



---

## **Factors Associated with Development among Children in Flood-Prone Areas in Indonesia**

**Tri Peni<sup>1\*</sup>, Tri Ratnaningsih<sup>2</sup>, Siti Indatul Laili<sup>3</sup>**

<sup>1</sup>STIKes Bina Sehat PPNI Kabupaten Mojokerto, Indonesia

<sup>2</sup>STIKes Bina Sehat PPNI Kabupaten Mojokerto, Indonesia

<sup>3</sup>STIKes Bina Sehat PPNI Kabupaten Mojokerto, Indonesia

---

### **Artikel info**

#### **Article history:**

Received; July 15<sup>th</sup> 2020

Revised: August 08<sup>th</sup> 2020

Accepted: September 09<sup>th</sup> 2020

---

#### **Correspondent author:**

Tri Peni.

E-mail: [peni.ners@gmail.com](mailto:peni.ners@gmail.com)

---

#### **DOI:**

<http://doi.org.10.35654/ijnhs.v3i6.349>

---

**Abstract.** Flood disasters caused losses and impacted disaster areas. The study aimed to examine the relationship between the economic factors, environmental sanitation, nutritional and psychological development among children in flood-prone regions of Gayaman Mojokerto Village. The samples were children who selected using the purposive sampling technique from flood-prone areas. Data were analyzed using the rho spearman test. The statistical test showed the positive relationship between psychology, closeness, and child psychology of children with child development (p-value<0.05). Statistical tests on environmental sanitation on child development showed a positive correlation (p-value <0.05). Another factor showed no relationship between the family's economy with child development (p-value> 0.05). Statistical test on the nutritional status with child development is p-value 0.019 closeness value of 0.232, meaning that there is a nutritional status with child development. In conclusion, the findings explained that children's development was associated with psychological, environmental sanitation, and children's nutritional status. Good nutritional status among childhood would affect subsequent child development.

**Keyword:** sanitation, economy, psychological, nutrition, child development



This is an Open Access article distributed under the terms of the Creative Commons Attribution 4.0 International License CC BY - 4.0

## INTRODUCTION

Floods are natural disasters that often occur in many cities on different scales where excess water is on dry land. Although the damage could be avoided by moving away from lakes, rivers, or other waterways, people would remain and work near these watersheds to make a living and make a low cost (1). Humans continue to settle in flood-prone areas is proof that the value of settling in flood-prone areas is greater than the cost of damage due to periodic flooding. Floods are also often found in the culture. The factors associated with such low awareness of throwing garbage into the river and reducing water catchment are associated with flooding. Other factors such as illegal logging, settlements on the banks of rivers or streams, high rainfall, lowland dwellings, low drainage changed, the dam is broken, and the soil also impacted the difficulty of absorbing water (2).

Every natural disaster must cause losses and impacts in the affected area, as well as flooding. Among them are the spread of various diseases, loss of property, agriculture, crops, or damaged fields, causing many victims in flash floods, public facilities, facilities, and infrastructure that become damaged. The World Health Organization (WHO) said floods could increase the transmission of infectious diseases. The spread of disease is divided into two ways: through water and transmitted through vectors. Water-borne conditions include typhoid fever, cholera, leptospirosis, and hepatitis A (3). Simultaneously, some diseases such as malaria, dengue, yellow fever, and West Nile fever spread through vectors. Direct contact with contaminated water also increases the risk of infectious diseases such as wounds, dermatitis, conjunctivitis, ear, nose, and throat infections. However, these diseases are not epidemic-prone (4). The only epidemic-prone infection that is transmitted directly through water is leptospirosis. This zoonotic disease is transmitted from the blood or urine of infected animals, mainly dogs, rodents such as mice, and livestock groups such as cattle or pigs. "Transmission through skin contact and mucous membranes with water, wet soil, vegetation, or contaminated mud (5).

Research by Fendi and winners on the description of health problems in communities after cold lava floods show results that people suffer from pharyngitis after cold lava floods and ARI. A study that processed global data said there was evidence of a height increase in children under five years of age of 0.5 cm living in an environment with clean sanitation. The study was conducted in Bangladesh, Ethiopia, Nigeria, Chile, Guatemala, Pakistan, Nepal, South Africa, Kenya, and Cambodia. There are currently reported as many as 265 million children in the world stunted growth and development with long-term health implications (6).

Indonesia is a disaster-prone region for several reasons. Among them because natural and climatic factors in Indonesia cause them. Indonesia stands on the meeting of tectonic plates. As a result, this country is above the earthquake path. In addition to being vulnerable to earthquake disasters, Indonesia currently has 127 active volcanoes. This is what makes Indonesia a part of the Pacific Ring of Fire. Tropical climate with high rainfall, which makes weathering easier, also causes natural disasters such as landslides and flash floods. Even the National Disaster Management Agency (BNPB) noted that in 2017 654 disasters had occurred throughout Indonesia. Besides natural disasters, it also destroyed most of the infrastructure, settlements, educational buildings, health, security, social and economic conditions, and affected the community's social and economic needs, including psychological disorders and welfare levels (7).

One of the most vulnerable groups to natural disasters is children because physically and mentally, they are still in their infancy and are still dependent on adults (8). Experiencing traumatic and terrible events due to disasters can cause stress and deep trauma for children and even adults (9). Besides being influenced by internal factors, children's development is also influenced by external factors such as flood conditions. Based on this background, the

the researcher wants to analyze the impact of flooding on the development of children in flood-prone areas.

## OBJECTIVE

The study aimed to examine the relationship between psychological factors, environmental sanitation, family's economic and nutritional status with child development among children in flood-prone areas in Gayaman Village.

## METHOD

A cross-sectional study design was applied in this study. The independent variables, including environmental sanitation, family economic, child psychological, and nutritional status. The dependent variable was child development. The samples were selected from the family who have children in Gayaman Village, Mojokerto Regency, in flood-prone areas. One-hundred two children were involved in this study and determined using a purposive sampling technique.

This research was conducted in a flood-prone area of Gayaman Village. Data collection was carried out on September 25-30, 2019. Data collection on children's economic and psychological status used a questionnaire. Environmental sanitation is done by observing the environment. Assessment of nutritional status by measuring the child's weight. The weight measurement results are categorized based on the standard table of children's body weight according to age. Bad nutrition (<-3 SD), less nutrition (-3 SD to <- 2 SD), good nutrition (-2 SD to 2 SD), more nutrition (> 2 SD) (10). The instrument for measuring child development using a developmental pre-screening questionnaire. First, Determine the developmental pre-screening questionnaire form based on the child's age. Then examine according to the developmental pre-screening questionnaire form. Children who can take the test for each item are given a score of 1. Then the score is totaled and classified: normal if the score is 9-10, doubt if the score is 7-8, delayed if the score is less than 6 (11).

## RESULTS

### Characteristic of Respondents

Table 1. Characteristics of Respondents

Characteristics	Category	frequency	Percentage (%)
Age	Baby	40	39.2
	Toddler	44	43.1
	Preschool	18	17.7
Father's education	primary school	22	21.6
	Middle school	70	68.6
	College	10	9.8
Mother's education	primary school	34	33.3
	Middle school	52	51.0
	College	16	15.7
Gender	Male	56	54.9
	Women	46	45.1
Father's occupation	private employees	66	64.7
	entrepreneur	26	25.5
	Labor	6	5.9
	Farmers	4	3.9
mother's job	private employees	14	13.7
	entrepreneur	2	2.0
	Housewife	76	74.5
	Government employees	10	7.8

Table 1 described the characteristic of respondents. The results showed that almost half of respondents aged was a toddler (43.1%). Most of the respondents' fathers were graduated from junior high (68.6%). More than half of the respondents were maternal middle school (51.0%). Regarding the characteristic of gender, more than half of the respondents were male (54.9%), and they worked in the private sectors (64.7%). For the occupation of the mother, the majority of them were housewives (74.5%).

Table 2. Cross-tabulation of child psychology, family economics, nutritional status, and environmental sanitation on child development.

Characteristics	Category	Child development					
		Normal		Doubting		Delayed	
		F	%	F	%	F	%
Psychological child	Good	56	57.1	12	12.2	4	4.1
	Less	14	14.3	12	12.2	4	4.1
Environment sanitation	Good enough	60	61.2	20	20.4	2	2.04
	Bad	8	8.2	2	2.04	4	4.1
		2	2.04	2	2.04	2	2.04
Family economy	High	32	32.6	6	6.1	4	4.1
	Intermediate	18	18.4	6	6.1	0	0
	Under	20	20.4	12	12.2	4	4.1
Nutritional status	Bad	0	0	2	2.04	0	0
	Less	2	2.04	0	0	2	2.04
	Good	66	67.3	22	22.4	6	6.1
	More	2	2.04	0	0	0	0

Table 2 explained the relationship between child psychology, family economics, nutritional status, and environmental sanitation on child development. The findings showed that children with good psychology have normal development (56.7%). More than half of the children who live with Good environmental sanitation have normal child development (61.2%). Regarding the family economy factors, only 32.6% of the family with high family economic level have normal child development. In contrast, good nutritional status was associated with an impact on normal child development (67.3%).

## The correlation between the psychological, environmental sanitation, family economics, and nutritional status with the development of children

Table 3. Correlation results between variables based on the rho spearman test

Variable	P-value	Relationship
Psychological children of child development	0.002	0.301
Environmental sanitation for child development	0.008	0.262
Family economics on child development	0.079	0.175
Nutritional status of child development	0.019	0.232

Table 3 explained the correlation between psychological, environmental sanitation, family economics, and nutritional status with children's development. The findings showed that psychological, environmental sanitation, and nutritional status were positive correlations with children's development (p-value <0.05). Simultaneously, the family economic level was not associated with child development (p-value >0.05).

## DISCUSSION

The study results found that most children with good psychology have normal development (57.1%) with a p-value was 0.002. Sigmund Freud argued that psychological trauma is retained memory because it lasts a long time without being realized (12). According to Moges and Weber explained children who have experienced conflict with their families could impact developmental disorders such as social and emotional well-being aspects(13)

Psychological trauma is a type of mental damage that leads to post-traumatic stress disorder. It was due to physical and chemical changes in the brain, which damages a persons' ability to cope with stress. Psychological trauma can experience transference, which is also about other people who indirectly share a disaster. Symptoms of psychological trauma that causes sufferers to be alone, irritable, destructive, consume sedatives, alcohol, or cigarettes (8). Children who are in good psychological condition will feel calm, happy so they can optimize their development.

The results showed adequate environmental sanitation with normal child development as many as 60 respondents (61.2%) with statistical test results p-value 0.008. The value of the relationship's closeness is 0.262, meaning that  $H_0$  is rejected, meaning there is a close relationship between environmental sanitation and child development. Souza's research results by reviewing 256 articles from 12 databases and books stated that the environment is considered influential for children's development (14).

Environmental sanitation is very influential on a person's health status. Environmental sanitation consists of clean water availability, availability of restrooms, the type of house floor, and cleanliness of eating utensils in each household. Poor environmental conditions are more easily affected by diseases such as diarrhea and infectious diseases. The availability of clean water for daily needs will reduce the family's risk of infectious diseases and malnutrition (15). Children who live in a healthy environment will avoid various infectious diseases. Healthy children will grow and develop properly.

The results showed data that families with high socio-economic with normal child development of 32 respondents (32.6%) with a p-value of 0.079 a closeness value of 0.175, meaning no significant relationship between economic conditions of the family and the

development of children under five. In simple socio-economic status is the status of a person in society regarding income, wealth, and position. Socio-economic status is conceptualized as a composite measure that combines economics such as finance and wealth, human beings. The social issues such as family and community relations, resources, and protection, that is, capital to which individuals or communities have access to survival. Socio-economic status is a composite measure of an individual or family's economic or social position relative to others, based on income, education, and employment. The socio-economic situation is a socio-cultural aspect that significantly influences health status and influences disease patterns, such as malnutrition, which is more commonly found among low economic levels. (16). Experts argue that the family's financial status does not directly affect the development of infants. The lack of purchasing power of food will impact children's nutritional intake, so that if the intake is less, then the child will be physically affected as sickly, if the child is too often sick, then child development is also not optimal (17). The results showed there was no family economic relationship with child development. Communities in the area already understand the importance of supporting child development to provide the best developmental stimulation and nutrition for children. Poor economic conditions do not prevent not helping the child's optimal development. The mothers are good at processing cheap food ingredients highly nutritious to become delicious food that their children.

Respondents who have good nutritional status with normal child development as many as 66 respondents (67.3%) with a p-value of 0.019 closeness value of 0.232, meaning a close relationship between nutritional status with the development of children under five. This study's results are in line with the results of Setyawati's research on the relationship of nutritional status with cognitive development in the golden age period, which states that most children with less developmental categories are found in children with short nutritional status. Fisher exact test results indicate a significant relationship between nutritional status and cognitive development of children (18). The results of Hanum and Khomsan's research on the relationship of nutritional status with language and cognitive development in children with normal nutritional status. The stunted in the Sumur Batu Bantar Gebang Sub-District of Bekasi show that normal toddlers have higher cognitive and language development achievements than the stunted toddler's group (19).

The results of a study at Pohkecik State Elementary School also stated that there was a relationship between nutritional status and the development of cognitive learning achievement in elementary school children. The better the nutritional status, the better the development of cognitive learning achievement. Nutrition aspects related to brain growth and development, level of intelligence, and nutritional status of children at primary school age (20). Paying attention to nutrition by maximizing the intake of fruits, fish, vegetables, and grains that contain some B vitamins, vitamin D, vitamin E, antioxidants, and omega-3 fatty acids, which are needed by the brain to improve cognitive abilities (21). Another study showed micronutrients could play an essential role in children's cognitive development. However, the results of the intervention test using a single micronutrient cannot be concluded. More generally, there is evidence that malnutrition can impair cognitive development (22). The research results of Peni et al. in Mojowates Village, Mojokerto Regency also showed a relationship between nutritional status and cognitive development in toddler age children. A good nutritional status would optimize the growth of all body organs to facilitate the child development (23). Good nutritional status also improve all organs' change since adequate nutrition could prevent the child to be easily sick.

## CONCLUSION

The results of this study found a significant relationship between child psychology and child development, there is also a meaningful relationship between environmental sanitation and child development, but there is no relationship between family socio-economic and child development, and there is a close relationship between the nutritional status of children on child development. Future researchers are expected to observe the child's growth because growth is related to the child's development.

## ACKNOWLEDGMENT

We would like to thank the research institute and community service of STIKes Bina Sehat PPNI Mojokerto and all of the respondents in this study.

## REFERENCES

- (1) Puspongoro A. *Kegawatdaruratan dan Bencana: Solusi dan Petunjuk Teknis Penanggulangan Medik dan Kesehatan*. Jakarta: PT. Rayyana Komunikasindo; 2016.
- (2) DAS A co. *Indonesia Dalam Kondisi Kritis*. In: EDISI 2. JAKARTA; 2013.
- (3) World Health Organization (WHO). *Flooding and communicable diseases fact sheet Risk assessment and preventive measures*. 2000;(March):1–9. Available from: [https://www.who.int/hac/techguidance/ems/flood\\_cds/en/](https://www.who.int/hac/techguidance/ems/flood_cds/en/)
- (4) Media Indonesia. *Media Indonesia [Internet]*. Synlett. Available from: <https://mediaindonesia.com/read/detail/281130-awas-penyakit-menular-pascabanjir>
- (5) Faiq MH. *Belajar dari banjir bandang Bukit Lawang*.
- (6) Rosyidie, Arief D. *Partisipasi Masyarakat Dalam Pengelolaan Daerah Aliran Sungai Citarum*. 2012;
- (7) Wilkinson J. *Buku saku diagnosis keperawatan, diagnosis NANDA, intervensi NIC, kriteria hasil: NOC*. Jakarta: EGC; 2012.
- (8) Rahardjo K. *Asuhan Neonatus, Bayi, Balita dan Anak Prasekolah*. Yogyakarta: Pustaka Pelajar; 2012.
- (9) Arvin KB. *Ilmu Kesehatan anak*. edisi 15. Jakarta: EGC; 2012.
- (10) Kemenkes RI. *Keputusan Menteri Kesehatan RI tentang Standar Antropometri Penilaian Status Gizi Anak*. Standar Antropometri Penilaian Status Gizi Anak. 2011. p. 40.
- (11) Martira Maddeppungeng. *Buku panduan kuesioner pra skrining perkembangan (KPSP)*. Buku Pandu Kuesioner Pra Skrining Perkemb. 2018;1–25.
- (12) Chandra B. *Ilmu Kedokteran Pencegahan & Komunitas*. JAKARTA: EGC; 2003.
- (13) Amir H. *Psychology-Child Emotions The Link between Inter-Parental Conflict and Health Emotional Development of Children*. *J Psychol Clin, Psychiatry*. 2017;7(2):3–6.
- (14) de Souza JM, Verissimo M de la ÓR. *Child development: Analysis of a new concept*. *Rev Lat Am Enfermagem*. 2015;23(6):1097–104.
- (15) Notoadmodjo S. *Ilmu Kesehatan Masyarakat: Prinsip- Prinsip Dasar*. Jakarta: Rhineka cipta; 2008.
- (16) Notoadmodjo S. *Promosi Kesehatan dan Ilmu Perilaku*. Jakarta: Rhineka cipta; 2007.
- (17) Rukiyah AY. *Asuhan Neonatus, Bayi dan Anak Balita*. Jakarta: Trans Info Media; 2010. 106–123 p.
- (18) Setyaawati VAV. *Peran Status Gizi terhadap Kecerdasan Kognitif pada Masa Golden Age Period*. *J VISIKES*. 2012;11(2):105–12.
- (19) Hanum NL, Khomsan A. *Pola Asuh Makan, Perkembangan Bahasa, Dan Kognitif*

- Anak Balita Stunted Dan Normal Di Kelurahan Sumur Batu, Bantar Gebang Bekasi. *J Gizi dan Pangan*. 2016;7(2):81.
- (20) Peni T, Laili S, Jayanti E, Sari D. Analysis of Cognitive Abilities of School-Age Children Based on Eating Habits and Nutritional Status. *Int J Nurs MIDWIFERY Sci*. 2020;4(1 SE-Articles). Available from: <http://ijnms.net/index.php/ijnms/article/view/257>
- (21) Tucker KL. Nutrient intake, nutritional status, and cognitive function with aging. *Ann NY Acad Sci*. 2016;1367 (Nutrition in Prevention and Management of Dementia Nutrient):38–49.
- (22) Neuroscience H, Nyaradi A, Li J, Hickling S, Foster J, Oddy WH. The role of nutrition in children ' s neurocognitive development, from pregnancy through childhood. 2013;7(March):1–16.
- (23) Tri Peni, Windu Santoso OAPU. Nutrition Status and Cognitive Development in Toddler. *Int J Nurs Midwifery Sci [Internet]*. 2017;1(2):145–53. Available from: <http://ijnms.net/index.php/ijnms>