# Editorial Policies

## Focus and Scope

Jurnal Keperawatan Soedirman is a Nursing journal cover all nursing area including basic research in nursing, management nursing, emergency and critical nursing, medical surgical nursing, mental health nursing, maternity nursing, pediatric nursing, gerontological nursing, community nursing, family nursing education nursing, complementary and alternative medicine (CAM) in nursing.

## Section Policies

### *Articles*

☑ Open Submissions    ☑ Indexed    ☑ Peer Reviewed

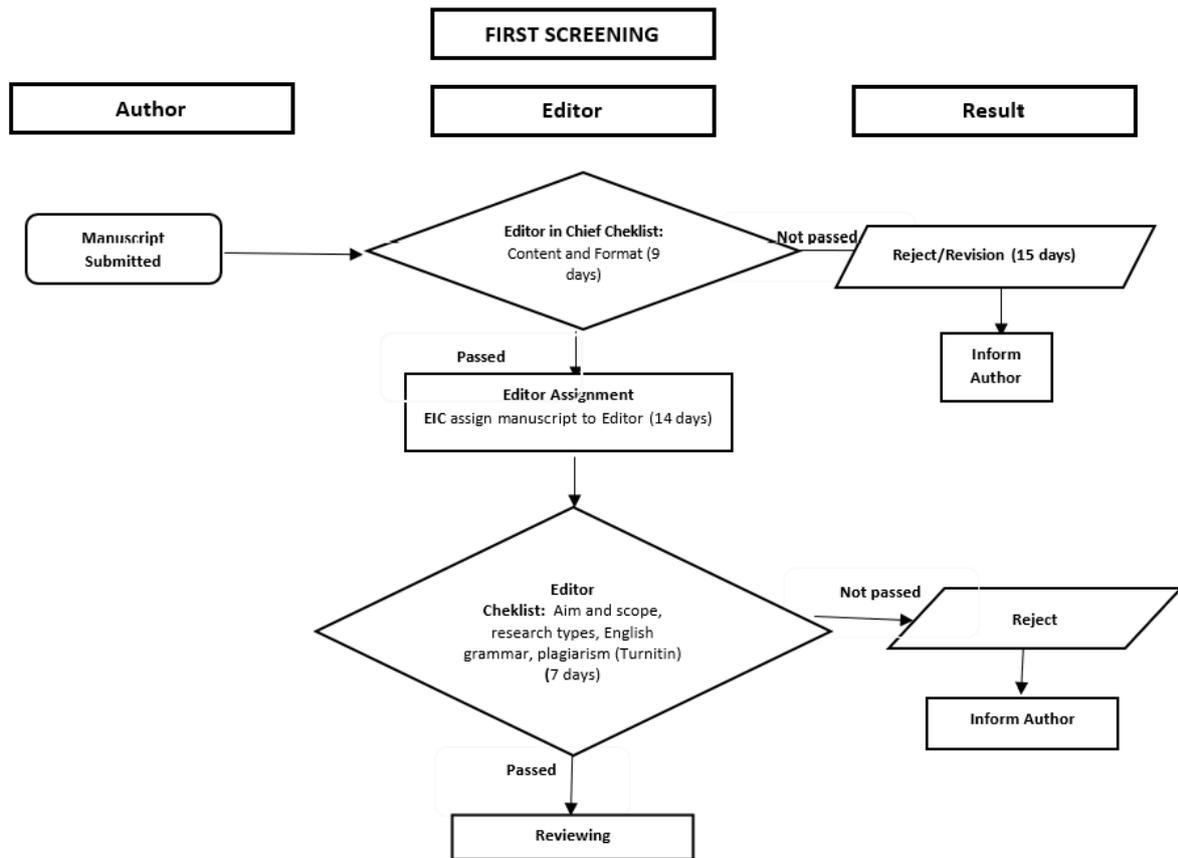### *Systematic review and meta analysis*

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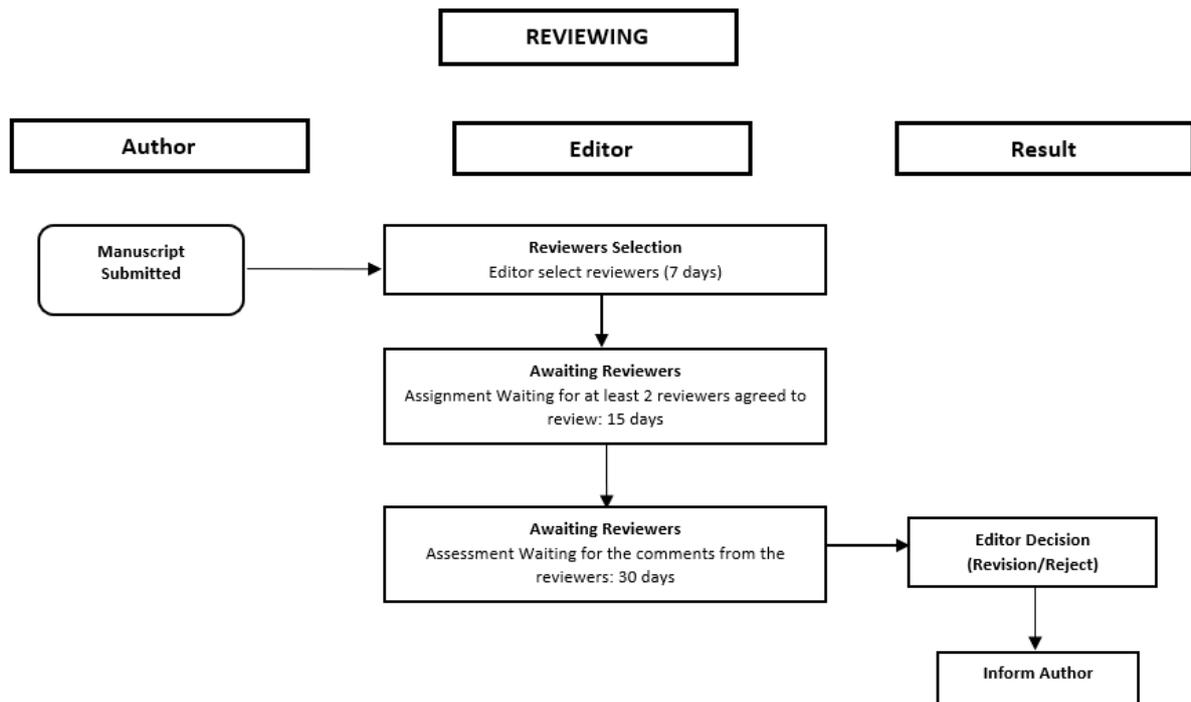
## Peer Review Process

Each submitted manuscript will be reviewed by two colleagues in the same field of science and assessed in conformity with the journal context. Review process is double-blind.

The peer review process consists of the steps below.

## Step 1

**FIRST SCREENING**

| Author | Editor | Result |

**Manuscript Submitted**

**Editor in Chief Cheklist:** Content and Format (9 days)

Not passed → **Reject/Revision (15 days)** → **Inform Author**

Passed ↓

**Editor Assignment** EIC assign manuscript to Editor (14 days)

↓

**Editor Cheklist:** Aim and scope, research types, English grammar, plagiarism (Turnitin) (7 days)

Not passed → **Reject** → **Inform Author**

Passed ↓

**Reviewing**

## Step 2

**REVIEWING**

| Author | Editor | Result |

**Manuscript Submitted**

**Reviewers Selection** Editor select reviewers (7 days)

↓

**Awaiting Reviewers** Assignment Waiting for at least 2 reviewers agreed to review: 15 days

↓

**Awaiting Reviewers** Assessment Waiting for the comments from the reviewers: 30 days → **Editor Decision (Revision/Reject)** → **Inform Author**

## Step 3

**REVISION**

| Author | Editor | Result |
|---|---|---|

**Revise Manuscript Submit revised manuscript** → **Editor Cheklist: Revised article (7 days)**

Not passed → **Resubmit/ Rejected**

Passed

**Editor Assignment**
**Editor assign manuscript to reviewer/round 2 (14 days)**

## Step 4

**DECISION MAKING**

| Author | Editor | Result |
|---|---|---|

**Awaiting Editor Recommendation**
Editor summarizes reviewer's comments and makes recommendation: 14 days

**Revise manuscript**
**Major revision: 30 days**
**Minor revision: 15 days**
**Submit revised manuscript/ resubmit as a new article** ← **Editor Recommendation**
Editor makes a decision and notifies author by e-mail: 7 days → **Inform Author**

**Revised or Resubmitted**

## Step 5

**FINAL DECISION MAKING**

| Author | Editor | Result |
|---|---|---|

**Awaiting Editor Decision**
Editor summarizes reviewer's comments: 7 days

**Revised manuscript**
**Major revision: 60 days**
**Minor revision: 30 days** ← **Editor Recommendation**
Editor makes a decision and notifies author by e-mail: 3 days → **Accepted/Rejected**
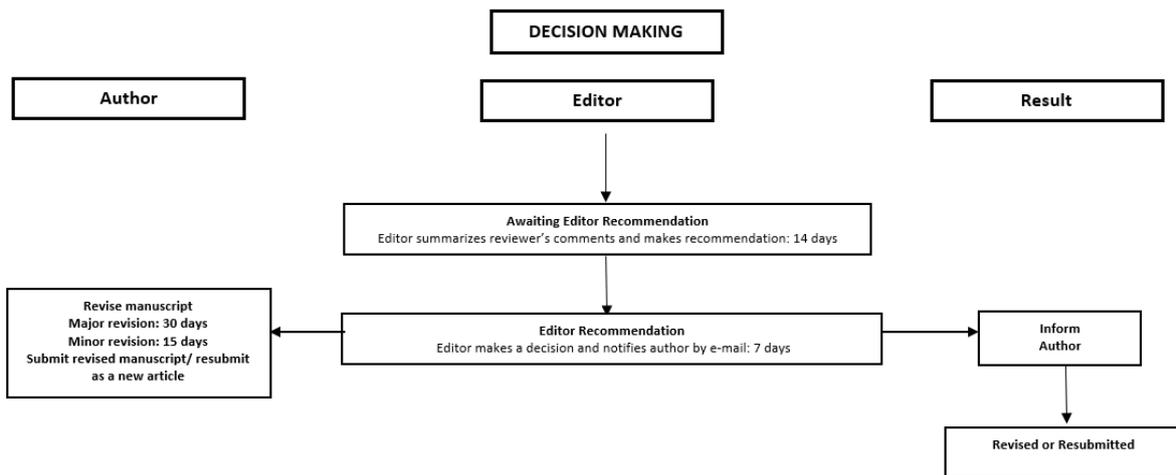
**Revision Manuscript Submitted** → **Publication**

**Inform Author**

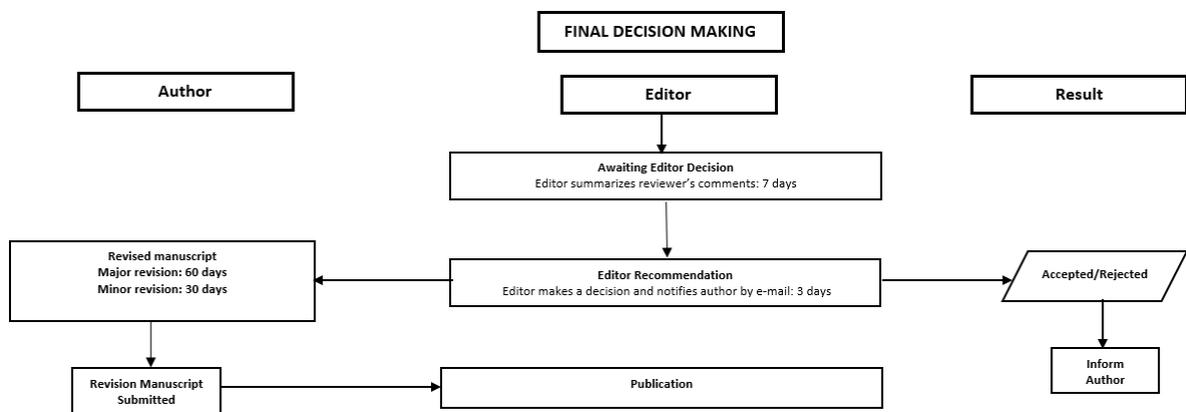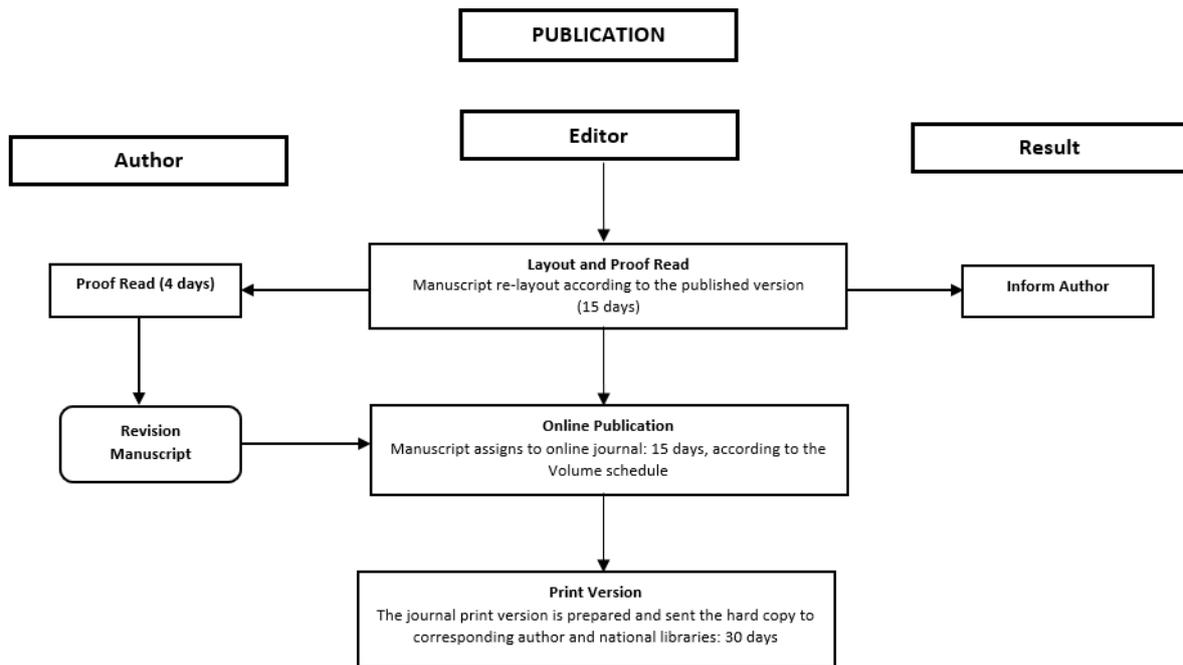**Step 6**



## Publication Frequency

The Jurnal Keperawatan Soedirman publishes 3 times a year in March, July, and November.

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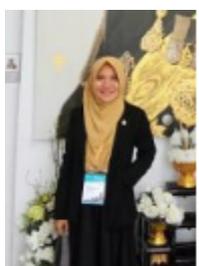# Galih Noor Alivian S.Kep.,Ns., M.Kep
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### Participants

Researchers from Universities, Research Institutes, and Hospitals.

### Abstract and Indexer

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### Writing Guidelines

### Coverage

Jurnal Keperawatan Soedirman includes research and developments in nursing fields, such as surgical medical nursing, emergency, and critical nursing, pediatric nursing, maternity nursing, community nursing, gerontologic nursing, nursing management, and other related fields.

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Jurnal Keperawatan Soedirman receives a full research article, and case study. Generally, the full research article, systematic review, and case study do not exceed 12 pages (3000-5000 words). The article should be written in English. A copy of institutional review board (IRB) approval is required for any research published in Jurnal Keperawatan Soedirman. The number of IRB approval should be provided in the methods section.

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The title section consists of:

1. The title of the article (not exceeding 20 words).

2. Author's name and its affiliation (institution). The author responsible for the correspondence, marked "*", which is then under affiliation given the "*" email address"

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The abstract should be concise, maximum of 200 words, written both in Indonesian and English. The abstract contains a summary of the research's background, objectives, methods, key results, and main conclusions. It should be avoided writing libraries or citations in abstracts and abbreviated abbreviations.

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This section contains tools and materials specifically used in the research as well as the workings of research methods undertaken. The workings that already existed in previous research, should be included in the reference and only modification if da which needs to be written in detail.

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The obtained result is then discussed by comparing it with the results of previous research. Other sources of references (of the previous research) are aimed at strengthening the argumentation of the results of research that has been done. The sources of references in the discussion must meet the scientific requirements (journal, textbook, or proceedings).

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**Acknowledgment**

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Simple mathematical formulas should use a slash (/) to replace a horizontal line, for example, X / Y.

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The title is written underdrawings, middle averages, capital letters at the beginning of a sentence. Avoid unusual use of abbreviations. The title pointer of the image is thick (for example, Figure 1. Influence Z on Y under X).

## Table

The table is given a horizontal line in the header (first row) and the end of the table only, with no vertical lines.

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The title is written above the table, left flat.

## Library

Type

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## Example of writing

## In writing

## Single author

In one developmental study (Smith, 1990), children learned ...

or

In the study by Smith (1990), primary school children ...

or

In 1990, Smith's study of primary school children ...

## Plural authors

The first citation: Masserton, Slonowski, and Slowinski (1989) state that ...

Next citation: Masserton et al. (1989) state that ...

## Some references in a sentence

Several studies (Jones & Powell, 1993; Peterson, 1995, 1998; Smith, 1990) suggest that ...

**Writing in the References**

**Book:**

Strunk, W., & White, E. B. (1979). *The guide to everything and then some more stuff*. New York, NY: Macmillan.

Gregory, G., & Parry, T. (2006). *Designing brain-compatible learning* (3rd ed.). Thousand Oaks, CA: Corwin.

**Book chapter:**

Bergquist, J. M. (1992). German Americans. In J. D. Buenker & L. A. Ratner (Eds.), *Multiculturalism in the United States: A comparative guide to acculturation and ethnicity* (pp. 53-76). New York, NY: Greenwood.

**Journal with DOI:**

Fatoni, A., Numnuam, A., Kanatharana, P., Limbut, W., Thammakhet, C., & Thavarungkul, P. (2013). A highly stable oxygen-independent glucose biosensor based on a chitosan-albumin cryogel incorporated with carbon nanotubes and ferrocene. *Sensors and Actuators B: Chemical, 185*(0), 725-734. DOI:10.1016/j.snb.2013.05.056

**Journal without DOI (DOI not available):**

Hermawan, D., Yatim, I. M., Ab Rahim, K., Sanagi, M. M., Ibrahim, W. A. W., & Aboul-Enein, H. Y. (2013). Comparison of HPLC and MEEKC for Miconazole Nitrate Determination in Pharmaceutical Formulation. *Chromatographia, 76*(21-22), 1527-1536.

Hamfi, A. G. (1981). The funny nature of dogs. *E-journal of Applied Psychology*, 2(2), 38 - 48. Retrieved from http://ojs.lib.swin.edu.au/index.php/fdo

**Conference**

Zusfahair, Ningsih, D. R., & Kartika, D. (2015). *The potency of Amylase Producing Bacteria in the Liquid Waste of Tapioca Factory*. Paper presented at the 1st Pharmacy International Conference, Purwokerto, Indonesia.

**Online Newspaper:**

Becker, E. (2001, August 27). Prairie farmers reap conservation's rewards. *The New York Times*. Retrieved from http://www.nytimes.com

**Encyclopedia:**

Brislin, R. W. (1984). Cross-cultural psychology. In R. J. Corsini (Ed.), *Encyclopedia of psychology* (Vol. 1, pp. 319-327). New York, NY: Wiley.

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3. If any URL address of the reference should be written.
4. Text typed in single space; font 12; all-images, use italics instead of underscore (except the URL address); and all illustrations, drawings, and tables are placed according to positions in the text (not on separate pages).
5. Writing styles follow the terms listed in the Author Guidelines
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If you do not have funds to pay such fees, you will have an opportunity to waive each fee. We do not want fees to prevent the publication of worthy work.

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# DOES CIGARETTE SMOKE EXPOSURE ON PREGNANT WOMEN INCREASE THE RISK OF AUTISM SPECTRUM DISORDERS IN THEIR CHILDREN?

**Desiyani Nani**

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## ABSTRACT

The prevalence of autism spectrum disorder (ASD) has increased over the last three decades. Although genetic factors have a big contribution to ASD, environmental factors, prenatal, and postnatal factors were also found to be related. According to past literature, exposure to cigarette smoke during pregnancy raises the risk of behavioral problems in children, including ASD. The purpose of this study was to determine the relationship between maternal exposure to cigarettes during pregnancy and the risk of having a child with ASD in Indonesia. This is a case-control study that was conducted in Banyumas, Indonesia. The study consisted of 47 children with ASD as the case group and 195 healthy children as the control group. The Chi-Square test was used to evaluate the relationship between exposure to cigarettes and ASD. The findings showed that exposure to cigarette smoke from active or passive smokers during pregnancy was associated with the occurrence of ASD in children ($p < 0.05$). Exposure to cigarette smoke during pregnancy raises the risk of ASD in children. Therefore, nurses should provide adequate education to the community about the dangers of exposure to cigarette smoke during pregnancy and the risks for ASD in their children.

## INTRODUCTION

*Autism spectrum disorder* (ASD) is a disability that is concerned with impairments in communication and social interaction, and repetitive behavior (*American Psychiatric Association*, 2013). It was estimated that 1 of 68 children diagnosed with ASD had a heritability presentation chance of 0.5-0.9%. Studies have shown that 881 genes, at least one of each chromosome, are factors that affect ASD (Butler, Rafi, & Manzardo, 2015). It was estimated 62/10 000 children were diagnosed with ASD around the world (Elsabbagh et al., 2012). There were 14.7/1000 children in the USA (CDC, 2014) and 27.2/10 000 children in Japan that were diagnosed with ASD (Honda, Shimizu, & Rutter, 2005). Meanwhile, in Indonesia, research about ASD prevalence is still limited. In 1992, it was reported that 12/10 000 children are diagnosed with ASD in Indonesia (Wignyosumarto, Mukhlas, & Shirataki, 1992). Based on the Indonesian Ministry of Education report in 2009, 638,000 children were diagnosed with ASD, and this statistic would rise 15% every year (Riany, Cuskelly, & Meredith, 2016).

Many clinical manifestations appear in children with ASD, especially problems in social and interaction skills, as well as repetitive behavior or interests. Some children with ASD would also show other characteristics such as delayed language and cognitive skills (CDC, 2021). The multiple clinical manifestations that are present in ASD make it challenging to study the etiology and genetic mechanism of ASD. Diagnostic and statistical manual of mental disorders (DSM-5) has categorized ASD based on clinical manifestations such as persistence deficit in social communication and repetitive behavior, interest, or activity patterns (American Psychiatric Association, 2013).

Multiple factors contribute to ASD such as genetic, environmental, pregnancy, and behavioral factors (CDC, 2020). One of the factors that are still being investigated as a risk factor of ASD is maternal smoking status during pregnancy. A previous study from howed that smoking causes several problems during pregnancy. Banyumas is the second highest region in terms of the number of active smokers in Central Java after Cilacap with 32.98% of the

productive age population being smokers (25-34 years old) (Statistics Indonesia, 2019).

Numerous studies have proven that smoking during pregnancy has caused several disorders such as preterm birth, low birth weight, altered cardiorespiratory responses, birth defects, and more (CDC, 2020); (Knopik, 2013); (Kataoka, Carvalheira, & Ferrari, 2018). Furthermore, past literature has also reported that mothers who were active or passive smokers during pregnancy are likely to have children with ASD (Johani, Mohamed, Abd Majid, Ibrahim, & Md Isa, 2020); (Kim et al., 2021). Conversely, studies from Norway and the UK have shown that there was no relationship between smoking status during pregnancy and ASD (Moylan et al., 2015); (Caramaschi et al., 2018). Therefore, this study investigated the relationship between maternal exposure to cigarettes during pregnancy and the risk of having children with ASD in Indonesia.

## METHOD
### Study Design
This is a quantitative analytical study with a case-control design.The case group consisted of children diagnosed with ASD, where the diagnoses were examined by psychologists and pediatricians that specialize in neurology and the diagnoses were made based on DSM V. Meanwhile, the control group was children in the healthy category that showed no signs of behavioral disorders or other mental disorders.

### Sample
The researchers did not calculate the sample size and used a purposive and consecutive sampling method of sample selection because ASD is a rare case. The inclusion criteria were mothers who were willing to become respondents within February-June 2018.

In this study, the case group consisted of 47 children diagnosed with ASD and 195 healthy children as the control group. The study was conducted in the region of Ex Regency of Banyumas Residency, namely, Banyumas, Cilacap, Purbalingga, and Kebumen Regencies.

### Data Collection
Consecutive sampling was used over 4 months to collect study samples. Parents who have children with ASD were invited to the Banyumas Autism Care Project (BACP) and were asked for their informed consent for their children to become participants. Control groups were selected from healthy children who came with their parents and through our team's visitation of local schools.

### Instrument
Demographic data that was measured in this research were the children's sex, newborn weight, gestational age, maternal age, maternal and paternal education status, and maternal and paternal smoking status.

The variables were measured in a questionnaire that consisted of 10 questions, namely, the name of the child and parents, gender and age of the child, and the child's weight and gestational age at birth. The questions for the parents were the age of the mother, the last education of the father and mother, and the smoking status of the father and mother.

The risk category of maternal smoking status included mothers that are active and passive smokers. Active smokers are defined as individuals who would smoke one or more cigarettes per day during pregnancy, while passive smokers were defined as individuals with a household member that regularly smoked cigarettes in their presence or if a co-worker smoked in the same indoor room in their presence during pregnancy (Bonita, Duncan, Truelsen, Jackson, & Beaglehole, 1999).

### Data Analysis
The data analysis was conducted by univariate and bivariate analysis. The univariate analysis of variables was presented by frequency and percentage of proportions. The bivariate analysis used the Chi-square test to explore correlations between variables.

### Ethical Consideration
This study has been approved by the Faculty of Medicine, Public Health and Nursing Ethics Committee of Universitas Gadjah Mada with number: KE/FK/0686/EC/2017.

## RESULTS
### Description of Respondent Characteristics
The respondents in this study were 242 respondents that divided into two groups, namely, the case group (N = 47, 36 boys and 11 girls) and the control group (N = 195, 72 boys and 123 girls). Most children were of school age. Most of the fathers' highest education levels in the case group were university level, and in the control group were high school level. The majority of both groups' highest level of education for mothers was high school level. The social demographic data are shown in Table 1.

**Table 1. Distribution of children's characteristics (n=242)**

| Variables | | Case group (n = 47) | | Control group (n = 195) | |
|---|---|---|---|---|---|
| | | f | % | f | % |
| Gender | Boys | 36 | 76.6 | 72 | 36.9 |
| | Girls | 11 | 23.4 | 123 | 63.1 |
| Age | Toddler (2-3 years old) | 2 | 4.3 | 20 | 10.3 |
| | Preschool (4-6 years old) | 10 | 21.3 | 74 | 37.9 |
| | School age (7-12 years old) | 21 | 44.7 | 79 | 40.5 |
| | Teenagers (13-18 years old) | 14 | 29.8 | 22 | 11.3 |
| Fathers' highest education level | < Elementary school | 0 | 0 | 67 | 34.4 |
| | Junior high school | 8 | 17.0 | 35 | 17.9 |
| | High school | 15 | 31.9 | 66 | 33.8 |
| | University | 24 | 51.1 | 26 | 13.3 |
| Mothers' highest education level | < Elementary school | 0 | 0 | 61 | 31.3 |
| | Junior high school | 6 | 12.8 | 42 | 21.5 |
| | High school | 21 | 44.7 | 69 | 35.4 |
| | University | 20 | 42.6 | 23 | 11.8 |

For measurement, we used data of the children's sex, newborn weight, gestational age, and maternal age. Based on the analysis of the frequency distribution of sex between the case and control groups, a significant difference was obtained, as indicated by the value of p = 0.00 (p < 0.05) with a value of OR = 5.6, which means that boys have a 5.6 times higher risk for ASD compared with girls. There was also no strong significant relationship between newborn weight, gestational age, and maternal age to ASD in this study. The data is shown in Table 2.

**Table 2. Characteristics of children with and without ASD (n=242)**

|  |  | Cases group (n = 47) | | Control group (n = 195) | | *p* | OR | CI 95% | |
|---|---|---|---|---|---|---|---|---|---|
|  |  | f | % | f | % |  |  | Min | Max |
| Gender | Boy | 36 | 76.6 | 72 | 36.9 | 0.00 | 5.6 | 2.68 | 11.66 |
|  | Girl | 11 | 23.4 | 123 | 63.1 |  |  |  |  |
| Newborn weight | Risky (< 2500 gr/> 4000 gr) | 5 | 10.6 | 11 | 5.6 | 0.206 | 1.99 | 0.66 | 6.04 |
|  | Not risky (> 2500 gr-4000 gr) | 42 | 89.4 | 184 | 94.4 |  |  |  |  |
| Gestational age | Risky (preterm/post-term) | 12 | 25.5 | 29 | 14.9 | 0.125 | 1.96 | 0.9 | 4.22 |
|  | Not risky (aterm) | 35 | 74.5 | 166 | 85.1 |  |  |  |  |
| Maternal age | Risky (< 20 years old/> 35 years old) | 9 | 19.1 | 31 | 15.9 | 0.75 | 1.25 | 0.55 | 2.85 |
|  | Not risky (20-35 years old) | 38 | 80.9 | 164 | 84.1 |  |  |  |  |

Table 3 shows the association between exposure to cigarette smoke (active and passive smokers) and ASD. It was found that maternal and paternal smoking status is related to ASD with a *p*-value = 0.003 and 0.00, and OR value = 0.33 and 1.02.

**Table 3. Analysis of the association of exposure to cigarette smoke with ASD**

|  |  | Case group (n = 47) | | Control group (n = 195) | | *p* | OR | CI 95% | |
|---|---|---|---|---|---|---|---|---|---|
|  |  | f | % | f | % |  |  | Min | Max |
| Maternal smoking status | Risky | 12 | 25.5 | 99 | 50.8 | 0.03 | 0.33 | 0.16 | 0.68 |
|  | Not risky | 35 | 74.5 | 96 | 49.2 |  |  |  |  |
| Paternal smoking status | Risky | 27 | 57.4 | 111 | 56.9 | 0.00 | 1.02 | 0.54 | 1.95 |
|  | Not risky | 20 | 42.6 | 84 | 43.1 |  |  |  |  |

## DISCUSSION

The number of children with ASD has continuously risen over the years (Baio et al., 2018) due to various etiologies including genetic and environmental factors (Hallmayer, 2011 and Sandin et al., 2014). Past literature has found that problems during the prenatal period could cause ASD in children in later life (Ben-Ari, 2015); (Stoner et al., 2014); (Willsey et al., 2013). This study found that sex and exposure to cigarettes during pregnancy are related to ASD.

Based on this study's demographic data measurement, boys have a higher possibility of having ASD than girls. Research in Egypt has shown a similar result where as many as 82 children out of 100 respondents were boys with ASD (82%) (El-Baz, Ismael, & El-Din, 2011). Similarly, Mandy et al. (2012) had more boys with ASD (N = 273) than girls (N = 52) as their participants. Furthermore, a study in Indonesia by Aditya, Dahliana, Widodo, & Sekartini (2021) also reported that boys have a significant association with ASD. Thus, these studies suggest that neurodevelopmental disorders are more common in the male gender. The mechanisms underlying higher vulnerability in men are unknown and are still being studied. Current research in the field of biology is examining why autism and other neurodevelopmental disorders are more prevalent in the male sex.

ASD is a complex neurodevelopmental disorder with a male-to-female occurrence ratio of 4:1 (Lai, Lombardo, & Baron-Cohen, 2014); (Zhang et al., 2020). Some researchers found that genes and hormones are associated with this gender risk factor in ASD (Zhang et al., 2020). One reason why the prevalence of ASD in males appears to be higher than females is that the signs and symptoms of ASD are more visible in males than females. Males with ASD show more externalizing behavior problems than females, such as aggressive behavior, hyperactivity, reduced prosocial behavior, and increased repetitive/restricted behaviors and interests. Females with ASD show more internal and emotional symptoms, such as anxiety or depression. Thus, it has been easier for ASD to be detected in boys (Werling & Geschwind, 2013). However, this sex-specific risk factor mechanism of ASD is still being investigated.

This research found that mothers that were exposed to cigarette smoke during pregnancy had a relationship with ASD. Hertz-Picciotto et al. (2021) and Ehrenstein et al. (2021) stated that mothers who actively smoked more than 20 cigarettes per day during pregnancy have a higher chance of having children with ASD. A meta-analysis study also found that mothers who were passive smokers have a risk of having children with ASD (Johani et al., 2020). Moreover, some studies have announced that smoking during pregnancy could raise the risk of hyperactive behavior and emotional problems in children (Lin et al., 2017); (Poole-Di Salvo, Liu, Brenner, & Weitzman, 2010). Additionally, smoking increases the risk of spontaneous abortus, premature labor, low birth weight, immunity problems such as asthma and allergy,

learning problems, attention deficit disorders, and mental disorders in children (Kiechl-Kohlendorfer et al., 2010).

This study also found that paternal smoking status during pregnancy is related to ASD. To our best knowledge, there are still limited studies about the relationship between fathers' smoking status with ASD. A study from South Korea discovered that prenatal paternal smoking significantly increased the risk of having children with ASD (Kim et al., 2021). Research from Japan also found that paternal smoking was related to short birth length and small head circumference (Inoue et al., 2017). However, research from Taiwan reported that there was an insignificant relationship between paternal smoking with low birth weight, small size for gestational age, and preterm birth infants (Ko et al., 2014).

Although the mechanism of ASD is still unclear, some studies believed that it could happen because of genetic mutations and cigarette exposure during pregnancy. This is because maternal cigarette smoking could alter the equilibrium between the oxidant and antioxidant systems in the mothers' body. This in turn causes oxidative stress and augments lipid peroxidation, which results in free radicals in the body and affects fetus development (Mund, Louwen, Klingelhoefer, & Gerber, 2013). Furthermore, toxins from cigarettes could also alter gene expression during fetus development (Joubert et al., 2012). Nicotine in cigarettes is also well-known for affecting the brain and neurological functions of the fetus (Cope, 2015).

The mechanism for paternal smoking status on fetus development is also still unclear. We assume that smoking fathers cause mothers to become passive smokers. Cigarette smoke is known to be riskier for passive smokers because it can spread damaging chemicals and toxins to the environment (American Cancer Society, 2020). Therefore, cigarette smoke inhaled by pregnant women could negatively impact the pregnancy and alter the fetus' development. However, further studies are needed to investigate the mechanism between paternal smoking status and ASD.

## CONCLUSION AND RECOMMENDATION
Gender and exposure to cigarettes during pregnancy are risk factors for the development of ASD in children. Boys have a 5.6 times higher risk for ASD than girls. Therefore, it is recommended for nurses to provide education to the community, especially to couples of childbearing age, about the dangers of exposure to cigarette smoke on fetal growth and development and risk for ASD.

## ACKNOWLEDGMENT

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**ORIGINAL ARTICLE**

# REMOTE LEARNING FOR NURSING EDUCATION IN INDONESIA DURING THE COVID-19 PANDEMIC: EFFORTS AND RECOMMENDATIONS

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## ABSTRACT

The COVID-19 pandemic had an impact on nursing students' academic and clinical performance. Nursing institutions have provided remote learning to continue the learning process. However, students have met several obstacles that caused a decrease in the quality of learning. Remote learning for education requires the support of information and communication technology. However, studies related to how the COVID-19 pandemic affected nursing education in Indonesia are still rarely done. Accordingly, this study was conducted to evaluate the implementation of remote learning for nursing education during the COVID-19 pandemic. A cross-sectional study was conducted with 331 members of the Association of Indonesian Nurse Education Center (AINEC). The instrument used was the *Guidelines of Filling Out Remote Learning*. The results showed that 51% of the study programs implemented remote learning, while 69% of the regulations for remote learning were created by rectors. The most common teaching materials were visual, text, and audio-visual content. These materials were distributed through WhatsApp Group, Learning Management System (LMS), and video conference. To support the process of remote learning, nursing institutions need to improve information technology staff and cooperate agreement with other institutions. Overall, the remote learning process needs to be further improved to increase the students' learning quality.

Keywords: Education; COVID-19 pandemic; nursing; remote learning

## INTRODUCTION

The COVID-19 pandemic has driven changes in many systems, including the health, economic, social, and education systems, due to the limited space for human movement due to the spread of the *coronavirus* (Cucinotta & Vanelli, 2020; Giatman *et al.,* 2020). For instance, the pandemic has significantly caused a shortage of health workers, facilities, and equipment (Zendrato & Hiko, 2021).

However, the existence of technological developments has made it easier for the healthcare system to achieve system goals. Technology has made it easy for people to get services that are fast, precise, and easy (Harjanto *et al.,* 2018). Moreover, health service performance at the primary and hospital levels has also improved both in clinical and community settings due to technological advancements (Wahyuningrum *et al.*, 2021).

However, the pandemic has negatively affected the education sector and caused a decrease in the quality of learning for students (Sahu, 2020). It is estimated that 91.3% or around 1.5 billion students worldwide were unable to attend school due to the emergence of the COVID-19 pandemic (UNESCO, 2020). This number includes approximately 45 million students in Indonesia or about 3% of the global affected student population (Central Bureau of Statistics, 2020). The pandemic required learning systems to be replaced with remote learning to ensure the continuation of the learning process. Per the instructions of the Ministry of Education and Culture, the government has prohibited universities from conducting face-to-face (conventional) lectures and ordered them to hold online lectures or remote learning (Ministry of Education and Culture Circular Letter No. 1 of 2020).

Remote learning is a form of distance learning that utilizes telecommunications, information technology, and learning processes such as video tutorials, teaching materials, and test questions for evaluation (Fuadi *et al.*, 2020). Its advantages include flexibility as students can learn anywhere and anytime, are able to get a new learning atmosphere according to their respective learning styles, save on transportation costs, and have more time to spend with their family. Moreover, with remote learning, students tend to be more creative, independent, and responsible. Meanwhile, the shortcomings of remote learning are the lack of interaction between lecturers and students, the change in teaching methods (from face-to-face to online), the lack of student motivation, and accessibility as not all students have internet access.

The remote learning process initially received a positive response from students, but over time, students have voiced several obstacles to this learning method, including an unsupportive network, lack of internet data, unfavorable home conditions, and lack of focus (Li *et al.,* 2021). Students also mentioned the obstacles they face because of the many assignments with short deadlines (Azzahra, 2020). Moreover, a previous study has found that the learning environment of online lectures does not support student learning because the process is not properly supervised (Harjanto *et al.,* 2018). In addition, weak internet signals and expensive internet quota fees are challenges in online learning (Azzahra, 2020). Therefore, to improve the quality of the remote learning environment, support from all aspects is needed.

The practice of nursing education has its own challenges in the pandemic era, especially from a clinical perspective. According to the Law on Health Workers No. 36 of 2014, nursing education seeks to produce responsible health workers who have high ethics and morals, expertise, and authority to improve health efforts. Higher education in the field of health as referred to in paragraph 4 article 17 of the Health Manpower Law Number 36 of 2014, is required to balance the implementation of health efforts and the dynamics of employment opportunities, pay attention to the balance of the production capabilities of health workers and available resources as well as the development of science and technology. The pandemic era has proved that the decreasing number of health workers has encouraged them to maximize the use of technology.

Based on a previous study, the COVID-19 pandemic has had an impact on nursing students' academic and clinical performance (Oducado & Estoque, 2021). Nursing institutions should provide remote learning to continue the learning process. However, students in higher education institutions met several obstacles that decreased their quality of learning. Nursing students in the Philippines reported poor satisfaction with remote learning (Oducado & Estoque, 2021). Remote learning for education requires the support of information and communication technology (Harjanto *et al.,* 2020). Therefore, the university's instructional planning and health-related procedures need to be strengthened to allow students and other stakeholders to continue learning while preventing the spread of the virus (Toquero, 2020).

However, to our knowledge, there is still a lack of studies related to how the COVID-19 pandemic has affected nursing education in Indonesia. Thus, this study was conducted to evaluate the implementation of remote learning for nursing education during the COVID-19 pandemic. In addition, our study also identified remote learning problems in the academic and clinical phase; efforts that had been made by institutions; and recommendations from institutions to improve the quality of learning during the COVID-19 pandemic.

## METHOD
### Study Design
We conducted a descriptive research study with a cross-sectional design. Secondary data was obtained from the results of a survey conducted by AINEC in May-July 2020.

### Study Sample
The study was conducted in Indonesia by distributing research instruments via Google Form to nursing institutions that are AINEC members. The purposive sampling method was used, and the inclusion criteria were faculty members from nursing schools who responded to the AINEC survey within 1 month. The participants were the head of study programs, deans, vice deans, nursing lecturers, and students in nursing institutions. In total, 158 of the 328 nursing institutions were AINEC members that were pursuing the nursing program bachelor's degree in Indonesia. The total number of participants in this study was 331.

### Instruments
In this study, we used the instrument from *Guidelines of Filling Out Remote Learning Survey* (Ministry of Research, Technology and Higher Education, 2017). It consists of 5 domains, including remote learning regulation, implementation of remote learning, teaching materials, human resources, and cooperation with other institutions. There are 28 closed questions and 4 open-ended questions. Some questions could have more than 1 answer. We used a validated survey that was further developed from the official guideline from the Ministry of Research, Technology, and Higher Education.

### Data Collection
Before this study began, we submitted a permit application letter and obtained permission from AINEC. This study used data from the results of a survey conducted by AINEC of their members in May 2020 regarding Online Learning Evaluation of Nurse Education Institutions.

## Data Analysis

Descriptive analyses methods were used to measure the implementation of remote learning in Indonesia during the COVID-19 pandemic. Qualitative data for opened questions was done by simple qualitative analysis. The qualitative data analysis in this study began with a review and exploration of the data, which included gathering all survey responses. The following stage was to create codes. The codes were modified based on the outcomes of the survey. The data were then summarized according to categories or themes. The last step was drawing a conclusion. In this final step, the researchers examined all entries of the same code, grouped these categories, and found the connection among the categories.

## Ethical Consideration

This study was approved by the Committee of Indonesian National Nurses Association with the number: 0003/DPP.PPNI/Ket/K.S/IX/2021. Informed consent was obtained from all participants before collecting data. The information collected from the participants was confidential and only used for research purposes.

## RESULTS

The participants were from 13 regions in Indonesia with a total of 328 members (Table 1). The total number of participants who filled out the online survey was 331 participants. The highest percentage of online survey submissions were from region 9 (East Java Province), while the lowest percentage came from region 12 (Papua, Maluku).

**Table 1. The distribution of AINEC member institution participants**

| Region | | Total members (n = 328) | Online survey (n = 158) |
|---|---|---|---|
| I. | Aceh | 12 | 7 |
| II. | North Sumatera | 15 | 4 |
| III. | West Sumatera, Jambi, Riau, Riau Island | 32 | 15 |
| IV. | South Sumatera, Lampung, Bengkulu, Bangka Belitung | 18 | 14 |

| Region | | Total members (n = 328) | Online survey (n = 158) |
|---|---|---|---|
| V. | DKI Jakarta, Banten | 30 | 11 |
| VI. | West Java | 31 | 25 |
| VII. | Central Java | 31 | 10 |
| VIII. | DI Yogyakarta | 15 | 7 |
| IX. | East Java | 55 | 28 |
| X. | Bali, NTT, NTB | 16 | 12 |
| XI. | Kalimantan | 15 | 11 |
| XII. | Sulawesi | 51 | 12 |
| XIII. | Papua, Maluku | 7 | 2 |

The implementation of remote learning for education is shown in Table 2. The majority of regulations related to remote learning were made by the rector (60%). For these regulations, the directions were in the form of circular letters (57%), decrees (42%), and meeting results (1%). Of all nursing institutions, 73% already had plans to implement remote learning. However, only 51% of institutions applied remote learning for all their study programs.

Various lecture strategies were used to run remote learning in their institutions. These include modified materials, self-made content, materials taken from the internet, bought materials, and others. The three common teaching material delivery methods were visual (24%), text (21%), and audio-visual (20%). For organizing the learning activities, most of them used group chats such as WhatsApp (WA) group (41%), followed by video conference (34%), Learning Management Systems (LMS) (15%), and repository (10%). For synchronous activities, the lecturer used Zoom (60%), Skype (11%), BigBlueButton (3%), and others (25%). To support remote learning, the nursing institutions provided internet facilities. The minimal bandwidth that was provided by the institutions was 100 Mbps (Megabits per second) (18%), but some institutions provided 100 – 250 Mbps (35%). The Human Resources (HR) staff that supported remote learning were mostly IT staff (61%), learning media developers (48%), instructional designers (31%), and none (14%). However, to support the process of remote learning, some nursing institutions had a cooperation agreement with other institutions (79%).

**Table 2. The implementation of remote learning in nursing education in Indonesia**

| Domain | The implementation of remote learning | n |
|---|---|---|
| **Remote Learning Regulation** | **Regulation maker of learning education[a]** | |
| | Rector | 269 |
| | Dean | 36 |
| | Head of Study Programs | 84 |
| | **The form of remote learning regulation in college institutions[a]** | |
| | Decree | 160 |
| | Circular Letter | 214 |
| | Meeting Result | 5 |
| | **Have remote learning strategic plan[b]** | |
| | Yes | 115 |
| | No | 43 |
| **Implementation of Remote Learning** | **The form of remote learning[a]** | |
| | Study program in remote learning | 38 |
| | Remote learning for all study programs | 240 |
| | Remote learning for some study programs | 62 |
| | Remote learning as an addition in all study programs | 81 |
| | Remote learning as an addition in some study programs | 46 |
| **Teaching Materials** | **How lecturers develop teaching materials[a]** | |
| | Bought | 24 |
| | Self-made | 210 |
| | Modified | 220 |

| Domain | The implementation of remote learning | n |
|---|---|---|
| | Taken from the internet | 143 |
| | Others | 6 |
| | **Various teaching materials[a]** | |
| | Text | 233 |
| | Audio | 197 |
| | Visual | 273 |
| | Audio-visual | 222 |
| | Animation | 78 |
| | Games and simulation | 99 |
| | Others | 14 |
| | **The facilities to organize activities[a]** | |
| | Repository | 73 |
| | WhatsApp group | 309 |
| | Learning Management System | 114 |
| | Video conference | 250 |
| | **The synchronous tools[a]** | |
| | Skype | 51 |
| | Zoom | 275 |
| | BigBlueButton | 15 |
| | Others (Google Meet, Webex) | 116 |
| | **Average of bandwidth[b]** | |
| | 100 Mbps | 28 |
| | 100 – 250 Mbps | 55 |
| | 250 Mbps – 1 Gbps | 41 |
| | >1 Gbps | 34 |
| **Human Resources** | **Human resources supporting remote learning[a]** | |
| | Instructional designers | 98 |
| | IT staff | 191 |
| | Learning media developers | 150 |
| | Others | 45 |
| **Cooperation with Other Institution** | **Cooperation with other institutions[a]** | |
| | Have cooperation agreements with other institutions | 125 |
| | Cooperation plans as an organizer and person in charge | 35 |
| | Cooperation plans as an agent | 52 |
| | Already cooperate with other institutions as an agent | 28 |

[a]*Respondents may select more than one choice*
[b]*Respondents only select one choice*

Several efforts have been made by institutions, including modifying learning methods, conducting evaluations at the end of practice hours, monitoring and evaluations every week, asking students to make learning resumes (academic phase) and make preliminary reports (clinical phase), modifying client cases to more affordable cases for example with neighbors or family, and motivating lecturers by providing SPADA grants from the ministry. SPADA is one of the Learning Management Systems (LMS) developed by the Ministry of Education that is mentioned in Table 3. Regarding technical processes, the institution has made several efforts: provided e-learning and blended learning training for lecturers and other staff, created online learning guidebooks and video tutorials, used virtual case analysis role plays, provided LMS, video recordings, conferences, handouts, videos, or e-books that can help students understand the lecture material, provided internet quota for students, prepared supporting infrastructure well, maximized WA group media, Google Classroom, Zoom Meeting, etc.

**Table 3. Remote learning problems in academic and clinical phases during the COVID-19 pandemic**

| | Academic phase | Clinical phase |
|---|---|---|
| **Learning process** | a. Suboptimal learning skills in the laboratory<br>b. Student motivation and abilities of learning skills<br>c. Difficulties in understanding material<br>d. Lecture assignments in every course<br><br>e. Difficulties in designing | a. Limited case media<br>b. Difficulties of virtual reality for clinical skills<br>c. Difficulties to provide methods of achieving psychomotor competence<br>d. Students' difficulties to imagine the given case<br>e. Lack of motivation in completing tasks<br>f. More difficulties in understanding the materials |
| **Technical process** | a. Limited lecturers and support staff.<br>b. Difficulties in monitoring students to keep following the material until they are finished | a. Bad internet connection<br>b. Lack of proficiency in using IT for students and lecturers<br>c. Clinical perceivers are not used to using online |

| | Academic phase | Clinical phase |
|---|---|---|
| | c. Not all lecturers have mastered the IT skills required in online lectures<br>d. Limited internet quota and network for lecturers and students<br>e. Expenses for the purchase of internet data<br>f. Some students have not been able to use the application<br>g. Difficulties of students adjusting to online learning | d. Lack of professional practice learning media<br>e. Difficulties in designing material that fit real cases<br>f. Financial needs for internet quota<br>g. Distractions, lack of focus, and less comfortable in creating learning atmosphere |
| **Evaluation process** | a. Learning objectives only reaching the cognitive aspect.<br>b. Laboratory and clinical practice cannot be evaluated.<br>c. Difficulties to achieve learning objectives related to attitude and psychomotor<br>d. Difficulties in evaluating lessons | a. Not all competency achievements can be done by online learning<br>b. Difficulties in evaluating student abilities<br>c. Difficulties in evaluating student's psychomotor competence<br>d. Students' unsatisfied with the achievement of their competence |

To optimize the implementation of remote learning, nursing institutions suggested several recommendations. The recommendations were grouped into infrastructure, human resources, and curriculum (Table 4).

**Table 4. Recommendations from nursing institutions to improve remote learning implementation**

| Infrastructure | Human Resource | Curriculum |
|---|---|---|
| a. Establishing remote learning support infrastructure<br>b. Collaborating with providers and application providers<br>c. Extending the network to remote places without incurring excessive costs<br>d. Developing low-cost and easily accessible platform | a. Workshop on online learning for academic and professional stages<br>b. Online training for laboratories and clinics using diverse learning media | a. Providing policy related to remote learning from AINEC<br>b. An introduction to remote learning for new students<br>c. Providing remote learning modules<br>d. Providing an example of a practicum video based on learning achievement |

## DISCUSSION

This study aims to evaluate the implementation of remote learning in institutions during the COVID-19 pandemic. The results showed that the power of rectors as principal of universities is important regarding the implementation of remote learning. Rectors are in charge of and responsible for the administration and management of the university (Rector Regulation of Universitas Indonesia, Number 14 of 2016). This suggests that rectors are generally considered as the regulation makers of remote learning in universities.

The COVID-19 pandemic caused a decrease in the learning quality of students in Indonesia. Our study's results showed that 73% of college institutions have a strategic plan for online learning and 51% have applied remote learning for all their study programs. Based on the Guidelines of Remote Learning in Indonesia from the Ministry of Research, Technology and Higher Education RI, it is referred to as a single mode of remote learning. A previous study has also reported that 99.3% of students admitted that the teaching and learning process was done online during the pandemic and only 0.7% did not conduct lectures for various reasons (Giatman *et al.*, 2020).

In line with the guide in the Online Learning Booklet from the Ministry of Education and Culture of the Republic of Indonesia, our study found that the online method which was implemented was WhatsApp group, Learning Management Systems (LMS), repository, and video conferences. In remote learning, the existence of a class is replaced by a virtual class called a Learning Management System (LMS). The LMS was used to facilitate learning activities, discussions, as well as distribute online materials and assignments (Ministry of Education and Culture RI, 2020). Furthermore, the government suggested institutions to use the Indonesian Online Learning System Grant (SPADA). SPADA is a learning management system that was developed by the Ministry of Education to develop student competencies. Thus, nursing institutions have the option to advance their learning innovation of remote learning by providing LMS (Harjanto *et al.*, 2018).

Lecturers have developed the teaching materials by themselves and by modifying the references. The IEEE defines a learning object as any entity - digital or non-digital - that can be used for learning, education, or training. In the context of remote learning, the learning materials used are digital learning resources that can be packaged and reused in modules, units, courses, or learning programs (Wibawanto, 2019). Various teaching materials are used by lecturers, such as text, visual, audio-visual, animation, games, and simulations. Various teaching materials are provided to gain the students' interest and motivate them to learn the materials provided.

There is a need to empower teaching staff and build their confidence so that they are able to implement remote learning for nursing education (Czerniewicz, 2020). One method of doing so is to provide training and support to the human resources staff required to support remote learning. Our study found that the staff that supported remote learning were mostly IT staff, learning media developers, and instructional designers. However, not only technical support is needed, social and moral support is also required so that the online classes will be delivered effectively (Ali, 2020).

There were several challenges in remote learning during the pandemic. Our study showed that several problems occurred

including learning, technical, and evaluation processes in the academic and clinical phase. In the learning process, the majority of problems were about difficulties in understanding the material, especially in the clinical phase. Clinical phase in nursing takes place in a complicated clinical learning context (Jamshidi *et al.,* 2016). Students need to have adequate knowledge and skill to provide care in clinical rotation (Joolae *et al.,* 2015). However, the COVID-19 pandemic has made the clinical rotation to be replaced with remote learning.

Moreover, various obstacles were encountered by lecturers and students in implementing remote learning for technical processes. Lack of internet connection was one of the major problems during remote learning. Azzahra (2020) stated that unequal internet access, teacher qualification gaps, quality of education, as well as a lack of ICT skills were challenges in remote learning in Indonesia. Internet speed and network problems were common technical issues faced by many people because they were using the internet at once. Some locations also have poor internet signals. According to a previous study, multimedia learning in the form of images, links, or audio and videos tended to be large in data size (Harjanto, 2018). Eventually, both students and lecturers would face problems regarding big internet quota and financial needs.

Several problems were also encountered in the evaluation process. College institutions reported that not all competency achievements can be done by remote learning. The students also reported that there was limited case media, so they found it difficult to imagine the case media given. This is in line with the findings of Aguilera-Hermida (2020) who stated that students have problems with understanding the materials and some lost their internships or clinical practice. Remote learning also makes the evaluation of student abilities challenging; therefore, the learning objective only reaches the cognitive aspect. Meanwhile, learning objectives related to attitude and psychomotor abilities were difficult to achieve.

Another challenge was students' lack of motivation. Patricia Aguilera-Hermida (2020) reported that the biggest challenge was concentrating while being at home due to distractions such as noise, housework, and family members. In conventional learning, students usually actively participate in academic activities due to their face-to-face engagement with lecturers and classmates. Adnan (2020) stated that 71.4% of students reported that learning in conventional classrooms was more motivating than remote learning. However, they also stated that they could manage their study time more effectively with remote learning and they could easily complete assignments in time. Nevertheless, they stated that full courses could not be completed online.

Next, students' motivation is a complex factor as students' self-regulation skills are needed to manage their learning process (Aguilera-Hermida, 2020). Students need to improve their self-efficacy to be successful at remote learning (Kemp *et al.*, 2019). Therefore, lecturers need to encourage the students constantly and promote a positive attitude towards remote learning (Aguilera-Hermida, 2020). Students' motivation and excitement for remote learning should improve as a result of the lecturers' encouragement.

The Ministry of Education and Culture (2020) has created an Online Learning Booklet to guide institutions in implementing remote learning. The booklet consists of strategies that could make remote learning to be more effective and efficient. For the implementation of remote learning, the General Directorate of Higher Education provided remote learning facilitation for universities, namely, the SPADA LMS platform (Ministry of Education and Culture RI, 2020). Based on the results of our study, several institutions have encouraged their lecturers to use the SPADA LMS platform. LMS is a platform that could be used to access materials, facilitate learning activities through distributing online materials, providing space for discussions, and providing assignments (Harjanto *et al.*, 2018).

Technology has allowed students to simulate real processes and execute virtual experiments that would otherwise be dangerous and expensive to be conducted in a school laboratory. According to Lee *et al.* (2014), the use of Information and Communication Technology (ICT) tools could help students to improve and understand instructional materials. On the other hand, the teaching staff need to be supported and confident in implementing ICT integrated teaching to take advantage of this advancement (Ali, 2020; Toquero, 2020).

Nursing institutions need to modify their curriculum from conventional learning to remote learning. Higher education institutions should integrate environmental and health studies into the curriculum (Toquero, 2020). It is commonly recognized that remote learning has been well implemented by lecturers and students, with the lecturer preparing adequate instructional materials, providing sufficient assignments, and reviewing the assignments given (Giatman *et al.,* 2020). The modified curriculum should also be accessible to all students in the university (Turkoglu, 2019). The limitation of this study was related to the proportion of participants from each region. Some regions have not filled the survey with a percentage of below 50%. In addition, not all question items were answered by participants. As a result, the information of this study maybe could not be representative of the implementation of remote learning in all regions in Indonesia.

## CONCLUSION AND RECOMMENDATION
Remote learning for education in Indonesia has been implemented in almost all study programs of AINEC institutions and the majority of remote learning regulation makers were rectors. The most common teaching materials were visual, text, and audio-visual content. Moreover, the WhatsApp group, video conference, and Learning Management Systems (LMS were used as facilities to organize activities. To support the process of remote learning, nursing institutions need to improve their IT staff and have more cooperation agreements with other institutions. Nursing institutions have also met some obstacles, such as limited lecturers and support staff, difficulties in monitoring students, limited case media for the clinical phase, and lack of students' motivation. Based on these problems, several efforts have been made by institutions, including modifying learning methods, conducting evaluations at the end of practice hours, monitoring, and having evaluations every week, as well as modifying client cases with affordable cases, and providing SPADA.

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# FACTORS THAT AFFECT THE POSTTRAUMATIC GROWTH OF FLASH-FLOOD SURVIVORS IN INDONESIA

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**ABSTRACT**

Disasters not only bring bad impacts and cause problems to the victims, but they can also bring a positive impact, i.e., posttraumatic growth (PTG), that appears after the disaster. Investigating the posttraumatic growth of disaster survivors is important as it helps to identify the needs of survivors and develop intervention programs. Currently, there is no research in Indonesia about the PTG of flash flood disaster victims. This study aims to determine the posttraumatic growth of flash flood disaster victims in Indonesia. This was an analytical correlation analysis study which observed 95 flood victims in Magelang and employed the Posttraumatic Growth Inventory-Expanded (PTGI-X) instrument. The data were analyzed by using the Mann-Whitney, Pearson, independent t-test, and multiple linear regression tests. The average PTG of flood victims was 72.31 ± 15.91. The disaster victims with high PTSD scores, males, holding high school and university levels, received more severe disasters had a higher level PTG. This model described that the factors investigated in this study had a 23.2% contribution to PTG.The factors that influence the PTG of flood victims were PTSD, gender, educational level, and severity of disasters.

## INTRODUCTION

Disasters have risen in occurrence worldwide and Indonesia is one of the disaster-prone countries as it is located in the Pacific Ring of Fire (Wibowo, Surbakti, & Yunus, 2013). The Index for Risk Management data reported that Indonesia ranked 19th out of 191 countries in the world for hazards and exposure (INFORM, 2016). Meanwhile, the World Risk Report in 2019 ranked Indonesia in the 37th position of 180 countries based on the risk of disasters (Day et al., 2019).

Indonesia faces many natural disasters, such as earthquakes, tsunamis, volcanic eruptions, floods, droughts, landslides, hurricanes, and fires. However, based on data from 2006 to 2021, floods are the most frequently occurring disaster and bring severe damage (Asian Disaster Reduction Center, 2021).

One flood disaster which brought severe impact during the last 5 years was a flash flood in Magelang which occurred on Saturday, April 29, 2017. The flood occurred at 3.30 PM at the Grabag District, Magelang. The flood struck two villages and five *dusun* (small villages). The flood displaced 170 people, destroyed 71 houses: 25 heavily damaged houses, 12 lightly damaged houses, and 34 affected houses (Fitriana, 2017). The total death toll of the flood was 13 people: 12 died in the disaster site and one died at Tidar Hospital, Magelang ("Flashflood in Magelang", 2017).

Disasters can negatively affect the physical and psychological health of survivors and their families (Warsini, Buettner, Mills, West, & Usher, 2015a). The most frequently occurring psychological impact is posttraumatic stress disorder (PTSD). Meanwhile, other problems that could be caused by a disaster are depression, anxiety, sleep disturbance, and decreased quality of life (Warsini, West, Mills, & Usher, 2014).

However, disasters not only bring negative impacts on human life, but also positive impacts perceived by humans after their occurrence. One of the positive effects is posttraumatic growth (PTG) (Cao et al., 2018), which is defined as a person's positive view or changes after struggling with a traumatic event (Tedeschi, Shakespeare-Finch, Taku & Calhoun, 2018; Asgari & Naghavi, 2019). This trauma includes the trauma caused by a disaster, rape, loss, attempted murder, and diseases, such as cancer or a heart attack.

Investigating the PTG of disaster survivors is important as it helps to identify the needs of survivors. Furthermore, it may help to develop interventions to minimize the survivors' burden (Javed & Dawood, 2016; Amiri et al., 2019). Disaster survivors who have PTG might also have a positive perspective of the disaster, which could help them to recover faster by using adaptive coping.

Some studies on the PTG of disaster victims in Indonesia have been conducted by Sattler et al. (2018) and Harsono et al. (2021), investigated the victims of the Bantul earthquake as well as Akbar and Witruk (2016), who investigated the victims of the Bantul earthquake and the Merapi eruption. All these studies used the Posttraumatic Growth Inventory (PTGI). However, to date, no study in Indonesia has described the PTG of flash flood disaster victims by using the PTGI-X, the newest and more comprehensive instrument of PTG. Therefore, it is considered critical to explore the PTG of flood victims by using the PTGI-X. This research aims to describe the posttraumatic growth of flash flood victims in Magelang, Indonesia.

## METHOD
### Study Design
This was an analytical correlation research. A cross-sectional design was used in this study.

### Research Samples
This research involved 100 respondents. The sample size was counted by using the Lemeshow equation. The stratified sampling technique applied in this study considered the following respondent proportions: elderlies, adults, men, and women to be almost balanced.

The respondents were selected by predetermining the inclusion criteria: (1) willingness to be involved as a research subject, (2) being at least 18 years old, and (3) being survivors of a flash flood disaster in April 2017. The respondents were excluded if they had a medical history of mental disorders and were not at the research site when the data was collected.

### Data Collection
The research was conducted at Sambungrejo Village, Grabag District, Magelang Regency, Indonesia, where the flood occurred. The data was collected from September-October 2017.

Two research assistants were involved with the data collection. The requirement for being a research assistant was mastery of the local language. All assistants received training on the research purposes, protocols, and instruments of data collection. The data from all respondents were collected from their residences. The research assistants also described the research to the respondents and helped the illiterate respondents to read the questionnaire.

### Instrument
The first section of the survey included sociodemographic questions including age, gender, marital status, education level, employment status, and survivor length of stay. The experiences of survivors during the disaster were also included.

The second section was the Indonesian version of the Impact of Event Scale-Revised (I-IES-R). This instrument consisted of 22 questions and was tested for its validity and reliability by Warsini et al. (2015b). All questions in the instrument are valid and the Cronbach Alpha result was 0.90 for the test and 0.92 for the retest.

The third section was the PTG instrument. The most common instrument widely used to measure PTG was the PTGI was developed by Tedeschi in 1996 (Cao et al., 2018; Jin, Xu, Liu, & Liu, 2014). However, this instrument was revised in 2017 because the spiritual domain was considered too short and limited in describing the domain. The revision was done by adding four items in the spiritual domain, thereby changing the domain name into the Spiritual-Existential Change, and calling the instrument the expanded PTGI (PTGI-X) (Tedeschi, Cann, Taku, Senol-Durak, & Calhoun, 2017).

The PTGI-X consisted of 25 questions with Likert options ranging from 0 to 5. It was comprised of several domains: personal strength (PS), new possibilities (NP), relating-to-others (RO), appreciation of life (AL), and spiritual existential changes (SEC) (Tedeschi et al., 2017).

The PTGI-X questionnaire was initially translated from English to Indonesian. Then, the translated version was retranslated to English. Finally, the translated version was compared with the retranslated version (the Indonesian and English translated versions). After the translation process was completed, the instrument was tested and measured to gain validity and reliability with 78 respondents who were landslide victims in Purworejo and not respondents of this research. The validity test revealed that all items were valid, and the value of the Cronbach's alpha was 0.931.

### Data Analysis
The data were analyzed by using univariate, bivariate, and multivariate analyses with SPSS software. The univariate analysis was conducted by measuring the percentage of the mean and median of each measured variable, including the demographic data. Meanwhile, the bivariate test was conducted by using the Mann-Whitney and Pearson tests. The multivariate test was performed by using linear regression with the forward method.

### Ethical Consideration
The ethical approval was obtained from the Ethics Commission of the Faculty of Medicine, Universitas Gadjah Mada, with the No. KE/FK/0931/EC/2017. Before the data was collected, all research respondents received explanations of the research and signed informed consent forms.

## RESULTS
This study involved 100 respondents, but five data were excluded because they were outliers. Table 1 concludes that the respondents in both locations had similar demographic characteristics.

## Table 1. Demographic characteristics of respondents (n=95)

| Variable | |
|---|---|
| **Gender, f(%)** | |
| Female | 52 (54.7) |
| Male | 43 (45.3) |
| **Age (years), median (min-max)** | 39 (18-96) |
| **Age group, f(%)** | |
| < 25 years | 13 (13.7) |
| 26-35 years | 27 (28.4) |
| 36-45 years | 20 (21.2) |
| 46-55 years | 18 (18.9) |
| 56-65 years | 10 (10.5) |
| >65 years | 7 (7.4) |
| **Occupation, f(%)** | |
| Unemployed (household, student, retired) | 31 (32.6) |
| Employed (farmer, employee, labor, merchant) | 64 (67.4) |
| **Education level, f(%)** | |
| Illiterate | 5 (5.3) |
| Elementary | 52 (54.7) |
| Junior high | 26 (27.4) |
| Senior high | 9 (9.5) |
| University degree | 3 (3.2) |
| **Marital status, f(%)** | |
| Married | 78 (82.1) |
| Unmarried/widow/widower | 17 (17.9) |
| **Length of stay (years), median (min-max)** | 30 (1-85) |
| **Disaster experience before, f(%)** | |
| Yes | 4 (4.2) |
| No | 91 (95.8) |
| **Family died due to disaster, f(%)** | |
| Yes | 11 (11.6) |
| No | 86 (88.4) |
| **Family injured due to disaster, f(%)** | |
| Yes | 9 (9.5) |
| No | 86 (90.5) |
| **House damage due to disaster, f(%)** | |
| Yes | 35 (36.8) |
| No | 60 (63.2) |
| **Evacuation experience, f(%)** | |
| Yes | 37 (38.9) |
| No | 58 (61.1) |
| **Severity level of disaster which experienced, f(%)** | |
| Mild | 17 (17.9) |
| Severe | 78 (82.1) |
| **PTSD score, mean±SD** | 31.52 ± 16.16 |

The PTG of 95 respondents of flood victims is shown in Table 2. The PTG score of the respondents was 72.31 with a maximum score of 125. The spiritual and existential change domain has the highest score while the new possibilities domain obtained the lowest score.

## Table 2. PTG score of respondents (n=95)

| Variable | Mean ± SD or Median (Min-Max) |
|---|---|
| Total score of PTG | 72.31 ±15.91[a] |
| Domain score | |
| *Appreciation to Life* | 3.1 (1-5) [b] |
| *Personal strength* | 2.75 (0.75-4.75)[b] |
| *New Possibilities* | 2.2 (0.8-4.6)[b] |
| *Relating to Others* | 2.99±0.82[a] |
| *Spiritual and Existential Change* | 3.15±0.79[a] |

[a]*Mean±SD; [b]Median (Min-Max)*

The PTG comparison based on the respondents' characteristics is displayed in Table 3. Table 3 shows that the PTG scores are significantly associated with the variables of age, level of education, severity level, and the PTSD scores of the respondents. Besides the four previously mentioned variables, the other three variables were classified in the multivariate analysis because the p-values of the variables of gender, marital status, and experience of disasters were < 0.25.

## Table 3. PTG score based on respondents' characteristics (n=95)

| Variable | Mean ± SD or r | p |
|---|---|---|
| **Gender** | | |
| Female | 70.25 ± 14.63 | 0.167[a] |
| Male | 74.79 ± 17.18 | |
| **Age** | | |
| Adult | 73.69 ± 16.54 | 0.022*[a] |
| Elderly | 65.94 ± 10.90 | |
| **Occupation** | | |
| Employed | 73.13 ± 15.45 | 0.474[a] |
| Unemployed | 70.61 ± 16.95 | |
| **Education level** | | |
| Illiterate - junior high | 71.07 ± 15.86 | 0.046*[a] |
| Senior high - university | 80.83 ± 14.04 | |
| **Marital status** | | |
| Married | 71.36 ± 15.66 | 0.216[a] |
| Unmarried/widow/widower | 76.65 ± 16.84 | |
| **Disaster experience before** | | |
| Yes | 57.50 ± 16.11 | 0.057[a] |
| No | 72.96 ± 15.67 | |
| **Family died due to disaster** | | |
| Yes | 73.27 ± 13.69 | 0.832[a] |
| No | 72.18 ± 16.25 | |
| **Family injured due to disaster** | | |
| Yes | 72.00 ± 18.82 | 0.952[a] |
| No | 72.34 ± 15.70 | |
| **House damage due to disaster** | | |
| Yes | 72.83 ± 15.84 | 0.808[a] |
| No | 72.00 ± 16.08 | |
| **Evacuation experience** | | |
| Yes | 72.38 ± 18.29 | 0.972[a] |
| No | 72.26 ± 14.34 | |
| **Severity level** | | |
| Mild | 63.35 ± 13.20 | 0.010[a]* |
| Severe | 74.26 ± 15.85 | |
| **PTSD** | r = 0.372 | 0.000[b]* |

[a]*analyzed by using the independent t-test, [b]analyzed by using the Pearson test*

The multivariate analysis results are shown in Tables 4 and 5. The analysis discovered that the factors that influence the PTG of flood victims were PTSD, severity, gender, and education level. The best model is the fourth model. The equation of the regression model of the PTG in this study is 23.815 + 0.358 (PTSD) + 9.127 (severity) + 6.971 (gender) + 9.277 (education level). The four factors of the PTG respondents contributed 23.2%. The remainder was influenced by factors not examined in this study.

**Table 4. Model summary**

| Model | R | R Square | Adjusted R Square | Std Error of The Estimate |
|---|---|---|---|---|
| 1 | .372a | .139 | .129 | 14.847 |
| 2 | .427b | .182 | .164 | 14.545 |
| 3 | .477c | .227 | .202 | 14.216 |
| 4 | .515d | .265 | .232 | 13.941 |

**Tabel 5. Model coefficients for PTG as a dependent variable**

| Model | | Standardized Coefficient | | | t | Sig. |
|---|---|---|---|---|---|---|
| | | B | Std. error | Beta | | |
| 1 | (Constant) | 60.753 | 3.353 | | 18.117 | .000 |
| | PTSD | .367 | .095 | .372 | 3.867 | .000 |
| 2 | (Constant) | 45.873 | 7.477 | | 6.135 | .000 |
| | PTSD | .334 | .094 | .339 | 3.556 | .001 |
| | Severity level | 8.730 | 3.941 | .211 | 2.215 | .029 |
| 3 | (Constant) | 34.183 | 8.899 | | 3.841 | .000 |
| | PTSD | .365 | .093 | .370 | 3.929 | .000 |
| | Severity level | 9.171 | 3.857 | .222 | 2.378 | .020 |
| | Gender | 6.834 | 2.968 | .215 | 2.302 | .024 |
| 4 | (Constant) | 23.815 | 9.968 | | 2.389 | .019 |
| | PTSD | .358 | .091 | .364 | 3.936 | .000 |
| | Severity level | 9.127 | 3.782 | .221 | 2.413 | .018 |
| | Gender | 6.971 | 2.911 | .219 | 2.394 | .019 |
| | Education level | 9.277 | 4.310 | .195 | 2.153 | .034 |

## DISCUSSION

This study found that the research respondents had a higher PTG average value than that of the earthquake victims in China which employed the same instrument (PTGI-X) and found an average value of 68.7 ± 25.3 (Cao et al., 2018). To date, from the revision of the PTGI in 2017 to the writing of this report, it was only Cao et al. (2018), who had applied the PTGI-X to measure PTG. Mordeno et al. (2016) also investigated a flood case in the Philippines and found that their respondents had a lower PTG with an average value of 57. The PTG values of the respondents in this study signified that the flood victims in Indonesia experienced more positive psychological changes compared to the earthquake victims in China or the flash flood victims in the Philippines.

Moreover, the PTG value of flood victims in this study was higher in almost all domains than that of Tedeschi et al.'s study (2017), who investigated the PTG of undergraduate students from the US, Turkey, and Japan by using the PTGI-X. The Japanese respondents were earthquake victims of Great East Japan. Meanwhile, the respondents from Turkey and the US were students who had a traumatic experience six months before data collection. However, the respondents of this research only had a lower value on the domain of new possibilities than the respondents in Turkey.

This difference was likely caused by many factors, such as the respondents' characteristics, disaster type, trauma experienced, and culture. The respondents in the study of Tedeschi et al. (2017) were students in Turkey who did not experience a specific disaster. In contrast, this research involved the general population (i.e., adults and elderlies), who experienced a flood. In addition, the two populations had very different cultures (Asian and European). An individual's PTG is influenced by his culture (Taku, 2011) because it could influence his subjectivity in assessing the PTG indicators (Taku, 2013).

This study found several factors that influence PTG, namely, PTSD, gender, education level, and severity of the disasters experienced. The respondents with high PTSD scores were males with high education levels (high school to university level) and experienced a severe disaster; they had a positive and more significant impact on disasters.

This study found moderate and positive values of the relationship between PTSD and PTG. This result is similar to those of Xu and Liao (2011), Jin, Xu, Liu, et al. (2014), Dursun et al. (2016), and Tominaga et al. (2019). The higher the PTSD score, the higher the PTG is perceived. Meanwhile, the results of the multivariate analysis of this research proved that PTSD was a factor that affects the PTG. Conversely, Dursun et al. (2016) found different results. Although Dursun et al. (2016) employed the multivariate analysis to investigate flood victims, their multiple regression analysis results did not show that PTSD was one of the factors that predict PTG. They only discovered that the search for meaning and perceived social support were the factors that affect PTG. This condition was probably caused by limited research proficiency levels, such as fewer samples (n = 57) and the likelihood that the samples were of students who less perceived the impact of a disaster. PTG will appear when the disaster victims have been traumatized to a certain level because to reach a positive sense or wisdom from a disastrous event, the tragedy itself must not cause excessive trauma (Liu, Wang, Li, Gong & Liu, 2017; Lowe, Manove & Rhodes, 2013, Zeligman, Majuta & Shannonhouse, 2020). This statement means that a traumatic event will cause a person to experience growth when he experiences PTSD. A specific level of psychological pressure is required to develop PTG. Distress has been found as a catalyst in cognitive restructuring which aims to explore the world in a new way and has become a characteristic of the PTG (Siqveland, Nygaard, Hussain, Tedeschi, & Heir, 2015). After facing traumatic events, people will adapt to their new situation by using cognitive restructurisation (Coroiu, Korner, Burke, Meterissian & Sabiston, 2016). Therefore, through this process, people can reassess their life goals and priorities, gain better social relations with others, and appreciate their life better (Aflakseir, Nowroozi, Mollazadeh & Goodarzi, 2016).

This result is different from that of Sattler et al. (2018), who investigated residents near the epicenter of the Bantul earthquake in Indonesia. Sattler et al. (2018) did not find a significant relationship between PTSD and posttraumatic growth. One possible explanation of the difference may be

due to data collection time. Sattler et al. (2018) collected the data long after the incidence of the disaster (10-11 years). The time of data collection which is too long from the disaster events may affect the PTSD and posttraumatic symptoms among disaster survivors.

This research revealed that gender is a factor that affects PTG. This finding is in accordance with the research of Akbar and Witruk (2016) and He et al. (2013). Interestingly, previous research (Akbar & Witruk, 2016; He et al., 2013; Jin, Xu, & Liu, 2014; Vishnevsky, Cann, Calhoun, Tedeschi, & Demakis, 2010) found that female respondents had a higher PTG score, while this study discovered that the male respondents had a higher PTG score.

At least two mediators could explain the difference in posttraumatic growth based on gender, namely, the rumination style (Leal-Soto, Carmona-Halty, & Ferrer-Urbina, 2016) and the coping style (Panjikidze, Beelman, Martskvishvili & Chitashvili, 2020). Some literature explained that women tend to use the deliberate rumination style and emotional-focused coping to encourage a high PTG (Jin, Xu, & Liu, 2014; Vishnevsky et al., 2010). The PTG will appear after the victim changes from intrusive rumination to deliberate rumination when coping with the situation (Garcia, Cova, Rincon, & Vazquez, 2015). This research was conducted in Indonesia and found that men tended to have deliberate rumination while women tended to have destructive intrusive rumination (overthinking but not resolving issues). In addition, Javanese women are known for too much thinking, worrying about something, and easily feeling emotional when solving problems. In contrast, men were more open to solving issues, meeting friends, finding a solution, and widely socializing (Warsini, 2015). Akbar and Witruk (2016) further stated that Javanese women used more of a coping approach.

The third factor which affects PTG in this research is education level. Sattler et al. (2018) and He et al. (2013) also asserted that the education levels of disaster victims affect their PTG. Cao et al. (2018) discovered that respondents with low levels of education had a high PTG. In contrast, this study revealed that respondents with higher levels of education (high school - university) had a high PTG. This result is in line with the research by He et al. (2013) who investigated earthquake victims in China and Wen et al. (2020) who found that respondents with high levels of education had higher PTG. This may be because having a higher education helps survivors to more comprehensively understand the trauma they experienced and improved their confidence to recover their physical and mental conditions after the disaster (He et al., 2013), as well as creative skills to facilitate their life opportunities (Wen et al., 2020).

The fourth factor that affects PTG is the level of severity of the disaster experienced by the survivors. This finding is in accordance with the research results of Leal-Soto et al. (2016) and Jin, Xu, Liu et al. (2014) who investigated the earthquake victims in Chile and China. Bilbao et al. (2013) also stated that the level of severity plays an important role in raising the PTG of victims. A severe event, in this case, a catastrophe, can lead to positive and large changes, such as personal strength development and support from others, through several mechanisms. First, the severity of disasters will affect the basic belief that instantly triggers the emergence of PTG (Leal-Soto et al., 2016). Second, the severity of disasters pushes intrusive rumination (Garcia, Pa'ez-Rovira, Zurtia, Martel, & Reyes, 2014). Moreover, the severity of disasters will encourage deliberate rumination after intrusive rumination occurs and support the emergence of problem-focused coping through social sharing (Garcia et al., 2015).

The contribution of the factors investigated in this research in predicting the respondents' PTG was only 23.2%. Meanwhile, the remaining factors were influenced by other variables not examined in this study. Some of these variables were social support (Harsono et al., 2021; He et al., 2013; Sattler et al., 2018), spirituality (Subandi, Achmad, Kurniati, & Febri, 2014), coping strategy (Akbar & Witruk, 2016; He et al., 2013), problem-focused coping (Sattler et al., 2018), religious coping (Prati & Pietrantoni, 2009), hope (Dong et al., 2017; Teixeira & Graça Pereira, 2013) optimism (Ho et al., 2011), distress, personality, emotional expression, environmental characteristics, perspectives to the world, contemplation styles (Ramos, Leal, Costa, Tapadinhas, & Tedeschi, 2018), physical health (Sawyer et al., 2010), religiosity (Russano, Straus & Sullivan, 2017), and social well-being (Wlodarczyk, Basabe, Paez, Villagran & Reyes, 2017).

Nevertheless, this study had several limitations. Firstly, this study only involved 95 respondents and only tested the variables of PTSD and the respondents' characteristics as PTG predictors. In addition, there was no clear cut-off point for PTG; thus, the researchers could not calculate the prevalence of PTG. Therefore, it is necessary to conduct further research, involve more samples to test the PTG predictors by using other variables, and examine the cut-off point of PTG in Indonesians.

## CONCLUSION AND RECOMMENDATION
Flood victims in Magelang had excellent PTG. PTSD, gender, level of education, and level of disaster severity have become predictors of the PTG of flash flood survivors in Magelang. It is highly recommended that health workers and relevant stakeholders pay greater attention to the survivors of flash flood disasters so that they will not experience severe PTSD and instead gain posttraumatic growth as a positive impact from the disaster.

## ACKNOWLEDGMENTS

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**ORIGINAL ARTICLE**

# FACTORS AFFECTING THE PREVENTION OF COVID-19 TRANSMISSION IN SCHOOL-AGE CHILDREN

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**ABSTRACT**

The COVID-19 pandemic has had a physical and psychological impact on school-age children. Parents also have the challenge of shaping the behavior of school-age children regarding the prevention of COVID-19 transmission. This study aims to analyze the factors that influence the behavior of school-age children in preventing the transmission of COVID-19. This is a cross-sectional study with a random sampling technique and distributed a questionnaire survey to parents who have school-age children that are 6-12 years old, and the total was 474 people. The questionnaire assesses school-age children's behavior by applying the Health Belief Model theory. Multiple logistic regression tests found that parental age, parental education level, parental knowledge, and residence had a significant influence on the prevention of COVID-19 transmission in school-age children (P-value < 0.05). Four variables having a chance in good prevention of COVID-19 transmission at school-age children, there were elderly parents had a 5.6-time (95% CI OR 2.8-11.5), parents with higher education had 2.9 times (95% CI OR 1.9:4,3), parents with good knowledge had 2.6-time (95% CI OR 1.7-4.1), urban areas also had 1.86-time (95% CI OR 1.18-2.95). Parental age, parental level education, parental knowledge, and residence have a significant influence on the prevention of COVID-19 transmission behavior in school-age children.

## INTRODUCTION

The Coronavirus (COVID)-19 has infected humans of all ages, including the age group of children. In Indonesia, the Ministry of Health on December 19, 2021, recorded that 2% of COVID-19 cases were in the 0-5-year age group, while 10.2% were in the 6-18-year age group. The group of positive cases in school-age children increased the percentage of overall positive cases due to face-to-face learning. Central Java, one of the provinces with the largest population in Indonesia, is one of the 10 regions with the highest cases of COVID-19 in school-age children (Ministry of Health, 2021).

The pandemic has had both physical and psychological impacts on school-age children. This arises from restrictions on daily activities, such as strict health protocols during learning at school, as well as restrictions on playing in public areas and socializing with friends (Bai et al., 2020). In

addition, information from social media also caused feelings of fear of being infected with COVID-19 and transmitting it to other family members (Narzisi, 2020; Szabo et al., 2020). One study stated that the COVID-19 pandemic situation caused sleep disorders and post-traumatic stress disorder (PTSD) in school-age children with an incidence rate of around 7% (Altena et al., 2020). Another study found that children had an increased frequency of anger by 67.2%, has worsened daily routine activities by 56%, and had trouble maintaining concentration by 53.9% (Zhang et al., 2020).

Parents need to exercise their role as caretakers to minimize the physical and psychological impact of the COVID-19 pandemic on their school-age children (Weaver & Wiener, 2020). This is in addition to preventing the transmission of the disease (Chen et al., 2020; Goldschmidt, 2020). However, the pandemic did not only affect the psychology of parents

through emotional disorders, depression, anxiety, and hypochondriasis (Bai et al., 2020) but also through socio-economic impacts, such as a decrease in family income which affects the fulfillment of nutritional needs and hygiene practice facilities, such as the purchase of masks and hand soap (Zhong et al., 2020).

Children's behavior during the COVID-19 pandemic is related to their parents' physical, emotional, and cognitive reactions (Bai et al., 2020; Cao et al., 2020; Liu et al., 2021; Paterson et al., 2021). Lack of parental knowledge has also been found to be related to negative attitudes and practices in preventing the transmission of this disease (Paulsen et al., 2021; Yıldırım & Güler, 2020; Zhong et al., 2020). Past studies have focused on the impact of the COVID-19 pandemic on the behavior of school-age children psychologically, but these studies have not been conducted holistically, including investigating the impact on children's physical, cognitive, social, and spiritual well-being.

This study aims to analyze the factors that influence the behavior of preventing the transmission of COVID-19 in school-age children. This study placed a greater focus on the impact of the COVID-19 pandemic on the psychology of school-age children. The researchers applied the Health Belief Model theory (Rosenstock, 1974) by analyzing the variables, i.e., perceived susceptibility, perceived severity, perceived benefits, perceived barriers, and cues to action.

## METHOD
### Study design
This is a quantitative study that applied a cross-sectional approach to analyze the factors that affect the prevention of COVID-19 transmission in school-age children.

### Sample
The random sampling technique was used with the inclusion criteria being parents of 6-12 years old children who have never been confirmed positive for COVID-19 by using the polymerase chain reaction (PCR) method and parents that are able to write and read. The exclusion criteria were parents that refused to participate in this study, parents of children with developmental disorders, such as autism spectrum disorder (ASD) and Down syndrome, and parents of children with immunocompromises, such as cancer. The total samples were 474 parents, thus, exceeding the minimum sample size for regression analysis, which is 10 times the independent variables (there are 9 independent variables in this study) (Pagano, 2018).

### Instrument
The questionnaire used contains basic information, such as the characteristics of the parents and their children. The characteristics of the parents include age, occupation, education, socioeconomic conditions, demographics, and knowledge. The characteristics of the children include age and gender.

The theory of Health Belief Model by Rosenstock (1974) questionnaire developed by Kamal et al. (2017) on the behavior of school children in preventing COVID-19 transmission was used. This questionnaire assesses the behavior of school-age children in preventing COVID-19 transmission with 20 questions that consider perceived susceptibility, perceived severity, perceived barriers, perceived benefits, and cues to action. The questionnaire had undergone validity and reliability tests with 40 parents as samples and the results of the Cronbach's alpha showed that

parental knowledge was 0.740 and behavior of school-age children was 0.738.

Each favorable statement on the questionnaire regarding behavior is measured by a Likert scale which consists of strongly agree (4), agree (3), disagree (2), and strongly disagree (1). Each unfavorable statement on the perceived barrier item consists of 1 for strongly agree, 2 for agree, 3 for disagree, and 4 for strongly disagree. The total score on behavior was calculated by the total score divided by the maximum score multiplied by 100%. The total score was then categorized as good if it had a percentage of > 75% and as bad if it had a score of ≤ 75%.

The questionnaire on parental knowledge consists of 10 questions with 7 questions on cognitive knowledge, 1 question on attitude, and 2 questions on practice. Each question was given a score of 1 if it is true and 0 if it is false. The total score was then categorized as good if it had a percentage of > 75% and as bad if it had a score of ≤ 75%.

### Data collection
This study was conducted with an online survey via Google Forms between May and July 2021 through a group of health workers or a group of parents in Central Java and Special Region (D.I.) of Yogyakarta, Indonesia. The Google Forms contained the informed consent form and questionnaire.

### Statistical analysis
The variables were categorized into two (binary). The dependent variable: the behavior of school-age children was categorized into two, namely, good (total score > 75%) and bad (total score ≤ 75%). The independent variable in the form of parental age was categorized according to Havighurst's Developmental theory, namely, early adulthood (19-30 years) and late adulthood (31-60 years). The educational variable was categorized into basic education (elementary school or SD, junior high school or SMP, and senior high school or SMA) and higher education (diploma, bachelor, and postgraduate) according to Government Regulation Number 17 of 2010 on Management and Implementation of Education. Parents' occupation status was categorized into employed and unemployed. The respondents' residence was categorized into urban and rural areas. Income during the pandemic was categorized into two categories; affected and not affected.

The source of information on COVID-19 was categorized into two: health workers and social media. Parental knowledge was categorized into good (total score > 75%) and bad (total score ≤75%). The children's ages were categorized based on Piaget's theory of Cognitive Development, namely, concrete operational stages (6-10 years) and formal (11-12 years). Gender was categorized into male and female.

A univariate analysis was used to describe the parents' and children's characteristics and prevention of COVID-19 transmission. A bivariate analysis or the Chi-square test was used to determine the factors affecting the prevention of COVID-19 transmission in school-age children. The multiple logistic regression using the enter method was also used to determine the most dominant factors that influence the behavior of school-age children.

### Ethical Consideration
This research has passed the ethical review of the ethics test at the Ethics Committee of Dr Moewardi Public Hospital (RSUD Dr Moewardi) Number: 427/IV/HREC/2021.

# RESULTS

## Univariate analysis

Table 1 exhibits that most parents were aged 31-60 years at 87.6%. Parents' education has almost the same percentage as 43.7% had basic education level and 46.3% had higher education. The majority of parents work at 78.5% and have had their income affected by the COVID-19 pandemic at 73.2%. Family demographics were almost the same between those living in rural areas and urban areas at 52.3% and 47.7%, respectively. For the characteristics of school-age children, a majority of them were in the 6-11-year age group at 73.6%. The respondents were also almost equal as 48.7% were girls and 51.3% were boys. For the parental knowledge variable, a majority of the parents tested were in the excellent category at 70%. The majority of parents also obtained information about COVID-19 from social media at 63.3**%**.

**Table 1. Characteristics of respondents based on parental identity, children's identity, and information in COVID-19 pandemic (n = 474)**

| Variable | Total f (%) |
|---|---|
| **1. Parents' characteristics** | |
| **a. Parents' age** | |
| - 19-30 years old (early adulthood) | 59 (12.4) |
| - 31-60 years old (old age) | 415 (87.6) |
| **b. Parents' education** | |
| - Basic education (elementary – high school) | 207 (43.7) |
| - Higher education (diploma, graduate, post-graduate, and doctoral degree) | 267 (56.3) |
| **c. Occupation** | |
| - Unemployment | 102 (21.5) |
| - Employment | 372 (78.5) |
| **d. Income during pandemic** | |
| - Affected | 347 (73.2) |
| - Not affected | 127 (26.8) |
| Total | 474 (100) |
| **e. Residence** | |
| - Rural | 248 (52.3) |
| - Urban | 226 (47.7) |
| **2. Children characteristics** | |
| **a. Age** | |
| - 6-10 years old (cognitive concrete operational development) | 349 (73.6) |
| - 11-12 years old (cognitive formal development) | 125 (26.4) |
| **b. Gender** | |
| - Female | 231 (48.7) |
| - Male | 243 (51.3) |
| **3. COVID-19 information characteristics** | |
| **a. Parents' knowledge of COVID-19 for children** | |
| - Poor | 142 (30) |
| - Excellent | 332 (70) |
| **b. References of COVID-19 for children** | |
| - Social media | 300 (63.3) |
| - Health workers | 174 (36.7) |

## Bivariate analysis

Table 2 exhibits the results from the Chi-square bivariate test analysis and shows that age, education, and parental knowledge significantly affect the behavior of school-age children in preventing COVID-19 transmission. Parents in the advanced adult age category are 9.2 times more likely to have school-age children with COVID-19 excellent transmission prevention behavior compared to parents in the early adult age category (95% CI OR 4.7:17.9). Further analysis found that parents' age had a significant influence on the behavior of school-age children in preventing the transmission of COVID-19 (*p*-value = 0.001).

Moreover, parents with higher education are 2.9 times more likely to have school-age children with excellent COVID-19 transmission prevention behavior than parents with primary education (95% CI OR 1.9:4, 3). Further analysis found that parental education significantly affects children's behavior in preventing COVID-19 transmission (*p*-value = 0.001).

It was also found that parents with good knowledge about COVID-19 are 3.4 times more likely to have school-age children with excellent COVID-19 transmission prevention behavior than parents with less knowledge (95% CI OR 2.3:5.2). Further analysis showed that knowledge had a significant effect on the behavior of school-age children in preventing the transmission of COVID-19 (*p*-value = 0.001).

Parents with urban demographics are also 2.2 times more likely to have school-age children with excellent COVID-19 transmission prevention behavior than parents with rural demographics (95% CI OR 1.5:3.3). The analysis results showed that the parents' demographics significantly influenced the behavior of school-age children in preventing the transmission of COVID-19 (*p*-value = 0.001).

**Table 2. Factors affecting the prevention of COVID-19 transmission in school-age children based on bivariate analysis (n = 474)**

| Variable | School-age behavior | children | Total | df | $X^2$ | *p*-value | OR (95% CI) |
|---|---|---|---|---|---|---|---|
| | **Poor** f (%) | **Excellent** f (%) | **f (%)** | | | | |
| **Parent identity** | | | | | | | |
| **1. Parents' age** | | | | | | | |
| a. 19-30 years old (early adulthood) | 47 (79.7) | 12 (50) | 59 (100) | 1 | 53.4 | 0.001* | 9.2 (4.7-17.9) |
| b. 31-60 years old (old age) | 124 (29.9) | 291 (70.1) | 415 (100) | | | | |
| **2. Parents' education** | | | | | | | |
| a. Basic education (elementary – high school) | 103 (49.8) | 104 (50.2) | 207 (100) | 1 | 28.8 | 0.001* | 2.9 (1.9-4.3) |
| b. Higher education (diploma, graduate, post-graduate, and doctoral degree) | 68 (25.5) | 199 (74.5) | 267 (100) | | | | |
| **3. Occupation** | | | | | | | |
| a. Unemployment | 41 (40.2) | 61 (59.8) | 102 (100) | 1 | 0.7 | 0.39 | 1.3 (0.9-2.1) |
| b. Employment | 130 (34.9) | 242 (65.1) | 372 (100) | | | | |
| **4. Income during pandemics** | | | | | | | |
| a. Affected | 133 (38.3) | 214 (61.7) | 347 (100) | 1 | 2.5 | 0.11 | 1.5 (0.9-2.3) |
| b. Not affected | 38 (29.9) | 89 (70.1) | 127 (100) | | | | |
| **5. Residence** | | | | | | | |
| a. Rural | 111 (44.8) | 137 (55.2) | 248 (100) | 1 | 16.2 | 0.001* | 2.2 (1.5-3.3) |
| b. Urban | 60 (26.5) | 166 (73.5) | 226 (100) | | | | |
| **Children Identity** | | | | | | | |
| **1. Children age** | | | | | | | |
| a. 6-10 year (cognitive concrete operational development) | 131 (37.5) | 218 (62.5) | 349 (100) | 1 | 0.9 | 0.32 | 1.3 (0.8-1.9) |
| b. 11-12 year (cognitive formal development) | 40 (32) | 85 (68) | 125 (100) | | | | |
| **2. Gender** | | | | | | | |
| a. Female | 80 (34.6) | 151 (65.4) | 231 (100) | 1 | 0.3 | 0.59 | 0.88 (0.61-1.29) |
| b. Male | 91 (37.4) | 152 (62.6) | 243 (100) | | | | |
| **COVID-19 information characteristics** | | | | | | | |
| **1. Knowledge about COVID-19** | | | | | | | |
| a. Poor | 80 (56.3) | 62 (43.7) | 142 (100) | 1 | 34.8 | 0.001* | 3.4 (2.3-5.2) |
| b. Excellent | 91 (27.4) | 241 (72.6) | 332 (100) | | | | |
| **2. COVID-19 references** | | | | | | | |
| a. Social media | 113 (37.7) | 187 (62.3) | 300 (100) | 1 | 0.72 | 0.39 | 1.21 (0.82-1.79) |
| b. Health workers | 58 (33.3) | 116 (66.7) | 174 (100) | | | | |

*Note: Chi-square test results. *statistically significant with p = 0.05*

**Multivariate analysis**

Table 3 exhibits the multiple logistic regression analysis and further describes the effect of knowledge on COVID-19 transmission prevention behavior. Parents in the advanced adult category have 5.6-time chance of having school-age children with excellent COVID-19 transmission prevention behavior compared to parents in the early adult category after controlling for the variables of parental education, parental knowledge, and demographics (95%). CI OR 2.8:11.5). Parental age has been found to have a significant influence on the behavior of school-age children in preventing the transmission of COVID-19 (*p*-value = 0.001). Thus, the variable of parental age has the most important impact on the behavior of avoiding the transmission of COVID-19 in school-age children with an OR = 5.6.

Parents with higher education are 2.9 times more likely to have school-age children with excellent COVID-19 transmission prevention behavior compared to parents with primary education after controlling for variables of parental age, parental knowledge, and demographics (95% CI OR 1.9:4,3), and also the parental education level has significant effect on the behavior of school-age children in preventing the transmission of COVID-19 (*p*-value = 0.001).

Parents with good knowledge are 2.6 times more likely to have school-age children with excellent COVID-19 prevention behavior compared to parents with less knowledge after controlling for the variables of parental age, education, and demographics (95% CI OR 1.7:4,1). Therefore, parental knowledge has a significant influence on the behavior of school-age children in preventing the transmission of COVID-19 (*p*-value = 0.001).

Parents living in urban areas are also 1.9 times more likely to have school-age children with excellent COVID-19 transmission prevention behavior compared to parents living in rural areas after controlling for the variables of parental

age, parental education, and parental knowledge. Thus, the parents' demographic significantly influences the behavior of school-age children in preventing the transmission of COVID-19 (*p*-value = 0.008).

**Logistics regression model equation**
The Z behavior of children of good school age = -2.077 + 1.729 elderly parents + 0.376 high parental educations + 0.965 good knowledge + 0.622 residences in the city.

The logistic regression model can be used as a basis for calculating the probability of COVID-19 prevention behavior in school-age children and lead to mapping risk groups or groups with a small probability.

**Table 3. Final model of the effect of parental characteristics, children, and COVID-19 information on school-age children's behavior in avoiding COVID-19 transmission (n = 474)**

| Variable | B | S.E | Wald | *p*-value | OR | 95% CI OR |
|---|---|---|---|---|---|---|
| Parents' age | 1729 | 0364 | 22573 | 0001 | 5636 | 2762-11502 |
| Parents' education | 0376 | 0238 | 2504 | 0114 | 1456 | 0914-2320 |
| Knowledge | 0965 | 0229 | 17686 | 0001 | 2625 | 1674-4115 |
| Demographics | 0622 | 0234 | 7053 | 0008 | 1862 | 1177-2946 |
| Constanta | -2077 | 0366 | 32265 | 0001 | 0125 | |

## DISCUSSION

This study analyzed factors that affect the prevention of COVID-19 transmission in school-age children based on the Health Belief Model theory by Rosenstock (1974). This study's results indicate that parents' age affects the behavior of preventing the transmission of COVID-19 in school-age children. However, different results showed that age has no effect on behavior formation during the COVID-19 pandemic, but gender affects psychological impact. The study stated that women are more likely to experience psychological behavioral disorders (Yıldırım & Güler, 2020).

This study found that parental demographics affect the behavior of preventing the transmission of COVID-19 in school-age children. Urban areas have a better economy and facilities than rural areas, therefore people living in urban areas are better at providing equipment and adequate information to prevent the transmission of COVID-19 (Cao et al., 2020). The results of different studies also showed that the high transmission of COVID-19 is associated with mobility and the use of public transportation in urban areas (Costa, 2020). School-age children require adherence to health protocols during activities (Paterson et al., 2021; Paulsen et al., 2021; Zhong et al., 2020).

The parent's level of education has a significant effect on the behavior of preventing the transmission of COVID-19. The level of education will affect the parents' knowledge. A study conducted in Hubei, China, stated that 90% of parents correctly filled out a questionnaire about the knowledge and prevention of COVID-19 transmission; 97.1% said they believed that they would win the war against the COVID-19 pandemic, and 98% said they used a mask when leaving the house. Thus, the respondents' characteristics such as education level influence the knowledge and practice of preventing the transmission of COVID-19 (Zhong et al., 2020).

The results showed that comprehensive parental knowledge affected the behavior of school-age children in preventing the transmission of COVID-19. Previous literature has also found that good parental knowledge will improve school-age children's physical, emotional, social, intellectual, and spiritual well-being (Dalton et al., 2020). Furthermore, parents could apply COVID-19 transmission prevention behaviors such as keeping their children sleeping 9-11 hours to maintain emotional stability and optimizing growth hormones at night (P. Chen et al., 2020; Király et al., 2020). Parents could also assist their children when accessing information on social media to meet their socializing needs, as well as to

channel their skills and maintain their children's emotions (Dong et al., 2020; Goldschmidt, 2020; Jiao et al., 2020).

The characteristics of the child also influence parental knowledge. Erikson's theory of psychosocial development (1963) states that school-age children are in the industrial versus inferiority stage. Children learn about rules such as wearing masks and keeping a distance when playing with friends. Piaget's theory of development (1969) adds that school-age children are at the concrete operation stage; namely, children learn based on logic and causal relationships in problem-solving (Murray et al., 2017). Obstacles experienced by parents in shaping the behavior of their school-age children are difficulties in explaining the importance of implementing health protocols and children experiencing boredom. Lack of time for parents to accompany their children, an undisciplined environment in implementing health protocols, and culture in the community are also other obstacles. UNICEF (2020) recommends having an open dialogue following the child's growth and development (Roy et al., 2020). The role of parents as role models is to explain to their children about the COVID-19 pandemic in easy-to-understand language and provide examples of hygienic behavior (Buheji et al., 2020).

The study found that a child's welfare is formed by 3 key components: good communication between children and parents, family beliefs or belief systems, and organization against the psychosocial impact of the COVID-19 pandemic (Jiao et al., 2020). Increasing parental knowledge in shaping children's COVID-19 transmission prevention behavior was conducted through the concept of "social learning". Social learning is the provision of aggressive family-based health information and education to optimize the role of the family. Communication strategies with cultural and religious approaches are also needed to increase beliefs about the risk of contracting the disease to form good preventive behavior (Adesina et al., 2021; Alagili & Bamashmous, 2021; Lee & You, 2020; Li et al., 2020; Prime et al., 2020).

This study proved that parental characteristics have a significant effect on the behavior of school-age children, especially on perceived susceptibility, severity, benefits, and cues to action. Other research shows that research respondents have a higher perceived severity of the impact of COVID-19 infection than their perceived susceptibility to COVID-19 infection. The practice of preventive measures is related to beliefs about the risk of COVID-19 disease. Faith in the risk of illness will increase confidence in protective behavior and affect adaptive behavior (Lee & You, 2020).

Moreover, perceptions of the belief in the severity of signs and symptoms and viewing COVID-19 as a severe disease will cause parents to adopt COVID-19 transmission prevention behaviors in their school-age children (Costa, 2020).

The limitation of this study is that the research was conducted through online surveys, therefore we were unable to reach parents who do not have access to the internet and smartphone networks. Further research can be conducted using face-to-face interviews and observation for data collection. Future research can also be conducted to examine the most effective interventions to optimize the role of parents in shaping the behavior of school-age children in preventing the transmission of COVID-19.

## CONCLUSION AND RECOMMENDATION

Parental characteristics, such as age, education, knowledge, and demographics have a significant effect on preventing the transmission of COVID-19 in school-age children. Nurses could optimize these parents' ability to increase the positive behavior of school-age children by preventing the transmission of COVID-19 through the provision of family-based information and education by considering demographic factors, education, and the parents' age.

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**ORIGINAL ARTICLE**

# ANALYSIS OF STUNTING FACTORS IN CHILDREN AGED 24-59 MONTHS DURING THE COVID-19 PANDEMIC

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**ABSTRACT**

The COVID-19 pandemic has caused many parents to lose their jobs and impacted their ability to purchase healthy food, affecting their children's development. This study aims to determine the factors that influence stunting in children during the COVID-19 pandemic. This was a cross-sectional study. The population was mothers who had toddlers aged 24-59 months (n=145). The sample was chosen through simple random sampling. The data were collected through height tests, interviews, and questionnaires. A univariate analysis was used to obtain a picture of each variable. The bivariate analysis was conducted with the chi-square test, and the multivariate analysis was performed using binary logistic regression. The results showed that 25.5% of children were experiencing stunting. There was a significant relationship between the eating habits of toddlers, childcare, history of infectious disease, mothers' visitation to health services, mothers' education level, and family income level with the prevalence of stunting. The level of family income has the most dominant relationship with stunting prevalence. Therefore, during the COVID-19 pandemic, it is essential to lower the prevalence of stunting through cross-sectoral collaborations regarding health service modifications according to the socio-economic level of the community and the incidence of COVID-19 cases.

Keywords: *Children; COVID-19; stunting*

## INTRODUCTION

The COVID-19 pandemic has hindered mothers and children from accessing appropriate healthcare services (Kenney et al., 2021). The pandemic has also instigated changes in service methods, i.e., the postponement of integrated services post (*posyandu*) activities and limiting healthcare services in public health centers (*puskesmas*) due to social distancing, thereby resulting in fewer health check visits. Furthermore, the decrease in visits related to nutritional care and maternal and child health during the COVID-19 pandemic has raised nutritional and mental health issues (Saputri et al., 2020). The conditions arising from the pandemic have caused malnourishment issues across the world, especially in low- and middle-income countries (LIMCs) (Laborde et al., 2020).

According to UNICEF, around 30% of children worldwide experienced a drop in nourishment at COVID-19, and almost 70% (2.4 billion) of them were found in LIMCs (UNICEF, 2020). Moreover, there was a 14.3% increase in the prevalence of malnourishment in children under five during the COVID-19 pandemic, and out of the 6.7 million malnourished children around the world, 57.6% of them were found in South Asia and 21.8% in Sub-Saharan Africa (Headey et al., 2020).

Since the first case of COVID-19 in Indonesia in March 2020, the government has made various efforts to stop the spread of COVID-19 by implementing large-scale social distancing. This policy negatively affected the economy as many workers were put on unpaid leave to reduce the workforce, and some companies also went to the extent of firing their workers. Therefore, many families' capabilities of procuring good quality foods were affected (Carroll et al., 2020). These conditions may lead to an increased risk of acute and chronic malnutrition in children. Children who suffer from acute malnutrition are more vulnerable to stunting (Indonesia Ministry of Health, 2018).

Some factors that affect stunting are infection and inadequate nutrition (both quality and quantity) (Connery et al., 2021), the improper practice of caring for children, limited access to public healthcare for maternal and children, poor sanitation, and low food security in the family (Indonesia Ministry of Health, 2018). As the family's economic level is also linked to securing nutritious food, this also triggers the family's susceptibility to infectious diseases (Sharma et al., 2020). These conditions could cause irreversible disruption of physical growth, which is further related to poor academic achievement and earning less when these children become adults (Fore et al., 2020).

The government has conducted various programs, e.g., prioritizing the decrease of stunting cases by 40% by 2025 as one of the Sustainable Development Goals (SDGs) (Indonesia Ministry of health, 2018). However, since the COVID-19 pandemic, the number of stunting cases might increase as children suffer from a lack of nourishment. The government prioritized stunting through pre and post maternal observation (Ministry of Health Indonesia, 2021).

The COVID-19 pandemic has caused disturbance to public healthcare facilities and services through general mobility restrictions set to prevent the COVID-19 transmission (Osendarp et al., 2021). A study conducted by the Health Research and Development Department regarding the impact of the pandemic on healthcare services showed that only 19.2% of integrated services posts (*posyandu*) remained operational (Ministry of Health Indonesia, 2021).

This caused a low visit count of mothers for healthcare services. Several global studies showed the correlation between pandemics and the healthcare services (Roberton et al., 2020). In Sierra Leone, there were indications of reluctance from the public to be immunized and weigh their children in health facilities due to the fear of contracting a viral infection from being in a crowd (Saputri et al., 2020). In Indonesia, there have been declining observation counts of children's growth observed through regular weighing in public health centers (Saputri et al., 2020). The government's responsive policy supported by the Directorate General of Public Health number: HK.02.02/V/393/2020 concerning nutrition services during the COVID-19 pandemic provided a reference for local nutritionists to modify nutrition services during the pandemic (Ministry of Health Indonesia, 2021). The nutritional service modifications made were creating online social media groups, conducting home visits for at-risk targets, and providing education and counseling services via WhatsApp.

According to Basic Health Research in 2018, Riau province is one of the provinces in Indonesia with a high stunting prevalence (27.4%), where approximately 3 out of 10 children experience stunting (Indonesia Ministry of health, 2019).

According to an annual report from the public health office of Pekanbaru City regarding child nutrition status, the stunting case count in Sidomulyo Public Inpatient Healthcare was 22.8% in 2020. According to an interview with the nutrition program department in the RI Sidomulyo Public Health Center, integrated service posts (*posyandu)* cannot be opened regularly to prevent COVID-19 spread. However, they can still be held only if the district head orders a special direction. Health workers must also limit their daily visit count, reduce their service duration, and implement COVID-19 prevention protocols. To maintain services and prevent COVID-19 transmission, surveillance was conducted through the mobile application (WhatsApp). However, this has its limitations as not everyone has sufficient access to an internet network.

Therefore, it is necessary to conduct a study to determine whether family income in the pandemic era influences stunting, along with other factors such as infection disease history, child feeding pattern, childcaring, mothers' visits to healthcare services, and their relation to stunting cases in children aged 24-59 months at the RI Sidomulyo Integrated Service Posts' working area in 2021.

## METHOD

### Study Design
This is a cross-sectional study, and the population of this study consists of mothers with children aged 24-59 months old who reside in the RI Sidomulyo's Public Health Center working area, Tampan District, Pekanbaru City, Riau Province, as one of the areas with high stunting cases. The sample size was calculated using the formula of one proportion hypothesis test.

### Sample
The sampling strategy implemented was a simple random sampling technique. A total of 145 participants matched the inclusion criteria: mothers with 24-59 months old children who do not suffer from a severe disease that affects nutritional status such as thalassemia or hydrocephalus, mothers who were willing to participate in the study, and mothers who adhere to health protocols (wear masks, socially distance, and washes their hands).

### Data Collection
Data were collected by measuring the children using a microtoise, conducting interviews, and distributing parent questionnaires. Stunting was determined by measuring a child's length or height index based on their age. The results would be categorized as severely stunted, stunted, and normal. They would also be categorized based on their height and the passing grade (Z-score) (Indonesia Ministry of Health, 2020). According to the WHO (2005), a child is categorized as normal if their height per age is ≥-2SD + 3 SD, and they are classified as stunted if their height per age is <-2SD (WHO, 2018).

Child caring and feeding behavior were obtained from direct interviews and a questionnaire of 100 questions (Indonesia Ministry of Health, 2018). The scores for positive childcaring and feeding behavior variables are as follows: 3 for answering yes or frequently; 2 for answering occasionally; 1 for answering no, and vice versa for unsupportive claims (unfavorable). At the same time, child feeding behavior is categorized into 2: good and poor.

The questionnaire was tested using Pearson's product-moment to determine the validity and reliability of the data. Based on the results, every question could be declared valid with a validity score of 0.889 and a reliability score of 0.949 (r table 0.468). The parent's characteristic data consist of the mothers' level of education and the parent's income level (according to the regional minimum wage in Pekanbaru), which was obtained through interviews and questionnaires. The secondary data used were the children's infectious disease history (diarrhea and Upper Respiratory Tract Infection), records of mothers' visitation to integrated service posts, and a maternal and child booklet.

### Data Analysis
The data collected were analyzed using a univariate analysis to get an overview of a frequency distribution; the bivariate

analysis with the Chi-square test was also conducted to obtain the correlation of the two variables. The multivariate analysis also used a regression binary logistic test to determine which independent variable (stunting in children) has the most dominant relationship with the dependent variable (mother's level of education, income level, child feeding behavior, childcaring behavior, infectious disease history, and mother's visit to the health center).

**Ethical Consideration**
This research has been approved by the ethics commission of Stikes Payung Negeri no: 0061/STIKES PN/KEPK/2021.

## RESULTS

**Table 1. Distribution frequency of children's characteristics aged 24-59 months during the COVID-19 pandemic (n = 145)**

| Variable | | f | % |
|---|---|---|---|
| Stunting growth | | 37 | 25.5 |
| Normal growth | | 108 | 74.5 |
| Mothers' level of education | Low (junior high school and below) | 62 | 42.8 |
| | High (senior high school and above) | 83 | 57.2 |
| Family income | Under minimum regional wage (< Rp2,997,971) | 82 | 56.6 |
| | Equal to or higher than minimum regional wage (≥ Rp2,997,971) | 63 | 43.4 |
| Child feeding behavior | Poor | 81 | 55.9 |
| Mean ($\bar{x}$) = 18.6; SD=5.2 | Good | 64 | 44.1 |
| Child caring | Poor | 76 | 52.4 |
| Mean ($\bar{x}$) = 18.6; SD=5.2 | Good | 69 | 47.6 |
| Infectious disease history | < 6 times in a year | 75 | 51.7 |
| | ≥ 6 times in a year | 70 | 48.3 |
| Mothers' visitation to healthcare service posts | < 8 times in a year | 80 | 51.7 |
| | ≥ 8 times in a year | 65 | 48.3 |

Table 1 shows that 25.5% of children experience stunting, 55.9% of children have poor eating behavior, and more than half of the mothers sampled care for their children poorly (52.4%). Moreover, most of the children tested (51.7%) have a history of experiencing infectious diseases more than six times a year. More than half of the mothers (57.2%) also have a higher education level, and more than half of the family's (56.6%) income level is lower than the regional minimum wage of Pekanbaru.

**Table 2. Analysis of child feeding behavior questionnaire**

| Questionnaire item | f | % |
|---|---|---|
| Administering colostrum to the newborn | 64 | 44.1 |
| Exclusive breastfeeding | 115 | 80.0 |
| Introducing weaning food starting from 6 months old | 69 | 47.6 |
| Child skipping breakfast | 81 | 55.9 |
| Child eating without parents' accompaniment | 103 | 71.0 |
| Variation in meals is infrequent | 75 | 51.7 |
| Children eat corresponding to what they wish | 45 | 31.0 |
| The provided meal is rarely finished by the child | 51 | 35.2 |
| Rare consumption of vegetables and fruits | 66 | 45.5 |
| The child never consumes milk | 81 | 55.9 |

Table 2 shows that most mothers (80%) provided exclusive breastfeeding.

**Table 3. Analysis of child-caring questionnaire**

| Questionnaire item | f | % |
|---|---|---|
| Frequent late bedtime | 76 | 51.7 |
| Frequent oversleeping in the morning | 76 | 57.1 |
| Frequent late morning shower | 76 | 51.7 |
| The child never brushes their teeth | 86 | 59.3 |
| The child never brushes their teeth before bedtime | 124 | 85.5 |
| Irregular nail clipping | 106 | 72.1 |
| The child rarely goes out wearing footwear | 106 | 72.1 |
| The child does proper handwashing with soap | 115 | 79.3 |
| The child rarely does proper handwashing post defecation | 20 | 13.6 |
| The child never takes a daytime nap | 126 | 85.7 |

Table 3 shows that most mothers care for their children's hygiene, particularly washing their hands with soap and clean water (79.3%).

**Table 4. Risk factors for stunted growth in children aged 24-59 months during the COVID-19 pandemic (n = 145)**

| Variable | Stunted f | Nutritional status Growth % | Normal f | Growth % | OR (95% CI) | p-value |
|---|---|---|---|---|---|---|
| **Child eating behavior** | | | | | | |
| Poor | 30 | 37.0 | 51 | 63.0 | 4.7 | 0.001 |
| Good | 7 | 10.9 | 57 | 89.1 | (1.9-11.8) | |
| **Child caring** | | | | | | |
| Poor | 25 | 33.3 | 50 | 75.0 | 2.3 | 0.051 |
| Good | 12 | 17.1 | 58 | 70.0 | (1.0-5.1) | |
| **Infectious disease history** | | | | | | |
| < 6 times in a year | 25 | 33.3 | 50 | 66.7 | 2.4 | 0.041 |
| ≥ 6 times in a year | 12 | 17.1 | 58 | 82.9 | (1.1-5.3) | |
| **Mothers' visitation to a health center** | | | | | | |
| < 8 times in a year | 29 | 36.3 | 51 | 63.7 | 4.0 | 0.002 |
| ≥ 8 times in a year | 8 | 12.3 | 57 | 87.0 | (1.6-9.6) | |

| Variable | Stunted f | Nutritional status Growth % | Normal f | Growth % | OR (95% CI) | p-value |
|---|---|---|---|---|---|---|
| **Mothers' level of education** | | | | | | |
| Low | 23 | 37.1 | 39 | 62.9 | 2.9 | 0.010 |
| High | 14 | 16.9 | 69 | 83.1 | (1.3-6.2) | |
| **Family income** | | | | | | |
| Under minimum regional wage | 32 | 39.0 | 50 | 61.0 | 7.4 | 0.000 |
| Equal or higher than the minimum regional wage | 5 | 7.9 | 58 | 92.1 | (2.6-20.4) | |

Table 4 shows the results of the bivariate analysis, which indicates that every independent variable has a significant correlation with stunting ($p < 0.05$), where the biggest OR is family income (OR = 7.4). This suggests that families with economic levels under the regional minimum wage are 7.4 times more likely to have children suffering from stunting than those with an income level equal to or higher than the regional wage.

**Table 5. The result of the multivariate analysis**

| Step 1a | Variable | Wald | df | Sig | Exp (B) | 95% CI for Lower | EXP(B) Upper |
|---|---|---|---|---|---|---|---|
| | Eating behavior | 1.769 | 1 | 0.184 | 4.839 | 0.474 | 49.431 |
| | Child caring | .000 | 1 | 0.999 | .000 | .000 | |
| | Health center visitation | .000 | 1 | 0.999 | 15 | .000 | |
| | Infectious disease history | 1.010 | 1 | 0.315 | 0.532 | 0.155 | 1.822 |
| | Education level | 0.807 | 1 | 0.369 | 0.581 | 0.177 | 1.901 |
| | Family income | 4.665 | 1 | 0.031 | 8.617 | 1.221 | 60.833 |
| | Constant | 7.563 | 1 | 0.006 | 2.312 | | |

Table 5 exhibits the results of the multivariate analysis using binary logistic regression, which found that the family income level has a *p*-value of 0.031 with an AOR of 8.6 (95% CI: 1.2-60.8). Thus, it can be concluded that family income level has the most dominant correlation with stunting cases in children aged 24-59 months during the COVID-19 pandemic.

## DISCUSSION
One of the impacts of the COVID-19 pandemic is changes in the community's socio-economic life, which increase the risk of nutritional problems in children (Zemrani et al., 2021). Several factors that increased the prevalence of stunting during the pandemic were decreased income and expenditure, purchasing power, and policies limiting social activities and activities. This causes obstacles to the supply of nutrients for toddlers and reduces the family's access to health services (Akseer et al., 2020).

The reduced access during the pandemic due to health services and the limitation of nutrition services led to an increased risk of stunting in children under five (Simbolon et al., 2021). On average, parents of children at risk for stunting have low levels of education and below-average income. Mothers' level of education and visitation to health services can also affect their ability to perform early detection of stunting in toddlers (Soekatri et al., 2020). Lack of access to health facilities and education for children and adults affects the prevalence of stunting (Yanti & Fauziah, 2021). There was also a decrease in the measurement of toddlers' growth during the COVID-19 pandemic. Inadequate nutritional intake was also found to be the main leading cause of the decrease in the nutritional status of toddlers (Jawaldeh et al., 2020). A previous study stated that socio-economic factors and family food insecurity during the pandemic are related to the prevalence of stunting in toddlers (Faqihatus et al., 2021). Furthermore, the mother's education level can also affect the health degree of a family member. This is related to the mother's role in establishing a child's eating behavior, starting from meal preparation. This includes organizing a meal plan, doing groceries, preparing and processing the ingredients, cooking the meal, and distributing food to their children.

Educated mothers have better access to information regarding nutrition status and child well-being, which they would then put into practice in their care for the child and result in better nutritional status (Ringoringo et al., 2021).

Education level also corresponds with income, as income level tends to increase along with education level (Baye et al., 2020). Based on the bivariate analysis results, there is a correlation between family income and stunting in children. An earlier study showed an increase in stunting cases in children during the COVID-19 pandemic (Jawaldeh et al., 2020). A survey was done by Hana & Olken in 2020 also found that 36% of respondents claimed to reduce their meal portions due to financial difficulties (UNICEF, 2020). This is supported by this study's questionnaire analysis which found that 51.7% of the parents provided infrequent meal variation, and 55.9% of children skipped breakfast and never consumed milk. Sufficient income supported with adequate education could make better life quality achievable as the family can respond swiftly to recognize health problems, take appropriate action, and properly care for any sick family members (UNICEF, 2021)

This study found that the parents' earnings are insufficient, as 56.6% of the respondents earn under the regional minimum wage of Pekanbaru. Family income becomes an important factor in achieving a good nutritional status (Sadhu & Gandhi, 2020). During the COVID-19 pandemic, many parents complained of decreasing earnings, delayed salaries for months, and inability to make a living due to losing their jobs (Akseer et al., 2020). The low family economic status will affect the quantity and quality of meals consumed in the family; meals will have minimum variation and a small portion, which will influence the behavior of applying a balanced diet for optimum child growth (Service, 2020). According to the results of the questionnaire analysis, the percentage of parents who rarely provide varied meals for their children is 51.7%.

One way to maintain baby and child health is by correct feeding (Ban et al., 2017). Two correlations were found between child feeding behavior and child stunting based on

the study results. Breastfeeding is the safest choice for babies in situations where access to food and healthcare services is limited (Brar et al., 2020). The questionnaire analysis found that 80% of mothers breastfed their children, and 47.6% of them were introducing weaning food to their children. Breastfeeding can shave some family expenses, especially during the pandemic when the government imposes large-scale social distancing and when many workers experience a financial drop due to layoffs (Yanti & Fauziah, 2021).

The bivariate analysis results found a correlation between childcaring and stunting cases. The questionnaire analysis found that 51.7% of children frequently have late bedtime. Theoretically, the growth hormone is excreted from the brain, specifically from the pituitary gland or hypophysis gland, during sound and sufficient sleep at night. Therefore, good quality sleep will impact a child's cognitive ability and growth. If their rest is frequently disturbed, there will be abnormal growth due to the growth hormone Field's low or lack of excretion (Bhutta et al., 2020).

Optimal child growth can be initiated by adopting a clean lifestyle. The questionnaire analysis found that 72.1% of the children rarely wear footwear, 72.1% irregularly clipped their nails, and 13.6% rarely do proper handwashing with soap post defecation. According to the government's recommendation, the habit of adequate handwashing for children is 79.3%. A previous study has also found that caretakers and children who have good personal hygiene practices, such as washing their hands with soap after defecation and before having a meal, can reduce the risk of stunting by 14% (Permatasari, 2021).

The bivariate analysis found a correlation between infectious diseases and childcaring with stunting cases. The sampled children's infection history throughout the COVID-19 pandemic were influenza, coughing, and diarrhea. Epidemiologic evidence proved that malnourished children are more vulnerable to infection, thus putting them in danger and suffering from further malnutrition (Walson & Berkley, 2018).

Next, mothers' visitation to healthcare was 55.2%, and there is a correlation between mothers' visitation to healthcare and stunting. This is in line with a study conducted in Bangladesh, which saw a dramatic drop in healthcare visitation due to the COVID-19 pandemic (Ahmmed et al., 2021). Changes in healthcare procedures, such as postponing integrated service post visits and limiting the services provided in public health centers, affect the number of mothers visiting to check their child's growth and health. Nutritional services and maternal and child health services are difficult to provide due to the high COVID-19 cases in Pekanbaru. The fear of getting infected by COVID-19 from visiting health facilities worsens things. An attempt to solve this is by having health workers do home visitations.

Table 5 shows a multivariate analysis of family income factors, the most dominant connection with stunting cases. It is different from previous studies, which found that the most dominant factors based on multivariate analysis of stunting in toddlers were the mother"s education, exclusive breastfeeding, and history of infection (Susilowati et al., 2019). Before the pandemic, Integrated Service Posts could still overcome the stunting issue by distributing supplementary food to children, providing immunization services to prevent infectious diseases, and educating mothers on stunting prevention practices. Nevertheless, during the pandemic, 89.3% of integrated service post

services and alike in Indonesia could not operate at their maximum (Ministry of Health Indonesia, 2021).

Moreover, a drop in a family's economic level would affect their ability to procure better meal ingredients in terms of quality and quantity. This will impact the children's nutrition intake that is needed to sustain their lives, maintain their health, and grow. When communities experience economic issues due to loss of income and limited access to healthy food, the number of malnourished children will increase. A study in Canada mentioned that communities tend to consume snacks when parents lose their jobs or shut down their businesses (Carroll et al., 2020). This is worrying as a healthy meal is critical for increasing immunity to prevent and fight COVID-19 (Bhutta et al., 2020).

Job loss and social activity restrictions have forced families to stay at home and caused food consumption to be less varied, with fewer vegetables and fruit. According to the questionnaire analysis, 45.5% of children rarely consume fruit and vegetables. This worsens the family's situation, which already has difficulty procuring affordable and decent food (Laborde et al., 2020).

## CONCLUSION AND RECOMMENDATION

This study found several factors that significantly affect stunting in children aged 24-59 months old in the RI Sidomulyo Public Health Center area: mother's education level, family's income level, child-eating behavior, infection disease history, and mothers' visitation to healthcare services. Family income was found to have the most dominant correlation in triggering stunting during the COVID-19 pandemic.

Multi-sectoral cooperation is required to countermeasure stunting during the COVID-19 pandemic. This could be done by modifying healthcare services according to a community's socioeconomic level and COVID-19 case severity and considering the importance of internet access in maintaining nutrition services and maternal and child health. Therefore, future policies should ensure the even distribution of access to online-based healthcare services during the COVID-19 pandemic.

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**ORIGINAL ARTICLE**

# NURSES' PERCEPTION ON THE INITIAL IMPLEMENTATION OF AN EARLY WARNING SYSTEM: A MIXED-METHOD STUDY

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**ABSTRACT**

The early warning system (EWS) has been decided as a new standard for Indonesian hospitals. The main objective of EWS implementation is to help nurses quickly recognize and react to deteriorating patients. This study explores how EWS contributes to nurses' clinical decisions around patient deterioration. The research design for this study was mixed-method sequential explanatory. A purposive sampling approach was used to recruit the participants. Closed and open-ended questionnaires were distributed (n = 53) to adult unit nurses and the data was analyzed by using descriptive statistics. Focus group discussions were conducted to evaluate the implementation process and the results obtained were analyzed by using thematic analysis. Both data were integrated by using a joint display table. We found that 79% of nurses indicated that they needed education about how to use the EWS and 92% of nurses required education on physiology and management of the deteriorating patient. Three themes emerged: (1) the nurses' experience of EWS Implementation, (2) the impact of EWS implementation, and (3) ameliorating the EWS Implementation. The participants showed that the EWS has been used for the assessment, documentation, and communication process of deteriorating patient management. The EWS is a complex tool for nurses, and they need support from stakeholders to maintain and optimize the advantages.

Keywords: *Deterioration; early warning system; emergency; general nurses; perception*

## INTRODUCTION

The early warning system (EWS) is widely recognized as part of the early detection methods for patient deterioration (Downey, Tahir, Randell, Brown, & Jayne, 2017). The EWS is a system that allows nurses to measure respiratory rate, systolic blood pressure, pulse, temperature, and level of consciousness, and each cumulative elevation score triggers an action (Odell, 2015). A previous study has stated how vital sign monitoring is more effective for the early recognition of patient deterioration (Churpek, Adhikari, & Edelson, 2016). Early recognition, response, and treatment of deteriorating patients are essential elements for improving patient outcomes and reducing unanticipated inpatient hospital deaths (Lambe, Currey, & Considine, 2016).

The Early Warning System is a tool used by health care teams to recognize the deteriorating patient early on to initiate responses and interventions, such as nursing care, informing physicians, and activating the rapid response team. However, the implementation of EWS becomes challenging due to a lack of resources or different health care systems of hospitals (Teasdale, 2012). Therefore, the EWS has been modified in many hospitals. The modified early warning system that has been run in a teaching hospital in Yogyakarta has adopted the New Zealand Early Warning Score parameters. The local-development of an EWS has caused the development of a wide range of scoring systems (McGaughey, O'Halloran, Porter, & Blackwood, 2017). Several studies have evaluated EWS to enhance the accuracy and efficiency of EWS

implementation in each setting (Drower, McKeany, Jogia, & Jull, 2013; Olsen, Mooney, & Evans, 2016; Salt, 2013).

The success of EWS implementation depends on the facilitation and support from the organization, staff empowerment, and cultural factors (McGaughey et al., 2017). Nevertheless, it is difficult to determine the positive impact of EWS implementation without calculating the score completely. However, some studies have shown that the implementation of EWS increases the nurse's workload (Hope et al., 2018; Neary, Regan, Joyce, McAnena, & Callanan, 2015; Salt, 2013). Therefore, this study will assess the effect of the implementation of EWS on nurses in a training hospital.

## METHOD
### Study Design
A sequential mixed method design was used in this research. The sequential mixed method model allowed the researcher to merge the results from the second phase with the first phase (Teddlie & Tashakkori, 2003).

### Participants
The selection of participants for the quantitative and qualitative phase followed a criterion that included all nursing staff who were working in the adult unit with more than 6 months of clinical experience, experience in clinical practice before and after the Early Warning System (EWS) implementation, having used EWS for at least one month since the system was implemented and demonstrated a willingness to participate in the research study by signing a consent form. The exclusion criteria included all non-adult unit nurses and adult unit nurses who were not rostered during EWS implementation, such as nurses on annual leave, monthly leave, maternity leave, and retired during EWS implementation.

### Data Collection
This study was conducted in a teaching hospital in Indonesia which has a 72-bed inpatient capacity in five adult units. All adult unit nurses (73 Nurses) were invited to participate in this study. A purposive sampling approach was used to recruit the participants. The first phase of the study was conducted through an exploratory descriptive approach by using a survey design that had been used in a previous study (Greenwood, Genford, Goward, & Doherty, 2015). A qualitative approach was used for this second phase by conducting a Focus Group Discussion (FGD). The researcher held two FGDs that consisted of one group for senior nurses and another group for junior nurses. This approach was used to prevent the senior nurses from subduing the junior nurses during the discussion process.

### Instrument
A 24-item survey was used to evaluate the nurses' understanding of EWS aspects, the need for EWS education, nurses' behavior toward EWS, nurses' perception toward

their colleagues in EWS implementation, enablers and barrier factors of EWS, and the negatives of EWS implementation. The survey was translated into Bahasa Indonesia and validated using face validity by three nurses who have a minimum of two years of clinical experience. Next, the researcher sent the link to the electronic survey to participants who were willing to participate. Dichotomous, Likert-scale, and open-ended responses were collected. The second phase was a confirmation of the data obtained in the first phase.

The survey was anonymous and voluntary. The researchers maintained the confidentiality of the participants by not mentioning their real names, gender, age, and workplace in the result of this study. The FGD session was held in a confidential setting and recorded after the consent form was signed. Data was kept in a secure drive in a cloud drive and was only accessible by the researcher and supervisors.

### Data Analysis
Quantitative data was analyzed by extracting the electronic survey results into a Microsoft database Excel file and the responses were counted. Descriptive statistics were used to analyze the frequency of response rates. The qualitative data was analyzed by using thematic analysis. The researcher then mixed the quantitative and qualitative study results by integrating the data during the analysis data by using the joint display technique (Creswell, 2014).

### Ethical Consideration
Ethics approval for this study was received from the University of Tasmania (UTAS) H0017853 and Universitas Gadjah Mada (UGM) KE/FK/1243/EC/2018.

## RESULTS
The electronic survey was completely filled by 53 nurses (75% of 73 rostered nurses); see respondent characteristics in Table 1.

**Table 1. Characteristic participants in the quantitative phase (n = 53)**

| Variable | Frequency | Percentages (%) |
|---|---|---|
| Gender | | |
| Female | 44 | 83 |
| Male | 9 | 17 |
| Education | | |
| Diploma | 21 | 40 |
| Bachelor | 32 | 60 |
| Years of experience | | |
| 0 – 2 years | 17 | 32 |
| 2 – 4 years | 12 | 23 |
| > 4 years | 24 | 45 |

In Table 2, over half of the nurses were found to have a "good" understanding of EWS. However, there is still one respondent (2%) that stated that her understanding of EWS was poor.

**Table 2. The understanding aspect of the EWS chart**

| Aspect | Very poor n (%) | Poor n (%) | Common n (%) | Good n (%) | Very good n (%) |
|---|---|---|---|---|---|
| Documenting observations on the EWS chart | 0 (0%) | 1 (2%) | 6 (11%) | 35 (66%) | 11 (21%) |
| Calculating an early warning score on the EWS chart | 0 (0%) | 1 (2%) | 5 (9%) | 37 (70%) | 10 (19%) |
| Following the actions outlined on the EWS chart | 0 (0%) | 1 (2%) | 15 (28%) | 30 (57%) | 7 (13%) |

The need for EWS education is shown in Table 3. Most nurses still need education about EWS. As many as 42 (79%)

respondents stated that they need training in using the EWS chart and escalation procedure. Over half, 49 (92%) of the

respondents also stated that they need education on the physiology of clinical deterioration and the management of the deteriorating patient.

**Table 3. The need for EWS education**

| Question | Yes n (%) |
|---|---|
| Do you feel that you need more training about the use of the EWS chart and escalation of care procedures? | 42 (79%) |
| Do you feel that you need more education about the physiology of clinical deterioration? | 49 (92%) |
| Do you feel that you need more education about the treatment/management of patients who deteriorate? | 49 (92%) |

**Table 4. Nurses' behavior towards EWS**

| Questions | Always n (%) | Usually n (%) | Sometimes n (%) | Never n (%) |
|---|---|---|---|---|
| When I document the vital signs of a patient, I calculate the EWS score | 36 (68%) | 15 (28%) | 2 (4%) | 0 (0%) |
| I use the EWS score during clinical handover to nurses | 51% (27) | 34% (18) | 15% (8) | 0 (0%) |
| I use the EWS score during clinical handover to doctors | 6 (11%) | 7 (13%) | 33 (62%) | 7 (13%) |
| I use the EWS score during clinical handover to allied health professionals | 8 (15%) | 14 (26%) | 24 (45%) | 7 (13%) |
| When a score of ≥1 is triggered, I increase the rate of observations according to the EWS escalation of care flowchart | 15 (28%) | 26 (49%) | 10 (19%) | 2 (4%) |
| When a score of ≥6 is triggered, I called the general doctor and ask him to report the patient's condition to the responsible doctor (specialist). | 16 (30%) | 30 (57%) | 7 (13%) | 0 (0%) |
| When a score of ≥6 is triggered, and I do not get an appropriate response from the specified | 4 (7%) | 8 (15%) | 30 (57%) | 11 (21%) |
| I escalate the care according to the EWS escalation of care flow chart | 18 (34%) | 27 (51%) | 8 (15%) | 0 (0%) |

The respondents were also asked to select the enabling factors of EWS implementation (Table 6). Over half (62%) of the respondents voted that the EWS chart is easy to use and that they are now familiar with it. The respondents' expectation to obtain clear medical reviews and to notify senior colleagues in the event of clinical deterioration was also common at 47% for both factors. Less than half (47%) of the respondents cited that there is a clear flowchart to follow if the right response is not/cannot be acted upon by a colleague. As many as 14 (26%) responses also mentioned that the EWS chart is efficient to use. However, only 15 (28%) respondents stated that they obtained support and value from their line managers during the EWS implementation.

**Table 5. Enabling factors of EWS**

| Question | Yes n (%) |
|---|---|
| The EWS chart is easy to use, now that I am familiar with it | 33 (62%) |
| Expectations for medical review in the event of clinical deterioration are clear | 25 (47%) |
| Expectations of doctors and nurses to notify senior colleagues in the event of clinical deterioration are clear | 25 (47%) |
| There is a clear flowchart to follow if the right response is not/cannot be acted upon by a colleague | 25 (47%) |
| My line managers value and support the EWS | 15 (28%) |

Nurses' behaviors towards EWS are shown in Table 4. Half (49%) of the nurses increased the rate of observation and escalated the care (51%) frequently according to the EWS escalation. Half (51%) of the nurses also indicated to "always" use the EWS during clinical handover to nurses. However, only six nurses (11%) "always" use the EWS during clinical handover to the doctor and 13% of the nurses indicated that they never use the EWS during clinical handover to another health professional. Moreover, only 11 nurses (21%) stated that they never obtained an appropriate response from the specified health professional when a score of ≥ 6 was triggered.

Two Focus Group Discussions were held during the qualitative phase. All the participants in this phase were female (100%) and more than half (67%) of the participants in this phase have a bachelor's degree.

**Table 6. Participants' characteristics in the qualitative phase (n = 9)**

| No | Group | Gender | Education | Years of experience |
|---|---|---|---|---|
| 1 | 1 | Female | Diploma | > 4 years |
| 2 | 1 | Female | Bachelor | > 4 years |
| 3 | 1 | Female | Bachelor | > 4 years |
| 4 | 1 | Female | Bachelor | > 4 years |
| 5 | 2 | Female | Diploma | 0-2 years |
| 6 | 2 | Female | Diploma | 0-2 years |
| 7 | 2 | Female | Bachelor | 0-2 years |
| 8 | 2 | Female | Bachelor | 0-2 years |
| 9 | 2 | Female | Bachelor | 0-2 years |

During the qualitative data analysis of the 2 FGDs, the researchers found three themes. The main finding of the qualitative analysis is shown in Figure 1.
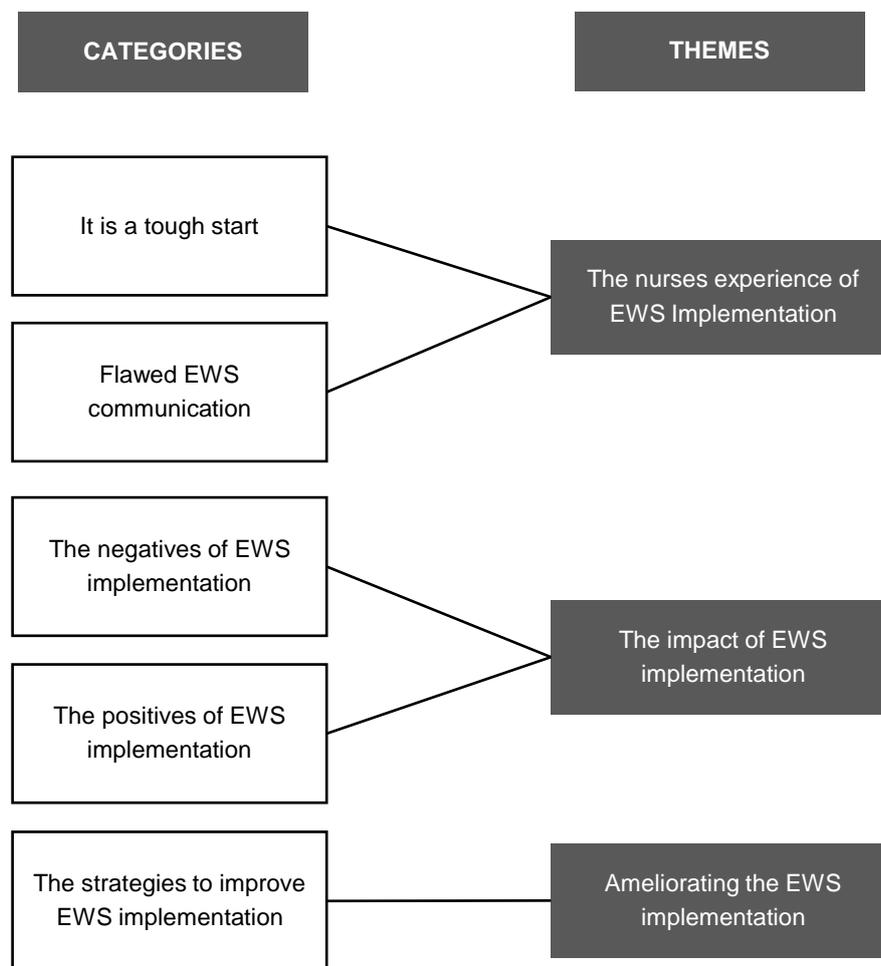
**Figure 1.  Themes and categories obtained in FGDs of nurses' perception during EWS implementation**

1. Theme 1: The nurses' experience with EWS implementation

The researchers found that the nurses have different perspectives and varying responses to when the EWS was implemented. During the FGD, the nurses had quite different opinions about EWS. Most of the nurses expressed that the EWS implementation is difficult for them.

a. Category 1: It was tough to start implementing the EWS

According to the respondents, the implementation process was challenging. In both FGDs, the participants expressed that the EWS implementation is complicated, and they were confused about how to apply the EWS. The nurses said that the burden of EWS implementation was only handled by them and that other health professionals were less aware of the EWS implementation. This is despite the fact that the implementation process is affected by varying factors such as nurse ward manager, nurse's experience, and supporting system. Therefore, some nurses in other wards could adapt and support the implementation and use of EWS.

b. Category 2: Flawed EWS communication

Most of the participants reported that the nurses did the documentation process carelessly. The nurses understood when to commence the re-measuring of vital signs in response to changes in the condition of the patient, but they did not do that. The main point of nursing documentation is to inform other health care professionals during the handover process of the patient's condition and progress. However, the nurses' responses varied regarding communication and handover of the EWS.

2. Theme 2: The impact of EWS implementation

The implementation of EWS is new for nurses in this hospital. This implementation has positive and negative impacts on nurses in this study's location.

a. Category 3: The negatives of EWS implementation

Most of the nurses reported the negative impact of implementing EWS was that they received complaints from patients as they would measure the vital signs during the patient's resting time. The participants in both groups felt that the doctors are less aware of the EWS. The nurses experienced difficulties when they reported the EWS to the doctors. One nurse during an FGD session stated that the EWS chart is less informative. Some participants pointed out that the key issue in implementing EWS is the limited availability of resources. The implementation process could imply that improvement is needed in the provision of various resources in the ward such as human resources and equipment.

b. Category 4: The positives of EWS implementation

The participants reported that EWS generally helps to assess the patients' conditions. The EWS assists their clinical judgment, identifies the deteriorating patient, gives them an early warning of physiological changes, and makes them warier of the patients' condition. The EWS also helped nurses to observe the patient's condition and alerted them when the re-observation should be conducted. Moreover, during FGDs, the nurses expressed that they could contact senior colleagues and transfer the deteriorating patient into the critical care unit.

3. Theme 3: Ameliorating the EWS implementation
The participants were asked whether they have any suggestions to improve the use of the EWS. The participants stated they still need further education to support the EWS implementation. Most nurses suggested making the EWS clearer and easier to use, especially the EWS form. The nurses felt that the EWS form is too complicated. Furthermore, to maintain the implementation of EWS, one group that consisted of senior nurses stated that the EWS needs to be evaluated to learn what the manager can do to improve the implementation.

**Integrated Results**
In terms of results integration, the researchers integrated both the quantitative and qualitative results obtained by using the joint display technique (Creswell & Plano Clark, 2017). The joint display below shows that the qualitative results support the survey that had been distributed before the focus groups.

**Table 7. Quantitative and qualitative integration results**

| Survey Result | Focus Group Discussion |
|---|---|
| 79% of respondents indicated they need more education on EWS and 92% stated they needed more information on the physiological management of deteriorating patients. | Theme: Ameliorating the EWS implementation<br><br>"Need a refresh (re-education), … especially regarding materials that we need to be aware of when the patient's vital signs are worsening." (1st FGD) |
| 77% of respondents agreed that EWS supports their clinical judgment. 68% of respondents indicated early intervention is delivered to patients who are deteriorating. | Theme: The impact of EWS implementation<br>Category: The EWS outcome<br><br>"When the EWS score reaches 7, we would contact the specialist about the patient's condition and ask about whether the patient could be transferred to the critical care unit." (2nd FGD) |
| 68% of respondents answered that the EWS replaced their clinical judgment. 58% of respondents indicated not always communicating the score to the specified health professional. | Theme: The impact of EWS implementation<br>Category: The EWS shortcomings<br><br>"Sometimes we don't work based on the EWS score itself but follow the patient's clinical condition instead." (1st FGD) |
| 51% of respondents indicated that they "always" use the EWS score during the handover to nurses. 11% of respondents indicated that they "always" use the EWS during the handover to doctors. 68% of respondents indicated that nurses "always" calculate the score. | Theme: The nurses' experience with EWS implementation<br>Category: Flawed EWS communication<br><br>"sometimes the nurses fill the charts carelessly." (1st FGD)<br>"sometimes the nurses forget to fill the chart." (2nd FGD) |
| 62% of the respondents agreed that the chart is too complicated.<br>77% of respondents showed that their line manager did not support the EWS. | Theme: The nurses' experience with EWS implementation<br>Category: It's a tough start<br><br>"It looks complicated." (1st FGD)<br>"The chart is too complicated" (2nd FGD) |

## DISCUSSION

The EWS has been implemented at this teaching hospital since November 2018 and this research is the first report that considers nurses' perspectives. The results from this study found varying responses from adult ward nurses regarding EWS implementation. More than half (62%) of the respondents indicated that the EWS chart is too complicated. During the FGDs, both groups discussed the complicated chart and most of them advised for the chart to be revised. One of the FGD participants also said that it was difficult for them to implement the EWS for the first time and that they needed some time to get used to it. However, from the survey's results, after the EWS had been implemented for three months, the majority of respondents (62%) agreed that the EWS is easy to use because they were used to it. This result is similar to a published study in which 58% of respondents found the EWS was easy to use (Salt, 2013).

Only half of the respondents indicated that they use the EWS in the handover process to the nurse in the next shift, and few respondents use the EWS during the handover to doctors. The participants in the FGDs stated that the doctors did not need the EWS report. Moreover, the reported conflict between nurses and other healthcare professionals makes the EWS less effective to help nurses communicate with other professionals. This finding is contrary to previous studies in which the EWS was found to empower communication between nurses and doctors to seek assistance from senior medical staff and avoid conflict (Neary et al., 2015; Shearer et al., 2012; Stafseth, Gronbeck, Lien, Randen, & Lerdal, 2016). One of the FGD participants said that the doctors were not informed that the EWS had been implemented, and they were not familiar with the scores. Therefore, to harmonize nurses' and doctors' support of EWS, it is necessary to implement and provide education on the EWS for all health professionals in the hospital, not only for the nurses.

The EWS is proposed to help nurses' ability to assess and manage deteriorating patients. Most of the participants in this study felt that the EWS had helped them in clinical practice, especially when managing deteriorating patients. The majority of the respondents (68%) agreed that the EWS helped them to deliver interventions earlier to the deteriorating patient. Additionally, the majority of respondents (77%) supported the EWS and backed up their clinical judgment. Previous studies support this finding as they stated that the EWS has been found as a predictor and could help nurses to manage deteriorating patients (Kovacs et al., 2016; Le Lagadec & Dwyer, 2017).

The participants in this study reported that sometimes nurses filled the chart carelessly and forget to sum the score. Moreover, the majority of respondents (77%) felt that they did not obtain any value or support from their line manager in implementing EWS. From the second FGD, a respondent stated that they did not obtain support from their senior nurse.

These findings suggest that the implementation of EWS requires regular evaluation and monitoring from line managers to maintain the adherence to and the effectiveness of the EWS (Petersen, 2018).

Furthermore, the participants in this study proposed several recommendations to improve the current EWS for the end-user. From the survey's results, a significant number of nurses (92%) needed education on the physiological management of deteriorating patients. This data was also supported by the qualitative result in which both groups stated that they need re-education about the EWS. These findings are similar to Rattray et al. (2011) who stated that education is a vital component of maintaining and enhancing the effectiveness of the use of the EWS. Furthermore, during this study, the researchers also found recommendations from the participants that the EWS chart should be revised to make it easier and clearer.

This study found limitations during EWS implementation at this hospital. Most of the participants stated that the lack of resources was a vital issue for the effective implementation of the EWS. Some nurses indicated that the scores could be inaccurate, especially for a patient who is not in a critical condition. Moreover, while the nurse had to monitor the patient during the night, they received complaints because the monitoring disturbs the patient's sleeping time. Those limitations are similar to a previous study (Petersen, 2018). Therefore, nurses tend to rely more on their clinical judgment rather than the score itself. A previous study explained that relying on the EWS is not enough and nurses have to improve their clinical judgment in managing patient deterioration (Kyriacos, Jelsma, & Jordan, 2011).

This study presents evidence of the contribution of the EWS implementation to adult unit nurses regarding patient deterioration. This study explored the impact of the EWS implementation, nurses' perception of the EWS implementation, and ideas to improve the efficiency of the EWS. This study involved all adult unit nurses to collect their perspectives on EWS implementation and to obtain a greater breadth and depth of the current EWS implementation, FGDs were also conducted. Nevertheless, there are limitations to this study. The study was conducted in a single location. Secondly, the survey that has been used in the quantitative phase of this study has not been tested for construct validity and reliability. Thirdly, the researcher did not perform triangulation in this study. Moreover, the researcher, who is a senior nurse in this hospital, was present as a moderator in FGDs and this may have altered the participants' natural responses. Additionally, the influence of the personal experience of the researcher and his interest in the subject area may have a bearing on the interpretations made during the analysis.

## CONCLUSION AND RECOMMENDATION

The participants in this study explained that the EWS is a useful system that helps adult unit nurses to assess, communicate, and manage deteriorating patients. They stated that during the first year of EWS implementation, they require more support from hospital management to recognize that the EWS has the benefit of improving patient safety. From the nurses' perspective, during the EWS implementation, there are still barriers and imperfections regarding its effectiveness. Therefore, improvements in terms of the chart and protocol need to be made to improve its usefulness.

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