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# THE EFFECTIVENESS OF M-KIA APPLICATIONS ON MOTHERS TO EARLY DETECTION AND PREVENTION OF PNEUMONIA IN DEMAK DISTRICT

**Chandra Kurniawan[1] , Dwi Sutiningsih[2] , Martini[3]**
Masters Faculty of Epidemiology, Diponegoro University Semarang, Indonesia

archianime06@gmail.com [1] , dwi.sutiningsih@live.undip.ac.i [2] , tinihen65@yahoo.co.id [3]

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***ABSTRACT***
*Introduction: Factors that cause high pneumonia cases, including age less than two years, population density, winter, antibiotic resistance, daycare attendance, exposure to cigarette smoke, nutritional status, and the influence of comorbidities. Methods: The research method used in this study is a quantitative study with a cross-sectional approach aimed at seeing the relationship between the effectiveness of early detection of pneumonia using an application system. The results of this study are used to develop prevention and control strategies for pneumonia that reach all levels of society, especially marginal groups and provide recommendations related to child pneumonia advocacy. The results of the analysis in this study for the weight of toddlers in Demak are still a lot less, amounting to 49 toddlers compared to toddlers who have normal weight. Results: The results of this study are 1) People in Demak who have almost 50 percent of toddlers say the M-KIA application cannot operate or open the M-KIA application; 2) There are still many people in Demak who have toddlers who say the M-KIA application does not understand and is not clear in meeting the needs for their toddlers. Most mothers of children under five in Demak with the M-KIA application are able to detect pneumonia early; 3) The M-KIA application is less effective because parents of toddlers in Demak have not all felt the function of the M-KIA application in meeting the health needs of toddlers, especially for early detection of pneumonia. Conclusion: The obstacle faced by the community in DEmak is the lack of knowledge of using the M-KIA application so that only some understand so that they feel the use of the M-KIA application to detect pneumonia in toddlers early.*

***Keyword:*** *M-KIA Application, Pneumonia Early Detection*

Corresponding Author : Chandra Kurniawan
E-mail: archianime06@gmail.com

## INTRODUCTION

Pneumonia can be caused by viruses, bacteria, parasites, or fungi. The bacteria that cause pneumonia in toddlers are Streptococcus pneumonia and Haemophilus influenza (Ruwandasari, 2019) . Pneumonia is an acute respiratory infection caused by a bacterial, viral, or fungal infection that attacks the lungs, especially the alveoli. In childhood pneumonia, the alveoli will be filled with pus or other fluid which causes difficulty in breathing, pain when breathing, lack of oxygen intake and a high risk of death (Hasadiki, Muhammad HasbyeHasadiki, 2021) .

Pneumonia is caused by inflammation of the lungs that makes breathing painful and oxygen intake less. The high rate of under-five mortality due to pneumonia has resulted in the 4th MDG's (Millennium Development Goals) target which aims to reduce child mortality by 2/3 from 1990 to 2014 not being achieved. Pneumonia is the second cause of death for children under five in Indonesia after diarrhea. The number of pneumonia sufferers in Indonesia in 2013 ranged from 23%-27% and

deaths from pneumonia were 1.19%. According to the Indonesian Ministry of Health (2014), Central Java in 2013, there were 55,932 cases of pneumonia, 67 deaths with CFR = 0.27%.

Toddler pneumonia is a disease that attacks the lung tissue and/or is characterized by coughing and difficulty breathing, which is commonly referred to as rapid breathing or shortness of breath in children under five (Wahyuningsih et al., 2014) . Pneumonia is a cough and cold disease accompanied by rapid breathing.1 The proportion of pneumonia under five in Indonesia from 2008 was 49.45%, in 2009 was 49.23% and in 2010 was 39.38% of the total number of children under five in Indonesia. The national average incidence of pneumonia from 2001 to 2010 was in the yellow area or areas that had an incidence rate of between 1-4 per 100,000 population and were in the moderate category, only in 2001 and 2004 were in the red category or areas that had an incidence rate more than >4 per 100,000 population and included in the high category (Kurniasih et al., 2015) .

Mathew's research (2015) in 2010-2011 estimated that there were more than 120 million cases of pneumonia of which occurred in children under five years of which more than 10% of the conditions were concerning. Pneumonia is an acute infection of the lung tissue (alveoli) caused by bacteria, viruses or fungi (Azizah & Kusuma, 2021) . Pneumonia can also occur as a result of accidents due to inhalation of liquids or chemicals. Populations susceptible to pneumonia are children aged less than 2 years, elderly people more than 65 years, or people who have health problems (malnutrition, immunological disorders) (Lutfah & Oxytocin, 2017 ).

Factors that cause high pneumonia cases, including age less than two years, population density, winter, antibiotic resistance, daycare attendance, exposure to cigarette smoke, nutritional status, and the influence of comorbidities (Badriah, nd) ; (Adinatha et al., 2020) . The under-five mortality rate in Indonesia is still high at 40/1000 live births (equivalent to 23 deaths per hour). The Indonesian Ministry of Health has set a goal of reducing the under-five mortality rate by 20/1000 live births. Pneumonia and diarrhea are 50% of the causes of under-five mortality in Indonesia, Pneumonia in Central Java Province is the highest contributor to under-five mortality (20.57%). According to the Ministry of Health of the Republic of Indonesia, the low coverage rate for finding pneumonia under five can be caused, among others, because the reporting system has not been maximized, case detection at puskesmas is still low and reporting completeness, especially from districts/cities to provinces is still low. The case of finding pneumonia in the Public Health Center of Demak Regency, Karangawen began in 2010.

The case of infant mortality in the Public Health Center of Demak Regency is a case of death that occurs in infants aged 0-11 months (including neonatal). The infant mortality rate in Demak Regency in 2015 was 149 consisting of 82 boys and 67 girls. So the Infant Mortality Rate (IMR) in Demak Regency in 2015 was 7.2/1.00 live births, an increase of 0.8/1000 when compared to 2014 which was only 6.4/1000 live births. In the case of infant death, the cause of the infant's death is not yet clearly reported at the Karangawen health center, Demak district.

Based on the results of the researcher's interview with the pneumonia handling section at the Demak District Health Center, there was a decrease in infant mortality per year from 2017-2019, while the examination of toddler visits at the Demak district health center was carried out by midwives in the Maternal and Child Health Room (KIA poly). Health workers owned by 8 midwives, general practitioners and specialists in internal medicine. Midwives have a very important role in

finding cases of pneumonia patients, especially toddlers. However, in reality, the practice of midwives in finding cases of pneumonia is still not optimal. The Indonesian Ministry of Health stated that midwives who had been trained in the Integrated Management of Sick Toddlers (MTBS) still had not fully practiced their knowledge and skills in the workplace so that pneumonia detection was still not optimal. It is proven by the fact that pneumonia in the Public Health Center in Demak is still very minimal, sometimes there is no pneumonia in infants.

The purpose of the M-KIA application is for parents to provide information about their baby's health whether phenomonia is detected or not? The M-KIA application in the mother and toddler class section, in which there are 3 pieces of information including information about all matters related to groups of infants aged 0 to 1 year, to groups of children aged 5 years. Each section is also equipped with a schedule for giving immunizations to the stages of child development.

Based on this background, the authors are interested in taking the title of this study "Effectiveness of M-KIA Applications in Mothers Toddlers on Early Detection and Prevention of Pneumonia in Demak Regency". The results of this study are used to develop prevention and control strategies for pneumonia that reach all levels of society, especially marginal groups and provide recommendations related to child pneumonia advocacy. Recommendations are given to policy makers at local and national levels as initial information to develop programs and advocacy as an effort to reduce morbidity and mortality of childhood pneumonia in Indonesia. The aims of this research are to:

1. Analyzing the effectiveness of the M-KIA application on mothers of children under five in early detection of pneumonia in Demak Regency.
2. Analyzing the effectiveness of the M-KIA application on mothers of children under five in the prevention of pneumonia in Demak Regency.
3. Analyzing the response to the use of the M-KIA application for mothers of children under five in Demak Regency.
4. Analyzing risk factors that can affect pneumonia in toddlers

## METHOD

The research method used in this study is a quantitative study with a cross-sectional approach aimed at seeing the relationship between the effectiveness of early detection of pneumonia using an application system. And to see the relationship of risk factors with the incidence of pneumonia. This study aims to explain the problem or detect pneumonia early. With a diagnostic test to determine the sensitivity and specificity. The research was conducted with the intention of seeing the consequences of a treatment. The research location was conducted at posyandu in six villages in Demak Regency. The study was conducted from December 2021 to February 2022. The population in this study were all children under five who attended the Posyandu Demak. The population of this study was 6 villages with 7 posyandu. 1 posyandu consisted of 60 mothers of children under five, so the total population in this study was 420 mothers of children under five.

## RESULTS AND DISCUSSION

### 1. Overview of the Demak District Health Office

The Demak District Health Office is one of the Regional Offices established based on the Demak District Regulation Number 5 of 2016 concerning the Establishment and Composition of the Demak Regency Regional Apparatus with typology B. The Health Service is located at Jalan Sultan Hadiwijaya Number 44 Mangunjiwan Village, Demak District, Demak Regency, in accordance with with regulation Number 42 of 2016 has the task of assisting the Regent in carrying out government affairs in the health sector which is the authority of the Region. The Health Service which is the implementing element of government affairs in the health sector which is under the authority of the Region, is led by the Head of the Service who is under and responsible to the Regent through the Regional Secretary.

The Demak District Health Office has the task of carrying out regional autonomy in the health sector. The Health Office in carrying out these tasks, the Demak District Health Office carries out the following functions:

1. Formulation of technical policies in the health sector
2. Granting of permits and implementation of public services
3. Guidance on the Service's Technical Implementation Unit in the health sector,
4. Management of administrative affairs of the office.

The organizational structure of the Demak District Health Office is as follows:

a) Head of Department
b) Secretariat, in charge of:
    1. Program and Finance Sub-Section, and
    2. General and Personnel Sub-Section
c) Public Health Sector, which is in charge of:
    1. Section of Family Health and Nutrition
    2. Promotion and Community Empowerment Section, and
    3. Occupational Health and Sports Environmental Health Section
d) Disease Prevention and Control Division, which is in charge of:
    1. Surveillance and Immunization Section
    2. Communicable Disease Prevention and Control Section, and
    3. Section on Prevention and Control of Non-Communicable Diseases and Mental Health
e) Health Services and Resources in charge of:
    1. Health Services Section
    2. Pharmaceutical Section of Medical Devices and Household Health Supplies, and
    3. Health Human Resources Section
f) Service Technical Implementation Unit
g) Functional Position Group

**2. Respondent Description**

Description of the respondents in this study is the people of Demak who have toddlers. Description of respondents in this study consists of:

1. Level of education

Based on the results of the analysis that respondents who have more children under five at the high school education level as many as 66, more details are presented in the table below:

**Table 1. Results of Education Level Description**

| Level of education | Frequency | Percentage |
|---|---|---|
| Bachelor | 6 | 7.5 |
| SD | 2 | 2.5 |
| SENIOR HIGH SCHOOL | 67 | 82.5 |
| JUNIOR HIGH SCHOOL | 6 | 7.5 |
| Total | 81 | 100% |

The table shows that respondents who have an undergraduate education level of 6, 2 elementary schools, 67 senior high schools, and 6 junior high school education levels. many have high school education. Mothers who have a high school education must have understood very well about home health or for their toddlers.

2. Type of work

The results of the analysis show that 77.8% of respondents who have children under five in Demak are housewives. Details for the description of the type of work are presented in the table below:

**Table 2. Descriptive Results of Types of Work**

| Type of work | Frequency | Percentage |
|---|---|---|
| Housewife | 63 | 77.8 |
| Private sector employee | 13 | 16.0 |
| Consultant | 1 | 1.2 |
| Trader | 1 | 1.2 |
| Shopkeeper | 3 | 3.7 |
| Total | 81 | 100 |

Source: Primary Data, 2022

3. Income

The results of the analysis show that the income of respondents who have toddlers in Demak is more in the range of 1 million – 3 million as much as 67, the rest is in the table below:

**Table 3. Descriptive Results of Income**

| Income | Frequency | Percentage |
|---|---|---|
| < 1 million | 8 | 9.9 |
| 1 million – 3 million | 67 | 82.7 |
| 4 million – 5 million | 6 | 7.4 |
| Total | 81 | 100 |

Source: Primary Data, 2022

**3. Description of Toddler**

The descriptions of toddlers in this study were about toddler age, weight, nutritional status, immunizations, and pneumonia identification. Based on the individual factors of toddlers to detect pneumonia seen in:

1. Toddler Age

The smallest age between 1-12 months has a large enough risk of getting pneumonia

and the age of 12-60 months is a vulnerable age with the highest risk of developing pneumonia where the peak risk is at 24-48 months of age (Sinaga, 2019). The results of the analysis in this study indicate that the toddlers who were the material in this study had more of 4 years of age as many as 42 and 23 years of 3 years. More details are presented in the table below:

**Table 4. Descriptive Results of Toddler Age**

| Age | Frequency | Percentage |
|---|---|---|
| 19 mths | 1 | 1.2 |
| 2 yrs | 2 | 2.5 |
| 3 yrs | 23 | 28.4 |
| 3 yrs.1 mth | 1 | 1.2 |
| 3 yr.10 mth | 1 | 1.2 |
| 3 yr.4 mth | 1 | 1.2 |
| 3 yrs. 7 months | 1 | 1.2 |
| 4 yr.6 mth | 1 | 1.2 |
| 4 yrs | 42 | 51.9 |
| 4 yr.2 mth | 2 | 2.5 |
| 4 yr.3 mth | 2 | 2.5 |
| 4 yrs. 4 mths | 1 | 1.2 |
| 4 yrs. 5 months | 2 | 2.5 |
| 5 yrs | 1 | 1.2 |
| Total | 81 | 100 |

Source: Primary Data, 2022

2. Toddler Weight

The weight of children under five based on the Ministry of Health of the Republic of Indonesia is presented in the table below:

**Table 5. Ideal Toddler Weight**

| Age | Girl | Boy |
|---|---|---|
| 1-2 yrs | 8.9 kg- 11.5 kg | 9.6kg-14.3kg |
| 2-3 yrs | 11.5kg-13.9kg | 12.2kg-14.3kg |
| 3-4 yrs | 13.9kg-16.1kg | 14.3 kg- 16.3 kg |
| 4-5 yrs | 16.1 kg-18.2 kg | 16.3 kg-18.3 kg |

**Table 6. Results of the Description of Toddler Weight**

| Weight | Frequency | Percentage |
|---|---|---|
| Not enough | 49 | 60.5 |
| Normal | 32 | 39.5 |
| Total | 81 | 100 |

Source: Primary Data, 2022

The table shows that the weight of children under five in Demak who has less body weight is 49 (60.5%) and children who have normal weight are 32 (39%). Based on the respondent's description of parents of toddlers in Demak, their income is more than 1 million-3 million, so that the toddler's food intake is sufficient according to the abilities and income of the parents of the toddlers. Adequate food intake can cause underweight toddlers.

3. Nutritional status

Toddler with nutrition malnutrition and malnutrition increase the risk of pneumonia in children under five. What if the toddler is malnourished/poor, the system the body's defenses decrease so that the impact is easy to get infection. The thymus organ is very sensitive to malnutrition because protein deficiency can cause thymus atrophy. Almost all of the body's defense mechanisms deteriorate in a state of malnutrition.

Vitamin A is a determining factor in the process of cell differentiation, especially goblet cells that can secrete mucus (Nurnajiah et al., 2016) . Mucus protects epithelial cells from invading microorganisms and other harmful particles. Vitamin A deficiency blocks the function of the glandular cells that secrete mucus and are replaced by dry, scaly epithelial cells. Mucous membranes are no longer able to excrete mucus properly so they are easily attacked by bacteria. Retinol in vitamin A affects the differentiation of B lymphocytes.

Vitamin A metabolism is also aided by the presence of micro minerals such as zinc (Zn). Zinc plays an important role in mediating non-specific immunity such as neutrophils and NK cells and non-specific immunity such as balance of Th cells. Zinc deficiency of 100 mg is one of the main determinants of pneumonia. Malnutrition caused by a lack of protein energy will be accompanied by a deficiency of vitamin A (Beta Carotene), vitamin E (Alphatocopherol), vitamin B6, vitamin C (Ascorbic Acid), folate, zinc, iron, copper, and selenium. Antioxidants can prevent oxidative stress and tissue damage, and prevent increased production of pro-inflammatory cytokines. Antioxidants can also repair tissues/cells that have been damaged by free radicals. Antioxidant deficiency can lead to immune suppression that affects T cell mediation and adaptive immune responses. Vitamin B6 deficiency can reduce antibody formation (Nurnajiah et al., 2016) . Folate deficiency can cause DNA metabolism disorders resulting in changes in the morphology of rapidly dividing cells, such as red blood cells, white blood cells, and gastric and intestinal epithelial cells.

Severe and chronic malnutrition is the main cause of thymus atrophy which is very important in the defense mechanism. When a person's immune system is not perfect or compressed, malnourished toddlers will be susceptible to chronic and recurrent infections (Nurnajiah et al., 2016) . The effect on the mucosa and barrier function against pathogen invasion changes during malnutrition (Desmawati, 2016). The analysis is presented in the table below:

**Table 7. Results Description of Nutritional Status**

| Nutritional status | Frequency | Percentage |
|---|---|---|
| Well | 79 | 97.5 |
| Pretty good | 2 | 2.5 |
| Total | 81 | 100 |

Source: Primary Data, 2022

The table shows that the nutritional status of children under five in Demak who have good nutritional status is 79 (97.5%) and 2 (2.5%). The conclusion is that under five in Demak, the nutrition obtained is good, it can be through the posyandu which provides additional nutritional intake for toddlers.

4. Immunization

Incomplete immunization is often found in children with pneumonia. Immunizations to prevent pneumonia are pneumococcal and Haemophilus influenza type B immunizations to prevent direct pathogen infection, as well as pertussis immunization in DPT and measles to prevent pneumonia as a complication of previous illnesses, including basic immunizations for <1 year. This analysis is more clearly presented in the table below:

**Table 8. Immunization Analysis Results**

| Immunization | Frequency | Percentage |
|---|---|---|
| Less complete | 1 | 1.2 |
| Complete | 80 | 98.8 |
| Total | 81 | 100% |

Source: Primary Data, 2022

The table shows that 80 (98.8%) children under five in Demak have complete immunizations, while only 1 child (1.2%). So toddlers in Demak have good immunity, so they are not easily infected with viruses that cause pneumonia. The results of the analysis of toddlers with pneumonia from 81 respondents, none of them in Demak suffers from pneumonia.

**4. Toddler Environmental Factors**

The existence of a healthy home is an important factor that can be directly related to the environment the community lives in. Poor housing conditions can facilitate the transmission of pneumonia. Physical environmental conditions such as the presence of family members who smoke, use of mosquito coils, residential density, ventilation area, floor type, wall type, lighting intensity, house temperature and humidity can affect the incidence of pneumonia.

1. Indoor Air Ventilation

Toddlers who live at home with lighting intensity that does not meet the requirements will be at risk of 7.364 times suffering from pneumonia compared to toddlers who live at home with lighting intensity that meets the requirements. A healthy home requires natural light that contains ultraviolet light. Ultraviolet light has a wavelength < 290 nm. At a wavelength of 253.7 nm, it can kill germs, bacteria, viruses and fungi that can cause various health problems.

**Table 9. Results of Indoor Air Ventilation Analysis**

| Indoor Air Ventilation | Frequency | Percentage |
|---|---|---|
| There is | 51 | 63 |
| There isn't any | 30 | 37 |
| Total | 81 | 100% |

Source: Primary Data, 2022

The table shows that there are 51 (63%) children under five in Demak who have indoor air ventilation and 30 (37%). So it is quite easy for toddlers in Demak to get pneumonia because of the lack of light in the house.

2. Residential Density

The physical condition of the building, one of which is residential density, is closely related to disease transmission. If the occupants are too crowded and there are residents who are sick, it will accelerate the transmission or transmission of disease. The more the number

of occupants will accelerate the decline in indoor air quality due to decreased oxygen levels and increased CO2. The impact of increasing room CO2 is a decrease in air quality which will allow germs to multiply more quickly. Toddlers will be easily infected or easily infected with pneumonia.

**Table 10. Results of House Density Analysis**

| House Density | Frequency | Percentage |
|---|---|---|
| Congested | 32 | 39.5% |
| Not solid | 49 | 60.5% |
| Total | 81 | 100% |

Source: Primary Data, 2022

The table shows that the under-five environment is seen in the density of houses that are not densely packed as much as 49 (60.5%) while those with dense houses are 32 (39.5%). So it can be concluded that some toddlers in Demak can easily transmit or become infected with pneumonia because the houses occupied by toddlers are dense while not densely packed there is no risk of contracting or being infected with pneumonia.

3. Floor Type

Toddlers who live in homes with floors that do not meet the requirements will be at risk of 3,400 times suffering from pneumonia compared to toddlers who live in homes with types of floors that meet the requirements. The dust will cause toddlers to have difficulty breathing because it can enter the respiratory tract. Bacteria that are often found include *Streptococcus pneumoniae, Staphylococcus aureus, Haemophulus influenza* and *Streptococcus pyogene. Secretions in the* form of phlegm and mucus can come out through the nose, throat and mouth along with droplets when coughing or sneezing (Yusela et al., nd) . The secretions will later fall to the floor, stick or mix in the air. These bacteria mixed in the air will be inhaled when breathing and infect family members (Yusela et al., nd) .

**Table 11. Results of Floor Type Analysis**

| Floor Type | Frequency | Percentage |
|---|---|---|
| Tiled | 58 | 71.6% |
| Untiled | 23 | 28.4% |
| Total | 81 | 100% |

The table shows that the residences for toddlers in Demak are 58 (71.65) tiled floors and 23 (28.45) untiled houses. So it can be concluded that the tiled children's residence has a small risk for toddlers to be infected with pneumonia, while those without tiles have a greater risk of developing pneumonia.

4. Presence of Smokers in the House

Toddlers who live at home with family members who smoke will have a 3.116 times risk of suffering from pneumonia compared to toddlers who live in homes with family members who do not smoke. According to Permenkes No. 1077/Menkes/Per/V/2011 states that cigarette smoke enters the source of chemical pollutants that affect air quality. Cigarette smoke has worse side effects than other smoke because it can irritate the respiratory tract mucosa and cause ARI. Free radicals contained in cigarette smoke can damage lung tissue

(Yusela et al., nd) .

**Table 12. Presence of Smokers in the House**

| The Presence of Smokers in the House | Frequency | Percentage |
|---|---|---|
| There is | 37 | 45.7 |
| There isn't any | 44 | 54.3 |
| Total | 81 | 100% |

Source: Primary Data, 2022

The table shows that the place of residence of children under five in Demak is seen in the presence of smokers in the house who do not have 44 (54.3%) and 37 (45.75) smokers in the house. So it can be concluded that the place of residence of children under five in Demak where there are smokers in the house has a high risk of developing pneumonia in children under five, while there is no smoker in the house of toddlers who have a small risk of developing pneumonia.

5. Use of mosquito coils

Toddlers who use mosquito coils have a 9.750 times greater risk of suffering from pneumonia compared to toddlers who do not use mosquito coils. Burning mosquito coils produce smoke containing *carbonyl compounds* ( *formaldehyde* and *acetaldehyde* ) which are *carcinogenic* . In addition, mosquito repellent smoke is also an irritant which causes irritation of the respiratory tract.

Exposure through breathing is very dangerous because the active ingredient particles can be quickly absorbed by the lungs into the bloodstream, causing serious damage to the nose, throat and lung tissue if inhaled in sufficient quantities and for a long period of time.

According to Chen et al (2008) stated that burning insect repellent will cause lung cancer because mosquito coils will release a number of *particulate matter* and *formaldehyde* (Sari et al., 2018) . The full analysis is presented in the table below:

**Table 13. Results of Analysis of the Use of Mosquito Repellent**

| Use of Mosquito Remedy in the House | Frequency | Percentage |
|---|---|---|
| There is | 10 | 12.3 |
| There isn't any | 71 | 87.7 |
| Total | 81 | 100 |

Source: Primary Data, 2022

The table shows that the place where the toddlers live is seen in the use of mosquito coils in the existing house amounting to 10 (12.3%) while there is no use of mosquito coils amounting to 71 (87.7%). So it can be concluded that the majority of toddlers who are demak do not experience the risk of suffering from pneumonia but a small portion have a greater risk of suffering from pneumonia.

6. Temperature

Air temperature that is too low below 18ºC can cause the room to become humid and if the temperature is too high above 35ºC the room will become stuffy. Healthy home temperature requirements are 18ºC - 30ºC. *Streptococcus pneumoniae* bacteria can grow in a temperature range of 25ºC - 40ºC and can grow optimally in a temperature range between

31ºC-37ºC.

**Table 14. Results of Temperature Analysis**

| Temperature | Frequency | Percentage |
|---|---|---|
| >30oC | 23 | 28.4 |
| 18oC-30oC | 71 | 71.6 |
| Total | 81 | 100 |

Source: Primary Data, 2022

The table shows where children live in Demak for 23 (28.45%), house temperatures > 30°C and [71] (71.6%) . So it can be concluded that toddlers in Demak have a small risk of suffering from pneumonia and most of them have a smaller risk of developing pneumonia because they have a normal and healthy temperature.

**5. Toddler Pneumonia**

Classification of pneumonia in toddlers based on age groups include:

1. Children aged 2 months - <5 years, coughing which indicates no pneumonia, no rapid breathing and no downward pull of the chest wall, while pneumonia is characterized by rapid breathing and no downward pull of the chest wall and severe pneumonia characterized by wall pull lower chest forward.
2. Age less than two months of cough is not pneumonia characterized by the absence of rapid breathing, if pneumonia, there will be rapid breathing and a strong pull in the lower chest wall.

Pneumonia in neonates aged 3 weeks to 3 months is most often caused by bacteria (Kaunang et al., 2016) . Usually *Streptococcus pneumoniae bacteria* . In toddlers aged 4 months to 5 years, the virus is the most common cause of pneumonia, namely respiratory syncytial virus. In developing countries, bacteria are the largest aspect in the incidence of pneumonia in children under five around 50%.

The results of this research analysis regarding the condition of toddlers in Demak through the distribution of questionnaires filled out by parents of toddlers are presented in the table below:

**Table 15. Results of Analysis of Pneumonia Findings**

| Question | Yes | Percentage | Not | Percentage |
|---|---|---|---|---|
| Toddler has cough | 9 | 11.1 | 72 | 88.9 |
| Toddler has seizures, does not want to suckle, decreased consciousness, fever. | 1 | 1.2 | 80 | 98.8 |
| Toddler has shortness of breath. | 1 | 1.2 | 80 | 98.8 |
| Toddlers often drink breast milk | 6 | 7.4 | 75 | 92.6 |
| Toddler sleeping snoring | 5 | 6.2 | 76 | 93.8 |
| Toddler Liquid CHAPTER | 9 | 11.1 | 72 | 88.9 |
| Toddler has a cold | 15 | 18.5 | 66 | 81.5 |

| | | | | |
|---|---|---|---|---|
| Toddlers get basic immunizations according to the child's age | 27 | 33.3 | 54 | 66.7 |
| Toddlers get breast milk for 0-6 months without any additional food | 72 | 88.9 | 9 | 11.1 |
| There are parents or other family members who have a habit of smoking in the house. | 14 | 17.3 | 67 | 82.7 |
| You pay attention to your toddler's nutritional intake | 6 | 7.4 | 75 | 92.6 |
| You regularly monitor the health of your toddler | 8 | 9.9 | 73 | 90.1 |
| You do not provide any form of protection to your toddler (covering nose, keeping away, giving mask) if your child is exposed to air pollution (cigarette smoke, dust, vehicle fumes, smoke waste burning) | 21 | 25.9 | 60 | 74.1 |
| Do you regularly clean the house? | 7 | 8.6 | 74 | 91.4 |
| You support the search for health services or treatment when your toddler is sick | 20 | 24.7 | 61 | 75.3 |
| Your toddler is being cared for by someone else | 70 | 86.4 | 11 | 13.6 |

good health condition is evidenced by the questions Toddler has cough 88.9% answered no, Toddler has seizures, does not want to suckle, decreased consciousness, fever 98.8% answered no, Toddler experienced shortness of breath 98.8% answered no, Toddler liquid defecation 88.9% answered no, and a small proportion of toddlers have a risk of suffering from pneumonia.

**6. The Effectiveness of the M-KIA Application on Early Detection and Prevention of Pneumonia**

Based on the data that has been declared normal and homogeneous, so that the hypothesis testing uses the two-way analysis of variance test in the SPSS 24.0 statistical application. This hypothesis test is used to examine whether there is an effect of a treatment, namely the use of the M-KIA application on early detection and prevention of pneumonia. Hypothesis testing using *independent T-test* with the help of SPSS version 24 program with the *output results* can be seen in Table 4.16.

**Table 16. *Independent T-test . Test Results***

| Group | Average value | SD | Results of Sig. (2-tailed) | Influence |
|---|---|---|---|---|
| Experiment | 69.6 | 6.2 | 0.000 < 0.05 | Significant |
| Control | 57, 2 | 4.8 | 0.337 < 0.05 | Not significant |

Based on the data obtained from the results of data analysis in Table 4.16, it shows that the average score of the experimental group is better than the control group, with a much different distribution of values. This is indicated by the value of the standard deviation (standard deviation), the more the standard deviation of the data approaches zero, the more uniform the distribution of the data with the average value of the existing data. This means that the

distribution of the data obtained is getting better. The results of the *T-test* in the experimental group showed that there was a significant effect on the sig value. 0.000 < 0.05 so Ho is rejected and Ha is accepted, so there is a difference in the average use of the M-KIA application before and after the use of the M-KIA application in early detection and prevention of pneumonia.

**Table 17. Effectiveness of early detection of pneumonia before and after using the M-KIA application system**

| Detection Type | *Mann-Whitney* test *Mean Rank* | Effectiveness (%) | | | *p* |
|---|---|---|---|---|---|
| | | Not enough | Enough | Well | |
| Conventional | 11.65 | 32.5 | 10.0 | 7.5 | 0.000 |
| M-KIA Application | 29.35 | 7.5 | 20.0 | 22.5 | |

Table 17 shows the effectiveness of early detection of pneumonia using the M-KIA application system which states that it is good as much as 22.5% when compared to before using the M-KIA application. The results of the *Mann-Whitney* test from the results of the *mean rank* of the effectiveness of early detection of pneumonia with the M-KIA application system better than before using the M-KIA application, namely the conventional way using the MCH book.

**7. Feedback on the use of the M-KIA Application**

1. Feedback about the display on the M-KIA application is good

   The response of parents of toddlers in Demak with the M-KIA application, most respondents answered quite agree. This shows that the M-KIA is classified as less effective, possibly because its features are unattractive or cannot be learned by parents of toddlers. The results of the response recap of parents of toddlers are presented in the table below:

**Table 18. Respondents' Responses Regarding Display on the M-KIA application**

| Response | Frequency | Percentage |
|---|---|---|
| Agree | 29 | 35.8% |
| Just Agree | 52 | 64.2% |
| Total | 81 | 100% |

The table shows that the respondents who said the display on the application was good were 29 (35.85) and answered quite agree were 52 (35.8%). So it can be concluded that the M-KIA application is seen from the appearance of the respondents who are not interested.

2. Respondents' Responses About How to Use the M-KIA Application

   Respondents' responses on how to use the M-KIA application for parents of toddlers in Demak mostly answered quite agree, amounting to 50 (61.7%). This shows that the M-KIA application cannot be understood by parents of toddlers. The results are more clearly presented in the table below:

**Table 19. Respondents' Responses About How to Use the M-KIA Application**

| Response | Frequency | Percentage |
|---|---|---|
| Agree | 31 | 38.3% |
| Just Agree | 50 | 61.7 % |
| Total | 81 | 100% |

The table shows that the responses of respondents regarding how to use the M-KIA application, parents of toddlers who answered agreed were 31 (38.3%) and those who answered quite agreed were 50 (61.7%). So it can be concluded that the M-KIA application is not in accordance with the needs of parents of toddlers in Demak, possibly because the M-KIA application is difficult to run so that parents of toddlers feel that the M-KIA application does not work.

3. Respondents' Responses About Comfort using the M-KIA application

   Respondents' responses regarding the convenience of using the M-KIA application, parents of toddlers mostly answered quite agree as many as 47 respondents. This shows that the M-KIA application for parents of toddlers in Demak does not feel comfortable as they wish. The results of this analysis are presented in full in the table below:

**Table 20. Respondents' Responses About the Convenience of the M-KIA Application**

| Response | Frequency | Percentage |
|---|---|---|
| Agree | 32 | 39.5% |
| Just Agree | 47 | 58% |
| Don't agree | 2 | 2.5% |
| Total | 81 | 100% |

So it can be concluded that the M-KIA application parents of toddlers in Demak feel more uncomfortable in using the M-KIA application, but only a small part feel comfortable as evidenced by 32 (39.5%).

4. Respondents' Responses About the information provided by the M-KIA application is clear and easy to understand.

   Respondents' responses to the information provided by M-KIA are clear and easy to understand, parents of children under five in Demak mostly answered quite agree, amounting to 46 (56.8) than those who answered agree. The results of this analysis are presented in the table below:

**Table 21. Respondents' Responses About Information From M-KIA**

| Response | Frequency | Percentage |
|---|---|---|
| Agree | 35 | 43.2% |
| Just Agree | 46 | 56.8% |
| Total | 81 | 100% |

So it can be concluded that the M-KIA application has not provided the information that parents of toddlers want only a small part of them have received clear and understood information.

5. Respondents' responses to the M-KIA Application for information on the danger signs of pneumonia in toddlers

   Respondents' responses regarding the M-KIA application for information on the danger signs of pneumonia in toddlers, parents of toddlers in Demak said they agreed as much as 42 (51.9%). This shows that the M-KIA application can provide and is useful for detecting toddlers whether they have pneumonia or not. The results of this analysis are presented in full in the table below:

**Table 22. Respondents' responses to the M-KIA application For Information on Danger Signs of Pneumonia in Toddlers**

| Response | Frequency | Percentage |
|---|---|---|
| Agree | 42 | 51.9% |
| Just Agree | 37 | 45.7% |
| Don't agree | 2 | 2.5% |
| Total | 81 | 100% |

So it can be concluded that most parents of toddlers in Demak feel that the M-KIA application can detect the danger signs of pneumonia in toddlers, a small proportion have not felt the function of the M-KIA application to detect the dangers of pneumonia.

6. Respondents' Responses Regarding the Performance of the M-KIA Application To Know Toddler Health

Respondents' responses regarding the performance of the M-KIA application to determine the health of toddlers, most of the parents of toddlers answered agree, amounting to 51 (63%). This shows that parents of toddlers feel helped by the M-KIA application because they can find out the health of their toddlers earlier. The results of this analysis are presented in full in the table below:

**Table 23. Respondents' Responses to the Performance of the M-KIA Application To Know Toddler Health**

| Response | Frequency | Percentage |
|---|---|---|
| Agree | 51 | 63% |
| Just Agree | 29 | 35.8% |
| Don't agree | 1 | 1.2% |
| Total | 81 | 100% |

So it can be concluded that the M-KIA application 63% of parents of toddlers find it useful for detecting the health of toddlers and 37% do not feel the M-KIA application is useful for detecting children's health.

According to Martani and Lubis (2007), there are three approaches that can be used to measure the effectiveness of an organization, namely:

1. Source approach ( *resource approach* ) which measures the effectiveness of the input. The approach prioritizes the success of the organization to obtain resources, both physical and non-physical in accordance with the needs of the organization.
2. The *process approach* is to see the effectiveness of program implementation from all internal process activities or organizational mechanisms.
3. Approach targets ( *goals approach* ) where the focus is on the output, measuring the success of the organization to achieve the results (outputs) in accordance with the plan.

The conclusion is that early application is less effective because parents of toddlers in Demak have not all felt the function of the M-KIA application in meeting the health needs of toddlers, especially for early detection of pneumonia. The obstacle faced by the community in Demak is the lack of knowledge of using the M-KIA application so that only some understand so that they feel the use of the M-KIA application to detect pneumonia in

toddlers early.

**8. Pneumonia Risk Factors**

This study corroborates the findings of previous studies in which children who are not exclusively breastfed until the age of six months can suffer from various infectious diseases including pneumonia (Hartati et al., 2012) . Raising awareness of women and families for breastfeeding, especially exclusive breastfeeding, is very necessary to reduce the risk of pneumonia. Developing a support system for families and communities is critical to the success of exclusive breastfeeding.

The survey found that more girls had a history of pneumonia in the past year than boys. Similar findings were found in a Brazilian study corroborating that a significantly higher risk of developing pneumonia was among female children compared with male children. However this contradicts the findings of another study in Indonesia which found that boys were a risk factor for developing pneumonia (Lubis, 2020) . Further research is needed to explore whether the differences are caused by biological or social factors.

This study also found that the capacity of families to provide proper care for their sick children needs to be addressed. This fact explains that most of the children in this study had more than one episode of pneumonia in the past year or had a relapse. Lack of capacity of parents to provide proper care at home for their sick children can be due to lack of knowledge of caregivers or parents about the causes and prevention of pneumonia. This lack of capacity may be related to a lack of information or skills transferred from health workers or an inability to follow up on information or skills received. This gap raises questions about the effectiveness of professional health workers and informal public health cadres in educating the public about pneumonia. Prevention of recurrence of childhood disease is important because the more sick a child is, the higher the risk of death. Pneumonia is a disease with a high risk of recurrence. Children are under family care when they are healthy and as such, the support and assistance of health professionals for families with regard to the maintenance of child health and disease prevention is essential.

Perceptions of a disease, from those held by service providers to policy makers locally and nationally because it can influence how it is treated and prevented. In the family context, previous research found that the perception of pneumonia influenced caregivers' habits of making decisions regarding bringing their child to a health care center.

This study found a lack of knowledge about childhood pneumonia. Lack of knowledge about the symptoms of childhood pneumonia has been studied previously and was found to influence behavior in seeking care from caregivers. Previous studies have also shown that public knowledge about pneumonia has an impact on health behavior (Syakurah & Moudy, 2020) . A study in Indonesia found an association between the level of knowledge of parents, especially mothers, with recurrence of pneumonia where more complete knowledge was associated with fewer recurrences.

Previous research has found that distance to health services is associated with utilization of health services, especially when it comes to child health. Children living 5 kilometers from the nearest health facility were about twice (95% CI: 1.11, 2.72) more likely to delay medical

care than those living at a closer distance from the health care facility. Families who have good health knowledge and awareness of pneumonia will not delay bringing their children to health facilities (Habibi, 2018) . Raising family awareness about the importance of bringing children with pneumonia symptoms to health services is a very significant preventive measure that can reduce child mortality and morbidity. Various barriers in treating and preventing childhood pneumonia have been identified quantitatively and qualitatively in this study.

**CONCLUSION**

The conclusion is that the effectiveness in this study: The effectiveness of the use of the M-KIA application on the early detection and prevention of pneumonia in Demak Regency, it was found that there was a significant effect on the sig value. 0.000 < 0.05 so Ho is rejected and Ha is accepted, so there is a difference in the mean of early detection and prevention of pneumonia before and after using the M-KIA application. There are still many people in Demak who have toddlers who say the M-KIA application does not understand and is not clear in meeting the needs for their toddlers. Most mothers of toddlers in Demak with the M-KIA application are able to detect pneumonia early. The results of the responses to the use of the M-KIA application are less effective because parents of toddlers in Demak have not all felt the function of the M-KIA application in meeting the health needs of toddlers, especially for early detection of pneumonia. The risk factors are mostly related to the health and development of children and their environmental conditions. Most of these risk factors can be prevented, this shows the importance of preventive measures to reduce the risk of pneumonia. The multi-dimensional nature of pneumonia risk also needs to be underlined because it has an impact on the importance of inter-agency collaboration among stakeholders to address issues outside the health sector. The obstacle faced by the community in DEmak is the lack of knowledge of using the M-KIA application so that only some understand so that they feel the use of the M-KIA application to detect pneumonia in toddlers early.

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