

# Analysis of Infectious Disease History and Basic Immunization Status in the Incidence of *Stunting* Under the Age of 25-59 Months

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**BACKGROUND:** Growth and development disorders are still quite common in early childhood in Indonesia. Basic immunization in toddlers is one of the factors that play an important role in preventing toddler exposure to various infectious diseases. Diarrhoea and ARI are diseases that often occur in young children. Diarrhoea is the first most common disease in young children, and ARI is the second most common disease after diarrhoea.

**METHODS:** The study design was an analytic observational and case-control approach. This study involved 76 respondents consisting of 36 case groups and 36 control groups. The sampling technique of this study used purposive sampling. Research materials were collected as primary data to determine the history of infectious diseases through questionnaires and as secondary data to determine the history of basic vaccination with MCH / KMS books. Data were tested using the Chi-Square test with 95% CI ( $\alpha=5\%$ ).

**RESULTS:** There was an association between basic childhood immunization and stunting ( $p$ -value = 0.040; OR = 3.478), history of diarrhoea also showed an association with stunting in children ( $p$ -value = 0.019; 4.304). , and in history, ARI is also associated with stunting in young children ( $p$ -value = 0.040; OR = 3.478).

**CONCLUSION:** There is a relationship between primary vaccination and exposure to infectious diseases in children in the working area of the Karang Bandar Lampung Health Center.

**Keywords:** basic vaccination, infectious disease, decline

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## I. Introduction

Stunting is a chronic nutritional problem in children under the age of 5 years, characterized by a shorter height than their peers, caused by growth and development disorders due to malnutrition and infectious diseases (Health Research and Development Agency, 2018). Stunting children are characterized by a Z-score of less than -2 SD (standard deviation) and less than -3SD (Ministry of Health RI, 2020)(Kemenkes RI, 2020). Several factors can also cause children to become stunted, including ignorance about stunting, premature birth, exclusive breastfeeding, complementary food for children, environmental cleanliness, and low family socioeconomic status (Beal et al., 2018). One such factor is that inadequate basic immunization can increase the risk of infection in children. One infectious disease that children do not immunize against is measles. This immunization can protect children from the measles virus caused by the measles virus Myxovirus viridian, which can spread through the air through sneezing or coughing and cause complications of severe diarrhoea that can be accompanied by dehydration (Harahap et al., 2019) The Ministry of Health of the Republic of Indonesia (2017) states that immunization can create an immunity that effectively prevents the spread of certain diseases (Wiyogowati, 2012). In a study on the relationship between complete immunization history, Lestasi (2014) found a relationship between basic immunization history and infant mortality in Hegarmanah Village, Jatinangor District (Lestari et al., 2014). (Lestari et al., 2014) Young children whose resistance is less to disease quickly lose their body energy due to infectious diseases, because the reaction is a decrease in the child's appetite so the child refuses to eat. Refusing to eat means reducing children's food intake (Sutriyawan et al., 2020) Previous studies by Swathma (2016) also

found an association between infants and young children who did not receive complete basic immunization (Swathma et al., 2016) Unlike Mayasari. (2018) found that children who received full basic immunization did not avoid the recurrence of an infectious disease (Mayasari, 2018)

Based on data from the 2021 Indonesian Health Profile, infectious diseases are the cause of death for children aged 11 months within 29 days, namely pneumonia 14.4% and diarrhea 14% (Kementerian kesehatan Republik Indonesia, 2022). Based on research conducted in the working area of the Rama Indra Regional Health Center. Seputih Raman Central Lampung Regency, children aged 12-59 months, the OR value of the relationship between infectious diseases and stunting is 3.236 which means that children with infectious diseases have a 3-fold risk of stunting (Subroto et al., 2021) The global prevalence of children under five decreased from year to year, while in 2018 the prevalence of stunting children was 22.9% (154.9 million), then in 2019 it decreased to 22.4% (152 million) and in 2020 it was 22% (149.2 million). In Asia, stunting prevalence also decreased from 22.4 per cent (81.6 million) in 2019 to 21.8 per cent (79 million) in 2020. In 2020, the Asian continent experienced the most stunting in the south. Central Asia at 29.8% (55.1 million), followed by South Asia at 30.7% (54.3 million), and Southeast Asia ranks third in Asia at 27.4% (15.3 million). In Asia, the stunting rate is the least in the Central Asia region, which is 10% (800 thousand) in 2020 (World Health Organization, 2022) (World Health Organization, 2022).

Based on Riskesdas data in 2010, the prevalence of stunting in toddlers in Indonesia is still very high, namely 35.6% and in 2013, stunting increased to 37.2% (18.0% very short and 19.0% short) and in 2018 decreased to 30.8% (11.5% very short and 19.3% short) (Balitbangkes RI., 2013; Health Research and Development Agency, 2018; Mitra, 2015). The prevalence of short and very short infants in Lampung Province has decreased from year to year. The highest stunting rate is found in Lampung Province, which peaked at 42.6% in 2013, then dropped significantly to 27.28% in 2018 and 26.26% in 2019. Although the prevalence of stunting has decreased from year to year, there are still areas in Lampung province with high stunting. North Lampung Regency has the highest prevalence of 38.56%, followed by Bandar Lampung City at 36.1%, South Lampung at 30.4%, while the lowest prevalence in Lampung Province is Tulang Bawang Regency at 15.39% (Kemenkes RI, 2022). In Lampung Province, there were 42,525 babies in 2021, of which 764 babies were very short (1.79%), 2,774 babies were short (6.52%), 38,591 babies were normal (90.7%), Profile of the Lampung Provincial Health Office, 2022). In a 2021 study based on community-based nutrition registration and early childhood reporting (e-PPGBM) in Bandar Lampung City, the highest stunting prevalence in Karang City sub-district was 24.7%.

The purpose of this study was to analyze the history of basic immunization and infectious diseases in the incidence of *stunting* in toddlers aged 25-59 months in the Working Area of the Puskesmas Kota Karang Bandar Lampung.

## **II. Method**

This study is an analytical observational study with a case-control study design that analyzes the history of basic immunization and disease in the incidence of stunting, The study was conducted in the working area of the Coral Health Center, Bandar Lampung City, Lampung Province in December 2022-January 2023. The population of toddlers aged 25-59 months with inclusion criteria with high places in the working area of the Karang City Health Center, seek treatment at the Karang City Health Center Bandar Lampung, are willing to participate in research and are not disabled. The number of case samples was 38 infants and the control was 38 toddlers who took samples using purposive sampling. The independent variables are basic immunization history and infectious disease history. Variables are tied to stunting events. The analysis used the Chi-square statistical test, using a 2x2 table with a confidence level of 95%, and a correlation value ( $\alpha < 0.05$ ). This research has received ethical approval from the Ethics Committee of the Faculty of Medicine, University of Lampung with number 77/UN26.18/PP.05.02.00/2023

## **III. Result**

This research was conducted in the working area of the Karang City Health Center located in Teluk Betung Timur Bandar Lampung District which includes 3 villages, namely Karang City, Karang Raya and Perwata. The majority of the population works as fishermen and day labourers. There are 18 Posyandu (Integrated Service Post) consisting of 8 Posyandu in Kelurahan Karang, 6 Posyandu in Kelurahan Karang Raya and 4 Posyandu in Kelurahan Perwata. The characteristics of respondents to this study based on age and gender are as follows:

**Table 4.1** Distribution of Characteristics of Parents of Toddlers

Characteristics of Respondents	Frequency	
	n	%
<b>Age (years)</b>		
20-30	49	64,4
31-40	27	35,5
<b>Education</b>		
Secondary Education	63	82,8
Primary Education	13	17,2
<b>Work</b>		
Work	15	19,8
Not Working	61	80,2

Based on Table 4.1 it is known that the age group of respondents with the highest percentage is 20-30 years ie. 49 respondents (64.4%), the majority of respondents have a high school education of 63 respondents (82.8%) and some respondents are not working as many as 61 respondents (80.2%).

**Table 4.2** Distribution of Toddler Characteristics

Characteristics of Toddlers	Frequency	
	n	%
<b>Age (month)</b>		
25-35	26	33,8
36-47	21	27,5
48-59	29	38,7
<b>Gender</b>		
Man	36	47,4
Woman	40	52,6

Based on Table 4.2, it is known that the highest age group is in the age group of 48-59 months, namely. 29 infants (38.7%) and the lowest age group is 36-47 months i.e. 21 years. young children (27.5%). The majority of babies in this category were girls, as many as 40 babies (52.6%). Giving children a complete set of basic vaccinations affects their growth and development. Vaccination is expected to protect children from infectious diseases that can cause injury or death. Complete basic vaccinations include hepatitis B, BCG, polio, DPT-Hb-HiB and measles.

**Table 4.3** Distribution of Completeness of Basic Immunization History in Toddlers Aged 25-59 Months in the Working Area of the Karang City Health Center in 2022.

Basic Immunization History	Frequency	
	n	%
Incomplete	21	27,6
Complete	55	72,4
Total	76	100

Table 4.3 shows that most children aged 25-59 months in the working area of the Puskesmas Kota Karang have received complete basic vaccination, which is at least 55 (72.4%) and their age. As many as 21 (27.6%) infants aged 25-59 months in the working area of the Puskesmas Kota Karang did not undergo complete basic vaccination. Diarrhoea is an intestinal disease characterized by defecating more than 3 times a day and liquid faeces (Walisah & Syamdarniati, 2020). The frequency of diarrhoea in toddlers aged 25-59 months in the working area of the Puskesmas Kota Karang can be seen in the following table.

**Table 4.4** Distribution of History of Diarrheal Disease in Toddlers Aged 25-59 Months in the Working Area of the Puskesmas Kota Karang

History of Diarrheal Disease	Frequency	
	n	%
There is a history	20	26,3
No history	56	73,7

Total 76 100

Table 4.4 shows that as many as 56 (73.7%) infants aged 25-59 months in the working area of the Karang City Health Center experienced diarrhoea as many as 20 cases. Acute respiratory tract infection (ARI) is an infection that lasts less than 14 days that affects the upper and lower respiratory tracts (Karundeng, 2016). The history of the distribution of ARI for infants aged 25-59 months in the working area of the Puskesmas Kota Karang is as follows.

**Table 4.5** Distribution of History of ARI Disease in Toddlers Aged 25-59 Months in the Puskesmas Kota Karang Area in 2022.

History of ARI Infectious Disease	Frequency	
	n	%
There is a history	21	27,6
No history	55	72,4
Total	76	100

Table 4.5 shows that there are 21 (27.6%) infants aged 25-59 months who have experienced ARI and infants aged 25-59 months in the working area of the Puskesmas Kota Karang. There are 55 children (72.4%) in the Puskesmas Kota Karang area who are not affected by ARI.

**Table 4.6** The Relationship Between Basic Immunization History and the Incidence of *Stunting* in Toddlers Aged 25-59 Months in the Working Area of the Puskesmas Kota Karang.

Basic Immunization History	<i>Stunting</i>				Total	P value CI 95%	OR
	Yes		Not				
	n	(%)	n	(%)			
Incomplete	15	(71,4%)	6	(28,6%)	21	0,040	
Complete	23	(41,8%)	32	(58,2%)	55	1,172-10.323	3,478

Based on the results of the bivariate analysis presented in Table 4.6, it is seen that 71.4% of mothers with incomplete basic immunization suffer from stunting. At the same time, 41.8% of infants had completed basic vaccinations and were stunted. The results of the Chi-Square statistical test of this study showed a p-value of 0.040 (<0.05), which means there is a relationship between basic vaccination history and fading in toddlers aged 25-59 months Working at the Karang City Health Center. Areas with a coefficient of 3.478 mean infants with incomplete basic vaccination have a 3.4 times greater risk of stunting than infants with complete basic vaccination.

**Table 4.7** The Relationship Between History of Diarrheal Disease and the Incidence of *Stunting* in Toddlers Aged 25-59 Months in the Working Area of the Puskesmas Kota Karang.

History of Diarrheal Disease	<i>Stunting</i>				Total	P value CI 95%	OR
	Yes		Not				
	n	(%)	n	(%)			
There is a history	15	(75%)	5	(25%)	20	0,019	
No history	23	(41,1%)	33	(58,9%)	56	1,372-13,507	4,304

Based on the results of the bivariate analysis in Table 4.7 shows that 75% of women with a history of diarrhoea experience constipation. Meanwhile, 41.1% without a history of diarrhoea were stunted. The results of the Chi-Square statistical test of this study showed a p-value of 0.019 which means there is a relationship between previous diarrhoea and stunting in toddlers aged 25-59 months Puskesmas Kota Karang Bandar Lampung with an OR of 4.304, meaning that babies with diarrhoea are 4.3 times more likely to experience colic than babies without a history of diarrhoea.

**Table 4.8** The Relationship Between History of ARI Disease and the Incidence of *Stunting* in Toddlers Aged 25-59 Months in the Working Area of the Puskesmas Kota Karang.

History of ARI	<i>Stunting</i>				Total	P value CI 95%	OR
	Yes		Not				
	n	(%)	n	(%)			
There is a history	15	(71,4%)	6	(28,6%)	21	0,040	3,478
No history	23	(41,8%)	32	(58,2%)	55	1,172-10,323	

Based on the results of the bivariate analysis in Table 4.8 shows that 71.4% of toddlers with a history of ARI disease have suffered *from stunting*, while toddlers who do not have a history of ARI disease by 41.8%. Chi Square's statistical test results result in a p-value of 0.040 ( $p < 0.05$ ) which means there is a relationship between the history of ARI disease and the incidence of *stunting* in toddlers aged 25-59 months in the working area of the Puskesmas Kota Karang Bandar Lampung with n OR (*odds ratio*) of 3.478 which means that toddlers who have a history of ARI disease are 3.4 times more likely to suffer *from stunting* compared to toddlers who do not have a history of ARI.

#### IV. DISCUSSION

One of the problems in Indonesia is stunting in early childhood. Despite decreasing every year, there are still many regions in Indonesia whose stunting is higher than the national average (Riskesmas, 2018) Vaccination is an effort to increase the immunity of young children and prevent children from contracting diseases that can be prevented by immunization (Kasim et al., 2019) Diarrhea is the first most common disease in young children, while ARI ranks second after diarrhoea (Riskesmas, 2018). In the working area of the Karang Health Center, based on the history of basic immunisation obtained through the MCH / KMS book, it was found that 27.6% of them had an incomplete basic vaccination history and 72.4% had a basic vaccination history. A complete history of basic vaccinations. This study is by data from the 2021 Lampung Provincial Health Profile which shows that up to 12.7% of the population of Lampung Province has received incomplete basic vaccination, while up to 87.3% of the population has received complete basic immunization. Data shows that the prevalence of infants with incomplete basic immunization in the working area of the Puskesmas Kota Karang is higher than that of the Lampung Provincial Health Office. The completeness of immunization for children is influenced by several factors such as the level of education of parents, the level of knowledge of parents and their professional level of parents (Tanjung et al., 2018). In addition, the Covid-19 pandemic factor also affects the completeness of early childhood immunization (Tanjung et al., 2018) immunization coverage in Lampung Province from 93% in 2020 to 87.3% in 2021. Immunization can produce antibodies or immunity that effectively prevent the spread of certain diseases. The main goal of childhood immunity is to reduce child morbidity and mortality due to vaccine-preventable diseases. Immunization status in children is an indicator of exposure to health services (Syam et al., 2019). Based on information obtained from diarrheal disease questionnaires distributed in the working area of the Karang City Health Center, 26.3% of them experienced diarrhoea. At the same time, 73.7% had never had diarrhoea before. This research is by data published by the 2021 Lampung Provincial Health Profile which states that 16.8% of children in Lampung Province suffer from diarrhoea. However, 83.2% (Syam et al., 2019) (Kusumawardhani et al., 2017). Diarrhoea can affect growth and development and cause infant death. Diarrhoea is the second leading cause of death in children after pneumonia. If toddler diarrhoea is not handled properly and quickly, then the risk of death is high (Sari & Sartika, 2021). Based on information obtained from the ISPA history questionnaire distributed in the working area of the Puskesmas Kota Karang, it was revealed that 72.4,6% of children aged 25-59 months suffered from ARVI, 72 of them. ISPA lost .4%. This study is on data from the 2021 Health Profile of Lampung Province which shows 32.2% of women suffer from ARI. However, 67.8% of them were not affected by ARI. Data shows that in the working area of the Puskesmas Kota Karang, the percentage of babies with ARI is higher than babies without ARI. Several factors can predispose a child to ARI such as completeness of basic immunization, exclusive breastfeeding, nutritional status and living environment (Kusumawardhani et al., 2017) ARI disease is divided into non-pneumonic and pneumonia. ARI is the second most common disease in young children, therefore young children come to health services for treatment. This is because innate immunity or adaptive immunity of young children is still developing so a person's chances of getting ARI increase (Wulandhani & Purnamasari, 2019) (Wiwin et al., 2020) 3.4-fold increased risk of delay compared to infants with a complete history of basic immunization. The theory presented by Izah, Zulfiana, and Rahmanindar in 2020 states that in essence, the purpose of immunization in children is to reduce the risk (Wulandhani & Purnamasari, 2019) (Izah et al., 2020). Babies need basic immunizations (Izah et al., 2020) because of their very important role in the immune system. Children with a history of incomplete basic immunity lack immunity to disease and quickly deplete their body's energy due to infectious diseases (Sutriyawan

et al., 2020). Repeated infections in children can affect the growth and development of children so that children are vulnerable to diseases that affect children's nutritional status, if it lasts a long time it can increase the risk of stunting (Permatasari & Sumarmi, 2018). In addition, children's immunization status is also an indicator of the success of health services, because it is expected that health services can improve nutritional problems, whereas immunization status (Sutriyawan et al., 2020) (Endris et al., 2017). (Permatasari & Sumarmi, 2018) (Darmawan et al., 2022). This research is also in line with Wanda et al. A study in Hegarmanah Village, West Java (2021) found that infants with incomplete basic (Endris et al., 2017) status (Darmawan et al., 2022) (Rustina et al., 2021; Wanda et al., 2021). The results of this study show that there is a relationship between basic immunization history (Rustina et al., 2021; Wanda et al., 2021) immunization of hepatitis Bo at birth and DPT 2 immunization at the age of 3 months, this is caused by several factors, such as parents who forget to immunize.

ARI disease is divided into non-pneumonic and pneumonia. ARI is the second most common disease in children, therefore young children come to health services for treatment. This is because innate immunity or adaptive immunity of young children is still developing so a person's chances of getting ARI increase (Gusla Nengsih & Melati Hutauruk, 2022). The results of the bivariate analysis of this study showed that there was a relationship between basic immunization history and stunting prevalence in toddlers aged 25-59 months in the working area of the Puskesmas Kota Karang Bandar Lampung with a p-value of 0.040. and OR = 3.478. This means that infants with an incomplete history of basic immunization have a 3.4-fold increased risk of delay compared to infants with a complete history of basic immunization. A theory presented by Izah, Zulfiana, and Rahmanindar in 2020 states that in essence, the purpose of immunization in children is to reduce child morbidity and mortality due to diseases that can be prevented by immunization and prevent infection in children by preventing the spread of infectious diseases. infectious diseases prevent the risk of stunting (Izah et al., 2020). (Izah et al., 2020) Babies need basic immunizations because of their very important role in the immune system. Children with an incomplete history of basic immunization lack immunity to disease and quickly deplete their body's energy due to infectious diseases (Sutriyawan et al., 2020) Repeated infections in children can affect the growth and development of children so that children are vulnerable to diseases that affect children's nutritional status, if it lasts a long time it can increase the risk of stunting (Permatasari & Sumarmi, 2018) In addition, children's immunization status is also an indicator of the success of health services, because it is expected that health services can improve nutritional problems, where immunization status positively affect the nutritional status of early childhood (Endris et al., 2017) The results of this study are in accordance with research conducted in Central Buton Regency in 2022 which showed that infants with incomplete immunization status have a 4.3-fold risk of stunting (p-value = 0.005; OR = 4.3) (Darmawan et al., 2022) This research is also in line with Wanda et al. A study in Hegarmanah Village, West Java (2021) found that infants with incomplete basic immunization status had a 4.9-fold increased risk (p-value = 0.000; OR) = 4.958 (Wanda et al., 2021) The results of this study show that there is a relationship between basic immunization history and attrition in toddlers aged 25-59 months in the working area of the Puskesmas Kota Karang Bandar Lampung. Based on information obtained by researchers, most babies in the working area of the Puskesmas Kota Karang do not get hepatitis B0 immunization at birth and DPT 2 immunization when the child is 3 months old, this is due to several factors. With more and more parents forgetting to immunize their children and vaccine supplies running low, education and health promotion one way that the government must actively and effectively. This is done in the hope that it can increase knowledge and change people's behaviour to know and understand the importance of basic immunization in the prevention of infectious diseases. In addition to counselling and health promotion, the government must ensure that children under five receive complete and timely basic immunizations, especially for newborns. Children who have received complete basic immunizations should also be vigilant and take community steps to avoid behaviours or activities that are at risk for infectious diseases that may increase the risk of delay.

The results of the analysis showed that there was a significant relationship between previous diarrhoea and colic (p-value = 0.019; OR = 4.304) in infants aged 25-59 months in the working area of the Puskesmas Kota Karang Bandar Lampung which means. that toddlers with a history of diarrhoea are 4.3 times less likely to suffer from colic than toddlers who have never had diarrhoea before. This study is by the theory that one of the causes of diarrhoea is food malabsorption, which is a failure of the absorption process that results in increased osmotic pressure in the intestine, causing water and electrolytes to move to the intestine. cavities that cause diarrhoea. In addition, infectious factors are also one of the factors causing diarrhoea, which can come from the presence of microorganisms that attack the gastrointestinal tract and damage intestinal mucosal cells so that they can shrink the intestinal surface and damage it. absorption from fluids and electrolytes. These problems can affect the nutritional status of toddlers and cause stunting (Maidarti & Anggraeni, 2017). The results of this study are from research conducted in the working area of the Simowang Surabaya Health Center which showed a relationship between previous diarrhoea and stunting (p-value = 0.025 and OR = 3.619). That is, babies with diarrhoea are 3.6 times more likely to experience colic than infants without a history of diarrhoea (Desyanti & Nindya, 2017). Later, research conducted in 2021 in the working area of the Way Urang Health Center, South Lampung Regency

found infants with a history of diarrhoea 4.2 times ( $p$ -value = 0.004; OR = 4.259) with a higher risk. more likely to suffer from colic than infants who do not have diarrhoea (Sutarto et al., 2021) There is a close relationship between infection and malnutrition. Infection is a cause of malnutrition due to decreased food intake, impaired absorption of nutrients in the small intestine and increased catabolism of nutrients needed for tissue repair. Malnutrition can also be a causative factor of infection, as the intestinal mucosal defences weaken and this leads to alterations in immune function that increase the risk of intestinal infections (Brown, 2003). The results of this study showed that there was a significant relationship between previous diarrhoea and stunting in toddlers aged 25-59 months in the working area of the Puskesmas Kota Karang Bandar Lampung. Based on information collected by researchers, most toddlers experience diarrhoea due to careless snacking habits and poor environmental hygiene. Diarrhoea in young children can cause the body to absorb nutrients that enter the digestive tract, causing malnutrition in young children and if it lasts long enough can cause stunting (Wolayan et al., 2020) Diarrhea is accompanied by symptoms of nausea and vomiting that lead to loss of appetite, which can lead to malnutrition and stunting. In addition, diarrhoea is also associated with excessive fluid intake so it can cause mild to severe dehydration (Maidarti & Anggraeni, 2017). Therefore, the cause of diarrhoea, especially in young children, must be detected early and measures to meet nutritional and fluid needs must be taken immediately to prevent constipation. Diarrhoea is closely related to the nutritional status of children under the age of 5 years. The role of the government, parents and the community is needed to reduce the incidence of diarrhoea in toddlers. Health promotion related to diarrhoea and early management of diarrhoea must be carried out by the government in a massive and structured manner so that the prevalence of diarrhoea-related diseases, especially in young children, does not increase. In addition to government programs, environmental sanitation, especially around the house, is also important to prevent diarrheal diseases. Parents must also maintain nutritional intake, growth and development of young children to ensure a good immune system and prevent diarrhoea that can cause stunting in children. The results of the bivariate analysis showed that there was a relationship between a history of ARI and stunting in infants aged 25-59 months in the working area of the Puskesmas Kota Karang Bandar Lampung. Infants with a history of ARI were 3.4 times more likely to have colic than infants without a history of ARI ( $p$ -value = 0.40; OR = 3.478). Children with ARI develop an inflammatory response that produces the cytokine interleukin-6 (IL-6) and C-reactive protein (CRP), which play a role in suppressing appetite through the hypothalamus central nervous system, causing decreased appetite in the child (Paulsen et al., 2017) In addition, inflammation leads to metabolic disorders in the child's body. The regulatory system of proinflammatory cytokines can directly affect chondrocytes. This affects the process of bone formation in such a way that it can inhibit the child's growth and development process (Sinharoy, 2020) During the inflammatory process, the body secretes hsRC (High-sensitivity C-reactive Protein) protein, which affects growth hormone (GH), which inhibits the activity of IGF-1 (Insulin Growth Factor-1), which acts as a mediator. between growth hormone and muscle and bone cell growth in humans and protection against stunting in children ((DeBoer et al., 2017; Syed, 2018). The results of this study are from a 2020 study in Sampang Regency, East Java Province, which showed that infants with ARI have 3.1 times the risk of stunting compared to infants without ARI ( $p$ -value = 0.029). OR = 3.115) (Himawati & Fitriana, 2020). In addition, a 2022 study in not malnutrition, can worsen the condition of young children when exposed to ARI. Puskesmas Marawola in Sigi Regency showed that infants with a history of ARI had a 5.4-fold increased risk of stunting ( $p$ -value = 0.023; OR = 5.484) (Sinharoy, 2020). This is because ARI triggers an inflammatory response and causes various symptoms that lead to decreased appetite and nutritional deficiencies in young children. Malnourished infants have weakened immune systems, which worsens the condition of ARI (Giroth et al., 2022) The results of this study showed a relationship between the history of ARI and the decline in toddlers aged 25-59 months in the working area of the Puskesmas Kota Karang Bandar Lampung. ARI is a disease that often occurs in young children. Based on information obtained by researchers, most young children are exposed to ARI due to infection in the homes of family members. Therefore, parents' awareness of a healthy lifestyle and the weak immune system of young children is the cause of frequent ARI in young children. In addition to a healthy lifestyle, parents must also maintain immunization and proper nutrition, and monitor young children so that

## V. Conclusion

The frequency of immunization is incomplete. diarrhoea and ARI in infants aged 25-59 months in the working area of the Puskesmas Kota Kota Karang each amounted to 27. 6%, 26. 3%, 27. 6%. There is a significant relationship between the history of basic immunization and the prevalence of stunting in toddlers in the working area of the Puskesmas Kota Karang Bandar Lampung with a  $p$ -value of 0. 040. Infants with incomplete immunization have a chance of 3.478 times more likely to be stunted (OR = 3. 478; 95% CI = 1. 172-10. 323). In the workplace of Puskesmas Kota Karang Bandar Lampung, there is a significant relationship between a history of diarrhoea and the incidence of stunting with a  $p$ -value of 0. 019. Infants with a history of diarrhoea are 4.304 times more at risk of stunting (OR = 4. 304; 95% CI = 1. 372-13. 507). and there is a significant relationship

between IPSA disease and the incidence of stunting with a p-value of 0.040. Children with a history of ARI have an increased risk of stunting 3.478-fold (OR= 3.478; 95% CI= 1.172-10.323).

Suggestions for the government in the health sector, especially in the city of Bandar Lampung, proposed to evaluate the implementation of immunization programs and counselling on infectious diseases that can attack early childhood to reduce the risk of stunting children. In addition, the community can actively participate and utilize facilities provided by the government to prevent stunting.

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