Original Article

Socio-economic factors and use of maternal health services are associated with delayed initiation and non-exclusive breastfeeding in Indonesia: secondary analysis of Indonesia Demographic and Health Surveys 2002/2003 and 2007

Christiana R Titaley PhD[1], Philips C Loh MSc[2], Sabarinah Prasetyo DR[1], Iwan Ariawan MS[1], Anuraj H Shankar DSc[3]

[1]Center for Health Research Universitas Indonesia (CHR-UI), Faculty of Public Health, Universitas Indonesia, Depok, Indonesia
[2]Department of Epidemiology, Harvard School of Public Health, Massachusetts, United States
[3]Department of Nutrition, Harvard School of Public Health, Massachusetts, United States

This analysis aims to examine factors associated with delayed initiation and non-exclusive breastfeeding in Indonesia. Data were derived from the 2002/2003 and 2007 Indonesia Demographic and Health Survey. Information from 12,191 singleton live-born infants aged 0-23 months was used to examine factors associated with delayed initiation of breastfeeding. Furthermore, information from 3,187 singleton live-born infants aged 0-5 months was used to identify factors associated with non-exclusive breastfeeding. Associations between potential predictors and study outcomes were examined using logistic regression. Our study found that infants from high household wealth-index had significantly increased odds of both delayed initiation and non-exclusive breastfeeding. Other factors associated with an increased odds of delayed initiation of breastfeeding included infants from Sumatera region (OR=1.64, 95% CI: 1.38-1.95), Caesarean-section deliveries (OR=1.84, 95% CI: 1.39-2.44) and deliveries in government-owned (OR=1.38, 95% CI: 1.08-1.76) and non-health facility (OR=1.20, 95% CI: 1.00-1.43). Other factors associated with an increased odds for non-exclusive breastfeeding included parents who were in the workforce (OR=1.37, 95% CI: 1.06-1.78) and mothers with obstetric complication at childbirth (OR=1.35, 95% CI: 1.05-1.74). However, the odds reduced for infants from Eastern Indonesia (OR=0.64, 95% CI: 0.49-0.85). Poor breastfeeding practices are associated with environmental, socio-economic, pregnancy-birthing characteristics and maternal health services factors. Efforts to promote breastfeeding practices should be conducted comprehensively to target population at risk for poor breastfeeding practices.

Key Words: delayed initiation of breastfeeding, exclusive breastfeeding, Indonesia Demographic and Health Survey, Indonesia

INTRODUCTION

Breastfeeding has been recognized as one of the key strategies to prevent childhood morbidity and mortality.[1,2] Studies have shown the role of breastfeeding in the improvement of mental and cognitive development amongst children.[3,4] However, the rate of optimal breastfeeding practices is still low in many countries.[5] Approximately 117 million years of life are lost in developing countries due to sub-optimal breastfeeding practices.[6]

In 2003, the World Health Organization (WHO) and UNICEF recommended that initiation of breastfeeding should start early within the first hour after life, and followed by exclusive breastfeeding for six months to gain optimal growth, development and health.[7,8] The colostrums, first milk of mothers in the first days post-partum, provides significant protection for newborn against morbidity and mortality due to the immunologic and nutrition properties, as shown in several trials.[9-11] Early breastfeeding practice has been reported to benefit maternal and infant relationship[12] and improve maternal survival due to the reduction of post-partum haemorrhage.[13] The importance of exclusive breastfeeding has also been widely reported.[14,15] A review on child survival intervention showed that optimal breastfeeding practices if implemented universally, can avert approximately 13% of un-

der five mortality in low income countries.[2] This shows that strategies aimed at promoting the rate of optimal breastfeeding will help countries to achieve the target of Millennium Development Goals (MDGs) #4 of reducing child mortality, and MDGs #5 of improving maternal health.[16]

Several studies have been conducted in developing countries to examine determinants of initiation of breast-feeding[17-19] and exclusive breastfeeding.[20-22] However, in Indonesia, no national level analysis has been reported regarding poor breastfeeding practices, including delayed initiation and non-exclusive breastfeeding. Therefore, using data from two national representative surveys, the 2002/2003 and 2007 IDHS, this study aims to examine the extent to which external environment, socio-economic, pregnancy and birthing characteristics as well as utilization of maternal care services are associated with delayed initiation and non-exclusive breastfeeding, and if multi-sectoral approaches are required to promote breastfeeding practices in Indonesia rather than interventions focusing only in health sector. The findings will provide insights to conduct evidence-based and effective public health strategies targeting population with sub-optimal breastfeeding practices, not only in Indonesia but also in other developing countries.

MATERIALS AND METHODS
Data source
Our analyses used data from the 2002/2003 and 2007 Indonesia Demographic and Health Survey (IDHS), which are part of the HENRI (Higher Education Network Ring Initiative) database. The 2002/2003 and 2007 IDHS are the fifth and sixth IDHS aimed at providing demographic and health related information including fertility, family planning, maternal and child health and maternal mortality.[23,24] In both surveys, three questionnaires were used, the Household Questionnaire, the Ever-Married Women's Questionnaire and the Married Men's Questionnaire. Variables included in this analysis were derived from the Household and the Ever-Married Women's Questionnaires. The Household Questionnaire was used to list of all household members and basic characteristics of housing condition. The questionnaire was also used as a basis to identify potential subjects for individual interview. The Ever-Married Women's Questionnaire was used to collect various demographic and health information including background characteristics, antenatal, delivery and postnatal care services, as well as breastfeeding practices, from ever-married women aged 15-49 years. More detailed information about the sampling method of IDHS and fieldwork team have been reported elsewhere.[23-26]

For both IDHS, the sample size was intended to produce reliable estimates at the national and provincial level. However, in the 2002/2003 IDHS, four provinces, Nanggroe Aceh Darussalam, Maluku, North Maluku, and Papua were excluded due to security reasons.[23] In the 2002/2003 IDHS, there were a total of 33,088 households and 29,483 women interviewed, with 99% households and 98% eligible women response rate.[23] In the 2007 IDHS, 40,701 households and 32,895 eligible women were interviewed, with 99% and 96% response rates, respectively.[24] The difference between the number of households and women interviewed is due to only the ever-married women aged 15-49 years were interviewed from these. In this analysis, information from 12,191 singleton live-born infants aged 0-23 months (5618 from IDHS 2002/2003 and 6163 from IDHS 2007) and 3,187 singleton live-born infants aged 0-5 months (1536 from IDHS 2002/2003 and 1651 IDHS 2007) was used.

Study outcomes
There were two primary outcomes used in this study, firstly, delayed initiation of breastfeeding and, secondly, non-exclusive breastfeeding. Delayed initiation of breastfeeding referred to infants who were put to breast one hour or more after delivery.[8] This variable was based on the question of *"How long after birth did you first put the child to the breast?"*[23,24] The study population used was singleton live-born infants aged 0-23 months.

Non-exclusive breastfeeding referred to infants who were not fed exclusively with breast milk according to the WHO definition.[8] The construction of this variable was based on three questions, 1) *"Are you still breastfeeding [the child]?"*; 2) *"Did (the child) drink plain water/commercially produced infant formula/any other milk product/fruit juice/any other liquid such as sugar water, tea, coffee, carbonated drinks or soup broth yesterday during the day or at night (last 24 hours)?"* and 3) *"Did (the child) eat yesterday during the day or at night (last 24 hours)"*.[23,24] Infants were considered exclusively breastfed if they were still breastfed at the time of interview and were reported did not consume any other food/liquid other than breast milk, oral rehydration therapy, drops, syrups, within the last 24 hours. For this outcome, we included only currently living infants aged 0-5 months.

Potential predictors
To examine potential predictors for delayed initiation and non-exclusive breastfeeding, twenty two potential predicators were included in the analyses. These variables were further categorized into external environment, socio-economic, pregnancy and birthing characteristics as well as utilization of maternal health care services factors. For non-exclusive breastfeeding, an additional variable, i.e. use of postnatal care service, was included in the model. All variables included in the analyses are shown in Figure 1. These variables were selected based on previous observational studies on breastfeeding practices in developing countries.[17,19,27]

In this study, we used a three category variable of infants' size at birth, which was based on mothers' subjective assessment regarding the size of their infants, to replace the birth weight variable. The replacement was due to the fact that a large proportion of infants were not weighed at birth (24% in IDHS 2002/2003 and 22% in IDHS 2007). These three categories were smaller than average, average and larger than average-sized infants.

To assess economic status of a household, a new household wealth index variable was constructed to rank households across the pooled 2002/2003 and 2007 IDHS datasets. This variable was constructed by assigning weights into 11 housing variables and household assets, i.e. source of drinking water, type of toilet, main material
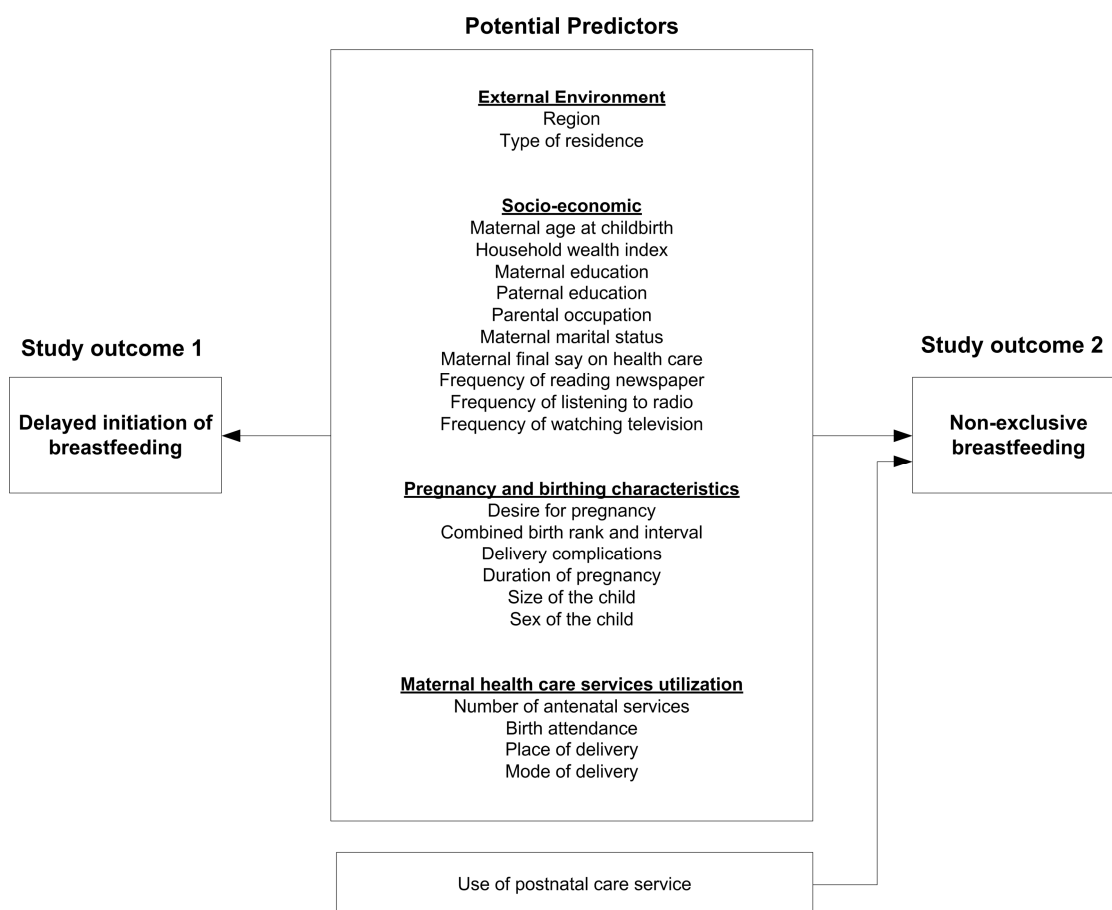
Potential Predictors

Figure 1. Conceptual framework for analyzing factors associated with delayed initiation and non-exclusive breastfeeding in Indonesia.

of floor, main material of wall, availability of electricity, possession of radio, television, fridge, bicycle, motorcycle, and car using the principal component analysis method. This was followed by the construction of a five-category variable of household wealth index, poorest, poor, middle, rich and richest.

Statistical analysis
Before conducting any statistical tests, datasets from IDHS 2002/2003 and 2007 were pooled together. Frequency tabulation was used to explain characteristics of infants whose information was included in this analysis. Univariable analysis was employed to assess the crude association between each potential predictor and poor breastfeeding practices. Multivariable analysis was used to assess the association between a predictor and study outcomes, after controlling for other covariates.

The baseline model of the multivariable analysis included all potential predictors along with a variable representing the year of IDHS. The backward elimination procedure was then used to only retain factors significantly associated with study outcomes, using a significance level of 0.05. In the final model, only variables significantly associated with study outcomes were retained, in addition to the year of IDHS variable. We conducted a goodness-of-fit test to examine the degree of correspondence between the model predictions and the observed data.[28]

After obtaining the final model, we also calculated the population attributable risk (PAR) to estimate the proportion of delayed initiation of breastfeeding and non-exclusive breastfeeding attributable to the some risk factors found in this analysis.[29] All OR and 95% CI were determined and weighted for the sampling probabilities. Sampling weight and cluster sampling design were considered in all regressions. We used STATA/MP version 10.0 (2007) (Stata Corporation, College Station, TX, USA) to run all statistical analyses.

This study was conducted in accordance with the internationally agreed ethical principles for the conduct of medical research. Ethical approval is not required since this is a secondary analysis of DHS data available in the public domain.[26]

RESULTS
Of 12,191 singleton live-born infants aged 0-23 months, 7475 (61%) infants had delayed initiation of breastfeeding. The proportion of infants who had delayed initiation breastfeeding in the first hour of life slightly reduced from 63% in IDHS 2002/2003 to 60% in IDHS 2007. Moreover, of 3,187 singleton live-born infants aged 0-5 months used in the pooled dataset, 2063 (65%) infants were not exclusively breastfed. The proportion of infants not exclusively breastfed in the first six months for each IDHS increased from 61% (IDHS 2002/2003) to 69% (IDHS 2007).

Table 1 presents the detailed characteristics of children aged 0-23 and 0-5 months included in our analysis. More than half of infants were from Java-Bali region and rural areas. Approximately one third came from households of which both parents involved in workforce. Almost 80% of the infants were born to mother who had four or more antenatal visits. More than 73% deliveries were attended

Table 1. External environment, socio-economic, pregnancy and birthing characteristics and maternal health service utilization factors of children aged 0-23 months and 0-5 months, IDHS 2002/2003 and 2007

Variable	Children aged 0-23 months (n=12,191)			Children aged 0-5 months (n=3,187)		
	n (%)	IDHS 2002/2003	IDHS 2007	n (%)	IDHS 2002/2003	IDHS 2007
External Environment						
Region						
Java/Bali	6761 (55.5)	56.3	54.7	1811 (56.8)	57.5	56.2
Sumatera	2781 (22.8)	23.1	22.6	711 (22.3)	22.9	21.8
Eastern Indonesia	2649 (21.7)	20.6	22.8	665 (20.9)	19.6	22.1
Type of residence						
Urban	5397 (44.3)	47.0	41.8	1437 (45.1)	47.3	43.1
Rural	6794 (55.7)	53.0	58.2	1750 (54.9)	52.8	56.9
Socio-economic factor						
Maternal age at childbirth, years						
Less than 20	1232 (10.1)	10.8	9.5	332 (10.4)	10.2	10.7
20-29	6732 (55.2)	56.2	54.3	1801 (56.5)	56.9	56.2
30-39	3825 (31.4)	29.8	32.8	942 (29.6)	29.7	29.5
40+	402 (3.3)	3.1	3.5	111 (3.5)	3.3	3.7
Household wealth index						
Poorest	1783 (14.6)	15.8	13.6	455 (14.3)	15.7	12.9
Poor	2077 (17.0)	19.4	14.9	543 (17.1)	19.0	15.2
Middle	2451 (20.1)	20.6	19.6	667 (20.9)	22.9	19.1
Rich	2821 (23.1)	22.1	24.1	725 (22.7)	20.8	24.6
Richest	2594 (21.3)	18.1	24.1	646 (20.3)	16.5	23.8
Maternal education						
No education/incomplete primary	1828 (15.0)	17.4	12.8	439 (13.8)	15.1	12.5
Completed Primary/Incomplete Secondary	6654 (54.6)	54.4	54.8	1822 (57.2)	60.1	54.4
Secondary+	3708 (30.4)	28.2	32.4	927 (29.1)	24.8	33.1
Paternal education						
No education/incomplete primary	1738 (14.3)	16.2	39.3	411 (12.9)	15.4	10.6
Completed Primary/Incomplete secondary	6014 (49.3)	50.9	47.9	1614 (50.6)	53.2	48.2
Secondary+	4407 (36.2)	32.7	12.5	1156 (36.3)	31.3	40.9
Parental occupation						
Unemployed mother and working father	7308 (60.0)	63.8	56.5	2096 (65.8)	70.3	61.6
Working mother and working father	4589 (37.6)	33.6	41.3	1008 (31.6)	26.1	36.8
Unemployed father	252 (2.1)	2.2	2.0	69 (2.2)	2.8	1.6
Maternal marital status						
Formerly married	189 (1.5)	1.4	1.7	23 (0.7)	0.8	0.7
Currently married	12002 (98.5)	98.6	98.3	3164 (99.3)	99.2	99.3
Maternal final say on her own health care						
Woman alone	6404 (52.6)	53.8	51.4	1649 (51.8)	53.9	49.8
Woman with partner/other	3994 (32.8)	32.1	33.4	1067 (33.5)	32.0	34.9
Partner alone/someone else/other	1789 (14.7)	14.0	15.2	469 (14.7)	14.0	15.4
Frequency of reading newspaper						
Never	5977 (49.1)	49.2	48.9	1544 (48.5)	49.8	47.2
Less than once a week	4467 (36.7)	34.7	38.4	1212 (38.1)	35.5	40.3
At least once a week	1730 (14.2)	16.0	12.5	428 (13.4)	14.5	12.5
Frequency of listening to radio						
Never	3913 (32.2)	27.4	36.3	953 (30.0)	25.6	33.9
Less than once a week	4374 (35.9)	34.4	37.2	1175 (36.9)	37.3	36.5
At least once a week	3884 (31.9)	38.0	26.3	1054 (33.1)	36.9	29.5
Frequency of watching television						
Never	1097 (9.0)	10.7	7.5	277 (8.7)	10.4	7.1
Less than once a week	1798 (14.8)	13.8	15.6	539 (16.9)	16.6	17.2
At least once a week	9282 (76.2)	75.4	76.8	2367 (74.4)	72.9	75.6

All values are weighted by the sampling probability

by trained delivery attendants although more than half of the deliveries occurred at home.

The results of the univariate and multivariate analyses for both outcomes are presented in Table 2. Factors sig-nificantly associated with increased odds of delayed initiation of breastfeeding included infants from in Sumatera region (OR=1.64, 95% CI: 1.38-1.95), mothers aged 40 years or above at the time of childbirth (OR=1.81, 95%

Table 1. External environment socio-economic, pregnancy and birthing characteristics and maternal health service utilization factors of children aged 0-23 months and 0-5 months, IDHS 2002/2003 and 2007 (cont.)

Variable	Children aged 0-23 months (n=12,191)			Children aged 0-5 months (n=3,187)		
	n (%)	IDHS 2002/2003	IDHS 2007	n (%)	IDHS 2002/2003	IDHS 2007
Pregnancy and birthing characteristics						
Desire for pregnancy						
Wanted then	9813 (80.5)	82.3	78.9	2563 (80.4)	80.6	80.3
Wanted later/no more	2344 (19.2)	17.4	20.9	621 (19.5)	19.3	19.6
Combined birth interval and rank						
2nd/3rd birth rank, > 2 year interval	4882 (40.0)	40.6	39.5	1288 (40.4)	42.6	38.4
1st birth rank	4220 (34.6)	32.8	36.2	1115 (35.0)	30.5	39.1
2nd/3rd birth rank, ≤ 2-year interval	796 (6.5)	6.5	6.5	188 (5.9)	4.9	6.8
4th birth rank, > 2-year interval	1972 (16.2)	17.5	15.0	524 (16.4)	20.1	13.0
4th birth rank, ≤ 2-year interval	322 (2.6)	2.5	2.7	73 (2.3)	1.8	2.7
Delivery complications						
None	6872 (56.4)	62.5	50.8	1817 (57.0)	63.2	51.3
Any complications	5179 (42.5)	36.1	48.2	1327 (41.7)	34.5	48.3
Reported duration of pregnancy						
None months and above	11906 (97.7)	98.0	97.3	3103 (97.4)	98.5	96.4
Less than nine months	253 (2.1)	1.7	2.4	79 (2.5)	1.5	3.4
Child size						
Average size	6375 (52.3)	53.2	51.5	1645 (51.6)	49.9	53.2
Smaller than average size	1596 (13.1)	12.8	13.3	342 (10.7)	10.5	10.9
Larger than average size	3812 (31.3)	30.4	32.0	1101 (34.6)	36.3	32.9
Child sex						
Male	6448 (52.9)	52.3	53.4	1719 (53.9)	52.7	55.0
Female	5743 (47.1)	47.7	46.6	1468 (46.1)	47.3	45.0
Maternal health service utilization						
Number of ANC						
4+ times	9654 (79.2)	78.1	80.2	2484 (77.9)	75.5	80.2
1-3 times	1592 (13.1)	12.8	13.3	456 (14.3)	15.7	13.1
None	872 (7.2)	8.3	6.1	233 (7.3)	8.3	6.4
Birth attendance						
None/untrained delivery attendants	3262 (26.8)	30.4	23.4	867 (27.2)	34.0	20.9
Trained delivery attendants	8914 (73.1)	69.3	76.5	2318 (72.7)	65.9	79.1
Place of delivery						
Private health facility	4440 (36.4)	33.7	38.9	1166 (36.6)	32.3	40.6
Public health facility	1253 (10.3)	9.2	11.2	345 (10.8)	9.2	12.4
Non-health facility	6472 (53.1)	56.9	49.7	1676 (52.6)	58.6	47.1
Mode of delivery						
Non-Caesarean section	11391 (93.4)	95.7	91.4	2935 (92.1)	95.6	88.9
Caesarean section	764 (6.3)	4.3	8.0	248 (7.8)	4.4	10.9
Postnatal care services						
None	2552 (21.0)	20.6	21.2	668 (21.0)	21.8	20.2
PNC by doctors	1410 (11.6)	11.1	12.0	396 (12.4)	10.0	14.7
PNC by nurse/midwives	6344 (52.1)	49.8	54.0	1626 (51.1)	47.9	53.9
Checked by TBA	1877 (15.4)	18.4	12.7	493 (15.5)	20.2	11.1

All values are weighted by the sampling probability

CI: 1.16-2.80), first birth rank (OR=1.57, 95% CI: 1.35-1.83), and Caesarean deliveries (OR=1.84, 95% CI: 1.39-2.44). An increased odds for delayed initiation of breast feeding was also associated with increased household wealth index, frequent exposure to mass media, deliveries occurred in government-owned health facility (OR=1.38, 95% CI: 1.08-1.76) and in non-heath care facility (OR=1.20, 95% CI: 1.00-1.43). The goodness-of-fitness test performed showed that the final logistic regression model of factors associated with delayed initiation of breastfeeding is reasonable (F= 0.85, p=0.57).

For factors associated with non-exclusive breastfeeding, the odds significantly increased amongst infants from the richest household wealth index (OR=2.01, 95% CI: 1.31-3.09), households of which both parents were in the workforce (OR=1.37, 95% CI: 1.06-1.78) and mothers who reported having obstetric complication during childbirth (OR=1.35, 95% CI: 1.05-1.74). The odds, however, significantly lower amongst infants from Eastern Indonesia region (OR=0.64, 95% CI: 0.49-0.85) compared to those in Java/Bali. The goodness-of-fitness test showed that that the model was reasonably consistent with the data (F= 0.76, p= 0.65).

Table 2. Univariable and multivariable analyses for factors associated with delayed initiation and non-exclusive breastfeeding, IDHS 2002/2003 and 2007

Variable	Delayed initiation of breastfeeding[†]						Non-exclusive breastfeeding[‡]					
	Unadjusted			Adjusted			Unadjusted			Adjusted		
	OR	(95% CI)	p	OR	(95% CI)	p	OR	(95% CI)	p	OR	95% CI	p
Year of survey												
2002/2003 IDHS (ref)	1.00			1.00			1.00			1.00		
2007 IDHS	0.84	(0.73 0.98)	0.024	0.81	(0.70 0.95)	0.008	1.36	(1.05 1.75)	0.019	1.20	(0.93 1.54)	0.155
External Environment												
Region												
Java/Bali (ref)	1.00			1.00			1.00			1.00		
Sumatera	1.54	(1.30 1.83)	<0.001	1.64	(1.38 1.95)	<0.001	0.94	(0.70 1.25)	0.664	1.00	(0.74 1.34)	0.989
Eastern Indonesia	0.93	(0.80 1.08)	0.352	0.99	(0.84 1.15)	0.859	0.59	(0.45 0.76)	<0.001	0.64	(0.49 0.85)	0.002
Type of residence												
Urban (ref)	1.00						1.00					
Rural	0.87	(0.74 1.01)	0.068				0.79	(0.61 1.04)	0.091			
Socio-economic factor												
Maternal age at childbirth, years												
Less than 20 (ref)	1.00			1.00			1.00					
20-29	0.92	(0.72 1.17)	0.480	1.08	(0.84 1.40)	0.546	0.68	(0.45 1.04)	0.075			
30-39	0.88	(0.69 1.12)	0.289	1.14	(0.85 1.54)	0.390	0.62	(0.40 0.96)	0.031			
40+	1.39	(0.95 2.04)	0.088	1.81	(1.16 2.80)	0.008	0.69	(0.32 1.51)	0.353			
Household wealth index												
Poorest (ref)	1.00			1.00			1.00			1.00		
Poor	1.37	(1.14 1.65)	0.001	1.25	(1.03 1.53)	0.024	1.09	(0.73 1.63)	0.676	1.10	(0.73 1.67)	0.646
Middle	1.41	(1.14 1.75)	0.002	1.23	(0.97 1.57)	0.091	0.97	(0.64 1.47)	0.878	0.92	(0.60 1.40)	0.696
Rich	1.44	(1.18 1.75)	<0.001	1.32	(1.04 1.69)	0.023	1.54	(1.02 2.32)	0.040	1.42	(0.94 2.16)	0.099
Richest	1.48	(1.22 1.80)	<0.001	1.34	(1.04 1.73)	0.024	2.33	(1.54 3.50)	<0.001	2.01	(1.31 3.09)	0.001
Maternal education												
No education/incomplete primary (ref)	1.00											
Completed Primary/incomplete secondary	1.07	(0.90 1.27)	0.445				0.89	(0.62 1.28)	0.540			
Secondary+	1.31	(1.08 1.58)	0.005				1.17	(0.80 1.71)	0.417			
Paternal education												
No education/incomplete primary (ref)	1.00						1.00					
Completed Primary/incomplete Secondary	1.06	(0.89 1.26)	0.529				1.17	(0.79 1.75)	0.433			
Secondary+	1.08	(0.90 1.31)	0.408				1.73	(1.14 2.62)	0.009			
Parental occupation												
Unemployed mother and working father (ref)	1.00						1.00			1.00		
Working mother and working father	1.01	(0.88 1.16)	0.906				1.45	(1.13 1.87)	0.004	1.37	(1.06 1.78)	0.017
Unemployed father	1.10	(0.73 1.64)	0.648				0.78	(0.35 1.74)	0.537	0.75	(0.32 1.81)	0.527
Maternal marital status												
Formerly married (ref)	1.00						1.00					
Currently married	1.20	(0.76 1.89)	0.442				1.90	(0.55 6.61)	0.314			

[†]1574 missing values are excluded from the analysis
[‡]433 missing values are excluded from the analysis
All values are weighted by the sampling probability; *(ref) = reference group*

Table 2. Univariate and multivariate analyses for factors associated with delayed initiation and non-exclusive breastfeeding, IDHS 2002/2003 and 2007 (cont.)

Variable	Delayed initiation of breastfeeding[†]						Non-exclusive breastfeeding[‡]					
	Unadjusted			Adjusted			Unadjusted			Adjusted		
	OR	(95% CI)	p	OR	(95% CI)	p	OR	(95% CI)	p	OR	95% CI	p
Maternal final say on her own health care												
Woman alone (ref)	1.00						1.00					
Woman with partner/other	0.92	(0.79 1.07)	0.266				1.02	(0.78 1.33)	0.866			
Partner alone/someone else/other	1.08	(0.89 1.31)	0.446				0.93	(0.63 1.35)	0.688			
Frequency of reading newspapers												
Never (ref)	1.00						1.00					
Less than once a week	1.19	(1.04 1.36)	0.014				1.04	(0.79 1.38)	0.760			
At least once a week	1.21	(1.01 1.44)	0.035				1.76	(1.23 2.51)	0.002			
Frequency of listening to radio												
Never (ref)	1.00			1.00			1.00					
Less than once a week	0.99	(0.86 1.15)	0.900	0.94	(0.80 1.09)	0.414	1.20	(0.88 1.65)	0.245			
At least once a week	1.33	(1.13 1.55)	<0.001	1.21	(1.02 1.43)	0.033	1.21	(0.88 1.68)	0.242			
Frequency of watching TV												
Never (ref)	1.00			1.00			1.00					
Less than once a week	1.25	(0.99 1.58)	0.064	1.25	(0.97 1.60)	0.087	1.02	(0.65 1.59)	0.940			
At least once a week	1.54	(1.28 1.86)	<0.001	1.41	(1.14 1.76)	0.002	1.50	(1.04 2.15)	0.030			
Pregnancy and birthing characteristics												
Desire for pregnancy												
Wanted then (ref)	1.00						1.00			1.00		
Wanted later	1.10	(0.94 1.29)	0.224				0.69	(0.50 0.94)	0.02	0.68	(0.50 0.93)	0.016
Combined birth interval and rank												
2nd/3rd birth rank, > 2 year interval (ref)	1.00			1.00			1.00					
1st birth rank	1.51	(1.32 1.74)	<0.001	1.57	(1.35 1.83)	<0.001	1.35	(1.01 1.82)	0.046			
2nd/3rd birth rank, ≤ 2-year interval	1.27	(0.99 1.63)	0.063	1.30	(1.02 1.67)	0.038	0.89	(0.49 1.61)	0.690			
4th birth rank, > 2-year interval	1.27	(1.06 1.52)	0.010	1.19	(0.97 1.47)	0.094	0.70	(0.49 1.00)	0.051			
4th birth rank, ≤ 2-year interval	1.02	(0.75 1.39)	0.911	0.98	(0.71 1.35)	0.920	0.77	(0.34 1.73)	0.529			
Delivery complications												
None (ref)	1.00						1.00			1.00		
Any complications	1.12	(0.99 1.28)	0.081				1.41	(1.09 1.81)	0.008	1.35	(1.05 1.74)	0.018
Reported duration of pregnancy												
Nine months and above (ref)	1.00						1.00					
Less than nine months	1.29	(0.82 2.02)	0.275				0.97	(0.46 2.06)	0.936			
Child size												
Average size (ref)	1.00			1.00			1.00					
Smaller than average size	1.30	(1.08 1.56)	0.005	1.31	(1.09 1.57)	0.004	0.98	(0.67 1.44)	0.908			
Larger than average size	1.15	(1.00 1.33)	0.052	1.15	(0.99 1.32)	0.064	0.98	(0.75 1.27)	0.854			

[†]1574 missing values are excluded from the analysis
[‡]433 missing values are excluded from the analysis
All values are weighted by the sampling probability; *(ref) = reference group*

Table 2. Univariable and multivariable analyses for factors associated with delayed initiation and non-exclusive breastfeeding, IDHS 2002/2003 and 2007 (cont.)

Variable	Delayed initiation of breastfeeding[†]						Non-exclusive breastfeeding[‡]					
	Unadjusted			Adjusted			Unadjusted			Adjusted		
	OR	(95% CI)	*p*	OR	(95% CI)	*p*	OR	(95% CI)	*p*	OR	95% CI	*p*
Child sex												
Girls (ref)	1.00						1.00					
Boys	1.01	(0.89 1.14)	0.914				0.86	(0.67 1.11)	0.248			
Maternal health service utilization												
Number of ANC												
4+ times (ref)	1.00						1.00					
1-3 times	1.06	(0.88 1.27)	0.542				0.71	(0.50 1.02)	0.065			
None	1.01	(0.80 1.27)	0.921				0.88	(0.57 1.37)	0.574			
Birth attendance												
None/untrained delivery attendants (ref)	1.00						1.00					
Trained delivery attendants	1.20	(1.02 1.40)	0.023				1.17	(0.90 1.53)	0.248			
Mode of delivery												
Non-Caesarean section (ref)	1.00			1.00			1.00					
Caesarean section	1.94	(1.49 2.54)	<0.001	1.84	(1.39 2.44)	<0.001	1.85	(0.98 3.49)	0.056			
Place of delivery												
Private health facility (ref)	1.00			1.00			1.00					
Government-owned health facility	1.38	(1.08 1.75)	0.010	1.38	(1.08 1.76)	0.011	0.63	(0.41 0.95)	0.029			
Non-health facility	0.99	(0.86 1.15)	0.898	1.20	(1.00 1.43)	0.047	0.77	(0.58 1.02)	0.073			

[†]1574 missing values are excluded from the analysis
[‡]433 missing values are excluded from the analysis
All values are weighted by the sampling probability; *(ref) = reference group*

Table 3. Adjusted population attributable risk (PAR) of factors significantly associated with delayed initiation of breastfeeding in Indonesia, IDHS 2002/2003 and 2007

Variable	%	Adjusted OR	Adjusted PAR	(95% CI)		
Region						
Java/Bali (ref)	53.7					
Sumatera	26.0	1.64	0.10	(0.07	-	0.14)
Eastern Indonesia	20.3	0.99		----		
Maternal age at childbirth, years						
Less than 20 (ref)	10.5	1.00				
20-29	55.3	1.08		----		
30-39	30.6	1.14		----		
40+	3.6	1.81	0.02	(0.00	-	0.03)
Household wealth index						
Poorest (ref)	12.6	1.00				
Poor	17.1	1.25	0.03	(0.00	-	0.07)
Middle	20.4	1.23		----		
Rich	23.9	1.32	0.06	(0.01	-	0.11)
Richest	21.9	1.34	0.06	(0.01	-	0.10)
Combined risk			0.14	(0.02	-	0.25)
Combined birth interval and rank						
2nd/3rd birth rank, > 2 year interval (ref)	37.1	1.00				
1st birth rank	37.7	1.57	0.14	(0.09	-	0.18)
2nd/3rd birth rank, ≤ 2 year interval	6.6	1.30	0.02	(0.00	-	0.03)
4th birth rank, > 2 year interval	16.2	1.19		----		
4th birth rank, ≤ 2 year interval	2.4	0.98		----		
Combined risk			0.15	(0.09	-	0.20)
Child size						
Average size (ref)	51.1	1.00				
Smaller than average size	14.2	1.31	0.03	(0.01	-	0.05)
Larger than average size	32.1	1.15	0.04	(0.00	-	0.08)
Combined risk			0.07	(0.01	-	0.13)
Mode of delivery						
Non-Caesarean section (ref)	92.2	1.00				
Caesarean section	7.6	1.84	0.03	(0.02	-	0.05)
Place of delivery						
Private health facility (ref)	36.4	1.00				
Public health facility	11.4	1.38	0.03	(0.01	-	0.06)
Non health facility	51.9	1.20	0.08	(0.00	-	0.16)
Combined risk			0.11	(0.01	-	0.21)

The PAR value for each variable should not be accumulated to avoid misinterpretation of the results.
(ref): reference group.

The calculation of PAR for some selected factors significantly associated with both outcomes is shown in Tables 3 and 4. Of the total risk for delayed initiation of breastfeeding, 15% was attributable to low birth rank of infants and 14% was attributable to household wealth index (Table 3). Approximately 27% of total risk for non-exclusive breastfeeding was attributable to differences in region and 12% of the risk was attributable to high household wealth index (Table 4). Figure 2a shows that, as reflected by the combined PAR, around 41% reduction of the risk of delayed initiation of breastfeeding amongst infants aged 0-23 months might be achieved due to interventions targeting women of low birth rank infants, from high household wealth index, differences in region, as well deliveries in government-owned health facilities, and home deliveries. Furthermore, interventions addressing differences in region, mothers from high household wealth index, issues related to working mothers, and delivery complications might reduce the risk of non-exclusive breastfeeding by 42% (Figure 2b).

DISCUSSION
Main findings
Our study showed the association between external environment, socio-economic, pregnancy and birthing characteristics, and use of maternal health service factors with delayed initiation of breastfeeding and non-exclusive breastfeeding. Infants from high household wealth index had increased likelihood for both delayed initiation and non-exclusive breastfeeding. The odds of delayed initiation of breastfeeding increased amongst infants from Sumatera region, mothers aged 40 years or more at the time of delivery, low birth rank infants, infants reported smaller than the average-sized, mothers intending to delay her pregnancy, Caesarean section deliveries, as well as deliveries at home and government-owned health facilities. The odds for non-exclusive breastfeeding increased amongst infants whose parents were in the workforce and mothers who reported having obstetric complications at childbirth. However, the odds significantly reduced amongst infants from Eastern Indonesia region.

These results are essential for policy makers to plan and formulate effective public health policy aimed at increasing the rates of early initiation and exclusive breast-

Table 4. Adjusted population attributable risk (PAR) of factors significantly associated with non-exclusive breastfeeding in Indonesia, IDHS 2002/2003 and 2007

Variable	%	Adjusted OR	Adjusted PAR	(95% CI)		
Region[†]						
Eastern Indonesia (ref)	17.7	1.00				
Sumatera	22.9	1.55	0.08	(0.04	-	0.12)
Java/Bali	59.4	1.55	0.21	(0.09	-	0.32)
Combined risk			0.27	(0.12	-	0.40)
Household wealth index						
Poorest (ref)	13.1	1.00				
Poor	15.7	1.10	----			
Middle	18.6	0.92	----			
Rich	24.0	1.42	----			
Richest	24.2	2.01	0.12	0.05	-	0.19
Parental occupation						
Unemployed mother and working father (ref)	63.5	1.00				
Working mother and working father	34.3	1.37	0.09	(0.02	-	0.17)
Unemployed father	1.9	0.75	----			
Delivery complications						
None (ref)	54.3	1.00				
Any complications	44.8	1.35	0.12	(0.02	-	0.20)

The PAR value for each variable should not be accumulated to avoid misinterpretation of the results.
(ref): reference group
[†]The reference group was different from the one use in multivariate analysis. For PAR analysis, the reference group is those with the lowest odds for non-exclusive breastfeeding based on the multivariate analysis

feeding to reduce childhood morbidity and improve survival. The results also indicate that multi-sectoral approaches addressing barriers for optimal breastfeeding practices are essential to increase the rate of early initiation and exclusive breastfeeding in Indonesia.

Factors associated with delayed initiation of breastfeeding in Indonesia

Our analysis demonstrates that infants in the Sumatera region were more likely to delay the initiation of breastfeeding than those from Java/Bali. Generally, compared to Java/Bali region, access and availability to health information, services and personnel in outer Java/Bali is more limited.[30] Misconception about colostrums might also play an important role that prevents infants from outer Java/Bali area from being breastfed immediately after delivery.[31] Empowering local community, including health workers, family members and traditional birth attendants as cues to action to promote early initiation of breastfeeding are required.[31]

Amongst socio-economic factors, high household wealth index was associated with delayed initiation of breastfeeding. Although previous literature[32] showed the association between high economic status and increased likelihood of early initiation of breastfeeding, data from UNICEF showed an increased likelihood of delayed initiation of breastfeeding amongst wealthy mothers in Middle East, North Africa, East Asia and the Pacific.[33] This suggests that interventions to raise awareness of the importance of early initiation of breastfeeding should also target women from high economic status.

Our analysis found the relationship between caesarean delivery and delayed initiation of breastfeeding, as reported in earlier literature.[19,21,34-36] In some hospitals, early breastfeeding was difficult to conduct, since newborns might be taken into a separate room to allow mothers to rest after surgery. Procedures preventing close contact

between mothers and infants following caesarean section deliveries should be adjusted. It is important that medical professional can facilitate a close proximity between mother and infant as soon as possible.[36]

An increased likelihood for delayed initiation of breastfeeding amongst infants delivered in government-owned health facilities was also shown. It was reported that up to 50% of infants delivered in hospital, midwife's house, or maternity clinic received either free or purchased formula milk in the first days after delivery.[37] Although the International Code of Marketing of Breast-milk Substitutes has been adopted in Indonesia, efforts to monitor and evaluate its implementation should be taken into account to prevent improper use of breast-milk substitutes.[38] Supports from health workers to encourage mothers to breastfeed their infant immediately after delivery will help to overcome potential barriers that may prevent mothers from conducting optimal breastfeeding practices.

Home deliveries also emerged as a significant predictor for delayed initiation of breastfeeding. Since the services of traditional birth attendants for home deliveries are still widely used particularly in rural and remote areas,[39] efforts to include traditional birth attendants in community-based health promotion activities might be advantageous for some women and infants.

Factors associated with non-exclusive breastfeeding in Indonesia

The variability across regions also plays an important role in exclusive breastfeeding practices in Indonesia, as mirrored by its high PAR. However, our analysis showed that infants from Eastern Indonesia were more likely to be exclusively breastfed than those in Java/Bali. This might be influenced by the less exposures to different varieties of food and infant formulas, which are reported to be some major concern of breastfeeding practice,[40] in Eastern Indonesia compared to Java/Bali region. Increasing
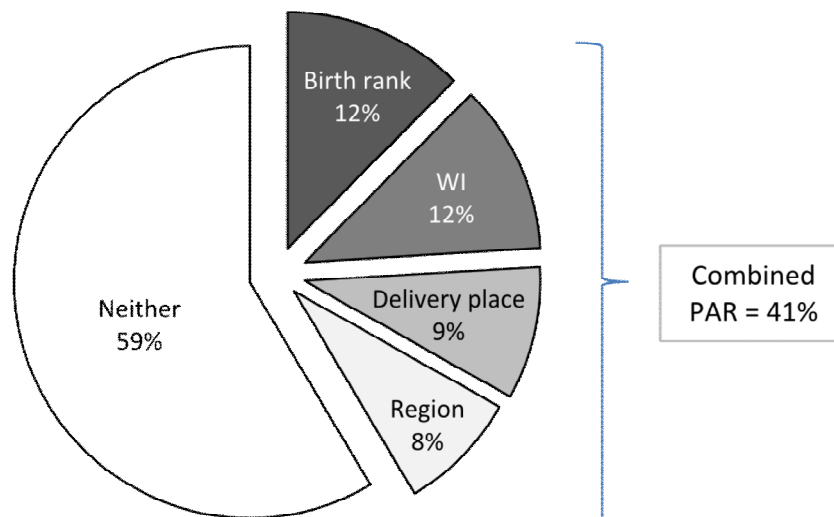
A. Combined population attributable risk (PAR) for factor associated with delayed initiation of breastfeeding in Indonesia, IDHS 2002/2003 and 2007. The PAR for each variable presented here was the proportion of individual PAR from the combined PAR of four risk factors
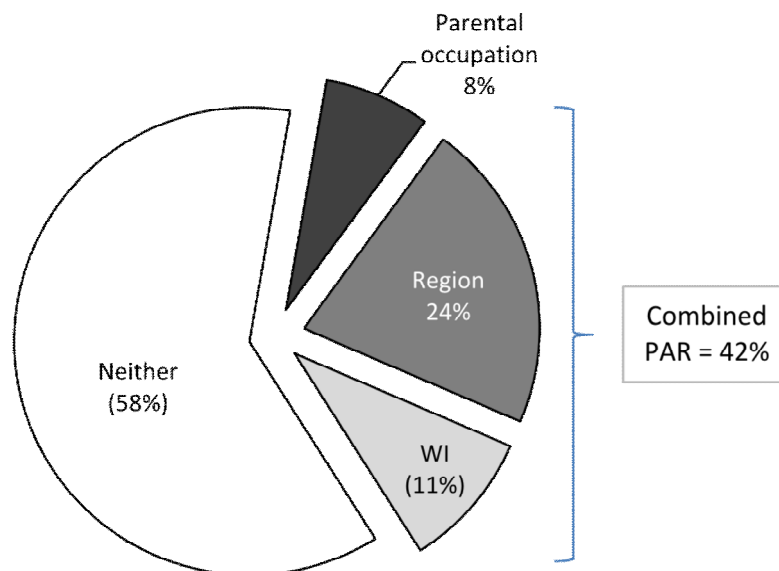
B. Combined population attributable risk (PAR) for factor associated with non-exclusive breastfeeding in Indonesia, IDHS 2002/2003 and 2007. The PAR for each variable presented here was the proportion of individual PAR from the combined PAR of four risk factors.

Figure 2. Combined Population Attributable Risk (PAR) for factor associated with delayed initiation and non-exclusive breastfeeding in Indonesia, IDHS 2002/2003 and 2007

maternal knowledge and promoting social supports from family members, peers and health providers will be beneficial.[41]

We found that infants from rich households were less likely to be exclusively breastfed, as also reported by previous literature.[27,32] The frequent exposure to various types of formula feeding along with the financial capability to purchase the formula feeding might explain this sub-optimal breastfeeding practice. Strategies targeting mothers from high household wealth index to promote exclusive breastfeeding practices are vital.

As reported in other studies, our analysis found that mothers working outside the household to be a barrier for exclusive breastfeeding.[32,42] Although women in Indonesia are entitled for a paid maternity leave, the duration was only for three months, ie 1.5 month before and after

delivery.[43] Nevertheless, this legislation only applies to formal sector; whereas in informal sector, of which majority are women labour, the legislation was not fully applied. When women return to work after delivery, most of the time they are also faced by the lack of supporting infrastructure that prevent them from continuing exclusively breastfeed their infants. In Indonesia, a high proportion of women are working in agricultural sector,[44] without any proper facilities and supports for breastfeeding. This indicates the need for fostering breastfeeding policy in workplace, including in the informal sector, to ensure working mothers are able to exclusively breastfeed their infants.

Strengths and limitations

This study used data from two nationally representative

surveys with a large sample size that provided adequate power to include various potential predictors in the analyses. The IDHS also uses standardized questionnaire and methodology which facilitate inter-country comparison. The inclusion of infants aged 0-23 months and 0-5 months at the time of interview as study population also minimized the recall bias of mother regarding breastfeeding practices, pregnancy and delivery histories, who had delivered at very different durations before the survey.

However, several limitations should be noted. As in other cross-sectional data, IDHS have restricted the causal inference of the results of these analyses. In this survey, information was provided based on maternal recall and there was no validation conducted. As recommended by the WHO,[8] the indicator of exclusive breastfeeding was only assessed based on the 24-hour recall data, and consequently might overestimate the proportion of infants exclusively breastfed. The aggregation of the data, for example by categorizing the country only to three regions might lead to residual confounding and mask the regional variation in the rates of early initiation and exclusive breastfeeding in Indonesia. Nevertheless, these limitations are unlikely to affect the validity of the results.

Conclusions
The associations between various groups of variables with delayed initiation of breastfeeding and non-exclusive breastfeeding demonstrate the need to conduct comprehensive public health strategy using a multi-sectoral approach to promote breastfeeding practices in Indonesia. Increasing the awareness of optimal breastfeeding amongst mothers and family members, including those from high household economic status, should become a priority. Efforts to strengthen and monitor the implementation of the International Code of Marketing of Breast-milk Substitutes will increase optimal breastfeeding practices and reduce improper use of breast-milk substitutes. Promoting supports from health care workers are also important along with repeated trainings for health professionals, particularly for those working in government-owned facilities. The involvement of traditional birth attendants might be beneficial to increase optimal breastfeeding rates in women from rural and remote areas. Efforts to implement, monitor, and reinforce breastfeeding policy in the workplace will be beneficial to ensure continuous breastfeeding for working mothers.

REFERENCES
1. Darmstadt GL, Bhutta ZA, Cousens S, Adam T, Walker N, de Bernis L. Evidence-based, cost-effective interventions: how many newborn babies can we save? Lancet. 2005; 365:977-88. doi: 10.1016/S0140-6736(05)71088-6
2. Jones G, Steketee RW, Black RE, Bhutta ZA, Morris SS. How many child deaths can we prevent this year? Lancet. 2003;362:65-71. doi: 10.1016/S0140-6736(03)13811-1
3. Angelsen NK, Vik T, Jacobsen G, Bakketeig LS. Breast feeding and cognitive development at age 1 and 5 years. Arch Dis Child. 2001;85:183-8. doi: 10.1136/adc.85.3.183
4. Grantham-McGregor SM, Fernald LC, Sethuraman K. Effects of health and nutrition on cognitive and behavioural development in children in the first three years of life: Part 1: Low birthweight, breastfeeding, and protein-energy malnutrition. Food Nutr Bull. 1999;20:53-75.
5. World Health Organization. World Health Statistics 2011. Geneva: World Health Organization; 2011.
6. Lauer JA, Betrán AP, Barros AJ, de Onís M. Deaths and years of life lost due to suboptimal breast-feeding among children in the developing world: a global ecological risk assessment. Public Health Nutr. 2006;9:673-85. doi: 10.10 79/PHN2005891
7. World Health Organization, UNICEF. Global strategy for infant and young child feeding. Geneva: World Health Organization; 2003.
8. World Health Organization. Indicators for assessing infant and young child feeding practices: conclusions of a consensus meeting held 6–8 November 2007 in Washington D.C., USA. Geneva: World Health Organization; 2008.
9. Orlando S. The immunologic significance of breast milk. J Obstet Gynecol Neonatal Nurs. 1995;24:678-83. doi: 10. 1111/j.1552-6909.1995.tb02550.x
10. Edmond KM, Zandoh C, Quigley MA, Amenga-Etego S, Owusu-Agyei S, Kirkwood BR. Delayed breastfeeding initiation increases risk of neonatal mortality. Pediatrics. 2006;117:e380-e6. doi: 10.1542/peds.2005-1496
11. Mullany LC, Katz J, Li YM, Khatry SK, LeClerq SC, Darmstadt GL, Tielsch JM. Breast-feeding patterns, time to initiation, and mortality risk among newborns in Southern Nepal. J Nutr. 2008;138:599-603.
12. Widström AM, Wahlberg V, Matthiesen AS, Eneroth P, Uvnäs-Moberg K, Werner S, Winberg J. Short-term effects of early suckling and touch of the nipple on maternal behaviour. Early Hum Dev. 1990;21:153-63. doi: 10.1016/0378-3782(90)90114-X
13. Sobhy SI, Mohame NA. The effect of early initiation of breast feeding on the amount of vaginal blood loss during the fourth stage of labor. J Egypt Public Health Assoc. 2004; 79:1-12.
14. Arifeen S, Black RE, Antelman G, Baqui A, Caulfield L, Becker S. Exclusive breastfeeding reduces acute respiratory infection and diarrhea deaths among infants in Dhaka slums. Pediatrics. 2001 Oct;108:E67. doi: 10.1542/peds.108.4.e67
15. Jason JM, Nieburg P, Marks JS. Mortality and infectious disease associated with infant-feeding practices in developing countries. Pediatrics. 1984;74:702-27.

16. United Nations. Road map towards the implementation of the United Nations Millennium Declaration: report of the Secretary-General. New York: United Nations; 2001. A/56/326.

17. Dashti M, Scott JA, Edwards CA, Al-Sughayer M. Determinants of breastfeeding initiation among mothers in Kuwait. Int Breastfeed J. 2010;5:7. doi: 10.1186/1746-4358-5-7

18. Horii N, Guyon AB, Quinn VJ. Determinants of delayed initiation of breastfeeding in rural Ethiopia: programmatic implications. Food Nutr Bull. 2011;32:94-102.

19. Vieira TO, Vieira GO, Giugliani ER, Mendes CM, Martins CC, Silva LR. Determinants of breastfeeding initiation within the first hour of life in a Brazilian population: cross-sectional study. BMC Public Health. 2010;10:760. doi: 10.1186/1471-2458-10-760

20. Agho KE, Dibley MJ, Odiase JI, Ogbonmwan SM. Determinants of exclusive breastfeeding in Nigeria. BMC Pregnancy Childbirth. 2011;11:2. doi: 10.1186/1471-2393-11-2

21. Pandey S, Tiwari K, Senarath U, Agho KE, Dibley MJ. Determinants of infant and young child feeding practices in Nepal: secondary data analysis of Demographic and Health Survey 2006. Food Nutr Bull. 2010;31:334-51.

22. Sasaki Y, Ali M, Kakimoto K, Saroeun O, Kanal K, Kuroiwa C. Predictors of exclusive breast-feeding in early infancy: a survey report from Phnom Penh, Cambodia. J Pediatr Nurs. 2010;25:463-9. doi: 10.1016/j.pedn.2009.04.010

23. Badan Pusat Statistik-Statistics Indonesia (BPS), National Family Planning Coordinating Board, Ministry of Health, ORC Macro. Indonesia Demographic and Health Survey 2002-2003. Calverton, Maryland: BPS and ORC Macro; 2003.

24. Badan Pusat Statistik-Statistics Indonesia (BPS), National Family Planning Coordinating Board, Ministry of Health, ORC Macro. Indonesia Demographic and Health Survey 2007. Calverton, Maryland: BPS and ORC Macro; 2008.

25. Macro International Inc. Sampling manual. Calverton, Maryland: 1996.

26. Macro International Inc. Measure DHS: Demographic and Health Surveys Maryland USA: ICF Macro; 2012 [cited October 2013]. Available from: http://www.measuredhs.com/Where-We-Work/Country-Main.cfm?ctry_id=17&c=Indonesia&Country=Indonesia&cn=&r=4.

27. Patel A, Badhoniya N, Khadse S, Senarath U, Agho KE, Dibley MJ. Infant and young child feeding indicators and determinants of poor feeding practices in India: secondary data analysis of National Family Health Survey 2005-06. Food Nutr Bull. 2010;31:314-33.

28. Archer KJ, Lemeshow S. Goodness-of-fit test for a logistic regression model fitted using survey sample data. The Stata Journal. 2006;6:97-105.

29. Rockhill B, Newman B, Weinberg C. Use and misuse of population attributable fractions. Am J Public Health. 1998;88:15-9. doi: 10.2105/AJPH.88.1.15

30. Ministry of Health Republic of Indonesia. Indonesia Health Profile 2010. Jakarta: Ministry of Health Republic of Indonesia; 2011.

31. Wiryo H, Hakimi M. Implementation of Health Education, Based on Ethnographic Study, to Increase the Colostrum and Decrease Early Solid Food Feeding. Health Educ Behav. 2005;32:102-12. doi: 10.1177/1090198104269 514

32. Mihrshahi S, Kabir I, Roy SK, Agho KE, Senarath U, Dibley MJ. Determinants of infant and young child feeding practices in Bangladesh: secondary data analysis of Demographic and Health Survey 2004. Food Nutr Bull. 2010;31:295-313.

33. Unicef. Childinfo: monitoring the situation of children and women: Unicef; 2012 [cited 11 July 2012]. Available from: http://www.childinfo.org/breastfeeding_status.html.

34. Qiu L, Zhao Y, Binns CW, Lee AH, Xie X. Initiation of breastfeeding and prevalence of exclusive breastfeeding at hospital discharge in urban, suburban and rural areas of Zhejiang China. Int Breastfeed J. 2009;4:1. doi: 10.1186/1746-4358-4-1

35. Orun E, Yalcin SS, Madendag Y, Ustunyurt-Eras Z, Kutluk S, Yurdakok K. Factors associated with breastfeeding initiation time in a Baby-Friendly Hospital. Turk J Pediatr. 2010;52:10-6.

36. Rowe-Murray HJ, Fisher JR. Baby friendly hospital practices: cesarean section is a persistent barrier to early initiation of breastfeeding. Birth. 2002;29:124-31. doi: 10.1046/j.1523-536X.2002.00172.x

37. Dickey V, Boedihardjo S, Bardosono T, (Global Health Technical Assistance Project). USAID/Indonesia Nutrition Assessment for 2010 New Project Design. Washington: Global Health Technical Assistance Project; 2010.

38. Word Health Organization. International Code of Marketing of Breast-milk substitutes. Geneva: World Health Organization; 1981.

39. Titaley CR, Hunter CL, Dibley MJ, Heywood P. Why do some women still prefer traditional birth attendants and home delivery?: a qualitative study on delivery care services in West Java Province, Indonesia. BMC Pregnancy Childbirth. 2010;10:43. doi: 10.1186/1471-2393-10-43

40. Lee WT, Lui SS, Chan V, Wong E, Lau J. A population-based survey on infant feeding practice (0-2 years) in Hong Kong: breastfeeding rate and patterns among 3,161 infants below 6 months old. Asia Pac J Clin Nutr. 2006;15:377-87.

41. Barona-Vilar C, Escriba-Aguir V, Ferrero-Gandia R. A qualitative approach to social support and breast-feeding decisions. Midwifery. 2009;25:187-94. doi: 10.1016/j.midw.2007.01.013

42. Tan KL. Factors associated with exclusive breastfeeding among infants under six months of age in peninsular malaysia. Int Breastfeed J. 2011;6:2. doi: 10.1186/1746-4358-6-2

43. Act of the Republic of Indonesia Number 13 Year 2003: Concerning Manpower. Jakarta, Indonesia.

44. van Klaveren M, Tijdens K, Hughie-Williams M, Martin NR. An overview of women's work and employment in Indonesia. Amsterdam: University of Amsterdam; 2010.

Original Article

Socio-economic factors and use of maternal health services are associated with delayed initiation and non-exclusive breastfeeding in Indonesia: secondary analysis of Indonesia Demographic and Health Surveys 2002/2003 and 2007

Christiana R Titaley PhD[1], Philips C Loh MSc[2], Sabarinah Prasetyo DR[1], Iwan Ariawan MS[1], Anuraj H Shankar DSc[3]

[1]*Center for Health Research Universitas Indonesia (CHR-UI), Faculty of Public Health, Universitas Indonesia, Depok, Indonesia*
[2]*Department of Epidemiology, Harvard School of Public Health, Massachusetts, United States*
[3]*Department of Nutrition, Harvard School of Public Health, Massachusetts, United States*

印尼婦女社經因子及孕產婦健康服務利用與延後開始及非純母乳哺餵有關：印尼 2002/2003 及 2007 人口與健康調查次級資料分析

本分析目的為評估印尼婦女延後開始哺餵母乳，以及非純母乳哺餵的相關因子。資料源自於 2002/2003 及 2007 年印尼人口與健康調查。評估共 12,191 名，年齡介於 0-23 個月的活產獨生子女，延後開始母乳哺餵的相關因子。此外，也評估 3,187 名，年齡介於 0-5 個月的活產獨生子女，其非純母乳哺餵的相關因子。使用羅吉斯迴歸，評估潛在預測因子與結果的相關性。我們的研究發現 來自高家戶財富指標的嬰兒，其延後開始哺餵母乳，及非純母乳哺餵的機會均顯著增加。延後開始母乳哺餵的相關因子，包括：嬰兒來自 Sumatera 區 (OR=1.64，95% CI=1.38-1.95)、剖腹產(OR=1.84，95% CI=1.39-2.44)及出生於公立醫院 (OR=1.38， 95% CI=1.08-1.76) 或是非醫療機構 (OR=1.20， 95% CI=1.00-1.43)。與非純母乳哺餵相關的其他因子，包括：父母有工作 (OR=1.37，95% CI=1.06-1.78)及媽媽在小孩生產時有併發症(OR=1.35，95% CI=1.05-1.74)。然而，來自印尼東部的嬰兒，非純母乳哺餵的機率較低 (OR=0.64，95% CI=0.49-0.85)。母乳哺育落實不佳與環境、社經狀況、懷孕生產的特性及母親健康服務因子有關。要促進母乳哺育，應全面針對那些母乳哺育落實不佳的危險族群。

關鍵字：延後開始母乳哺餵、全母奶、印尼人口及健康調查、印尼