Mortality from neonatal tetanus in Indonesia: results of two surveys*

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Two, 30-cluster, retrospective surveys of deaths from neonatal tetanus in Indonesia were conducted during 1982. The first survey, in the city of Jakarta, identified 16 deaths from neonatal tetanus among 2310 live births, giving a mortality rate of 6.9 per 1000 live births. The second survey covered 19 of Indonesia's 27 provinces. Fifty-three neonatal tetanus deaths occurred among 4971 live births, giving a mortality rate of 10.7 per 1000 live births. Overall, 68.8% of mothers interviewed in the second survey received antenatal care on at least two occasions when tetanus toxoid was, in principle, available.

Cases of neonatal tetanus are frequently observed in hospitals in Indonesia. However, since most deaths from neonatal tetanus occur at home, hospital data provide little information about overall mortality from the disease. Two retrospective surveys were therefore carried out to gain more information about the extent of the problem (1, 2). The surveys had two objectives:

— to estimate the incidence of neonatal tetanus in Indonesia;
— to establish a baseline against which the impact of immunization efforts could be measured in the future.

For this purpose, neonatal tetanus was defined using the following criteria recommended by WHO:4

— history in the neonate of normal suck and cry for the first 2 days of life;
— history of onset of illness between 3 and 28 days of life;
— history of inability to suck followed by stiffness and/or "convulsions";
— death within the first month of life.

The first survey, conducted in urban Jakarta, was implemented on 1–13 March 1982. The second survey was carried out on 14–30 June 1982 in 19 provinces on various islands of Indonesia. Eight of the 27 Indonesian provinces were excluded from the survey: five on Java that had previously been surveyed, and three where transportation would have been very difficult.

MATERIALS AND METHODS

A modified version of the 30-cluster sample method was used in both surveys (3). By this means, 77 live births were identified in each cluster in Jakarta, giving a total of 2310 live births. In the provincial survey, 4971 live births were identified, i.e., approximately 165 live births per cluster. Both surveys were retrospective, the mothers recalling all births and deaths during the preceding 13 months, and both were conducted by 30 interview teams, each consisting of a local midwife or nurse and a local government guide. In the Jakarta survey, groups of three teams were supervised by a senior nurse, and in the provincial survey each team was supervised by a graduate student from the University of Indonesia School of Public Health. Interviews were conducted strictly on a house-to-house basis from a random starting-point. Data were recorded on two forms. One was used to register household visits, list all births and deaths of infants over the preceding 13 months, and record the type of antenatal and delivery

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* Provisional guidelines for the diagnosis and classification of the EPI target diseases for primary health care surveillance and special studies. Unpublished WHO document EPI/GEN/83.4.
care received by the mothers. The second form was used to record clinical data on neonatal deaths.

RESULTS

In the Jakarta survey, 2310 live births were identified in 8611 households. Of the 40 neonatal deaths recorded, 16 resulted from tetanus. The overall neonatal mortality rate was 17.3 per 1000 live births, while the mortality rate for neonatal tetanus was 6.9 per 1000 live births. Table 1 summarizes the antenatal history of the 16 mothers whose infants died from neonatal tetanus and their contact with health services where tetanus toxoid was potentially available; 13 (81%) of them received antenatal care in a hospital or community health centre or from a trained midwife. Also shown is the delivery care history by source and type of attendant. Eight of the 11 mothers whose babies were born at home and were delivered by a traditional birth attendant (dukun) received antenatal care at a hospital or community health centre or from a trained midwife.

The provincial survey, which comprised five urban and 25 rural cluster sites, covered 18633 households. In the survey year, 4971 live births were recalled. During the same period, 104 neonatal deaths, 53 of which were from tetanus, were identified. This gives an overall neonatal mortality rate of 20.9 per 1000 live births and a mortality rate from neonatal tetanus of 10.7 per 1000 live births.

It is noteworthy that 66.8% of mothers in the provincial survey received antenatal care at health services where tetanus toxoid was potentially available. Of the 4971 women who delivered children in the 13 months preceding the survey, 3420 had contact at least twice with a health facility (Table 2). Of these women, 728 (21%) had received two doses of tetanus toxoid, 328 (10%) one dose, while 2364 (69%) either had not been inoculated or did not know their immunization status. In 53 (62%) of the deaths from neonatal tetanus there was no contact with antenatal health facilities.

DISCUSSION

In both studies described here the number of deaths from neonatal tetanus were identified by retrospective survey, and the results obtained may therefore underestimate the true situation. Retrospective surveys depend on the interviewee’s ability to retrieve information and the interviewer’s persistence. For cultural reasons many Indonesians are reluctant to mention a death involving a child younger than 1 year of age. The results obtained therefore represent minimum estimates of the mortality from neonatal tetanus.

Based on our results, we estimate that the minimum mortality from neonatal tetanus is 1850 per annum in the city of Jakarta and 20 000 per annum in the 19 provinces surveyed. A recent prospective survey in the province of Jawa Barat, an area not covered in our survey, indicated that the annual mortality rate from neonatal tetanus was 14.7 per 1000 live births (4). For Indonesia as a whole we estimate the annual number of deaths from this cause to be approximately 71 000 (Table 3). This is based on a conservative estimate of the crude birth rate (35 per 1000 population), a population of 7.5 million for metropolitan Jakarta, a population of 52 million for the 19 provinces in the survey, and a total Indonesian population of 155 million. Since the survey did not

<table>
<thead>
<tr>
<th>Source of antenatal care</th>
<th>No. of mothers</th>
<th>Source of delivery care</th>
<th>No. of deaths</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hospital</td>
<td>3</td>
<td>Hospital + dukun*</td>
<td>1</td>
</tr>
<tr>
<td>Community health centre</td>
<td>4</td>
<td>Hospital + midwife</td>
<td>1</td>
</tr>
<tr>
<td>Trained midwife</td>
<td>5</td>
<td>Community health centre + midwife</td>
<td>1</td>
</tr>
<tr>
<td>Private physician</td>
<td>—</td>
<td>Home + midwife</td>
<td>2</td>
</tr>
<tr>
<td>Dukun*</td>
<td>—</td>
<td>Home + dukun*</td>
<td>11</td>
</tr>
<tr>
<td>None</td>
<td>3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Dukun: traditional birth attendant.
Table 3. Estimated mortality from neonatal tetanus in Indonesia

<table>
<thead>
<tr>
<th>Area</th>
<th>Estimated mortality rate for neonatal tetanus (per 1000 live births)</th>
<th>Population (million)</th>
<th>Estimated deaths from neonatal tetanus</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jakarta*</td>
<td>7</td>
<td>7.5</td>
<td>1 850</td>
</tr>
<tr>
<td>19 Provinces*</td>
<td>11</td>
<td>52</td>
<td>20 000</td>
</tr>
<tr>
<td>Irian Jaya, Maluku, and Timor Timur*</td>
<td>11</td>
<td>5.3</td>
<td>2 050</td>
</tr>
<tr>
<td>Java*</td>
<td>15</td>
<td>90</td>
<td>47 250</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>154.8</td>
<td>71 150</td>
</tr>
</tbody>
</table>

* Estimated from the rate determined in survey of 19 provinces.
* Prospective survey 1983 (4).
* Crude birth rate estimated as 35 per 1000 population.

No cover the provinces of Timor Timur, Irian Jaya, and Maluku, we have used for the purpose of Table 3 the mortality rate found for the 19 provinces in our survey.

Two doses of tetanus toxoid given to previously non-immunized women during pregnancy provide enough transferrable immunity to protect a newborn infant. A study in India has indicated that protection from two doses is 73–91% effective, depending on the interval (4–16 weeks) between doses (5).

Table 4 summarizes data on deaths from neonatal tetanus according to the vaccination status of the mother. Vaccine efficacy, i.e., (attack rate, unvaccinated – attack rate, vaccinated)/(attack rate, unvaccinated), was calculated to be 88.8% (6).

UNICEF has sponsored schemes to train or retrain traditional birth attendants throughout Indonesia. Of the estimated 102 000 attendants, 61 000 par-
ticipated in such a training scheme between 1979 and 1983 and were issued kits for cutting umbilical cords. Before 1979, about 13 000 attendants were trained, and the balance of approximately 28 000 have not yet completed training (7).

In Jakarta, second dose tetanus-toxoid immunization of pregnant women increased from 0.8% to 9.3% in the two-year, post-survey period (H. M. Sjatar Malik, unpublished observations, 1984).

When they receive antenatal care, the majority of women come into contact with potential sources of tetanus toxoid. There is therefore a need to increase the commitment of medical staff to immunizing these women. Extension of the use of tetanus toxoid to inoculate every woman of reproductive age who visits a community health centre or hospital clinic is being considered. In future, progress made in reducing neonatal tetanus will be monitored in three ways: surveillance at urban hospitals, surveys of the extent of antenatal inoculation with tetanus toxoid, and follow-up retrospective studies of neonatal tetanus mortality.

One priority of the fourth 5-year plan in Indonesia is to substantially reduce the infant mortality rate. The finding of the two surveys reported here that 40–50% of neonatal deaths in Indonesia are due to tetanus has heightened awareness that this infection is responsible for 15–20% of the total infant mortality rate in Indonesia.

### Table 4. Attack rate as a function of the number of doses of tetanus toxoid reported by mothers in the survey of 19 Indonesian provinces, June 1982

<table>
<thead>
<tr>
<th>No. of doses of tetanus toxoid</th>
<th>No. of deaths from neonatal tetanus</th>
<th>No. of infants at risk</th>
<th>Attack rate (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>1</td>
<td>728</td>
<td>0.14</td>
</tr>
<tr>
<td>1</td>
<td>3</td>
<td>328</td>
<td>0.91</td>
</tr>
<tr>
<td>None</td>
<td>49</td>
<td>3915</td>
<td>1.25</td>
</tr>
<tr>
<td>Total</td>
<td>53</td>
<td>4971</td>
<td>1.07</td>
</tr>
</tbody>
</table>


RÉSUMÉ

MORTALITÉ PAR TÉTANOS NEONATAL EN INDONÉSIE:
RÉSULTATS DE DEUX ENQUÊTES

Deux enquêtes rétrospectives utilisant une version modifiée de la méthode des trente grappes, et portant sur le nombre de décès par tétanos néonatal, ont été réalisées en Indonésie en 1982. Lors de la première enquête, en ville de Djakarta, on a recensé 2310 naissances vivantes et 16 décès par tétanos néonatal dans 8811 foyers, ce qui donne un taux...
de mortalité par tétanos néonatal de 6,9 pour 1000 naissances vivantes. Il est intéressant de noter que sur les 16 mères dont l'enfant est mort de tétanos néonatal, 13 avaient reçu des soins anténataux dans un hôpital ou un centre de santé communautaire ou avaient été vues à domicile par une sage-femme qualifiée.

La deuxième enquête a couvert 19 des 27 provinces de l'Indonésie. Sur les 30 grappes, 5 étaient choisies dans des sites urbains et 25 dans des sites ruraux. Pendant la période d'enquête, on a recensé 4971 naissances vivantes dans 18 633 foyers. Le nombre de décès par tétanos néonatal s'élevait à 53, ce qui donne un taux de mortalité de 10,7 pour 1000 naissances vivantes. Parmi les mères interrogées lors de cette deuxième enquête, 68,8% (3420 sur 4971) s'étaient rendues au moins deux fois pour une visite anténatale dans des centres où, en principe, on disposait d'anatoxine tétanique; toutefois, 21% (728) seulement de ces mères avaient reçu deux doses d'anatoxine.

En regroupant les données de mortalité par tétanos néonatal obtenues lors de nos deux enquêtes (1800 décès par an en ville de Djakarta et 20 000 décès par an dans les provinces) avec les résultats récemment publiés d'une enquête réalisée à Java, nous avons calculé que plus de 70 000 nouveau-nés meurent chaque année de tétanos néonatal en Indonésie.

Le quatrième plan quinquennal indonésien compte parmi ses priorités la réduction du taux de mortalité infantile et a désigné comme meilleur moyen d'atteindre cet objectif la lutte contre le tétanos néonatal au moyen de la vaccination.

REFERENCES