

CHAPTER II

LITERATURE REVIEW

A. Toddler Concept

1. Definition of Toddler

Toddler is a term that comes from the shortening of the word under five years old. According to the Ministry of Health of the Republic of Indonesia, the period of toddlers is the period after birth until before the age of 59 months, consisting of newborns aged 0-28 days, infants aged 0-11 months, and toddlers aged 12-59 months. (Kemenkes RI, 2024)

The Toddler Period is often referred to as the golden age or *golden age*. Because in this period there was the formation of basic abilities such as sensory skills, thinking, speaking, deep intellectual development, and early moral development. During this time, children also need stimulation or stimulation for all aspects of development in the form of motor, vision, thinking skills, language skills, social development, and emotional intelligence (Nafiyah & Eliyana, 2023).

2. Growing and Developing Toddlers

The toddler period is a phase of life characterized by rapid and continuous changes, including two fundamental processes that run simultaneously and affect each other: growth (*Growth*) and development (*development*) (Amaniyah et al., 2024).

a. Growth and Development Stages of Toddlerhood

The toddler period is often divided into two main categories that have different characteristics of psychosocial and cognitive development:

1) Toddler Period (Toddlers, 1-3 years old)

This stage is a period of physical exploration, during which the child begins to develop independence, especially in gross motor skills such as walking and running. Psychosocial development is characterized by a conflict between *independence* and sense shame and doubt (*shame and doubt*), in which the child begins to assert his own

will and learns to control bodily functions (for example, *toilet training*) (Prasma et al., 2021).

2) Pre-school period (ages 3-5 years)

This phase reflects the peak of the golden age in which rapid cognitive and language development occurs. The child begins to enter the initiative stage (*initiative*) against guilt (*Guilt*), characterized by a strong desire to plan activities and interact in a complex way with the environment and peers. In terms of cognition, the child is in the pre-operational stage, where intuitive logic begins to take shape and imagination is very dominant (Nurhayati et al., 2020).

b. Aspects of Toddler Growth and Development

The developmental process in toddlers involves at least four main aspects that are interrelated and inseparable according to (Amaniyah et al., 2024) namely:

1) Physical and Motor Growth :

Physical growth includes increasing body size such as weight, height, and head circumference. In the pre-school period (3–5 years), weight gain tends to slow down to an average of 2 kg per year. The motor aspects are divided into 2 according to (Amir et al., 2025), namely:

a) Motor Skills Kasar (*Gross Motor*)

Engages large muscles for body movement and coordination such as running, jumping, and balancing. Optimal gross motor development indicates the child's physical readiness to interact with the environment.

b) Motor Skills (*Fine Motor*)

Involves small muscles and hand-eye coordination, such as drawing, swinging, and using a spoon. These skills are important as a prerequisite for a child's readiness to learn.

2) Language and Cognitive Development

Cognitive development is the ability to think, solve problems, and process information. At the age of 2.5 to 5 years, children's language skills undergo an acceleration, where they begin to produce longer speech and resemble the grammatical structure of adults. Healthy cognitive abilities ensure that children can understand instructions and adapt to the environment, including receiving health education (Sanctuary, 2024).

3) Socio-Emotional Development

This aspect includes the child's ability to interact and establish relationships with others (social) as well as the ability to recognize, manage, and express his feelings (emotional). Healthy socioemotional development is characterized by the ability to share, alternate, and the emergence of empathy, which is strongly influenced by the nurturing environment (Anggraini et al., 2023).

3. Factors Affecting the Health of Toddlers

Toddler health is the result of a complex interaction between factors inherent in the child (internal) and the conditions of the surrounding environment (external). This interaction greatly determines the growth and development status and level of vulnerability of toddlers to diseases, including ARI.

a. Internal Factors (Genetic and Biological)

Internal factors refer to those that cannot be manipulated and are innate, which includes genetics and biological conditions at birth. Gender is one of the biological factors that is often studied, where several epidemiological studies show that male toddlers may have a slightly higher prevalence of ARI incidence than female toddlers (Azis et al., 2023). However, the more dominant factor is health and nutritional conditions at birth, such as a history of Low Birth Weight (BBLR) or the presence of congenital abnormalities of the respiratory system, which genetically or

developmentally increase the risk of complications when exposed to the disease (Sakiguna et al., 2025).

b. External Factors (Environment, Nutrition, and Parenting)

External factors are the environment that can be modified and controlled, and have the most direct impact on the health of toddlers.

1) Physical Environment

Air quality, especially indoors, is a major determinant of respiratory health for toddlers, confirming that indoor air pollution (such as cigarette smoke, smoke from combustion, or the use of biomass fuels) is the greatest risk. Cigarette smoke containing fine particles and chemical irritants can damage the mucocilia system of toddlers, cause chronic inflammation, and worsen symptoms of ARI. In addition, poor sanitation, housing density, and inadequate ventilation of homes also create an environment conducive to pathogen transmission (Krisnasari et al., 2022).

2) Social Environment (Knowledge, Education, Attitudes and Actions)

Parents who have a good knowledge of how ARI can arise, such as an understanding of home ventilation, environmental cleanliness, the dangers of cigarette smoke, and indicators of early symptoms of infection are better able to identify warning signs and implement preventive measures as early as possible, so that the risk of toddlers contracting or getting seriously ill can be reduced (Rohmani et al., 2025).

The level of formal education of parents also plays a role. Higher education usually improves health literacy, which is the ability to understand health information, translate it into appropriate preventive measures, and access health services if needed (Putri et al., 2022).

However, knowledge and education will not yield results if they are not followed by real attitudes and actions in daily life. Parents need to consistently implement clean and healthy living practices such as maintaining home ventilation, avoiding smoking habits indoors,

maintaining children's hygiene, and immediately seeking health services when symptoms appear (Hao et al., 2025).

3) Health Parenting (Breastfeeding Status and Immunization Status)

Exclusive breastfeeding for the first six months and continued until the age of two provides very strong immunological protection for toddlers. Breast milk contains components such as Immunoglobulin A (IgA), lactadine, prebiotic oligosaccharides, and antimicrobial enzymes that function to coat the airway mucosa and inhibit the colonization of bacteria and viruses that cause infection. In addition, breast milk supports the formation of a healthy gut microbiota, which plays a role in the maturation of the innate and adaptive immune systems. Toddlers who do not receive exclusive breastfeeding generally have an immature immune system so they are more susceptible to experiencing ARI and tend to experience more severe symptoms (Vassilopoulou et al., 2024).

In addition to breastfeeding, complete immunization status is a primary preventive measure that is very effective in reducing the incidence of ARI. Vaccines help the child's body form specific immunity to the main pathogens that cause respiratory infections such as *Streptococcus pneumoniae*, *Haemophilus influenzae type b*, *pertusis virus*, *influenza*, and measles. With the immunological memory of the vaccine, the toddler's body can respond quickly and strongly when exposed to pathogens, so that the risk of severe infections and complications can be minimized (Lea et al., 2022).

B. Concept of Acute Respiratory Tract Infection

1. Definition

Acute Respiratory Tract Infection (ARI) is an infectious condition that attacks one or several segments of the respiratory tract from the upper airways such as the nose, sinuses, pharynx, larynx to the lower airways such as the trachea, bronchi, bronchi, alveoli and lungs that occur suddenly and can vary in severity, ranging from mild symptoms such as colds and coughs to severe conditions such as pneumonia that threaten health in toddlers. ARI

is caused by various infectious agents, especially viruses and bacteria, when the infection reaches the lungs is called pneumonia, which is one of the leading causes of morbidity and mortality in children under five years of age globally (Hothan et al., 2022; Juanita et al., 2022).

2. Etiology

The causes of ARI include a variety of factors derived from pathogens, the environment, and host conditions (*host*). Biologically, ARI is most often caused by respiratory viruses such as *Respiratory Syncytial Virus* (RSV), *influenza*, *parainfluenza*, *rhinovirus*, *adenovirus*, and *coronavirus* which is capable of infecting the airway mucosa quickly. In addition to viruses, bacteria also play an important role, especially *Streptococcus pneumoniae*, *Haemophilus influenzae*, *Staphylococcus aureus*, *Bordetella pertussis*, and *Moraxella catarrhalis*, which can lead to more severe infections such as pneumonia (Correia et al., 2021).

In certain cases, fungi such as *Aspergillus* and *Candida* It can also be a cause, especially in individuals with a decreased immune system. Beyond pathogenic factors, environmental aspects have a large contribution, for example exposure to cigarette smoke, smoke from burning wood or garbage, poor ventilation of houses, and high occupancy density, all of which can damage mucociliary defenses and increase the chances of transmission of microorganisms. Host factors also determine risk, especially in children under five who have narrower airways and immature immune systems, as well as in poor nutritional conditions, anemia, lack of immunization, or a history of comorbidities. The combination of pathogen type, environmental conditions, and individual susceptibility is what then determines whether a person only experiences mild ARI or progresses to severe infections such as pneumonia (Correia et al., 2021).

3. Classification

According to Turyasiima et al., (2024) ARI can be classified based on the anatomical location of the infection, being the upper ARI (*upper respiratory tract*) and lower ARI (*lower respiratory tract*). Upper ARIs include parts such as the nose, sinuses, pharynx, larynx, and middle ear for example rhinitis, pharyngitis, laryngitis, and otitis media while lower ARIs involve the trachea, bronchi, bronchioles, and lungs such as bronchitis, bronchiolitis, and pneumonia.

In addition to anatomy, ARI is also classified according to the degree of clinical severity, i.e. ARI without pneumonia such as *cough & cold*, pneumonia with rapid breathing, and severe pneumonia with chest retraction, cyanosis, or other red flags (Pranathi et al., 2023).

4. Pathophysiology

ARI begins when pathogens, generally viruses or bacteria, enter the airways through inhaled droplets. The pathogen then binds to receptors in mucosal epithelial cells, especially in the nasopharynx, trachea, bronchi, and bronchioles. Once binding, the pathogen replicates and causes damage to the ciliated epithelial cells. Damage to the cilia causes disruption of the mucociliary cleaning mechanism that functions to expel foreign particles, so that mucus and cellular debris easily accumulate in the airways. This process triggers an innate immune response, characterized by the release of pro-inflammatory cytokines such as IL-1, IL-6, and TNF- α that cause early clinical symptoms in the form of fever, cough, rhinorrhea, and increased secretion production (Correia et al., 2021).

When inflammation continues, mucosal edema occurs that narrows the lumen of the airway. This narrowing increases the resistance of airflow and causes symptoms such as tachypnea, wheezing, and chest wall retraction, especially in children who have a smaller airway diameter. In cases of infections that reach the lower airways, especially the bronchioles, obstruction can occur due to the buildup of secretions and inflammatory cells that aggravate the obstruction of airflow. When the pathogen reaches the

alveoli, the inflammatory process leads to fluid exudation, neutrophil migration, and consolidation of lung tissue. This condition interferes with oxygen diffusion resulting in hypoxemia, which is characterized by rapid breathing, cyanosis, and increased breathing effort. Impaired oxygenation in pneumonia explains the increased risk of severe clinical and complications, especially in toddlers with immature immunity (Lowe, 2022).

In addition to the direct infection process, the degree of pathophysiological severity of ARI is also influenced by host status. Factors such as malnutrition, anemia, lack of immunization, and exposure to secondhand smoke can exacerbate the inflammatory response and weaken mucociliary defenses. Children with the condition tend to progress more quickly from mild ARI to severe pneumonia due to limited respiratory compensation capacity (Wisudariani et al., 2022). Research by Oktaviani et al., (2022) suggests that household exposure to cigarette smoke and low nutritional status are significantly associated with increased airway epithelium damage and the risk of severe infections.

5. Clinical Manifestations

ARI disease in toddlers can cause various signs and symptoms ranging from mild to severe. Common symptoms include cough, runny nose, fever, difficulty breathing, sore throat, and excess secretion production. Upper airway involvement usually causes mild symptoms, while infections that reach the lower airways can cause moderate to severe symptoms. Toddlers have narrower airways and a stronger inflammatory response, so the worsening of symptoms can occur faster than older adults (Fenta et al., 2024; Klu et al., 2025). The signs and symptoms of ARI based on severity are divided into 3, namely:

a. Lightweight ARI

A person can be categorized as having mild ARI if there are one or more of the following symptoms:

- 1) Cough
- 2) Hoarseness

3) Cold

4) Fever, body temperature more than 37°C

b. Medium ARI

A person can be categorized as having moderate ARI if there are one or more of the following symptoms:

1) Fever $\geq 39^{\circ}\text{C}$

2) Shortness of breath

3) Breathing sounds like *snoring* or *light wheezing*

c. Heavy ARI

A person can be categorized as having severe ARI if there are one or more of the following symptoms:

1) Blue lips or fingertips (*cyanosis*)

2) Decreased consciousness

3) Shortness of breath and seems restless

4) Pulse is very fast or difficult to feel

5) Decreased appetite

6. Risk factor

The risk factors for ARI in toddlers are influenced by the individual condition of the child, the living environment, and family behavior. Toddlers with low immunity, poor nutritional status, or a history of low birth weight (BBLR) are more susceptible to infection. Unhealthy home environments such as exposure to cigarette smoke, poor ventilation, and housing density also increase the incidence of ARI. In addition, incomplete immunization and the lack of exclusive breastfeeding have also been proven to increase the vulnerability of toddlers to ARI (Fadila & Siyam, 2022; Zolanda et al., 2021).

a. Host Factor

1) Poor nutritional status, which lowers the immunity of toddlers so that they are more easily infected.

2) Low Birth Weight (BBLR), because lung structure and immunity have not been developed optimally.

- 3) Immunizations are incomplete, especially immunizations that protect against respiratory infections.
- 4) Not getting exclusive breast milk, which reduces the baby's natural immunological protection.

b. Environmental and Family Behavioral Factors

- 1) Exposure to secondhand smoke indoors, which irritates the airways and increases the risk of ARI.
- 2) Housing density, thus facilitating the transmission of infection.
- 3) Poor ventilation, high humidity, and inadequate lighting, which create an ideal environment for respiratory pathogens.
- 4) Poor household water quality, which has been associated with an increased incidence of ARI symptoms in toddlers.

7. Governance

According to D. Dewi, (2023), the management of ARI in toddlers requires a comprehensive approach that involves prevention, early detection, and treatment at the community level through health centers.

a. Prevention Strategies at the Family and Puskesmas Level

1) Family education

Educate parents, especially mothers, on clean and healthy living behaviors (PHBS), how to maintain home ventilation, avoid exposure to cigarette smoke, and the importance of complete immunization.

2) PHBS Program at Puskesmas

Puskesmas can develop prevention programs through a community approach, such as routine counseling at posyandu, PHBS campaigns, and collaboration with health cadres to socialize ARI risk factors.

3) Increased maternal knowledge

The use of ARI prevention-based education modules to improve mothers' understanding of early symptoms, prevention methods, and when to take children to health centers.

b. Early Detection

1) Training of Puskesmas Cadres and Officers

Train health cadres and health center officers to recognize early signs of ARI, such as rapid breathing, coughing, and chest retraction, and encourage screening of toddlers immediately when symptoms appear.

2) Symptom Screening at Posyandu

Conduct routine examinations at posyandu to evaluate the respiratory symptoms of toddlers, including breathing frequency measurements and observation of warning signs, so that mild cases of ARI can be identified early

3) Quick Referral System

Providing a referral mechanism from posyandu to health centers for toddlers with severe symptoms or danger signs, so that they get further treatment as soon as possible.

c. Treatment and Case Management

1) Treatment at the Health Center

a) Supportive treatment: Puskesmas provides basic care such as hydration, rest, and symptom monitoring.

b) Rational antibiotics: Evaluation of antibiotic use is very important so that it is appropriate for indications and doses.

2) Nursing Intervention

Nurses at health centers or hospitals can provide nursing care such as chest physiotherapy to help clear the airways, especially in toddlers with excess secretion and rapid breathing.

3) Monitoring and Follow-up

After initial therapy, toddlers should be monitored regularly to ensure symptoms improve, no complications, and the use of antibiotics or other interventions is effective.

C. Basic Concepts of Mother's Knowledge about ARI

1. Definition of knowledge

Mother's knowledge of Acute Respiratory Tract Infection (ARI) in toddlers is the understanding or mastery of information that mothers have about the causes, risk factors, symptom signs, prevention, and early treatment of ARI in children under five years of age. This knowledge includes the mother's ability to recognize environmental conditions that are risky to the health of the child's respiratory tract, including exposure to cigarette smoke in the home, air hygiene, ventilation, and clean and healthy living behaviors that play a role in the prevention of ARI (Agustina & Sulistyarini, 2024).

Good knowledge allows mothers to understand that ARI is a disease that is greatly influenced by environmental and family behavioral factors. *World Health Organization* emphasized that the main risk factors for ARI in toddlers include exposure to cigarette smoke, housing density, poor ventilation, and low household hygiene practices (WHO, 2025). Therefore, mothers' understanding of these factors is key in prevention efforts.

2. Factors influencing knowledge

a. Education

Education is a learning process that allows individuals to acquire certain knowledge, understanding, and skills. The higher a person's level of education, the easier it will be for the individual to receive, understand, and process the information obtained. Mothers with higher levels of education tend to have a better understanding of the dangers of cigarette smoke and the importance of implementing smoke-free homes as an effort to prevent ARI in toddlers. On the other hand, mothers with lower levels of education may experience limitations in understanding the health information provided, including education through media such as *WhatsApp Reminder* (Amila et al., 2021).

b. Jobs

Work can affect a person's level of knowledge through experience, social interaction, and access to various sources of information. The work environment is often a place for the exchange of information that can broaden individual horizons, including in the field of health. Working mothers have the potential to obtain broader information about health, including related to the dangers of cigarette smoke and the prevention of ARI in toddlers. However, time constraints due to work activities can also affect the mother's attention in receiving and understanding the education provided through *WhatsApp Reminder*. In contrast, non-working mothers may have more time to access and understand information, but have limitations in the variety of information sources (Dealita Khairani Daulay, 2025).

c. Number of children (Parity)

Parity or the number of children that mothers have is one of the factors that can affect the level of knowledge of mothers. The more children you have, the more experience the mother will gain in caring, nurturing, and meeting the health needs of children. These experiences can be a source of learning that helps mothers obtain information and improve their understanding of children's health. Mothers with higher parity generally have more frequent interactions with health workers, participated in health service activities such as posyandu, and faced various children's health problems so that the knowledge they have tends to be better than mothers with fewer children (Titin Novayanti Dey et al., 2026).

d. Information / Mass Media

Information is an important factor that affects a person's level of knowledge. Information can be obtained through various media, both print, electronic, and digital media. Delivering accurate, clear, and repetitive information can improve an individual's understanding of a health topic. The use of digital media in the form of *WhatsApp Reminder* to be a relevant

means of education. Regular provision of information about the dangers of cigarette smoke and the importance of smoke-free homes can help increase maternal knowledge in preventing STIs in toddlers. Repeated exposure to information through this media allows mothers to more easily understand and remember the health messages given (N. W. E. P. Dewi et al., 2019).

e. Experience

Experience is one of the sources of knowledge obtained through events that individuals have experienced. Experiences related to health problems can increase a person's awareness and understanding of risk factors and their prevention efforts. Mothers who have experienced their children experiencing ARI tend to better understand the impact of exposure to cigarette smoke on the health of toddlers (Amila et al., 2021).

f. Age

Age is a factor that affects a person's cognitive ability to receive and process information. As one gets older, one's experience and maturity of thinking tends to increase, so it can affect the level of knowledge they have. Mothers of a more mature age generally have more experience in caring for children, so it is easier to understand health information, including related to the dangers of cigarette smoke and the prevention of ARI in toddlers (Mappewali et al., 2024).

3. Mother's knowledge of efforts to prevent STI in toddlers

Knowledge is the result of the process of human sensing of an object through the five senses, which is then processed into an understanding. Knowledge is a very important domain in shaping a person's actions, because behaviors based on knowledge will last longer than behaviors that are not based on knowledge (Notoatmodjo, 2018). In the context of health, knowledge plays an important role in determining how individuals understand a health problem and make the right decisions in efforts to prevent and treat it. A person's level of knowledge is influenced by various factors such as education, age, experience, and exposure to the information received.

In this study, the knowledge in question is mother's understanding of the dangers of cigarette smoke and the importance of implementing smoke-free homes as an effort to prevent Acute Respiratory Infections (ARI) in toddlers. This knowledge includes understanding the meaning of ARI, risk factors for the occurrence of ARI, the impact of exposure to cigarette smoke on the health of toddlers, and prevention efforts through a healthy home environment.

Mothers as the main caregivers have an important role in maintaining the health of toddlers, including in creating a home environment that is free from exposure to cigarette smoke. Good knowledge will encourage mothers to be more aware of risk factors for ARI and take preventive measures, such as prohibiting family members from smoking in the home.

In today's digital era, the delivery of health information can be done through various media, one of which is *WhatsApp Reminder*. Education provided regularly through this media can increase mothers' knowledge because information is conveyed repeatedly and easily accessed at any time. This is in line with the theory that repeated exposure to information can strengthen a person's memory and understanding of a material.

Thus, increasing maternal knowledge through *WhatsApp Reminder* education is expected to be one of the effective efforts in encouraging the implementation of smoke-free homes, so as to reduce the risk of ARI in toddlers.

D. Basic Concepts of Maternal Attitudes in the Prevention of ARI in Toddlers

1. Attitude Definition

Attitude is a person's closed response or reaction to an object, which is not necessarily directly manifested in action, but reflects the individual's readiness to act (Notoatmodjo, 2018). Attitudes are formed through the process of learning and experience, and are influenced by the knowledge, beliefs, and values that individuals have.

In the context of this study, the mother's attitude is the tendency of the mother's response to information about the dangers of cigarette smoke and the importance of implementing a smoke-free house as an effort to prevent Acute Respiratory Infection (ARI) in toddlers. This attitude reflects how mothers assess, receive, and respond to health information provided, including through WhatsApp Reminder-based education.

According to Ajzen & Fishbein, (1985) in the theory of planned behavior (*Theory of Planned Behavior*), attitude is one of the main factors that affect a person's intentions and behavior. A positive attitude towards a health measure will increase the individual's likelihood of carrying out that behavior. The attitude of mothers in this study includes several components, namely:

a. Cognitive Components

The cognitive component is related to the mother's knowledge, understanding, and belief in the dangers of cigarette smoke and its impact on the health of toddlers. The cognitive component is reflected in the extent to which mothers understand that exposure to secondhand smoke in the home can increase the risk of STI in toddlers, as well as the importance of creating a home environment that is free from cigarette smoke. The knowledge gained through *WhatsApp Reminder education* can strengthen this cognitive component.

b. Affective Components

The affective component is related to the feelings or emotions of the mother towards a certain object or situation. The affective component includes maternal feelings such as worry, concern, or discomfort to exposure to cigarette smoke that can harm the health of toddlers. These feelings can affect the mother's acceptance of educational messages and encourage the formation of a more positive attitude towards the implementation of smoke-free houses.

c. **Conative Component (Behavior/Tendency to Act)**

The conative component is the individual's tendency or readiness to act according to his knowledge and feelings. The conative component is shown through the readiness of mothers to take action, such as prohibiting family members from smoking indoors, reminding smokers to smoke outside the home, and supporting the implementation of smoke-free homes as an effort to prevent ARI in toddlers.

A positive attitude towards smoke-free homes is expected to encourage mothers to play an active role in protecting toddlers from exposure to cigarette smoke. This is in line with health behavior theory which states that attitude is one of the important determinants in the formation of health behavior (Glanz et al., 2015).

E. Basic Concepts of Maternal Action in the Prevention of ARI in Toddlers

1. **Action Definition**

Actions are a tangible form of behavior that individuals do in response to a stimulus or stimulus. Action is an advanced stage of the knowledge and attitude that a person already has, where the individual not only knows and agrees with something, but also implements it in daily life (Notoatmodjo, 2018).

In the context of health, actions reflect the individual's ability to apply knowledge and attitudes into real behaviors to maintain and improve the degree of health. Good actions are generally based on adequate knowledge and a positive attitude, so that the behavior carried out tends to be more consistent and sustainable.

Mothers' actions in preventing ARI in toddlers are a real effort made by mothers to protect children from disease risk factors, especially exposure to cigarette smoke in the home environment. This action reflects the ability of mothers to implement healthy living behaviors to create a safe environment for toddlers.

2. Forms of Maternal Action in the Prevention of ARI in Toddlers

According to Notoatmodjo, (2018), actions in health behavior can be classified into several levels, namely:

a. Perception

Perception is the initial stage where individuals begin to recognize and understand information, then adjust actions based on that understanding. At this stage, mothers begin to realize that exposure to cigarette smoke in the home can harm the health of toddlers and increase the risk of ARI. This awareness is the basis for determining the next action.

b. Guided *Response*

A guided response is an action that is carried out with example, direction, or guidance from other parties. At this stage, the mother begins to follow the recommendations or education given, such as reminding family members not to smoke in the house or starting to limit smoking areas. This action is usually still influenced by directions from health workers or educational media.

c. Mechanism

Mechanism is a stage in which actions have become habitual and are carried out automatically without having to be consciously thought. At this stage, mothers have become accustomed to implementing smoke-free home behaviors, such as consistently prohibiting smoking in the house and maintaining air quality in the residential environment.

d. Adaptasi (*Adaptation*)

Adaptation is the highest level of action, where individuals are able to modify or develop behavior according to the conditions they are facing. At this stage, mothers not only implement smoke-free house behaviors, but are also able to adjust strategies, such as providing a special smoking area outside the house, providing education to other family members, and inviting the surrounding environment to implement similar behaviors.

3. Factors Influencing Action

A person's actions are inseparable from various factors that affect him. According to Lawrence Green, (1980) in the PRECEDE-PROCEED model, the action is influenced by:

- a. Predisposing factors: knowledge and attitudes
- b. Supporting factors: availability of facilities and access to information
- c. Driving factors: family and health worker support

These three factors interact with each other in shaping a person's actions in maintaining health.

4. The Relationship between Action and the Prevention of ARI in Toddlers

The mother's actions have a very important role in preventing the occurrence of ARI in toddlers. The implementation of measures such as maintaining environmental cleanliness, ensuring good home ventilation, and creating smoke-free homes can reduce exposure to respiratory disease risk factors.

Exposure to cigarette smoke is one of the main risk factors for ARI in toddlers. Therefore, mothers' actions in limiting or eliminating exposure to cigarette smoke in the home are important steps in prevention efforts. Actions taken consistently will provide optimal protection for the health of toddlers and support the creation of a healthy home environment.

F. Concept of Smoke-Free House

1. Definition of a Smoke-Free Home

Smoke-free houses (RBAR) are the application of the concept of Smoke-Free Zones (KTR) at the household level, where smoking activities are prohibited in the house to protect residents (especially children and passive smokers) from exposure to cigarette smoke. The basic principles of a smoke-free home include a ban on smoking in enclosed spaces, avoidance of places at risk of exposure, and a family's commitment to keeping the air in the home clean of tobacco smoke. According to a community empowerment study in Indonesia, efforts to establish a "smoke-free healthy house" through the declaration of smoke-free houses and the installation of stickers at home

can increase the awareness of family members to not smoke in the house (Rohmah et al., 2023).

Within the framework of the national tobacco control policy, smoke-free houses are considered an extension of the policy of public smoke-free areas, because private areas (houses) are also an important place for exposure to cigarette smoke from active smokers to passive smokers in the family. The implementation of smoke-free homes has become a social and public health norm, with the premise that smoke-free home spaces can help reduce health risks due to smoke exposure, encourage smoking cessation behavior, and build an image that not smoking is a more responsible and healthy behavior (Asyary & Veruswati, 2023).

2. Purpose and Benefits of a Smoke-Free Home

The main purpose of the implementation of RBAR is to protect family members, especially toddlers, from exposure to cigarette smoke that has been proven to be harmful to the respiratory system. These goals include efforts to create a healthy home environment, break the chain of exposure to tobacco smoke, and support clean and healthy living behaviors (PHBS) at the family level. In addition, the RBAR policy is intended to change social norms in the family, so that smoking is no longer considered an acceptable behavior in the home. The implementation of RBAR also aims in the long term to reduce the incidence of diseases caused by cigarette smoke, including ARI, asthma, pneumonia, and other respiratory infections in toddlers (Widiastuti et al., 2024).

The benefits of RBAR are not only felt clinically, but also socially and economically. Health, RBAR can reduce the risk of exposure to direct cigarette smoke (*second hand smoke*) or cigarette smoke residue that sticks to the surface (*third hand smoke*), which can cause respiratory distress in toddlers. Socially, the implementation of RBAR helps to create a safer and more educational family environment, as well as increase awareness of the importance of healthy behaviors. Meanwhile, from an economic aspect, reducing cigarette consumption at home can reduce family spending and

reduce health costs due to smoking-related diseases. In addition, RBAR can encourage changes in smoking behavior within the family to reduce the frequency of smoking or gradually quit smoking (Rohmah et al., 2023).

3. Components and Strategies for the Implementation of a Smoke-Free Home

The components and strategies for implementing RBAR according to (Ifalahma et al., 2024; Rohmah et al., 2023) namely:

a. Family Education

Education is the main component in the formation of RBAR. Families need to be given an understanding of the dangers of *second-hand smoke* and *third-hand smoke* for toddlers, the importance of maintaining home air quality, and the long-term health impacts of exposure to second-hand smoke. This education can be carried out through counseling at health centers, posyandu, or community empowerment programs. This shows that proper education is able to increase awareness and commitment of families to implement RBAR policies consistently.

b. Installation of No Smoking Signs

The installation of stickers or signs of "Smoke-Free Houses" at entrances, living rooms, or other strategic areas is an important part of the RBAR implementation strategy. This visual sign serves to remind family members and guests not to smoke in the house. In addition, the existence of prohibition signs can strengthen family norms regarding commitment to the health of toddlers and the home environment. The program of installing cigarette ban signs has been proven to help increase compliance with RBAR policies in community interventions.

c. Monitoring of Smoking Behavior

Supervision is needed so that families can consistently enforce the rules of not smoking at home. This includes restricting smoking areas outside the home, encouraging smokers to stay away from doors and windows when smoking, and avoiding storing ashtrays or cigarettes indoors. This supervision aims to reduce exposure to cigarette smoke in closed spaces and improve the control of smoking behavior in families.

d. Social Support from the Community

Social support from neighbors, health cadres, and the community environment plays a major role in the successful implementation of RBAR. This support can be in the form of a joint commitment to create a smoke-free environment, the formation of health care groups, or campaign activities at the RT/RW level. Social environments that support smoke-free policies have been shown to strengthen family health behaviors and increase the effectiveness of RBAR implementation

4. Obstacles in the Implementation of Smoke-Free Houses

The obstacles in the implementation of RBAR based on opinions (Arsania & Gurning, 2024; Attica, 2020; Puspitasari & Arifa, 2023) namely:

e. Low Family Knowledge and Awareness

Many families still do not understand the dangers of exposure to *second-hand smoke* (SHS) and *third-hand smoke* (THS). As a result, many households have not set smoke-free rules even though they have children under five.

f. Culture of Smoking in the House

In many areas, smoking indoors is still considered normal or part of a social habit, so family members are reluctant to reprimand smokers, especially parents or guests. This cultural norm is the main barrier why the RBAR rules are difficult to fully implement.

g. Weak Socialization and Supervision

Non-smoking area (KTR) programs, including RBARs, often have uneven socialization and are not accompanied by a monitoring mechanism. Weak enforcement of rules makes people not feel the need to carry out their smoke-free commitments at home.

h. Communication Barriers in the Family

Some families, especially mothers or children, find it difficult to reprimand family members who smoke in the house because of hierarchy or hesitation. This causes the rules not to be implemented even though the family has received education.

i. High Exposure to Cigarette Smoke in Households

According to Indonesian Demographic and Health Survey (IDHS) data, as many as 78.4% of households in Indonesia experience indoor cigarette smoke pollution, showing that indoor cigarette smoke pollution is still high, reflecting that many households are not yet smoke-free despite health policies and campaigns, showing that RBAR commitments have not been widely implemented.

G. Exposure to Cigarette Smoke in the Home Environment

1. Definition of Cigarette Smoke and Its Types

Cigarette smoke is a complex mixture of particles and gases produced from the combustion of tobacco products. It contains thousands of chemical compounds including nicotine, tar, carbon monoxide, tobacco-specific nitrosamines, formaldehyde, and many other carcinogens. This chemical composition causes cigarette smoke to have systemic and localized impacts on the airways, and can settle on surfaces in the indoor environment (Arfaenia et al., 2023). In general, the form of exposure to cigarette smoke can be divided into three main types as follows:

a. Active smokers (*first hand smoke / mainstream smoke*)

Active smokers are individuals who directly consume cigarettes by inhaling *mainstream smoke*. *Mainstream smoke* is the main smoke that enters the respiratory tract through cigarette butts when a person smokes the cigarette. Direct exposure to these fumes causes smokers to receive the highest concentrations of various toxic substances, such as nicotine, tar, carbon monoxide, and other carcinogenic compounds. Contamination of these harmful compounds contributes to an increased risk of chronic obstructive pulmonary disease, cancer, and cardiovascular disorders. In the household environment, active smokers are the main source of *tobacco smoke exposure* (TSE) which can then affect the health of other family members, especially children and toddlers who are more vulnerable to exposure to air pollutants in the home.

b. (*Second Hand Smoke / Sidestream Smoke*)

A passive smoker is an individual who does not smoke but is exposed to smoke from the surrounding environment, either from *sidestream smoke* (smoke from the tip of a lit cigarette) or from smoke exhaled back by the smoker. *Sidestream smoke* tend to contain higher concentrations of some harmful substances compared to *mainstream smoke* because of its imperfect combustion process. Exposure *second hand smoke* (SHS) in children, especially toddlers, is consistently associated with an increased risk of ARI, asthma, otitis media, and impaired lung function (Vevon & Temples, 2024).

c. *Third hand Smoke* (THS)

Third hand smoke (THS) is a toxic chemical residue from cigarette smoke that is left on indoor surfaces such as walls, fabrics, dust, and toys after smoking activities are complete. These compounds, including nicotine and *tobacco specific nitrosamines* (TSNA), can survive for hours to months in an indoor environment, as well as react with oxidants to form secondary pollutants. Exposure to THS can occur through skin contact, reemissionant air inhalation, or ingestion (e.g. through hand to mouth), which is especially relevant for Toddlers due to their habit of playing on the floor and often putting their hands in their mouths (Hamzai et al., 2024).

2. Harmful Substances in Cigarette Smoke

Cigarette smoke is a highly complex chemical aerosol, consisting of gaseous and particulate (tar) phases, which contains a variety of harmful and carcinogenic substances (Li & Hecht, 2022; Lu et al., 2024). The various toxic compounds contained in cigarette smoke can be classified into several important components as follows:

a. Nicotine

Nicotine is the main addictive substance in cigarettes found in particulate phase (tar) and aerosol liquids. In addition to causing dependence, nicotine

also contributes to oxidative stress and can affect the biological functions of the human body.

b. Tar

Tar is a mixture of solid particles (aerosols) from the particulate phase of cigarettes that contains many harmful compounds such as *polycyclic aromatic hydrocarbons* (PAHs) and nitrosamines. These compounds are carcinogenic and can damage lung tissue.

c. Carbon Monoxide (CO)

CO is a toxic gas produced from the combustion of cigarettes. Because it has a high affinity for hemoglobin, CO reduces the blood's ability to bind to oxygen, which can decrease the oxygenation of body tissues.

d. Formaldehyde and Other Carbonyls

Formaldehyde is one of the important aldehydes in cigarette smoke. Along with other carbonyl compounds such as acetaldehyde and acrolein, formaldehyde can irritate the airways, cause inflammation, and are associated with carcinogenic risks.

e. Ammonia

Ammonia is an irritant gas that is released when tobacco is burned. Although the levels are relatively small compared to some other toxins, ammonia still adds to the toxicity of cigarette smoke and can damage the respiratory mucosa.

f. Other Toxic Compounds

In addition, cigarette smoke also contains various other harmful compounds such as:

- 1) *Tobacco specific nitrosamines* (TSNAs), karsinogen kuat.
- 2) *Polycyclic aromatic hydrocarbons* (PAHs), are mutagenic and carcinogenic.
- 3) Toxic heavy metals such as cadmium, arsenic, and other metals.
- 4) Other volatile compounds such as *hydrogen cyanide*, 1,3-butadiene, and nitric acid.

3. The Impact of Cigarette Smoke Exposure on Toddlers

Exposure to cigarette smoke in the home environment has a significant impact on the health of toddlers because their respiratory system and immune mechanisms are still in the developmental stage. Toddlers have a higher breathing rate than adults and often interact with house surfaces, so exposure to SHS and THS becomes more intensive. Clinically, exposure to secondhand smoke increases the risk of developing ARI, including pneumonia and bronchiolitis. Toxic compounds in cigarette smoke cause irritation of the airway epithelium, mucosal edema, and increase susceptibility to viral and bacterial infections. A decrease in local immunity also occurs due to impaired function of macrophages and neutrophils, thereby worsening the ability of the toddler's body to fight pathogens (Iqbal et al., 2024).

In addition to increasing the risk of infection, exposure to cigarette smoke also contributes to impaired lung function, such as decreased ventilation capacity, impaired lung growth, and increased wheezing frequency. Toddlers who are repeatedly exposed to SHS or THS have a higher chance of developing respiratory allergies, asthma, and chronic inflammation of the airways. The cumulative effects of this exposure can last into childhood and even adolescence. Exposure to THS, which comes from chemical residues that stick to the surface of the house, further aggravates the risk because toddlers easily absorb toxic substances through the skin, re-inhalation, and hand-to-mouth behavior. Thus, exposure to cigarette smoke, both direct and residue, is the main risk factor for respiratory disorders in toddlers and contributes to the high incidence of ARI in households that do not implement a smoke-free home policy (Xiang et al., 2023).

H. Health Education

1. Definition of Health Education

Health education (*Health Education*) is a planned process that provides information and skills to individuals, groups, or communities so that they are able to improve knowledge, attitudes, and healthy behaviors in order to maintain and improve their health (Aji et al., 2023). Health education is part of health promotion that focuses on behavior change through information and empowering individuals or communities to make healthy decisions. Operationally, health education includes activities such as counseling, group discussions, demonstrations, the use of visual media, and the use of digital technology to convey health messages (Suwanti & Purwanto, 2025).

2. Health Education Objectives

Health education has the main goal of improving the ability of individuals and communities to understand, decide, and implement correct health behaviors. This goal is not only limited to increasing knowledge, but also includes the formation of positive attitudes, increased motivation, as well as behavioral changes in daily life. Health education helps individuals recognize disease risk, understand the benefits of prevention, and develop skills to manage health independently (Fortunka, 2020; Suryasa et al., 2022).

- a. Increase knowledge about risk factors and disease prevention efforts.
- b. Forming a positive attitude towards healthy behavior.
- c. Encourage behavior change that supports improved quality of life.
- d. Empowering individuals and families to be able to make informed health decisions.
- e. Create a social environment that supports healthy behavior through effective communication and strengthening long-term motivation.

3. Principles of Health Education

Health education does not only focus on providing information, but must also follow basic principles so that the process of conveying messages can be well received by the target and able to encourage behavior change.

These principles serve as guidelines in designing, implementing, and evaluating health education programs, so that educational activities become more effective, relevant, and have a sustainable impact on individual and community health behaviors. By following these principles, educational interventions can help improve understanding, readiness to act, and commitment to goals in maintaining and improving health. (Kumalasari et al., 2023). The principles of health education that are widely used in contemporary health promotion practices according to (K et al., 2025; Randika et al., 2025; Sholihah et al., 2025) Includes:

a. Participatory Principles

Health education must actively involve target targets in the learning process, not just conveying one-way information.

b. Promotive and Preventive Principles

Health education is not only informative, but designed to encourage preventive measures and healthy lifestyles.

c. Sustainable Principles

Education should be done continuously and not just once, as the repetition of information helps to strengthen understanding and improve the consistency of healthy behaviors.

d. Contextual and Adaptive Principles

Educational materials are adjusted to socio-cultural conditions and target characteristics, so that they are more relevant and accepted.

e. Evaluative Principles

Every health education activity must be followed by an evaluation to find out the extent to which knowledge improvement, attitude change, or behavior change occurs.

4. Health Education Media

Health education media is a means or platform used to convey health information to the public with the aim of improving knowledge, attitudes, and healthy behaviors. This media can be conventional or digital, depending on the needs and characteristics of the audience. In the digital era, the use

of information technology in health education media is increasingly dominant because it is able to reach a wider audience, convey messages interactively, and provide continuous repetition of messages to strengthen understanding and healthy behaviors (Permatasari et al., 2023). Various forms of health education media can be categorized as follows:

a. Conventional Media

This media includes leaflets, leaflets, posters, and brochures. Conventional media are usually used to provide information directly and easily accessible to the public in certain locations, such as in health centers, posyandu, or public facilities (Barik et al., 2019).

b. Media Audio Visual

This media includes educational films, animated videos, and presentation slides. Audio-visual media allows for a more interactive and engaging message delivery, making it easier for audiences to understand health materials (Rahma & Mutiaz, 2020).

c. Digital Media / Social Media

Digital media includes *WhatsApp*, Facebook, Instagram, and health promotion websites. Its advantages are the ability to reach a wide audience, deliver messages repeatedly, and facilitate two-way interaction between presenters and the public (Pandhika et al., 2023).

d. Combination Media

It is a combination of conventional and digital media, for example leaflet + *WhatsApp* or video + poster. The use of this combination media aims to strengthen the effectiveness of message delivery because the audience receives information through multiple channels at once (Mappewali et al., 2024).

I. *WhatsApp Reminder*

1. Definition of *WhatsApp Reminder*

Reminders are a form of reminder designed to help a person remember important information or actions that need to be taken at a certain time. In the context of health, *Reminder* is often used as part of health education and promotion strategies to increase adherence to recommended behaviors, such as disease prevention, health monitoring, and the establishment of a healthy home environment.

WhatsApp Reminder is a reminder sent through the app *WhatsApp*, an internet-based instant messaging platform that allows the delivery of text, image, audio, and video messages in real time. *WhatsApp* It is now widely used as a health education media because it has a two-way communication range, ease of use, and the ability to send multimedia content that can increase the target understanding of health messages (Swarnata et al., 2022).

In the context of preventing infectious diseases in toddlers, *WhatsApp Reminder* serves as an educational tool that helps parents understand and implement health behaviors. Messages sent on a regular basis can include information about the dangers of exposure to secondhand smoke (SHS and THS), how to create a smoke-free home environment, and the impact on the risk of ARI in toddlers. This shows that the use of *WhatsApp* as an educational medium is preferred by parents because it is interactive and easily accessible, especially in Indonesian society where most of them have actively used *WhatsApp*.

As a digital intervention medium, *WhatsApp Reminder* It has also been proven to increase knowledge, strengthen attitudes, and encourage sustainable health behavior change. Recent studies confirm that interventions based on *WhatsApp* able to improve ARI prevention practices in households, increase parental adherence to health behaviors, and strengthen family commitment in creating a safe home environment from cigarette smoke. Thus, *WhatsApp Reminder* can act as an effective educational intervention to

support RBAR behavior in an effort to reduce the incidence of ARI in toddlers (Swasti & Natalia, 2025).

2. WhatsApp Reminder *Working Mechanism*

WhatsApp Reminder works through behavioural reinforcement mechanisms (*behavior reinforcement*) that utilizes repetitive messaging, two-way communication, and easy access to information to form new health habits in the family. Reminders sent regularly help parents more consistently implement healthy behaviors. The messages that appear on the phone screen serve as a stimulus that reminds, reprimands, and motivates, thereby preventing negligence or forgetfulness in keeping the home environment free from cigarette smoke. These interventions also facilitate gradual behavioral change through increased knowledge, positive attitudes, and a sense of responsibility in protecting children from exposure to secondhand smoke (Brown et al., 2020).

In addition, *WhatsApp Reminder* works through the *cue to action* principle, which is to provide a cue that triggers immediate action. When parents receive a message in the form of a brief education, invitation, or warning, they are encouraged to make behavioral adjustments on the spot, such as asking smokers to smoke outside or making sure no family members smoke inside the house. Reminder messages also allow *micro learning*, which is short but repetitive education, so that health information is easier to understand and remember.

This intervention also strengthens *self-monitoring*, as families become more aware of smoking habits in the home and its impact on toddlers. With a regular frequency of messages, parents get the psychological boost to stay consistent, as well as create healthier environmental changes. Ultimately, *WhatsApp Reminder* helps maintain family commitment to implementing a smoke-free home through cognitive, emotional, and behavioral reinforcement in a simple but effective way.

3. Advantages and Disadvantages of *WhatsApp Reminder*

Usage *WhatsApp Reminder* As an educational medium, it is increasingly developing along with the increasing use of communication technology in public health interventions. In the context of preventing ARI in toddlers through education on smoke-free homes, *WhatsApp Reminder* has several advantages as well as a number of limitations that need to be considered according to (Latif & Tiala, 2021) namely:

a. Advantages of *WhatsApp Reminder*

1) High Accessibility

WhatsApp is a very common application used by the Indonesian people. Almost all parents of toddlers already have a *WhatsApp* account and actively use it every day, so educational messages can be easily received without the need for additional platforms.

2) Real-Time and Scheduled Messaging

WhatsApp allows regular messaging to be sent on a predetermined schedule. This feature makes *WhatsApp Reminder* a constant reminder of RBAR behavior, especially for parents who often forget or are not used to practicing healthy habits.

3) Supports Multimedia Content

Education can be delivered in the form of text, images, infographics, sounds, and short videos. This variety of message formats helps the delivery of material to be more interesting and easy to understand, especially for topics such as the dangers of cigarette smoke in toddlers who need visualization.

4) Two-Way Interaction

WhatsApp provides a space for dialogue between parents and health workers or facilitators. Parents can ask questions, ask for clarification, or discuss the difficulties in implementing a smoke-free home. These interactions can increase engagement and compliance.

5) Efficient and Cost-effective

Compared to face-to-face interventions, *WhatsApp Reminder* doesn't require large transportation costs, special facilities, or time. This makes it an effective solution, especially for public education programs on a large scale.

6) Strengthening Habits Through Repetition

Messages sent regularly help strengthen memory, form positive attitudes, and strengthen parents' intentions to maintain a smoke-free environment to prevent ARI in toddlers.

b. Disadvantages of *WhatsApp Reminder*

1) Reliance on Smartphone Ownership and Access

Although *WhatsApp* is very popular, there is still a small percentage of parents who have limited access to smartphones or stable internet networks, so messages are not always optimally received.

2) Risk of Unread Information

The sheer number of daily messages that users receive can make *Reminders* sink among other notifications. This can reduce the effectiveness of education if messages are not opened or read regularly.

3) Limitations in Live Behavior Monitoring

WhatsApp is able to provide education and reminders, but it can't ensure that RBAR behavior is actually performed. Behavior change is entirely dependent on parental commitment.

4) Potential Misunderstandings Without Direct Assistance

Information conveyed through text or multimedia can sometimes be interpreted differently by each person. Without additional clarification or explanation, parents' understanding can become inappropriate.

5) Distractions from Other Notifications

Because *WhatsApp* is used for a variety of daily needs, educational messages can be mixed with personal, work, or other group messages, reducing the user's focus on health materials.

6) Not All Users Are Responsive

In some cases, parents are inactive in providing feedback or rarely responding to messages. Low interactivity can affect the success of interventions.

J. Relevant Prior Studies

Several previous studies have shown that instant messaging-based interventions, particularly *WhatsApp*, have a strong effectiveness in influencing family health behaviors, including smoking behavior, adherence to health services, and disease prevention in children. The use of *WhatsApp* as an educational medium and *reminder* has been proven to be able to increase knowledge, change attitudes, and encourage healthy behavior in the target group because of its easily accessible, flexible, and can be used to provide messages personally and periodically.

Research conducted by Haryono et al., (2022) aims to assess effectiveness *Reminder* message-based *WhatsApp* to the compliance of the visit of the toddler's mother at the Tanjung II Posyandu. Using the pre-test and post-test approaches, this study showed a significant increase in adherence to visits after being given an intervention in the form of a reminder message through *WhatsApp* ($p = 0.008$). The intervention is considered effective because it can provide consistent reminders to parents so that they can increase their involvement in health services for toddlers. This research is relevant to the research conducted by the author, because they both use the same media *WhatsApp* as a means of reminding and educating children of toddlers. The difference lies in the focus of the variable, where this study assesses the compliance of posyandu visits, while the author's research focuses on education on smoke-free homes and prevention of ARI.

Furthermore, research by Swarnata et al., (2022) in Denpasar examines the influence of health education through *WhatsApp Reminder* to increase public knowledge about COVID-19 prevention. With a pre-post quasi-experiment design, the results showed a significant increase in respondents' knowledge after being given an educational message via *WhatsApp* regularly. *WhatsApp* It has

proven to be an effective educational medium because it is able to convey health information in a structured and easy-to-understand manner. Although it does not focus on smoking behavior, this study is particularly relevant because it shows that health education is based on *WhatsApp* able to increase public understanding of certain health issues, which is also the purpose of the intervention in this study.

Support for use *WhatsApp* as a means of intervention is also strengthened by research Ariati et al., (2024), which developed the system *Reminder Immunization-based WhatsApp* in primary health services. This intervention helps parents get timely immunization reminders so as to increase the regularity of children's immunizations. The results show that the *WhatsApp* Structured makes it easier for parents to understand the schedule of children's health services. This research provides a solid basis that *WhatsApp* It can be used not only as education, but also as a reminder tool for health behaviors that affect children's conditions. This is relevant to the author's research because the context is both in primary health services and targets maternal behavior in maintaining children's health.

In addition, research by Haug et al., (2025) shows that *coaching* and smoking cessation education through *WhatsApp* effective in reducing smoking frequency and increasing motivation to quit in young age groups. With a pre-post approach, automated messaging intervention and counseling through *WhatsApp* Proven to improve self-control and reduce smoking intensity. This research is relevant because it provides evidence that *WhatsApp* can be used as a medium for changing smoking behavior. Although the target of this study is adolescents and young adults, the mechanism of behavior change through digital messaging can be applied to the education of smoke-free homes in the author's research.

Additional support is obtained from Nawawi et al., (2025) who conducted a systematic review related to smoke-free home interventions. The results of their review show that home-based educational interventions, including behavioral counselling and media campaigns, have been shown to be effective in reducing children's exposure to secondhand smoke, both through biological

measurements and environmental assessments. Although it does not specifically use *WhatsApp*, this study is particularly relevant because it shows that home-based behavioral education and interventions have strong potential in reducing the incidence of ARI associated with cigarette smoke exposure.

From the series of studies, it can be concluded that WhatsApp-based interventions in the form of education, *reminders*, and behavioral assistance have proven to be effective in increasing knowledge, compliance, and changing public health behavior. In addition, RBAR interventions have been proven to be able to reduce exposure to cigarette smoke in children so that they can prevent the occurrence of ARI. These findings are an important basis for the author's research to develop WhatsApp Reminder-based education as a practical, affordable, and appropriate strategy in the context of primary health services in an effort to prevent ARI in toddlers through the implementation of RBAR.



K. Theoretical Framework

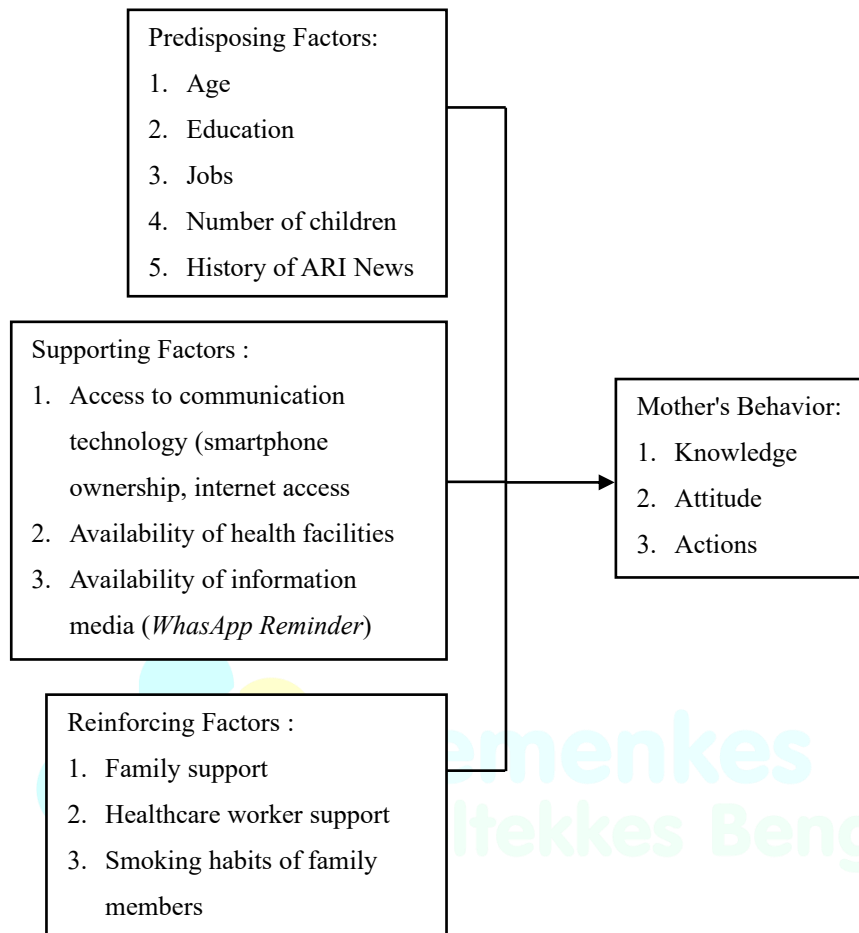


Chart 2.1 Theoretical Framework

Source : (Green, 1980; Hao et al., 2025; Rahmawati et al., 2024; Yusriani & Acob, 2020)