

## TABLE TOP TSUNAMI SIMULATOR ON TSUNAMI DISASTER PREPARADNESS OF SCHOOL CHILDREN

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### ABSTRACT

**Introduction:** Tsunami in Indonesia become a threat to society, especially for vulnerable groups. Primary school students are one of the vulnerable groups that should have adequate preparedness both in their knowledge and attitudes in facing the tsunami. To support the preparedness, a tabletop tsunami simulator has been developed. **Objective:** To describe the tsunami preparedness of school-age children and to assess the impact of the tabletop tsunami simulator on the knowledge and attitudes of school children towards tsunamis. **Methods:** The study design was a one group pre-test – post-test design with a total participant of 157 students. The research instrument used was a tabletop tsunami simulator and a questionnaire to assess knowledge and attitude towards tsunamis. The statistical test used was the Mann Whitney test. The inclusion criteria included primary school 5<sup>th</sup> and 6<sup>th</sup> grade students, had a smartphone, and were willing to be participants. The data was collected using Google form and had obtained ethical approval number 62/SDS/KEPK/TL/VI/2020. **Result:** The Mann Whitney test showed a significant effect between the tabletop tsunami simulator and the participants' knowledge of tsunamis with a p-value of 0.000 (p-value <0.05). In the attitude variable, an increase in the attitude score between the pre-test and post-test was also observed. The average attitude score increased from 32.99 to 34.97, with a p-value = 0.000. **Conclusion:** There is a significant effect between the tabletop tsunami simulator with the participants' knowledge and attitudes in facing the threat of a tsunami.

### ABSTRAK

**Latar belakang:** Kejadian tsunami Indonesia menjadi ancaman tersendiri bagi masyarakat terutama kelompok khusus. Anak sekolah dasar adalah salah satu kelompok khusus yang harus mempunyai kesiapsiagaan yang baik dilihat dari pengetahuan dan sikap dalam menghadapi ancaman tsunami. Diperlukan sebuah formula untuk bisa meningkatkan hal tersebut, salah satunya dengan tabletop tsunami simulator. **Tujuan:** Tujuan penelitian ini adalah gambaran kesiapsiagaan tsunami anak sekolah dan menganalisa pengaruh Tabletop Tsunami Simulator dengan pengetahuan dan sikap anak sekolah terhadap tsunami. **Metode:** Penelitian ini menggunakan pendekatan desain one group pretest-posttest dengan jumlah sampel 157 responden. Instrumen yang digunakan adalah tabletop tsunami simulator, kuisioner pengetahuan dan sikap. Uji statistic yang digunakan adalah uji mann whitney. Kriteria inklusinya adalah anak sekolah dasar kelas 5 dan 6, mempunyai smartphone, dan mau menjadi responden. Pengambilan data dilakukan dengan menggunakan Google form dan sudah memenuhi layak etik dengan no. 62/SDS/KEPK/TL/VI/2020. **Hasil:** Uji mann whitney didapatkan bahwa ada pengaruh antara tabletop tsunami simulator dengan pengetahuan responden tentang tsunami yaitu dengan P value 0.000 (P value < 0.05). Sedangkan pada variabel sikap ada kenaikan nilai dengan variabel sikap antara pretest dan posttest. Nilai rata-rata sikap dari 32.99 menjadi 34.97 dengan P value = 0.000. **Kesimpulan:** Ada pengaruh antara tabletop tsunami simulator dengan pengetahuan dan sikap responden dalam menghadapi ancaman bencana tsunami.

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**Keywords :** Tabletop Tsunami Simulator, knowledge, attitude, disaster-preparedness

**Introduction:**

Tsunamis are caused by a shift in the earth's plate due to an earthquake, causing giant sea waves (BNPB, 2011). Indonesia is a country with a high risk of tsunami due to its location on the Eurasian plate, the Indo Australia plate, and the Pacific Ocean plate (Viverita, Kusumastuti, & Husodo, 2014). In the South Coast of Java, 166 earthquakes have occurred, and 16 of them have the potential for a tsunami (Nurulliah, 2018). Jember Regency is one of the areas with a high risk of tsunamis. Seven districts have an increased risk of being affected by the tsunami (Maradona, 2011). A tsunami that occurs can cause tremendous damage and casualties. This year, the Meteorology and Geophysics Agency often issues tsunami early warnings in Java island waters. Therefore, all must be prepared optimally, including vulnerable groups.

One of the focused vulnerable groups is primary school children. The earthquake that hit Sichuan, China, in 2008, occurred during school hours. The earthquake with a magnitude of 7.9 Richter resulted in 87,000 deaths of which 5,335 people were students, and as many as 6% of the victims died in school (Consortium Disaster Education, 2011). Schools are safe places for millions of children and become a second family after home (Murray & Al, 2008). Thus, school readiness is essential to improve tsunami preparedness. There are three pillars for comprehensive school safety: safe school facilities, effective school disaster management and disaster resilience education (Management, 2014). *Sekolah Siaga Bencana (SSB)* or Disaster Prepared Schools Programme is an implementation of the Hyogo Framework 2005 - 2015 which requires schools to prepare students when a disaster occurs.

However, the level of disaster preparedness in schools is still low, both in terms of knowledge, attitudes and skills (Lesmana, 2015). Parameters for disaster prepared schools are the attitude and skills, school policy, planning and mobilisation requirements (Consortium Disaster Education, 2011). Most primary schools are not prepared

for a tsunami, either before, during, or after the tsunami. Students' knowledge and attitudes are indicators of disaster preparedness and the realisation of the Disaster-Prepared Schools Programme (Sujarwo *et al*, 2018). Tabletop disaster exercise is useful for practising group problem-solving, assessing specific case studies, observing various information, and training staffs in facing a tsunami (UNESCO, 2011). The process of knowledge transfer to something unfamiliar to health will create problems and make the knowledge transfer not optimal (Evans & Schwartz, 2018). Therefore, the use of tabletop tsunami simulator media, which is a media innovation, is expected to increase the preparedness of school children against tsunami which may occur anytime.

The study aims to describe the tsunami preparedness of school-age children and to analyse the impact of the Tabletop Tsunami Simulator on the knowledge and attitudes of school children towards tsunamis.

**Methods:**

The study was a quantitative study with one group pre-test – post-test design. The participants were 157 primary school students, generated by multistage random sampling method. 157 respondents are contained from 2 elementary school which nearest from sea and on 5<sup>th</sup> and 6<sup>th</sup> level.

Instruments used in this study was a tabletop tsunami simulator and knowledge-and-attitude questionnaire from Sujarwo *et al*. (2018). Tabletop tsunami simulator was an education tool for tsunami mitigation with suitable for elementary school. The data was collected using a Google form, and the data were statistically analysed using the Mann-Whitney test. An intervention using a tabletop tsunami simulator was given virtually to comply health protocols during the COVID-19 pandemic.

Inclusion criteria in this study were 1) primary school 5th and 6th-grade students; 2) willing to become a participant in this study, and 3) present during the experiment. Meanwhile, the exclusion criteria were: 1) the participants do not own a smartphone/android, and 2) the participants do not complete the

experiment. This study had obtained ethical approval number 62/SDS/KEPK/TL/VI/2020 from STIKES dr. Soebandi ethic commission.

### Results:

**Tabel 1. Distribusi Karakteristik Responden Berdasarkan Usia**

Usia	Frekuensi (n=157)	Persen (%)
10 Tahun	24	15.3
11 Tahun	55	35
12 Tahun	69	43.9
13 Tahun	9	5.7

The results consist of several participant characteristics, as shown in Table 1. Participants were on average 12 years old (43.9%).

**Tabel 2. Distribusi Karakteristik Responden Berdasarkan Jenis Kelamin**

Jenis Kelamin	Frekuensi (n=157)	Persen (%)
Laki-laki	68	43.3
Perempuan	89	56.7

Table 2 shows that most of the participants were female, with a total of 89 female participants (56.7%).

**Tabel 3. Distribusi Karakteristik Responden Berdasarkan Pengalaman Pelatihan atau Simulasi Bencana Tsunami**

Pengalaman	Frekuensi (n=157)	Persen (%)
Pernah 1 Kali	151	96.2
Belum Pernah	5	3.2
Lebih dari 1 kali	1	0.6

Table 3 displays that most of the participants (96.2%) have participated in a training or tsunami simulation at least once.

**Tabel 4. Gambaran Pengetahuan, Sikap dan Kesiapsiagaan Responden Terhadap Tsunami**

Variabel	Nilai Maximum	Mean	Kategori	SD
Kesiapsiagaan	20	14.28	Baik	3.607
Pengetahuan	10	6.35	Cukup	0.823
Sikap	40	32.99	Cukup	2.446

The results also give an overview about knowledge, attitude, and preparedness of the study participants regarding tsunamis. Table 4 indicates that the participants' knowledge had a mean score of 6.35 out of 10. The mean score of attitudes towards tsunami was 32.99 out of 40. On the other hand, the participants scored a mean score of 14.28 out of 20 for preparedness towards a tsunami.

**Tabel 5. Pengaruh Tabletop Tsunami Simulator Terhadap Pengetahuan**

Pengetahuan	Mean	SD	P Value
Pretest	6.35	0.823	0.000
Posttest	9.08	1.308	

The author also performs the Mann Whitney test to investigate the impact of the tabletop tsunami simulator on participants' knowledge and attitudes towards tsunami. The result of the Mann Whitney test is shown in table 5; there was an increase in the post-test compared to the pre-test. The mean score of knowledge increased to 9.08 from 6.35 with a p-value of 0.000, which means that the tabletop tsunami simulator has significantly affected the participants' knowledge regarding tsunami.

**Tabel 6. Pengaruh Tabletop Tsunami Simulator Terhadap Sikap**

Sikap	Mean	SD	P Value
Pretest	32.99	2.446	0.000
Posttest	34.97	4.351	

Table 6 shows an increase in attitude scores between the pre-test and post-test. The mean score of attitudes increased to 34.97 from 32.99 with a p-value of 0.000, which means that the tabletop tsunami simulator has significantly affected the participants' attitude towards tsunami.

### Discussion:

It can be concluded from the participants' characteristics that the participants were mostly women, and the mean age was 12 years. Twelve years old is in a range of child age-group (Kementerian Kesehatan RI, 2014).

Descriptive statistic results on tsunami preparedness showed a mean of 14.28. This result indicates a good tsunami-preparedness among the participants. Most of the participants (96.2%) have participated in tsunami training or tsunami-response simulation at least once.

The Mann Whitney analysis showed a significant association between tabletop tsunami simulator and the knowledge of tsunami among participants with a p-value of 0.000 (p-value < 0.05). An increase of 2.73 in the post-test score compared to the pre-test also supported the significant result.

Knowledge is a process of recalling something someone did either on purpose or spontaneously (Mubarak, W.I., Chayatin, 2009). It is in line with a previous study that stated that the best time to give children health education is between 11-20 years due to their exceptional sensory, psychology, and psychomotor functions. At this age, children are also more interested in trying new things (Wong, Eaton, Wilson, Winkelstein, & Schwartz, 2009). Another study mentioned that children's knowledge of disaster-preparedness increased using a virtual tabletop exercise method (So et al., 2019).

The presentation of something new, especially disaster-related, to children is the right solution. The tabletop tsunami simulator was made as engaging as possible to increase the knowledge regarding tsunami among school-age children.

This is equivalent to the independent variable, participants' attitude to a tsunami. Statistical analysis showed a significant influence between tabletop tsunami simulator and participants; attitude towards tsunamis with a p-value of 0.000 (p-value < 0.05). Attitude significantly affects how someone behaves in a disaster (Taghizadeh et al., 2012). Another report stated that people with the right attitude towards disasters would be calmer in the incidence of a tsunami (Codreanu, Celenza, & Alabdulkarim, 2015). High score of attitudes observed in this study suggested that the tabletop tsunami simulator may increase students' attitudes towards a tsunami.

Knowledge and attitude are some of the indicators used to build a disaster-prepared school (CDE, 2011). More studies reported a significant association between knowledge and attitude in students' preparedness to achieve disaster-prepared school (Fathoni, 2018). A school is a safe place for millions of children globally and their second home (Blum et al., 2008). Thus, students' preparedness for disasters at school, especially tsunamis, is essential to reduce risks caused by tsunamis.

### Conclusion:

The conclusion of this study is students have a good preparedness; even so, improvements still should be made. The tabletop tsunami simulator may increase students' knowledge and attitude towards tsunami and may be used as a reference for schools to construct a disaster-prepared school.

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