Research Article

Open Access   CrossMark

Determinants of community acquired pneumonia among children in kersa district, southwest Ethiopia: facility based case control study

Abstract

Background: Pneumonia is the leading cause of death in children under the age of 5 years. Ethiopia is ranked the fifth of 15 countries having the highest death rate of under five children due to pneumonia.

Objective: To identify determinants of Community Acquired Pneumonia (CAP) among 2-59 months old children.

Methods: Unmatched case control study was conducted in Kersa district, Southwest Ethiopia. A 95% confidence interval is desired with 90% statistical power and 1:1 ratio of controls to cases. Data were collected using structured and pre-tested questionnaire, entered into EpiData and analyzed using SPSS version 20. WHO Anthro plus was used to calculate nutrition indexes. Binary logistic regression analysis was used to test associations between the potential factors and the dependent variable. Variables with P-value < 0.25 during bivariate analysis were included to multivariate logistic regression model. Finally, variables with P-value < 0.05 were expressed as potential determinants of Community Acquired Pneumonia.

Results: Maternal age (AOR= 5.3; 95% CI: 1.9, 14.3), previous upper respiratory tract infection (AOR= 5.2; 95% CI: 3.1, 8.9), current parental smoking (AOR= 1.9; 95% CI: 1.1, 3.7), more than four family members (AOR= 2.1; 95% CI: 1.1, 3.9), non- exclusive breast feeding during the first six month of life (AOR= 3.3; 95% CI: 2.0, 5.4), lack of zinc supplementation (AOR= 1.7; 95% CI: 1.1, 2.8) and wasting (AOR= 2.0; 95% CI: 1.2, 3.5) were determinants of Community Acquired Pneumonia among 2-59 months old children.

Conclusion: Community Acquired Pneumonia is associated with young maternal age, large family size, parental smoking, non-exclusive breast feeding, lack of zinc supplementation, wasting and Previous Upper Respiratory Tract Infection. Therefore, improving child nutritional status, avoidance of smoking, limiting family size and early control of respiratory tract information could have significant salubrious effects on the event of Community Acquired pneumonia.

Keywords: pneumonia, children, determinants

Daniel Geleta, Fasil Tessema, Haimanot Ewnetu
Department of Epidemiology, Jimma University, Ethiopia

Correspondence: Haimanot Ewnetu, Department of Epidemiology, Jimma University, Jimma, Ethiopia, Tel 252000000000, Email hewnetu@yahoo.com

Abbreviations: CAP, community acquired pneumonia; URTI, upper respiratory tract infection; MOH, ministry of health; IMNCI, integrated management of neonatal and childhood illness; HMIS, health management information system

Introduction

The term pneumonia describes inflammation of parenchymal structures of the lung, such as the alveoli and the bronchioles. Pneumonias can be commonly classified according to the type of agent causing the infection, distribution of the infection and setting in which it occurs. Pneumonias are increasingly being classified as community-acquired and hospital-acquired (nosocomial) pneumonias. Community-acquired pneumonia is an infection that begins outside the hospital or is diagnosed within 48 hours after admission to the hospital in a person who has not resided in a long-term care facility for 14 days or more before admission. Community-acquired pneumonia may be either bacterial or viral. The etiologic agents of this infection include infectious and noninfectious agents.[1] The most common cause of infection in all age categories is Streptococcus pneumonia and it is the known leading bacterial cause of severe pneumonia among children across the developing world. Common viral causes of community-

acquired pneumonia include the influenza virus, respiratory syncytial virus, adenovirus, and Para influenza virus.[1] Bacterial pneumonia usually causes children to become severely ill with high fever and rapid breathing. Viral infections, however, often come on gradually and may worsen over time.[1,2] Children and infants with compromised immune systems, undernourished children, particularly those not exclusively breast fed or with inadequate zinc intake, are at higher risk of developing pneumonia. Environmental factors, such as living in crowded homes and exposure to parental smoking or indoor air pollution, may also have a role to play in increasing children's susceptibility to pneumonia and its severe consequences.[2] In 2013 Pneumonia took the lives of over one million children around the world,[3] about 15 percent of total deaths for children under age 5.[4] Recent estimates from the World Health Organization suggest that pneumonia is responsible for 20% of deaths in the under-five age group, leading to 3 million deaths per year. Of these deaths, two thirds occur during infancy and more than 90% occur in the developing countries.[5] It is most prevalent (20%) in sub-Saharan Africa and South Asia, of which India, Nigeria, Pakistan, Democratic Republic of Congo (DRC), Ethiopia, and China accounted for 50% of total deaths.[4] In Ethiopia, Pneumonia, diarrhea, malaria, measles and problems of the newborn cause more than 90% of the deaths in children under-five

Determinants of community acquired pneumonia among children in kersa district, southwest Ethiopia: facility based case control study

Copyright:
©2016 Geleta et al.   2

years of age.[6,7] As a result, Ethiopia is the fifth (62 deaths in 1000) among 15 countries having the highest death rate of under five years clinical pneumonia in the world.[8] Similarly, pneumonia is the most prevalent, 20%, acute respiratory infection among two months to five years' children's in urban areas of Oromia Zone.[9]

Given the seriousness of the problem and variability of risk factors, research is needed to identify the potential determinants of Community acquired pneumonia in under five children. Therefore, this study will provide valuable information about the community acquired pneumonia among children aged 2-59 months to start on simple &effective strategies to tackle the problem. It will also assist health care providers & policy makers to consider CAP prevention strategies at rural settings.

Objective

To identify determinants of Community Acquired Pneumonia among 2-59 months old children.

Methods and materials

Study Setting and participants

A case control study was conducted at Kersa district which is located about 323km Southwest of Addis Ababa, the Capital city. The source populations were all children aged 2-59 months who attended all the Health Centers during the study period. Cases were 2-59 months old children who visited under five 'sick-baby clinic', registered and classified for CAP as defined by the World Health Organization's Integrated Management of Childhood Illness guideline & adapted by Ethiopian ministry of health and controls are 2-59 months age children who visited under five 'sick-baby clinic', registered and classified for other condition than CAP as defined by the World Health Organization's Integrated Management of Childhood Illness guideline & adapted by Ethiopian MOH.

Sample size and sampling procedure

Sample size determination

Sample size was determined based on sample size calculation for two population proportions formula using EPI info version 3.5.1 software by considering the proportion of wasting among control which is 19.2% as reported from previous study (10) with confidence interval and power set at 95% and 90% respectively. The 1:1 control to case ratio was considered to detect an odds ratio of 2.2(11) at alpha of 0.05. Finally, 382 (191case and 191control) children were considered for the study.

Sampling procedure

All the 7 health centers that provide service for children as Integrated Management of Neonatal and Childhood Illness (IMNCI) protocol were purposively included. The sample size was distributed to each health center based on the district's HMIS report of existing case load. Finally, children were consecutively recruited by the concurrent controls selection technique.

Data collection procedure

Data were collected by trained nurses working in under five clinic using a structured and pre-tested questionnaire. After the study subjects were identified as cases and controls, they were sent to two separate rooms; one for cases and the other for controls but the data collectors are blinded for the status of the respondent. Afterwards, they were interviewed based on an interviewer administered structured questionnaire. The questionnaire was on the possible risk factors of CAP including socio-demographic factors, homebased factors, child's nutritional status, childhood illnesses and care practices. Finally record review was done to collect information on height, weight and zinc supplementation status of the children.

Data processing and analysis

Data were checked for completeness, coded & entered into Epi Data version 3.1 and then exported to SPSS version 20 for analysis. WHO Anthro plus version 1.0.4 was used for analysis of nutrition indexes to prepare for SPSS. Both descriptive and inferential statistical techniques were employed. Summary statistics such as percentages were computed and odds ratios were calculated with 95% confidence interval.

Binary logistic regression model was used to test associations between each independent factor with the outcome variable. Variables that showed significance during bivariate analysis at p-value <0.25 were set as candidate and simultaneously included to multivariable binary logistic regression with backward stepwise method. Finally, the variables with statistically significant associations at p-value of <0.05 with the outcome variable were expressed as potential determinants of community acquired pneumonia.

Ethical consideration

Ethical Clearance was obtained from Ethical Review Committee of Jimma University and verbal consent was taken from all the study participants.

Results

Socio-demographic factors associated with community acquired pneumonia

Overall, 378 child population (189 cases & 189 controls) were enrolled into the study making 98.9% response rate for both study groups. Of these enrolled, 182(96.3%) cases and 180(95.2%) controls were permanent rural residents. Female children account for 92 (48.7%) of cases & 87 (46%) of controls from all participants. The mean age of the children was 15.5 (with *SD* =13.3) &16.9 (with *SD* =14.1) months for case & controls respectively.

In the bi-variable logistic regression analysis, variables such as maternal age (P=0.01), maternal education (P=0.01) &occupation (P=0.08), father's level of education (P=0.01) &occupation (P=0.22), number of under-five children in the household (P=0.01), family size (P=0.01) and family monthly income (P=0.11) were identified to be associated with community acquired pneumonia at P <0.25 significance level (Table 1).

Home based factors associated with Community acquired pneumonia

The bivariate logistic regression analysis revealed that, Place the family used for cooking (P=0.01), place to keep the child while cooking (P=0.01), parental smoking (P=0.01) and materials used for washing child's hand after latrine (P=0.22) had significant association with Community acquired pneumonia among children at P <0.25 significance level. Proportion of family who use separate kitchen for cooking was more than half for both cases (52.4%) and controls (59.3%) (Table 2).

Determinants of community acquired pneumonia among children in kersa district, southwest Ethiopia: facility based case control study

Copyright:
©2016 Geleta et al.   3

Table 1 Socio-demographic characteristics of respondents and their association with community acquired pneumonia in Kersa district, Southwest Ethiopia, October 2015

Variables	Cases		Controls		Total		P-value	COR (95% C.I.)
	n	%	n	%	n	%		
Age of the Mother								
Less than 18 Years	25	13.2	9	4.8	34	9.0	0.01*	3.4[1.5, 7.6]
18-24 Years	80	42.3	78	41.3	158	41.8	0.31	1.2[0.8, 1.9]
25 or Above Years	84	44.4	102	54	186	49.2		1.0
Mother Education								
No Formal Education	137	72.5	119	63	256	67.7	0.01*	2.1[1.2, 3.9]
1-4 Grade	30	15.9	28	14.8	58	15.9	0.05*	2.0[1.0, 4.2]
5 Grade or Above	22	11.6	42	22.2	64	16.9		1.0
Father Education								
No Formal Education	106	56.1	87	46	193	51.1	0.01*	1.9[1.1, 3.0]
1-4 Grade	41	21.7	38	20.1	79	20.9	0.10*	1.6[0.9, 2.9]
5 Grade or Above	42	22.2	64	33.9	106	28.0		1.0
Mother Occupation								
House Wife	176	93.1	170	89.9	346	91.5	0.08*	2.8[0.9, 9.1]
Farmer	5	2.6	5	2.6	10	2.6	0.24	2.8[0.5, 14.8]
Merchant	4	2.1	3	1.6	7	1.9	0.18*	3.7[0.6, 24.7]
Others**	4	2.1	11	5.8	15	4		1.0
Father Occupation								
Farmer	159	84.1	148	78.3	307	81.2	0.22*	1.6[0.8, 3.5]
Merchant	18	9.5	23	12.2	41	10.8	0.74	1.2[0.5, 3.1]
Others**	12	6.3	18	9.5	30	7.9		1.0
Number of Under-Five Children in the Household								
3 or More Children	28	14.8	10	5.3	38	10.1	0.01*	3.1[1.5, 6.6]
1-2 Children	161	85.2	179	94.7	340	89.9		1.0
Family Size								
More than Four	162	85.7	136	72.0	298	78.8	0.01*	2.3[1.4,3.9]
Four or Less	27	14.3	53	28.0	80	21.2		1.0
Monthly Family Income								
<500 Birr	61	32.3	58	30.7	119	31.5	0.11*	1.6[0.9, 3.1]
500-1500 Birr	102	54.0	90	47.6	192	50.8	0.05*	1.9[1.1, 3.2]
Above 1500 Birr	26	13.8	41	21.7	67	17.7		1.0

*Variables which show significant association at bivariate logistic regression at P- value <0.25

Table 2 Home based factors association with CAP among children in Kersa district, Southwest Ethiopia, October 2015

Variables	Cases		Controls		Total		P-value	COR (95% C.I.)
	n	%	n	%	n	%		
Place the Family Mainly Used for Cooking								
In the Living Room	44	23.3	24	12.7	68	18.0	0.01*	2.1[1.2,3.7]
In the Kitchen Attached to Living Room	46	24.3	53	28.0	99	26.2	0.94	1.0[0.6,1.6]
In Separate Kitchen	99	52.4	112	59.3	211	55.8		1.0
Place to Keep a Child While Cooking								
Carried on the Back	39	20.6	22	11.6	61	16.1	0.01*	2.3[1.5, 4.9]
Kept at <2 Meter from Cooking Area	73	38.6	49	25.9	122	32.3	0.01*	2.3[1.4, 3.6]
Kept at ≥2 Meter from Cooking Area	77	40.7	118	62.4	195	51.6		1.0
Parental Smoking								
Yes	49	25.9	27	14.3	76	20.1	0.01*	2.1[1.2, 3.5]
No	140	74.1	162	85.7	302	79.9		1.0
Materials Used to Wash Child's Hand after Latrine								
Water only	62	34.4	52	28.4	114	31.4	0.22*	1.3[0.8, 2.1]
Ash and Water	27	15.0	29	15.8	56	15.4	0.88	1.1[0.6, 1.8]
Water and Soap	91	50.6	102	55.7	193	53.2		1.0

*Variables which show significant association at bivariate logistic regression at P- value <0.25.

Determinants of community acquired pneumonia among children in kersa district, southwest Ethiopia: facility based case control study

Copyright:
©2016 Geleta et al. 4

Nutritional factors associated with community acquired pneumonia

Breast feeding status in the first six months (P<0.001), weight for height (P<0.001), weight for age (P<0.001) and zinc supplementation (P=0.04) was found to be associated with CAP occurrences during bivariate logistic regression analysis.

One hundred thirty (68.8%) cases and 70 (37.0%) controls were nonexclusively breastfed during the first six month of their life. Regarding Anthropometric measurements, a large proportion of cases (40.7%) are wasted compared to controls (24.5%). Similarly, 28.0% and 14.3% of cases and controls are underweight respectively (Table 3).

Common childhood illnesses &related care practices associated with CAP

The study indicated that, variables such as immunization (P=0.09), child with previous history of URTI (P<0.001) and diarrhea (P=0.12) and familial pneumonia in the preceding two weeks (P<0.001) were associated with CAP in children in the bivariate logistic regression.

Majority of cases (81.5%) and controls (87.8%) have received Pentavalent vaccine while only half (50.8%) of cases and 60.3% of controls received measles vaccination. Regarding history of illness in the past two weeks, almost half of cases (51.9%) and less than 1/4th of controls (18.0%) reported URTI (Table 4).

Factors independently associated with community acquired pneumonia

The variables that exhibited significant association at P<0.25 at bivariate analysis were simultaneously included to multiple logistic regression. The finding revealed a child born from a mother whose age is < 18years is 5.3 times (AOR=5.3, 95% CI: 1.9, 14.3; P< 0.001) more likely to develop CAP compared to a child born to a mother whose age is 25 years or above. The odds of having CAP is 2.1 times more likely among a child with more than four family members compared to a child with less family members (AOR=2.1; 95%CI: 1.1, 3.9; P=0.02). On the other hand, a child who was living with a smoking parent is 1.9 times more likely (AOR= 1.9; 95%CI: 1.1, 3.7; P=0.04) to develop community acquired pneumonia than a child who was living with non-smoking parent. Those children who was not on exclusive breastfeeding in the first six months of life has three fold increased odds of pneumonia compared to exclusively breastfed children (AOR=3.3; 95%CI: 2.0, 5.4; P<0.001). Likewise, a child who was not ever supplemented with zinc was 1.7 times more likely to develop community acquired pneumonia than a child who ever supplemented (AOR=1.7; 95%CI: 1.1, 2.8; P=0.04) and wasted children had double risk (AOR=2, 95% CI: 1.2, 3.5) of getting community acquired pneumonia than normal children. Children who have history of URTI in the last 2 weeks preceding the study were 5.2 times (AOR= 5.2, 95% CI: 3.1, 8.9) more likely to acquire community acquired pneumonia than children with no previous history of URTI in the same time period (Table 5).

Table 3 Nutritional factors associated with CAP among children in Kersa district, Southwest Ethiopia, October, 2015

Variables	Cases		Controls		Total		P-value	COR (95% C.I.)
	n	%	n	%	n	%		
Birth to 6 Months Breast Feeding								
Non-Exclusive	130	68.8	70	37.0	200	52.9	0.00*	3.7[2.4,5.7]
Exclusive	59	32.2	119	63.0	178	47.1		
Weight for Height								
Wasted(≤ -2 SD)	77	40.7	46	24.5	123	32.5	0.00*	2.1[1.4,3.3]
Normal(≥ -2 SD)	112	59.3	143	75.5	155	67.5		1.0
Weight for Age								
Under Weight(≤ -2 SD)	53	28	27	14.3	80	21.2	0.00*	2.3[1.4, 3.9]
Normal (≥ -2 SD)	136	72	162	85.7	298	78.8		1,0
Zinc Supplementation								
No	94	49.7	39.2	168	168	44.4	0.04*	1.5[1.0, 2.3]
Yes	95	50.3	60.8	210	210	55.6		1.0

*Variables which show significant association at bivariate logistic regression at P- value <0.25.

Table 4 Common childhood illnesses & related care practices associated with CAP among children in Kersa district, southwest Ethiopia, October 2015

Variables	Distribution of Subjects						P-value	COR (95% C.I.)
	Case	%	Control	%	Total	%		
A Child Received Pentavalent Vaccine								
No	35	18.5	23	12.2	58	15.3	0.09*	1.6[0.9, 2.9]
Yes	154	81.5	166	87.8	320	84.7		1.0
A Child Received Measles Vaccine								
No	93	49.2	75	39.7	168	44.4	0.06*	1.5[1.0, 2.2]
Yes	96	50.8	114	60.3	210	55.6		1.0
A Child Received PCV								
No	38	20.1	23	12.2	61	16.1	0.04*	1.8[1, 3.2]
Yes	151	79.9	166	87.8	317	83.9		1.0
URTI in the Last 2 Weeks								
Yes	98	51.9	34	18	132	34.9	0.00*	4.9[3.1,7.8]
No	91	48.1	155	82	246	65.1		1.0

Citation: Geleta D, Tessema F, Ewnetu H. Determinants of community acquired pneumonia among children in kersa district, southwest Ethiopia: facility based case control study. *J Pediatr Neonatal Care.* 2016;5(2):11–12. DOI: 10.15406/jpnc.2016.05.00179

Determinants of community acquired pneumonia among children in kersa district, southwest Ethiopia: facility based case control study

Copyright:
©2016 Geleta et al.   5

Table Continued...

Variables	Distribution of Subjects						P-value	COR (95% C.I.)
	Case	%	Control	%	Total	%		
Diarrhea in Last 2 Weeks								
Yes	66	34.9	52	27.5	118	31.2	0.12*	1.4[0.9, 2.2]
No	123	65.1	137	72.5	260	68.8		1.0
Pneumonia among Family in Last 2 Weeks								
Yes	54	28.6	28	14.8	82	21.7	0.00*	2.3[1.4,3.8]
No	135	71.4	161	85.2	296	78.3		1.0

*Variables which show significant association at bivariate logistic regression at P- value <0.25

Table 5 Potential determinants of CAP among children aged 2-59 months in Kersa district, Southwest Ethiopia, October 2015

	Cases No (%)	Controls No (%)	COR (95% C.I.)	AOR (95% C.I.)
Age of the Mother				
Less than 18 Years	25 (13.2)	9(4.8)	3.4[1.5, 7.6]	5.3[1.9, 14.3] *
18-24 Years	80(42.3)	78(41.3)	1.2[0.8, 1.9]	1.4[0.8, 2.4]
25 & Above Years	84(44.4)	102(54)	1.0	1.0
Family Size				
More than Four	162(85.7)	136(72.0)	2.3[1.4,3.9]	2.1(1.1, 3.9) *
Four or Less	27(14.3)	53(28.0)	1.0	
History of Current Parental Smoking				
Yes	49(25.9)	27(14.3)	2.1[1.2, 3.5]	1.9[1.1, 3.7] *
No	140(74.1)	162(85.7)	1.0	1.0
Birth to 6 Months Breast Feeding Practice				
Non-Exclusive	130(68.8)	70(37.0)	3.7[2.4,5.7]	3.3[2.0, 5.4] *
Exclusive	59(32.2)	119(63.0)	1.0	1.0
Zinc Supplementation Status of Children				
No	94(49.7)	74(39.15)	1.5[1.0, 2.3]	1.7[1.1, 2.8] *
Yes	95(50.3)	115(60.85)	1.0	
Weight for Height Status of the Child				
Wasted	77(40.7)	46(24.5)	2.1[1.4,3.3]	2.0[1.2, 3.5] *
Normal	112(59.3)	143(75.5)	1.0	1.0
History of Child URTI in the Last 2 Weeks				
Yes	98(51.9)	34(18.0)	4.9[3.1,7.8]	5.2[3.1, 8.9] *
No	91(48.1)	155(82.0)	1.0	1.0

*Variables which show significant association during the multiple logistic regression at P < 0.05

Discussion

Knowledge on the possible determinant factors is important for proper management and prevention strategy of Community Acquired Pneumonia. The results of the current study identified maternal age as a risk factor for CAP in children. There were similar studies conducted in different countries which reported young maternal age as risk factor for community acquired pneumonia. A case control study conducted in Thailand and other research reports of Brazil& Southeast Asian countries reported young maternal age to be risk factor for developing childhood community acquired pneumonia[12,13] but two studies conducted in Northwest Ethiopia contradict the current study result (those reported absence of association between maternal age & occurrence of CAP in children.[9,14] The variation of the results could be due to different maternal age categories that different studies used based on their contexts. The possible explanation for this finding might be due to poor experience of the younger mothers on child care, number of individuals involved in child caring practices at home (where it could be limited in younger families). Additionally, in mothers whose age is less than 18 years, there is a higher risk of unintended or unwanted pregnancy which could lead to poor child

feeding which could be a risk factor occurrence of community acquired pneumonia.

Family size was also another factor identified to affect occurrences of community acquired pneumonia indicating that children who live in families with more than 4 members had double risk and this is in line with studies conducted in Netherland, Brazil and Northwest Ethiopia.[12,14,15] Whereas the study conducted in Pakistan and another studies in Northwest of Ethiopia reported as there was no association between CAP and family size.[9,11,16] From different prospect of different literatures large family size is usually allied with overcrowding (promotes transmission of respiratory pathogens through respiratory droplets), higher food sharing among family members (leading to poor child nutritional status) and less health seeking behavior.

Smoking was identified as independent risk factor for occurrence of CAP in children and it is consistent with study conducted in England & Gambia.[17,18] Studies conducted in Northwest Ethiopia and Brazilian metropolitan area has reported no association between current parental smoking and community acquired pneumonia.[9,12] The explanation for the current result could be stated as smoking contributes generally to the particulate load in indoor air and inhaling

Determinants of community acquired pneumonia among children in kersa district, southwest Ethiopia: facility based case control study

Copyright:
©2016 Geleta et al.   6

particles in the respirable size range which further contributes to pulmonary inflammation (limit action of mucus) leading to cause of cough in children. Further it causes lung tissue damage which leads to accumulation of fluid that favors the growth of etiologic agents. In the current study, the presence of at least one smoker in the family was associated with CAP regardless of the number of smokers in the family. Therefore, it is better to consider large scale research with stronger design to determine pattern of association between parental smoking and community acquired pneumonia in children.

Non-exclusive breast feeding in children during the first 6 months was identified to increase the risk of community acquired pneumonia. This finding agreed with the studies conducted in different part of the world. For example, exclusively breast fed children were reported to be 83 times less likely to develop pneumonia base on study conducted in Ethiopia, and WHO reported that non-exclusive breast feeding increase risk of pneumonia by 2.5 folds. Similarly, systematic review on the benefits of exclusive breastfeeding indicated that there is a 23% pneumonia incidence reduction among exclusively breastfed children and it is also considered as the best strategy to prevent & reduce prevalence of pneumonia by 2-3 fold.[8,16,19,20] This possibly explains that breast feeding in early age provide a unique anti-infective properties, providing passive protection against pathogens (Anti-bacterial & Anti-viral substances) including secretary IgA & Ig G (provide short-term systemic and long-term enteric humeral immunity to the child), stimulants of infant immune system.

Different studies identified zinc deficiency to be associated with increased risk of infection, particularly pneumonia. Similarly, in the current study it is implied that children who were not ever supplemented by zinc were at increased risk of having CAP. Studies conducted in US & Pakistan reported the reduction of pneumonia incidence and prevalence among children who received zinc supplementation.[19,21]

Wasting was also identified as a determinant of CAP in this study and this is consistent with study conducted in Pakistan and Brazil,[11,12] unlike the studies in Ethiopia which reported absence of association between child wasting and occurrences of CAP.[9,16] The possible explanation for the observed association is the fact that wasting weakens child's natural body defense and the child become susceptible for infection causing agents including opportunistic pathogens.

Finally, the history of URTI in a child in the last two weeks preceding the current CAP infection was identified to put a child at more than 5 times risk of occurrence of CAP as compared to a child of their counterpart. This result goes with the study conducted in Netherlands which indicates the risk of CAP to be 2.46 times & 1.8 times more likely if the child has three and two episodes of URTI respectively in the past[15] and similar finding for the study conducted in Kenya.[22] However, the study conducted in Malaysia, Brazil and Ethiopia reported no association between occurrences of CAP and preceding infection of URTI in children.[9,12,23] This can explain that upper respiratory tract infection reduces child feeding habit by causing anorexia in a child and hereby affects the nutritional status (lead to wasting) of the children which could further lead to Community acquired pneumonia (wasting and infectious diseases exist in a baleful synergy in children) as wasting reduces immunological capacity to defend against diseases.

Conclusion

The study identified the potential determinants of community acquired pneumonia in under-five children such as socio-demographic characteristics, homebased factors, child nutritional factors and childhood illnesses. Specifically, the risk factors of community acquired pneumonia were identified to be maternal age less than 18 years, family size of more than four, current parental smoking, non-exclusive breast feeding during the first six months of life, lack of zinc supplementation, wasting and history of URTI.

Ministry of Health should work in collaboration with different stakeholders including the community members in improving early marriage/pregnancy, family size, promotion of exclusive breastfeeding, universal zinc supplementation and health seeking behavior of childhood illnesses.

Acknowledgements

Conflicts of Interset

None.

References

1. Carol M, Glenn PM. *Pathophysiology: Concepts of altered health states.* (8th edn), New York: Wolters Kluwer Health Lippincott Williams & Wilkins, USA, 2009. p. 676–680.

2. Levine O, Dinleyici EC. Pneumonia: The forgotten killer of children. *Annotated.* 2010;4(10):27–28.

3. WHO. *Revised WHO classification and treatment of childhood pneumonia at health facilities quick reference guide.* World Health Organization, Geneva, Switzerland. 2014.

4. *World Pneumonia day: Universal access for pneumonia prevention and care.* Pneumonia. 2015.

5. Tiewsoh K, Lodha R, Pandey RM, et al. Factors determining the outcome of children hospitalized with severe pneumonia. *BMC Pediatr.* 2009;9:15.

6. Assefa T, Belachew T, Tegegn A. Mothers' Health Care Seeking Behavior for Childhood Illnesses in Derra District, Northshoa Zone, Oromia Regional State, Ethiopia. *Ethiop J Health Sci.* 2008;18(3):87–94.

7. Federal Democratic Republic of Ethiopia Ministry of Health. *Introduction to Integrated Management of Newborn and childhood Illiness, Part 1.* HEAT, Canada. 2015.

8. United Nations Children's Fund (UNICEF). *Pneumonia and Diarrhea Progress Report.* IVAC, Bangladesh. 2013.

9. Abel Fekadu D, Yigzaw K, Zelalem B. Determinants of Pneumonia in Children Aged Two Months to Five Years in Urban Areas of Oromia Zone, Amhara Region, Ethiopia. *Open Access Library Journal.* 2014;1:1–10.

10. Teklebrhan TB. Predictors of Nutritional Status of Children Visiting Health Facilities in Jimma Zone , South West Ethiopia. *International Journal of Advanced Nursing Science and Practice.* 2012;1(1):1–13.

11. Fatmi Z, White F. A comparison of cough and cold and pneumonia : risk factors for pneumonia in children under 5 years revisited. *Int J Infect Dis.* 2002;6(4):294–301.

12. Victora CG, Fuchs SC, Flores JA, et al. Risk factor for pneumonia among children in Brazilian Metropolitant area. *Pediatrics.* 1994;93(6 Pt 1):977–985.

13. Turner C, Turner P, Carrara V, et al. High Rates of Pneumonia in Children under Two Years of Age in a South East Asian Refugee Population. *PloS One.* 2013;8(1):e54026.

Determinants of community acquired pneumonia among children in kersa district, southwest Ethiopia: facility based case control study

Copyright:
©2016 Geleta et al.   7

14. 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. *Sci J Public Heal.* 2014;2(3):150–155.

15. Teepe J, Grigoryan L, Verheij TJ. Determinants of community-acquired pneumonia in children and young adults in primary care. *Eur Respir Journal*. 2010;35(5):1113–1117.

16. Gedefaw M, Berhe R. Gedefaw M, Berhe R. Determinates of Childhood Pneumonia and Diarrhea with Special Emphasis to Exclusive Breastfeeding in North Achefer District, Northwest Ethiopia: A Case Control Study. *Open Journal of Epidemiology*. 2015;5(2):107–112.

17. Strachan DP, Cook DG. Health effects of passive smoking. Parental smoking and lower respiratory illness in infancy and early childhood. *Thorax*. 1997;52(10):905–914.

18. O'Dempsey TJ, McArdle TF, Morris J, et al. A Study of Risk Factors for Pneumococcal Disease among Children in a Rural Area of West Africa. *Int J Epidemiol*. 1996;25(4):885–893.

19. Bhutta ZA, Black RE, Brown KH, et al. Prevention of diarrhea and pneumonia by zinc supplementation in ch ildren in developing countries: pooled analysis of randomized controlled trials. Zinc Investigators' Collaborativ e Group. *J Pediatr.* 1999;135(6):689–697.

20. Bernardo LH, Cesar GV. Short-term effects of breastfeeding: a systematic review on the benefits of breastfeeding on diarrhoea and pneumonia mortality. *WHO Libr Cat Data*. 2013;1–49.

21. Lassi ZS, Haider BA, Bhutta ZA. Zinc supplementation for the prevention of pneumonia in children aged 2 months to 59 months. *Cochrane Database Syst Rev*. 2010;12:CD005978.

22. 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;13:45.

23. Maliha N, Zafar F, Arif A. Effect of Behavioral Risk Factors on Development of Pneumonia among Children Under-5 Years of Age: A Case-Control Study. *Malaysian Journal of Paediatrics and Child Health Online Early*. 2011;1(07):1–13.