



Social issues in reproductive medicine

# Tetanus immunization and prenatal care in developing countries

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## Abstract

**Objective:** We sought to estimate the proportion of women immunized against tetanus while attending prenatal care in the developing countries. **Method:** We computed the ratio of the percentage of births to women immunized against tetanus to the percentage of births to women with prenatal care (TP ratio). A TP ratio is lower than 100% if not every woman attending prenatal care is immunized. We used 1986–1992 Demographic and Health Surveys data from 38 countries. **Results:** The mean TP ratios were 86% in Africa ( $n = 23$ ), 79% in Asia ( $n = 6$ ) and 60% in Latin America and the Caribbean ( $n = 9$ ). The TP ratio was lower than 75% in 15 countries. Of these, four had a TP ratio lower than 50%. **Conclusion:** In many countries the number of pregnant women immunized against tetanus is lower than the number of women attending prenatal care, suggesting that prenatal services are missing opportunities to immunize attending women.

**Keywords:** Developing countries; Immunization; Pregnancy; Prenatal care; Quality assurance; Tetanus

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## 1. Introduction

In the developing countries tetanus is a major cause of neonatal mortality [1], and tetanus immunization should be one of the main objectives of prenatal care. With the exception of those who have already received five doses of tetanus toxoid, all pregnant women should be immunized against tetanus during pregnancy [2].

In many countries the number of women with a well-documented full course of five immunizations prior to the current pregnancy is expected to be low, and prenatal clinics should thus immunize most attending women. Women not attending prenatal care should also receive tetanus toxoid, for example when children are immunized. The recommendation is to offer tetanus immunization as widely as possible to women of childbearing age [2,3].

The proportion of women immunized against

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tetanus among those attending prenatal care would be a useful indicator of the quality of prenatal services. Unfortunately this information is generally not available. In this paper we propose a method of estimating the proportion of women immunized during prenatal care, using data from 38 developing countries.

## 2. Populations and methods

We used data from the Demographic and Health Surveys (DHS). The DHS program is a project of the Institute for Resource Development/Macro Systems Inc., which collects data on demography and maternal and child health in the

Table 1  
Maternal tetanus immunization, prenatal care and TP ratios for developing countries with DHS data [4]

Region, country and survey year	Births to women immunized with tetanus toxoid (%)	Births to women with prenatal care (%)	TP ratio (%)
<b>Africa</b>			
Botswana (1988)	85	92	92
Burundi (1987)	59	79	75
Cameroon (1991)	69	79	87
Egypt (1992)	57	53	108
Ghana (1988)	70	82	85
Kenya (1989)	89	77	116
Liberia (1986)	71	83	86
Madagascar (1992)	60	78	77
Malawi (1992)	86	90	96
Mali (1987)	18	31	58
Morocco (1992)	54	32	169
Namibia (1992)	64	88	73
Niger (1992)	23	30	77
Nigeria (1990)	52	57	91
Rwanda (1992)	90	95	95
Senegal (1986)	31	64	48
Sudan (1989–90)	45	70	64
Tanzania (1991–92)	90	92	98
Togo (1988)	70	82	85
Tunisia (1988)	33	58	57
Uganda (1988–89)	56	87	64
Zambia (1992)	81	92	88
Zimbabwe (1988–89)	79	91	87
<b>Asia</b>			
Indonesia (1991)	57	76	75
Jordan (1990–91)	43	80	54
Pakistan (1990–91)	30	27	111
Sri Lanka (1987)	83	97	86
Thailand (1987)	65	77	84
Yemen (1991–92)	16	26	62
<b>Latin America/Caribbean</b>			
Bolivia (1989)	20	45	44
Brazil (1986)	40	74	54
Colombia (1990)	55	82	67
Dominican Republic (1991)	91	97	94
Ecuador (1987)	39	70	56
Guatemala (1987)	14	34	41
Paraguay (1990)	84	84	100
Peru (1991–92)	35	64	55
Trinidad and Tobago (1987)	31	98	32

developing countries. A standard methodology and questionnaire are used in the different countries. We used data on prenatal care and tetanus immunization from 38 countries surveyed between 1986 and 1992 [4].

The DHS surveys include questions about prenatal care and tetanus immunization for births that occurred 5 years prior to the interview [5]. The question on tetanus immunization is “When you were pregnant...were you given any injection to prevent the baby from getting tetanus, that is, convulsions after birth?”. The question on prenatal care is “....did you see anyone for a check of this pregnancy? If yes, whom did you see?”. We used information on ‘formal’ prenatal care, i.e. that provided by a trained nurse, midwife or medical doctor.

We have defined the following tetanus immunization/prenatal care (TP) ratio:

TP ratio = % Births to women immunized against tetanus during pregnancy/% Births to women with at least one prenatal visit  $\times 100$

A TP ratio lower than 100% means that not every woman attending prenatal care has been immunized. A TP ratio higher than 100% means that women have been immunized outside of prenatal care. A TP ratio of 100% means that all women attending prenatal care have been immunized, or that immunization in other settings compensated for a lack of immunization during prenatal care. Except where many women were fully immunized before becoming pregnant, a low TP ratio suggests that prenatal services have missed opportunities to vaccinate attending women. A low TP ratio should thus be a warning signal for the health services.

### 3. Results

Among the 38 countries surveyed (Table 1), 14–91% of pregnant women were immunized against tetanus, 26–98% had at least one prenatal visit, and TP ratios varied from 32% to 169%. The unweighted mean TP ratios were 86% in Africa ( $n = 23$ ), 79% in Asia ( $n = 6$ ) and 60% in Latin America and the Caribbean ( $n = 9$ ).

Table 1 shows that 15 countries had a TP ratio lower than 75%, of which four had a TP ratio

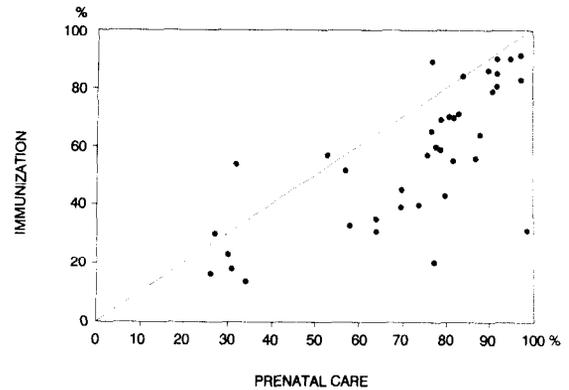


Fig. 1. Proportions of tetanus immunization during pregnancy (%) and proportion of women attending prenatal care (%) in 38 developing countries [4]. Countries with TP ratios higher than 100% are above the diagonal line.

lower than 50%. Only five countries had a TP ratio equal to or higher than 100%. These countries are on or above the diagonal line of Fig. 1, which plots percentages of tetanus immunization rates against percentages of prenatal care.

### 4. Discussion

Our results show that many women attending prenatal care in the developing countries are not immunized against tetanus. In Bolivia, Guatemala, Senegal, and Trinidad and Tobago, the proportion of women immunized against tetanus is less than 50% of the proportion of women attending prenatal care. Many other countries have TP ratios lower than 75%. This suggests that opportunities to immunize women have been missed.

In Egypt, Kenya, Morocco and Pakistan, the proportion of immunized women is higher than the proportion of women attending prenatal care. The interpretation is that many women have been immunized outside of prenatal care in these countries. A previous DHS survey performed in Egypt in 1988 showed that 11% of pregnant women were immunized against tetanus, and that 53% attended prenatal care [6]. The TP ratio for Egypt was 21% in 1988 compared with 108% in 1992. Egypt thus strongly improved its tetanus immunization coverage between 1988 and 1992.

The TP ratio has some shortcomings as an indi-

cator of the quality of immunization in prenatal care. A TP ratio higher than 100% means that women have been immunized outside of prenatal visits, but does not tell anything about immunization in prenatal care. A TP ratio lower than 100% does not tell which proportion of the immunization has been performed outside of prenatal care. A relatively high TP ratio should thus not be automatically seen as a sign of good immunization in prenatal clinics.

A low TP ratio is a warning that immunization activities are not strong enough in prenatal clinics. This warning should be interpreted according to the immunization policy and to the proportion of women having received five doses of tetanus toxoid prior to the current pregnancy. If the policy is to immunize all pregnant women attending prenatal clinics, a low TP ratio should prompt a discussion about the performance of the prenatal care delivery system.

In our opinion, the information on tetanus immunization provided by the DHS surveys is useful for assessing the immunization services' activities. However these data do not give an accurate measure of the proportion of women protected against tetanus [7]. The first DHS surveys, and the data we used, did not consider a difference between one or two doses of tetanus toxoid. One dose is not enough in the absence of previous immunization, and the proportion of women protected might be inferior to the proportion we used in our calculations. DHS data might also underestimate the proportion of women protected against tetanus. Women not immunized during the current pregnancy might be partly protected by injections received previously. For example, two doses received 3 years earlier still protect the current pregnancy [2,7].

The validity of the national survey data we used may be questioned. The question on tetanus immunization included in the DHS questionnaire

may not have been well understood by some women. For example, injections for other reasons than tetanus immunization may have been included in the answers. Other instances of recall bias may have occurred. However it has to be stressed that DHS data are probably the best available for comparative study. Their strength is that they have been collected using the same questionnaires and that the population samples have been carefully designed to be representative of the countries investigated.

In conclusion, our results show that many countries with relatively high proportions of women attending prenatal care have low tetanus immunization rates, suggesting a need for improvement.

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