

**TECHNICAL ASSISTANCE
TO THE WORLD HEALTH ORGANIZATION
TO DOCUMENT RECENT ADVANCES IN THE
CONTROL AND ELIMINATION
OF NEONATAL TETANUS**

December 1997

Geneva, Switzerland

Steve Solter

BASICS Directive 000-AF-51-025
USAID Contract Number HRN-C-00-93-00031-00

A

TABLE OF CONTENTS

ACRONYMS

EXECUTIVE SUMMARY 1

PURPOSE OF VISITS 1

BACKGROUND 2

TRIP ACTIVITIES 2

RESULTS AND CONCLUSIONS 2

RECOMMENDATIONS 3

APPENDIXES

APPENDIX A Expanded Program on Immunization—progress Towards the Global Elimination of Neonatal Tetanus Use of the "High-risk" Approach

APPENDIX B Eliminating Neonatal Tetanus by the Year 2000
an Achievable and Sustainable Goal

ACRONYMS

BASICS	Basic Support for Institutionalizing Child Survival
EPI	Expanded Programme on Immunization
GPV	(WHO) Global Program for Vaccines and Immunization
NT	Neonatal Tetanus
TT	Tetanus Toxoid
USAID	United States Agency for International Development
WER	<u>Weekly Epidemiological Record</u>
WHO	World Health Organization

EXECUTIVE SUMMARY

The World Health Organization (WHO) has been in the forefront of the worldwide effort to reduce the number in infants dying from neonatal tetanus (NT). The major strategy over the past 15 years has been to immunize women of childbearing age (especially pregnant women) with tetanus toxoid (TT) vaccine. This strategy has been very effective, but there remain high-risk areas in a number of developing countries where NT mortality is still high. WHO has called for the elimination of NT by 2000, with elimination defined as fewer than 1 NT case annually per 1,000 live births within a country as a whole, as well as within any given district of that country.

WHO/GPV/EPI requested BASICS to provide technical assistance in a) reviewing the current status of NT elimination efforts, b) helping to write an epidemiological summary of NT elimination efforts and c) helping to write a less technical document on NT for EPI's Technical Update series. This consultant visited WHO/Geneva twice (for three days in September 1997 and for two weeks in December 1997) to assist in writing the two documents.

The consultancy involved reviewing documents related to NT that were available to WHO. The WHO Health Officer responsible for NT, Dr. Francois Gasse, worked very closely with this consultant and was generous in sharing his time as well as his extensive knowledge and experience of NT control and elimination efforts gained over the past 12 years.

The product resulting from this consultancy consists of two draft documents (Appendix A and Appendix B). The first is a draft report intended for publication in the Weekly Epidemiological Record (WER), which summarizes current information on the status of NT elimination efforts worldwide. The second document is a draft of a brochure that WHO/EPI periodically publishes on selected topics relevant to EPI. These brochures are technical updates and are written for a wide audience, including nontechnical people.

PURPOSE OF VISITS

The main purpose of these two visits to WHO/EPI was to assist the unit responsible for the control and elimination of neonatal tetanus (and especially Dr. Francois Gasse, the officer responsible for the unit) with writing two documents:

- a paper to be submitted to the Weekly Epidemiological Record on the current status of efforts to eliminate NT
- a brochure consisting of a technical update on NT, but written in nontechnical language, to be part of WHO/EPI's ongoing series of technical updates

BACKGROUND

WHO has been actively involved over the past several decades with reducing mortality due to neonatal tetanus, one of the most easily prevented of all major diseases. The major strategy to prevent neonatal tetanus has been to immunize women of reproductive age (especially pregnant women) with tetanus toxoid vaccine. In order to speed up the rate at which NT is being reduced, WHO has established the goal of eliminating NT by 2000, with elimination defined as fewer than 1 NT case annually per 1,000 live births within a country as a whole and within every district (e.g., demographic units averaging at least 100,000 population) within that country. Significant progress, especially utilizing the "high risk" approach, has been made towards achieving this goal, but the current status of that progress has not been recently documented. WHO/EPI has felt the need to review and document the current status of the elimination effort.

In addition, WHO/EPI also needs to inform a large audience of the elimination effort and the "high-risk" approach being used to achieve elimination by the year 2000. This needs to be done in clear, simple language and included in WHO's Technical Update series.

TRIP ACTIVITIES

Two trips were involved. The first, in the beginning of October 1997, involved becoming familiar with WHO/EPI's NT elimination effort and the available documents and reports that describe the efforts of countries throughout the developing world in combating NT. The second trip, in December 1997, involved writing the two documents described above, in close collaboration with Dr. Francois Gasse of WHO/EPI's NT unit. The two draft documents can be found in Appendix A and Appendix B.

RESULTS AND CONCLUSIONS

1. The main result was that two draft documents were completed. The first was to be submitted to the **WER** as a summary of the current status of the NT elimination effort. The second was to be the basis of a brochure on NT as part of EPI's Technical Update series.
2. The major conclusion of this consultant was that WHO and the world community more generally were making extraordinary progress towards the goal of eliminating NT by 2000, but that a few countries would probably fall short of the goal.
3. A second conclusion was that once NT elimination in a country was achieved, a critical challenge would be in sustaining NT elimination over the long term.

RECOMMENDATIONS

- 1 The main recommendation coming from this consultancy is that WHO/EPI should continue to place a high priority on NT control and elimination, and that polio eradication, though of vital importance for the entire world, should not divert energy and resources with which to pursue the elimination of NT
- 2 A second recommendation is that developing countries, once they have achieved NT elimination, should consider using immunization of female primary school students (in the first three grades) as the major means of ensuring sustainability of NT elimination. Of course, this strategy can only be effective in those countries that have high rates of female primary school enrollment. By immunizing all first, second, and third year female students every year, most girls will have three tetanus toxoid injections plus whatever they received via DPT injections as infants. This should provide lifetime protection for these girls and their future infants.
- 3 WHO/EPI should continue to provide updated information on the worldwide NT elimination effort and disseminate this information as widely as possible.

APPENDIXES

APPENDIX A·

**EXPANDED PROGRAM ON IMMUNIZATION-PROGRESS TOWARDS
THE GLOBAL ELIMINATION OF NEONATAL TETANUS USE OF THE
"HIGH-RISK" APPROACH**

Expanded Program on Immunization (EPI)

Progress Towards the Global Elimination of Neonatal Tetanus Use of the "High-Risk" Approach

Neonatal tetanus (NT) remains a major cause of neonatal mortality in many parts of the developing world. In 1997, an estimated 375,000 neonatal deaths were caused by NT for a global mortality rate of 3.0/1,000 live births (compared with an estimated global mortality rate of 4.1/1,000 live births in 1993). The number of reported cases of NT has continued to decline, from 31,849 cases in 1988 to 4,170 cases in 1996, despite significant improvement in NT surveillance. More than 80% of countries now report cases of NT, including China which reported 3,768 cases of NT in 1996 (reporting NT cases for the first time). However, an estimated 98% of NT cases remain unreported. Effective NT surveillance requires reporting of cases that are not brought to health facilities.

The goal of worldwide elimination of NT by 2000 has been endorsed by WHO and has been claimed so far by 102 countries. "Elimination" of NT refers to fewer than 1 NT case annually per 1,000 live births within a country as a whole as well as within every district (e.g. demographic units averaging at least 100,000 population) within that country. Each country decides for itself what constitutes a "district" for the purpose of elimination of NT, as long as the average population of all the districts is at least 100,000.

There remain 58 nations which have not yet achieved this goal. Of these, 26 countries account for 90% of globally estimated cases, with 15 countries being located in WHO's Africa Region. The countries not yet reaching NT elimination vary greatly in both the number of districts that still have NT at a rate of at least 1/1,000 live births and in the populations that live in areas where NT has not yet been eliminated. A country is not considered to have eliminated NT until every district in the country has reached the goal of less than 1 case of NT per 1,000 live births.

WHO's recommended strategy for NT elimination has focused on four key elements:

- Routine immunization of pregnant women
- Clean deliveries and cord care
- Effective surveillance
- High-risk approach

The remainder of this report will describe use of the high-risk approach by a number of countries in their efforts to achieve NT elimination.

The high-risk approach to the elimination of NT is a means of reducing the risk of NT, rapidly and cost-effectively, by identifying areas and population groups where there is a particular risk of the disease, and focusing immunization and other preventive efforts on these areas. Because the demographic, cultural, and disease patterns affecting NT differ so greatly from country to

country, there is no single recommended way to identify high-risk areas within a particular country. WHO has developed a simple algorithm to help countries determine if any particular district (or province, or other similar administrative unit) is likely to be high-risk regarding the presence of cases of NT.

The algorithm suggests that a reported NT rate of greater than 1/1,000 live births indicates that a particular district is high-risk. However, when districts report fewer cases than 1/1,000 live births or do not submit reports at all, there are no standard, worldwide criteria for determining if the NT surveillance system in that particular area is reliable, if the "clean delivery coverage" in that area is effective, or if the tetanus toxoid (TT) coverage provides effective protection. Since NT is usually a "silent disease," occurring at home and rarely seen at health facilities, it is very important for program managers to identify high-risk areas even when reported cases are extremely rare or even non-existent. Each country needs to make these determinations based upon criteria that are relevant for that country and for its particular geographical areas. An approach that is frequently adopted, however, for the purpose of assessing the reliability of NT surveillance is that at least 80% of reporting units are regularly reporting cases or lack of cases of NT. Similarly, if 80% of deliveries are assessed as "clean," and there is 80% coverage of pregnant women with TT, then it is likely that low reported rates of NT are valid. Urban areas, where access to hospitals is generally much better than in rural areas, may need to be assessed separately, since a high percentage of NT cases may be brought to hospital.

Once a particular district or districts is determined to be at high-risk, there are several approaches that might be taken to reduce the number of NT cases:

- All women of childbearing age (CBA) can be targeted for immunization with TT. Three rounds of TT immunization will provide protection for any future children these women might bear for most if not all of the remainder of their childbearing years.
- Maintain high TT coverage among CBAs through strengthening the routine TT immunization program and through immunizing CBAs whenever the opportunity arises.
- Provide outreach services (via mobile teams) to expand TT coverage as well as periodic mass campaigns to reach women who otherwise have no contact with the primary health care system. In all TT immunization activities, auto-destruct syringes should be used as much as possible.

Prior to 1996, more than 40,000,000 women worldwide who lived in high-risk areas for NT had been immunized by TT. During 1996, more than 15,000,000 additional women living in new high-risk areas were immunized, including 10,000,000 women living in high-risk counties in China, 4,000,000 women living in 10,000 high-risk villages in Indonesia, and 1,000,000 women living in high-risk districts in Vietnam.

What are some innovative approaches that individual countries have used to control neonatal tetanus and what cost-effective innovations can sustain NT elimination in those 102 developing countries that have claimed NT elimination in every district? Within WHO's Southeast Asia

Region, Indonesia has achieved high coverage with TT in large areas of the country and has identified high-risk villages for more intensive TT immunization. But in order to establish a sustainable, cost-effective neonatal tetanus control program which will keep NT cases at extremely low levels over the long term, Indonesia has adopted a new strategy.

The Indonesian approach consists of immunizing children entering school (at age seven) with DT and then repeating the immunization when the child enters Grade 2 and again upon entering Grade 3. This strategy can work only where primary school attendance rates are very high, and where DPT3 coverage in infancy is also high. It requires only a single visit each year to every primary school where all 1st, 2nd, and 3rd grade students are immunized. The result is lifetime immunity for the great majority of children who receive at least 5 tetanus toxoid injections. This approach is likely to be sustainable over the long term, predictable regarding annual recurrent costs, and highly effective when resulting in high coverage of 9 year-old children with at least 5 TT injections.

The strategy of providing tetanus immunization to school children in order to sustain NT elimination is becoming feasible in a number of countries. Some countries have already achieved NT elimination regarding the percentage of infants receiving DPT3 and the percentage of 7 year-olds attending school. When both these percentages are high (such as over 70%), immunizing children at school entry becomes a useful strategy for sustaining NT elimination.

Other countries have also been using the high-risk approach to achieve NT elimination in every district. For example, in WHO's Eastern Mediterranean Region, Pakistan has found that supplementary immunization rounds have been necessary in certain high-risk areas. Since, for cultural and religious reasons, women living in these particular areas could not easily leave their homes and go to an immunization site, door-to-door campaigns were conducted in 1995 which immunized over 390,000 women. Such campaigns are only necessary when the routine EPI program is not reaching certain areas of a country with TT.

In WHO's Americas Region, 43 out of 45 countries have claimed NT elimination. In 1990 there were 1,208 cases reported in the region but by 1996 there were only 292. Intensive immunization efforts targeting reproductive age women living in high-risk districts has been the basic strategy. In addition, there has been a major effort to minimize missed opportunities, and there has been active involvement of traditional birth attendants in both TT immunization and NT surveillance.

In a massive effort, China (of WHO's Western Pacific Region) has identified 560 high-risk counties (out of XXXX counties altogether) where more than 40,000,000 women were immunized in supplementary immunization rounds during 1996.

In order for countries that have not yet achieved NT elimination levels in every district (below 1 NT case per 1,000 live births) to track their progress, WHO recommends dividing districts into 3 categories:

- ▶ Those districts where NT has been eliminated

- ▶ Those districts which have not yet been assessed regarding elimination
- ▶ Those districts which have more than one NT case per 1,000 live births and have been declared high-risk

It is feasible for the 58 countries which have not yet eliminated NT in every district to use the high-risk approach and eliminate NT by 2000. When appropriate, these countries can use National Immunization Days as an opportunity to reach large numbers of women in selected high-risk districts for supplemental TT immunization. This should only be done under conditions that do not disrupt polio immunization in any way, and when auto-destruct syringes are used to ensure injection safety.

APPENDIX B

**ELIMINATING NEONATAL TETANUS BY THE YEAR 2000:
AN ACHIEVABLE AND SUSTAINABLE GOAL**

ELIMINATING NEONATAL TETANUS BY THE YEAR 2000 AN ACHIEVABLE AND SUSTAINABLE GOAL

HIGHLIGHTS

Eliminating Neonatal Tetanus by the Year 2000 An Achievable and Sustainable Goal

- Neonatal tetanus (NT) still kills 375,000 infants every year, more than 1,000 every day, yet because of remarkable progress, 850,000 NT deaths are prevented annually
Preventing NT is one of the most cost-effective ways to reduce the infant mortality rate
- 102 out of 160 developing countries have eliminated NT--that is, they have reduced NT to fewer than one case per 1,000 live births in every district of their country. Currently, out of a total of XXX districts in those countries which have not yet eliminated NT in every district, YYY districts have eliminated NT, with only ZZZ districts remaining
- Targeting "high-risk districts" with three doses of tetanus toxoid (TT) vaccine given to all childbearing age women will eliminate NT. The high-risk approach is the most cost-effective way to achieve this goal
- 26 countries account for 90 % of all NT cases (15 of the countries are in WHO's Africa Region). If these countries make NT elimination a priority through the high-risk approach, worldwide elimination of NT by 2000 becomes a real possibility
- Only \$50 million in additional funds for the poorest countries is needed to complete worldwide NT elimination by the year 2000. The goal is in reach--IT CAN AND MUST BE DONE
- NT elimination can be sustained at very low cost over the long term. Building on the routine EPI through immunizing schoolchildren with 3 doses of TT during their early school years can provide full protection against TT before childbearing begins. Periodic supplementary immunization rounds in high-risk areas can also sustain elimination

THE PROBLEM

In 1997, an estimated 30,000 women died from maternal tetanus and an additional 375,000 infants died from neonatal tetanus (NT), or more than 1,000 per day. NT is easily preventable through immunization of women of childbearing age or through clean and safe deliveries, yet NT still causes up to 25% of all infant deaths and up to 50% of neonatal deaths in many developing countries. Simply providing three tetanus toxoid (TT) injections to women provides 15-year protection against maternal as well as neonatal tetanus. Every case of NT indicates multiple failures in the health delivery system--the mother had not been adequately immunized, the newborn had not been delivered or provided cord care in a clean and safe manner--and should serve as a warning bell that there are serious problems that must be addressed.

PROGRESS BEING ACHIEVED

● **Worldwide Progress**

About 850,000 NT deaths were prevented in 1997-- the number of newborns who would have died without NT prevention efforts Neonatal tetanus cannot be eradicated, like smallpox or polio, because tetanus spores are everywhere in the environment, but the number of cases can be reduced to a very small number and kept at that level Cases and deaths from NT are declining, but not as rapidly as could be achieved if NT were accorded a higher priority The goal of worldwide elimination of NT by 2000 has been endorsed by WHO and has been claimed by 102 developing countries, with 58 countries remaining Elimination means that a country has been able to reduce the level of NT to fewer than 1 case per 1,000 live births in every district of the country as well as in the country as a whole Of the 58 nations which have not yet claimed elimination, 26 account for 90% of estimated cases, with 15 of the 26 located in WHO's Africa Region Rates of immunization of pregnant women continue to lag behind rates of childhood immunization for the other EPI diseases Rapid progress towards NT elimination has been made possible through building on the success of the routine EPI program and through implementation of the "high-risk approach" in districts where TT coverage is low and where there are many unsafe deliveries

● **The High-risk Approach**

NT is a disease that clusters in areas where health services are inaccessible or not utilized, and where delivery and cord care practices cause contamination with tetanus spores Because of this clustering tendency, targeted strategies in high-risk areas have the most impact Since elimination of NT requires that every district within a country has fewer than one case of NT per 1,000 live births, the high-risk approach can be a practical and cost-effective method to eliminate NT from priority districts The main features of the high-risk approach include

- ▶ Identifying districts which have reported or estimated rates of NT greater than 1 case per 1,000 live births
- ▶ In targeted districts, immunizing all childbearing age women (CBAs) with 3 doses of TT to provide protection for the remainder of their reproductive lives
- ▶ Maintaining high TT coverage among CBAs through strengthening the routine TT immunization program and through immunizing CBAs whenever the opportunity arises
- ▶ Providing outreach services to expand TT coverage as well as periodic mass campaigns to reach women who otherwise have no contact with the primary health care system

Since tetanus is not a contagious disease, the NT situation in one district can be very different from neighboring districts In some cases, selected areas within high-risk districts can be chosen for intensive immunization efforts rather than the entire district Countries need to use criteria

relevant to their own epidemiologic situation when determining which districts or sub-districts need mass TT campaigns

- **Progress Towards Implementing the High Risk Approach in Different WHO Regions**

More than 40 million women have been immunized with TT in high-risk districts over the past 4 years, with 15 million immunizations occurring in 1996 alone. As a result of the high-risk approach, countries in every region have been able to achieve substantial progress in reducing the number of districts where NT still represents a public health problem. NT has been virtually eliminated throughout WHO's American Region, with 43 out of 45 countries claiming elimination. In the Western Pacific Region, 26 out of 33 have done so whereas in the Eastern Mediterranean Region it is 14 countries out of 23. In the Southeast Asian Region, 5 countries out of 10 have claimed elimination, but in the Africa Region only 9 of 48 countries have done so. Egypt has successfully implemented the high-risk approach during 1992-94 when 36 out of 231 districts were identified as high-risk (based on reported NT cases and/or low TT coverage) and a campaign was launched to immunize women in the targeted districts. The high-risk approach helped to reduce the number of reported NT cases from 7,256 (1986) to XXX (1996). China has targeted 560 high-risk counties with a combined population of over 200 million and immunized over 20 million reproductive age women in those counties, increasing TT coverage from YYY to ZZZ.

ACHIEVING WORLDWIDE NT ELIMINATION BY 2000 IMPLEMENTATION OF THE HIGH-RISK APPROACH

- **How can Countries Achieve NT Elimination by 2000 and How can They Pay for It?**

What needs to be done to achieve worldwide elimination of NT by 2000? Of the 58 countries that have not yet claimed elimination, many have only a few high-risk districts where NT cases are clustered. In the rest of their districts NT has already been eliminated. For these countries, implementing the high-risk approach in the few remaining districts will easily allow them to claim nationwide elimination of NT by 2000. The main difficulty lies with the 26 countries which together account for more than 90% of all cases of NT in the world. Many are among the very poorest countries with per capita incomes less than \$1.00 per day and have large populations and large numbers of districts where NT is still a public health problem. As compared with countries that have already eliminated NT, these 26 countries tend to have lower routine EPI coverage levels, and less money to pay for vaccine, auto-destruct syringes, and the operational costs of conducting supplementary immunization rounds.

The additional costs (over and above those required for the standard EPI program) involved in eliminating NT from a country are very modest--approximately \$1.00 per woman of reproductive age living in high-risk districts. Since about 100 million women live in high-risk districts, and since the 26 countries themselves have agreed to provide \$50 million towards NT elimination, only another \$50 million is required over the next three years from outside sources to eliminate

NT from the world. This can be done by phasing supplementary immunization rounds over a 3-year period. By investing in TT vaccine, auto-destruct syringes, and in limited operational costs, a donor could have a major, sustainable, and cost-effective impact on infant mortality in the world's poorest countries.

- **Selecting High-risk Districts**

What is actually involved in carrying out the high-risk approach? The first step is to identify which districts in a country have reported or estimated NT rates greater than 1 per 1,000 live births. If the NT reporting system is not functioning adequately, how does one determine whether it is likely that the actual rate of NT is greater than 1 per 1,000? Figure 5 is an algorithm (decision tree) that can help make this determination where information is incomplete and/or inaccurate. In using the algorithm, it is important to use criteria that are specific to a particular country. Regarding NT case reporting, for example, urban areas may have to be treated differently than rural areas, since infants with NT are more likely to be brought to urban hospitals than to rural health centers.

- **Supplementary TT Immunization Rounds in High-risk Districts**

Once high-risk districts have been identified, the most effective strategy to achieve NT elimination in each district is to carry out 3 rounds of supplementary TT immunization covering all women of childbearing age in the district or those living in a particular high-risk area within the district. "Childbearing age" can vary from place, depending upon the age when women normally stop having children. In some districts the age range is 15-44 and in others it is 15-39. Decisions can be made on a case-by-case basis. The first two rounds should be at least one month apart while the third round should be at least six months after the second round.

Supplementary TT immunization rounds are sometimes necessary for eliminating NT in those remote areas where the routine EPI program does not normally reach. In such cases, outreach posts can make TT accessible to women. In other cases, women for cultural or religious reasons cannot easily leave their homes or villages and TT immunization must be brought to them. In Pakistan, for example, 390,000 women were immunized in 1995 by teams actually going door-to-door.

- **Tracking Progress in Eliminating NT**

How does a country know whether it is making adequate progress in eliminating NT? One way to keep track is to separate those districts where NT has not yet been eliminated into two categories: the first category includes those districts where the elimination status is unknown or which haven't been assessed regarding NT status, the second category includes those districts which have been determined to be at high risk of NT (with reported or estimated NT cases greater than 1 per 1,000 live births). The goal of NT elimination is to reduce the number of districts where NT has not been eliminated to zero. By keeping track of this number and acting to bring it to zero, program managers can have a clear picture at any given time of how they are

doing regarding NT elimination On the back of this brochure is a table that lists districts according to NT elimination status for every country where such information is known

AFTER NT ELIMINATION--ACHIEVING SUSTAINABILITY OVER THE LONG TERM

● How can NT Elimination be Sustained?

Now that 102 developing countries have successfully eliminated NT in every district (and other countries will soon be added to the list), what happens next? Since eradication of all tetanus spores is not possible, the next logical step after elimination has been achieved is to sustain, in a cost-effective way, low levels (below 1 case of NT per 1,000 live births) in every district Fortunately, sustaining NT elimination is neither terribly difficult nor terribly expensive, for the following reasons

- ▶ Over the past 15 years, the percentage of children receiving at least 3 DPT injections has reached very high levels in many developing countries (of 167 countries reporting to WHO as of July 1997, 107 had achieved at least 80% DPT3 and 129 had at least 70% DPT3 coverage) When this fact is added to the fact that many of these same countries have also been able to increase the rate of school attendance to very high levels, a cost-effective strategy becomes possible
- ▶ All that is required is for children upon school entry to receive a tetanus injection (Td or DT vaccine) which is repeated for the next two years This is relatively easy to do, since one visit per year per primary school is sufficient (at each visit, all 1st year, 2nd year, and 3rd year students are immunized)
- ▶ If all schoolchildren who have received DPT3 then receive 3 injections one year apart in school, they will have at least 5 valid tetanus injections before beginning their reproductive years, these 5 injections will protect themselves and their infants for their entire reproductive lives They will therefore be fully protected before they enter their childbearing years

● Protecting Those who are Missed by the School-Based Immunization Program

The major problem concerns those children not receiving DPT3 and/or those children not attending three years of primary school They will be missed by any system that focuses on those attending the first 3 years of primary school and assumes that children in school already have DPT3 The main categories at risk of being missed by this strategy include

- ▶ Children not receiving DPT3
- ▶ Children not attending primary school (or drop out before completing grade 3)
- ▶ Children who are in school above grade 3 when the school-based immunization program begins

- ▶ Children who enter their childbearing years not fully protected

There are several different strategies which can effectively reach each of these at-risk groups, but each country needs to identify which strategies are most cost-effective given the particular circumstances of that country. For example, school-based immunization (in addition to reaching children in the first 3 grades), can be done to protect children in higher grades who have not yet reached childbearing age. In appropriate circumstances, periodic supplementary immunization rounds in high-risk areas can help maintain NT elimination.

- **Sustainable NT Elimination Can be Done and Must be Done by 2000**

Just as the world aims to give the gift of a polio-free world to the 21st century, a world where NT is eliminated is a wonderful gift to make to people living in the next century. Of all major human diseases, neonatal tetanus is the most unnecessary and the easiest to prevent. Unlike other common diseases, there are two basic approaches--immunization and clean/safe deliveries as well as clean/safe cord care. Only the poorest, least educated, most isolated women and infants suffer from neonatal tetanus. If we truly want to help the poorest of the poor, eliminating NT is one of the most effective ways to do it. Since NT is not contagious and doesn't spread to rich areas or rich nations, many people and many countries may not be very interested in its elimination. It may not matter very much to them because they aren't threatened by it. For this reason it is all that much more important for health workers, health leaders, and interested governments, NGOs, and donors to commit themselves and their resources to rid the world of the scourge of neonatal tetanus.