COLLEGE OF MEDICINE AND HEALTH SCIENCES

DEPARTMENT OF PUBLIC HEALTH

PREVALENCE OF PNEUMONIA AND ITS ASSOCIATED FACTORS AMONG UNDER-FIVE CHILDREN AT EMDBIR HEALTH CENTER , EMDBIR TOWENGURAGE ONE,CENTERAL ETHIOPIA, 2025.

A RESEARCH REPORT SUBMITTED TO WOLKITE UNIVERSITY, COLLEGE OF HEALTH SCIENCES AND MEDICINE, DEPARTMENT OF PUBLIC HEALTH IN PARTIAL FULFILLMENT FOR REQUIREMENT OF BACHELOR OF SCIENCE DEGREE IN PUBLIC HEALTH.

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WOLKITE, ETHIOPA

WOLKITE UNIVERSITY COLLEGE OF MEDICINE AND HEALTH SCIENCE DEPARTEMENT OF PUBLIC HEALTH

PREVALENCE AND ASSOCIATED FACTORS OF PNEUMONIA AMONG UNDER-FIVE CHILDREN IN EMDBIR HEALTH TOWN, CENTERAL ETHIOPIA, 2025.

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Abstract

Background

Pneumonia: is an infection that inflames the air sacs in the lungs. Ethiopia faces a critical challenge, with pneumonia responsible for 18% of all under five mortality. Socioeconomic challenges, like low parental education,poverty and overcrowded living conditions significantly increase vulnerability. Understanding these localized factors is essential for designing targeted interventions and improving child health outcomes in the region.

Objective: To assess prevalence of pneumonia associated factors among under five children at emdbir health center emdbir town gurage zone centeral Ethiopia, 2025.

Method: Institutional based cross-sectional study was employed. The study was conducted from November 28 to January 15. Interviewer administered structured questionnaire was used to collect data from sampled mother or care giver who visiting under five children out patient department. Data collectors were discussed on data collection and data was checked for completeness and consistency each night after data collection by group members to maintain data quality Data was entered to Statistical Package for be Social Science (SPSS) version 26 for analysis. Logistic regression analysis technique was applied. Bivariate logistic regression analysis was used to assess the relationship between independent and dependent variables. Variables with p value less than 0.25 in the bivariate analysis were then included in multivariate

logistic regression model. . The significance level for interpreting the result of the multivariate logistic regression was set at p<0.05 respectively.

Result: The prevalence of pneumonia in the study area was 26.8%., Among those factors children who's MUAC were MAM(11.6-12.5) were 27.5% more likely develop pneumonia than those who's MUAC were normal(>12.6) (P=0.009, AOR=0.275(0.104,0.725).

children who had previous history of measles had 7.3% more likely develop pneumonia than children who has no history of measles were (P=0.000, AOR=0.073(0.34,0.153)). post term infants are 25.3% more likely to develop pneumonia than term infants (P= 0.032, AOR=0.253(0.072,0.890). children who's age were between 12-23 months 3.4 times (p=0.015.AOR=3.418(1.2666,9.226) more likely develop pneumonia than those who's age is between 2-11monthss. Were significantly associated with the occurrence of pneumonia in under 5 children.

Conclusion: This study showed that the prevalence of under-five pneumonia was twenty six percent. It was high. The study identified factors associated to under-five pneumonia such as; . The pre term infants are potential predictors of under-five pneumonia. MUAC ,the age of children and previous history of measles weeks are also potential predictors of under-five pneumonia.

Abbreviation /Acronym

AOR: Adjusted odds ratio

CI: Confidence interval

ANC:anti natal care

EDHS: Ethiopian Demographic Health Survey

ETB: Ethiopian birr

LMIC: Low- and middle-income countries

OR: Odds ratio

SPSS: Statistical Package for the Social Sciences

WHO: World Health Organization

CHAPTER ONE

1. Introduction

1.1 Background

Pneumonia, a significant public health concern, manifests as an inflammatory process affecting the vital tissues of the lungs, specifically the alveoli and bronchioles. While predominantly caused by viral and bacterial infections, particularly in the pediatric population, other etiologies, including fungal infections, aspiration, and ventilator-associated events, contribute to its diverse pathogenesis. This complex disease presents a wide spectrum of clinical presentations, categorized by its acquisition setting; community-acquired or hospital-acquired , based on causative agent; bacterial, viral, fungal. on anatomical involvement it includes lobar, bronchial, interstitial, and depending on its clinical severity it ranging from mild to severe pneumonia. [1]

In developing countries, Streptococcus pneumoniae, stands as the leading bacterial pathogen responsible for pneumonia during childhood .These microorganisms, commonly inhabiting the upper respiratory tract, can readily descend to the lower respiratory system, causing infection. Transmission often occurs through airborne droplets expelled during coughing or sneezing. Further more ,bloodstream dissemination, particularly during and immediately after birth, represents a significant route of infection. [2]. Pneumonia stands as a leading cause of mortality among children under five years of age, surpassing all other childhood diseases.[3]This devastating illness inflicts significant morbidity and mortality, particularly in developing nations, where the burden of pneumonia is most pronounced.[4]

Sub-Saharan Africa and South Asia bear the heaviest burden of childhood pneumonia, with Nigeria, Pakistan, the Democratic Republic of Congo, and Ethiopia experiencing particularly high rates. These regions collectively account for a staggering 50% of all pneumonia-related deaths among children under five.[5][6].Ethiopia faces a critical public health challenge, with pneumonia emerging as the primary cause of death among children under five years of age. This devastating disease accounts for a significant 18% of all under-five mortality, highlighting the urgent need for effective prevention and treatment strategies in the country.[7]

Ethiopia's dire situation is underscored by its ranking among the top 15 countries globally for childhood pneumonia mortality, placing it fifth with a staggering 62 deaths per 1000 children under five. This grim reality underscores Ethiopia's alarmingly high death rate from clinical pneumonia, highlighting the urgent need for effective interventions to combat this devastating disease [4] Beyond mortality, pneumonia also imposes a substantial burden on Ethiopia's health care system, causing millions of cases of morbidity and placing significant strain on already limited resources. An estimated 3,370,000 children experience pneumonia annually, necessitating extensive health care interventions and contributing to a substantial financial drain on the health services program. [3].

Previous research has identified a complex interplay of factors influencing the susceptibility and severity of childhood pneumonia. These determinants include socioeconomic factors such as parental education, maternal age, household income, and family care practices, as well as environmental factors such as indoor air pollution from biomass fuel smoke, overcrowding, and the presence of windows in the kitchen.[1] Furthermore, child-specific factors such as age, sex, nutritional status, and presence of co-morbidities like diarrhea, measles, acute upper respiratory infections (AURTIs), and previous asthma are associated with increased risk[8]. Additional risk factors include parental smoking, parental asthma, family history of pneumonia, lack of exclusive breastfeeding,. [9]

1.2 Statement of problem

Pneumonia remains a significant global health threat, particularly affecting children under five years of age. This vulnerable population faces a disproportionate burden of this disease, with nearly 800,000 children succumbing to pneumonia each year [1]. The impact of pneumonia extends beyond mortality, with long-term health consequences such as chronic respiratory illnesses, developmental delays, and impaired cognitive function. It remains a significant global health threat, with an estimated 921,000 children under five years of age succumbing to the disease in 2019. This burden disproportionately affects low- and middle-income countries (LMICs), particularly in South Asia and sub-Saharan Africa, where over 95% of these deaths occur [8]

Pneumonia poses a substantial threat to child health in Ethiopia, where it is the leading cause of morbidity and mortality among children under five.[10] An estimated 3,370,000 children experience pneumonia annually, contributing to 20% of all child deaths and resulting in over 40,000 fatalities in this age group. The disease is particularly devastating during the postnatal period, where it is the leading cause of death. [11]

Despite the availability of cost-effective interventions like immunization, proper nutrition, and sanitation, pneumonia remains a preventable and treatable cause of death for children under five. However, delays in recognizing and treating pneumonia are a major contributor to these deaths. Interventions that address these delays are crucial to reducing the burden of pneumonia-related mortality. [12]

While the World Health Organization's fourth Millennium Development Goal aimed to reduce child mortality by two-thirds between 1990 and 2016, pneumonia continues to be the leading cause of death for children under five globally. A significant proportion of these deaths, approximately three-quarters, occur in sub-Saharan Africa and South Asia, highlighting the disproportionate impact of the disease in these regions.[13] Despite the devastating impact of pneumonia, claiming the life of a child every 23 seconds, the disease has historically received inadequate attention.[14]

Ethiopian government introduced Pneumococcal conjugate vaccine in 2011 and Rota virus in 2013 to prevent pneumonia[15] In addition to these the government create strong political will, organized capacity building efforts and prioritized funding for immunization programs to reduce

infant mortality and morbidity in each corner of the countries, but as a result of large populations, health disparities in vulnerable subgroups, including girls, rural dwelling children, and poor communities there were discrepancies across the region within Ethiopia [16]

Despite the Ethiopian government's efforts to reduce pneumonia morbidity and mortality through various strategies, the burden of childhood pneumonia remains substantial, causing significant mortality. This is attributed to limited coverage an affordability of preventive interventions like immunization, inadequate access to care, and the lack of effective management strategies. To address this ongoing challenge, innovative strategies are urgently needed, and these can only be developed through robust and systematic research, while various interventions have led to improvements in the incidence of pneumonia among children under five in Ethiopia, the disease remains a major cause of death in this age group [17]

A thorough understanding of the contributing factors to pneumonia is essential to guide health care providers and policymakers in developing effective prevention strategies. While studies on pneumonia risk factors have been conducted in Ethiopia, it is important to recognize that these factors can vary significantly across different societies and populations. Further research is needed to identify the specific risk factors relevant to the Ethiopian context [18]

Despite the global efforts to combat childhood pneumonia, it remains a significant public health threat in Ethiopia.. While national data suggests a high prevalence of pneumonia in children under five, the specific situation in emdbir health center remains poorly understood. This study seeks to address this gap by investigating the prevalence of pneumonia and its associated factors among children under five years old who come out patient department. By understanding the local prevalence and contributing factors. This research aims to inform the development of targeted interventions and policies to reduce the burden of pneumonia in this vulnerable population within emdbir health center at emdbir town.

1.3 Significance of the study

This study aims to investigate the prevalence and factors associated with pneumonia among children under five at embir health center in centeral Ethiopia. While global data on pneumonia prevalence and risk factors are extensive, there is a lack of information specific to this health setting. Understanding the local prevalence and risk factors will enable health care providers to tailor interventions effectively. This research will not only enhance our understanding of childhood pneumonia epidemiology but also improve prevention practices through better assessment, management, and prevention strategies. By providing updated data and identifying context-specific factors, this study will contribute valuable insights to the existing knowledge base.

In general, the findings have the potential to raise awareness, guide interventions, and enhance child health outcomes for health care providers and community members alike.

CHAPTER TWO

2 Literature review

2.1Prevalence of pneumonia among under five

While previous research in Dibrugarh town, India, identified a prevalence rate of 16.34% for pneumonia among under-five children, this study aims to delve deeper into the associated factors and potential disparities within this population [14]. On another hand Research in New Delhi, India, found a prevalence of 4.5% for Acute Respiratory Infections (ARI) among under-five children over a one-month period, while a study in Bangladesh reported a much higher prevalence of 21.3% over a two-week period. This disparity in prevalence highlights the need for further investigation into the specific factors influencing ARI rates in different geographical regions[19].

Pneumonia disproportionately affects children in least developed and developing countries, accounting for 39% and over 99% of global child deaths from the disease, respectively. In contrast, industrialized nations experience a negligible mortality rate from pneumonia, with less than 1% of global deaths attributable to the condition [1]. The prevalence of pneumonia is particularly pronounced in sub-Saharan Africa, reaching 46% of the population[1]

Africa bears the heaviest burden of pneumonia-related child mortality, accounting for 50% of worldwide deaths in this age group. While Europe and the Americas experience significantly lower mortality rates, Southeast Asia, alongside Africa, also experiences high incidence and severity of childhood pneumonia, accounting for 39% of the global burden of severe cases [5]More than 490,000 children under-five died by pneumonia in 2016 in sub-Saharan Africa [14].

A systematic review and meta-analysis of 22 studies across East Africa revealed a pooled prevalence of pneumonia in under-five children at 34%, with a 95% confidence interval of 23.8% to 44.21%. While this provides regional insights, understanding the specific prevalence and contributing factors within individual countries is crucial. In Uganda, for example, 80% of children under five seeking treatment presented with symptoms of acute respiratory infection,

highlighting the need for further investigation into the local context and factors driving this high prevalence[20]

Studies conducted across various African countries have estimated pneumonia prevalence among under-fives to range between 16% and 33%. However, a study conducted at Mulago National Referral Hospital in Uganda, a major referral center, reported a significantly higher prevalence of 53.7%, emphasizing the importance of understanding local context and potential variations in contributing factors within specific regions [17]

Ethiopia, a country in sub-Saharan Africa, faces significant infant and under-five mortality rates, with 59 and 88 deaths per 1,000 live births respectively. Pneumonia is a leading cause of these deaths, contributing to 21% of fatalities, despite the Global Alliance for Vaccines and Immunization (GAVI) supporting child immunization programs [21]

The 2016 Ethiopian Demographic Health Survey (EDHS) reported a national prevalence of 18% for acute respiratory infections (ARI) [21]. However, a study conducted in Wondo Genet district, Ethiopia, found a significantly higher prevalence of pneumonia, reaching 33.5%, among under-five children visiting a health center [22]. Research on pneumonia prevalence among under-five children in Ethiopia has revealed a range of findings across different regions. A study in Jimma Zone reported a prevalence of 28.1% [21]. While other local studies found a prevalence of 16.1% in Este Town, Northwest Ethiopia [13] and 33.5% Wondo Genet district [8].

2.2 Factors associated with under five pneumonia

A systematic review and meta-analysis done in East Africa revealed that using woods as a source of fuel, cooking foods living rooms, holding children on back while cooking foods, being un-vaccinated, history of being not on exclusive breast feeding, history of upper respiratory tract infection and parental smoking as a significant risk factor for increased prevalence of pneumonia among under five children in East Africa.

2.2.1 Socio-demographic characteristics

A case-control study conducted in Pakistan revealed a higher incidence of pneumonia among younger children compared to older children [23]. Previous research has consistently highlighted the heightened risk of pneumonia in very young children. A Lancet report from 2013 indicated a higher prevalence of pneumonia among children under two years of age. Similar findings

emerged from studies conducted among indigenous populations in Brazil, including the Suruí Indians in Rondônia and the Guarani from the South and Southeastern regions.

These studies demonstrated that infants under twelve months were significantly more likely to experience hospitalization due to lower respiratory tract infections, particularly pneumonia[24]. The underdeveloped immune systems of young children, coupled with limited access to vaccinations, render them highly susceptible to pneumonia and other infections. A study in conducted Ethiopia [8] revealed a significant association between age and pneumonia risk. Infants aged 2-12 months were found to be 2.5 times more likely to develop pneumonia compared to children over 12 months. This finding is likely due to the developing immune systems of infants in this age range, which may increase their susceptibility to upper respiratory infections that can progress to pneumonia.

2.2.2. Maternal Education Statues Related to Prevalence of pneumonia

Maternal education is critical determination of the child health outcomes including the risk of developing pneumonia. Studies have consistently shown that children of mothers with higher education levels have a lower risk of pneumonia[25]. The protective effect of maternal education against pneumonia is particularly strong in developing countries. In these settings mothers with higher education levels are more likely to have access to clean water, sanitation and health services. They become more likely to be aware of importance of exclusive breast feeding and other preventive measures.[25]

Children of mothers with higher education levels are more likely to be diagnosed and treated promptly, which can improve their chance of survival. Additionally, mothers with higher education levels are more likely to be able to provide their children with adequate nutrition and care during illness[25].

Interventions aimed at improving maternal education have been shown to be effective in reducing the incidence and severity of pneumonia among under five children. These interventions can include providing training programs for mother and community based education campaigns.[26]

2.2.3. Environmental and Housing Characteristics of the Respondents

Environmental health is the major determinant of child health, and a number of environmental factors have been associated with an increase of pneumonia among under 5 children. These

factors include Air pollution, contaminated water, inadequate sanitation are factors have been associated with an increased pneumonia among under five children.

Exposure to high level of air pollution, both indoor and outdoor, has been linked to an increased risk of pneumonia. Air pollution can damage the lungs and make the children to more susceptible to infection

A survey conducted in Nepal revealed a strong association between the use of traditional cooking fuels and the prevalence of acute lower respiratory infections (ALRl) [26]. A UNICEF report highlights the significant impact of household air pollution on childhood pneumonia. The report reveals that exposure to smoke from solid fuels, such as wood, animal dung, and crop waste, used for cooking doubles the risk of developing pneumonia in children [1]

A study conducted in Nigeria established a link between indoor cooking smoke exposure and an increased risk of childhood pneumonia and bronchitis [27]. Research conducted in Ndola, Zambia, indicated a strong correlation between the lack of a dedicated cooking space and the occurrence of acute respiratory infections (ARI) in children under five.[28] Similarly, a study in Kenya revealed a significant association between cooking near sleeping areas and an increased risk of ARI in young children. [29]

Research conducted in Wondo Genet, Sidama Zone, Ethiopia, revealed a significantly higher risk of pneumonia in children from households without a designated kitchen space, with a 6.8 times higher likelihood compared to children living in homes with separate kitchens. Further research from Este town, Northwest Ethiopia, demonstrated a fivefold increase in the risk of pneumonia among children carried on their mothers' backs during cooking compared to children not exposed to this practice [8]

Another a local study conducted in Jimma Zone, Ethiopia, found that children who are carried on their mothers' backs or kept close to them during cooking are three times more likely to develop pneumonia compared to children who are not exposed to this practice[21].

2.2.4. Nutritional, Past Co-morbidity and Vaccination Status of Children

Child nutrition is one of the major determinant of the child health, and malnutrition is the major risk factor for pneumonia. Malnourished children have weakened immune system, which makes

them more vulnerable to infection. A study conducted in India found that children who were under weight or stunted were more likely to be hospitalized for pneumonia than children [30]

A study conducted in Brazil revealed a significantly increased risk of pneumonia among children who were not exclusively breastfed. These children were found to be 2.4 times more likely to develop pneumonia compared to their exclusively breastfed counterparts. Additionally, the study found that children who lacked immunization were 2.5 times more likely to develop pneumonia compared to those who were fully vaccinated.[31]

Both exclusive breastfeeding and immunization play a vital role in protecting children from pneumonia. These practices have been proven to significantly reduce the risk of developing this serious respiratory infection [6]

The lack of exclusive breastfeeding and immunization contributes to a heightened risk of pneumonia, as evidenced by the increased likelihood of developing the infection in children who lack these protective measures. Further supporting the role of nutritional interventions, a study conducted in Rwanda demonstrated the effectiveness of vitamin A supplementation in reducing pneumonia among children under five years old. A study in Jimma Zone, Ethiopia, reinforces this finding, revealing that children who received vitamin A supplementation were 83% less likely to develop pneumonia [21]

The protective effect of vitamin A against pneumonia likely stems from its essential role in cell growth and development, particularly in respiratory epithelial cells and lung tissue. Furthermore, vitamin A contributes to reducing inflammation and infection in children, potentially mitigating the severity of pneumonia. Related studies from southern Ethiopia, district hospitals of Malawi [20] and in a tertiary Care Centre in Pradesh India[30] Children experiencing severe acute malnutrition were found to be at a higher risk of developing pneumonia compared to children with good nutritional status. This increased susceptibility is likely due to malnutrition weakening the immune system, making these children more vulnerable to acquiring pneumonia.

A case control study conducted in eastern Kenya [37] revealed a significantly elevated risk of pneumonia in children with preexisting health conditions, with an odds ratio of 3.8. The presence of co-morbidities such as HIV, asthma, cerebral palsy, and congenital heart disease was associated with a heightened likelihood of developing pneumonia.

These underlying conditions can compromise the immune system, making children more vulnerable to pneumonia following an upper respiratory tract infection Research conducted in Wondo Genet, southern Ethiopia, revealed a significant association between exposure to cigarette smoke and an increased risk of pneumonia. Children exposed to cigarette smoke were found to be 2.8 times more likely to develop pneumonia compared to children not exposed to smoke [21].

This increased risk is likely due to the damaging effects of cigarette smoke on the respiratory tract. Cigarette smoke irritates and damages the epithelial lining of the respiratory tract, weakening the innate immune system and making it easier for microorganisms to colonize and cause infection. [13]

2.2.5 Conceptual frame work

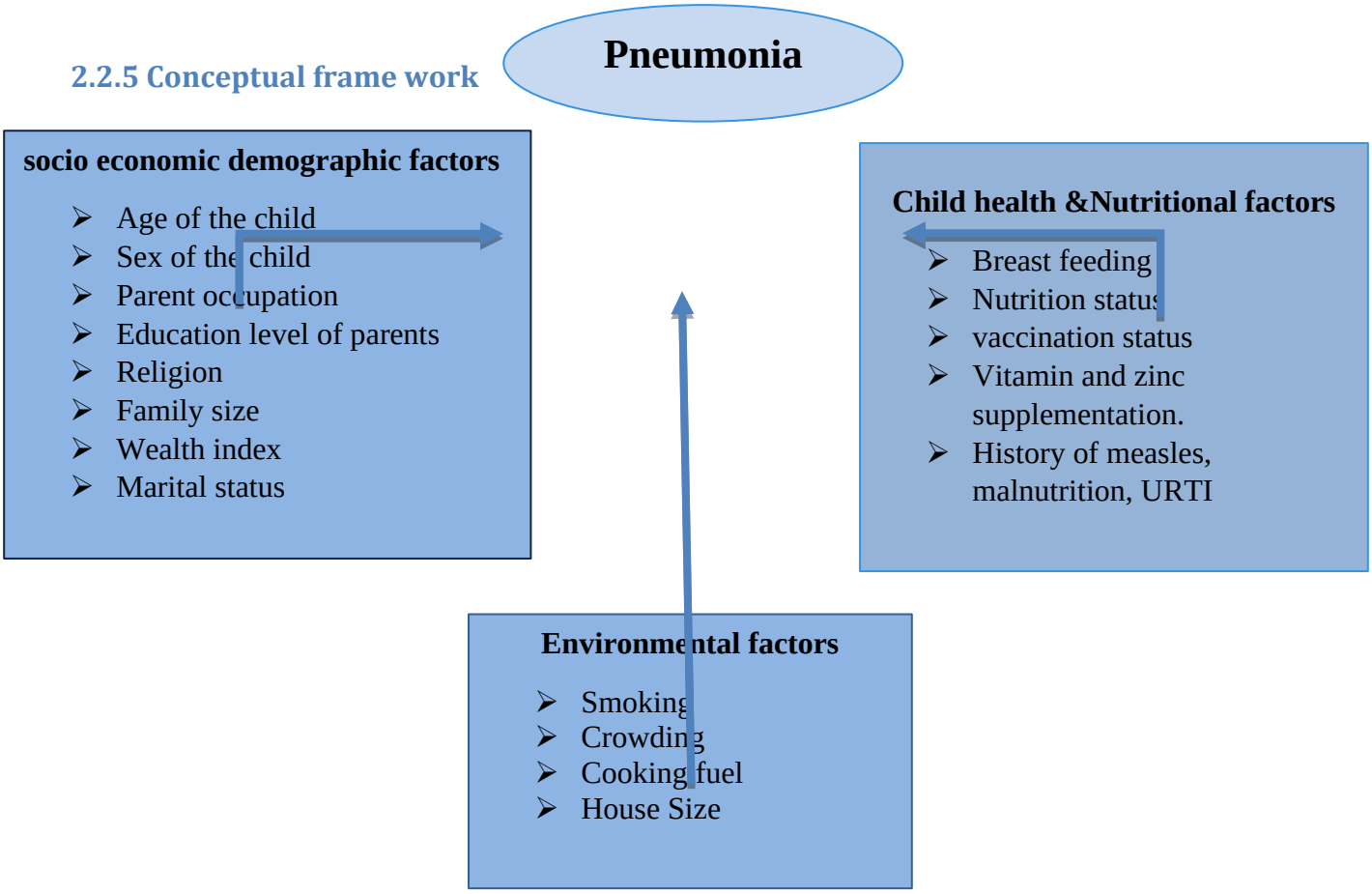

Figure 1; Conceptual frame work for prevalence and associated factor of pneumonia adopted from different literature. (1, 10, 16, 20, 26, 27, 30, 32, 40, 41)

CHAPTER 3

3. Objective of study

3.1 General objective

To assess the prevalence of pneumonia and its associated factors among under-five children at emdbir health center, wolkite centeral Ethiopia, 2025

3.2 Specific objectives

- To determine the prevalence of pneumonia among under-five children visiting pediatrics Out patient at emdbir health center, centeral Ethiopia,2025.
- To identify factors associated with pneumonia among under-five children visiting Out patient at emdbir health center, centeral Ethiopia, 2025.

CHAPTER FOUR

4 Material and method

4.1 Study area and period

The study was conducted at Emdibir health center which is located in Emdibir town, Gurage zone Central Ethiopia. It is one Of the health center found in Gurage zone central Ethiopia region. Emdibir town is a city and Separate woreda located about 187km away from Addis Ababa, the capital city of Ethiopia and 33km from wolkite town. Based On 2007 Census The city has a total population of 32753, of whom 16752 are men and 16001 are Women. The town is situated on plane 60% and slopy 40% land form and the average elevation of the town is 1900_3000 meter sea level .Emdbir health center provides out patient ,emergency, maternal and child health ,ART ,Tb ,and inpatient services at general level include laboratory ,and pharmacy services.

4.2 Study design

Institutional based cross-sectional study design was conducted

4.3 Populations

4.3.1 Source population

All under five children visiting the pediatrics outpatient department of emdbir health center.

4.3.2 Study population

All under five children and mother/care givers who visited Emdibir health center during data collection period

4.4 Eligibility criteria

4.4.1 Inclusion criteria

The study included children who are between 2 and 59 Months of age. Infants younger than 2 months are excluded because pneumonia diagnosis criteria differ in this age group children who are residents of Emdibir town for a minimum of six months, and children accompanied by care givers who visited the pediatric unit of Emdibir health center during the study period.

4.4.2 Exclusion criteria

Children with the following conditions was excluded from the study: caregiver who did not have any information about the child at the time of data collection

4.5 Sample size determination and sampling procedure

We taken a study conducted in wondo Genet district, sidama zone, Ethiopia. And its prevalence rate was 33.5% [16].

The sample size would be collected using the following assumption.

$$\mathbf{n} = \frac{\mathbf{z}\left(\frac{\alpha}{2}\right)^{2} p(\mathbf{1}-\mathbf{p})}{\mathbf{d^2}}$$

Where: -

n = is calculated sample size

Z = Confidence interval [95%]

p = According to study conduct at Wondo Genet district, Ethiopia, the prevalence of pneumonia among under-five children visit health center was 33.5% [16].

d^2 = marginal error [5%]

n = $(1.96)^2$ x 0.335[1-0.335]/ $(0.05)^2$ = 342.9~343

When the population size is less than 10,000 we would used correctional formula

Nf = n/1+n/N

Nf = 343/1+343/900= 248

By adding 10% of non-respondent rate the final sample size would be

Nf = 272

The sample size for the second objectives had been calculated by using 955 CI,80% Power, exposed to unexposed ratio of 1 and EpiInfo.7 was used.

Table 1:Sample size determination for factors associated to pneumonia to asses pneumonia and associated factors at Emdibir health center,2024

Exposed variables	AOR	Ratio	Power	% of outcomes		Sample size	10% non response rate	Total sample size
				unexposed	exposed			
Vaccination status	3.59	1:1	80%	55	45	110	11	121
Breast feeding	3.26	1:1	80%	60	40	136	13.6	150
Place of cooking	5.79	1:1	80%	60	40	79	7.9	87
Vitamin A	5.62	1:1	80%	57	43	86	8.6	95

Generally to asses all our objectives and associated factors we use the proportion of largest sample size among each specific objectives

$n = (1.96)^2 \times 0.335[1-0.335]/ (0.05)^2 = 342$

4.5.2 Sampling technique and procedure

We will collect data by systematic random sampling from study subjects who are available at the time of the study and who fulfilled the criteria until the calculated sample size will be reached. a sampling interval(K) will be determined by dividing the total number of under five children with pneumonia to calculated sample size(n).

Systematic random sampling= N/n= 900/342

=2.6~ 3

K=3

4.6 Data collection methods

4.6.1 Data collection instruments

Interviewer administered structured questionnaire was used to collect data from sampled mother or care giver who visiting under five children out patients department. The questionnaire is adapted from related study [16] and modified. Structured questionnaire developed in English and translate to Amharic (local language) and then re-translated back in to English by the other to check the consistency. And also, will review a OPD record to collect information on diagnosis of child, preexisting medical or Co-morbid conditions, height and weight of the children

4.6.2 Data collection procedure

The data was collected at pediatrics ward after the child is come with complaints. The selected respondents was taken to class room where they was informed about the purpose of the study, importance of their participation and verbal consents was taken. Based on their willingness to participate in the study, the interview was conducted and the questionnaire will be filled by group members of our research team.

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4.7 Study Variables

4.7.1 Dependent variable

Presence of pneumonia on under five children

4.7.2 Independent variable

Socio demographic characteristics includes

Age, Sex, Occupation of mother , Educational status of mother and father, Size of family, marital status, Income index.

Environmental factors

Presence of separated kitchen or not, Ventilation status of the house, Presence of cigarette smoker in the house.

Nutritional factors and co-morbidities

Breast feeding status of the child, Vaccination status of the child, History of diarrhea, History of measles ,History of malnutrition

4.8 Operational definitions

Under five children - children age less than 59 months, but in this study infant age less than two month will not include because at age less than two month the case as not diagnosis as pneumonia.[33]

Co-morbidity- diseases associated with another disease, like measles, HIV ,cerebral palsy, congenital heart disease. [33]

Pneumonia- respiratory illness characterized by a cough ,fever and rapid breathing in a child.[33]

4.9 Data quality assurance

Continuous supervision of the data collection process was carried out to assure the quality of the data. Finally, the collected data were carefully checked daily for completeness.

4.10 Data processing and analysis

After data collection, the data were cleared and checked every day before data processing and analysis. The data were then compiled and coded. Statistical package for social science (SPSS) version 26 was used for analysis. Data exploration was conducted in SPSS version 26 to check completeness and consistency. This study employed both descriptive and inferential statistical methods to analyze the data. Descriptive statics including frequencies, percentages were used to summarize the characteristics of the study population and prevalence of pneumonia. The prevalence of pneumonia was calculated as the number of children diagnosed with pneumonia divided by the total number of children in the study population, expressed as percentage.

To identify factors associated with pneumonia, we first conducted bivariate analysis using appropriate chi square test were used to access between pneumonia and categorical variables. Variables with p value less than 0.25 in the bivariate analysis were then included in multivariate logistic regression model. The rationale for selecting a p value of 0.25 for inclusion in the multivariate analysis was relatively small sample size (n= 272). Using a more stringent p value cutoff would have resulted in excluding too many variables from the analysis and potentially missing important predictors of pneumonia. While the conventional significance level is often set at $p<0.05$ employing a more liberal threshold of $p<0.25$ in this instance was to balance the risk of excluding potentially important variables with the need to avoid over fitting the model .Variables

with p values below 0.25 in bivariate analysis, while not statically significant on their own, might still exhibit important relationship with pneumonia in the context of the multivariate model, considering potential confounding effects.

Multivariate logistic regression was employed to access the independent association between several risk factor and the presence of pneumonia. Odds ratio and adjusted odds ratios with 95% confidence interval were calculated to quantify the strength and statically significance of these associations. The significance level for interpreting the result of the multivariate logistic regression was set at $p<0.05$.

4.11 Ethical consideration

This study was conducted in accordance with ethical principle outlined in the declaration of Helsinki. Prior to the data collection, informed consent was obtained from the parents or legal guardians of all participating children. All data were anonym to protect participants confidentiality and ensure anonymity. The study protocol was designed to minimize any potential risks to the children. The findings from this research will be used to the improvement of the child health services in the study area.

4.12 Dissemination of the result

The findings of this study were presented during final presentation. The hard copies of the findings were sent to School public health wolkite unversity and also to endbir health center.

CHAPTER 5

5.1 Socio demographic characteristics of the respondents

A total of 272 respondents participated, resulting in a 100% response rate. Among 272 children, 142(52.4%) of them were male. the occupation of mother constitute farmer of 83(30.5%) .age of the child between 12-23 month were 102(27.5&) educational status of mother 158(58.1%) were illiterate. 224(82.4%) were married. Regarding their religion 96(35.3%) were muslim and 80 (29.4%) the monthly income between (4000-5999) of the respondants have two children of 105(38.6%) .

Table 2 Sociodemographic characteristicof children and mother/ care givers studied at emdbir health center. (n=272)

Variables	Category	Frequency	Percent
Sex of the child	Male	142	52.4
	Female	130	47.6
Age of the child	2-11 Month	82	30.1
	12-23 Month	102	37.5
	24-59 Months	88	32.4
Educational status of mother	Illiterate	158	58.1
	Litrate	114	41.9
Educational status of father	Illiterate	145	53.3
	litrate	127	46.7
Mother Occupation	House Wife	65	23.9
	Farmer	83	30.5
	Merchant	67	24.6
	Governmental	57	21.0

Marital Status	married	224	82.4
	single	14	5.1
	Divorced	34	12.5
Religion	Orthodox	70	25.7
	Muslim	96	35.3
	protestant	55	20.2
	catholic	51	18.8
Monthly Average income	<2000	65	23.9
	2000-3999	90	33.1
	4000-5999	80	29.4
	>6000	37	13.6
Number of children	one	64	23.5
	two	105	38.6
	More than three	103	37.9

5.2 Environmental characteristics of the respondents

A total of 272 respondents 134(49.3%) were used wood. Around 154(56.6%) of respondents were kitchen attached to main house. 175(64.3%) of windows were two and above. Regarding the child position 203(74.6%) were always away from cooking area 200(73.5) were non smoker in family.

Table 3:Environmental characteristics of children and mother/ care givers studied at emdbir health center. (n=272)

Variables	Category	Frequency (N=272)	Percent
Type of fuel source	wood	134	49.3
	Charcoal	93	34.2
	Electricity	45	16.5
Place of food cooking	housing	118	43.4
	kitchen	154	56.6
is kitchen attached to main house	Yes	131	48.2
	No	141	51.8
Number of windows in the main house	1 and less	97	35.7
	2 and above	175	64.3
theChild position during cooking	Holding at her back	69	25.4
	Always away from cooking area	203	74.6
Any cigarette smoker	Yes	72	26.5
	No	200	73.5

5.3 Health care facility and child care characteristics of respondents

Atotal of 272child participants 108 (38.7%) were fully vaccinated. about 148(54.4.0%) were practiced exclusive breast feeding. 178(65.4%)were start breast feeding immidiatly. Regarding to birth status 212(77.9%) were term. 174(64.0%) were duration <2 year. 179(65.8%) constitute birth at health facility. 182(66.9%) were vitamin A supplementation and 251(92.3%) were vaccinated.

Table 4: Health care facility and child care characteristics of under -five children at emdbir health center, Nov, 2024.(n=272)

Variables	Category	Frequency (N=272)	Percent
When the baby start breast feeding	immidately	178	65.4
	With in hours	78	28.7
	More than hours	16	5.9
Birth status	Preterm	40	14.7
	Post term	20	7.4
	term	212	77.9
Breast feeding status during 6 months	Breast feeding only	148	54.4
	Breast feeding and other	124	45.6
Duration of breast feed	<2 Years	174	64.0
	>2 Years	98	36.0
Vaccination status	Fully vaccinated	108	39.7
	Vaccination until now	107	39.3
	Stoped at middle	45	16.5
	Unvaccinated	12	4.4
Place of birth	Home	93	34.2
	Health Institution	179	65.8

Vitamin A supplementation	Yes	182	66.9
	No	90	33.1
has he or she vaccinated	yes	251	92.3
	no	21	7.7

5.2 vaccination status

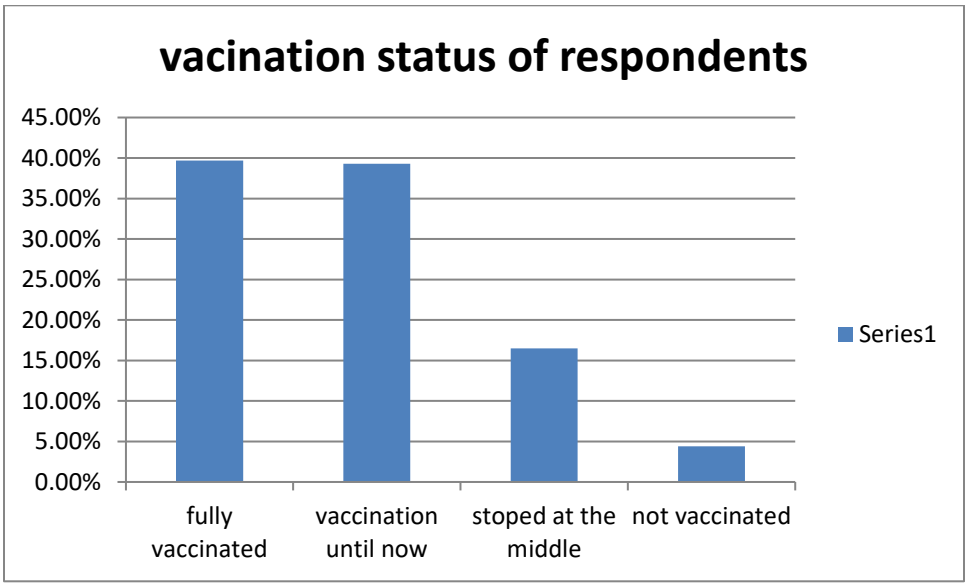

Figure 2: Vaccination status of respondents of under 5 children at emdbir health center, Nov, 2024.

5.4 Preexisting medical or Co-morbid conditions characteristics of respondent's

A total 272 child participants 186(68.4 %) had no malnutrition.113(41.5%) were history of diarrhea .regarding their MUAC 193(71.0) were normal.

Table 5:Preexisting medical and characteristics of under -five children at emdbir health center,Nov, 2024 (n=272)

Variables	Category		Frequency (N=272)	Percent
MUAC	SAM (≤11.5 cm)		36	13.2
	MAM (11.6-12.5 cm)		43	15.8
	Normal (>12.6cm)		193	71.0
History of Malnutrition	No malnutrition		186	68.4
	Some malnutrition		78	28.7
	Sever malnutrition		8	2.9
History of past medical diseases	diarrhea	Yes	113	41.5
		No	159	58.5
	History of respiratory iilness	Yes	73	26.8
		No	199	73.2
	Measles	Yes	89	32.7
		No	183	67.3

5.5 Prevalence of History of measle of respondents

From 272 children participated in study, the overall prevalence of under-five children's during study was 89(32.7%) history of measles.

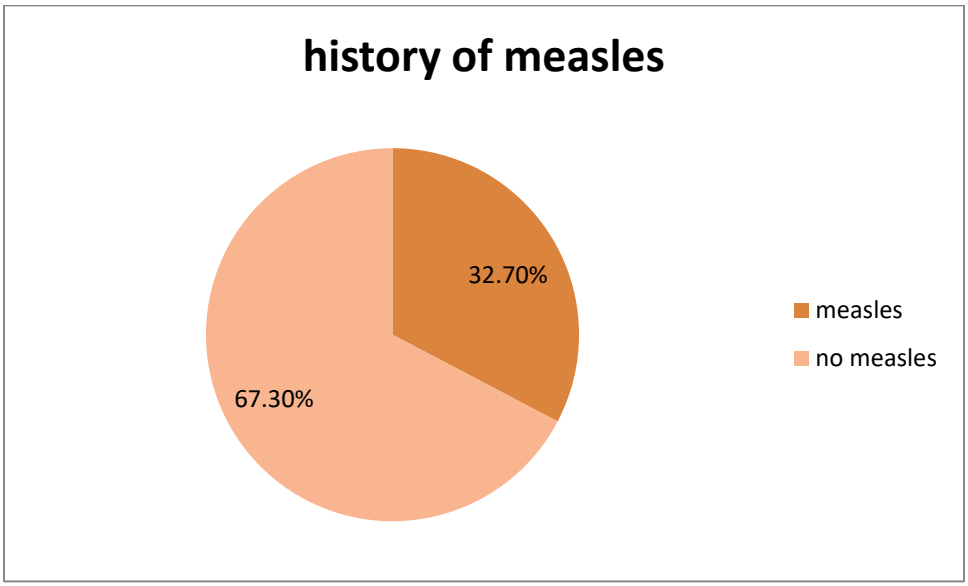

Figure 3: prevalence of history of measles of respondants among under five chidren in emdbir health center

5.5.1 Prevalence of Pneumonia

From 272 children participated in study, the overall prevalence of under-five children's pneumonia during study was 73(26.8%) 95% of CI(21.2,32.8)

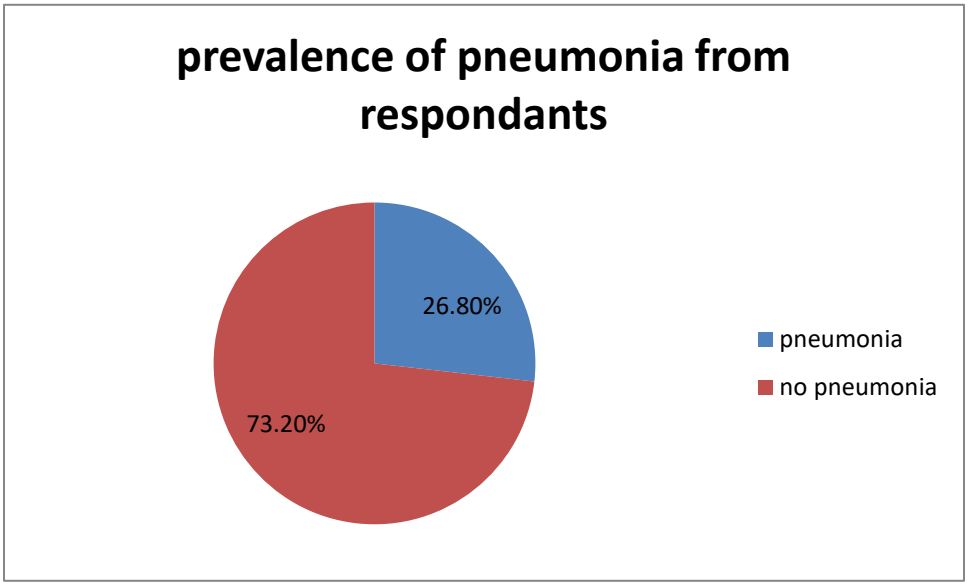

Figure 4:prevalence of pneumonia in under five children in emdbir health center

5.6 6 Factors associated with under five pneumonia in emdibr town

All study variables were tested by binary logistic regression analysis and variable with p-values less than 0.25were candidates for the multivariate logistic regression.

Sociodemographic variables on binary logistic showed that monthly average income, mother age child age, mother's educational status, father's educational status, among environmental variables source of fuel used for cooking, cigarette smoker in the family member, cooking place, child location during cooking, kitchen windows, number of windows in the main house, separation of kitchen from main house. Among Health care facility and child care variables Duration of breast feed, Breast feeding status, Birth status, Vaccination Status and Vitamin A supplementation and from Preexisting medical or Co-morbid variables current MUAC, History

of Malnutrition and among History of past medical diseases, History of Acute gastroenteritis was associated with under five pneumonia at P<0.25.

According to our study mother's educational status, mother or care giver job, of fuel used for cooking, Birth status, Vaccination Status, MUAC, history of measles, monthly average income, child age, Vitamin A supplementation ,when to start breast feeding are passed by binary testing.

The finding indicates that children who's age was between 12-23 months was 3.4 times (p=0.015.AOR=3.418(1.2666,9.226) more likely develop pneumonia than those who's age is between 2-11monthss. this is statistically significant.

This study showed that children who had previous history of measles had 7.3% more likely develop pneumonia than children who has no history of measles was(P=0.000, AOR=0.073(0.34,0.153)) this also statistically significant . .

This finding suggests that post term infants are 25.3% more likely to develop pneumonia than term infants (P= 0.032, AOR=0.253(0.072,0.890)) this is statistically significant.

According to our study children who's MUAC was MAM(11.6-12.5) was 27.5% more likely develop pneumonia than those who's MUAC was normal(>12.6) (P=0.009, AOR=0.275(0.104,0.725)

Table 6:Multivariate logistic regression analysis of independent variables and occurrence of pneumonia in under 5 children in the emdbir health center

Variable	Category	pmeumonia		COR	AOR	P-Value
Educational Status of Mother		YES	NO			
	Illiterate	47	111	1	1	
	litrate	26	88	1.433(0.823,2.496)	1.405(0.556,3.553)	0.473
Age of the child	2-11	31	51	1	1	
	12-23	25	77	1.872(0.992,3.532)	3.418(1.2666,9.226	0.015
	24-59	17	71	2.539(1.270,5.073)	2.517(0.677,9.361)	0.168
income	<2000	20	45	1		
	2000-3999	25	65	1.156(0.574,2.327)	0.817(0.312,2.135)	0.680
	4000-5999	21	59	1.249(0.605,2.578)	0.786(0.285,2.167)	0.641
	>6000	7	30	1.905(0.717,5.059)	1.990(0.512,7.727)	0.320
Vaccine status	Fully vaccinated	18	90	1	1	
	Vaccination until now	33	74	0.448(0.234,0.860)	0.473(0.158,1.417)	0.181
	Stoped at the middle	17	28	0.329(0.150,0.724)	0.347(0.107,1.127)	0.078
	Not vaccinated	5	7	0.280(0.080,0.981)	0.262(0.037,1.840)	0.178
fuel	wood	34	100	1	1	
	charcoal	23	70	1.035(0.562,1.906)	1.017(0.426,2.429)	0.970
	electricty	16	29	0.616(0.299,1.271)	0.541(0.159,1.847)	0.327

Variable	Category	Pneumonia		COR	AOR	P-Value
Measles	yes	53	36	0.083(0.044,0.156)	0.073(0.34,0.153)	0.000
	no	20	163	1	1	
MUAC	SAM(<11.5)	8	28	1.034(0.440,2.429)	0.982(0.327,2.947)	0.974
	MAM(11.6-12.5)	21	22	0.309(0.156,0.614)	0.275(0.104,0.725)	0.009
	Normal(>12.6)	44	149	1	1	
Birth status	Pre term	6	34	2.034(0.811,5.105)	1.5130.441,5.183)	0.510
	Post term	11	9	0.294(0.116,0.746)	0.253(0.072,0.890)	0.032
	term	56	156	1	1	

6. Discussion

In this study the prevalence of under-five pneumonia was 26.8% which was higher than 16.1% community based cross sectional study conduct at Este town Northwest Ethiopia. This discrepancy was due institutional basis of the study might increase the prevalence. But This study prevalence was lower than the 33.5% prevalence of study conducted at Wondo Genet district, Sidama zone, Ethiopia. This deference might be due to study setting and seasonal variation [8]. Studies conducted in Southeast Nigeria indicated that the prevalence of pneumonia was 31.6 percent which was greater than this study prevalence [34]. The prevalence of pneumonia in children in this study setting was lower than findings from a cross sectional survey in Uganda [17], where pneumonia prevalence was found to be (53.7%) and cross-sectional survey in Bangladesh showed that the prevalence of under-five pneumonia was estimated to be 53% [11]. The difference could be due to difference in study setting in which study from Uganda was conducted in the National referral hospital of Uganda,

The study found that post term infants were 25.3% more likely to develop pneumonia than term infants (P= 0.032, AOR=0.253(0.072,0.890).

Post term delivery confers multiple risks for childhood morbidity, including less trans placental antibody transfer, anemia , suboptimal breastfeeding, delayed/missing vaccinations, and slower growth. Post term birth is useful as a risk stratification marker where gestational age is accurately known; front-line health care workers can quickly identify at-risk children from patient-held birth records, and prioritize them for urgent assessment and pulse oximetry testing[48].

This study showed that children who had previous history of measles had 7.3% more likely develop pneumonia than children who has no history of measles were (P=0.000, AOR=0.073(0.34,0.153).

This finding is consistent with other research that child-specific factors such as age, sex, nutritional status, and presence of co-morbidities like diarrhea, measles, acute upper respiratory infections (AURTIs), and previous asthma are associated with increased risk has shown to pneumonia[8].

Study conducted in pakistana department of pediatrics Lahore medical measles infect the respiratory tract of nearly all affected person pneumonia is the most common sever complication of measles and accounts for most measles associated death .if not treated well then sever outcome can occur. appropriate surviellance and management are necessary for health and benefit of diseased child.

According to our study children who's MUAC was MAM(11.6-12.5) were 27.5% more likely develop pneumonia than those who's MUAC was normal(>12.6) (P=0.009, AOR=0.275(0.104,0.725) this is statistically significant. It was in line with UNICEF report which shows It is widely recognized that, breast milk contains the nutrients, antioxidants, hormones, lymphocytes and antibodies secretory Immunoglobulin A (IgA) well nutration needed by the child to survive and develop, and specifically for a child's immune system to function properly[2].

The finding indicates that children who's age were between 12-23 months was 3.4 times (p=0.015.AOR=3.418(1.2666,9.226) more likely develop pneumonia than those who's age is between 2-11months.

7. Conclusion and Recommendation

7.1 Conclusion

This study showed that the prevalence of under-five pneumonia was 26..8%,which was high. The birth status of children are potential predictors of under-five pneumonia, MUAC ,age of children and History of measles were also potential predictors of under-five pneumonia..

7.2 Recommendation

Based on the results of this study the following recommendations were forwarded.

For emdbir health center, Community of wolkite and health care provider.

- We recommend the age between 12-23 months comes with complaints rule out pneumonia , asses the risk factors and counseling them.
- There should be organized effort to mobilize communities on decrease post term birth and health benefits of ANC service sand increase the number of follwop for ANC,
- Promote and give health education on measles sign and symptom and the vaccine which is given for measles .
- All children attending health care services should be assessed for MUAC and counseling for MAM is recommended for all children attending health facilities.

8.Strength and limitation

8.1 Strength

Study participants were selected randomly;

The study collected on wide range of potential risk factors of pneumonia including socio demographic, co-existing environmental, and nutritional factors.

The study used appropriate statistical methods to analyze the data and identify the factors that are associated with pneumonia

8.2 limitation

The cross-sectional study design was not allow the study to establish causal relationship between the different independent variables and the outcome variable.

The other limitation regarding information about factors associated with pneumonia was obtained from respondents through interviewer administered questionnaires rather than self administered so response ,recall ,and social desirability bias are the potential limitation of this study.

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ANNEX

ANNEX: 1 QUESTIONERS

Informed consent form

Name of Institute……..Address of Institute…….

Hello greeting, I am……..

We are working in the research for the fulfillment of degree program in Department of public health, College of Health Science and Medicine, wolkite University. So we would like to ask you some questions relevant to the study which may take about 20 minutes. The purpose of this questionnaire is to gather information about the study aimed at "Prevalence of Pneumonia and Its Associated Factor Among under five children at emdbir Town, guragev Zone, Southern Ethiopia., . Your response to the study items will highly contribute to the success of the study. You will asked by the data collectors. Your name, your responses, or anything describing, you will not be mentioned to anyone. Everything is confidential in a secure way; you will have the full right to refuse not to participate in the research. You will not be given any incentives or be benefited or injured in any way. The information is used for the intended purpose only Do I have your permission to continue?

1.If yes, signature of participant…….and continue next page.

2. If no, skip to the next participant.

Informed consent Certified by an interviewer

Date of interview……..

Name of interviewer…… signature……

Supervisor…… signature……

Date of check in …….

Investigators:

1. Socio demographic factor

No	Question	Response	Remark
1.1	Education levels of mother/caregivers	1.Illiterate 2.Literate	
1.2	Education levels of father	1.Illiterate 2.literate	
1.3	Mother /caregiver job	1.house wife 2.merchant 3. Governmental 4. Farmer	
1.4	What is your marital status	1.single 2.married 3.divorced	
1.5	What`s your religion	1.orthodox 2.muslim 3.protestant 4.catholic 5.others	

2. Status of child

No	Question	Response	Remark
2.1	Age of child	1.2-11month 2.12-23 Month 3.24-59 Month	
2.2	Sex of the child	1.Male 2. Female	
2.3	Birth status	1.Preterm 2.Term 3.Post term	
2.4	Place of birth	1.Home 2. healthcare	
2.5	Numbers of Children	1. One 2.Two 3. More than three.	

3. Environmental and housing condition

	Question	Response	Remark
3.1	What kind of fuels do you use for cooking?	1.Wood 2.Charcoal 3.electricservice	
3.2	Cooking area	1.housing 2. kitchen	
3.3	Is the kitchen attached to the main house	1.yes 2. no	
3.4	Number of windows in the main house	1. One and less 2. Two and above	
3.5	The child position during cooking	1.Holding at her back 2. Away from cooking area.	
3.6	Does anyone in the family smoke?	1.yes 2.No	

4. Nutritional, past co-morbidities and vaccination statues of the child

no	Question	Response	Remark
4.1	How many months does the baby breast feed?	1.Exclusive breastfeeding 2.Mixed Breast feeding	
4.2	Duration of breast Feeding	1. <2 Years 2. >2 Years	
4.3	Has your child ever been malnourished?	1.No 2. some malnourished 3.sever malnourished	
4.4	Have you had diarrhea in the last 14 days?	1. Yes 2.No	
4.5	Has he /she been diagnosed with measles?	1.Yes 2.No	
4.6	Has he /she had respiratory illness such as cough, fast breathing and fever	1.Yes 2.No	
4.7	Has she \he has been vaccinated?	1.Yes 2.No	
4.8	vaccination	1. Completely vaccinated 2.vaccination until now 3.stopped at the middle 4.Notvaccinated	

4.9	Does he/she take vitamin A?	1.Yes 2. No	
4.10	Breast feeding in first 6 month?	1. Breast feeding 2. breast feeding and other	
4.11	MUAC	1.SAM (<11.5 cm) 2.MAM (11.6-12.5 cm) 3.Normal (>12.6cm)	