Maternal Characteristics as Predictors of the Incidence of Acute Upper Respiratory Infection in Children Under Five Years Old in Indonesia

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Abstract. The morbidity rate of acute upper respiratory infection (ARI) in children under five is still relatively high in Indonesia. Many factors are thought to influence this incident. The present study analyzed the characteristics of mothers as predictors of the incidence of acute upper respiratory infection in children under 5 years old in Indonesia. Data from Indonesia Basic Health Research 2018 using a multistage systematic random sampling method. A total of 72,954 children aged 0–59 months and their mothers were examined. The incidence of acute upper respiratory infection is based on the results of the diagnosis from health workers and the symptoms experienced by the child during the last 1 month before the survey was conducted. Maternal characteristics include age, education, common mental disorders experienced, and depression. Area of residence and socioeconomic status were also analyzed. Analysis used logistic regression. Maternal mental health is a predictor of acute upper respiratory infection in children under five. Children of mothers with common mental disorders have a risk of 1.78 times higher than children of mothers without common mental disorders (95% CI: 1.543–2.059). Meanwhile, children with mothers with depression had a 1.78 higher risk than children with mothers without depression before being adjusted with other variables (95% CI: 1.544–2.051). Children under five with mothers who did not go to school or did not finish elementary school had a 1.53 times higher risk of experiencing acute upper respiratory infection than children with mothers with a diploma and above (95% CI: 1.163–2.013). Maternal education, maternal common mental disorder, and child age are predictors of the incidence of acute upper respiratory infection in children under 5 years old in Indonesia.

Keywords: ARI · education · maternal mental health

1 Introduction

Acute respiratory infection (ARI) is a combination of a series of respiratory symptoms, ranging from mild symptoms to symptoms that can cause death. Based on the location of the infection, ARI is divided into upper respiratory tract infections and lower respiratory

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tract infections [1]. Upper respiratory tract infections (URTIs) are generally treated on an outpatient basis and are associated with low mortality rates but significant health system costs [2, 3]. Meanwhile, lower respiratory tract infection (LRTI) is a respiratory infection that is the main cause of treatment in hospitals and has a high risk of causing death in children aged less than one year [4, 5].

Acute respiratory infection (ARI) is one of the leading causes of child mortality in the world and contributes to a third of deaths of children under five years of age in low and middle-income countries (LMICs), including Indonesia [6, 7]. Globally, the mortality rate of children under five years old due to ARI (pneumonia) in 2019 was 740,180 children or 14 percent of deaths of children under five years old [8]. In Indonesia, the percentage of children under five years of age experiencing ARI in 2018 was 12.8 percent, with the highest percentage in the province of East Nusa Tenggara [9]. Morbidity and mortality caused by ARI in Indonesia are still relatively high and become a health problem [10–12].

Since 2007, 2012, and 2017 there has been a downward trend in the prevalence of factors associated with ARI symptoms in children under five years of age in Indonesia [10]. However, community awareness about the dangers of ARI still needs to be considered because research showed that children aged two years or over two years old are less likely to seek health care when they have symptoms of ARI compared with children less than two years of age with ARI symptoms [13]. IDHS 2017 data states that 8 percent of children who experience ARI symptoms are not taken to a health facility or health provider for treatment [14].

Previous studies in several LMICs, including Indonesia, showed factors related to the higher prevalence of ARI among children, including sociodemographic, environmental, and behavioral factors. Among sociodemographic factors were poverty or wealth quintile, parental age, or occupation. Child age and gender were related to the risk of ARI. Behavioral factors include exclusive breastfeeding and parental indoor smoking behavior. Smoking is a behavioral factor that has an impact on the environment. Pollution, low air quality both inside and outside the home, home density, room density, poor ventilation, high humidity levels, and poor drinking water quality were among the environmental factors related to a higher risk of ARI in children [4, 5, 15, 16].

Although maternal factors had known to be related to child health, including ARI [10, 17, 18], no previous research found in Indonesia exploring maternal characteristics, including maternal mental health about the risk of ARI in children. This study aimed to determine the association between maternal characteristics and the risk of acute upper respiratory infection in Indonesia's children under 5 years old.

2 Materials and Methods

2.1 Data Source

This study used secondary data from the 2018 Indonesian Basic Health Survey. This survey interviewed approximately 1,017,290 people from 34 provinces in 2018. A multistage systematic random sampling method was used to select participants. The first stage identifies and assigns primary sampling units to all census blocks (PSUs). The second stage uses a probability proportional to enrollment size design to determine each

PSU's census block. Of the 720,000 census block master frames obtained from the 2010 Population Census conducted by the Central Bureau of Statistics (BPS), 180,000 were selected as sampling frames using the Probability proportional to size (PPS) method. Another PPS considers the rural-urban distribution followed by systematic linear sampling. The next step is to select 10 households from each CB randomly. All households are defined as those who have lived in the same location for at least 6 months and have the same financial resources for food. Before the data collection interview using structured questionnaires, participants were explained and signed the informed consent directly by trained fieldworkers. All selected households were asked if they were willing to participate after getting the information about the research and signing the informed consent. The inclusion criteria in this study were all households with children under five. The exclusion criteria were incomplete maternal and child data.

In this study, we used a sample of 0–59 months-old children and their parents for analysis. The total sample was 72,954 children. The dependent variable in this analysis was the incidence of acute upper respiratory infection (ARI). This variable was derived from the questions in the survey concerning the diagnosis made by health workers and based on the symptoms experienced by the respondents in the last month before the survey. A child was considered to have an ARI if within the last month, they had been diagnosed with ARI by a health worker or if he or/she has symptoms of fever, cough for less than two weeks, runny nose, or stuffy nose, and sore throat. The incidence of ARI is categorized into two: yes or no.

The independent variable consists of the demographic characteristics of mothers and children. Characteristics of children include the age and sex of the child. Maternal characteristics consist of maternal age, education, occupation, common mental disorders, and depression. Socio-economic variables and area of residence were also analyzed. Child age was divided into 0–5 months, 6–11 months, 12–23 months, 24–35 months, 36–47 months, and 48–59 months. Child sex was divided into boy and girl. Maternal age was categorized into 15–24 years, 25–34 years, 35–49 years, and more than 49 years. Maternal education was divided into not attending school - not completing elementary school, graduating from elementary school, junior high school, senior high school, and diploma and above. The maternal occupation was divided into two: working and not working. Maternal common mental disorder (CMD) was obtained based on statements from the Self Reporting Questionnaire (SRQ), consisting of 20 statements that the mother felt. This variable is divided into two, namely, yes and no. The cut-off used in this study is six; if the respondent answers "yes" to at least six questions, they are indicated to have a common mental disorder [19]. Maternal depression was measured based on 10 questions from MINI (The Mini International Neuropsychiatric Interview), then divided by two, yes and no. The MINI is an interview-based diagnostic instrument that assesses depression in the past two weeks or over a lifetime. It consists of three screening questions and seven main questions. An algorithm that determines whether a person is depressed or not uses the data from the tools as input [20].

The socio-economic level was determined by categories from the Center for Statistical Agency, where household assets, as well as average income and expenditure, are taken into account before being categorized into a wealth index with five categories

(lowest, lower-middle, middle, upper-middle, and highest). In addition, the place of residence was divided into urban and rural.

2.2 Ethical Consideration

The ethics and permission for this research follow the ethical approval for Riskesdas 2018 from the Ethical Committee of Health Research, National Institute of Health Research and Development (NIHRD) Ministry of Health, Republic of Indonesia No. LB.02.01/2/KE.267/2017.

2.3 Statistical Analysis

All statistical analyses were conducted in Stata 14. The chi-square test was used in bivariate analysis to determine the relationship between predictor variables and the incidence of ARI. The adjusted associations between the incidence of ARI and independent variables were calculated using logistic regression analysis. The odd ratio (OR) adjusted was obtained after calculating other variables with multiple logistic regression (significance $p < 0.05$).

3 Results

According to the analysis's findings, 11.8 percent of children under five were found to have ARI. The result of this analysis was lower than the Indonesian Basic Health Survey's report (12.8%). The difference in the prevalence of ARI in children under five is due to the data used in this paper using child data which is connected to maternal data. Based on the child's age, the lowest prevalence of children experiencing ARI was at 0–5 months. The incidence of ARI was approximately the same in boys and girls. Based on maternal education, children who experienced ARI were more experienced than children whose mothers had elementary education (Table 1).

Table 2 shows the results of the logistic regression analysis of ARI incidence based on other variables. Variables significantly related to the incidence of ARI in children under five before adjustment with other variables were the child's age, maternal education, maternal CMD, and maternal depression. After adjustment with other variables, there was a significant change in the variables with the incidence of ARI in children under five. However, maternal depression was not significantly associated with the incidence of ARI after analysis with other variables.

The most significant risk for children to experience ARI occurred at the age of 12–23 months before other variables were included (OR: 2.81; 95% CI: 2.377–3.334). After considering other variables, the most significant risk still occurred in children aged 12–23 months (adjusted OR: 2.13; 95% CI: 1.746–2.599). Maternal characteristics related to the incidence of ARI are maternal education. Mothers with low education had a slightly higher risk of having children with ARI at 1.48 (95% CI: 1.161–1.885).

After considering other variables, the most significant risk remained for mothers with low education at 1.53 (95% CI: 1.163–2.013). Children whose mothers had CMD had a higher risk of developing ARI than children whose mothers did not experience ARI by

Table 1. Descriptive analysis

Variables	Acute respiratory infection		n total (%)	P-value
	Yes n (%)	No n (%)		
Child characteristics				
Age				0.000*
0–5 months	359 (4.17)	6,509 (10.12)	6,868 (9.41)	
6–11 months	937 (10.86)	6,694 (10.40)	7,631 (10.46)	
12–23 months	1,816 (21.10)	12,515 (19.45)	14,331 (19.64)	
24–35 months	1,857 (21.58)	12,864 (19.99)	14,721 (20.18)	
36–47 months	1,803 (20.95)	12,850 (19.97)	14,653 (20.09)	
48–59 months	1,834 (21.31)	12,916 (20.07)	14,750 (20.22)	
Sex				0.516
Boy	4,495 (52.23)	33,370 (48.14)	37,865 (51.90)	
Girl	4,111 (47.77)	30,978 (48.14)	35,089 (48.10)	
Maternal characteristics				
Maternal age				0.024*
15–24 years	1,370 (15.92)	10,086 (15.68)	11,456 (11.71)	
25–34 years	4,392 (51.03)	33,917 (52.73)	38,309 (52.53)	
35–49 years	2,808 (32.63)	20,072 (31.20)	22,880 (31.37)	
≥50 years	36 (0.42)	251 (0.39)	287 (0.39)	
Maternal education				0.000*
Diploma and above	988 (11.48)	9,135 (14.20)	10,123 (13.88)	
Senior high school	2,594 (30.14)	20,524 (31.90)	23,118 (31.69)	
Junior high school	1,990 (23.12)	14,640 (22.75)	16,630 (22.80)	
Elementary school	2,779 (32.29)	18,511 (28.77)	21,290 (29.18)	
Not completing elementary school	255 (2.96)	1,538 (2.39)	1,793 (2.46)	
Maternal occupation				0.144
Not working	4,582 (53.24)	34,798 (54.08)	39,380 (53.98)	
Working	4,024 (46.76)	29,550 (45.92)	33,574 (46.02)	
Maternal CMD				0.000*
Yes	1,287 (14.95)	5,548 (8.62)	6,835 (9.37)	
No	7,319 (85.05)	58,800 (91.38)	66,119 (90.63)	

(*continued*)

Table 1. (*continued*)

Variables	Acute respiratory infection		n total (%)	P-value
	Yes n (%)	No n (%)		
Maternal depression				0.000*
Yes	707 (8.22)	3,251 (5.05)	3,953 (5.43)	
No	7,899 (91.78)	61,097 (94.95)	68,996 (94.57)	
Residence				0.000*
Urban	3,284 (38.16)	26,133 (40.61)	29,417 (40.32)	
Rural	5,322 (61.84)	38,215 (59.39)	43,537 (59.68)	
Drinking water				
Groundwater	4,696 (54.57)	33,819 (52.56)	38,515 (52.79)	0.000*
Tap water/refill	3,910 (45.43)	30,529 (47.44)	34,439 (47.21)	
Social economy				0.000*
Lowest	1,829 (25.95)	12,665 (24.84)	14,494 (24.98)	
Lower-middle	1,548 (21.96)	11,301 (22.17)	13,849 (22.14)	
Middle	1,419 (20.13)	10,103 (19.82)	11,522 (19.86)	
Upper-middle	1,304 (18.50)	9,081 (17.81)	10,385 (17.90)	
Highest	949 (13.46)	7,830 (15.36)	8,779 (15.13)	

Note: * p-value < 0.05

Table 2. Results of logistic regression of incidence of acute respiratory infection

Predictor	Crude OR	P-value	Lower bound	Upper bound	Adjusted OR	P-value	Lower bound	Upper bound
Child characteristics								
Age								
0–5 months (ref)	1.00				1.00			
6–11 months	2.49	0.000*	2.075	2.991	1.91	0.000*	1.547	2.364
12–23 months	2.81	0.000*	2.377	3.334	2.13	0.000*	1.746	2.599
24–35 months	2.71	0.000*	2.297	3.203	2.06	0.000*	1.694	2.503
36–47 months	2.57	0.000*	2.180	3.045	1.82	0.000*	1.497	2.208
48–59 months	2.68	0.000*	2.274	3.159	1.97	0.000*	1.619	2.394
Sex								
Boy	1.07	0.053	0.999	1.144	1.04	0.338	0.963	1.117
Girl	1.00				1.00			

(*continued*)

Table 2. (*continued*)

Predictor	Crude OR	P-value	Lower bound	Upper bound	Adjusted OR	P-value	Lower bound	Upper bound
Maternal characteristics								
Maternal age								
25–34 years (ref)	1.00				1.00			
≥50 years	0.64	0.087	.388	1.065	0.54	0.053	0.288	1.007
35–49 years	1.05	0.185	.975	1.138	1.03	0.547	0.941	1.121
15–24 years	1.06	0.193	.968	1.170	1.04	0.491	0.933	1.155
Maternal education								
Diploma and above	1.00				1.00			
Senior high school	1.34	0.000*	1.193	1.521	1.45	0.000*	1.262	1.672
Junior high school	1.37	0.000*	1.209	1.556	1.43	0.000*	1.236	1.671
Elementary school	1.48	0.000*	1.309	1.674	1.51	0.000*	1.299	1.751
Not completing elementary school	1.48	0.002*	1.161	1.885	1.53	0.002*	1.163	2.013
Maternal occupation								
Not working	1.02	0.601	0.950	1.092	0.96	0.286	0.886	1.036
Working (ref)	1.00				1.00			
Maternal CMD								
Yes	1.99	0.000*	1.781	2.241	1.78	0.000*	1.543	2.059
No (ref)	1.00				1.00			
Maternal depression								
Yes	1.78	0.000*	1.544	2.051	1.14	0.140	0.957	1.369
No (ref)	1.00				1.00			
Residence								
Urban (ref)	1.00				1.00			
Rural	1.00	0.881	0 .9727	1.0284	1.07	0.143	0.978	1.168
Drinking water								
Groundwater	0.97	0.396	0.901	1.042	0.89	0.021*	0.823	0.984
Tap water/refill (ref)	1.00				1.00			

(*continued*)

Table 2. (*continued*)

Predictor	Crude OR	P-value	Lower bound	Upper bound	Adjusted OR	P-value	Lower bound	Upper bound
Social economy								
Lowest	1.02	0.708	0.899	1.168	0.90	0.826	0.780	1.041
Lower middle	1.04	0.589	0.907	1.185	0.92	0.613	0.793	1.056
Middle	1.07	0.330	0.932	1.230	0.96	0.226	0.832	1.114
Upper middle	1.08	0.305	0.934	1.242	0.98	0.159	0.850	1.138
Highest (ref)	1.00				1.00			

OR = Odd Ratio; *$p < 0.05$.

1.78 times. After adjusting for other variables, the risk decreased slightly to 1.99 times (0 = 95% CI: 1.543–2.059). Meanwhile, children with depressed mothers had a 1.78 times greater risk than children with non-depressed mothers (95% CI: 1.544–2.051).

4 Discussion

This study's prevalence of ARI in children under five was 11.8%. The 2018 Riskesdas results report shows that the prevalence of ARI in Indonesia is 9.3% for all ages. The greatest prevalence is in children aged 1–4 years at 13.7% [9]. The results in this study are lower than the prevalence of ARI in Northwest Ethiopia, which is around 27.3% [21]. Meanwhile, in rural areas of Ethiopia, the prevalence of ARI in children under five is around 7.8% [22].

This study found that maternal education was linked to the prevalence of ARI in under five children after controlling for other factors. Another study showed similar results and a relationship between maternal education and the incidence of ARI in children. Mothers educated and working can identify predisposing factors and take action to prevent and treat ARI [23]. One of the factors associated with the risk of the incidence of ARI is the breastfeeding issue. Exclusive breastfeeding is possible for more mothers with higher education [24].

A study in Ethiopia stated that maternal education level was one of the risk factors associated with the incidence of ARI in children under five [25]. Maternal education is a factor that needs to be considered because there is a significant difference in the risk of ARI based on the mother's education level. The risk of ARI occurrence was statistically higher in mothers with no education or low education than in mothers with higher education. Mothers with higher education are associated with better behavior in seeking treatment when their children are sick [26, 27]. Well-educated mother is related to the level of knowledge possessed by mothers, which includes transmission models, symptoms, and danger signs of ARI in the community [28].

This study found that maternal CMD was associated with the incidence of ARI in children under five. A cohort study conducted on pregnant women continued until the child was born and showed that maternal stress during the prenatal period was associated

with a higher risk of recurrent respiratory infection until the child was two years old [29]. Research in Ethiopia tested the relationship between CMD in mothers and the risk of diseases in early childhood, including diarrhea, fever, and acute respiratory infections. The result was CMD symptoms after delivery are associated with an increased risk of diarrhea in infants, but not associated with ARI after adjustment for other variables [30]. In addition, the findings of another study state that parental distress is associated with reduced linear growth and the risk of mild and moderate stunting in children. Parental distress is strongly associated with behavioral and other risk factors that limit child growth [31].

The presence of CMD in mothers reduces the involvement of mothers in the childcare process, which impacts child development. Maternal mental vulnerability, low family support, and low ability to financial problems will affect the child-rearing process [32, 33]. Risk factors for maternal psychosocial conditions are associated with the incidence of severe lower respiratory tract infection and LRTI, especially for post-natal stress and long-term maternal psychological distress [34].

According to this study, children between the ages of 12 and 36 months were most at risk for ARI. The findings of this study differ from those of other studies conducted in sub-Saharan Africa, which found that children between the ages of 24 and 59 months had a higher chance of getting ARI than children younger [35]. This statement is related to the period of adequate exclusive breastfeeding and continued breastfeeding combined with good protection of complementary feeding for infants [36].

The strength of this study was that it used data with national representation. The limitation of the study was that the measurements were carried out using self-report, so there was a risk of memory bias. In addition, the study could not answer the causal relationship because of the cross-sectional method.

5 Conclusion

Based on the analysis and discussion above results, it can be concluded that the incidence of ARI in children under five is related to maternal education, maternal mental health, and the child's age. Further research can be carried out to determine the effect of maternal characteristics on child risk for other infectious diseases such as pneumonia or other respiratory diseases such as COVID-19 and include more comprehensive maternal factors such as breastfeeding, nutrition, and health behavior.

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References

1. Simoes EAF, Cherian T, Chow J, Shahid- Salles, Sonbol A. Laxminarayan R, John TJ. Acute respiratory infections in children. In: Jamison DT et al., editor. Disease Control Priorities in Developing Countries [Internet]. 2nd Editio. Washington DC; 2006. p. 483–97. Available from: https://pubmed.ncbi.nlm.nih.gov/21250360/

2. Nair H, Simões EA, Rudan I, Gessner BD, Azziz-Baumgartner E, Zhang JSF, et al. Global and regional burden of hospital admissions for severe acute lower respiratory infections in young children in 2010: a systematic analysis. Lancet (London, England). 2013 Apr;381(9875):1380–90.
3. Liu L, Oza S, Hogan D, Perin J, Rudan I, Lawn JE, et al. Global, regional, and national causes of child mortality in 2000-13, with projections to inform post-2015 priorities: an updated systematic analysis. Lancet (London, England). 2015 Jan;385(9966):430–40.
4. McAllister DA, Liu L, Shi T, Chu Y, Reed C, Burrows J, et al. Global, regional, and national estimates of pneumonia morbidity and mortality in children younger than 5 years between 2000 and 2015: a systematic analysis. Lancet Glob Heal [Internet]. 2019;7(1):e47–57. https://doi.org/10.1016/S2214-109X(18)30408-X
5. Shibata T, Wilson JL, Watson LM, Leduc A, Meng C, Ansariadi, et al. Childhood acute respiratory infections and household environment in an eastern indonesian urban setting. Int J Environ Res Public Health. 2014;11(12):12190–203.
6. UNICEF. Ending Preventable Child Deaths from Pneumonia and Diarrhoea by 2025-The integrated GLobal Action Plan for Pneumonia and Diarrhoea (GAPPD) [Internet]. 2013. Available from: https://apps.who.int/iris/bitstream/handle/10665/79207/WHO_FWC_MCA_13_01_eng.pdf
7. UNICEF, WHO, Group WB, Nations U. Levels and trends in child mortality 2020 [Internet]. 2020. Available from: https://www.unicef.org/reports/levels-and-trends-child-mortality-report-2020
8. World Health Organization. Pneumonia [Internet]. 2021. Available from: https://www.who.int/news-room/fact-sheets/detail/pneumonia
9. Badan Penelitian dan Pengembangan Kesehatan KK. Laporan Nasional Riskedas 2018. Jakarta: Lembaga Penerbit Badan Penelitian dan Pengembangan Kesehatan; 2019.
10. Lutpiatina L, Sulistyorini L, Notobroto HB, Raya RP, Utama RD, Thuraidah A. Multilevel Analysis of Lifestyle and Household Environment for Toddlers With Symptoms of Acute Respiratory Infection (ARI) in Indonesia in 2007, 2012, and 2017. Glob Pediatr Heal. 2022;9.
11. Soleman SR. The Trend of Children Mortality Rates in Indonesia. J Ilmu Kesehat Masy. 2020;11(01):52–62.
12. Nelson CM, Sutanto A, Gessner BD, Suradana IG, Steinhoff MC, Arjoso S. Age- and cause-specific childhood mortality in Lombok, Indonesia, as a factor for determining the appropriateness of introducing Haemophilus influenzae type b and pneumococcal vaccines. J Health Popul Nutr. 2000 Dec;18(3):131–8.
13. Titaley CR, Que BJ, de Lima FVI, Angkejaya OW, de Lima FVI, Maelissa MM, et al. Health Care–Seeking Behavior of Children With Acute Respiratory Infections Symptoms: Analysis of the 2012 and 2017 Indonesia Demographic and Health Surveys. Asia-Pacific J Public Heal. 2020;32(6–7):310–9.
14. BKKBN, BPS, Kementerian Kesehatan, USAID. Survei Demografi dan Kesehatan 2017. Kesehatan Reproduksi Remaja. Jakarta; 2017.
15. Akinyemi JO, Morakinyo OM. Household environment and symptoms of childhood acute respiratory tract infections in Nigeria, 2003–2013: a decade of progress and stagnation. BMC Infect Dis [Internet]. 2018;18(1):296. https://doi.org/10.1186/s12879-018-3207-5
16. Mir F, Ariff S, Bhura M, Chanar S, Nathwani AA, Jawwad M, et al. Risk Factors for Acute Respiratory Infections in Children Between 0 and 23 Months of Age in a Peri-Urban District in Pakistan: A Matched Case–Control Study. Front Pediatr. 2022;9(January):1–7.
17. Handayuni L, Ridha Alfian A, Amran A, Razak A. Knowledge of mother about the household environment againt acute respiratory infection in Padang Pasir: A literature study. IOP Conf Ser Earth Environ Sci. 2019;314(1).

18. Ullah MB, Mridha MK, Arnold CD, Matias SL, Khan MSA, Siddiqui Z, et al. Factors associated with diarrhea and acute respiratory infection in children under two years of age in rural Bangladesh. BMC Pediatr. 2019;19(1):1–11.
19. Idaiani S. Elderly people and women were more risk to mental emotional disorders. Heal Sci Indones. 2010;1(1).
20. Idaiani S, Waris L. Depression and Psychological Stress Among Health Workers in Remote Areas in Indonesia. Front Public Heal. 2022;10(April):1–7.
21. Dagne H, Andualem Z, Dagnew B, Taddese AA. Acute respiratory infection and its associated factors among children under-five years attending pediatrics ward at University of Gondar Comprehensive Specialized Hospital, Northwest Ethiopia: Institution-based cross-sectional study. BMC Pediatr. 2020;20(1):1–7.
22. Merera AM. Determinants of acute respiratory infection among under-five children in rural Ethiopia. BMC Infect Dis [Internet]. 2021;21(1):1–12. https://doi.org/10.1186/s12879-021-06864-4
23. Aboulazm SF, Darwish AM, Okasha M. Mother ' s Knowledge and Beliefs About Management Of Acute Respiratory Infection (ARI) Among Children In Alexandria City Abstract : Introduction : Subjects and Methods : Results : Discussion : 1994;1–8.
24. Laksono AD, Wulandari RD, Ibad M, Kusrini I. The effects of mother's education on achieving exclusive breastfeeding in Indonesia. BMC Public Health. 2021;21(1):1–6.
25. Woldeamanuel BT, Gebreyesus HL. Prevalence and risk factors for chest-related symptoms of acute respiratory tract infections among under five children: Case of Ethiopia. Trends Biomed Res. 2019;2(1):1–7.
26. Danquah L, Amegbor PM, Ayele DG. Determinants of the type of health care sought for symptoms of Acute respiratory infection in children: analysis of Ghana demographic and health surveys. BMC Pediatr [Internet]. 2021;21(1):1–14. https://doi.org/10.1186/s12887-021-02990-9
27. Sultana M, Sarker AR, Sheikh N, Akram R, Ali N, Mahumud RA, et al. Prevalence, determinants and health care-seeking behavior of childhood acute respiratory tract infections in Bangladesh. PLoS One. 2019;14(1):1–18.
28. Wembonyama Kasongo AN, Mukuku O, Kanteng GA-W, Shongo MY-P, Mutombo AK, Tambwe AM-A-N, et al. Maternal knowledge and practices regarding childhood acute respiratory infections in Lubumbashi, DRC. Theory Clin Pract Pediatr. 2020;2(1):44–51.
29. Korhonen LS, Karlsson L, Scheinin NM, Korja R, Tolvanen M, Mertsola J, et al. Prenatal Maternal Psychological Distress and Offspring Risk for Recurrent Respiratory Infections. J Pediatr [Internet]. 2019;208:229–235.e1. Available from: https://www.sciencedirect.com/science/article/pii/S0022347618318249
30. Ross J, Hanlon C, Medhin G, Alem A, Tesfaye F, Worku B, et al. Perinatal mental distress and infant morbidity in Ethiopia: A cohort study. Arch Dis Child Fetal Neonatal Ed. 2011;96(1):59–64.
31. Susiloretni KA, Smith ER, Suparmi, Marsum, Agustina R, Shankar AH. The psychological distress of parents is associated with reduced linear growth of children: Evidence from a nationwide population survey. PLoS One [Internet]. 2021;16(10 October):1–23. https://doi.org/10.1371/journal.pone.0246725
32. Rahman A, Harrington R, Bunn J. Can maternal depression increase infant risk of illness and growth impairment in developing countries? Child Care Health Dev. 2002;28(1):51–6.
33. Rahman A, Iqbal Z, Bunn J, Lovel H, Harrington R. Impact of maternal depression on infant nutritional status and illness: A cohort study. Arch Gen Psychiatry. 2004;61(9):946–52.
34. MacGinty R, Lesosky M, Barnett W, Nduru PM, Vanker A, Stein DJ, et al. Maternal psychosocial risk factors and lower respiratory tract infection (LRTI) during infancy in a South African birth cohort. PLoS One [Internet]. 2019;14(12):1–21. https://doi.org/10.1371/journal.pone.0226144

35. Seidu AA, Dickson KS, Ahinkorah BO, Amu H, Darteh EKM, Kumi-Kyereme A. Prevalence and determinants of Acute Lower Respiratory Infections among children under-five years in sub–Saharan Africa: Evidence from demographic and health surveys. SSM - Popul Heal [Internet]. 2019;8(June):100443. https://doi.org/10.1016/j.ssmph.2019.100443
36. Ujunwa F, Ezeonu C. Risk factors for acute respiratory tract infections in under-five children in Enugu Southeast Nigeria. Ann Med Health Sci Res. 2014;4(1):95.