


# The effect of health insurance and socioeconomic status on women's choice in birth attendant and place of delivery across regions in Indonesia: a multinomial logit analysis

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## ABSTRACT

**Background** Evidence suggests that women gave birth in diverse types of health facilities and were assisted by various types of health providers. This study examines how these choices are influenced by the Indonesia national health insurance programme (Jaminan Kesehatan Nasional (JKN)), which aimed to provide equitable access to health services, including maternal health.

**Methods** Using multinomial logit regression models, we examined patterns and determinants of women's choice for childbirth, focusing on health insurance coverage, geographical location and socioeconomic disparities. We used the 2018 nationally representative household survey dataset consisting of 41 460 women (15–49 years) with a recent live birth.

**Results** JKN coverage was associated with increased use of higher-level health providers and facilities and reduced the likelihood of deliveries at primary health facilities and attendance by midwives/nurses. Women with JKN coverage were 13.1% and 17.0% ( $p<0.05$ ) more likely to be attended by OBGYN/general practitioner (GP) and to deliver at hospitals, respectively, compared with uninsured women. We found notable synergistic effects of insurance status, place of residence and economic status on women's choice of type of birth attendant and place of delivery. Insured women living in Java–Bali and in the richest wealth quintile were 6.4 times more likely to be attended by OBGYN/GP and 4.2 times more likely to deliver at a hospital compared with those without health insurance, living in Eastern Indonesia, and in the poorest income quintile.

**Conclusion** There are large variations in the choice of birth attendant and place of delivery by population groups in Indonesia. Evaluation of health systems reform initiatives, including the JKN programme and the primary healthcare strengthening, is essential to determine their impact on disparities in maternal health services.

## INTRODUCTION

Improving access to safe birth settings and skilled professionals is one of the components of health policy to avert maternal

## WHAT IS ALREADY KNOWN ABOUT THIS TOPIC

- ⇒ Health insurance programmes improve healthcare utilisation, including for maternal health services across socioeconomic groups and geographical regions by affecting women's choice in skilled birth attendants and facility-based delivery.
- ⇒ However, higher-level care with specialist birth attendants is mostly available in areas with good access to health services and to more affluent populations.
- ⇒ There is insufficient evidence on the effect of health insurance, socioeconomic status and geographical region on women's choice of type of birth attendant and place of delivery in Indonesia and other low-income and middle-income countries.

## WHAT THIS STUDY ADDS

- ⇒ We found that high-level maternal health services were mainly enjoyed by women living in the most developed regions in Indonesia and from the wealthiest economic group.
- ⇒ There was a notable synergistic effect of insurance status, place of residence and economic status in women's choice of type of birth attendant and place of delivery.
- ⇒ Women with health insurance coverage, living in Java–Bali and in the richest wealth quintile, have the highest probability to be attended by OBGYN/general practitioner during delivery and to deliver at a hospital.

morbidity and mortality in many low-income and middle-income countries (LMICs). Existing studies show that 16%–33% of maternal deaths could be reduced through universal coverage of skilled birth attendance.<sup>1</sup> The place of delivery is also linked to the quality of maternal care. In the context of LMIC, home deliveries are less likely to have favourable maternal and newborn outcomes compared with facility-based

### HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OR POLICY

- ⇒ The expansion of the Indonesia national health insurance programme might inadvertently widen geographical inequities in maternal healthcare use and outcomes.
- ⇒ Increased hospital-based delivery among those insured could pose higher costs to the insurance programme.
- ⇒ Policy development should be geared towards improving the quality of care in the primary healthcare setting to ensure the quality of care and financial sustainability of the health insurance programme and reduce health inequities.

delivery<sup>2-4</sup> due to the higher rate of complications caused by poorer hygiene, limited access to skilled birth attendant (SBA), higher probability of infections as well as limited access to referral health facilities.<sup>4-7</sup> Interventions that improve the coverage and uptake of high-quality maternal care are key to achieving sustainable development goal target 3, which aims to reduce neonatal and maternal mortality to less than 12 per 1000 live births and 70 per 100 000 live births by 2030, respectively.<sup>8</sup>

Indonesia, home to 270 million population, has the largest population and third highest maternal mortality ratio (MMR) in the Southeast Asia region. Despite gradual improvement over the last decades, Indonesia's MMR at 177 per 100 000 in 2017 was higher than countries with similar economic development levels.<sup>9</sup> There are also large variations in maternal outcomes across regions in Indonesia. For example, MMR in Java-Bali—the most developed region in Indonesia—is substantially lower (147 per 100 000) compared with the other regions, particularly the Eastern islands (489 per 100 000).<sup>10</sup> Such inequities may relate to the fact that rural and less developed areas have significantly lower health workers and health facilities to population ratio, particularly ones that are equipped for safe deliveries and the management of delivery complications.<sup>11-13</sup>

The Indonesian government has introduced a series of policies for primary care strengthening to improve outcomes and reduce health inequalities. As the primary health centres (PHCs) are available in all Indonesian districts and are relatively more cost-efficient than hospitals, the intention of such policy is to provide good quality health services and reach the majority of the population in the most efficient way. A similar approach was also integrated into the Indonesia national health insurance programme (Jaminan Kesehatan Nasional (JKN)). Introduced in 2014, the programme aims to cover all populations and increase access to quality health services including maternal and child health,<sup>14 15</sup> and help achieve universal health coverage (UHC). Under the JKN regulation, all normal deliveries should take place at primary health facilities. Hospitals should only be used for referral cases of pregnancies and deliveries with complications or in areas

where there are no available primary health facilities that are equipped to provide the services.<sup>16</sup>

However, around 20% of delivery-associated JKN reimbursement at the hospital level was for normal deliveries,<sup>17</sup> which translates to around US\$42 million spent for services that could essentially be delivered at the primary healthcare settings.<sup>16</sup> Anecdotal evidence indicated that this might be due to incorrect referrals and bypassing of the referral system due to the lack of confidence of the patients in the quality of care provided at primary health facilities,<sup>18-22</sup> particularly among urban population and those from the wealthier economic background. This may be due to perceived low quality among pregnant women towards primary health facilities,<sup>23 24</sup> which is in line with a recent World Bank study<sup>25</sup> where most Indonesia PHCs have limited basic amenities and SBAs compared with secondary healthcare facilities.<sup>25 26</sup>

Previous studies have generally shown variations in the clinical competence and quality of maternal care and health outcomes across different types of birth attendants. An evaluation study conducted in 5 LMICs involving 1524 SBAs revealed that physicians scored higher in knowledge and skills tests related to obstetric care compared with other health cadres, including midwives and nurses.<sup>27</sup> Similar findings were also shown in countries such as Cambodia, Tanzania and Afghanistan.<sup>28-30</sup> However, other studies show favourable maternal health outcomes for obstetric nurses in Mexico.<sup>31</sup> In the Indonesian context, previous studies and a World Bank report show that midwives may have limited training in several key competencies<sup>32-34</sup> and are usually assigned to health facilities with more limited infrastructure compared with physicians.

Few studies in Indonesia examined factors associated with skilled birth attendance and facility-based delivery.<sup>35-38</sup> For instance, Efendi *et al*<sup>39</sup> found that high wealth quintile, educational attainment and residing in urban predict childbirth in health facilities. However, these studies have not examined the important heterogeneity in different choices of types of providers nor the levels of health facilities, such as delivery at home, primary care or hospital settings. Analysing data from 41 460 women, our study aims to assess the effect of JKN, the largest single-payer public health insurance in the world, on the choice of different types of SBA and levels of health facilities and how the effect may vary across the socioeconomic groups and regions in Indonesia.

## METHODS

### Data

This study used the Indonesian National Socioeconomic Survey (Susenas) 2018, conducted by the Indonesia National Bureau of Statistics. Susenas is a nationally representative, a multistage stratified survey that collects socioeconomic and health information.

Importantly, Susenas includes a specific subsection that measures healthcare utilisation of women aged 15–49 years, including healthcare use during pregnancy and delivery. The original sample of the 2018 Susenas included 285 400 households and 1 098 260 individuals. This study focused on women aged between 15 and 49 years who had a delivery within 24 months prior to the survey. After excluding observations with missing values (1.6%), 41 460 most recent birth histories from women from 34 provinces of Indonesia were included in our analysis (see also online supplemental appendix 1 for sample flowchart).

This study did not seek a full review from an institutional review board as this manuscript used secondary data analyses using a dataset that is publicly available and contains no personal identifications of the survey participants.

Our main outcome variables are the choices of delivery made by women in their most recent delivery, including the types of (a) birth attendant who assisted during the delivery and (b) the place of delivery.

For the types of birth attendant, the alternatives were: (1) an obstetrician/gynecologist (OBGYN) or a general practitioner (GP); (2) a midwife or a nurse; or (3) a traditional birth attendant (TBA) or other non-health birth attendant. Other non-health birth attendants could include a family member or no assistance at all. And the alternatives for choice of place of delivery were: (1) hospital (including secondary and tertiary hospitals and either of private or public entity); (2) higher primary health facility (including public PHCs or private delivery clinics); (3) lower primary health facility (including auxiliary PHCs or a midwife clinic); and (4) home or non-health facility delivery. The Susenas did not distinguish between public and private health facilities.

### Patient and public involvement

This study used a secondary dataset that is publicly available. No direct patient involvement in the design and implementation of the study.

### Statistical approach

In this study, a multinomial logit regression model was used to investigate factors associated with medical provider selection. McFadden<sup>40</sup> developed the model to better understand rational consumer choices in the economic literature. In health service research, the multinomial logit model is increasingly being used to understand patient choices and medical decisions. The multinomial model is applied to a discrete dependent variable that accepts multinomial unordered outcomes from individual patients. For the purpose of this study, individual patients' choices of medical providers were defined in our study as two sets (one for types of birth attendants, another for place of delivery) of binary variables indicating which alternative ( $j=1, \dots, m$ ) each

individual ( $i=1, \dots, n$ ) selects. In our analysis,  $j$  represents the various options for:

Birth attendant:

- $$j = \begin{cases} 1 & \text{OBGYN/GP} \\ 2 & \text{Midwife/nurse} \\ 3 & \text{Traditional birth attendant (TBA) or} \\ & \text{other non-health birth attendant} \end{cases}$$

And the place of delivery:

- $$j = \begin{cases} 1 & \text{Secondary-level health facility(hospital)} \\ 2 & \text{Higher primary-level health facility} \\ 3 & \text{Lower primary-level health facility} \\ 4 & \text{Home delivery} \end{cases}$$

The choices made by pregnant women depend on their characteristics and perceived benefits from the different types of delivery care. In other words, a pregnant woman chooses her delivery attendant (or place of delivery) given her insurance coverage status, income, education, her place of residence other features such as cultural preferences.<sup>41–43</sup> It is important to note that this study did not attempt to capture the effect of women's autonomy in choosing and deciding where to deliver, but rather to assess how the status of women's insurance coverage may affect the utilisation of different types of birth attendants and place of delivery.

As the nature of the alternatives available in this study is multicategory and dissimilar from one another, we applied the multinomial logit regression. This approach has been commonly used in health service research.<sup>42–44</sup> The probability of a woman choosing an alternative  $j$  can be estimated using the following equation:

$$\text{Prob}(\text{Option}_j | X_{ij}) = \frac{\exp(\beta_j X_{ij})}{\sum_{k=0}^3 \exp(\beta_j X_{ik})} \quad (5)$$

We presented results from multinomial logit using relative risk ratio (RRR), controlling for all other covariates included in the analyses. We applied survey weighting to account for the sampling strategy used in the Susenas. All analyses were conducted using Stata SE V.15.

### Independent variable

Our primary independent variables of interest are the enabling variables including women's insurance status, type and region of residency and economic status. Three main types of health insurance ownership in Indonesia are those covered by government-organised national health insurance (JKN), private insurance providers and no insurance coverage. Women's economic status is measured by using the household's total expenditure per capita and converted into quintiles. The type of residency is denoted as urban or rural. We are also interested in assessing how the regions of residence affect the choices made by pregnant women in deciding who would assist with their deliveries and where to give birth. Java–Bali

**Table 1** Sample characteristics by types of providers and place of delivery, 2018

Variable	Total N=41 460	Types of providers			Types of the place of delivery			
		Obstetrician/ gynecologist or general practitioner (%) n=12 108 (29.2%)	Midwife or nurse (%) n=24 862 (59.9%)	Traditional birth attendant and other non-skilled attendant (%) n=4490 (10.8%)	Secondary facility (%) n=12 891 (31.1%)	Higher primary (%) n=12 451 (30.0%)	Lower primary (%) n=5865 (14.1%)	Home or other non-health facilities (%) n=10 559 (25.5%)
Wealth quintile								
Poorest	25.68	19.20	68.75	12.05	19.85	31.69	22.88	25.58
Poor	22.10	25.03	67.62	7.34	26.37	34.32	18.81	20.50
Middle	19.80	30.94	63.95	5.11	31.87	35.38	16.06	16.70
Rich	17.03	42.50	54.91	2.60	41.34	33.58	13.81	11.27
Richest	15.21	61.10	37.86	1.04	58.37	29.15	7.77	4.71
Insurance status								
No insurance	30.22	20.69	69.49	9.83	18.72	34.11	21.69	25.48
Jaminan Kesehatan Nasional	63.83	36.52	58.27	5.21	37.77	32.88	15.12	14.23
Private insurance	5.95	60.40	38.68	0.92	57.57	27.64	9.74	5.05
Residency								
Rural	46.33	24.10	65.17	10.74	24.33	28.28	19.78	27.61
Urban	53.67	40.97	56.46	2.57	40.84	36.96	14.20	8.00
Region								
Java–Bali	52.57	36.88	59.12	4.01	35.12	35.88	19.14	9.85
Sumatra	24.23	31.66	62.87	5.47	30.54	29.98	17.48	22.00
Kalimantan	6.80	27.54	63.67	8.79	31.82	28.94	11.93	27.76
Sulawesi	8.43	29.37	62.54	8.10	33.55	32.16	9.20	25.08
Eastern Indonesia	7.97	21.93	57.47	20.60	29.31	27.14	11.29	32.27
Education								
None	6.68	24.60	58.34	17.06	26.03	28.66	14.79	30.53
Primary	20.99	20.33	67.51	12.17	20.85	30.02	20.68	28.45
Secondary	57.16	33.18	63.10	3.72	33.12	35.69	17.80	13.39
Post secondary	15.16	54.58	41.91	3.51	53.68	28.50	8.45	9.36
Women's work status								
Not working	66.90	31.10	62.47	6.43	31.19	33.93	17.37	17.51
Working	33.10	37.30	56.50	6.20	37.24	30.94	15.60	16.22
Maternal age								
<20 years	5.50	22.31	66.38	11.31	23.61	29.49	21.28	25.62
20–25 years	28.75	29.64	64.17	6.19	29.61	34.99	17.71	17.68
26–35 years	51.52	34.86	59.27	5.88	34.49	33.29	16.34	15.88
36+ years	14.23	38.27	55.24	6.49	39.43	28.86	14.78	16.93
Marital status								
Not married	1.68	25.60	61.97	12.43	24.78	34.84	17.50	22.88
Married	98.32	33.28	60.47	6.25	33.34	32.91	16.77	16.99
Weighted for survey design.								

region—the most developed region—has much better access to higher quality health services, as opposed to other regions such as Sulawesi or Eastern Indonesia.<sup>11</sup>

Other independent variables include the sociodemographic characteristics: maternal age (less than 20 years, 20–25 years, 26–35 years and 35+), marital status (currently married or not), the education level (no education, primary, secondary and postsecondary

education) and occupation status (working or not working).

We could not include variables on pre-existing medical conditions of the pregnant women or known risk factors for delivery complications as the Susenas survey does not collect such information.

As this study is a collaboration between researchers from LMICs and high-income countries and to promote

equitable authorships, we included our reflexivity statement in online supplemental appendix 2.

## RESULTS

### Descriptive analysis

Of the 41 460 women who recently gave birth, 12 108 (29.2%) chose to be assisted by OBGYN/GP, 24 862 (59.9%) by midwife/nurse and 4490 (10.8%) chose TBA or other non-skilled attendants. The majority of women chose to deliver at a secondary facility (31.1%) followed by higher primary health facility (30.0%), home delivery (25.5%) and lower primary health facility (14.1%).

Sample characteristics are presented in table 1. A large proportion of women were covered by JKN (63.3%), lived in the Java–Bali region (52.6%), had secondary-level

education (57.2%), were not working (66.9%), aged between 26 and 35 (51.5%) and were currently married (98.3%).

### Factors associated with the choice of type of birth attendant

Table 2 presents the RRRs from the multinomial logit model for each alternative given a particular determinant or women's characteristics for the choice of birth attendant (see also online supplemental appendix 3 for the logit results). We found an increasing relative risk for choosing OBGYN/GP and midwife/nurse over TBA as wealth status increases. The relative risks of choosing OBGYN/GP and midwife/nurse versus TBA were 12.3 and 3.3, respectively, for women in the richest wealth quintile compared with the poorest. Having insurance

**Table 2** Relative risk ratio (RRR) (95% CI) for the multinomial logistic regression fitted for the choice of birth attendant

Variable	Obstetrician/gynecologist or general practitioner versus TBA/other non-skilled		Midwife/nurse versus TBA/other non-skilled	
	RRR	95% CI	RRR	95% CI
Wealth quintile (ref: poorest)				
Poor	1.60***	(1.35 to 1.89)	1.28**	(1.11 to 1.48)
Middle	2.40***	(1.93 to 2.99)	1.58***	(1.30 to 1.94)
Rich	5.55***	(4.22 to 7.32)	2.51***	(1.93 to 3.27)
Richest	12.29***	(8.01 to 18.87)	3.33***	(2.18 to 5.09)
Insurance status (ref: no insurance)				
Jaminan Kesehatan Nasional	2.91***	(2.52 to 3.36)	1.57***	(1.38 to 1.78)
Private insurance	6.50***	(3.13 to 13.51)	2.36*	(1.15 to 4.87)
Residency (ref: rural)				
Urban	2.97***	(2.41 to 3.66)	2.32***	(1.90 to 2.85)
Region of residence (ref: Java–Bali)				
Sumatra	0.74**	(0.61 to 0.90)	0.89	(0.74 to 1.08)
Kalimantan	0.35***	(0.28 to 0.45)	0.56***	(0.45 to 0.70)
Sulawesi	0.59***	(0.47 to 0.75)	0.72**	(0.58 to 0.90)
Eastern Indonesia	0.19***	(0.16 to 0.23)	0.28***	(0.24 to 0.33)
Education (ref: no education)				
Primary	1.06	(0.84 to 1.33)	1.42***	(1.18 to 1.71)
Secondary	3.51***	(2.78 to 4.45)	3.35***	(2.73 to 4.10)
Post-secondary	3.67***	(2.81 to 4.79)	2.14***	(1.69 to 2.71)
Women's work status (ref: not working)				
Working	0.85*	(0.74 to 0.97)	0.92	(0.82 to 1.04)
Maternal age (ref: <20 years)				
20–25 years	1.55**	(1.15 to 2.10)	1.49**	(1.15 to 1.94)
26–35 years	1.63**	(1.22 to 2.18)	1.39**	(1.09 to 1.79)
36+ years	2.45***	(1.80 to 3.34)	1.51**	(1.16 to 1.98)
Marital status (ref: not married)				
Married	1.46	(0.99 to 2.15)	1.52**	(1.11 to 2.08)

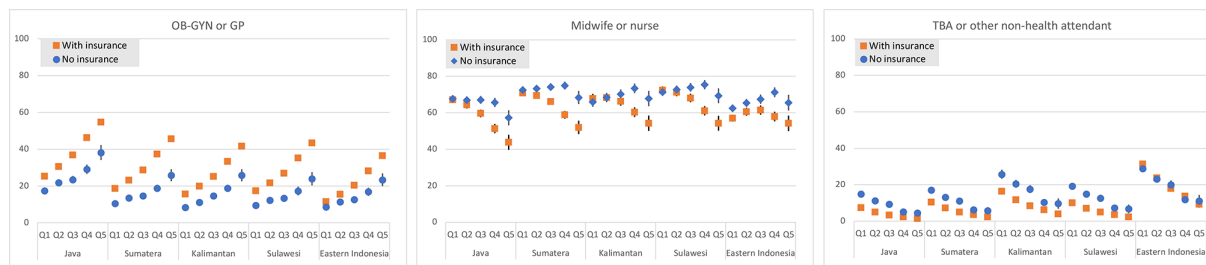
Weighted for survey design; \*significant at 10%; \*\* significant at 5%; \*\*\*significant at 1%. TBA to traditional birth attendant.

coverage was also associated with statistically significant higher likelihood in using SBA over a TBA. Compared with those with no insurance coverage, women who were covered by the JKN were 2.9 (95% CI 2.5 to 3.4) and 1.6 (95% CI 1.4 to 1.8) more likely to choose OBGYN/GP and midwife/nurse, respectively, over TBA. Higher RRR for choosing OBGYN/GP (RRR=6.50, 95% CI 3.1 to 13.5) and midwife/nurse (RRR=2.4, 95% CI 1.2 to 4.9) over TBA was observed for women with private health insurance compared with no insurance.

We present the predicted probabilities based on the multinomial logit regression in table 3. Health insurance coverage increased the probability of choosing OBGYN/GP from 22.4% to 35.5% (for JKN) and to 45.3% (for private insurance). Those with any insurance coverage also have a lower probability of choosing a midwife/nurse or TBA compared with uninsured women. For instance, the probability for choosing TBA was 3.0% for JKN and 1.7% for private insurance, compared with 5.6% among uninsured women.

**Table 3** Predicted probability of patient choice of different delivery providers

Variable	Types of providers		
	Obstetrician/gynecologist or general practitioner (%)	Midwife or nurse (%)	Traditional birth attendant and other non-skilled attendants (%)
Wealth quintile			
Poorest	22.01	71.56	6.44
Poor	26.35	68.83	4.83
Middle	30.63	65.64	3.73
Rich	39.62	58.29	2.09
Richest	52.51	46.24	1.25
Insurance status			
No insurance	22.38	72.02	5.59
Jaminan Kesehatan Nasional	35.45	61.51	3.04
Private insurance	45.27	52.99	1.74
Residency			
Rural	28.30	65.97	5.74
Urban	34.59	63.05	2.36
Region of residence			
Java–Bali	34.65	62.51	2.84
Sumatra	30.37	66.26	3.37
Kalimantan	24.49	69.83	5.68
Sulawesi	29.92	65.92	4.16
Eastern Indonesia	24.57	64.89	10.55
Education			
None	29.16	62.51	8.33
Primary	24.16	69.32	6.53
Secondary	32.01	65.38	2.60
Post-secondary	42.94	53.72	3.34
Women's work status			
Not working	32.29	64.25	3.46
Working	30.49	65.68	3.84
Maternal age			
<20 years	27.87	66.90	5.23
20–25 years	29.16	67.31	3.52
26–35 years	31.60	64.77	3.63
36+ years	39.07	57.95	2.99
Marital status			
Not married	32.05	62.71	5.24
Married	31.68	64.76	3.56
Weighted for survey design.			



**Figure 1** Predicted probability of patient choice of different birth attendants, by insurance status. OB-GYN, obstetrician/gynecologist; GP, general practitioner; TBA, traditional birth attendant.

Women living in urban areas were more likely to be attended by OBGYN/GP over TBA relative to rural residents (RRR=2.9, 95% CI 2.4 to 3.7). The probability of choosing TBA is also higher for women in Eastern Indonesia (10.6%) compared with other regions such as Java–Bali (2.8%) or Sumatera (3.4%).

The combined effect of insurance coverage, region of residence and wealth status on the choice of birth attendant is presented in figure 1. The coverage of health insurance increased the probability of having an OBGYN/GP across the regions. The synergistic effect of the insurance coverage, region of residence and economic deprivation was notably large. For example, women who were insured, living in the Java–Bali region and from the richest wealth quintile had the highest probability of choosing OBGYN/GP (54.7%) compared with uninsured women who live in Eastern Indonesia and from the poorest wealth quintile (8.6%). In contrast, the lowest probability of choosing TBA was among insured women, living in Java–Bali and in the richest wealth quintile (1.5%) as opposed to their uninsured, poorest and living in Sulawesi region counterparts (2.3%). Interestingly, the insurance coverage had little effect in choosing a TBA for women living in Eastern Indonesia.

Region of residence played a significant role in the choice of types of birth attendant. The probability of choosing an OBGYN/GP is higher for women living in the Java–Bali region and were from the richest wealth quintile (54.7%) compared with women in the richest wealth quintile who were also insured but live in the less-developed region of Eastern Indonesia (36.5%).

### Factors associated with the choice of place of delivery

The RRR for the multinomial logit regressions and the predicted probability for types of place of delivery is presented in tables 4 and 5 (see also online supplemental appendix 4 for the logit results), respectively. Economic status was associated with choosing hospitals and higher primary health facilities over home delivery, with increasing likelihood as the women’s economic status increases. There was no significant association between choosing a lower primary health facility over home delivery and women’s economic status.

Women’s insurance status was also associated with the choice of place of delivery. Compared with no insurance,

those with insurance coverage (either JKN or private) were more likely to choose hospital over home delivery (RRR 3.3 and 4.8, respectively) (table 4). Those with any insurance coverage have a lower probability of choosing home delivery (10.7% for JKN and 8.9% for private insurance) compared with 19.7% probability for women with no insurance coverage (table 5). Similar to the choice of birth attendant, women with JKN and private insurance coverage had higher probabilities of choosing hospital delivery (38.3% and 45.8%, respectively) compared with only 21.3% for uninsured women. The variations in the predicted probability for choosing higher or lower primary health facilities were smaller across the women’s characteristics.

The RRR for hospital delivery, higher and lower primary health facility over home delivery were 2.9, 2.9 and 1.7, respectively, for women living in urban areas compared with their rural counterparts. Women living in regions outside Java–Bali were less likely to choose hospital delivery over TBA. Home delivery was also more likely for women living in Eastern Indonesia (21.9%) and Kalimantan (23.9%) compared with other regions such as Java–Bali (8.7%), Sumatera (18.0%) and Sulawesi (18.2%).

Figure 2 shows the synergistic effect of insurance status, region and economic status on the choice of place of delivery. Across the regions, insurance coverage increased the likelihood of having hospital-based delivery and in general, decreased the likelihood of choosing primary health facilities as the place of delivery. As wealth status improves, the effect of having insurance coverage on choosing hospital delivery also increased significantly. The combination of insurance coverage, wealth status and region affects the choice of having home delivery. The lowest probability was observed among insured women in the richest quintile who live in urban Java–Bali (2.3%), while the highest was among poor uninsured women living in Kalimantan (48.3%).

## DISCUSSION

### Main findings

Using data from 41 460 childbirth delivery from 34 provinces in Indonesia, we found substantial variations in choice for types of birth attendant and place of delivery by socioeconomic status, geographical region and health

**Table 4** Multinomial logit results for choice of levels of facilities

Variable	Hospital versus home/ others		Higher primary health facility versus home/others		Lower primary health facility versus home/others	
	RRR	95% CI	RRR	95% CI	RRR	95% CI
Wealth quintile (ref: poorest)						
Poor	1.41***	(1.24 to 1.61)	1.18**	(1.05 to 1.33)	0.92	(0.81 to 1.05)
Middle	1.84***	(1.59 to 2.14)	1.37***	(1.18 to 1.58)	0.93	(0.79 to .108)
Rich	2.06***	(2.64 to 3.56)	1.80***	(1.55 to 2.09)	1.14	(0.96 to 1.35)
Richest	6.32***	(5.14 to 7.78)	2.56***	1.07 to 3.15)	1.24	(0.97 to 1.60)
Insurance status (ref: no insurance)						
Jaminan Kesehatan Nasional	3.31***	(2.97 to 3.68)	1.72***	(1.56 to 1.90)	1.34***	(1.20 to 1.49)
Private insurance	4.77***	(3.55 to 6.42)	1.83***	(1.34 to 2.49)	1.47*	(1.03 to 2.09)
Residency (ref: rural)						
Urban	2.97***	(2.63 to 3.35)	2.93***	(2.60 to 3.31)	1.74***	(1.52 to 2.00)
Region of residence (ref: Java–Bali)						
Sumatra	0.43***	(0.38 to 0.49)	0.43***	(0.38 to 0.49)	0.44***	(0.39 to 0.51)
Kalimantan	0.33***	(0.28 to 0.39)	0.31***	(0.27 to 0.37)	0.25***	(0.21 to 0.30)
Sulawesi	0.51***	(0.44 to 0.59)	0.47***	(0.41 to 0.55)	0.22***	(0.18 to 0.26)
Eastern Indonesia	0.41***	(0.35 to 0.47)	0.35***	(0.30 to 0.40)	0.22***	(0.19 to 0.26)
Education (ref: no education)						
Primary	0.78**	(0.66 to 0.94)	0.94	(0.80 to 1.12)	1.16	(0.95 to 1.41)
Secondary	1.88***	(1.59 to 2.23)	1.89***	(1.60 to 2.23)	1.94***	(1.60 to 2.35)
Post secondary	2.71***	(2.23 to 3.29)	1.89***	(1.55 to 2.31)	1.42**	(1.12 to 1.81)
Women's work status (ref: not working)						
Working	0.84**	(0.76 to 0.93)	0.86**	(0.78 to 0.94)	1.00	(0.90 to 1.12)
Maternal age (ref: <20 years)						
20–25 years	1.22	(0.99 to 1.52)	1.40**	(1.14 to 1.71)	1.11	(0.89 to 1.38)
26–35 years	1.37**	(1.11 to 1.69)	1.40**	(1.15 to 1.70)	1.10	(0.89 to 1.37)
36+ years	1.95***	(1.55 to 2.44)	1.38**	(1.12 to 1.71)	1.07	(0.85 to 1.35)
Marital status (ref: not married)						
Married	1.15	(0.84 to 1.57)	1.01	(0.74 to 1.38)	1.13	(0.80 to 1.61)

Weighted for survey design; \*significant at 10%; \*\* significant at 5%; \*\*\*significant at 1%. RRR, relative risk ratio.

insurance status in Indonesia. Our results indicate that health insurance coverage (both JKN and private health insurance) was associated with increased use of higher-level health providers and facilities and reduced the likelihood of choosing to be attended by a midwife/nurse or to deliver at primary health facilities. Specifically, women who are enrolled in the health insurance scheme are more likely to be attended by an OBGYN/GP (increases from 22.4% to 35.5% for JKN and to 45.3% for private insurance), while the probability of visiting midwife/nurse decreases from 72.0% to 61.5% (JKN) and to 53.0% (private insurance). Health insurance coverage also increases the probability of having a hospital delivery, from 21.3% to 38.3% (JKN) and to 45.8% (private insurance). Conversely, having insurance coverage also decreases the probability of delivering at

a higher primary health facility, from 38.2% to 35.8% (JKN) and 31.5% (private insurance).

Our results also indicate that high-level healthcare utilisation was mainly enjoyed by women living in Java–Bali and from the richest wealth quintile. Living in urban areas or Java–Bali increased the probability of being attended by an OBGYN/GP during delivery and having delivered at a hospital compared with other regions of Indonesia. Furthermore, compared with the poorest wealth quintile, being in the richest wealth quintile increased the probability of having attended by OBGYN/GP from 22.0% to 52.5%. Women from the richest wealth quintile also had higher probability at 51.5% of having hospital-based delivery, compared with only 23.2% among women from the poorest wealth quintile.



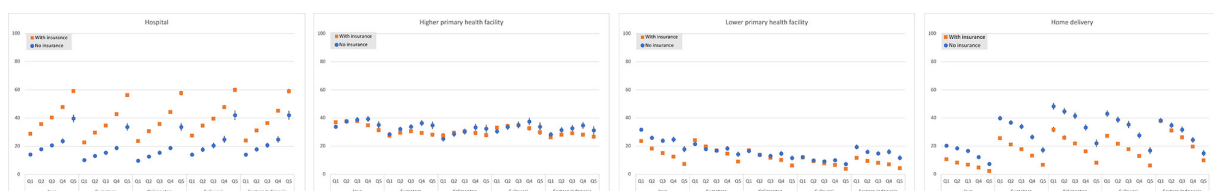
**Table 5** Predicted probability of patient choice of level of health facilities

Variable	Levels of facilities			
	Secondary facility (%)	Higher primary (%)	Lower primary (%)	Home or other non-health facilities (%)
<b>Wealth quintile</b>				
Poorest	23.24	36.03	22.91	17.82
Poor	28.77	37.19	18.46	15.59
Middle	32.66	37.58	16.17	13.59
Rich	39.52	36.06	14.53	9.89
Richest	51.50	32.28	9.97	6.24
<b>Insurance status</b>				
No insurance	21.25	38.12	20.99	19.65
Jaminan Kesehatan Nasional	38.26	35.77	15.26	10.70
Private insurance	45.78	31.45	13.90	8.87
<b>Residency</b>				
Rural	28.44	31.99	19.54	20.03
Urban	36.33	40.39	14.65	8.62
<b>Region of residence</b>				
Java–Bali	33.41	38.17	19.69	8.73
Sumatra	29.87	34.07	18.03	18.02
Kalimantan	29.98	32.75	13.41	23.86
Sulawesi	35.39	37.52	8.91	18.18
Eastern Indonesia	33.94	33.21	10.96	21.89
<b>Education</b>				
None	30.58	34.62	15.75	19.05
Primary	25.51	34.77	19.46	20.27
Secondary	33.34	37.92	17.70	11.04
Post-secondary	43.65	34.51	11.80	10.03
<b>Women's work status</b>				
Not working	33.68	37.42	16.40	12.50
Working	31.72	35.88	18.42	13.97
<b>Maternal age</b>				
<20 years	30.30	33.84	19.57	16.29
20–25 years	30.35	38.63	17.69	13.32
26–35 years	32.70	37.36	17.07	12.86
36+ years	41.23	32.74	14.65	11.38
<b>Marital status</b>				
Not married	30.89	39.04	16.16	13.91
Married	33.08	36.89	17.07	12.96

Weighted for survey design.

We also found a notable synergistic effect of insurance status, place of residence and economic status in women's choice of type of birth attendant and place of delivery. Women with health insurance coverage, living

in Java–Bali and in the richest wealth quintile have the highest probability of being attended by OBGYN/GP during delivery and to deliver at a hospital. Conversely, women who are in the poorest wealth quintile, without


**Figure 2** Predicted probability of patient choice of different health facilities, by insurance status.

any health insurance coverage and living in Eastern Indonesia had the highest probability of being attended by a non-skilled provider. Home delivery was most likely for women living in Kalimantan, not insured and from the poorest wealth quintile.

### Comparison with literature

Our results confirm the findings of previous studies about the impact of the health insurance policies on the choice of birth attendance and place of delivery in Indonesia and other LMICs.<sup>41 45–48</sup> Our results showing variations in the choice of birth attendant and place of delivery across socioeconomic groups and geographical regions support the notion that socioeconomic deprivation manifest as inequity in accessing high-quality maternal health services. More deprived groups tend to deliver at home or at lower primary health facilities with less-competent providers,<sup>48</sup> which potentially lead to poorer health outcomes. According to a recent report by the World Bank, the ability of public PHCs in Indonesia in providing basic emergency obstetric and neonatal care services is very low.<sup>25</sup> For instance, only 48% of the sampled health centres could perform the procedure to remove retained products or tissues, meaning that if postpartum haemorrhage occurred and was caused by retained placental fragments, half of these facilities would not be able to handle the complication. Furthermore, the survey also found urban–rural variations in the PHCs' capacity in managing maternal delivery services.

Our findings also support previous studies in Indonesia showing that health insurance coverage expansion alone may not be sufficient in improving equitable utilisation of quality skilled birth attendance, particularly for people residing in rural areas.<sup>49–51</sup> Indirect costs of treatment, such as travel costs and long travel time to health facilities, posed additional burdens to not only patients but also their families.<sup>50 51</sup> Erlyana *et al*, using the third wave of the Indonesia Family Life Survey, found that the uninsured rural population was more sensitive to out-of-pocket costs related to commuting distance than the medical cost itself.<sup>50</sup> A qualitative study in rural India also reveals that the introduction of the Janani Suraksha Yojana (JSY) programme was ineffective to motivate women to deliver at health facilities due to the distance to the health facility, which incurred additional transportation costs and attendant charges.<sup>50 52</sup> Moreover, the complex administration of health insurance and the lack of knowledge of how to use it in emergency situations were also identified factors that hinder women from using health services.<sup>53</sup>

### Policy implications

Since the early 1990s, Indonesian policies have been focused on improving the coverage of skilled birth attendance and facility-based deliveries. Resources have been allocated for meeting these targets: establishing the village midwife programme, village birthing posts, equipping public healthcare facilities (Puskesmas) with delivery apparatus, upgrading Puskesmas with Basic Emergency

Obstetric Care facilities and building maternity waiting homes to improve physical access to facility delivery.<sup>54–56</sup> However, the latest evidence shows positive associations between a lower MMR and a higher number of doctors and the shortest distance to hospitals but not with the number of midwives or distance to PHCs.<sup>12</sup> This implies that services offered at the primary healthcare setting might be lower compared with high-level healthcare facilities. Further, the Java–Bali region on average had higher availability of hospital beds and health workers compared with Eastern Indonesia. For instance, districts in the Java–Bali region on average had more than 1400 hospital beds compared with only 238 beds in Eastern Indonesia districts.<sup>11</sup> The low confidence level among patients in the quality of primary health facilities has also resulted in bypassing of the referral system and higher use of hospital services,<sup>21 22</sup> particularly among the richer population and those living in urban areas. These would influence the high hospital utilisation in the developed region of Java–Bali. And thus, stronger affirmative health system reforms that focus on improving equitable access to high quality maternal services are warranted.

Our results revealed that insurance coverage also shifted the preference for delivering at primary health facilities to higher-level facilities, that is, hospitals and that the richer population consistently had higher levels of hospital-based deliveries. These warrants continued policy discussions for several important reasons. First, the use of hospitals and medical specialists is skewed towards the richer population and women living in Java–Bali region. This is also partly caused by the significant deficit in clinicians and hospital beds, especially in less developed regions.<sup>11 57 58</sup> And as such, beneficiaries living in areas with a higher level of economic development will continue to have better access to a greater number of medical and health service providers if the JKN removes the financial barrier to receiving those services. This could result in a widening of the existing regional disparities. On the other hand, residents of less developed regions would remain to have limited access to high-quality health services due to shortages in medical personnel and facilities in those areas.

Second, hospital-based delivery can be much more costly compared with deliveries in primary healthcare setting. As mentioned above, the JKN reimbursement for hospital-based normal delivery is tripled compared with the reimbursement for primary healthcare settings. Based on 2014–2019 JKN reimbursement data, the cost of normal deliveries occurring at the hospital level increased significantly over the year, from US\$26.9 million in 2014 to US\$64.2 million in 2019, or a 137% increase.<sup>17 59 60</sup> This increase is significantly higher than the reimbursement for catastrophic medical conditions such as cardiovascular diseases, which only increased by around 75% within the same period. It is also important to note that the JKN programme has been experiencing funding deficits since the start of its implementation in 2014, with its cumulative deficit now standing at US\$1.6 billion.<sup>60</sup>

Considering the points above, we do not propose to increase the use of high-level health facilities and specialised healthcare providers but rather to promote policies that encourage normal deliveries to occur at the primary healthcare setting and with good quality of care. This is particularly important to improve efficiency, reduce inequities and ensuring the financial sustainability of the JKN programme. A strong health system underpinned by primary healthcare is also supported by the WHO as the core component in the effort to attain UHC in LMICs.<sup>61–63</sup> Further, there is a need to strengthen studies that focus on monitoring the effect of JKN on equity in access to quality maternal care.

Achieving equitable access to quality maternal care should be part of the JKN targets. And as the findings suggest, health insurance coverage alone will not address the ongoing inequities in maternal healthcare utilisation. And thus, the JKN programme would benefit from reforms in the health supply side<sup>63 64</sup> and stronger strategic purchasing functions, particularly to improve quality maternal health service delivery to the poorest population and those living in the most deprived regions.<sup>65</sup> Other financial barriers such as transportation costs should also be included as part of the JKN scheme to improve access in remote areas.

### Limitation

There are several important caveats to this study. First, Susenas dataset did not include the specific features of the type of birth attendant or the place of delivery, such as proximity, equipment or drug availability, and costs associated with the different levels of care. This limits our ability to capture other factors that may directly influence women's choices. Another limitation is that we could not control for the women's medical conditions or the known risks factors for delivery complications. Women who, for example, have been identified to have high-risk pregnancies may have opted or been instructed to deliver at a hospital and attended by an OBGYN/GP. And thus, cautious interpretation is warranted. For instance, anaemia is more prevalent among the poorest Indonesian population and may increase the likelihood of postpartum haemorrhage and infection and the need for hospital delivery. In this case, our results may underestimate the association between insurance coverage and the choice of place of delivery.

### CONCLUSION

Insurance coverage, type and region of residency as well as the economic status of women determined the choice of birth attendant and place of delivery. If not addressed, the expansion of the JKN programme could result in widening the existing socioeconomic and regional disparities in the use of specialised and high-level maternal healthcare services. Strengthening the primary healthcare sector by ensuring the availability of qualified health workers and facility readiness should be prioritised in the

effort of achieving the UHC and to help ensure the financial sustainability of the JKN programme.

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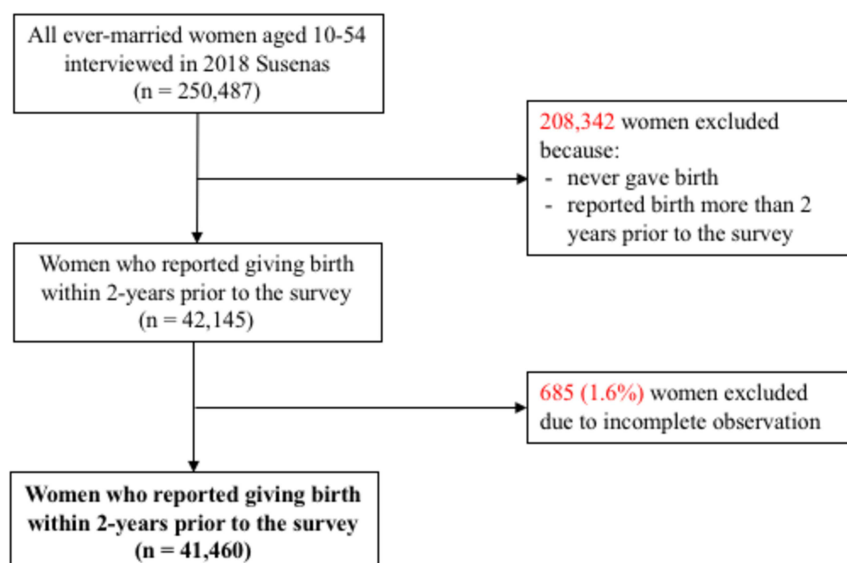
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## Appendix 1. Sample flowchart



## Appendix 2. Multinomial logit results for types of provider

Variable	OBGYN or GP		Midwife/nurse	
	vs TBA/other non-skilled		vs TBA/other non-skilled	
	Coef.	95% CI	Coef.	95% CI
<b>Income quintile (ref: poorest)</b>				
Poor	0.47***	(0.30, 0.63)	0.25***	(0.11, 0.39)
Middle	0.88***	(0.66, 1.09)	0.46***	(0.26, 0.66)
Rich	1.71***	(1.44, 1.99)	0.92***	(0.66, 1.19)
Richest	2.51***	(2.08, 2.94)	1.20***	(0.78, 1.63)
<b>Insurance status (ref: no insurance)</b>				
JKN	1.07***	(0.92, 1.21)	0.45***	(0.33, 0.58)
Private insurance	1.87***	(1.14, 2.60)	0.86**	(0.14, 1.58)
<b>Residency (ref: rural)</b>				
Urban	1.09***	(0.88, 1.30)	0.84***	(0.64, 1.05)
<b>Region of residence (ref: Java-Bali)</b>				
Sumatra	-0.30***	(-0.5, -0.11)	-0.11	(-0.30, 0.07)
Kalimantan	-1.04***	(-1.28, -0.80)	-0.58***	(-0.80, -0.36)
Sulawesi	-0.53***	(-0.76, -0.29)	-0.33***	(-0.55, -0.10)
Eastern Indonesia	-1.65***	(-1.85, -1.46)	-1.27***	(-1.45, -1.10)
<b>Education (ref: no education)</b>				
Primary	0.06	(-0.17, 0.28)	0.35***	(0.16, 0.54)
Secondary	1.26***	(1.02, 1.49)	1.21***	(1.01, 1.41)
Post-secondary	1.30***	(1.03, 1.57)	0.76***	(0.52, 1.00)
<b>Women's work status (ref: not working)</b>				
Working	-0.16**	(-0.30, -0.03)	-0.08	(-0.20, 0.04)
<b>Maternal age (ref: &lt;20 years)</b>				
20-25 years	0.44***	(0.14, 0.74)	0.40***	(0.14, 0.66)
26-35 years	0.49***	(0.20, 0.78)	0.33***	(0.08, 0.58)
36+ years	0.90***	(0.59, 1.21)	0.41***	(0.14, 0.69)
<b>Marital status (ref: not married)</b>				
Married	0.38*	(-0.01, 0.77)	0.42***	(0.11, 0.73)

Note: Weighted for survey design; \*significant at 10%; \*\* significant at 5%; \*\*\*significant at 1%.

## Appendix 3. Multinomial logit results for place of delivery

Variable	Hospital vs home/others		Higher primary health facility vs home/others		Lower primary health facility vs home/others	
	Coef.	95% CI	Coef.	95% CI	Coef.	95% CI
<b>Income quintile (ref: poorest)</b>						
Poor	0.35***	(0.22, 0.48)	0.17***	(0.05, 0.28)	-0.08	(-0.21, 0.05)
Middle	0.61***	(0.46, 0.76)	0.31***	(0.17, 0.46)	-0.08	(-0.24, 0.08)
Rich	1.12***	(0.97, 1.27)	0.59***	(0.44, 0.74)	0.13	(-0.04, 0.30)
Richest	1.84***	(1.64, 2.05)	0.94***	(0.73, 1.15)	0.22*	(-0.03, 0.47)
<b>Insurance status (ref: no insurance)</b>						
JKN	1.20***	(1.09, 1.30)	0.54***	(0.45, 0.64)	0.29***	(0.18, 0.40)
Private insurance	1.56***	(1.27, 1.86)	0.60***	(0.30, 0.91)	0.38**	(0.03, 0.74)
<b>Residency (ref: rural)</b>						
Urban	1.09***	(0.97, 1.21)	1.08***	(0.96, 1.20)	0.56***	(0.42, 0.69)
<b>Region of residence (ref: Java-Bali)</b>						
Sumatra	-0.84***	(-0.97, -0.71)	-0.84***	(-0.96, 0.71)	-0.81***	(-0.95, -0.68)
Kalimantan	-1.11***	(-1.28, -0.95)	-1.16***	(-1.32, -1)	-1.39***	(-1.58, -1.20)
Sulawesi	-0.68***	(-0.83, -0.52)	-0.75***	(-0.90, -0.6)	-1.53***	(-1.70, -1.35)
Eastern Indonesia	-0.90***	(-1.05, -0.76)	-1.06***	(-1.20, 0.92)	-1.50***	(-1.68, -1.33)
<b>Education (ref: no education)</b>						
Primary	-0.24***	(-0.42, -0.07)	-0.06	(-0.23, 0.11)	0.15	(-0.05, 0.35)
Secondary	0.63***	(0.46, 0.80)	0.64***	(0.47, 0.80)	0.66***	(0.47, 0.85)
Post-secondary	1.00***	(0.80, 1.19)	0.64***	(0.44, 0.84)	0.35***	(0.11, 0.59)
<b>Women's work status (ref: not working)</b>						
Working	-0.17***	(-0.27, -0.07)	-0.15***	(-0.25, 0.06)	0.00	(-0.10, 0.11)
<b>Maternal age (ref: &lt;20 years)</b>						
20-25 years	0.20*	(-0.01, 0.42)	0.33***	(0.13, 0.54)	0.10	(-0.12, 0.32)
26-35 years	0.31***	(0.10, 0.52)	0.33***	(0.14, 0.53)	0.10	(-0.11, 0.31)
36+ years	0.67***	(0.44, 0.89)	0.33***	(0.11, 0.54)	0.07	(-0.16, 0.30)
<b>Marital status (ref: not married)</b>						
Married	0.14	(-0.17, 0.45)	0.01	(-0.30, 0.32)	0.13	(-0.23, 0.48)

Note: Weighted for survey design; \*significant at 10%; \*\* significant at 5%; \*\*\*significant at 1%.



## Appendix 4 – Author Reflexivity Statement

### 1. How does this study address local research and policy priorities?

The study addresses an important public health issue in LMICs and in attaining UHC, whose researchers engage in collaboration with high-income country researchers.

### 2. How were local researchers involved in study design?

The study idea and design were developed by TM, an Indonesian researcher who was at the time, working on their PhD in Australia under the supervision of BM and JTL. As an Indonesian researcher, TM led the contextualization of the research with significant inputs on global health, methods, and analysis approaches from BM and JTL, both from HICs. TM also then involved LPP, KA, and DAP (all Indonesian-based researchers with ongoing experience as local researchers as well as conducting international research collaborations involving HICs) who provided their inputs on the methods, and discussion section. DAP specifically has experience with authorizing permission to publish health research publication that uses Susenas datasets for Indonesian studies. Finally, there were a couple high-income country researchers with ongoing experience as journal editors (BM and JTL). Many of the authors originated from low- and middle-income countries, with only two high-income country researchers involved in the manuscript. We reflect that this might reflect equitable authorship.

### 3. How has funding been used to support the local research team?

While there was no specific funding used to fund this study, TM received the DFAT-funded Australia Awards Scholarship (AAS) for their PhD program, of which this study was part of the PhD project. Since the AAS program aims to build capacity for LMIC students, the fund has been used to support local researcher.

### 4. How are research staff who conducted data collection acknowledged?

Not applicable as the study used a secondary dataset. Acknowledgment to the Indonesia Bureau of Statistics, that provided the dataset, has been stated in the manuscript.

### 5. Do all members of the research partnership have access to study data?

Only local researchers from Indonesia have access to the data due to conditions set by the Indonesia Bureau of Statistics.

### 6. How was data used to develop analytical skills within the partnership?

TM had multiple direct discussions with BM and JTL during the analysis phase of the study. Other authors would then get feedbacks from JTL to leverage their discussion points and interpretation of the findings.

### 7. How have research partners collaborated in interpreting study data?

Multiple discussions on data interpretations were held, which included all authors involved in the study but mainly between TM, JTL, BM, and KA. And thus, there is a room for improvement where the discussions could be more comprehensively involve all authors to further strengthen the collaboration in data interpretation.

### 8. How were research partners supported to develop writing skills?

The research team involved in this study is predominantly composed of junior academics. The PhD student (TM) and early career researchers (KA and LPP) on the authorship team were supported by senior academics within this research team to develop and refine their writing skills.

**9. How will research products be shared to address local needs?**

This study will be published as open access. We also plan to develop a media release through local and international media outlets to distribute recommendations across a wide constituency. This will include engagement with local stakeholders, international collaborators and those interested in a wider global health issues.

**10. How is the leadership, contribution and ownership of this work by LMIC researchers recognised within the authorship?**

Author TM worked as part of the senior authorship team in developing this manuscript, and their contribution has been recognised as the first author. We have specifically included researchers based in Indonesia, an LMIC within the authorship team. We acknowledge, however, that the senior authorship team is predominantly based in high-income countries. The primary reason for this is that the study was part of a PhD project (TM's), which was supervised by researchers based in HICs.

**11. How have early career researchers across the partnership been included within the authorship team?**

We have included early career researchers (TM, KA, and LPP) within the authorship team. They all contributed to the interpretation of the study findings, refining of the methods and the development of the manuscript. While TM is based in a high-income country, KA and LPP were at the time of the development of this study, based in an LMIC.

**12. How has gender balance been addressed within the authorship?**

Five authors are female (TM, BM, LPP, KA, and DAP) with only one male author (JTL). We would need a more gender-balanced authorship team.

**13. How has the project contributed to training of LMIC researchers?**

The main author was a PhD student undertaking their degree in a high-income country, but was originally based in an LMIC. In addition, the authorship team is composed of two ECRs from LMIC (LPP and KA). All the authors based in high-income countries are especially senior researchers.

**14. How has the project contributed to improvements in local infrastructure?**

This project has not directly contributed to improvements in local infrastructure.

**15. What safeguarding procedures were used to protect local study participants and researchers?**

There was no primary data collection as part of this project, therefore this question is not directly applicable.