

## Antenatal and neonatal visits increase complete immunization status among children aged 12-23 months in rural area of Indonesia

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### Abstrak

**Latar Belakang:** Anak yang memiliki status imunisasi dasar lengkap di daerah pedesaan di Indonesia lebih rendah dibandingkan di perkotaan. Penelitian ini menilai hubungan kunjungan antenatal dan neonatal terhadap status imunisasi lengkap pada anak usia 12-23 bulan di daerah pedesaan Indonesia.

**Metode:** Penilaian menggunakan data Riset Kesehatan Dasar 2013 (Riskesdas). Sub-sampel terdiri dari anak usia 12-23 bulan di daerah pedesaan. Dari 8747 anak umur 12-23 bulan di wilayah pedesaan, 5452 memiliki data yang lengkap untuk dilakukan analisis. Status imunisasi dasar lengkap berdasarkan catatan pada kartu imunisasi dan wawancara. Analisis menggunakan regresi Cox dengan waktu yang konstan.

**Hasil:** Dari 5452 responden, 52,8% (2880/5452) mempunyai imunisasi dasar lengkap. Faktor-faktor dominan yang berhubungan dengan status dasar imunisasi lengkap adalah kunjungan antenatal dan neonatal, indeks kekayaan, pendidikan ibu, dan pekerjaan ibu. Dibandingkan dengan yang tidak melakukan kunjungan antenatal, mereka yang melakukan kunjungan antenatal 38% lebih besar kemungkinan mendapatkan imunisasi dasar lengkap [risiko relatif suaian (RRa) = 1,38; 95% interval kepercayaan (CI) = 1,27-1,50; P = 0,000]. Menurut kunjungan neonatal, mereka yang melakukan kunjungan neonatal 37% lebih besar untuk mendapatkan imunisasi dasar yang lengkap dibandingkan dengan yang tidak melakukan kunjungan neonatal (RRa = 1,37; 95% CI = 1,29-1,46; P = 0,000).

**Kesimpulan:** Anak-anak di pedesaan Indonesia yang melakukan kunjungan antenatal dan neonatal lebih mempunyai kemungkinan mendapatkan imunisasi dasar lengkap. (*Health Science Indones 2014;2:73-7*)

**Kata kunci:** imunisasi dasar lengkap, kunjungan antenatal dan neonatal, pedesaan

### Abstract

**Background:** The children who had complete basic immunization status in rural areas in Indonesia was lower than in urban areas. This study assessed the association of antenatal and neonatal visits with complete immunization status among children aged 12-23 months in rural area of Indonesia.

**Methods:** The assessment used a part data of the 2013 Basic Health Research (Riskesdas). The sub-samples consisted of children aged 12-23 months lived in rural area. Out of the 8747 children aged 12-23 months who lived in rural area, 5452 children had complete data for the analysis. Complete basic immunization status based on record on immunization card and mother's recall. Cox regression analysis with constant time was used for the analysis.

**Results:** Out of 5452 children, 52.8% (2880/5452) had completed the basic immunization. Dominant factors related to basic complete immunization status were antenatal and neonatal visit, wealth index, mother's education, and mother's occupation. Compared with those who did not antenatal visit, those who had antenatal visit had 38% to be more complete basic immunization [adjusted relative risk (RRa) = 1.38; 95% confidence interval (CI) = 1.27 - 1.50; P = 0.000]. In term of neonatal visit, those who had neonatal visit had 37% to be more complete basic immunization compare to those who did not have neonatal visit (RRa = 1.37; 95% CI = 1.29 - 1.46; P = 0.000).

**Conclusion:** In Indonesia rural areas the children who had antenatal and neonatal visits tend to have more complete basic immunization status. (*Health Science Indones 2014;2:73-7*)

**Key words:** complete basic immunization, antenatal and neonatal visits, rural

Immunization has been shown to be one of the most cost effective health interventions against vaccine-preventable diseases. During 2013, nearly 84% of infants were received 3 doses of diphtheria-tetanus-pertussis (DTP3) vaccine, nearly 21.8 million children are still missing out basic immunization.<sup>1,2</sup> In Indonesia, the Expanded Program on Immunization (EPI) routine schedule recommends that infants should be immunized with the following vaccines: one dose of hepatitis B (HB-0) vaccine at birth (or as soon as possible); one dose of Bacillus Calmette-Guerin (BCG) at 4 weeks of age; three doses of diphtheria, pertussis and tetanus (DPT) with hepatitis B (HB) (DPT-HB) at 8, 12 and 16 weeks of age; four doses of oral polio vaccine (OPV) - at 4, 8, 12 and 16 weeks of age; and one dose of measles vaccine at 9 months of age.<sup>3</sup> Therefore, children are expected to be fully immunized by 12 months of age.

The World Health Organization (WHO) suggests that complete vaccination coverage should reach at least 90% of children at the country level. Unfortunately, the Indonesian Demographic and Health Survey (IDHS) 2012 revealed that only 66% of children 12–23 months of age were fully immunized and 7.5% of children did not receive any immunization.<sup>4</sup> The Basic Health Research (Riskesdas) 2013 also showed similar result, which were 59% and 8%.<sup>5</sup>

Besides of low coverage, Indonesia also facing a gap between urban and rural areas. Complete immunization coverage in rural area (53.7%) lower than urban area (64.5%). Improving access to immunization service for the poor is a challenge in developing countries, especially the poor living in remote and rural areas.<sup>6</sup>

Antenatal and neonatal care as well as education to provide knowledge for target populations are recommended to improve immunization coverage.<sup>7</sup> Antenatal and neonatal education during antenatal visits may increase maternal knowledge and, among others, increase immunizations coverage.<sup>8</sup>

In order to assess more specific risk factors related to complete immunization status among children aged 12–23 months in rural area of Indonesia, therefore, it is important to assess the effect of antenatal and neonatal visits and other risk factors to the risk of complete immunization status in rural area.

## **METHODS**

The analysis used a part of data from a national health survey, Basic Health Research (Riskesdas) 2013, and its cited information as follow.<sup>5</sup>

Sampling frameworks of Riskesdas 2013 based on stratified sampling design for 497 districts/cities in Indonesia. Riskesdas 2013 was approved by the Ethical Committee of National Institute of Health Research and Development (NIHRD) Ministry of Health of Republic of Indonesia.

The population was all households in the entire Republic of Indonesia. All households were having equal probability of being included. Respondents were interviewed in the households by trained enumerators. The subjects consisted of 294,959 households, with 1,027,763 respondents, and 82,666 child age under-5 years. The sub-sample included in the analysis was 16021 children aged 12–23 months of which 8747 lived in rural area. For the analysis, 3295 respondents were excluded because of incomplete data, leaving 5452 subjects who had complete data on complete/incomplete basic immunization, antenatal visit as well as neonatal visits.

Data on immunization history was collected either from the records on immunization cards and mother's verbal report. For the child with immunization card, the information on the doses and types of vaccines was copied from the card. In the absence of immunization card, mothers were asked for immunization history of the child including type of vaccine, timing and frequency of the vaccination. Information on other variables was asked directly from the child's mother. Information on other variables was asked directly from the child's mother.

Complete immunized are children between 12–23 months old who received one dose of HB-0, one dose of BCG, at least three doses of DPT-HB (Diphtheria, Pertussis and Tetanus – Hepatitis B), four doses of OPV (Oral Polio Vaccine) and a measles vaccine. Partially immunized are children who missed at least one dose of the ten vaccines. Unimmunized are children who do not receive any dose of the ten vaccines. Partially immunized and unimmunized recoded as not complete immunized for cox regression with constant times and sample weighting factors was used for the analysis.<sup>9</sup>

Neonatal visit refers to children who had visit to health care at least 1 times in first 2 days, at least 1 times in first 7 days and at least 1 times in first 28 days. Father's and mother's educational status were divided into 3 groups (no education, basic education=primary and junior high school, secondary education=senior high school or higher). Father's and mother's occupation were divided into 2 groups (working and not). Residence was divided

into 2 subgroups (urban and rural). Wealth status was divided into 5 subgroups based on wealth quintile.

The Riskesdas 2013 accepted the Indonesia Central Bureau of Statistic (BPS) for definition and criteria. Urban: as the status of a village/*kelurahan* (urban neighborhood) which satisfies the criteria for classification of urban areas (population density, percentage of agricultural households, number of urban facilities). Whereas, the rural areas are the area which do not satisfy the definition for urban areas.

The family's economic status (rich and poor) based on the following manner.<sup>5</sup>

The Riskesdas 2013 used proprietary index for economic status calculation through calculations polychoric correlation (PCA) to the ownership of durable goods, such as houses, cars, motorcycles, bicycles, a refrigerator plus a few other variables. Variables forming the index were: 1) the primary source of water for drinking, 2) cooking fuel, 3) ownership defecation facilities, 4) type of toilet, 5) the final disposal of faces, 6) a source of illumination, 7) motorcycles, 8) TV, 9) water heater, 10) gas cylinder 12 kg, 11) refrigerator, and 12) car. Furthermore, the index has been formed into five quintiles: lowest (quintile 1), lower middle (quintile 2), middle (quintile 3), high (quintile 4), and the highest (quintile 5).<sup>5</sup>

Cox regression analysis with constant times and sample weighting factors using STATA version 12.0 software. for this analysis. Relative risk (RRs) and their 95% confidence intervals (CIs) were calculated.<sup>9</sup> Bivariate analysis was done to identify the crude association between dependent and independent variables. Then, all variables that had  $p < 0.25$  in the bivariate analysis were included as candidate for multivariate Cox regression analysis to determine the dominant factors associated with complete immunization status.<sup>10</sup>

Complete immunization status of the children (records on immunization card and mothers recall) was included in the Cox regression model as a dependent variable, while socio-demographic characteristics of mother and father, child characteristics, residence and household socio-economic status were used as independent variables. Adjusted RRs with their 95% CI were computed to determine the association.

## RESULTS

Table 1 shows that out of 5452 children, 52.8% (2880/5452) had completed the basic immunization. Furthermore, Table 1 also shows that complete immunization status similarly distributed with respect to mother's age and sex of children. Furthermore, compared to the respective reference groups, educated fathers, working fathers, educated mothers, working mothers, and higher socio-economic more likely to have higher risk to complete immunization status.

Table 1. Several socio-demographic characteristics of mothers, fathers and their children related to complete immunization coverage among children aged 12–23 months in rural area of Indonesia

Characteristics	Fully immunized				Crude relative risk	95% confidence interval	P
	No (n=3600)		Yes (n=3221)				
	n	%	n	%			
Father's education							
None	742	61.5	465	38.5	Reference		
Primary	2073	53.4	1808	46.6	1.14	1.03 - 1.25	0.010
Secondary +	785	45.3	948	54.7	1.30	1.17 - 1.44	0.000
Father's occupation							
None	181	62.4	109	37.6	Reference		
Yes	3419	52.4	3112	47.6	1.29	1.06 - 1.57	0.011
Mother's education							
None	814	61.9	500	38.1	Reference		
Primary	2140	52.5	1933	47.5	1.15	1.05 - 1.26	0.004
Secondary +	646	45.0	788	55.0	1.30	1.18 - 1.45	0.000
Mother's occupation							
None	2069	52.5	1871	47.5	Reference		
Yes	1531	53.1	1350	46.9	1.07	1.01 - 1.15	0.021
Mother's age (year)							
<20	81	64.3	45	35.7	Reference		
20-35	2220	53.8	1907	46.2	1.15	0.87 - 1.53	0.333
>35	1299	50.6	1269	49.4	1.29	0.97 - 1.72	0.077
Sex of children							
Male	1803	53.0	1601	47.0	Reference		
Female	1797	52.6	1620	47.4	1.03	0.96 - 1.09	0.395

The final model (Table 2) reveals that dominant factors related to basic complete immunization status were antenatal and neonatal visit, wealth index, mother's education, and mother's occupation. Compared with those who did not antenatal visit, those who had antenatal visit had 38% to be more complete basic

immunization [adjusted relative risk (RRa) = 1.38; 95% confidence interval (CI) = 1.27 - 1.50; P = 0.000]. In term of neonatal visit, those who had neonatal visit had 37% to be more complete basic immunization compare to those who did not have neonatal visit (RRa = 1.37; 95% CI = 1.29 - 1.46; P = 0.000).

Table 2. Neonatal visits and socio-economic factor related to complete immunization coverage among children aged 12–23 months in rural area of Indonesia

Characteristics	Fully immunized				Adjusted relative risk*	95% CI	P
	No (n=3600)		Yes (n=3221)				
	n	%	n	%			
Neonatal visits							
No	1623	76.4	500	23.6	Reference		
Yes	1977	42.1	2721	57.9	2.16	1.95 - 2.43	0.000
Wealth indeks							
Lowest	1374	68.9	621	31.1	Reference		
Second	867	51.7	811	48.3	1.30	1.18 - 1.43	0.000
Middle	577	44.0	734	56.0	1.37	1.24 - 1.51	0.000
Fourth	470	44.7	581	55.3	1.38	1.25 - 1.53	0.000
Highest	312	39.7	474	60.3	1.41	1.26 - 1.57	0.000

\* Adjusted each other between variables listed on this Table, mother's and father's occupation

## DISCUSSION

The study results show, among others, that antenatal and neonatal visit were dominant factors associated with complete basic immunization coverage. This finding is similar with the previous publication that that health care visit during pregnancy and neonatal period would have positive impact on immunization coverage of children.<sup>11,12</sup>

Health providers were seen to be a potential source for disseminating information related to the immunization program. This especially their position as role models in the rural community.<sup>13</sup>

This study finding suggest there was a difference in immunization coverage related to the economic conditions of households. These results similar with previous studies in Burkina Faso.<sup>14</sup> Children in the highest economic quintile have a better immunization coverage rate and a greater probability of being complete basic immunization. It may be difficult for decision makers to control the indirect influence of economic factors on immunization. However, there remains a need to identify all the interactions between the health system and the communities that require money. Thus, large-scale communication about the free services, making them available as close as

possible to limit ancillary costs such as transportation for low income families, and careful monitoring of vaccination procedures should be undertaken to clarify the issue at the community level.

Findings of the study should be interpreted in the light of the following limitations. The validity of data on complete immunization status based on mother's recall has been questioned. The WHO has standardize the measurement for valid immunization using immunization card only.<sup>15</sup> Yet, Indonesia still face on poor health documentation and measurement using immunization card will result in under reporting.

In conclusion, in Indonesia rural areas the children who had antenatal and neonatal visits tend to have more complete basic immunization status. Overall, as a factor with the potential for public health intervention, this study suggests improving the promotion of the importance of immunization during antenatal and neonatal care, especially in rural area.

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