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REVIEW ARTICLE

Importance of WASH Interventions in Tackling Stunting and Wasting Problems in Children

Steffany Soegijanto[1], Jessica Natalie Santoso[1], Angelica Gabriel Eldyjoe[1], Bernadeth Caecilya[1], Anggraini Halim[1], Timothy Sastra[1], Zenlly Erren Jossevynne[2], Figo Valentino[2], Junaida Astina[1]*

[1]Department of Food Science and Nutrition, Institut Bio Scientia Internasional Indonesia, Jakarta, Indonesia
[2]Department of Biotechnology, Institut Bio Scientia Internasional Indonesia, Jakarta, Indonesia
**corresponding author: junaida.astina@gmail.com*

ABSTRACT

Child malnutrition is a serious health condition caused by insufficient or excessive consumption of calories, carbohydrates, fats, proteins, vitamins, and minerals. Stunting (low height for age) and wasting (low weight for height) are groups of deficiency that commonly occur to children suffering from malnutrition. Poor sanitation, hygiene, and viral infections are directly related to malnutrition including stunting and wasting. UNICEF and WHO work globally to combat malnutrition, especially in stunting and wasting implement the WASH programs to minimize diarrheal illnesses and improve nutritional status. The core activity of the WASH program emphasizes safe drinking water, basic sanitation, and hygiene among the community. This review article aims to assess studies on the effect of WASH interventions on the prevention and treatment of stunting and wasting problems in children. Despite encouraging results, WASH interventions face several limitations such as resource demand and adaptation to unforeseen circumstances. Some recommendations for future programs include combining WASH with nutritional education, growth tracking, community engagement, and supplements for better results. Taking a holistic approach to physical and cognitive development is essential to solving the complicated issue of child malnutrition.

KEYWORDS

Hygiene, Malnutrition, Sanitation, Stunting, WASH Interventions, Wasting

HIGHLIGHTS

- Malnutrition problems in children have been increasing
- Some issues such as stunting and wasting problems
- There are multiple health effects to these problems
- WASH interventions have been implemented to tackle these issues
- WASH interventions was found to be successful in decreasing stunting and wasting problem

INTRODUCTION

Malnutrition continues to be one of the global epidemic issues currently. As of 2019, about 462 million of the population are reported to be underweight (WHO, 2019). The burden of such problems is more prominent around the African and Asian regions due to lack of food distribution discrepancies and economic development (Gao et al., 2020; Sotiraki et al., 2022). Despite the significant progress since 1990, 149 million children worldwide under 5 are still estimated to be stunted and 45 million children are approximately wasted (WHO, 2024). Both of these cases account for the overall 45% mortality rate in children below 5 (Food And Agriculture Organization Of The United Nations, 2020). Although the immediate cause of these occurrences is poor dietary intake, disease, or food access and stability, the cause of malnutrition is multifactorial. Poor WASH practice has been highly associated with populations suffering from stunting and wasting (Patlán-Hernández et al., 2021). However, this occurrence is expected given that undernutrition is more prevalent amidst children living in unsanitary conditions, polluted water, and inadequate sanitation. Lack of sanitation and accessible clean waters leads to the increased incidence of diarrhea and spread of harmful intestinal parasites (Cooten et al., 2018). With that being said, it is reported that the lack of WASH practices across countries is responsible for over 50% of malnutrition cases (UNICEF, 2015). This review paper was made with the aim to evaluate the effectiveness of WASH interventions in solving malnutrition problems in children, especially stunting and wasting, based on the data from published journals.

STUNTING AND WASTING PROBLEMS IN CHILDREN

Malnutrition in Children

A health condition known as malnutrition is brought from consuming food that is either insufficient or excessive in calories, carbohydrates, fats, proteins, vitamins, or minerals (Abate & Belachew, 2019). Malnutrition is found as the most severe risk of food insecurity in children. The higher demand for nutrients in children due to growth makes them more prone to macro- and micronutrient deficiencies (Govender et al., 2021). In children, the caloric requirement can differ depending on age, sex, and activity status. The recommended daily caloric intake is 1000 to 1400 kcal/day which will be increased along with the age of children (Yu et al., 2018). Good nutrition for children is needed to thrive, grow, learn, and play. Balanced nutrition in children can be obtained through the proper nutrition service as well as the good knowledge of balanced and diverse nutrition to the parents. The essential nutrients can be divided into seven groups, including carbohydrates, protein, fat, minerals, vitamins, fiber, and water which should be fulfilled to ensure adequate body functions (Zhang & Ma, 2018). Among all groups of nutrients, water is the most important as it plays many roles, such as acting as a solvent, transporter mode, and substrate for metabolic reactions. The daily recommended intake (DRI) for water depends on age, sex, weight, activity status, air temperature, and humidity. Based on a study by Brooks et al. (2017), those with lower incomes had 20% higher odds of inadequate hydration than did higher-income adults

Aside from the dietary intake, this nutritional problem also may occur as the effects of malabsorption that may happen due to food intolerances, parasites, and intestinal infections. Malabsorption refers to the impairment of nutrient absorption due to a defect or dysfunction in the small intestine, pancreas, or gallbladder (Misselwitz et al., 2019). The most common malabsorption occurs for carbohydrate metabolism syndromes, such as lactose intolerance or fructose intolerance. The prevalence of this carbohydrate intolerance has been increasing during the last few decades due to the effect of the higher consumption of selected carbohydrates, particularly in the form of added sugar (Berni Canani et al., 2016). The non-absorbed carbohydrates in the intestine bring fluids to the lumen through osmotic force causing osmotic diarrhea which will increase the malnutrition risk. Furthermore, due to immature

immunity and feeding behavior, children are prone to infections by parasites, particularly *Trichuris trichuria* and hookworm which are the most prevalent (Fauziah et al., 2022). Furthermore, infections in the intestine are linked to the increasing risk of stunting, wasting, and being underweight.

Other than that, maternal nutrition during pregnancy also can affect fetal growth and development, which can have prolonged effects until adulthood. This is also related to malnourished mothers who will also have a higher risk of trouble breastfeeding their infants. A similar study reported by Soofi et al. (2022) has mentioned poor maternal nutrition during conception pregnancy, and after delivery are linked to poor maternal and child health outcomes. Exclusive breastfeeding is important for the child's life health, however, if the mother is severely malnourished, the health benefits may not be passed on, instead, the children have a higher possibility of malnutrition (Koletzko et al., 2019). A study by Hadi et al. (2021) stated that the prevalence of exclusive breastfeeding is only 37.3% in Indonesia for infants at six months, and it has not improved despite the World Health Organization's Infant and Young Child Feeding (WHO IYCF) guidelines' recommendations to exclusively breastfeed. Moreover, in Indonesia, it has been found that breastfeeding is more common in impoverished communities, yet relatively few of these societies support exclusive breastfeeding. In fact, it has been reported that exclusively breastfeeding the infants can help them retain their optimal growth until they become children (Ahmed et al., 2022).

Stunting and Wasting

Stunting and wasting are widely acknowledged as two of the most severe global issues. Based on the periods, malnutrition can be categorized into acute and chronic. Acute malnutrition is caused by short periods of inadequate nutrition that may lead to wasting, whereas chronic malnutrition results from prolonged periods of inadequate nutrition and leads to stunted growth. Stunting is a condition characterized by a significant lack of essential nutrients, which can be identified by abnormal height for a child's age and directly affects their growth. Conversely, wasting is seen as a state resulting from severe malnutrition, which immediately impacts the physical growth of children, manifested by a fast and rapid decline in weight (Morales et al., 2023). Furthermore, numerous studies have demonstrated a clear and direct relationship between stunting and wasting, which significantly affects the cognitive development of children (Mireku et al., 2020). Siddiqa et al. (2023) suggest that the WHO anthropometry growth chart can be employed as a potential approach to assess a child's nutritional status and growth. By referring to this chart, it is possible for one to determine that a child is stunted by observing specific z-scores values. A stunted child would display a z-score of less than -2 on the height-for-age chart. Conversely, in the case of wasted children, their weight-for-height and BMI-for-age measurements would indicate a score lower than -2 on the growth charts.

In the year 2018, WHO revealed that 21.9% of children were found to be stunted. On the other hand, 7.3% of children under the age of 5 suffered from wasting (Khadija et al., 2022). Mertens et al. (2023) conducted research which demonstrated that the occurrence of stunted and wasted children is prevalent in low and middle income nations. Western Africa, Southeastern Asia, Nigeria, Zambia, Timor-Leste, and India were identified as countries with significant stunting and wasting issues (Ssentongo et al., 2021). There are numerous health organizations which work to resolve this issue.

The WHO has established an international objective to reduce the prevalence of childhood stunting by 40% by the year 2025. This movement has been specifically targeted for children under the age of 5. UNICEF, also known as the United Nations International Children's Emergency Fund, is collaborating with national forces to publish multiple estimates to monitor the prevalence of stunting and wasting. These conditions have shown improvement over time, with a significant decrease since 2000. Not only, the aforementioned organizations are addressing issues of stunting, wasting but also contributing to decrease

obesity, and overweight through program implementation, with the goal of resolving these problems by the year 2030 (UNICEF, 2023).

Factors Contributing to Stunting and Wasting along with Health Effects

Stunting and wasting have been attributed to several factors. Maternal height and nutrition are recognized as contributing factors to wasting and stunting. Maternal nutrition significantly influences the occurrence of stunting and wasting. If a woman experiences inadequate nutrient intake, it might immediately affect her offspring, causing children to also experience this problem. In addition, maternal education significantly influences the prevalence of stunting and wasting in children. This is primarily attributed to the inadequate nutrition that children receive during their development period. Failure of a parent to provide the children's proper nutritional requirements can result in the potential for stunting and wasting. Paternal genetic factors and height are other variables that can influence the level of risk. If the parent is stunted or of low height, it might also heighten the likelihood of their offspring becoming stunted. Furthermore, the socioeconomic variables and economic levels would significantly impact this risk. Low household wealth and poverty can directly enhance the likelihood of children experiencing stunted growth and malnutrition. Poverty often leads to restricted availability of nourishing and healthy food choices (Li et al., 2020).

Poor sanitation and hygiene might be another contributing factor to this issue. When a country has low levels of sanitation and hygiene, it can directly increase the chance of children experiencing stunted growth due to the lack of appropriate and safe foods. Moreover, a short time between births or an increased risk of premature births can heighten the likelihood of children experiencing stunting and wasting. This is due to their bodily systems may not develop appropriately, leading to health complications and hindering nutrient absorption in their bodies (Siddiqa et al., 2023). Furthermore, it should be noted that stunting and wasting can also arise as a consequence of some viral illnesses. The occurrence of several infections, such as diarrhea, parasite infection, or infections of the respiratory tract, can have a detrimental effect on children's nutrition, resulting in impaired growth characterized by stunted and wasted growth (Thurstans et al., 2021).

In addition to the previously specified height and weight problems. Stunting and wasting also have several other negative effects on health. Mortality is a significant and major harmful risk for children who experience stunting and wasting. Underweight children face a significantly greater likelihood of morbidity. Multiple studies have indicated that over two million children die each year owing to stunting, accounting for 12% of the total deaths of children (Myatt et al., 2018). Another potential health outcome that may arise is the onset of additional health conditions, like anemia, due to inadequate food intake and patterns, which can negatively impact cognitive development and overall growth (Khadija et al., 2022). Lastly, the close association between wasting and stunting, along with their reciprocal relationship, heightens the significance of addressing this issue. In the long run, failure to take action on this problem directly raises the probability of growth impairment in offspring and future generations (Mertens et al., 2023).

Impact of Improper Sanitation and Hygiene towards Malnutrition

Malnutrition can result from the spread of diarrheal illnesses like cholera, dysentery, typhoid, and polio, which are all associated with poor sanitation (WHO, 2023). These illnesses are brought on by bacteria, viruses, or parasites that contaminate surfaces, water, or food. A person may have symptoms including fever, vomiting, and diarrhea if they contract one of these infections. Dehydration is a potentially deadly condition that can arise from these symptoms, especially in young children (Akech et al., 2018). Electrolyte abnormalities brought on by dehydration can result in seizures, comas, and even death. Food and water sources can become contaminated as a result of poor sanitation, raising the risk of infection.

Malnutrition can occur when a person has a pathogen infection because their body is unable to adequately absorb nutrients (Siddiqui et al., 2020). The risk of illness can also be raised by bad hygiene habits, such as not washing hands before eating or preparing food.

Stunting is a frequent form of malnutrition that affects millions of children globally. It is brought on by persistent malnourishment and recurring infections, which can compromise immune system function and barrier defense, resulting in more frequent and severe infections (van Cooten et al., 2018). Stunting can also be linked to improper hygiene, since food and water can be contaminated in various ways. Contaminated water utilized during crop production, harvesting, and processing can cause health problems (Centers for Disease Control and Prevention, 2016). Fresh fruits and vegetables come into touch with water throughout several stages of production, which can result in contamination. Aside from improper handling and application techniques, contaminated agricultural water can also result from the spread of viruses and parasites to crops and livestock. Furthermore, eating or drinking food or beverages contaminated by bacteria, parasites, or viruses that are spread through the excrement of animals and infected people is the main cause of foodborne illnesses, often known as food poisoning (Bintsis, 2017).

Although the relationship between health and hygiene is widely recognized, it was only recently realized how crucial sanitation is to the fight against hunger (Patlán-Hernández et al., 2021). Longer life expectancies, higher quality of life, reduced rates of malnutrition, and enhanced health have all been associated with access to clean water and sanitation. Based on the estimation from the WHO (2023), malnutrition is majorly caused by poor sanitation, and already affects 2.5 billion people in underdeveloped nations. Studies have revealed that the recent realization of sanitation's crucial role in combating malnutrition is significant. The growth impairment seen in children living in unhygienic conditions isn't solely because of food scarcity (Owino et al., 2016). Continuous exposure to germs and bacteria in their surroundings compels these children's bodies to redirect energy from growth and brain development toward combating infections, resulting in growth impediments. Insufficient access to clean water along with inadequate hygiene and sanitation practices stand as the primary factors behind diarrhea in children under five, potentially leading to malnutrition and various health complications (WHO, 2022). Thus, the prevalence of malnutrition can be considerably decreased by enhancing sanitation and hygiene standards.

Furthermore, malnutrition has been controlled through a variety of strategies, including dietary methods, nutritional supplements, and specific treatments. These interventions have been created to emphasize the severity and underlying causes of malnutrition in various age groups (Young & Argáez, 2019). For example, nutrition instruction or counseling, meal delivery services, nutrition supplements, and diet are frequent interventions for older persons. Treatment choices for children may include vitamin and mineral supplements, family support, dietary modifications, and therapy for underlying medical issues (NHS, 2023). To further avoid malnutrition and enhance nutrition, a strong healthcare system that offers immunization, oral rehydration, periodic deworming, early diagnosis, and appropriate treatment of common illnesses is essential (Vikaspedia, 2020).

The World Health Organization highlights the necessity of eradicating malnutrition in all of its manifestations and the significance of providing everyone with access to efficient nutrition interventions (WHO, 2021). This includes being overweight, deficient in vitamins or minerals, and undernourished. The WHO methods include providing secure and supportive environments for nutrition at all ages, ensuring that important nutrition interventions are covered universally, and enhancing nutrition through trade and investment policies. Treatment options for severe cases, such widespread and chronic malnutrition, may include developing a food plan, giving nutrients intravenously, addressing particular symptoms, and looking for any oral or swallowing issues (Brazier, 2023). The patient's medical team will keep an eye on them to make sure they get the nourishment they need.

WASH INTERVENTIONS TO SOLVE MALNUTRITION PROBLEM IN CHILDREN

Diarrhea among Children

One of the main causes of illness and death among children in developing countries is diarrhea, which has become a significant public health concern (Forster et al., 2020). Based on estimations, children under the age of five account for around 1 billion episodes of diarrhea and 2.5 million of these deaths annually (Wu et al., 2021). The long-term negative effects of diarrhea are frequently linked to immune system abnormalities, malnutrition, and stunted growth (Masangkay et al., 2020). Most children's diarrhea cases have the potential to be lethal, even though the majority of instances are not serious and may not require special treatment (Abbasi et al., 2020). The most common public health issue linked to the state of the water and sanitation systems is diarrhea. Research indicates that inadequate environmental circumstances, inaccessible and unsafe drinking water sources, and inadequate hygiene and sanitation protocols are the primary contributors to diarrhea in children under five years of age (Birhan et al., 2017). Thus, the availability of clean drinking water, good personal cleanliness, and public health are the three key components in the prevention of diarrhea (Drago et al., 2020).

According to the study by Crane et al. (2015), there is a cyclical relationship between undernutrition and diarrheal illnesses. Undernutrition impairs the immune system of the child and makes them more susceptible to diarrheal problems by increasing the body's loss of water and nutrients. Moreover, it is now widely acknowledged that diarrhea may both occur and result from malnutrition. As diarrhea lowers caloric intake and affects nutrient absorption, malnutrition can weaken immune system function and barrier protection, which increases the frequency of diarrhea episodes (Marshak et al., 2016). Therefore, to minimize cases of diarrhea in children, more intervention needs to be implemented, for instance WASH. Water, sanitation, and hygiene (WASH) is an education or promotion that can effectively prevent diseases linked to poor sanitation caused by enteric pathogens, especially diarrhea.

WASH INTERVENTIONS

The term "water, sanitation, and hygiene" (WASH) interventions encompasses the full range of measures related to food and environmental hygiene, handwashing with soap, sanitation, and water quantity and quality (Bekele et al., 2020). An estimated 1.9 billion people depended on drinking water polluted by human excrement in 2015, while 663 million people globally had limited access to clean sources of drinking water (Bain et al., 2014). In contrast, it was estimated that 13% of the world's population, around 2.4 billion people, practiced open defecation and only one-third of them had access to improved sanitation facilities (Cha et al., 2015). The lowest rates of sanitation coverage are still seen in South Asia and Sub-Saharan Africa. According to Freeman et al. (2014), only 19% of people worldwide perform handwashing with soap after touching excreta.

Personal nutritional status may be primarily influenced by interventions related to water, sanitation, and hygiene (WASH), with food intake and overall health status being seen as direct causes and the physical environment being designated as an indirect cause (Dangour et al., 2013). Additionally, WASH intervention is connected with the four "pillars" of the food and nutrition security framework, which encompasses food access, food availability, food utilization, and food stability. In which, these pillars are what determine food security and nutrition (Cumming & Cairncross, 2016). The global environmental risk that contributes to poor health conditions is inadequate access to WASH, especially for children that live in low- and middle-income countries (LMIC). Worm, digestive, respiratory, skin, and ear infections are among the unfavorable health consequences linked to inadequate WASH practices (Prüss-Üstün et al., 2016).

Both direct biological processes and indirect pathways involving economic and social determinants are proposed as the causal pathways linking inadequate WASH to undernutrition in children. There are

three main biological processes that have been postulated to relate WASH to undernutrition: helminth infections, environmental enteric dysfunction (EED), and recurrent episodes of diarrhea (Cumming & Cairncross, 2016). In the absence of proper treatment, these illnesses may result in chronic illnesses such as anemia and weakened immune systems, the consequences of which may persist into adulthood (Sangalang et al., 2022).

In addition to being food-based, WASH programs also aim to solve the underlying sources of undernutrition by going beyond diet counseling and food provision (Black et al., 2013). The main goal of WASH interventions is to stop the spread of pathogens through the feces and mouth in order to stop enteric infection and the ensuing diarrheal illness (Watson et al., 2022). As mentioned previously, in low- and middle-income countries, diarrheal illness is one of the main causes of mortality and morbidity for children under five; in these countries, it kills more children than HIV, malaria, and measles (Ramesh et al., 2015). Almost 90% of diarrheal disease cases have been associated with inadequate WASH intervention. Thus, it is expected that WASH interventions is able stop and manage the spread of bacteria (e.g., *E. coli* and *Shigella*), viruses (e.g., hepatitis A and E), and parasites (e.g. soil-transmitted helminths and *Cryptosporidium*) to new human hosts (Seventer & Hochberg, 2017).

WASH Intervention in Daycare, Preschool and School

Families where both parents work find it difficult to give enough time to raising their children. Due to these conditions, parents, especially mothers, are forced to enroll their children in daycare centers, which provide a nurturing environment (Zainuddin et al., 2021). Daycare services, as defined by Berlinski & Schady (2015), are those that provide young children with childcare outside of their homes, especially if they are not yet old enough to be enrolled in the official school system. When children enroll in daycare, they spend the majority of the day without their parents (Nystad et al., 2021). Therefore, WASH intervention in childcare is crucial to be implemented as it will influence children's behavior toward sanitation and hygiene as they get older. Considering the results of school-based WASH in older children, preschool WASH should effectively be expected to contribute to other SDG goals as well, such as poverty reduction (SDG 1), good health and wellbeing (SDG 3), gender equality (SDG 5), inequity reduction (SDG 11), and peace and justice (SDG 16). Furthermore, WASH implementation in early childhood will advance the three interconnected crucial pillars of sustainability: social equitable, viable economies, and healthy environments (Siraj-Blatchford et al., 2016).

Numerous studies have shown that instruction in hand hygiene lowers the long-term health and social repercussions of stunting as well as mortality and disease among school children. According to Srivastava and Mehta (2018), hand hygiene should be prioritized highly throughout one's life. Children in Indonesia, aged 10 to 14, participated in a study and the results showed that there was a strong relationship between positive attitudes and hygiene behaviors, as well as between knowledge and personal hygiene activities like handwashing (Sudjana et al. 2016). Additionally, regular group handwashing has shown to be a particularly successful, affordable, and health-promoting habit. According to a research in Denmark, regarding the primary school children, hand washing can effectively lower the risk of infectious diseases and absenteeism, even in today's highly developed and contemporary society (Xun et al., 2021). Furthermore, Wagner & Samuelsson (2019) claimed that school-based WASH programs help older children, their families, and their communities in the short- and long-term provides sufficient justification, thus extending WASH into early childhood settings is an indispensable action.

Current Outcomes from WASH interventions

As previously stated, stunting and wasting are significant global concerns (Soliman et al., 2021). This study provides a comprehensive analysis of the impacts and outcomes of water, sanitation, and hygiene interventions on the growth retardation and malnutrition of children. The previous research aimed to elucidate the advantages of implementing WASH intervention, either independently or in conjunction with other nutrition treatments, in order to assess their impact on children's growth. The methodologies employed included a systematic review of Preferred Reporting Items and Meta-Analysis. Based on this particular study, it was found that children aged 18-60 months and children under 2 years experience an enhanced Height-for-age Z-score value while solely utilizing water, sanitation, and hygiene. Nevertheless, when this intervention is integrated with another dietary intervention, it yields a significantly more pronounced positive trend in the Height-for-age Z-score and Weight-for-age Z-score values, while also exerting a minor impact on the weight-for-height Z-score. The results of this study demonstrated the efficacy of this intervention in promoting children's growth (Bekele et al., 2020).

In addition, Hossain et al. (2017) did a study on 14 various interventions, including WASH interventions, to address stunting in children. The research indicated that the program can be beneficial if implemented properly and in accordance with the subjects. Nevertheless, the data also demonstrated that the simultaneous combination of many therapies was perceived as the most efficacious approach. These therapies are deemed effective only if there is an annual rate reduction of less than 3% for stunting. Furthermore, a separate study was carried out to investigate interventions in Bangladesh aimed at addressing the issue of stunted children with a diminished appetite. This study implemented several nutrient interventions, including growth tracking, health and nutrition education, and WASH interventions. The findings indicate that targeted interventions can have a beneficial effect on the prevention of children's stunting and improvement of their nutritional condition (Naila et al., 2021).

LIMITATIONS AND RECOMMENDATION FOR WASH INTERVENTIONS

Limitations of WASH interventions

In addition to the numerous positive outcomes of WASH interventions, it is important to acknowledge and address certain limitations. The implementation of WASH interventions is a continuous project that requires constant enhancement and supervision to ensure the long-term viability of the benefits. This intervention demands substantial resources and a comprehensive understanding from everyone engaged and professionals. Another potential constraint could be the escalation of assignments and labor for certain individuals. In addition, WASH programs may encounter unanticipated occurrences and unforeseen circumstances that can affect their effectiveness. Furthermore, several factors can influence the efficacy of these interventions, necessitating ongoing modifications over time (Yates et al., 2017). Although there are limitations to applying WASH interventions in specific areas with certain conditions, multiple studies have demonstrated the positive impact of using these interventions on reducing stunting and wasting in children. However, there are instances where the interventions have been unsuccessful or may require an extended period to achieve the desired outcomes (McMichael, 2019).

Recommendations for Future WASH Interventions

There has been a thorough assessment of the literature that is currently available regarding the impact of WASH interventions on child growth, but not on child development (Russell & Azzopardi, 2019). Anthropometric measurements, primarily weight and height, are frequently employed to assess child growth (Caballero, 2013). In contrast, child development is a measurement of brain function that is usually carried out through testing of language, fine and gross motor skills, and socio-emotional abilities

(Neumann et al., 2021). For older children, more academic or cognitive measurements, like reading and numeracy, are also evaluated. In fact, children's developmental outcomes are really impacted by a lot of factors that support physical growth in early age (Britto et al., 2017). Furthermore, recent findings indicate that interventions aimed at promoting WASH are highly correlated with enhanced growth and cognitive outcomes, based on numerous studies of observational studies as well as clinical trials (Pickering et al., 2019). Despite the fact that observational studies are prone to confounding, there is growing evidence that malnutrition and poor socioeconomic position have detrimental effects on children's development in ways other than just raising their risk of sickness. For instance, the child's lack of energy and decreased curiosity, as well as the absence of expectations, education, and stimulation from caregivers and the community (Piper et al., 2017).

Previous researchers have conducted a review suggesting that combining interventions with additional measures such as nutritional education, growth monitoring, health and service community engagement, and supplementation can enhance the effectiveness of this intervention (Goudet et al., 2019). Additional enhancements that can be implemented include the implementation of water filtration systems, the utilization of soap for washing, the establishment of sewer sanitation facilities, and other measures that can effectively mitigate the occurrence of stunted growth in children (Wolf et al., 2022). To enhance the effectiveness of WASH, certain factors that may contribute to its improvement include educating family members and friends to enhance nutritional consumption and hygiene (Vally et al., 2019). Another intention is to enhance the sanitation conditions for children by updating the infrastructure in public areas like schools and parks, with the aim of reducing the prevalence of stunting among children (Wolf et al.,2022).

CONCLUSION

Chronic malnutrition relates to several issues such as stunted growth, which arises from prolonged chronic inadequate nutrition, while acute malnutrition, causes wasting, results from short-term nutritional deficiencies. Stunting is characterized by abnormal height for a child's age, directly impacting growth, whereas wasting involves a rapid decline in weight due to severe malnutrition. Balanced nutrition, encompassing carbohydrates, protein, fat, minerals, vitamins, fiber, and water, is essential for children's optimal development, encompassing physical growth, learning, and play. Beyond dietary factors, malabsorption resulting from food intolerances, parasites, and intestinal infections contributes significantly to malnutrition. Several organizations such as WHO and UNICEF also contribute in combating stunting and wasting, as well as obesity and overweight through program implementation, including WASH (water, sanitation, and hygiene) interventions. WASH interventions play a vital role in preventing diarrheal diseases and reducing rates of stunting and wasting by improving sanitation conditions and promoting hygiene practices. These interventions are essential not only for reducing the frequency of diarrhea episodes but also for breaking the cycle of undernutrition and diarrheal illnesses. However, implementing WASH interventions comes with challenges, including the need for continuous resources, comprehensive understanding, and adaptation to unforeseen circumstances. Despite these limitations, the positive impact of WASH interventions on reducing stunting and wasting is evident. The implementation of WASH can be alerting since problems like this still occur in many countries, especially Indonesia. The government can try to pursue these types of solutions by realizing how important they are. This study answers the objective by which WASH interventions have been found to improve and decrease the risk of Stunting and Wasting of children however, it is highly recommended that this intervention is accompanied by other interventions to improve it affectivity

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