

# Neonatal tetanus: countdown to 1995

Progress in the campaign against neonatal tetanus in South and Central America and the Caribbean is reviewed. The main emphasis is on immunizing women of childbearing age who live in high-risk areas, although importance also attaches to routine tetanus toxoid treatment, adequate care during the prenatal period and delivery, and epidemiological surveillance.

WHO has estimated that 700 000 children die from neonatal tetanus annually (1). In 1989 the World Health Assembly approved a resolution for its worldwide elimination by 1995, and soon afterwards the Pan American Health Organization decided on a strategy of immunizing women of childbearing age (12–44 years) who live in high-risk areas. In the high-risk areas the basic instruments that have a direct impact on the disease's incidence and help in the assessment of results are the immunization of women of childbearing age with tetanus toxoid, prenatal and delivery care, and epidemiological surveillance.

## High-risk areas

A high-risk area is a geographical unit that has had a neonatal tetanus morbidity or mortality rate above the national average in

any of the 3–5 previous years. It can be measured in total figures, as a proportion of every 1000 live births in a year, and/or in connection with the constant presence of cases during the period in question (whatever the number of cases) (2).

The identification of high-risk areas was based upon national, regional and local data on morbidity, mortality and other indicators. Among additional sources of information were medical periodicals and reports on special studies in countries where neonatal tetanus is endemic.

The initial case data related to the last 3–5 years, although the publications examined also covered earlier periods.

Data concerning the following were analysed:

- case identification, place of origin, age, and sex;
- dates of birth, start of trismus, and hospital admission and discharge (depending on clinical evolution);

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- mother's age, immunization history, prenatal care, and number of deliveries;
- place of birth;
- training level of people assisting at birth.

The national epidemiological services identified high-risk areas in regions, states, provinces, *municipios*, districts or other geographical units. In some areas, clinical and epidemiological data were obtained from hospital admission records. The use of information available in clinical files speeded up the data-gathering effort. Although not standardized, they offered the best way of conducting epidemiological research.

### Strategies

The selection of immunization activities is based on schemes that offer a potential for immediate results: during the first three years at least two doses of tetanus toxoid for 100% of the women of childbearing age living in high-risk areas; during the next few years, the level is to be raised to five doses for 100% of this target population.

In respect of prenatal and delivery care in the high-risk areas, the Pan American

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Health Organization has proposed the training of traditional midwives in the immunization of women with tetanus toxoid and, if feasible, of children with other

vaccines. Traditional midwives are also trained to report cases of vaccine-preventable diseases, mainly neonatal tetanus. When training in tetanus toxoid administration is not feasible, these midwives refer women of childbearing age, particularly those who are pregnant, to health facilities for immunization.

The delivery of tetanus toxoid to the midwives is possible because of its thermostability (3).

Systematic reporting of neonatal tetanus takes place in Bolivia, Colombia, the Dominican Republic, Ecuador, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Panama, Peru, and Venezuela. Of these countries, only Guatemala has not yet started case investigations. Argentina, Brazil, Haiti, and Paraguay do not report the disease systematically. In Haiti, which does not have a tetanus surveillance system, all data were gathered through active hospital searches.

In the countries where neonatal tetanus is endemic, 277 million persons (71% of the population) live in urban areas. It is estimated that 11.5 million children are born every year (4). National birth rates range from 21 to 42/1000 inhabitants and the average number of children per mother ranges from three to six. The proportions of women of childbearing age and pregnant women are estimated to be 22% and 5% of the overall population respectively.

### Incidence

Of the 1276 cases reported in 1990, 446 were investigated. Between 1985 and 1990 the annual number of cases fluctuated between 1500 and 1300. Underreporting was taken into account on analysing the data, as was the bias associated with patients who

appeared at health facilities for treatment. Efforts have been made to mitigate these problems by using other information, including that on different neonatal pathologies. This additional information has helped to identify areas where no neonates were brought to hospitals used as sources of data on neonatal tetanus.

In the State of Jalisco, Mexico, the results of a community survey on deaths caused by neonatal tetanus were compared with the findings of retrospective search in hospitals during 1990. The survey conducted between June 1987 and May 1988, included interviews with 14 508 families. The rates of incidence for 1987–88, as ascertained by the survey and the hospital search, were 3.7 and 1.7 respectively. Other information, for instance on the percentages of hygienic deliveries in a country, has been used to estimate the incidence level to give the best picture of the reality of a given country. In El Salvador, interviews were conducted with people living in remote areas who came to hospitals for external consultations. These people were asked whether they knew of the “seven-day disease”, this being the popular name for neonatal tetanus. If the answer was in the affirmative, a nurse made an initial contact. If all the information seemed consistent a regional nurse or a physician, trained in this type of investigation, conducted a further interview aimed at confirming or discarding the case. In 1990, four of 25 cases reported by El Salvador were identified through this procedure.

## Distribution

The criteria for high-risk areas led to the identification of 606 of the 11 282 *municipios* in the 16 endemic countries where 637 of the 1276 cases known in 1990 occurred. Half the cases were in 5% of the *municipios*.

In addition to identifying *municipios* at risk as priority geographical units for control actions, an effort is made to define populations that run the greatest risk in such areas. Thus Colombia's Health Ministry, besides using its epidemiological investigation data, has used the findings of a Ministry of Agriculture survey on the condition of the poor.

Seventy-three urban cases were identified in Colombia and Honduras in 1990, representing some 37% of the cases investigated in these countries. During the previous few years, 42% of the 678 cases investigated were in urban areas. Tetanus is known as a mainly rural disease; the lower numbers of cases in urban areas are attributable to the comparatively good access to hospitals enjoyed by urban populations. This bias notwithstanding, the data suggest that no progress has yet been achieved towards eliminating neonatal tetanus in urban areas.

Of the 88 million women of childbearing age in countries where the disease is endemic, some 10 million live in high-risk areas. By immunizing these women the number of cases could be halved. Disease distribution data do not help to determine the high-risk areas in all countries. In El Salvador, for instance, case occurrence does not vary from one region to another, and so the goal is to immunize all women of childbearing age throughout the country.

## Missed opportunities

In the Americas, the number of children a woman has had prior to the birth of one with neonatal tetanus is used as an indicator of missed opportunities for immunization. This is based on the assumption that pregnancy and birth offer opportunities for mothers to visit health facilities. If at least

one visit is made to a health facility with each child, a mother with two children should receive at least two doses of tetanus toxoid, provided the opportunity is taken to immunize women who establish contact.

**Data on neonatal tetanus from national morbidity and mortality information systems allowed the identification of high-risk areas.**

For several years prior to 1990 the available evidence indicates that 78% of recorded cases involved women who had at least two other children, suggesting two or more missed opportunities for vaccination (2).

Information on prenatal care was obtained in connection with 199 of 446 cases investigated in Colombia and Honduras; 18% had received such care. There are large differences between the percentages of pregnant women who seek prenatal care and those given the toxoid in all the countries where the disease is endemic and for which data are available. The only exception is

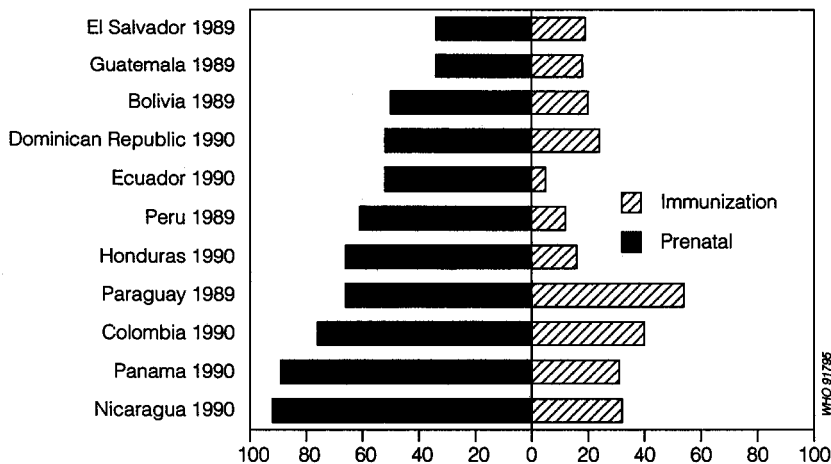
Paraguay (Fig. 1). It seems clear, notwithstanding some bias in the data, that not all pregnant women who seek prenatal services are being immunized.

**Delivery care**

In the endemic countries of the American Region during 1990, of 212 cases of neonatal tetanus for which information on the place of delivery was available, 17 were born in hospitals. All other cases involved home deliveries. In previous studies (1985-88), 7% of 256 cases were associated with institutional deliveries.

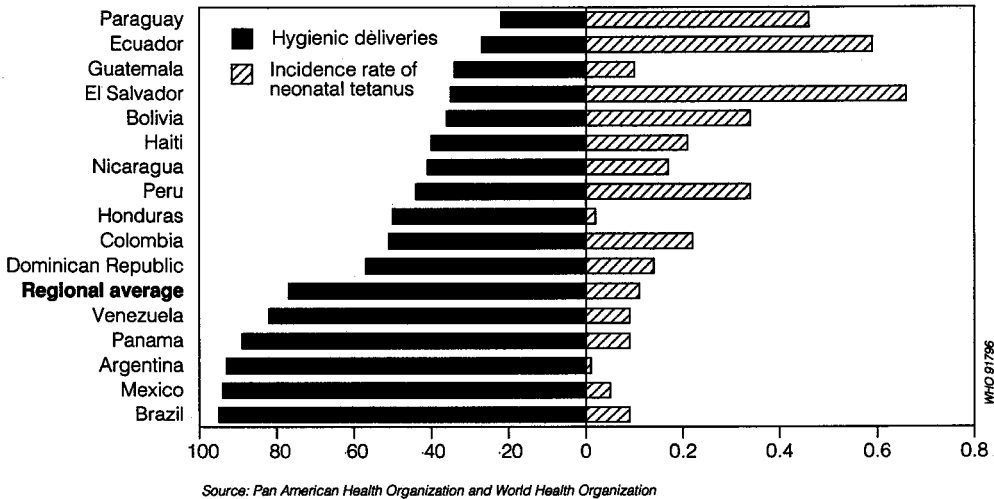
Delivery care itself is not enough to achieve the 1995 goal of elimination. During 1988 in the countries where the disease is endemic, an average of 77% of deliveries took place in hygienic conditions (4) and the mean incidence rate was 0.11 cases per 1000 live births (Fig. 2). It is important to highlight the bias involved in national assessments of the incidence of the disease. The low frequencies of neonatal tetanus shown in Fig. 2 result from case dilution in

**Fig. 1. Prenatal coverage and immunization of pregnant women, 1989 and 1990**



Sources: Pan American Health Organization (prenatal coverage); UNICEF (immunization)

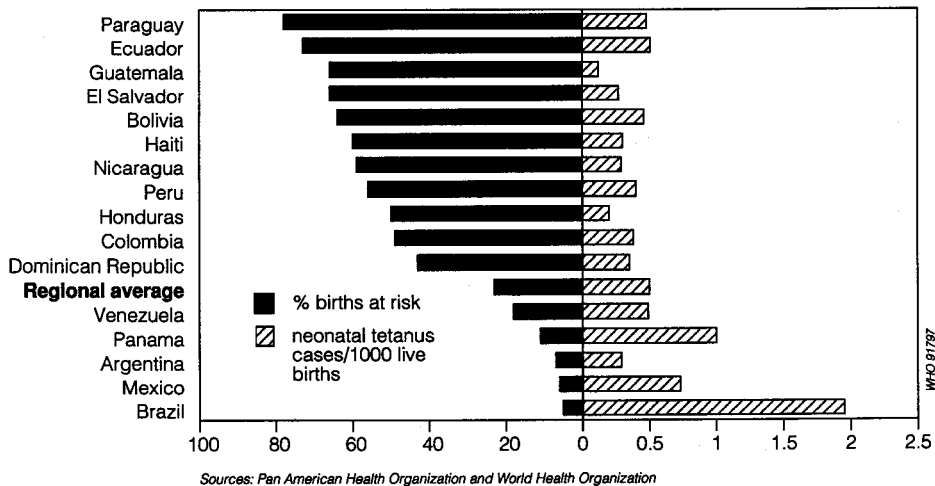
Fig. 2. Proportions of hygienic deliveries and annual incidence rates of neonatal tetanus, 1988



a denominator that includes population segments not exposed to the risk of contracting the disease. If the data are analysed differently, with the denominator including only the populations at risk (deliveries without care by trained personnel), countries can be identified in which a higher level of control of the disease has been achieved despite the fact that resources for delivery care are scarce.

Fig. 3 shows the proportions of domiciliary deliveries having taken place in unhygienic conditions during 1988. These births constitute the best denominator to use in assessing the regional rate of incidence of neonatal tetanus. Thus computed, the regional average, which was 0.11 cases per 1000 live births (Fig. 1), becomes 0.5 per 1000 live births among the populations exposed to risk of neonatal tetanus (Fig. 3).

Fig. 3. Proportions of births and annual neonatal tetanus incidence rates in populations at risk, 1988



The extrapolation of incidence data from areas where special studies have been made can lead to overestimates of the frequency of the disease. Thus if one were to extrapolate to the whole of Mexico the rates of 1.7 per 1000 live births in the hospital search or 3.7 per 1000 live births in the community survey found in Jalisco in 1988, one would arrive at 4000–9000 cases for 2 446 000 births in 1988. Large population groups have to be considered for these assessments and one has to bear in mind that 71% of the population of the countries where the disease is endemic live in urban areas.

If we suppose that the incidence rate for the population at risk is five cases per 1000 live births in the Americas, the annual number of cases would reach about 13 000, and the surveillance system would be covering 10% of the actual incidence.

### Immunization coverage

Of 239 cases for which information was available in 1990 on the mothers' immunization history, 215 (90%) were the

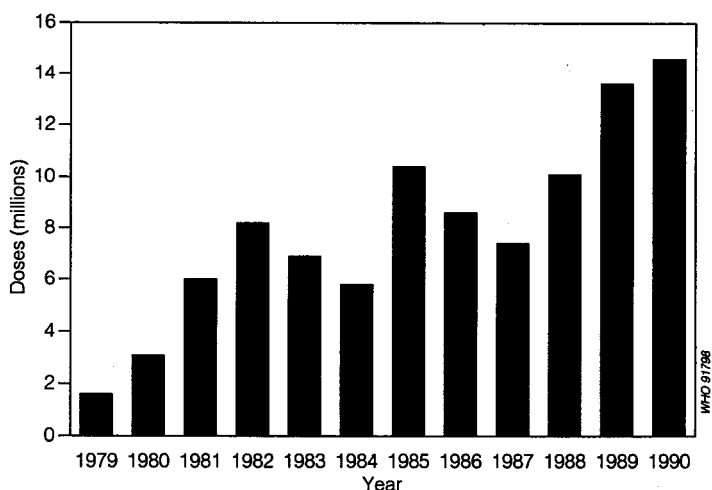
children of women who had not received any vaccine; one dose had been received in 16 cases (6.7%), and two doses had been given in eight cases (3.3%). In the latter instances the date of the second dose was unavailable.

Not all countries have provided information on immunization coverage, because of limited recording systems. Of the 16 countries where the disease is endemic, seven have reported their coverages with two doses of tetanus toxoid for 1987–89 and 1990.

Until 1989 the average immunization coverage of women of childbearing age with a second dose of tetanus toxoid in those seven countries was 14%; in 1990 it rose to 22%.

In nine countries where comparisons could be made in 1990 between the proportions of women of childbearing age living in and outside of high-risk areas who received a second dose of tetanus toxoid, coverage averaged 22% and 8% respectively.

Fig. 4. Purchases of tetanus toxoid through the revolving fund of the Expanded Programme on Immunization, 1979–90



\* except Brazil, Mexico, and Venezuela

In Bolivia's Department of Santa Cruz, 40 midwives were trained in 1990 to perform immunization. During their first four months of work they administered 4243 doses of tetanus toxoid without producing adverse effects. Some of them also administered measles and oral trivalent polio vaccines. They have also cooperated in the surveillance of the diseases covered by the Expanded Programme on Immunization by reporting cases of neonatal tetanus and measles. In this way an important community resource — the midwives — was used to greater advantage than it had been previously.

The efforts to expand immunization in the countries where neonatal tetanus is endemic are also apparent in the purchases of tetanus toxoid through the revolving fund of the Expanded Programme on Immunization (Fig. 4).

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It should be possible to hasten the control of neonatal tetanus by concentrating effort and resources in high-risk areas. The identification of these areas has allowed policies and control measures to be adopted on the basis of WHO recommendations. The countries gather, analyse, revise and publish their own information. As a result, information systems can be expected to improve, particularly regarding epidemiological surveillance. In addition, short-term information is needed to help both decision-making on the development of control measures and systematic assessment.

While health service data have the disadvantage that they may lead to underreporting, they have the advantage of offering an overview of the area to which they relate. The special studies performed in communities allow a better understanding of

actual incidence but they fail to provide a basis for extrapolation to other areas. Health service data make it possible to select areas where control actions should be launched.

**Advantage should be taken of all opportunities to immunize women of childbearing age, for example during prenatal and other visits to health facilities.**

They are also instrumental in enhancing health sector information flows.

The identification of high-risk areas facilitates the task of short-term determination of the impacts of control efforts on the disease. It has been recommended because the geographical distribution of the disease is often uneven and because it is impossible to immunize all of a country's population in a single effort. Epidemiological research is needed, and the investigation of all cases is recommended. Case investigation has provided information on missed opportunities and procedural mistakes in hospital deliveries. It may also provide the means of assessing the effectiveness of the vaccine.

In some countries, measures to enhance the immunization of women of childbearing age in high-risk areas have been impaired by a lack of inputs.

Neonatal tetanus data from national morbidity and mortality information systems of the 16 Latin American countries allowed the identification of high-risk areas. This could be a valuable first step in other countries wishing to define priority areas for control measures. The target for

immunization should be all women of childbearing age who live in high-risk areas. Advantage should be taken of all opportunities to immunize these women, for example during prenatal and other visits to health facilities or to markets; house-to-house immunization drives should be launched; and the women could be immunized at the same time as their children.

In addition to control measures it is essential to establish or improve epidemiological surveillance systems. In respect of areas initially classified as being of low risk for neonatal tetanus, such systems can confirm this status or provide further information on

the disease. For areas already classified as being of high risk, surveillance systems can measure the impact of control measures. □

## References

1. *A vision for the world: global elimination of neonatal tetanus by the year 1995. Plan of action.* Geneva, World Health Organization, 1990.
2. **de Quadros, C. A. & Silveira, C.** Neonatal tetanus control. Defining high-risk areas: the experience in the Americas. *EPI Newsletter, EPI in the Americas.* XII: 3-5 (1991).
3. **Galazka, A.** *Stability of vaccines.* Geneva, World Health Organization, 1989 (unpublished document WHO/EPI/GEN/89.8).
4. **UNICEF.** *The state of the world's children.* Oxford, Oxford University Press, 1991.

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## Preventing foodborne diseases

*Nearly all outbreaks of foodborne disease throughout the world are caused by failure to observe satisfactory standards in the preparation, processing, cooking, storing or retailing of food.*

*Many raw foods, particularly of animal origin, are heavily contaminated with organisms of various kinds and attempts to reduce microbial loads at various stages of production have generally been unsuccessful. The elimination of pathogenic organisms therefore depends largely on the correct application of processing technologies, such as pasteurization, irradiation, cooking, freezing and pickling at the industrial, retail and domestic levels.*

*The prevention of outbreaks of foodborne disease depends on the correct application of these technologies, especially in terms of time and temperature control, and on proper storage and the prevention of cross-contamination.*

— Adapted from *Health surveillance and management procedures for food-handling personnel.* Report of a WHO Consultation. Geneva, World Health Organization, 1989 (Technical Report Series, No. 785), p. 9.