Regional disparities and their contribution to the coverage of the tetanus toxoid vaccine among women aged 15–49 years in Indonesia [version 1; peer review: 1 approved, 2 approved with reservations]

Hidayat Arifin, Restuning Widiasih, Rifky Octavia Pradipta, Yulia Kurniawati

1Department of Medical-Surgical Nursing, Faculty of Nursing, Universitas Padjadjaran, Bandung, Indonesia
2Department of Maternity Nursing, Faculty of Nursing, Universitas Padjadjaran, Bandung, Indonesia
3Faculty of Nursing, Universitas Airlangga, Surabaya, Indonesia

Abstract

Background: The prevention of Clostridium tetani bacterial infection through the administration of the tetanus toxoid (TT) vaccine in women is important. The purpose of this study was to determine the regional disparities and factors associated with TT vaccine coverage in women aged 15–49 years in Indonesia.

Methods: The Indonesian Demographic Health Survey (IDHS) 2017 data was used in this study. A total of 36,028 women, aged 15–49 years were recruited using the two-stage stratified cluster sampling technique. The questionnaire used was based on the DHS Questionnaire Phase 7. Chi-squared and binary logistic regression were used in this study as part of the analysis.

Results: We found that the TT vaccine coverage was 75.32% and that the majority were spread across several provinces. The provinces of Bali and Nusa Tenggara, the richer respondents, living in a rural area, visiting the health facility, having health insurance, and those currently working were factors making it more likely that the women would receive the TT vaccine. The respondents aged 15–24 years with a primary education level and the respondents who were divorced were less likely to receive the TT vaccine.

Conclusion: The coverage of the TT vaccine among women can be increased by considering the regional disparities in Indonesia and the socio-economic demographic details of the respondents. Strengthening the policies from the central government in the local governments can improve the screening process and vaccine delivery outcomes. In addition, the importance of giving the TT vaccine to women needs to be relayed through health education in collaboration...
between health workers and the public.

**Keywords**
vaccine; tetanus toxoid; tetanus vaccine; demographic health survey, women

---

Corresponding author: Hidayat Arifin (hidayat.arifin@unpad.ac.id)

Author roles: **Arifin H**: Conceptualization, Formal Analysis, Methodology, Writing – Original Draft Preparation, Writing – Review & Editing; **Widiasih R**: Conceptualization, Formal Analysis, Methodology, Writing – Original Draft Preparation, Writing – Review & Editing; **Pradipta RO**: Conceptualization, Data Curation, Formal Analysis, Methodology, Validation, Writing – Review & Editing; **Kurniawati Y**: Conceptualization, Methodology, Writing – Review & Editing

Competing interests: No competing interests were disclosed.

Grant information: The author(s) declared that no grants were involved in supporting this work.

Copyright: © 2021 Arifin H et al. This is an open access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

How to cite this article: Arifin H, Widiasih R, Pradipta RO and Kurniawati Y. Regional disparities and their contribution to the coverage of the tetanus toxoid vaccine among women aged 15–49 years in Indonesia [version 1; peer review: 1 approved, 2 approved with reservations] F1000Research 2021, 10:437 https://doi.org/10.12688/f1000research.53004.1

First published: 03 Jun 2021, 10:437 https://doi.org/10.12688/f1000research.53004.1
Introduction
Neonatal tetanus (NT) is a disease that can be prevented. It has become a global health problem with both high case and high fatality rates among neonates. NT refers to tetanus that occurs at 28 days of early life. NT occurs due to the toxins produced by *Clostridium tetani* alongside an unhygienic labor agent. It spreads through the umbilical cord. One of the efforts to prevent the incidence of NT is the provision of an adequate tetanus toxoid (TT) vaccine for women of reproductive age. In 2006, WHO developed guidelines for the TT vaccine for pregnant women to prevent NT. The Indonesian government through the Ministry of Health Regulation number 42 of 2017 also launched the TT vaccine program as an advanced vaccine with a national and regional vaccine target coverage of at least 90% and 80%, respectively.

Two doses of the TT vaccine can provide immunity and reduce neonatal mortality by 94%. One case–control study also reported that the administration of two doses of the TT vaccine was associated with a decrease in the incidence of NT and *vice versa*. Infant mortality was predicted to decrease by 46% after the mother received their first dose of the TT vaccine and by 45% after the second dose. The Indonesian Health Profile data from the years 2013–2015 show the trend that not receiving the TT vaccine is the leading cause of neonatal mortality. Although NT can be prevented by the TT vaccine, the number of cases is still high. Globally, it is estimated that as many as 3.6 million neonates die every year, among which 59,000 die from tetanus. The infant mortality rate in Indonesia according to the Indonesian Demographic and Health Survey in 2007 was 34 deaths per 1,000 live births with the highest number of deaths occurring during the neonatal period. The neonatal mortality rate in Indonesia in 2007 was 19 per 1000 live births and NT was one of the main causes of death.

There are still cases of NT in line with the coverage of the national and regional TT vaccines not yet reaching the target. Nationally, the coverage of the TT vaccine for both pregnant and reproductive age women tends to fluctuate and has not yet reached the target. The TT vaccine coverage for pregnant and reproductive age women from 2007 to 2011 was 26% and 27.1%, 65.2% and 24.7%, 73.5% and 11.2%, 69.5% and 8.6%, and 63.6% and 11.8%, respectively. If the regional data is examined randomly, the coverage of the TT vaccine in select regions has also not reached the target. The low coverage of the TT vaccine is largely influenced by inadequate knowledge. Women of reproductive age with knowledge of maternal and neonatal tetanus (MNT) and low TT vaccine are 0.435 times more likely to receive the TT vaccine. Insufficient knowledge of the TT vaccine among prospective brides of reproductive age are one of the factors for the low TT vaccine coverage. Based on the data above, to overcome this inadequate knowledge, health education about TT is needed. Good health education pays attention to and identifies people’s characteristics in the intended category so then the health education provided can be more effective. This study is focused on revealing TT vaccine coverage and the determinant factors of the TT vaccine being received in relation to women of reproductive age.

Several previous Indonesian studies have revealed the coverage and determinants of the TT vaccine. Research into the TT coverage is still reported on a regional scale. Research on the determinants of the vaccine for women of childbearing age specifically includes knowledge, family support, attitudes, and the behavior of the health workers. This study used available national data including age, education level, wealth quintile, residence, marital status, visiting the health facilities, health insurance, occupational status, the sex of the household head, pregnancy, and the different regional areas in relation to the TT vaccine. It is expected that the results of this study can be used when devising effective approaches for the education of women of reproductive age to promote the TT vaccine.

Methods
Study design
A cross-sectional study design was undertaken. We used secondary data from the Indonesian Demographic Health Survey (IDHS) 2017 and parts of the Inner-City Fund (ICF) International data.

Sample
The survey was conducted in December 2017. We used the IDIR71FL dataset (Indonesian Individual Recode phase 7). The total study population was 49,627 women aged 15–49 years. We then weighted the data based on the number of provinces in Indonesia in order to obtain the average for each region. We managed to reach 36,028 women aged 15–49 years who have not received the TT vaccine in Indonesia. Furthermore, there was missing data. Two-stage stratified cluster sampling was used in this study by selecting clusters from each stratum and a list of families from the selected clusters. Then the families’ questionnaire responses were investigated (Demographic Health Survey, 2017).

Variables
The independent variables in this study included age, education level, wealth quintile, residence, marital status, visiting the health facility, health insurance, occupational status, sex of household head, pregnancy, regional disparities. Age was
categorized into 15–24 years old, 25–34 years old and 35–49 years old (Health Ministry of Republic Indonesia, 2009). Based on Law No. 20 of 2003 concerning the National Education System in Indonesia, education level was categorized into high, secondary, primary, and no education.30 The respondents’ wealth quintile was categorized into poorest, poorer, middle, richer, and richest respectively.31,32 Residence was categorized into either an urban or rural area.33 Marital status was classified as either married, partnered, widowed, divorced or separated. The respondents who had visited a health facility in the last six months, whether they had health insurance, if they were currently working, and their pregnancy status were all categorized as either yes or no.31 We identified the sex of the household head as either male or female. For the regions in Indonesia, we classified the country based on the big islands as follows: Sumatera, Riau, Java, Bali and Nusa Tenggara, Kalimantan, Sulawesi, Maluku, and Papua.34

The dependent variable in this study was the TT vaccine. We identified women aged 15–49 years who either received or did not receive the TT Vaccine. Then we categorized them according to their answer of either yes or no (Demographic Health Survey, 2017). To enhance the quality and transparency of reporting the study results, the researchers applied The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE).35

Data analysis
We used the STATA version 16.1: “A Software resource for statistical analysis and presentation of graphics (Stata, RRID:SCR_012763)”. We used Chi-squared to analyze the bivariate data and binary logistic regression to analyze the multivariate data. We used the adjusted odds ratio (AOR) with a 95% confidence interval (CI) and a significance level of p < 0.05.

Ethical considerations
Ethical approval for the secondary dataset was not required. The dataset policy is available on the official website. We received approval to use the dataset from ICF International with number AuthLetter_154679.

Results
In this study, we found that the coverage of the TT vaccine in Indonesia reached 75.32% out of the 36,028 respondents. More than half of the total respondents who received the vaccine aged 35–49 years were educated to secondary school level. The distribution of wealth quintiles was almost the same, ranging from poorest to richest. The majority were in the poorest quintile. In addition, the distribution of residence was almost the same across both urban and rural areas. The majority of the respondents in this study were married and they had regularly visited health facilities in the last six months. We found that the majority of respondents had health insurance, were working, and were not pregnant. The majority of the household heads were male. According to the regional data, the majority of the respondents were spread across the large islands in Indonesia such as Java and Sumatra (Table 1).

Upon examining the regional distribution data in Indonesia, the TT vaccine coverage was more than 70% in Riau, Java, Bali and Nusa Tenggara, Kalimantan, Sulawesi, and Papua. The majority of respondents aged 35–49 years were spread across Indonesia. The distribution data indicate that the majority of respondents were educated to secondary school level, followed by those with primary education. The majority of respondents in the richest quintile and living in an urban area in Riau and Java. The majority of respondents in the poorest quintile and living in a rural area were in Bali and Nusa Tenggara, Sulawesi, Maluku, and Papua. Most of the respondents were married, had health insurance, were working, were not pregnant, and the household head was male. The respondents in Riau, Maluku, and the Papua islands responded stating that they had rarely visited the health facilities in the last six months (Table 2).

The bivariate analysis showed that the regional variables, age, education level, wealth quintile, residence, marital status, whether they visited the health facilities, health insurance, whether they were currently working, and the sex of the household head have a significant relationship with TT vaccine coverage in women aged 15–49 years. However, the pregnancy variable did not have a significant relationship with TT vaccine coverage (Table 3).

Table 4 shows the results of the multivariate analysis. The data indicate that regional disparities, age, education level, wealth quintile, residence, marital status, whether they had visited the health facilities recently, and health insurance are likely to be associated with TT vaccine coverage in women aged 15–49 years in Indonesia. The regional data shows that the respondents in Bali and Nusa Tenggara are 3.773-times more likely to receive the TT vaccine than the respondents in Sumatera (AOR = 3.363; 95%CI = 2.997–3.773). The respondents aged 35–49 years old are 0.71-times less likely to receive the TT vaccine than those aged 35–49 years (AOR = 0.71; 95%CI = 0.653–0.772). Regarding education level, the respondents with a primary school level of education were 0.544-times less likely to receive the TT vaccine than the respondents with a higher level of education (AOR = 0.544; 95%CI = 0.494–0.599). Furthermore, the richer respondents were 1.645-times more likely to receive the TT vaccine than the poorest respondents (AOR = 1.645; 95%CI = 1.506–1.798). The respondents living in rural
areas were 1.106-times more likely to have had the TT vaccine than those living in urban areas (AOR = 1.106; 95%CI = 1.044–1.173). Divorced respondents were 0.693-times less likely to receive the TT vaccine than married respondents (AOR = 0.693; 95%CI = 0.608–0.79). The respondents who had regularly visited a health facility in the last six months were 1.693-times more likely to receive the vaccine than those who had not (AOR = 1.693; 95%CI = 1.609–1.781). The respondents who had health insurance were 1.176-times more likely to receive the vaccine than those who did not (AOR = 1.176; 95%CI = 1.117–1.239). The respondents who worked were 1.147-times more likely to receive the vaccine than those who did not (AOR = 1.147; 95%CI = 1.088–1.208).

Table 1. Demographic variables (n = 36,028).

| Variable                | n    | %    |
|-------------------------|------|------|
| TT Vaccine              |      |      |
| No                      | 8,893| 24.68|
| Yes                     | 27,135| 75.32|
| Age                     |      |      |
| 25–49 years old         | 19,697| 54.67|
| 25–34 years old         | 12,325| 34.21|
| 15–24 years old         | 4,006 | 11.12|
| Education level         |      |      |
| High education          | 5,251 | 14.57|
| Secondary education     | 18,770| 52.10|
| Primary education       | 11,254| 31.24|
| No education            | 753  | 2.09 |
| Wealth quintiles        |      |      |
| Poorest                 | 8,374 | 23.24|
| Poorer                  | 7,016 | 19.47|
| Middle                  | 6,945 | 19.28|
| Richer                  | 6,952 | 19.30|
| Richest                 | 6,741 | 18.71|
| Residence               |      |      |
| Urban                   | 18,316| 50.84|
| Rural                   | 17,712| 49.16|
| Marital status          |      |      |
| Married                 | 33,294| 92.41|
| Partner                 | 369  | 1.02 |
| Widowed                 | 884  | 2.45 |
| Divorced                | 1,319| 3.66 |
| Separated               | 162  | 0.45 |
| Visiting health facility|      |      |
| No                      | 16,639| 46.18|
| Yes                     | 19,389| 53.82|
| Health insurance        |      |      |
| No                      | 13,839| 38.41|
| Yes                     | 22,189| 61.59|
| Currently working       |      |      |
| No                      | 14,978| 41.57|
| Yes                     | 21,050| 58.43|
| Sex of household head   |      |      |
| Male                    | 32,233| 89.47|
| Female                  | 3,795 | 10.53|
| Pregnancy               |      |      |
| No                      | 34,081| 94.60|
| Yes                     | 1,947 | 5.40 |
| Regional (island)       |      |      |
| Sumatera                | 8,344 | 23.16|
| Riau                    | 753  | 2.09 |
| Java                    | 12,336| 34.24|
| Bali & Nusa Tenggara    | 3,053 | 8.47 |
| Kalimantan              | 3,291 | 9.13 |
| Sulawesi                | 5,415 | 15.03|
| Maluku                  | 1,945 | 5.40 |
| Papua                   | 891  | 2.47 |
| Variable                  | Region                          | Sumatera | Riau | Java | Bali & Nusa Tenggara | Kalimantan | Sulawesi | Maluku | Papua |
|---------------------------|---------------------------------|----------|------|------|-----------------------|------------|---------|--------|-------|
| Age                       | No education                    | 21.5     | 19.2 | 34.9 | 29.2                  | 26.7       | 22.5    | 17.7   | 25.0  |
|                          | 5-14 years old                  | 27.0     | 22.1 | 29.7 | 33.3                  | 33.3       | 31.6    | 33.3   | 34.8  |
|                          | 15-24 years old                 | 23.1     | 19.2 | 30.1 | 29.1                  | 26.6       | 20.9    | 18.4   | 24.4  |
|                          | 25-34 years old                 | 18.4     | 17.3 | 25.2 | 23.4                  | 23.7       | 17.1    | 10.6   | 26.2  |
|                          | 35+ years old                   | 12.5     | 13.4 | 15.2 | 18.3                  | 15.9       | 15.6    | 12.0   | 14.8  |
| Education level           | No education                    | 21.5     | 19.2 | 34.9 | 29.2                  | 26.7       | 22.5    | 17.7   | 25.0  |
|                          | 5-14 years old                  | 27.0     | 22.1 | 29.7 | 33.3                  | 33.3       | 31.6    | 33.3   | 34.8  |
|                          | 15-24 years old                 | 23.1     | 19.2 | 30.1 | 29.1                  | 26.6       | 20.9    | 18.4   | 24.4  |
|                          | 25-34 years old                 | 18.4     | 17.3 | 25.2 | 23.4                  | 23.7       | 17.1    | 10.6   | 26.2  |
|                          | 35+ years old                   | 12.5     | 13.4 | 15.2 | 18.3                  | 15.9       | 15.6    | 12.0   | 14.8  |
| Wealth quintiles          | No education                    | 21.5     | 19.2 | 34.9 | 29.2                  | 26.7       | 22.5    | 17.7   | 25.0  |
|                          | 5-14 years old                  | 27.0     | 22.1 | 29.7 | 33.3                  | 33.3       | 31.6    | 33.3   | 34.8  |
|                          | 15-24 years old                 | 23.1     | 19.2 | 30.1 | 29.1                  | 26.6       | 20.9    | 18.4   | 24.4  |
|                          | 25-34 years old                 | 18.4     | 17.3 | 25.2 | 23.4                  | 23.7       | 17.1    | 10.6   | 26.2  |
|                          | 35+ years old                   | 12.5     | 13.4 | 15.2 | 18.3                  | 15.9       | 15.6    | 12.0   | 14.8  |

**Note:** Data from Table 2: Socio-demographic characteristic based on region (n = 36,028).
| Variable                  | Region         | Sumatera | Riau | Java | Bali & Nusa Tenggara | Kalimantan | Sulawesi | Maluku | Papua |
|---------------------------|----------------|----------|------|------|-----------------------|------------|----------|--------|-------|
|                           |                | n       | n    | n    | n                      | n          | n        | n      | n     |
| Currently working         |                | n       | %    | n    | %                      | n          | %        | n      | %     |
| No                        |                | 3,393   | 40.66 | 335  | 44.49                  | 5,478      | 44.41    | 1,054  | 34.52 |
|                           |                | 4,951   | 59.34 | 418  | 55.51                  | 6,858      | 55.59    | 1,999  | 65.48 |
| Yes                       |                | 335     | 44.49 | 5,478 | 44.41                  | 34.52      | 65.48    | 1,999  | 60.50 |
|                           |                | 418     | 55.51 | 6,858 | 55.59                  | 1,054      | 34.52    | 1,999  | 60.50 |
| Sex of household head     |                | n       | %    | n    | %                      | n          | %        | n      | %     |
| Male                      |                | 7,487   | 89.73 | 684  | 90.84                  | 11,057     | 89.63    | 2,618  | 94.42 |
|                           |                | 857     | 10.27 | 69   | 9.16                   | 1,279      | 10.37    | 435    | 5.58  |
| Female                    |                | 11,057  | 89.63 | 1,279 | 10.37                  | 2,618      | 435      | 142.25 | 85.75 |
|                           |                | 88.38   | 10.62 | 9.16 | 10.37                  | 94.42      | 5.58     | 14.25  | 85.75 |
| Pregnancy                 |                | n       | %    | n    | %                      | n          | %        | n      | %     |
| No                        |                | 7,832   | 93.86 | 711  | 94.42                  | 11,766     | 95.38    | 2,896  | 94.86 |
|                           |                | 512     | 6.14  | 42   | 5.58                   | 570        | 4.62     | 157    | 5.14  |
| Yes                       |                | 711     | 94.42 | 11,766 | 95.38                  | 2,896      | 94.86    | 1306   | 94.38 |
|                           |                | 42      | 5.58  | 570  | 4.62                   | 157        | 5.14     | 185    | 5.62  |
|                           |                | 94.38   | 5.62  | 94.86 | 5.14                   | 2,896      | 95.38    | 11,766 | 95.38 |
|                           |                | 94.38   | 5.62  | 94.86 | 5.14                   | 2,896      | 95.38    | 11,766 | 95.38 |
|                           |                | 5,139   | 94.90 | 149  | 92.34                  | 1,796      | 94.90    | 149    | 7.66  |
|                           |                | 276     | 5.10  | 7.66 | 5.10                   | 5,139      | 94.90    | 1,796  | 5.10  |
|                           |                | 835     | 93.71 | 56   | 6.29                   | 276        | 9.99     | 835    | 93.71 |
|                           |                | 835     | 93.71 | 56   | 6.29                   | 276        | 9.99     | 835    | 93.71 |
Table 3. Bivariate analysis of tetanus toxoid vaccine coverage among women aged 15–49 years in Indonesia (n = 36,028).

| Variable                        | Tetanus toxoid vaccine coverage | χ²   |
|---------------------------------|---------------------------------|------|
|                                 | No | %   | Yes | %   |        |
| **Regional (island)**           |    |     |     |     |        |
| Sumatera                        | 2,618| 7.27 | 5,726| 15.89| 578.813*** |
| Riau                            | 199 | 0.55 | 554 | 1.54 |        |
| Java                            | 3,157| 8.76 | 9,179| 25.48|        |
| Bali & Nusa Tenggara           | 499 | 1.39 | 2,554| 7.09 |        |
| Kalimantan                      | 701 | 1.95 | 2,590| 7.19 |        |
| Sulawesi                        | 898 | 2.49 | 4,517| 12.54|        |
| Maluku                          | 608 | 1.69 | 1,337| 3.71 |        |
| Papua                           | 213 | 0.59 | 678 | 1.88 |        |
| **Age**                         |    |     |     |     |        |
| 35–49 years old                 | 4,940| 13.71| 14,757| 40.96| 45.499*** |
| 25–34 years old                 | 2,830| 7.86 | 9,495| 26.35|        |
| 15–24 years old                 | 1,123| 3.12 | 2,883| 8.00 |        |
| **Education level**             |    |     |     |     |        |
| High education                  | 914 | 2.54 | 4,337| 12.04| 1,200*** |
| Secondary education             | 3,879| 10.77| 14,891| 41.33|        |
| Primary education               | 3,631| 10.08| 7,623| 21.16|        |
| No education                    | 469 | 1.30 | 284 | 0.79 |        |
| **Wealth quintiles**            |    |     |     |     |        |
| Poorest                         | 2,710| 7.52 | 5,664| 15.72| 406.478*** |
| Poorer                          | 1,756| 4.87 | 5,260| 14.60|        |
| Middle                          | 1,627| 4.52 | 5,318| 14.76|        |
| Richer                          | 1,461| 4.06 | 5,491| 15.24|        |
| Richest                         | 1,339| 3.72 | 5,402| 14.99|        |
| **Residence**                   |    |     |     |     |        |
| Urban                           | 4,220| 11.71| 14,096| 39.13| 54.138*** |
| Rural                           | 4,673| 12.97| 13,039| 36.19|        |
| **Marital status**              |    |     |     |     |        |
| Married                         | 7,978| 22.14| 25,316| 70.27| 127.472*** |
| Partner                         | 113 | 0.31 | 256 | 0.71 |        |
| Widowed                         | 313 | 0.87 | 571 | 1.58 |        |
| Divorced                        | 430 | 1.19 | 889 | 2.47 |        |
| Separated                       | 59 | 0.16 | 103 | 0.29 |        |
| **Visiting health facility**    |    |     |     |     |        |
| No                              | 5,108| 14.18| 11,531| 32.01| 601.783*** |
| Yes                             | 3,785| 10.51| 15,604| 43.31|        |
| **Health insurance**            |    |     |     |     |        |
| No                              | 3,865| 10.73| 9,974| 27.68| 127.253*** |
| Yes                             | 5,028| 13.96| 17,161| 47.63|        |
| **Currently working**           |    |     |     |     |        |
| No                              | 3,911| 10.86| 11,067| 30.72| 28.121*** |
| Yes                             | 4,982| 13.83| 16,068| 44.60|        |
| **Sex of household head**       |    |     |     |     |        |
| Male                            | 7,825| 21.72| 24,408| 67.75| 27.295*** |
| Female                          | 1,068| 2.96 | 2,727| 7.57 |        |
| **Pregnancy**                   |    |     |     |     |        |
| No                              | 8,418| 23.37| 25,663| 71.23| 0.091 |
| Yes                             | 475 | 1.32 | 1,472 | 4.09 |        |

**p < 0.01.  
**p < 0.05.  
*p < 0.1.  
χ²: Chi-squared.
In this study, we discussed the gap in the reception of the TT vaccine among women aged 15–49 years in Indonesia by looking at the regional disparities. We also were able to determine the contributions behind the achievement of the TT vaccine coverage in Indonesia as it stands. We found that regional disparities were significantly associated with TT vaccine performance. In addition, the factors of age, education level, wealth quintile, residence, marital status, whether

### Table 4. Multivariate analysis of tetanus toxoid vaccine coverage among women aged 15–49 years in Indonesia (n = 36,028).

| Variable                      | Tetanus toxoid vaccine coverage | AOR | p     | 95% CI    | Lower | Upper |
|-------------------------------|---------------------------------|-----|-------|----------|-------|-------|
| Regional (island)             |                                 |     |       |          |       |       |
| Sumatera                      | Ref.                            |     | 0.044 | 1.005    | 1.427 |
| Riau                          | 1.197**                         |     | 0.000 | 1.266    | 1.445 |
| Java                          | 3.363***                        |     | 0.000 | 2.997    | 3.773 |
| Bali & Nusa Tenggara         | 1.874***                        |     | 0.000 | 1.697    | 2.07  |
| Kalimantan                    | 2.752***                        |     | 0.001 | 1.086    | 3.162 |
| Sulawesi                      | 1.217***                        |     | 0.000 | 1.88     | 2.686 |
| Maluku                        | 2.247***                        |     | 0.000 | 1.632    | 1.005 |
| Papua                         |                                 |     |       |          |       |       |
| Age                           |                                 |     |       |          |       |       |
| 35–49 years old               | Ref.                            |     | 0.031 | 0.886    | 0.994 |
| 25–34 years old               | 0.939**                         |     | 0.000 | 0.653    | 0.772 |
| 15–24 years old               | 0.71***                         |     |       |          |       |       |
| Education level               |                                 |     |       |          |       |       |
| High education                | Ref.                            |     | 0.901 | 0.911    | 1.085 |
| Secondary education           | 0.994                           |     | 0.000 | 0.494    | 0.599 |
| Primary education             | 0.544***                        |     | 0.000 | 0.125    | 0.179 |
| No education                  | 0.149***                        |     |       |          |       |       |
| Wealth quintiles              |                                 |     |       |          |       |       |
| Poorest                       | Ref.                            |     | 0.000 | 1.334    | 1.558 |
| Poorer                        | 1.442***                        |     | 0.000 | 1.421    | 1.676 |
| Middle                        | 1.544***                        |     | 0.000 | 1.506    | 1.798 |
| Richer                        | 1.645***                        |     | 0.000 | 1.382    | 1.687 |
| Richest                       | 1.527***                        |     |       |          |       |       |
| Residence                     |                                 |     |       |          |       |       |
| Urban                         | Ref.                            |     | 0.001 | 1.044    | 1.173 |
| Rural                         | 1.106***                        |     |       |          |       |       |
| Marital status                |                                 |     |       |          |       |       |
| Married                       | Ref.                            |     | 0.003 | 0.541    | 0.882 |
| Partner                       | 0.691***                        |     | 0.000 | 0.573    | 0.796 |
| Widowed                       | 0.675***                        |     | 0.000 | 0.608    | 0.79  |
| Divorced                      | 0.693***                        |     | 0.002 | 0.415    | 0.824 |
| Separated                     | 0.585***                        |     |       |          |       |       |
| Visiting health facility      |                                 |     |       |          |       |       |
| No                            | Ref.                            |     | 0.000 | 1.609    | 1.781 |
| Yes                           | 1.693***                        |     |       |          |       |       |
| Health insurance              |                                 |     |       |          |       |       |
| No                            | Ref.                            |     | 0.000 | 1.117    | 1.239 |
| Yes                           | 1.176***                        |     |       |          |       |       |
| Currently working             |                                 |     |       |          |       |       |
| No                            | Ref.                            |     | 0.000 | 1.088    | 1.208 |
| Yes                           | 1.147***                        |     |       |          |       |       |
| Sex of household head         |                                 |     |       |          |       |       |
| Male                          | Ref.                            |     | 0.177 | 0.857    | 1.029 |
| Female                        | 0.939                           |     |       |          |       |       |

***p < 0.01.
**p < 0.05.
*p < 0.1.

AOR: Adjusted odds ratio, CI: confidence interval.

**Discussion**

In this study, we discussed the gap in the reception of the TT vaccine among women aged 15–49 years in Indonesia by looking at the regional disparities. We also were able to determine the contributions behind the achievement of the TT vaccine coverage in Indonesia as it stands. We found that regional disparities were significantly associated with TT vaccine performance. In addition, the factors of age, education level, wealth quintile, residence, marital status, whether
they visited the health facilities, health insurance, and whether they were currently working also contribute to the TT vaccine coverage among women aged 15–49 years in Indonesia.

Regional disparities are one of the demographic factors that contribute greatly to the TT vaccine coverage among women. Indonesia, which is an archipelago region, can be an inhibiting factor regarding vaccine coverage.36,37 Differences in culture, region, ethnicity, language, knowledge, and access are important factors to consider when seeking to facilitate access to a vaccine.38,39 According to this study, the Bali and Nusa Tenggara regions have a greater chance of administering the TT vaccine to their respective populations than other regions. When viewed according to socio-economic development, Bali and Nusa Tenggara, which are included within Eastern Indonesia, are far behind compared with the Java, Sumatera and Riau.40,41 However, it can be seen in this study that the respondents' awareness of the importance of the TT vaccine is very high. This is consistent with the previous research which states that vaccine coverage can be influenced by region, development, knowledge and self-awareness.42,43

We found that the younger respondents, aged 15–24 years, were less likely to receive the TT vaccine than the respondents who were older (35–49 years old). A previous study showed that age is related to the knowledge of the importance of vaccines and the ability to make decisions.44,45 Therefore, health education is needed among those of a young age about the importance of vaccines. In addition, in this study it is also known that this is less likely for those of a primary education level compared with those with a higher level of education. This is because with a good level of knowledge, TT vaccination coverage can be achieved. In this case, the government and health workers have an important role in distributing knowledge about vaccines to the public. The previous study has shown that vaccine performance is influenced by a good level of knowledge.46,47

In this study, we found that economic status contributed to the achievement of TT vaccine coverage in women. It is known that respondents with a wealth quintile that is higher and those with a job are more likely to receive the TT vaccine compared with the respondents whose economic level is low and who do not work. Previous research has shown that the respondents with a stable income can easily access private and government health facilities and get vaccines.48,49 In addition, the respondents who had health insurance were found to be more likely to receive the TT vaccine. This is because the respondent feels calm that their medical costs will be covered by their health insurance. Previous research has shown that with health insurance, vaccine coverage can increase.50–52

In terms of the rural areas, the study found that the residents of these areas are more likely to receive the TT vaccine. This is related to the obedience of the rural population where doctors, nurses and midwives have been able to gain the trust of the community.53 This closeness is also obtained through the routine outreach process used to engage with the community members.54 The information obtained by the rural residents tends to be more centralized and there is no intervention from other sources such as the internet and minimizing false news; the information will be centered on the doctors, nurses and midwives visited at the health facility as a result. This is in contrast to the urban residents who prefer to obtain their health-related information independently. They tend to compare the results of the information obtained from the internet with that of the doctors, nurses and midwives at the health facilities. The gaps in the information obtained trigger doubts about the TT vaccine and in the end, there is a delay in getting the vaccine even after marriage.

This study found that the women who visit the health facility are more likely to receive the TT vaccine. Visiting the health facility will increase their information and knowledge related to vaccines.55 In addition, each visit can increase their closeness and bond with the health workers. This can convince the women aged 15–49 years old to have the TT vaccine. Routine visits to the health facilities can also overcome obstacles that have previously been a barrier to vaccines, including a lack of knowledge and excessive concern about the side effects of the vaccine. Rumors circulating in the community regarding the TT vaccine can be explained through counselling during visits to the health facilities. One of the rumors is that the content of the vaccine material is not halal, so there is resistance from some women. Health workers like the doctors and nurses are needed to clarify the problem.

Those with a divorced status were found to be less likely to receive the TT vaccine. This is associated by the decrease or non-existence of motivation from a partner. Divorced women do not feel the need to receive the TT vaccine. This is because one of the goals of this vaccine is to reduce the risk of tetanus in women and their unborn baby.56 If they are divorced, there is no need for the TT vaccine. Although the TT vaccine is actually a requirement before marriage takes place, this vaccine can be missed because of the assumption that you have received the vaccine before. There is still the assumption that the vaccine is not necessary.

The strength of our study is that it provides information on the TT vaccine coverage nationally while highlighting the regional disparities in Indonesia. The results of this study can become basic data for the Indonesian government to use to
determine further policies to achieve an improved level of TT vaccine coverage among women. However, this study has limitations in that the researchers looked at the distribution based only on the major islands in Indonesia. Descriptions at the provincial level are needed for the formulation of more specific policies.

**Conclusion**

In this study, we found there to be a gap in the TT vaccine uptake among women aged 49 years old in Indonesia. Indonesia as a whole, which is an archipelago, is one of the considerations and constraints involved in the coverage of the TT vaccine among women. The findings of this study provide an overview about the TT vaccine coverage among women. The government can collaborate across different sectors between the central and local governments to achieve the desired TT vaccine coverage. Providing accurate and precise information about the TT vaccine needs to be promoted by healthcare workers in collaboration with the community through online methods to reach the urban population areas in Indonesia. An in-depth exploration with additional factors and sectors involved is needed in terms of the direction of further research.

**Data availability**

Data used in this study is available online from the Indonesian 2017 Demographic and Health Survey (DHS) website under the ‘Individual Recode’ section. Access to the dataset requires registration and is granted only for legitimate research purposes. A guide for how to apply for dataset access is available at: https://dhsprogram.com/data/Access-Instructions.cfm.

**References**

1. Njuguna HN, Yusuf N, Abid Raza A, et al.: Presidential Report of Maternal and Neonatal Tetanus Elimination—Worldwide, 2000-2018. Morb Mortal Wkly Rep. 2020; 69(17): 515–20. [PubMed Abstract](#) [Publisher Full Text](#) [Full Text](#)
2. Roper MH, Van de Vliet J, Gasse F, et al.: Maternal and neonatal tetanus incidence. Lancet. 2007; 370(9603): 1947-59. [PubMed Abstract](#) [Publisher Full Text](#)
3. World Health Organization: Maternal and Neonatal Tetanus Elimination (MNTE). 2020. [Reference Source](#)

[Full Text](#)
4. Verma R, Khanna P: Tetanus toxoid vaccine: Elimination of neonatal tetanus in selected states of India. Hum Vaccines Immunother. 2012; 8(10): 1439–42. [PubMed Abstract](#) [Publisher Full Text](#)
5. World Health Organization: Maternal Immunization Against Tetanus. 2006. [Reference Source](#)
6. Health Ministry of Republic Indonesia: Minister of Health Regulation number 12 of 2017 concerning Immunization. 2017. [Reference Source](#)
7. Blencowe H, Lawn J, Vandelinde J, et al.: Tetanus toxoid immunization to reduce mortality from neonatal tetanus. Int J Epidemiol. 2010; 39(SUPPL. 1). [PubMed Abstract](#) [Publisher Full Text](#) [Full Text](#)
8. Gebremedhin TS, Welay FT, Mengesha MB, et al.: Tetanus Toxoid Vaccination Uptake and Associated Factors among Mothers Who Gave Birth in the Last 12 Months in Erre’ District, Somali Regional State, Eastern Ethiopia. Biomed Res Int. 2020; 2020. [PubMed Abstract](#) [Publisher Full Text](#) [Full Text](#)
9. Chai F, Prevots DR, Wang X, et al.: Neonatal tetanus incidence in China, 1996-2001, and risk factors for neonatal tetanus, Guangxi Province, China. Int J Epidemiol. 2004; 33(3): 551–7. [PubMed Abstract](#) [Publisher Full Text](#)
10. Gitta, Wabwire-Mangen, Kitimbo, et al.: Risk factors for neonatal tetanus—Busoga region, Uganda, 2002-2003. MMWR Morb Mortal Wrkly Rep. 2006; 55(Suppl 1): 25–30. [PubMed Abstract](#)
11. Sugiarto M, Ristrini: Profil Tetanus Neonatorum dalam Rangka Kebijakan Eliminasi Tetanus Maternal dan Neonatal di Kabupaten Bangkalan Provinsi Jawa Timur, Tahun 2012 – 2014 (Neonatal Tetanus Profiles for Support the of Policy Maternal and Neonatal Tetanus Elimination in Bang. Bul Penelit Sis Kesahat. 2016; 2014(17): 149-56. [Publisher Full Text](#)
12. Singh A, Pallikkadavath S, Opliah R, et al.: Maternal Tetanus Toxoid Vaccination and Neonatal Mortality in Rural North India. PLoS One. 2012; 7(11). [PubMed Abstract](#) [Publisher Full Text](#) [Full Text](#)
13. Health Ministry of Republic Indonesia: Profil Kesehatan Indonesia Tahun 2014. Jakarta: Health Ministry of Republic Indonesia; 2015. [Reference Source](#)
14. Health Ministry of Republic Indonesia: Profil Kesehatan Indonesia Tahun 2015. Jakarta: Health Ministry of Republic Indonesia; 2016. [Reference Source](#)
15. Kementerian Kesehatan R of I: Profil kesehatan Indonesia tahun 2013. Jakarta Kementeri Kesehat RI; 2014. [Reference Source](#)
16. Lawe JG, Berker B, Enweronu-Laryea C, et al.: 3.6 Million Neonatal Deaths-What Is Progressing and What Is Not? Semin Perinatal. 2010; 34(6): 371-85. [PubMed Abstract](#) [Publisher Full Text](#)
17. Data and Information Center: Eliminasi Tetanus Maternal dan Neonatal. Jakarta: Ministry of Health Indonesia; 2012. [Reference Source](#)
18. Badan Pusat Statistik, Macro International: Demographic and Health Survey,USA: BPS and Macro International; 2008. [Reference Source](#)
19. Badan Pusat Statistik, Macro International: Demographic and Health Survey,USA: BPS and Macro International; 2013. [Reference Source](#)
20. Batu City Health Office: Profil Kesehatan Kota Batu tahun 2016. J Chem Information Modeling. 2017. [Reference Source](#)
21. Shafiq Y, Khowaja AR, Yousafzai MT, et al.: Knowledge, attitudes and practices related to tetanus toxoid vaccination in women of childbearing age: A cross-sectional study in peri-urban settlements of Karachi, Pakistan. Infect Prev. 2017; 18(5): 232–41. [PubMed Abstract](#) [Publisher Full Text](#) [Full Text](#)
22. Mislianti AK: Faktor-Faktor Yang Berhubungan Dengan Pemberian Imunisasi Tt Pada Wanita Usia Subur (WUS) Di Puskesmas Kesumadadi Kecamatan Bekri Lampung Tengah. J Kesmas. 2016; 1: 175-83. [Publisher Full Text](#)
23. Meghna A, Ali MA, Kharboshi I: Knowledge and health beliefs of reproductive-age women in Alexandria about tetanus toxoid immunization. J Egypt Public Health Assoc. 2020; 95(1): 1–11. [PubMed Abstract](#) [Publisher Full Text](#) [Full Text](#)
24. Niwa K, Armi Y: Gambaran Pengetahuan Wanita Usia Subur Pra-Nikah Tentang Kecamatan Kelahiran dan Kebutuhan Lima Puluh Kota. J Kesahat STIKes Prima Nusan Kebitlanggi. 2013; 4(1): 68–71. Reference Source

25. World Health Organization: Health education: theoretical concepts, effective strategies and core competencies. Regional Office for the Eastern Mediterranean; 2012. Reference Source

26. Khori A, Rochnah D, Falih A, et al.: Screening Program Evaluation of Tetanus Toxoid Status among Childbearing Women in Jember District in 2010. Kebijak Kesahat Indonesia. 2012; 01(01): 2–6. Reference Source

27. Suhartatik S, Mato R: Faktor Yang Berhubungan Dengan Imunisasi Tetanus Toksoid Pada Wanita Usia Subur Di Puskesmas Mandai Kabupaten Limapuluh Kota. J Kesahat STIKes Prima Nusan Kebitlanggi. 2013; 4(1): 68–71. Publisher Full Text

28. Ayu D, Rosyida C, Latifah A: Gambaran Faktor Yang Memengaruhi Pelaksanaan Imunisasi TT Pada Ibu Hamil. J Kesahat. 2020; 13: 172–179. Publisher Full Text

29. Lupiani M, Ilyas H, Oktiani K: Faktor-Faktor yang Berhubungan dengan Pemberian Imunisasi TT pada Wanita Usia Subur (WUS) di Puskesmas Kesumadadi Kecamatan Bekri Lampung Tengah Tahun 2012. Holistik J Kesahat. 2018; 12(3). Publisher Full Text

30. Kementrian Pendidikan dan Kebudayaan: UU No. 20 Tahun 2003. Jakarta: Badan Pusat Statistik; 2010. Reference Source

31. Croft NT, Marshall AMJ, Allen CK: Guide to DHS Statistics (Version 2). Rockville, Maryland, USA: ICF International; 2018. 2.33 Publisher Full Text

32. Demographic Health Survey: Wealth Quintiles. USAID. 2018. Reference Source

33. BPS: Peraturan Kepala Badan Pusat Statistik Nomor 37 Tahun 2010 Tentang Klasifikasi Perkotaan dan Perdesaan di Indonesia (Head of the Central Statistics Agency Regulation No. 37 Year 2010 About the Urban and Rural Classification in Indonesia). Vol. 2015. Jakarta: Badan Pusat Statistik; 2010. Reference Source

34. Demographic Health Survey. Guide to DHS Statistics DHS-7. 2017. Reference Source

35. von Elm E, Altman DG, Egger M, et al.: The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement: guidelines for reporting observational studies. PLoS Med. 2007; 4(10): e226. PubMed Abstract | Publisher Full Text

36. Malande O, Munube D, Mafay RN, et al.: Barriers to effective uptake and provision of immunization in a rural district in Uganda. Leash J, editor. PLoS One. 2019; 14(2): e0212270. PubMed Abstract | Publisher Full Text | Free Full Text

37. Farisa EC: Kemenkes: Kondisi Geografi Indonesia Jadi Kendala Distribusi Vaksin Covid-19. kompas.com. 2020 Dec 14. Reference Source

38. Sevin AM, Romeo C, Gagne B, et al.: Factors influencing adults’ immunization practices: a pilot survey study of a diverse, urban community in central Ohio. BMC Public Health. 2016; 16(1): 424. PubMed Abstract | Publisher Full Text | Free Full Text

39. Wilson RJ, Paterson P, Jarrett C, et al.: Understanding factors influencing vaccination acceptance during pregnancy globally: A literature review. Vaccine. 2015; 33(47): 6420–9. PubMed Abstract | Publisher Full Text

40. Suparni, Kusumawardani N, Nambiar D, et al.: Subnational regional inequality in the public health development index in Indonesia. Glob Health Action. 2018; 11(sup1): 41–53. PubMed Abstract | Publisher Full Text | Free Full Text

41. Ministry of Health Republic of Indonesia: Ministry of Health Republic of Indonesia. Indonesia; 2018. Reference Source

42. Harapan H, Wagner AL, Yufika A, et al.: Acceptance of a COVID-19 Vaccine in Southeast Asia: A Cross-Sectional Study in Indonesia. Front Public Heal. 2020; 8. PubMed Abstract | Publisher Full Text | Free Full Text

43. Baldoli A, Michon J, Verdon R, et al.: Vaccination perception and coverage among healthcare students in France in 2019. BMC Med Educ. 2020; 20(1): 508. PubMed Abstract | Publisher Full Text | Free Full Text

44. Painter JE, Viana De O, Mesquita S, et al.: Vaccine-related attitudes and decision-making among uninsured, Latin American immigrant mothers of adolescent daughters: a qualitative study. Hum Vaccin Immunother. 2019; 15(1): 121–33. PubMed Abstract | Publisher Full Text | Free Full Text

45. Damjanovic V, Graber J, Illic S, et al.: Parental Decision-Making on Childhood Vaccination. Front Psychol. 2018; 9. PubMed Abstract | Publisher Full Text | Free Full Text

46. Kusrananto K, Arfinin H, Kurniaswati Y: Determinant of BCG vaccine coverage among Indonesian children aged 0–2 months. Child Youth Serv Rev. 2020; 116. Publisher Full Text

47. Mediarti D, Rosnani R, Sukartini T, et al.: Coverage and factors associated with complete polio vaccination among Indonesian children aged 0–18 months. Child Youth Serv Rev. 2020; 118: 105399. Publisher Full Text

48. Chen W, Elam-Evans LD, Hill HA, et al.: Employment and Socioeconomic Factors Associated With Children’s Up-to-Date Vaccination Status. Clin Pediatr (Phila). 2017; 56(4): 348–56. PubMed Abstract | Publisher Full Text | Free Full Text

49. Pasteur S: The Economic Value of Vaccination: Why Prevention is Wealth. J Mark Access Heal Policy. 2015; 3. PubMed Abstract | Publisher Full Text | Free Full Text

50. Blewett LA, Davidson G, Bramlett MD, et al.: The Impact of Gaps in Health Insurance Coverage on Immunization Status for Young Children. Health Serv Res. 2008; 43(Sp1): 1619–36. PubMed Abstract | Publisher Full Text | Free Full Text

51. Tsai Y, Zhou F, Lindley MC: Insurance Reimbursements for Routinely Recommended Adult Vaccines in the Private Sector. Am J Prev Med. 2019; 57(2): 180–90. PubMed Abstract | Publisher Full Text | Free Full Text

52. Seib K, Underwood NL, Gargano LM, et al.: Preexisting Chronic Health Conditions and Health Insurance Status Associated With Vaccine Receipt Among Adolescents. J Adolesc Heal. 2016; 58(2): 148–53. PubMed Abstract | Publisher Full Text

53. WHO: Nursing and Midwifery in the History of the World Health Organization 1948-2017. 2017. 1–102 p. Reference Source

54. WHO: Community health workers: A strategy to ensure access to primary health care services. 2016. 37 p. Reference Source

55. EI KNA, Ibrahim RA, Wadad A: Knowledge and practice of healthcare providers as regards routine children vaccination in primary healthcare facilities of Quewísia District, Menoufia Governorate. Menoufi Med J. 2016; 29(4): 1018. Publisher Full Text

56. Mahmood Awan MT, Harneed T, Arshad MH: Tetanus Toxoid Vaccination coverage and Reason for non-vaccination among females of reproductive age group. Int J Sci Res Publ. 2019; 9(9): p9319.
Open Peer Review

Current Peer Review Status: ✔️❓❓

Version 1

Reviewer Report 19 August 2021

https://doi.org/10.5256/f1000research.56345.r90139

© 2021 Mehanna A. This is an open access peer review report distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Azza Ahmed Aly Mehanna
Health Administration and Behavioral Sciences Department, HIPH, Alexandria University, Alexandria, Egypt

Introduction:

- Paragraph 1, last line: Reference 6 is not in English, and on opening it, it seemed to lack some important details such as the target year for national and regional vaccine coverage of at least 90% and 80% respectively and it (target year) was not mentioned in the manuscript either.

  Also: "as an advanced vaccine", what do you mean?

- Paragraph 2, line 4: Reference 12 is rather old, aren't there more recent updates for these figures?

  Also: "and by 45% after the second dose", I don't think this percentage is correct, infant mortality shows more decrease after the second dose.

- Paragraph 2, line 7: Reference 16 is rather old, try to find more recent data.

- Paragraph 2, lines 7-8: you got the data from DHS 2007, isn't there a more recent DHS? You mentioned DHS 2017 in methodology, why haven't you used it in your review?

- Paragraph 3, line 1: “There are still cases of NT in line with the coverage of the national and regional TT vaccines not yet reaching the target.” This statement is not clear and needs to be rephrased.

- Paragraph 4, lines 1-2: “Women of reproductive age with knowledge of maternal and neonatal tetanus (MNT)”, you probably mean poor knowledge, please clarify.

- Paragraph 4, line 2: “low TT vaccine are 0.435 times more likely to receive the TT”, what do
you mean by low tetanus toxoid vaccine? "0.435 times more likely to receive the TT vaccine": this is not a good interpretation of the odds ratio.

- I found some difficulty checking on some references, e.g references 6 and 27, as they were written in a different language.

**Methods:**

You need to elaborate more on methods as follows:

- Sample, lines 3-4: “We managed to reach 36,028 women aged 15–49 years who have not received the TT vaccine in Indonesia”, how did you reach them? Did you give them questionnaires? Please clarify.

- Why haven’t you been able to study the whole population mentioned (49,627)? Please clarify.

- This sample of women (36,028) comprises those who received and those who did not receive the vaccine according to Table 1 and not only those who have not received the vaccine as you mentioned.

- Sample, line 4: “Two-stage stratified cluster sampling was used”, what are the two stages? Stratified according to what?

**Results:**

- Tables 3 and 4: You don’t need to put *P<0.1 in the footnotes.

- Table 3, last row: Is the value “0.091” the correct value of χ²? Please check.

- Table 3: Why have you calculated percent from total not from independent variable?

- Table 4, line 2: “and health insurance”, it is better to say "and having health insurance".

**Discussion:**

- Paragraph 2, line 2: “Indonesia, which is an archipelago region, can be an inhibiting factor regarding vaccine coverage”. This statement needs rephrasing and clarification.

- Paragraph 2, lines 7-9: “However, it can be seen in this study that the respondents’ awareness of the importance of the TT vaccine is very high. This is consistent with the previous research which states that vaccine coverage can be influenced by region, development, knowledge and self-awareness”:

  - “vaccine coverage can be influenced by region, development”: From the context, it seems that you refer to a direct relationship. However, this contradicts your findings as vaccine coverage in Bali and Nusa Tenggara is high (83.66%), despite having a high percentage of the poorest (48.38%) and a relatively low percentage of the richest (10.94%).

  - "self-awareness": Self-awareness was not studied in this research and it is a totally different concept, I think you mean awareness of the disease and vaccine.
“it can be seen in this study that the respondents' awareness of the importance of the TT vaccine is very high": Awareness of the vaccine and of its importance was not studied in this research, in fact, awareness of the vaccine and of its importance could just be some of the possible factors underlying high coverage rates. You may point to awareness as an inference not as a finding. Please note that awareness of the vaccine is not the same as awareness of the importance of the vaccine.

Paragraph 3: Why do you relate your studied variables as age and education to knowledge and you continue referring to it (knowledge) despite not being studied in this research? In fact, many other variables could underlie and explain high coverage, such as: applying a good coverage policy, life experiences and beliefs, culture, physicians' attitude and behavior regarding vaccine, availability and accessibility of vaccine, and social support/pressure.

Paragraph 3, line 7: “the previous study”, which study? You put two references not one.

Paragraph 4, lines 1-2: “It is known that respondents with a wealth quintile that is higher and those with a job are more likely to receive the TT vaccine compared with the respondents whose economic level is low and who do not work“:

“it is known that”: From where? Opposite findings are displayed in other studies, for example, Mehanna A, Ali MH, Kharboush I: Knowledge and health beliefs of reproductive-age women in Alexandria about tetanus toxoid immunization. J Egypt Public Health Assoc. 2020; 95(1): 1–11 (Reference 23).

Paragraph 4, lines 6-7: “Previous research has shown that with health insurance, vaccine coverage can increase”, this statement may be too simple, it needs rephrasing.

Paragraph 5: You pointed out that residents of rural areas are more likely to receive the TT vaccine, and you attributed that to their obedience to their doctors and nurses. Well, perhaps there are other justifications; maybe physicians in rural areas - who usually work in health units or hospitals affiliated to the ministry of health (MOH) - are more committed to vaccinate or recommend vaccination to their female clients. Maybe females in urban areas rely more on private physicians who may not always adhere to the instructions and regulations of the MOH regarding vaccination.

Paragraph 6: You found that women who visited the health facility were more likely to receive the TT vaccine, then you started explaining your finding. You gave a good interpretation, however, some information was repeated, e.g “Routine visits to the health facilities can also overcome obstacles that have previously been a barrier to vaccines, including a lack of knowledge and excessive concern about the side effects of the vaccine”. This is a repetition of what you have just said. You may rephrase this paragraph to explain your point without redundancy.

Paragraph 7: The same comment as paragraph 6. Please rephrase this paragraph to avoid redundancy.

Paragraph 7, line 4 “Although the TT vaccine is actually a requirement before marriage takes place”, please identify the regulations and policy of the Ministry of Health in Indonesia.
regarding TT vaccination for females.

○ Paragraph 7, line 5 “vaccine can be missed because of the assumption that you have received the vaccine before”, isn't there vaccination cards or records to refer to by the health personnel to make sure that the female client has been vaccinated? Is vaccine given only in health facilities affiliated with the MOH or it may be administered in private clinics? Please clarify.

○ Paragraph 7, lines 5-6: “There is still the assumption that the vaccine is not necessary”, you need to elaborate a little more on this point and identify the rationale beyond this assumption.

Conclusion
○ Line 1: “we found there to be a gap in the TT vaccine uptake among women aged –49 years old in Indonesia”, if you mean the age group 35-49 then this conclusion contradicts your findings as this group is the highest in vaccine uptake. If you mean 15-49 then you need to explain your conclusion, especially that your results (Table 2) and your Discussion ("However, it can be seen in this study that the respondents' awareness of the importance of the TT vaccine is very high") referred to the high TT vaccine coverage rates.

○ Lines 2-3: “Indonesia as a whole, which is an archipelago, is one of the considerations and constraints involved in the coverage of the TT vaccine among women", you need to clarify this point a little.

Is the work clearly and accurately presented and does it cite the current literature?
Partly

Is the study design appropriate and is the work technically sound?
Partly

Are sufficient details of methods and analysis provided to allow replication by others?
Partly

If applicable, is the statistical analysis and its interpretation appropriate?
Partly

Are all the source data underlying the results available to ensure full reproducibility?
Yes

Are the conclusions drawn adequately supported by the results?
Partly

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: Behavioral Sciences, Health promotion, Health Education

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard, however I have
significant reservations, as outlined above.

Reviewer Report 09 August 2021

https://doi.org/10.5256/f1000research.56345.r87930

© 2021 Hardhantyo M. This is an open access peer review report distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Muhammad Hardhantyo

1. Faculty of Health Science, Universitas Respati Yogyakarta, Yogyakarta, Indonesia
2. Center for Health Policy and Management, Faculty of Medicine, Public Health and Nursing, Universitas Gadjah Mada, Yogyakarta, Indonesia

1. Please clarify the sudden increase of pregnant TT vaccine coverage in Indonesia from 2007 to 2008. It was mentioned that the vaccine coverage was 26% in 2007 and significantly increased to 65.2% in 2008. The strategies might benefit to improve the coverage in reproductive age women vaccination also.

2. Please determine the framework or theoretical model to decide the independent variables used in the study.

3. How was the categorization of household wealth determined by the authors of this article?

4. Please clarify the sampling method used in the articles, in the sample section the authors managed to reach 36,028 women aged 15–49 years who have not received the TT vaccine in Indonesia. However, in the results section, the authors found that the coverage of the TT vaccine in Indonesia reached 75.32% out of the 36,028 respondents. Both statements were contradictory.

5. Please explain the process of handling the missing data and whether these might cause a bias in the estimation of parameters.

6. To reduce the number of tables, Tables 1 and 2 could be combined together.

7. Need to add 1 row to correct the position of the p-value and 95% Confidence Interval column in Table 4.

8. Underprivileged communities such as poor, low-educated women, single parents did not have any health insurance and the unemployed were less likely to have received TT vaccination compared to their counterparts. However, an interesting finding in the rural area where rural women are more likely to have received TT vaccination. Authors need to find more explanations and references.

9. Please provide reference to this statement "The information obtained by the rural residents..."
tends to be more centralized and there is no intervention from other sources such as the internet and minimizing false news; the information will be centered on the doctors, nurses and midwives visited at the health facility as a result. This is in contrast to the urban residents who prefer to obtain their health-related information independently. They tend to compare the results of the information obtained from the internet with that of the doctors, nurses, and midwives at the health facilities.

10. In the Discussion section, please have a comment on any current public health efforts from the Indonesian government to increase immunization coverage?

Is the work clearly and accurately presented and does it cite the current literature?
Yes

Is the study design appropriate and is the work technically sound?
Yes

Are sufficient details of methods and analysis provided to allow replication by others?
Partly

If applicable, is the statistical analysis and its interpretation appropriate?
Yes

Are all the source data underlying the results available to ensure full reproducibility?
Yes

Are the conclusions drawn adequately supported by the results?
Yes

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: Health Policy, Epidemiology, Child Health, Maternal Health

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard, however I have significant reservations, as outlined above.
Surabaya, Indonesia

This paper has been written very well, with a structure that is easily understood. However, there is a minor comment that might be considered to improve the quality of the paper:

The interpretation of the logistic regression model is done partially without trying to interrelate the finding on another variable. In this paper, since the authors did not conduct a collinearity test, some findings need to be clarified further. For instance, I guess women in rural areas are mostly without insurance, but the statistical test showed that either women in rural areas or women with insurance are likely to be vaccinated. This finding seems to contradict each other which might be caused by a high degree of correlation between variables (considering the fact that the odds ratio is also very close to 1). If it is difficult to be done, I would suggest that the authors state the assumption of no significant correlation among predictors.

Is the work clearly and accurately presented and does it cite the current literature?
Yes

Is the study design appropriate and is the work technically sound?
Yes

Are sufficient details of methods and analysis provided to allow replication by others?
Yes

If applicable, is the statistical analysis and its interpretation appropriate?
Yes

Are all the source data underlying the results available to ensure full reproducibility?
Yes

Are the conclusions drawn adequately supported by the results?
Yes

**Competing Interests:** No competing interests were disclosed.

**Reviewer Expertise:** Statistical data analysis, econometrics

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard.

---

**Comments on this article**

**Version 1**

Reader Comment 14 Jul 2021
Yohanes Andy Rias, Taiwan Medical University, Taipei, Taiwan

It is an interesting topic where the authors raised the topic of the tetanus toxoid vaccine among women aged 15–49 years in Indonesia. It can be useful information to readers around the world and especially in Indonesia.

**Competing Interests:** None

---

The benefits of publishing with F1000Research:

- Your article is published within days, with no editorial bias
- You can publish traditional articles, null/negative results, case reports, data notes and more
- The peer review process is transparent and collaborative
- Your article is indexed in PubMed after passing peer review
- Dedicated customer support at every stage

For pre-submission enquiries, contact research@f1000.com