Prevalence and associated factors of pneumonia among under-five children at public hospitals in Jimma zone, South West of Ethiopia, 2018.

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Abstract

Background: Pneumonia is a leading single disease killing under-five children. In Ethiopia, it contributes to 18% deaths of under-five children every year. These deaths are easily preventable and treatable through simple and cost effective interventions.

Objective: To assess the prevalence and associated factors of pneumonia among under -five children at public hospitals in Jimma Zone, Ethiopia.

Methods: Cross-sectional study design was conducted on 306 systematically selected participants. Data was entered in to EPIDATA version 3.1 and exported to SPSS version 23 for analysis. Variables with p- value less than 0.2 at Bivariate logistic analysis were selected for further analysis by multivariate logistic regression to declare statistically significant association at P value <0.05

Result: Prevalence of pneumonia among under-five children was 28.1%. Use wood as fuel source(P= 0.003, AOR=3.45), cook food in living room(P= 0.008, AOR= 3.34), caring of the child on mothers back or besides the mother during cooking (P= 0.008, AOR= 2.96), absence of windows in the kitchen (P= 0.001, AOR= 2.5), children who unvaccinated (P= 0.004, AOR= 4.6), Vitamin A supplementation (P= 0.002, AOR= 0.168), mixed breast feeding (P= 0.014, AOR= 3.26), moderate acute malnutrition(P= 0.002, AOR= 4) and child history of ARTI(P= 0.004, AOR= 4) were a potential determinates of pneumonia.

Conclusion and Recommendations: This study showed that the prevalence of pneumonia was high. Therefore, intervention on potential determinates such as: improved housing conditions, health education on exclusive breastfeeding and nutrition, increase immunization and Vitamin A supplementation and early control of respiratory tract infection were recommended.

Keywords: Prevalence, Under-five pneumonia, Associated factors, Jimma zone.

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Introduction

Pneumonia is describes as inflammation of parenchymal structures of the lung, such as the alveoli and the bronchioles. Pneumonia is usually caused by infection with viruses or bacteria. Globally, Pneumonia is the leading cause of child mortality from infectious diseases, accounting for approximately 16% of the 5.6 million under-five deaths, killing around 900,000 children in 2016. This means a loss of over 2,500 child lives every day, or over 100 every hour. Pneumonia kills nearly 1 million children under the age of five around the world, causing more deaths than HIV/AIDS, diarrhea and malaria combined. The forgotten child killer': Pneumonia kills two kids under five every minute [1].

According to the WHO 2016 report, pneumonia accounted for 16% of the estimated 5.9 million deaths among children aged less than 5 years in 2015 [2,3]. The incidence in under-five age group is estimated to be 0.29 episodes per child-year in developing and 0.05 episodes per child-year in developed countries. This translates into about 156 million new episodes each year worldwide, in which 151 million episodes are in the developing world. Of all community cases, 7–13% is severe to be life-threatening and require hospitalization [2,4].

The African Region has the highest burden of global child mortality, 50% of worldwide deaths from pneumonia in this age group. By contrast, less than 2% of these deaths take place in the European Region and less than 3% in the Region of the Americas. More than 90% of all deaths due to pneumonia in children aged less than 5 years take place in 40 countries. The incidence and severity of childhood pneumonia was highest in Africa and south East Asia, which accounted for 30% and 39% respectively of the global burden of severe cases [2,5]. More than 490,000 children under-five died by pneumonia in 2016 in sub-Saharan Africa [6].

In Ethiopia, pneumonia is a leading single disease killing under-five children. It is estimated that 3,370,000 children encounter pneumonia annually which contributes to 18% of all causes of deaths killing over 40,000 under-five children every year [2]. These deaths are easily preventable by cost effective interventions like immunization, good nutrition, exclusive breast feeding, appropriate complementary feeding hand washing [7].

According to study conduct at Wondo Genet district, Ethiopia, the prevalence of pneumonia among under-five children visit health center was 33.5% [8].

Burden and severity of childhood pneumonia is high in Ethiopian children due to limited coverage and affordability of effective preventive interventions like immunization of PCV, RSV, and lack of good access to care and unavailability of effective management strategies. In our countries, children also have high exposure ton pneumonia compared with children in high-income countries. The huge discrepancy between the current incompatibly big and high peal of pneumonia reflects poorly designed prevention strategies in the poorest settings like Ethiopia [9,10].

It is therefore important to look at a combination of strategies for reducing the morbidity and mortality from pneumonia. These include preventive strategies such as routine immunizations, zinc and vitamin A supplementation, control of environmental factors, promotion of breast feeding, good nutrition, safe drinking water and good sanitation. Nevertheless, pneumonia remains the major cause of death in children. These deaths are easily preventable and treatable through simple and cost effective interventions. So, addressing current gaps for prevention of under-five pneumonia is critical to achieving Sustainable Development Goal (SDG 3) [11].

The widespread nature of the problem in Ethiopia has already killed thousands of children which need to look for lasting solution so as to end the problem. Despite the sustained effort to stop the problem, pneumonia continue to common mortality of children which calls for innovative strategies that will come about only through systematic researches. Data on the frequency of pneumonia and their related risk factors are important for planning child health care services but scarce in our countries. There is no study done on the prevalence and associated factors of pneumonia at Jimma zone. Therefore, this study aimed to assess the prevalence and associated factors of pneumonia among under-five children visited public hospitals of Jimma Zone.

Methods and Materials

Study area and the study period

The study was conducted from March 1-31, 2018 in public hospitals of Jimma zone, South West Ethiopia. Jimma zone is located at 350 Km far away from Addis Ababa. In this zone, there are seven public hospitals. In this zone, there were seven public hospitals six were district hospitals and one was referral.

Study design and population: Institutional based cross-sectional study design was conducted.

The sources of population were all under -five children visited out patients department of public hospitals in Jimma zone. Study populations were all under -five children with mother visited out patients department of selected public hospitals during data collection period.

Inclusion criteria and exclusion criteria: Children 2-59 months of age with mother / care giver visiting out patients department during data collection period were included. Severely sick child need life treating intervention and whose mother / care givers refused were excluded from the study.

Sample size and sampling technique

The sample size was determined using the single population proportion formula considering the following assumptions: Proportion of under-five pneumonia(p=34%) was taken from previous similar study [8], level of confidence 95%, and margin of error 5%, the sample size calculated as follows:

$$n_o = \frac{(Z\alpha/2)^2\, p(1-p)}{} = 345\ d^2$$

Because of the source of population was 1500 under -five children visit out patients departments of selected public hospital in Jimma zone which is less than 10,000, population correction formula was used to determine adjusted minimum sample size of 281. By adding 10% sample for non respondents rate, the final sample size was 309. From seven public hospitals, four hospitals were selected by using simple random sampling. Then, 309 estimated participants were proportionally allocated to each selected hospitals based up on their respective under five visit outpatient department of each hospitals. Finally, individual of study participant was selected using systematic random sampling techniques from under five OPD registration book of each selected hospital in which every 5th child was selected.

Data collection procedures: Interviewer administered structured questionnaire was used to collect data from sampled mother or care giver who visiting under five children out patients departments. The questionnaire was adapted from related study [8] and modified. English version questionnaire was translated in to Afan Oromo language by experts and then re-translated back in to English by the other expert to check the consistency. Finally record review was done to collect information on diagnosis of child, preexisting medical or Co-morbid conditions, height and weight of the children. Four diploma nurse and one Degree Nurse was recruited as data collectors and supervisor respectively.

Data quality control: Both data collectors and a supervisor were trained for two days on objective of study and techniques of data collection. A supervisor was checked the completeness and consistencies of questionnaires filled by the data collectors to ensure the quality of the data. The Principal investigator was evaluates the data before the data analysis stage to verify the completeness of the collected data. Pretest was done on 5% of a sample size in Limu hospital which did not included in the study and necessary modification was done.

Data processing and analysis

The data was coded and entered in to the Epi-Data version 3.1 up on creating the questionnaire template in the QES file of the software. The entered data was cleaned to ensure the validity of the data. Then, the analysis was exporting to and analyzed by SPSS version 23. Descriptive statistics and logistic regression was computed. All variables were used in the bivariate logistic regression and a variable with p-value ≤ 0.2 was further considered for multivariate logistic regression to control confiding variables. Crude odds ratio and adjusted odds ratio (AOR) was analyzed with a 95% confidence interval (CI) and p-value <0.05 was considered to declare statistically significant association.

Operational definition

Under five children: Children age less than 59 months, but in this study infant less than two months was not included because at age of less than two months the case as not diagnosis as pneumonia.

Under five pneumonia: Diagnosis of pneumonia taken from the card of under-five Childers seen at OPD (Out patients departments) of selected hospital.

Ethical consideration

Ethical clearance was obtained from Research Ethical Committee of Department of Nursing and Midwifery, College of Health Sciences, Addis Ababa University**.** Then, the letter was written to each selected hospital and permission n was obtained. Verbal and written informed consent was obtained from participants after a detailed explanation on the purpose and benefit of the study insured right before data collection. The confidentiality of data was kept at all stages.

Results

From the estimated 309 sample, 306 respondents were participated which yields response rate of 99%. Among 306 children, 169(55.2%) of them were males and 137(44.8%) were female. The mean age of the children was 23.5 ± 16 months and majority 179 (58.5%) children were from urban.

Environmental characteristics of the respondents

Charcoal were the most common 182(59.5%) source of cooking fuel and 170 (55.6%) of house hold were used wood as fuel source for cooking. Around 227(75%) of participants family's had a kitchen and 79(25%) participants families were cook food in the living room (Table 1).

Health care facility and child care characteristics of respondents

From total 306 children participants, 198 (64.7%) were fully vaccinated, 45(14.7%) were up to date, 18(5.8) were partial vaccinated and 45(14.7%) were unvaccinated. About 256(83.6%) of mothers were practice exclusive breastfeeding within the first six months of life (Table 2).

Preexisting medical or Co-morbid characteristics of respondents

Out of 306 children, 248(81.1 %) had no malnutrition and 58(18.9%) had moderate acute malnutrition. Among the study participants, acute respiratory tract infection was the commonest, 107 (35%) history of past medical diseases followed by acute gastro enteritis, 77(25.2%) (Table 3).

Prevalence of pneumonia and Signs and symptoms of pneumonia

Of 306 participated children, 115(37.6%) had history of cough during the time of survey. The overall prevalence of pneumonia during the study period was 86 (28.1%) of which 31(10%) was severe pneumonia. Moderate to severe respiratory distress is common Signs and symptoms of severe pneumonia followed by central cyanosis or hypoxemia (oxygen saturation<90%) (Figure 1).

Multivariate logistic regression

All independent variables were tested by binary logistic regression analysis and variable with P- values less than 0.2 were candidate for multivariate logistic regression to control confounding variable and to determine potential predictors of pneumonia.

Table 1. *Environmental characteristics of under -five children who visit hospitals of Jimma Zone.*

Variables	Category		Frequency (N=306)	Percent
Kind of toilet	pit latrine		271	88.6
	Ventilated improve pit latrine		21	6.9
	Open field		14	4.6
Number of rooms in house	1 room		77	25.2
	≥ 2 rooms		229	74.8
source of fuel	Charcoal	Yes	182	59.5
		No	124	40.5
	Wood/ Crop wastes	Yes	170	55.6
		No	136	44.4
	Electricity	Yes	85	27.8
		No	221	72.2
Place of food cooking	Living room		79	25.8
	Kitchen		227	74.2
Child location during cooking	Caring mothers back or besides		102	33.3
	Outside of the cooking house		204	66.6
Place of child sleep	Separate room		245	80.1
	The same room to food cooking room		61	19.9
Separation of kitchen from the main house	Yes		182	59.5
	No		45	14.7
windows in Kitchen	No window in kitchen		65	47.1
	≥1 window in kitchen		162	52.9
windows in the house	≤1 window in house		116	37.9
	≥ 2 window in house		190	62.1
House hold exposure cigarette smoking.	1 Yes		30	9.8
	2 No		276	90.2

This result showed that children from those household used wood as fuel source increase the risk of child hood pneumonia by 3.4 times (AOR=3.4 CI= (1.5, 7.7)) compared to those not used wood as fuel source. According to this study, children those from household cook food in living room were three times (AOR= 3.2 CI= (1.37, 7.9)) more likely to develop pneumonia compared to those from household cook food in kitchen. Also caring mothers back or besides during cooking increase the risk of developing pneumonia by 2.5 times (AOR= 2.56 CI= (1.33, 6.5)) compared to keeping the child outside of the cooking house.

This study also revealed that unvaccinated children were 4.6 times (AOR= 4.6 (95% CI) = (2.64, 11)) more likely to develop pneumonia as compared to children who fully vaccinated. Children who got Vitamin A supplementation were 83% less likely to had pneumonia (AOR= 0.168 (95% CI) = (0.055-0.51)) when compare to Children who did not get Vitamin A supplementation. Children whose parent practiced mixed breast feeding during 6 months have three times (AOR= 3.26 (95% CI) = (1.266, 8.34)) risk to develop pneumonia than whose parent practiced exclusive breastfeeding. This study finding indicated that children who had moderate acute malnutrition were four times (AOR= 4 (95% CI) = (2, 10)) more likely to develop pneumonia as compared to who had no malnutrition. Also this finding revealed that history of ARTI in last two weeks were four times (AOR= 4 (95% CI) = (2, 8)) more likely risk to develop pneumonia than who had no history of ARTI in last two weeks. Similarly children those who had contact with house hold those had ARTI in last two weeks were two point six times (AOR=2.6 (95% CI)=(1, 6)more likely to develop pneumonia as compared to children those who had no contact with house hold ARTI in last two weeks (Table 4).

Table 2. *Accessibility of health facility and child care characteristics of under -five children at public hospitals in Jimma Zone.*

Variables	Category	Frequency (N=306)	Percent
Visit health care facility as soon as sick	Yes	269	88.2
	No	37	11.8
Distance from home to nearest health facility	≤ 3 K	200	65.4
	4-6 KM	49	16.0
	≥ 7 KM	57	18.6
Duration of illness	≤ 1 day	199	65.0
	2-4 day	86	28.1
	≥ 5 day	21	6.9
means of transportation	Walking	98	32.0
	motor-cycle	62	20.3
	Public service vehicle	140	45.7
	Personal vehicle	6	2.0
Vitamin A supplementation	Yes	80	26.1
	No	226	73.9
Zinc Supplementation	Yes	22	7.2
	No	284	92.8
Vaccination Status	Fully vaccinated	198	64.7
	Up to date	45	14.7
	Partial vaccinated	18	5.8
	Unvaccinated	45	14.7
Breast feeding during 6 months	Exclusive breastfeeding	256	83.6
	Mixed Breast feeding	50	16.4
Duration of breast feed	< 2 years	185	60
	>2 years	121	40
Child care giver at home	Parental care	266	86.9
	Home maid/ care giver	40	13.1

Table 3. *Preexisting medical or Co-morbid conditions characteristics of under -five children at public hospitals in Jimma Zone.*

Variables	Category		Frequency (N=306)	Percent
MUAC	≤ 11.9 Cm		11	3.6
	12-12.9 Cm		36	11.8
	≥ 13 Cm		259	84.6
Malnutrition	No malnutrition		248	81.1
	Moderate acute malnutrition		58	18.9
Past-medical History	AGE	Yes	77	25.2
		No	229	74.8
	ARTI	Yes	107	35
		No	199	65
	Malaria	Yes	10	3.3
		No	296	96.7
	HIV/AIDS	Yes	3	1.0
		No	301	98.4
	Chronic diseases like CHD, Asthma	Yes	8	2.6
		No	298	97.4
	History of parent ARTI	Yes	67	21.9
		No	239	79.1

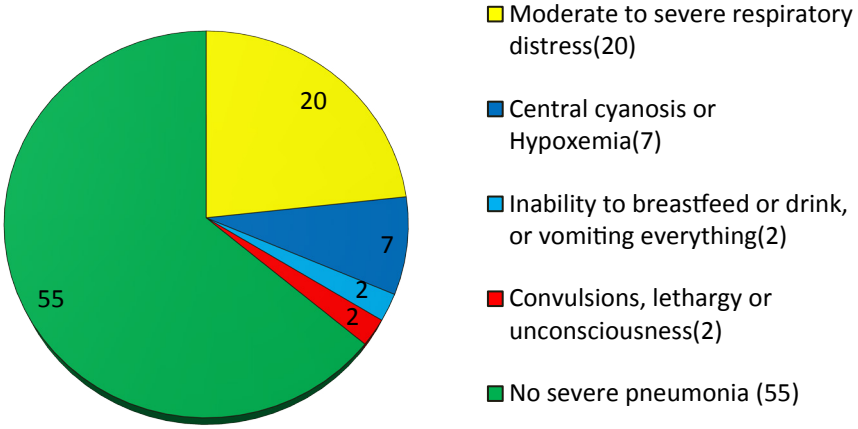

Figure1. *Distribution of pneumonia by clinical characteristics among under -five children visiting public hospitals in Jimma Zone.*

Table 4. *Factors associated with pneumonia among under -five children at public hospitals in Jimma Zone.*

Variable	Category	Pneumonia		COR	p-value	AAOR(95% CI)
		Yes	No			
Wood as fuel source	Yes	65	105	3.39	.003	**3.411** (1.5, 7.7)
	No	21	115			1
Place of food cook	Living room	41	38	4.36	.009	**3.268**(1.4, 7.9)
	Kitchen	45	182			1
Child location during cooking	caring mothers back or besides during cooking	56	46	7	.008	**2.55**(1.33, 6.5)
	Outside of the cooking house	30	174	1		1
Vitamin A supplementation	Yes	12	68	0.362	.002	**.168**(0.05- 0.5)
	No	74	152	1		1
Vaccination Status	Fully vaccinated	39	159	1		1
	Up to date	12	33	1.483	.123	**2.245** (0.8-6.3)
	Partial vaccinated	9	9	4.077	.094	**3.1(0.8-11)**
	Unvaccinated	26	19	5.579	.003	**4.624**(2.64, 11)
Breast feeding status during 6 m	Exclusive breastfeeding	59	193	1		1
	Mixed Breast feeding	27	27	3.271	.014	**3.3**(1.266, 8.3)
Malnutrition	No malnutrition	54	194	1		1
	Moderate acute malnutrition	32	26	4.4	.002	**4.161**(2, 10)
History ARTI	Yes	51	56	4.26	.001	**4.027**(2, 8)
	No	35	164	1		1
History of house hold ARTI	Yes	35	32	4.03	.011	**2.655**(1, 6)
	No	51	188	1		1

AOR= Adjusted Odds Ratio, COR = Cured Odds Ratio, Hosmer and Lemeshow Test=0.419

Discussion

Pneumonia among under- five children is a leading cause of morbidity and mortality in developing countries including Ethiopia. Prevalence and related risk factors of pneumonia are important for planning child health care services, for proper management and prevention strategy. In this study, the prevalence of pneumonia was 28.1% which is higher than Este town Northwest Ethiopia, 16.1% [12,13]. But this prevalence was lower than that of Wondo Genet district 33.5% [8]. These differences might be due to difference in study setting and seasonal variation. Studies done at Southeast Nigeria indicate that the prevalence of pneumonia was 31.6% which is almost consistent to the current study [14].

Our finding showed that children whose household used wood as fuel increase the risk of child hood pneumonia by three times. This was in line with survey conducted in Nepal, which shows use of traditional cooking fuel was found to be highly associated with ALRI [15]. UNICEF report shows that exposing children to household air pollution like solid fuels (wood, animal dung and crop waste) to cook food double their risk of pneumonia [16]. In the current study, children from household who had no kitchen were 3.34 times more likely to develop pneumonia which was almost in agreement with study done in Sidama zone in which children from household without kitchen were 6.8 times more likely to develop pneumonia [8].

According to this study caring of the child on mothers back or besides the mother during cooking increase the risk of child to develop pneumonia by three times. It is consistent with study conduct at Este town Northwest Ethiopia which shows that a child carried on back during cooking was five times more likely to develop pneumonia than a child who was not carried [13]. This is due to the facts that high indoor air pollution associated fuel use may adversely affect specific and non-specific host defenses of the respiratory tract against pathogens. Improved household air quality can reduce cases of severe pneumonia [17].

Our study finding indicated that, children who were unvaccinated were more vulnerable to develop pneumonia than fully vaccinated which was consistent with study undertaken in two slums of Dibrugarh town, India [18]. This is due to immunizations help reduce childhood pneumonia in two ways. First, vaccinations help prevent children from developing infections that directly cause pneumonia and immunizations may prevent infections that can lead to pneumonia as a complication [19].

This study revealed that Children who got Vitamin A supplementation were 83% less likely to had pneumonia. This result is in agreement with that of study conduct in Rwanda which shows that vitamin A supplementation reduces under-five pneumonia [20]. This probably due to the facts that role of vitamin A in the growth and development of cells and tissues (especially in respiratory epithelial cells and lung tissue) is essential. Vitamin A also help in preventing inflammation and infection in children and the severity of the infection [21].

In our study, children whose parent practice mixed breast feeding during 6 months had three times risk to develop pneumonia. It is in line with UNICEF report which showed that infants under of six months old who are not breastfed were at five times the risk of dying from pneumonia than infants who are exclusively breastfed for the first six months of life [16]. It is widely recognized that, breast milk contains the nutrients, antioxidants, hormones, lymphocytes and antibodies secretory Immunoglobulin A needed by the child to survive and develop, and specifically for a child's immune system to function properly. Also other evidence suggested that Suboptimal breastfeeding elevated the risk of pneumonia morbidity and mortality outcomes across age groups [22].

In this study, under-nutrition also showed significant difference to increase risk of developing pneumonia than well nourished. It in line with a study conducted in India which showed that malnutrition was significantly associated with pneumonia [23]. This might be due to under nutrition weakens a child's overall immune system as an adequate amount of protein and energy is needed for proper immune system functioning and undernourished children have weakened respiratory muscles, which inhibits them from adequately clearing secretions found in their respiratory tract [16].

Our study finding also indicated that, children who had ARTI in last two weeks were more at risk to develop pneumonia which was in line that of Kenya [24] and Netherlands [25]. This evidences indicate that children who have had history of ARTI are at great risk to develop pneumonia. Not only their own history of ARTI, but also children who had contact with house hold those who had ARTI indicated significant difference risk of developing pneumonia than who had no household contact history of ARTI which was consistent with study conducted in different regions ;Kamise, Oromia zone, Amhara [26]. This probably might be due to respiratory tract infections are easily transmitted from household contacts to children. Severity of the disease also depends on virulence and load of the pathogen; the load is usually higher when infection is from a household contact [4].

Conclusion

This study showed that the prevalence of pneumonia was high in the study area. The study also identified that, using wood as fuel, cooking food in living room, caring of child on mothers back or besides the mother during food cooking, absence of windows in the kitchen, vitamin A supplementation, vaccination status, malnutrition, history of child ARTI, history of contact with house hold that had ARTI and breast feeding status during 6 months were independent potential predictors of under-five pneumonia.

Recommendation

Oromia regional health bureau, Jimma Zonal health bureau, each public hospital in Jimma zone and health care providers were encouraged to:

- Educate the community that using wood as fuel source should be discouraged but instead alternative affordable methods which produce less smoke be used.
- Educate the community to ventilate and improve housing conditions, use separate kitchen from living room and use kitchen which has windows should be encouraged.
- Educate the mothers in caring of child on cooking mothers back or besides the mother should be discouraged
- Promote and give health education on exclusive breastfeeding, immunization for the first six months of life.
- All children attending health care services should be assessed for nutritional status and Nutritional counseling is recommended for all children attending health facilities.
- Promote early treatments and prevention of ARTI of child and house hold.
- Give health education about immunization and make community mobilization and increase immunization coverage
- Promote exclusive breastfeeding for the first six months of life.
- Increase and promote Vitamin A supplementation.

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Conflict of Interest

All authors declared that there is no conflict of interest. Funder of this study was acknowledged and they have no contribution in publication process.

References

1. UNICEF. Monitoring the Situation of Children multiple Indicator Cluster Surveys (MICS) Child Health/Pneumonia. 2017.
2. Walker CLF, Rudan I, Liu L, et al. Global burden of childhood pneumonia and diarrhoea. The Lancet. 2013;381(9875):1405-16.
3. Requejo JH, Bryce J, Barros AJ, et al. Countdown to 2015 and beyond: fulfilling the health agenda for women and children. The Lancet. 2015;385(9966):466-76.
4. Rudan I, Boschi-Pinto C, Biloglav Z, et al. Epidemiology and etiology of childhood pneumonia. Bulletin of the World Health Organization. 2010;86(5):408-16B.
5. Nair H, Simões EA, Rudan I, et al. Global and regional burden of hospital admissions for severe acute lower respiratory infections in young children in 2010: a systematic analysis. The Lancet. 2013;381(9875):1380-9
6. UNICEF. The State of the World's Children 2016: A Fair Chance for Every Child. New York: UNICEF. 2016.
7. Chopra M, Mason E, Borrazzo J, et al. Ending of preventable deaths from pneumonia and diarrhoea: an achievable goal. Lancet 2013.
8. Abuka T. Prevalence of pneumonia and factors associated among children 2-59 months old in Wondo Genet district, Sidama zone, SNNPR, Ethiopia. Curr Pediatr Res. 2016; 21(1).
9. Zar HJ. Childhood pneumonia – looking beyond mortality. African Journal of Respiratory Medicine. 2016;11(2).
10. WHO, UNICEF. Pneumonia and diarrhea tackling the deadliest diseases for the world' poorest children. UNICEF/ WHO. 2012.
11. UNICEF. Integrated Global Action Plan for the Prevention

and Control of Pneumonia and Diarrhoea (GAPPD). In: WHO/UNICEF. 2015.

12. Harris M, Clark J, Coote N. British Thoracic Society guidelines for the management of community acquired pneumonia in children. britanupdate 2011.
13. Fekadu GA, Terefe MW, Alemie GA. Prevalence of pneumonia among under-five children in Este Town and the surrounding rural Kebeles, Northwest Ethiopia: A community based cross sectional study. Science Journal of Public Health. 2014;2(3).
14. Ujunwa F, Ezeonu C. Risk Factors for Acute Respiratory Tract Infectons in Under-fve Children in Enugu Southeast Nigeria. Anna Med Health Sci Res. 2014;4(1).
15. Sharma R, Bhandari N, Bhandari R, et al. Types of cooking stove and risk of Acute Lower Respiratory Infection among under-five children: across sectional study in Rasuwa, a Himalayan district of Nepal. Health Prospect: Journal of Public Health. 2015;14(1).
16. Wardlaw TEWJ, Hodge M. pneumonia the forgotten killer of children. In: UNICEF W. 2016.
17. Organization WH. Revised WHO classification and treatment of childhood pneumonia at health facilities–Evidence summaries. Geneva: World Health Organization. 2014.
18. Nirmolia N, Mahanta TG, Boruah M, et al. Prevalence and risk factors of pneumonia in under five children living in slums of Dibrugarh town. Clin Epidemiol Glob Health. 2017.
19. Tong N. Update on Background Paper, BP 6.22 Pneumonia. 2013.
20. Harerimana JM, Nyirazinyoye L, Thomson DR, et al. Social, economic and environmental risk factors for acute lower respiratory infections among children under five years of age in Rwanda. Arch Public Health. 2016;74(1):19.
21. Ramezani M, Aemmi SZ, Moghadam EZ. Factors Affecting the Rate of Pediatric Pneumonia in Developing Countries: a Review and Literature Study. Int J Pediatr. 2015;3(6.2):1173-81.
22. Lamberti LM, Grković ZI, Walker CLF, et al. Breastfeeding for reducing the risk of pneumonia morbidity and mortality in children under two: a systematic literature review and meta-analysis. BMC public health. 2013;13(3):S18.
23. Srivastava P. Predisposing Factors of Community Acquired Pneumonia in Under-Five Children. Journal of Lung Diseases & Treatment. 2015;1(1).
24. Onyango D, Kikuvi G, Amukoye E, et al. Risk factors of severe pneumonia among children aged 2-59 months in western Kenya: a case control study. Pan Afr Med J. 2012;13(1).
25. Teepe J, Grigoryan L, Verheij T. Determinants of community-acquired pneumonia in children and young adults in primary care. Eur Respir J. 2010;35(5):1113-7.
26. Dadi AF, Kebede Y, Birhanu Z. Determinants of pneumonia in children aged two months to five years in urban areas of Oromia Zone, Amhara Region, Ethiopia. Open Access Library J. 2014;1(08):1.

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