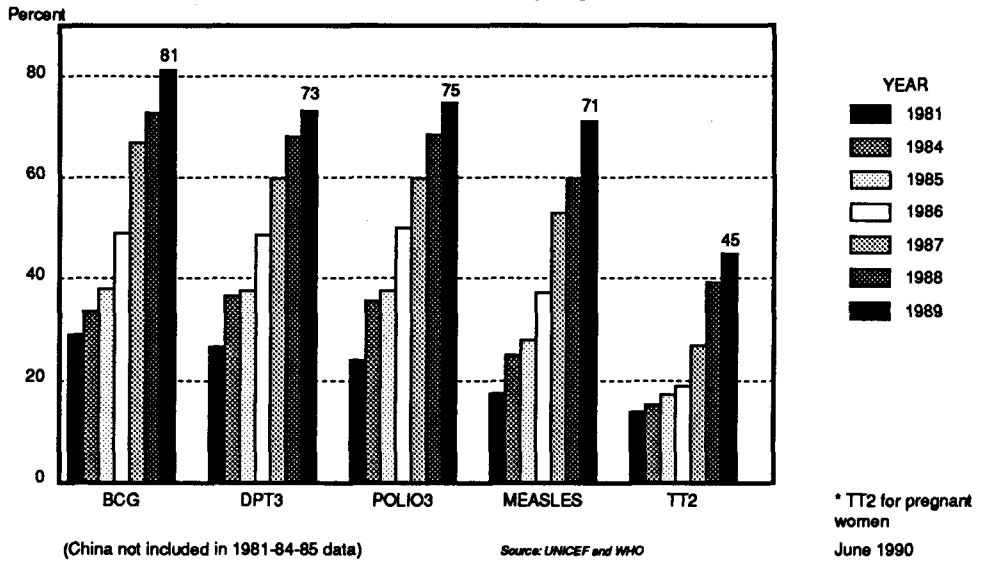
- Global eradication of polio by the year 2000;
- Elimination of neonatal tetanus by 1995;
- Reduction by 95 percent in measles deaths and reduction by 90 per cent of measles cases in 1995, compared with pre-immunization levels as a major step to the global eradication of measles in the longer run.

If the UCI goal of covering 80 per cent of children by the end of 1990 is reached, an estimated 1.8 million children will still die annually from the six major diseases. Achieving the goals above in addition to the goal of UCI, however, can reduce the devastating loss each year to 150,000 deaths, and free all children from disabilities due to polio, by the year 2000.

UCI's success at the end of 1989

The dramatic success of UCI up to now indicates that the breakthrough is feasible. In 1981, only around 20 per cent of the world's children had expanded immunization coverage. In 1984, levels were around 35 per cent. By the end of 1989, however, BCG coverage for tuberculosis had reached 81 per cent; 75 per cent of children received the third dose of polio vaccine; 73 per cent of children received their third DPT dose. Coverage against measles was at 71 per cent.

Increase in immunication coverage for under-one children* in developing countries



(China not included in 1981-84-85 data)

Source: UNICEF and WHO

* TT2 for pregnant women

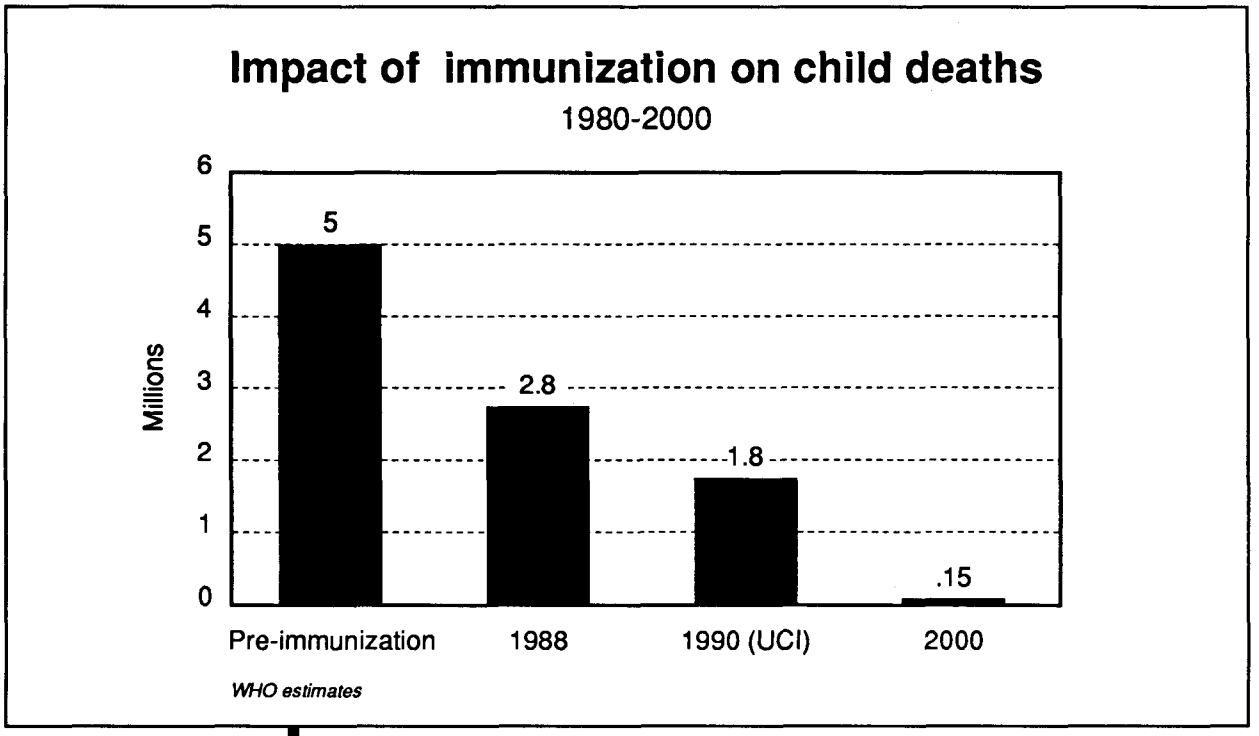
June 1990

Tetanus toxoid (TT2) coverage for pregnant women, however, remained a problem, with only 45 per cent of women covered by two doses.

The number of developing countries achieving their UCI targets grew from 16 in 1986 to 43 in 1989. An additional 40 countries have managed to protect 60 per cent of their children against all six of the diseases targeted by EPI, putting the goal of UCI within their reach by the end of 1990.

The cost of sustaining universal child immunization

The cost of UCI varies greatly from country to country–from $5 to $25 for routine programmes. Using an average of $13 per child, as suggested by a recent review of literature on the subject, however, the annual cost of immunizing 80 per cent of infants in developing countries would be approximately $1 billion. It is estimated that in meeting this goal, the governments of developing countries themselves will bear 80 per cent to



90 per cent of the cost, leaving approximately $100 million to $150 million to be raised from external sources. This level of support will be needed for more than a decade in order to sustain the high levels of coverage that make UCI attainable.

Reaching the goals

Global Eradication of Poliomyelitis by the Year 2000

To reach the goal, WHO drew up a plan, approved by the World Health Assembly in 1989. The first step is to reach at least 80 per cent coverage with potent vaccines at district levels. Upgrading or replacing cold-chain facilities and training and supervising health workers will help ensure such a level of coverage.

A three-tiered global network of laboratories, modeled on the pattern successfully employed in the Americas is the second step. National laboratories, reference laboratories that serve selected countries, and at the third tier specialized laboratories will all have interrelated but distinct roles in helping confirm diagnoses and in confirming that the wild polio viruses are no longer circulating in the environment.

Health workers will continue to be trained, primarily as part of EPI. However, training for outbreak investigation and control and for clinical and laboratory diagnosis of poliomyelitis is also being conducted.

Societies are continuing to mobilize to immunize children as part of the UCI drive. And national medical establishments are being asked to commit their prestige and political influence to the effort, so government support remains firm until the last case of polio is diagnosed.

Research and development are improving polio vaccines in terms of formulation, efficacy with fewer doses, and heat stability. Better diagnostic tests are being created, and efforts are being made to improve management efficiency of the eradication effort.

And finally, health workers and families are encouraged to make early rehabilitation efforts for children who contract the disease. These efforts can prevent much of the need for surgical treatment. Better guidelines on which children require surgical treatment are also being developed, and braces are being improved.

Elimination of Neonatal Tetanus by 1995

Although tetanus will never be fully eradicated–tetanus spores can survive indefinitely in the environment without a human host–neonatal tetanus has virtually disappeared from industrial countries because of aseptic delivery practices.

In the developing world, however, conditions during births are often unsanitary, attendants are frequently untrained, and in many cultures, the umbilical stump is actually treated with materials containing the tetanus organisms.

The training of birth attendants to ensure clean hands and delivery surfaces and proper care of the umbilical cord can all reduce the risk of neonatal tetanus. But only by vaccinating all women who are pregnant or likely to become pregnant against tetanus will neonatal tetanus be eliminated.

In the next five years, the focus will be on ensuring that all pregnant women receive two doses of tetanus toxoid prior to delivery. This, together with the emphasis on clean delivery, will hopefully eliminate neonatal tetanus during the next five years. By also ensuring that girls receive three doses of DPT during the first year of life, one dose when they enter school, and two additional doses before they leave school, they and their future children will be protected.

The promotion of tetanus toxoid immunization is part of the Safe Motherhood Initiative established in 1987 by WHO, the World Bank, and UNFPA, and supported by many other organizations.

Reduction by 95 Per Cent in Measles Deaths and Reduction by 90 Per Cent of Measles Cases Compared to Pre-Immunization Levels by 1995 – a Major Step Toward the Global Eradication of Measles in the Longer Run.

Because measles is highly infectious, it is difficult to control, even in industrial countries with many years of high levels of coverage. In developing countries, where health services are often marginal, children frequently malnourished, and living conditions overcrowded and impoverished, control is much harder. Children are also infected at younger ages, sometimes before they are even nine months old.

Recent research has shown a high titre Edmonston-Zagreb strain of vaccine to be effective in children as young as six months of age. The EPI Global Advisory Group recommended in October 1989 that this vaccine be administered to children at six months of age in countries and areas where early measles is a problem. The vaccine, however, is not yet widely available.

In addition to high levels of immunization coverage in all communities of all countries at the earliest age possible, measles surveillance will be emphasized to find cases and control epidemics on a timely basis.

The countries of the English-speaking Caribbean have adopted the goal of measles elimination by 1995. Their strategy is to immunize all children between 12 months and 15 years of age by May 1991, regardless of their previous immunization status.

Research priorities for the 1990s: a children's vaccine

A major research and development effort aimed at producing improved vaccines more closely approaching the "ideal"–a single dose multi-antigen oral vaccine that is stable at ambient temperatures and produces life-long immunity–is under discussion. The effort would be called, simply, the Children's Vaccine Project. In addition to the current EPI diseases, it would seek to develop protection against pneumonia, hepatitis, influenza, mumps, chickenpox, and diarrhoea due to Rotavirus. Regional variants would also be sought in order to provide protection to children against typhoid, cholera, leprosy, shigella, and dengue.

A heat-stable vaccine would eliminate the need for, and cost of, what is now known as the "cold chain," the vaccine distribution system that requires refrigerators, refrigerated transport, skilled maintenance, and a whole series of logistic measures. If any link in this chain fails, the vaccine can be rendered useless. An oral vaccine would further eliminate the need for, and thus the expense and complications of, needles, which require sterilization and also have the potential for transmitting disease if sterilization is not properly performed.

Reducing the number of required doses–ideally to a single dose–would substantially reduce costs, solve the problem of dropouts, and help bring disease control and eradication goals within our grasp.

Basic and applied research must be carried out, field efficacy trials must be conducted, and production and marketing problems solved before all this can become a reality. However, much of the basic research is

already–or nearly–in hand. What remains to be undertaken is an intensive international collaboration to bring together the elements of modern science in this effort for children. It would be a very fitting gift to the children of the twenty-first century if Heads of State assembled at the World Summit for Children were to pledge themselves and their research establishments to making this a reality within the decade.

Further reading

Protecting the World's Children: A Call for Action. Report on the Fourth International Child Survival Conference, Bangkok, Thailand, March 1-3, 1990. Available from UNICEF.

Assignment Children: Universal Child Immunization by 1990. UNICEF. Geneva. 1985.

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IMMUNIZATION PROGRESS DURING THE 1980s

	Percentage of one-year-old children fully immunized*					
	DPT		Polio		Measles	
	1981	1989	1981	1989	1981	1989
LATIN AMERICA & CARIBBEAN	**42**	**62**	**42**	**66**	**38**	**67**
Argentina	46	74	38	81	73	78
Bolivia	13	40	15	50	17	70
Brazil	47	54	99	97	73	58
Chile	97	96	96	95	93	91
Colombia	20	75	22	92	26	73
Costa Rica	83	88	85	91	71	88
Cuba	67	94	82	94	49	97
Dominican Rep.	27	46	42	75	17	46
Ecuador	26	54	19	63	31	56
El Salvador	42	64	38	72	44	73
Guatemala	42	51	42	57	8	52
Guyana	45	77	37	79		69
Haiti	14	50	3	50		31
Honduras	38	77	37	83	38	86
Jamaica	39	85	37	84		71
Mexico	41	65	85	96	33	85
Nicaragua	23	64	52	82	20	61
Panama	49	71	50	71	53	75
Paraguay	28	67	26	71	16	58
Peru	18	58	18	59	24	52
Trinidad & Tobago	52	77	55	77		59
Uruguay	57	82	58	82	95	75
Venezuela	54	55	75	67	43	49
MIDDLE EAST & NORTH AFRICA	**40**	**80**	**45**	**81**	**40**	**77**
Algeria	33	81	30	81	17	73
Egypt	82	81	84	81	65	83
Iran, Islamic Rep.	29	88	47	89	48	89
Iraq	13	83	16	83	33	82
Jordan	81	94	87	94	40	84
Kuwait	54	92	76	92	66	93
Lebanon		7		7		3
Libyan Arab Jamahiriya	55	84	55	84	57	70
Morocco	43	79	45	79		82
Oman	9	96	9	96	6	94
Saudi Arabia	53	96	52	96	12	86
Syria	14	93	14	93	14	86
Tunisia	36	93	37	93	65	92
Turkey	64	79	69	79	52	71
United Arab Emirates	45	84	45	84	42	66
Yemen	25	56	25	56	40	48
Yemen, Dem.	5	40	5	40	6	35
AFRICA SOUTH OF THE SAHARA	**23**	**52**	**18**	**51**	**28**	**54**
Angola		18		19		42
Benin		42		42		41
Botswana	64	89	71	88	68	80
Burkina Faso	2	49	2	49	23	72
Burundi	38	82	6	82	30	73
Cameroon	5	53	5	51	16	48
Central African Rep.	12	20	12	20	16	32
Chad		79		79		75
Congo	42	42	42	42	49	41
Côte d'Ivoire	42	43	34	42	28	55
Ethiopia	6	26	7	26	7	23
Gabon		65		65		68
Ghana	22	51	25	51	23	65
Guinea		16		16	15	27
Kenya		77		78		65
Lesotho	56	77	54	81	49	75
Liberia	39	28	26	28	99	55
Madagascar	40	45		42		40
Malawi	66	90	68	89	65	84
Mali		26		26		40
Mauritania	18	28	18	28	45	45
Mauritius	82	87	82	88		82
Mozambique	56	39	32	39	32	48
Namibia						
Niger	6	12	6	11	19	12
Nigeria	24	58	24	57	55	59
Rwanda	17	84	15	83	42	83

IMMUNIZATION PROGRESS DURING THE 1980s

	Percentage of one-year-old children fully immunized*					
	DPT		Polio		Measles	
	1981	1989	1981	1989	1981	1989
AFRICA SOUTH OF THE SAHARA (continued)						
Senegal		67		67		65
Sierra Leone	15	34	13	34	28	37
Somalia	2	18	2	18	3	30
South Africa						
Sudan	1	52	1	52	1	43
Tanzania	58	85	49	82	76	83
Togo	9	55	9	55	47	62
Uganda	9	60	8	60	22	60
Zaire	18	38	18	38	23	40
Zambia	44	83	77	81	21	80
Zimbabwe	39	79	38	79	56	75
ASIA	**48**	**81**	**32**	**81**	**N/A**	**75**
Afghanistan	3	31	3	31	6	30
Bangladesh	1	49	1	49		52
Bhutan	13	70	11	76	21	36
China		95		96		95
Hong Kong	84	83	94	92		85
India	31	83	7	82		69
Indonesia		75		78		68
Kampuchea		22		22		20
Korea, Dem.	52	57	51	58	31	58
Korea, Rep.	61	86	62	87	5	96
Laos	7	21	7	22	7	20
Malaysia	54	72	61	72		50
Mongolia	99	69	99	69		58
Myanmar	5	47		42		47
Nepal	16	67	1	67	2	54
Pakistan	3	73	3	73	2	64
Papua New Guinea	50	53	32	52		52
Philippines	51	86	44	85		83
Singapore	87	96	88	95	57	98
Sri Lanka	45	89	49	87		81
Thailand	52	80	22	80		63
Viet Nam		68		68		71
INDUSTRIAL COUNTRIES	**91**	**65**	**95**	**68**	**90**	**76**
Albania	94	96	92	94	90	96
Australia						68
Austria	90	90	90	90	90	60
Belgium	95	95	99	97	50	50
Bulgaria	97	99	98	99	98	99
Canada		85		85		85
Czechoslovakia	95	99	95	98	95	98
Denmark	85	94	97	100		82
Finland	92	94	90	95	70	87
France	79	96	80	97		41
Germany, Dem.	80	94	90	97	95	99
Germany, Fed.	50	97	80	95	35	50
Greece	95	83	95	93		82
Hungary	99	99	98	99	99	99
Ireland	36	45	76	90		63
Israel	84	87	91	93	69	89
Italy		88		95		21
Japan		83		95		73
Netherlands	97	97	97	97	93	93
New Zealand	72	70		84		60
Norway		80		80		87
Poland	95	98	95	99	65	96
Portugal	75	78	16	80	70	84
Romania		92		94		90
Spain		74		78		81
Sweden	99	99	99	98	56	93
Switzerland		92		98		70
United Kingdom	44	70	71	87	52	76
USSR	95	79	95	80	95	79
USA		97		97	96	98
Yugoslavia	90	90	95	90	95	92

Source: UNICEF and WHO.
*Fully immunized = DPT and Polio, three doses each; Measles, one dose.
Figures for country groupings are weighted mean values.

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Control of diarrhoeal diseases

In brief

The Goal: Reduction by 50 per cent, compared with 1990 levels, in the deaths due to diarrhoea in children under the age of five years and a 25 per cent reduction in the diarrhoea incidence rate.

Diarrhoeal diseases are the primary cause of infant and child mortality in most countries, responsible for over a quarter of all child deaths world-wide each year.

Yet oral rehydration therapy (ORT)—a simple and inexpensive method of replacing fluids and minerals lost during an episode of diarrhoea—could prevent up to two thirds of these deaths.

If cases of diarrhoea are correctly managed—by combining ORT with continued feeding, increased liquid intake, and the appropriate use of drugs and intravenous therapy—up to 95 per cent of these deaths could be prevented. More and more countries have the capacity to solve the problem. The challenge now is to put the control of these devastating but manageable diseases at the top of every national political agenda.

On average, children under five years of age in the developing world suffer from two to three episodes of diarrhoea a year, and as many as 150 children out of every 1,000 in developing nations may die from diarrhoea in the first two years of life. In all, acute diarrhoeal diseases cause an estimated 1.3 billion bouts of illness and around 4 million deaths each year in children under five.

In addition, repeated attacks of diarrhoea are a major cause of malnutrition and faltering height and weight gain. In a debilitating cycle, an undernourished child can suffer increasingly severe, and possibly more frequent, attacks of diarrhoea, leading to greater exposure to life-threatening dehydration.

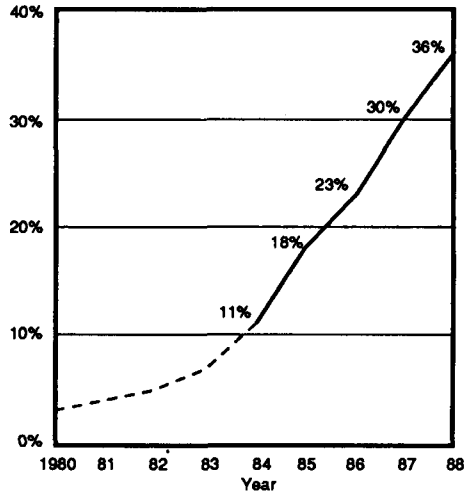
Progress in the 1980s

While the toll of diarrhoeal diseases on young children's lives remains high, substantial progress has been made in reducing their impact during the 1980s. Credit for many of these gains goes to the programmes now established in 112 countries to control diarrhoeal diseases.

One of the cornerstones of these programmes is ORT–the administration, by mouth, of a fluid in adequate quantities to replace the water and salts lost during diarrhoea. Its correct administration could reduce by two thirds the current deaths from diarrhoea.

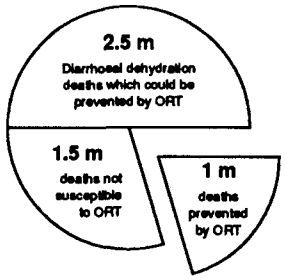
While much remains to be done, almost one in three children who develop diarrhoea is now treated with ORT, using either oral rehydration salts (ORS) or another recommended home-available solution.

Percentage of children under five with diarrhoea being treated with ORT, developing countries*, 1984-88.



Source: WHO (CDD) and UNICEF estimates

Annual deaths from diarrhoeal disease prevented and still occuring, developing countries*.



* Excluding China. Reference year for annual deaths is 1988.

The increased production of ORS is an indicator of their increased use. From 40 million packets produced world-wide in 1980, the figure rose dramatically to 330 million packets produced in 1988. And the number of developing countries producing ORS rose from 13 to 61 in the same period. The per cent of the world's population with access to ORS has grown from essentially zero in 1980 to almost 60 per cent in 1988, and should reach 80 per cent within the next few years.

Yet diarrhoea in many areas of the world continues to be treated inappropriately with antidiarrhoeals and antibiotics. In fact, an estimated $1 billion is spent annually on remedies that in many cases are useless or actually harmful.

Thirty per cent or more of admissions to children's hospitals or wards are due to diarrhoea. A study sponsored by WHO in 14 countries, however, demonstrated that hospital admissions dropped 61 per cent in countries where ORT was effectively promoted.

Managing care correctly

The correct care of diarrhoeal disease begins at home. At the onset of diarrhoea, mothers can immediately begin to administer increased amounts of whatever fluids are available, for example rice water, clear soup, or plain water.

At the same time, the mother should continue to breastfeed if the child is not yet weaned, and/or continue feeding the child a regular diet in smaller amounts, and usually at more frequent intervals.

The key danger in an episode of diarrhoea is that the child will become dehydrated. An essential part of correct care for diarrhoeal disease, therefore, is to ensure that mothers can recognize signs of dehydration. If a child shows signs of dehydration or if the child does not appear to be getting better, the mother should immediately administer ORS (if available) and seek care from a qualified provider outside the home.

ORS are necessary once dehydration occurs because most fluids available in the home are unable to correct the water and salt imbalances that occur in dehydration.

In a very small percentage of cases, when dehydration is severe, intravenous therapy may be necessary. Furthermore, in instances where blood or mucus are observed in the stool (for example, dysentery or shigella) antibiotics may be appropriate.

Even when dehydration occurs and children are treated in health centers with intravenous and antibiotic therapy, breastfeeding and other feeding should continue. And after an episode of diarrhoea, careful nourishment is also crucial to ensure adequate catch-up growth.

About 10 per cent of all cases of childhood diarrhoea last over two weeks and are classified as persistent. Correct treatment of persistent diarrhoea will become increasingly important during the 1990s. While only 3 per cent to 20 per cent of acute diarrhoeal episodes become persistent, up to 50 per cent of all diarrhoea-associated deaths occur during episodes of persistent diarrhoea.

Research is continuing, but current recommendations on treating persistent diarrhoea include appropriate feeding, vitamin supplementation, ORT, and in some cases, the use of antimicrobials and other medicines.

Mobilizing support

The treatment of childhood diarrhoea in the home and in health facilities can be improved in this decade if countries make commitments to the following:

- Increasing the involvement of parents and communities in the household management of diarrhoea. Control of diarrhoeal diseases must be promoted as a parent-centered initiative, with parents directly affecting the health and survival of their children. Parents' actions must, of course, be backed up by correct and easily accessible health care at all levels, especially that closest to the community.

A study sponsored by the World Health Organization in 14 countries demonstrated that hospital admissions dropped 61 per cent in countries where oral rehydration therapy was effectively promoted.

- Mobilizing all levels of society to support and promote ORT as the preferred treatment for childhood diarrhoea. Strengthening the social and health-related infrastructures necessary for its widespread use must also be given priority attention. Training of health staff and other providers of care is an urgent priority.
- Continuing advocacy among health professionals to adopt ORT as their first line treatment for childhood diarrhoea. The resistance of doctors and other health personnel to changing existing attitudes and practices has been a formidable obstacle to the effective promotion of ORT.
- Improving methods for measuring the mortality and morbidity levels associated with diarrhoea. ORT use rates should be closely monitored; changes in practices known to affect the incidence of diarrhoea—including breastfeeding and hygiene practices—also need further development.

Preventing diarrhoea

The causes of diarrhoea vary from country to country and within countries as well, but research thus far suggests that the following interventions can help reduce substantially the incidence of childhood diarrhoea:

- Helping mothers improve infant feeding practices, especially breastfeeding and weaning practices;
- Ensuring that water supplies are safe and easily accessible and that communities use them correctly;

- Improving domestic and personal hygiene practices;
- Promoting measles immunization.

Research priorities for the decade

Since persistent diarrhoea is responsible for as many as one of every two diarrhoea-related deaths, research is needed to identify risk factors for it, as well as to determine the usefulness of advice on nutrition, antimicrobials (oral gentamicin, for example), vitamin supplementation, and other care strategies.

Comparisons need to be made of the effects of cereal-based vs. glucose-based ORS in young children with noncholera or low-purging diarrhoeas, in infants below four months of age, and in severely malnourished children.

There is concern as to how cereal-based home rehydration solutions may affect food intake and nutritional status during diarrhoea. The impact of cereal-based home rehydration solutions on clinically evident dehydration also needs to be evaluated.

And the success of interventions to prevent diarrhoea, including ways to change behaviours, needs to be examined.

Calculating the costs

To rehydrate a child in a health facility using ORS costs only about $1. At that rate, to cover all diarrhoeal episodes with prepackaged ORS in health facilities would cost about $1.3 billion.

Perhaps even more telling are the costs of not addressing the problem:

- Since an average child under five years old has between two and three episodes of diarrhoea each year, if each episode lasts between four and seven days, the child will spend somewhere between 8 and 21 days each year sick or debilitated by diarrhoeal disease. In Ghana, for example, it is estimated that 14,470 healthy days of life per 1,000 people are lost each year to diarrhoea-related ailments.
- Not only do children experience illness during these periods, but families (and particularly mothers) are constrained from fully participating in the social and economic life of their communities. For families already living on the brink of survival, these constraints can prove devastating.
- While national experience varies widely, it is estimated that globally $1 billion per year is spent on useless or harmful treatments for diarrhoea. This figure can be expected to increase in the 1990s.

The toll of diarrhoeal diseases on young children's lives remains high. Fortunately, the solutions are clear and well-defined. Furthermore, the capacity of most countries to implement them is steadily growing. The challenge is to put the control of diarrhoeal diseases at the top of every national political agenda.

Further reading

A Simple Solution: How Oral Rehydration Is Averting Child Death From Diarrhoeal Dehydration, by Glen Williams. New York. UNICEF. 1987.

The Treatment and Prevention of Acute Diarrhoea: Practical Guidelines. Geneva. WHO. 1989.

ORAL REHYDRATION THERAPY USE RATES, 1987*

LATIN AMERICA & CARIBBEAN	**30**
Argentina	3
Bolivia	53
Brazil	40
Chile	0
Colombia	12
Costa Rica	78
Cuba	70
Dominican Rep.	41
Ecuador	24
El Salvador	26
Guatemala	17
Guyana	10
Haiti	16
Honduras	56
Jamaica	6
Mexico	72
Nicaragua	23
Panama	34
Paraguay	36
Peru	18
Trinidad & Tobago	60
Uruguay	56
Venezuela	28
MIDDLE EAST & NORTH AFRICA	**25**
Algeria	16
Egypt	83
Iran, Islamic Rep.	31
Iraq	51
Jordan	47
Kuwait	10
Lebanon	10
Libyan Arab Jamahiriya	10
Morocco	44
Oman	19
Saudi Arabia	43
Syria	31
Tunisia	50
Turkey	0
United Arab Emirates	13
Yemen	6
Yemen, Dem.	10
AFRICA SOUTH OF THE SAHARA	**15**
Angola	12
Benin	26
Botswana	46
Burkina Faso	15
Burundi	30
Cameroon	22
Central African Rep.	15
Chad	2
Congo	2
Côte d'Ivoire	4

AFRICA SOUTH OF THE SAHARA (continued)	
Ethiopia	23
Gabon	7
Ghana	36
Guinea	1
Kenya	26
Lesotho	68
Liberia	9
Madagascar	2
Malawi	42
Mali	3
Mauritania	2
Mauritius	4
Mozambique	14
Namibia	0
Niger	24
Nigeria	20
Rwanda	24
Senegal	9
Sierra Leone	31
Somalia	12
South Africa	0
Sudan	25
Tanzania	14
Togo	19
Uganda	5
Zaire	10
Zambia	59
Zimbabwe	26
ASIA	**23**
Afghanistan	11
Bangladesh	26
Bhutan	40
China	5
Hong Kong	0
India	23
Indonesia	72
Kampuchea	6
Korea, Dem.	0
Korea, Rep.	0
Laos	20
Malaysia	11
Mongolia	59
Myanmar	21
Nepal	23
Pakistan	42
Papua New Guinea	20
Philippines	24
Singapore	0
Sri Lanka	40
Thailand	30
Viet Nam	50
INDUSTRIAL COUNTRIES	
No data available	

Source: WHO/CDD/89.31, "Programme for control of diarrhoeal diseases." Interim Programme Report 1988.
* Percentage of all cases of diarrhoea in children under five years of age treated with oral rehydration therapy. Figures for country groupings are median values.

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Acute respiratory infections in children

In brief

The Goal: To reduce by 33 per cent the deaths due to acute respiratory infections in children under five years.

Each year, acute respiratory infections (ARI), one of the three leading causes of death in children under five, claim the lives of over four million young children. Most of these deaths could be prevented simply through earlier diagnosis and low-cost treatment, and through immunization programmes to prevent diseases such as measles and whooping cough.

In the industrialized world, pneumonia is a relatively rare childhood respiratory illness. But in developing countries, where malnutrition and low birth weight are prevalent, large numbers of children under five develop pneumonia and die from it. Children in developing countries are up to 20 times more likely to die from pneumonia than are children in the industrialized world.

Studies have proved that correctly managing the care of ARI can reduce the rate of pneumonia-related child deaths by as much as 70 per cent. A world that spends millions of dollars on largely ineffective cough and cold remedies cannot afford to ignore comparably low-cost programmes that produce such dramatic results.

ARI is one of the three leading killers of infants and children in the world. Every year, two billion young children suffer some kind of acute respiratory infection. While many of these are self-limiting viral illnesses, such as coughs and colds, a substantial proportion are life-threatening, particularly in the developing world. Of the estimated 14.6 million deaths among children under five years of age each year, about 30 per cent are due to ARI.

Pneumonia accounts for most ARI deaths, taking the lives of four million children, mostly in developing countries, annually. In fact, pneumo-

nia develops in many children when they get respiratory infections, largely because of the prevalence of the two major risk factors—low birth weight and malnutrition. And pneumonia can claim the lives of its victims quickly, often within five days of the onset of symptoms. The risk is greatest to infants under two months of age.

Cough and cold remedies are the single largest drug expenditure in most countries around the world. While a few provide symptomatic relief, most are largely ineffective and unnecessary in respiratory infections, and sometimes can even be toxic in children.

The two major strategies of correct case management and immunization, however, can substantially reduce the deaths due to pneumonia.

Managing care correctly

Studies in India, Indonesia, the United Republic of Tanzania, Pakistan, Nepal, and the Philippines demonstrate the success of correct case management in cutting the rate of child deaths from pneumonia by as much as 50 to 70 per cent.

Correct case management, a central strategy in reducing mortality from ARI, involves early recognition of the signs of pneumonia, by families or other caretakers, followed by the seeking of care from a trained health worker, and finally appropriate treatment by that worker.

It is also important for community health workers, who are often the first point of contact with sick children, to recognize cases of pneumonia and refer them for treatment.

Rapid breathing rate is one of the key warning signs of pneumonia. Parents can be helped to recognize changes in respiratory rate and other signs of pneumonia, and learn to take a child who exhibits them to a clinic or a community health worker.

Health workers can look for diagnostic signs such as chest wall indrawing, observe a child's breathing, and count the breathing rate. If a child is under two months of age and is taking more than 60 breaths a minute, the danger is life-threatening. For children between two months and two years old, danger is indicated by a breathing rate of 50 breaths a minute. For children between two years and five years old, 40 inhalations a minute is the crucial sign.

Health workers can then treat the respiratory infection. The specific care given will depend on the serverity of the case and the age of the child, very young infants requiring special treatment.

Immunization

Immunization, the second important strategy to lower the ARI toll, can help prevent the respiratory infections in children that are caused by pertussis, measles, and diphtheria. Over a third of all ARI-related deaths in developing countries are caused by these three diseases. Immunizing children

against these diseases is a key component of the Expanded Programme on Immunization (EPI).

Putting ARI programmes into effect

For the most part, national programmes to control ARI are just getting underway. Emphasis now is on developing sound national policies and plans of action, phasing programmes appropriately, and developing effective training strategies. Attention needs to be given to the following as national programmes are further developed:

- Ensuring that antibiotics are used appropriately. They should not be used to treat simple coughs and colds. At the same time, the inappropriate use of cough and cold remedies needs to be discouraged.
- Improving communication so that parents and health workers understand each other and the illness. Parents (or other caretakers) need to understand the importance of obtaining rapidly from a trained health worker the right therapy (antibiotics) for the right children (with pneumonia), for the right duration (five days).
- Educating parents and other caretakers on home care of simple coughs and colds, how to recognize the signs of pneumonia, and where to go for help.
- Training health workers to recognize the signs and symptoms of pneumonia and how to treat it.
- Examining ways to prevent pneumonia through, for example, the better understanding of how specific risk factors may promote the development of pneumonia in young children. Once risk factors are more clearly understood, interventions can be developed to minimize their impact.

Research priorities for the 1990s

To improve methods of managing the care of pneumonia, a number of subjects need to be studied. For example, the clinical signs and agents of pneumonia among very young infants (less than two to three months old) is a top priority. WHO is organizing a multicentre study in several different countries to answer key questions in this area. The ability of different categories of health workers to diagnose and treat pneumonia is an area that needs to be studied. Clinical trials are also needed to determine whether antibiotic treatment of pneumonia can be simplified. Simple technologies to improve diagnosis and treatment—for example, 30-second and 60-second timers for counting respiratory rates, and oxygen concentrators—need to be tested and applied.

In addition, studies are needed to understand what parents and other caretakers know about the signs of pneumonia and which signs prompt them to seek help outside the home.

Prevention research could yield valuable insights into the impact of such risk factors as nutritional deficiencies, exposure to cold, and indoor air pollution from fuel and tobacco smoke. Field trials of potential vaccines to prevent the most common pneumonias in young children—specifically pneumonias caused by *Streptococcus pneumoniae* and *Haemophilus influenzae*—would be of particular value.

The cost of progress

The cost of providing correct treatment for ARI is not excessive. To deliver a full course of antibiotics for a case of pneumonia costs about $2. And to prevent a death from pneumonia—based on a case fatality rate of 4 per cent estimated by WHO—would cost an estimated $52, without hospitalization. If a child were hospitalized, then the cost to prevent death would be $72 per case.

Correct case management is a central strategy in reducing mortality from acute respiratory infections. It involves early recognition of the signs of pneumonia, by families or other caretakers, followed by the seeking of treatment from a trained health worker, and finally appropriate treatment by that worker.

The costs of not moving aggressively to control ARI are harder to quantify. They are, however, devastating to children, families, and to struggling nations. ARI accounts for 30 per cent to 50 per cent of the visits by children to treatment facilities and between 30 per cent to 40 per cent of hospitalizations. An episode of pneumonia, even if not fatal, can seriously affect a child's health and resistance to other infections. Parents or other caretakers must interrupt other activities to care for the child, and may spend often scarce resources on unnecessary and sometimes toxic drugs. And hospitalizing a child costs between $15 and $25 per day in most countries, a tremendous strain on national resources.

For the first time in history, pneumonia, one of the most serious causes of child deaths, can be treated inexpensively and effectively by health workers in a wide range of settings. Controlling ARI among young children, however, is not easy. Even more than with many other interventions, effective national programmes depend on functioning health systems, regular supplies of drugs, extensive training efforts, effective referral systems, and close monitoring and supervision. The challenge is enormous and high-level political support and commitment will be necessary to meet

it. With four million children succumbing to pneumonia each year, however, action is long overdue.

Further reading

"Case Management of Acute Respiratory Infections in Children: Intervention Studies," Report of a Meeting, 19-21 April 1988, WHO, Geneva.

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