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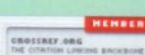
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Pre-Testing Muhammadiyah COVID-19 Guidelines in Jakarta Province

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Abstract

Muhammadiyah, being one of the religious-based organizations, has its affiliated members comprising 14,9% of the general Indonesian population. The Muhammadiyah Central Board declared an ad-hoc group called the Muhammadiyah COVID-19 Command Centre (MCCC) to combat COVID-19. Among the used media were the third COVID-19 guidelines publications by the MCCC. This study aimed to determine the Muhammadiyah members' understanding of the COVID-19 Revision III Guidelines based on their consistency, clarity, relevance, credibility, and interest. This research was a descriptive qualitative type of study. The eleven informants who participated in this study, determined by purposive sampling, were Muhammadiyah members who lived and worked in the Jakarta. These informants consisted of various professions, including health workers, teachers, district board members, nurses, drivers, traders, housewives, and students. Data collection was by online focus group discussions through the zoom cloud meetings platform. Informants discussed the five aspects of the guideline which included consistency, clarity, relevancy, credibility and interest. The contents of the guideline were found to be consistent with other similar guidelines published by the Ministry of Health (MOH). In addition, being affiliated members of the Muhammadiyah group, informants felt more comfortable trusting the Muhammadiyah-published COVID-19 guidelines. From the clarity and relevance aspect, the informants had positive perspectives on the guidelines. The design of the published guidelines attracted their interest in reading, implementing, and sharing the guidelines with others. However, the guideline did not contain the names of its drafting team nor the introduction by the Central Board leadership. It would have been a very important strategy in strengthening the credibility of the media published by the MCCC. The MCCC needed more enticing plans and methods in the dissemination of its online or printed media to the population. For online media, the published number of pages should be fixed to a less readable number.

Introduction

The COVID-19 outbreak has been a global concern since the World Health Organization declared it a global pandemic and a public health emergency in March 2020. There were 154.815.500 confirmed COVID-19 cases, with 3.236.104 deaths by May 6, 2021. The number of confirmed COVID-19 cases in Southeast Asia surpassed 24.269.809 people (WHO, 2020). Indonesia had the highest number in Southeast Asia, with 1.691.658

infected people, 46.349 deaths, and 1.552.532 COVID-19 recoveries. The highest number by May 6, 2021, was in DKI Jakarta Province with confirmed cases of 413,323 (24.4%). (Satuan Tugas Penanganan COVID-19, 2021).

As an institution with the mandate to respond to global health problems, the WHO published several health protocols and guidelines. Each country then developed its guidelines and protocols depending on the needs and demands of the WHO guidelines.

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Surtimanah et al. (2019) evaluated the guidelines for Quick Medical and Public Health handling of Coronavirus Disease (COVID-19), and they observed that the guidelines were not suitable since they were less attractive to the public and difficult to understand. Health workers' understanding of the guidelines for rapid medical and public health handling of COVID-19 in Indonesia was good but on the contrary difficult for the public to understand. On the other hand, the guideline was attractive to health workers but less attractive to the public. More so, the guidelines for rapid medical and public health handling of COVID-19 were promising in bringing positive behavioral changes among health workers and the community (Surtimanah et al., 2019).

Muhammadiyah, a religious based community organization with affiliated members representing 14.9% of the population, had a vital role in the country. In response to the global pandemic, the Muhammadiyah COVID-19 Command Center (MCCC) was established on March 14, 2020. The MCCC was formed by a Declaration from the Muhammadiyah Central Executive Number 02/MLM/1.0/H/2020 concerning COVID-19 (Fadliyah et al., 2020). The MCCC was significant to the affiliated members since it searched for the publications on behalf of members, an approach needed for each target audience "segmentation" (Dao Truong, 2014; Handayani et al., 2021).

Based on guidelines from the WHO and the Indonesian Government, the MCCC set guidelines for the Muhammadiyah members' daily lives in the COVID-19 era. By December 2020, the MCCC had published several guidelines for schools, hospitals, board offices, and communities. The MCCC revised the COVID-19 general guidelines three times in an attempt to rhyme Indonesia's current situation and conditions. Its contents included a general guide, a personal guide, a vulnerable group, a community, and a health care guide. People suffering from comorbid hypertension and diabetes mellitus, male gender, and active smokers were at higher risks of severe COVID-19 caused by SARS-CoV-2 infection. They were higher among males than females, which was associated with the higher prevalence of active smoking among men. In patients

with a history of smoking, hypertension, and diabetes mellitus; it was suspected that there was an increase in the expression of ACE2 receptors (Cai, 2020; Lei et al., 2020).

In the current COVID-19 pandemic, the WHO strives to disseminate accurate and credible information through various social media platforms. With the speed at which it spreads on the internet, the information's scrutiny and authenticity should be checked to curb the spread of misinformation and myths (Adhee et al., 2020; Pennycook et al., 2020). During media planning (pre-testing media), it is necessary to confirm whether the target audiences could welcome the created media. A study observed that in a Pre-testing campaign about safe sex in a television advertisement; where a storyboard with images and text presented to members of a target population of students (between 14 and 16 years) enrolled in a vocational school showed results of a positive effect on safe sexual behavior (Whittingham et al., 2008). In another study by Fadliyah et al. (2020), about pre-testing educational videos by WHO on the prevention of COVID-19 transmission, participants found the video contents to fit their values, with the portrayed message addressing all the different groups of the community. The participants had positive perceptions of the video since it was considered persuasive to the population (Fadliyah et al., 2020).

Pre-testing can only estimate how many messages or materials would be responded to in the real world. However, if executed correctly, it could identify potential sources of confusion and other features that could improve the response. Pre-testing is used to understand consumer responses to messages, activities, concepts, and other program intervention components (Brown et al., 2008). Among the most common mistakes in pre-testing is structuring the interview, asking consumers what they like best, or even asking them to choose the best version. This study aimed to find out the in-depth views of Muhammadiyah members in Jakarta towards the third edition of the COVID-19 guidelines issued by the MCCC with respect to consistency, clarity, relevancy, credibility, and interest points of view.

Method

This study was descriptive qualitative research. This study contained eleven Muhammadiyah informant residents who lived in DKI Jakarta. These were determined and selected for the study by purposive sampling among health workers, teachers, district board officers, nurses, drivers, traders, and students. The selected informants met the inclusion and exclusion criteria. The inclusion criterion was being from a Muhammadiyah affiliation who resided in the DKI Jakarta area. The exclusion criteria were that participants had never read the COVID-19 revision III guide by the Muhammadiyah COVID-19 Command

Centre; and that the informant had provided interview consent through informed consent.

Data collection took time on 23/October/2020 through a focus group discussion (FGD) in a virtual face-to-face 90-minute Zoom cloud meetings application. Each informant was informed about the study and provided informed consent before the interview. The research instrument in form of an in-depth interview guide covered five aspects of the pre-testing communication, including consistency, clarity, relevance, credibility, and interest. Ethical clearance was obtained from the Ethics Commission of Muhammadiyah University Prof. Dr. HAMKA No 03 / 20.07 / 0549.

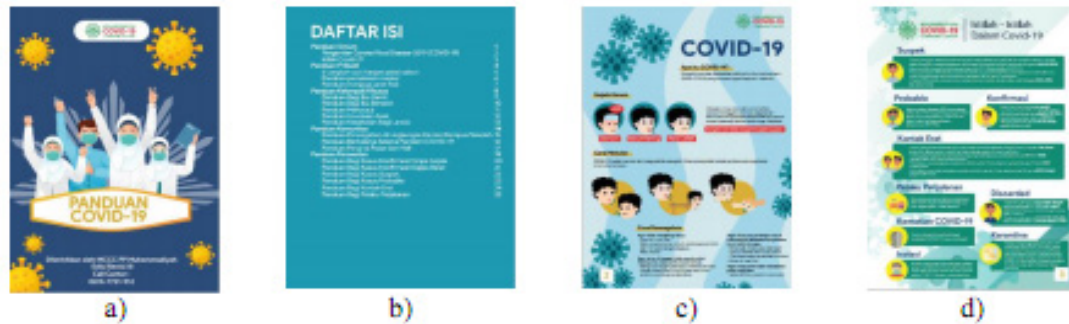


Figure 1. MCCC COVID-19 Guidelines on Preventing COVID-19 3rd Revision, (a) Cover; (b) Content; (c) Introduction and (d) COVID-19 Terms. The guidelines consist of 25 pages 1) Introduction, 2) Personal Guideline, 3) Specific Group Guideline, 4) Community Guideline, and 5) Treatment Guideline.

Results and Discussion

Table (1) describes the characteristics of the informants who participated in this study. The informants differed in gender and age. The

age of informants in the study ranged between 20-59 years. All six male and five female informants were Muhammadiyah-affiliated members who worked and stayed in Jakarta.

Table. 1 Characteristics of Research Informants; An Overview of The Understanding of The COVID-19 Revision III Guide by The Muhammadiyah COVID-19 Command Centre

Informant	Age	Gender	Occupation	Institution
Informant 1	48	Male	Staff Officer	Central Board of Muhammadiyah
Informant 2	23	Male	Teacher	177 Junior High School
Informant 3	25	Male	Student	UHAMKA
Informant 4	52	Male	Staff officer	District Board of Muhammadiyah
Informant 5	31	Female	Staff Officer	Universitas Uhamka
Informant 6	35	Female	Nurse	Persahabatan Hospital
Informant 7	33	Female	Librarian	Pascasarjana Uhamka
Informant 8	51	Female	Housewife	District Board of Aisyiah
Informant 9	59	Male	Trader	District Board of Muhammadiyah
Informant10	36	Male	Online driver	Gojek
Informant 11	50	Female	Teacher	Muhammadiyah Junior High School

Source: Primary Data, 2020

The results showed five themes that explained pretesting communication components presented in Table (2) below.

Table 2. Themes and Statements of Informants

Theme	Informant Statement
Consistency	<p>“In terms of consistency, yes, because it is still related to how to prevent and deal with COVID-19. Even though there are some things that have changed, the information remains consistent. For instance, how to protect yourself from the spread of COVID-19. Even though something has changed because this is a revision. yes, there is revision 1, revision 2, revision 3; there must be changes that have occurred but I see that MCCC is still consistent with how to deal with COVID-19 so that it does not spread widely” (Informant 2)</p> <p>“I also opened the guidelines from the Ministry of Health, and I tried to compare. Insha Allah, this guideline is also represented in the Ministry’s guidelines. From the beginning to the end, the content is consistent. For me, it is easier to understand and convincing because it’s published from Muhammadiyah, the institution I am affiliated with” (Informant 6)</p>
Clarity	<p>“As far as I read, it is crystal clear, especially with a picture explaining the text. However, there are several terminologies, maybe the language of health, for instance, the term ‘covid’ which probably not many people know. But for the whole content and purpose to be understood by the community, that is good enough” (Informant 5)</p> <p>“The language is quite understandable. The pictures are quite interesting, which attracts people to read the text” (Informant 12).</p> <p>“They are sufficiently complete and representative compared to some that do not seem to be included. For example, a breastfeeding guide during a pandemic. That is a lot. However, it is amazing to explain since some pictures already represent it” (Informant 9)</p> <p>“Language can be understood and clear” (Informant 10)</p>
Relevancy	<p>“Both the guidelines from the ministry and the MCCC will be of use if I read all of them since almost all of them are similar. Because it suggests several roles that we, as Muhammadiyah Aisyiah, have in the environment that have an impact, the content from the MCCC as a whole is good; more detailed and It’s more flexible, right? So those of us who read know better what to do “(Informant 9)</p> <p>“So, in my opinion it’s good and already been good. That means following a lot from the guidelines, which in my opinion, we have to do God willing. So far, this guide has good accuracy and high yes (acceptance), although many other guides are almost similar to this guide. Are you a Jakarta province resident? - Yes. Then in terms of religion, do they also pay attention to it? – Yes. Say that maybe the guidance guide contains involvement! – yes.”(Informant 4)</p>
Credibility	<p>“This guide was made after carrying out a study. The people at the MCCC can’t make a guide without first reviewing it. Because I know people at Muhammadiyah have high credibility in their education and religious aspect” (Informant 2)</p> <p>“Unfortunately, there is no mentioned aspect in the guideline about the writing team nor a preface from the Central Board. Those two were supposed to be written, and this would show more credibility.” (Informant 1)</p>
Interest	<p>“Incidentally, I also have a problem with my eyesight. So, in the sense that if I looked a little further, it becomes a little less clear. The end should be closer (bigger), but if the side of the letters is not too distracting, it cannot be read. Maybe when the appearance of the letters is too small, I would be a little disturbed because I have to look at the draft again since I can’t see far from the side”(Informant 4).</p> <p>“Yesterday, I shared it immediately because the language was easy. From my point of view as a student, it is good, and not the mix of colors that makes it interesting. For example, on page four, there is a combination of green and fonts, which makes me eager to share it with friends. However, the number of pages is big. The MCCC should come up with deliverable strategies first; whether it will be published online or offline” (Informant 3)</p> <p>“I am very interested in this guide, and with my desire to share, I have shared several times both within the environment with friends on campus and also at the prayer room” (Informant 1)</p> <p>“After I learned from the guideline, I developed an interest in it since it was easy to understand. The interesting picture was also used in my teaching material as additional knowledge for the student’s guardians. If the rest is general, the guidance on pages 9-10 for the pregnant mother shows that it has a wide scope. So it is possible to be of help if I share in the group of students who are parents “(Informant 12)</p>

An overview about the understanding of the Muhammadiyah COVID-19 Command Center’s (MCCC) COVID-19 Revision III Guidelines

Consistency

Consistency in the guidelines is a prerequisite for developing messages and materials. There is a rapid change of information that has many topics; often, what is accurate one year is no longer valid the following year. It makes consistency in each material, such as a guideline, a must. The COVID-19 guideline's third revision is related to II and I. The first revised guideline served as a guide for Muhammadiyah members at the beginning of the spread of COVID-19. Each revision of the guide follows the development in the situation and the urgency of the existing COVID-19 status. The revision II content focused on the current COVID-19 situation at that time. The third revision of COVID-19 guidelines rhymes with the COVID-19 guidelines from the MOH and WHO. The message and content in the third revision guide had significant consistency with the previous ones. The messages are the combination of new information and the update of existing information. The publishing of a creative, interesting, and clear message must maintain and follow the strategy, goals, and the intended audience (Devine et al., 2016).

Supporting tools such as pictures, slides and films are indispensable during demonstrations; which should carry out systematically and in stages. In practice, the inconsistency between the message and what the audience might already know is a controversy among scientists, government agencies, and advocacy groups (Devine et al., 2016). The material provisions in the guide could be supported with complete data and printed using a colour similar to the illustration and typography to be compatible across campaigns. If there is a logo or theme, it is then used in all materials so that graphics and messages reinforce each other without sending different signals (Devine et al., 2016).

Clarity

The study results showed that the COVID-19 revision III guide provided clear and easy-to-understand information. The COVID-19 guide had many sub-themes of information well summarized to be relatively concise and exciting. The language was easy to understand, and the pictures were interesting

enough to attract and lure people into reading the COVID-19 guide. Information is welcomed if it has explicit content, where good planning produces a clear message depending on the audience's needs. Indicators and measurements of the impact of community action require precise definitions of ongoing environmental (organizational, community, social) and individual changes as part of program objectives (TAIoPC, 2008). Modules or guidelines should be developed for direct technical guidance by referring to the curriculum, training module, and health promotion implementation policy (Surtimanah et al., 2019).

The informants thought that the information contained in the manual was complete and arranged according to themes. Meanwhile, the guideline had five. Each had clear and detailed sub-themes. Among these were the general guides, personal guides, exceptional group guides, community, and care guides. In packaging the media's information, it is necessary to determine the angle while highlighting key messages to minimize the gap from the sources. It is done by ensuring that the public's content is clear and relevant. The clear reasons and ambitions of the program make it easier to create media. Indicators that clearly and objectively measure the achievement of program objectives and as well systematically document the program process lead to the program being conveyed to the audience (TAIoPC, 2008).

In a study on the impact of COVID-19 on media, the media's role, especially television, was revived. The fact that citizens who are usually far from information have reconnected with the news due to the reduction in news consumption among the citizens. However, media switching concerning the accessibility of public affairs can also be utilized by agencies and the Government (Casero-Ripollés, 2020). A study of periodontal knowledge campaigns through TV had heterogeneous targets with various levels of education where population-based media campaigns promote oral health and periodontal knowledge among adults had a positive short-term impact. However, these effects appeared to be stable after three months (Gholami et al., 2017).

Relevancy

The interview results found the information contained in the COVID-19 guideline's third revision to have the same essential message as the government guidelines. The only uniqueness of information in this guideline was that Muhammadiyah Aisyiah modified it for their members in their families, school environments, and the Muhammadiyah hospital. The prepared content was detailed and more flexible for easier understanding by the Muhammadiyah members who read it.

Relevant information needs information about demography, the effectiveness of previous programs, morbidity and mortality, and social and economic factors (e.g. education, social support, literacy rates, and housing conditions). Impact evaluation and outcomes to assist in future planning are needed. The results should also be documented and disseminated to the public with the help of computers with relevant software packages for data entry and analysis. Obtaining information about the most appropriate journals and up-to-date information helps in relying on correct information (WHO, 2020).

Credibility

It is fundamental that the MCCC reviews the COVID-19 guideline's third revision before publishing it to Muhammadiyah members. The assessment process could also include experts who have in-depth knowledge of health. The COVID-19 guideline revision III has a general segmentation of the public and specifically the Muhammadiyah members. In the COVID-19 third guideline, there was no introduction, which makes it a credible guide. The foreword's importance in providing information and building belief in the correctness of the existing guidelines makes COVID-19 guidelines more acceptable to the broader community.

In the program, the overall communication objectives and decisions to balance the different views of the audience take priority. Whether art, science, or a combination of both, pre-testing is intended to strengthen the social marketing commitment to creating, communicating, and delivering program services and products that consumers genuinely value (Brown et al., 2008). Health knowledge

such as daily health care, disease prevention, and treatment needs to be released by professional medical organizations to ensure the credibility of information (Wang & Wu, 2020).

Interest

In health promotion media, the indicator "interest" is one of the requirements to which planners must pay attention. The study showed that COVID-19 guideline was interesting for the various age groups and professions. People with vision problems would have particular trouble reading the publication since the font size's literary diversity forces some readers to extend away from the text for better vision. However, via a smartphone, font enlargement of the writing is easy. An exciting guide made informants eager to share with others. This COVID-19 third guideline had a good design with an impressive combination of colours and a mixture of illustrative funny pictures that discourages boredom when reading. The appearance of a friendly and attractive guide is also teaching material since its language is understood, and its nice images are shared among adults, family, friends, co-workers, and parents for additional knowledge.

A message or information must be appealing to move and encourage people's attitudes and behavior in a more positive direction. A good message uses easy to understand word choices, does not cause multiple interpretations, and uses vocabulary commonly used by the targets (Pennycook et al., 2020). Addressing psychology in all people is vital during a pandemic. An effective communication network is the key to it. Effective communication, if ignored, will generate gaps for vulnerable populations and result in added difficulty in fighting the COVID-19 pandemic (B & Gupta, 2020). An experimental study in Taiwan concluded that both pre-test and post-test materials had significant improvements to the meaning of life, positive beliefs, and well-being after health promotion intervention. Therefore, nursing educators should include these variables in the health promotion curriculum to improve the physical and psychological preparedness of undergraduate nursing students' health promotion and social health promotion skills (Tsai et al., 2020).

Another study on health promotion of dental health services in television-based waiting rooms observed that many patients did not know their contacts during an emergency, whereas others did not intend to contact a dentist before the survey (Jawad et al, 2017).

Conclusion

Informants discussed the five aspects of the guideline i.e., consistency, clarity, relevancy, credibility, and interest. In general, the guideline content was consistent with others guidelines published by the Ministry of Health (MOH). However, as members of Muhammadiyah, they felt more comfortable trusting this guideline since it was affiliated with their group. From the clarity and relevance point of view, the informants had a positive perspective since its design lured and encouraged them to read, implement and share them with others. However, this guide did not include names of the writing team nor an introduction from the Central Board. It is, however, highly vital in strengthening the credibility of the media produced by the MCCC as a delivering strategy. The MCCC needs to plan and devise effective means of disseminating both the printed and online media it publishes. For online media distribution, it is necessary to limit a small number of pages for easiness.

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Patient Satisfaction Improvement by Comprehensive Holistic Services at Public Health Centre X Surabaya

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Abstract

Comprehensive holistic health services are a form of improving the quality of health services by measuring IKM. The result of a survey by BPJS Kesehatan is that the IKM has not reached targeted satisfaction in 2016 and 2017. Public Health Center X has an index value that exceeds the existing IKM target, but the index value is lower than the index value in 2016. This study will analyze the decrease in the satisfaction index of BPJS participants towards First-Level Healthcare Facilities (FKTP). Then the low satisfaction index of BPJS participants getting their treatments in Public Health Center X. The study aims to understand the relationship between comprehensive holistic service and the satisfaction of outpatients at Public Health Center X. The research was an analytical observational study with a cross-sectional design. The samples obtained in this study were 242 respondents. The data were next processed using the PLS-SEM application. The results show that comprehensive holistic services affect satisfaction ($t=7.983$). The holistic service affects loyalty ($t=6.112$). The customer value affects satisfaction ($t=2.155$) and loyalty ($t=3.527$). Satisfaction affects loyalty ($t=4.488$). This research concludes that comprehensive holistic service and customer value affect satisfaction and loyalty. In addition, satisfaction has a direct effect on loyalty.

Introduction

Health is a human right and one of the elements of welfare that must be realized according to the ideals of the Indonesian people. Health services in Indonesia are regulated by the national health insurance system, which also pays attention to the quality and guarantee of health financing. Minister of Health Regulation No. 28 of 2014 concerning the National Social Security System (SJSN) states that every citizen is required to have a National Health Insurance (JKN), which seeks to ensure the quality and financing of public health are guaranteed. The implementation is carried out by the Social Security Administration (BPJS) (BPJS Kesehatan, 2020). The public health insurance program implementation is a public health center or primary health service. It aims to achieve the ideals of fully healthy Indonesian

people through health services carried out holistically and comprehensively (promotive, preventive, curative, and rehabilitative) including biological, psychological, and social aspects (Kumar, 2017; Setyawan, 2019).

Holistic and comprehensive health services are a form of effort to improve the quality of health services (Setyawan, 2019). One quality measurement is community satisfaction, as measured by the Community Satisfaction Index (IKM). The satisfaction assessment is carried out both qualitatively and quantitatively based on a comparison of expectations and the reality of the services obtained (LaVela and Gallan, 2014). According to BPJS Kesehatan (2020), based on the results of a survey conducted by SWA, it showed that in 2019 the BPJS Health Health Facility Satisfaction Index was 79.1%. Meanwhile, in 2016 the index only

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reached 76.2%, 75.7% in 2017, and 75.8% in 2018. This significant increase occurred by as much as 3.3% compared to the previous year.

Meanwhile, according to the results of a survey conducted by BPJS Health itself, it is known that the BPJS Health Participant Satisfaction Index in 2019 showed 80.1%. It indicates an upward trend. In 2016 the index was only around 78.6%, 79.5% in 2017, and 79.7% in 2018 (BPJS Kesehatan, 2020). The Community Satisfaction Index (IKM) is data and information that becomes a benchmark in assessing the suitability of services by established standards (Kania, 2019). Evaluation of satisfaction both qualitatively and quantitatively is done based on public opinion. In measuring community satisfaction, the public service providers provide support by comparing expectations and reality in the services obtained (Kania, 2019).

Based on data from the Directorate General of Health Services from the Indonesian Ministry of Health (2019), the satisfaction index for BPJS participants in East Java is the lowest at 79.9%. This figure is lower than South Sumatra, Bangka Belitung, and Bengkulu, which have a satisfaction index of 82.8%, Papua-West Papua at 81.2%; Central Sumatra and Jambi at 81.1%, and Banten, West Kalimantan, and Lampung 81.0% (BPJS Kesehatan, 2020). The target value of the Community Satisfaction Index for puskesmas services in 2017 is 62.5. Public Health Center X has an index value of 69.7. It can be categorized as good because it has passed the target of the existing Community Satisfaction Index. However, this value decreased by 6.4 points from the index value reported in 2016, which had an index value of 76.1. So there is a gap (in expectations and reality). It is necessary to make continuous improvement efforts to increase community satisfaction (Pemerintah Kota Surabaya, 2017).

National Health Insurance is administered using a social insurance mechanism by the Health Insurance Administration Agency (BPJS) and is mandatory for the Indonesian population. The benefits received by JKN participants are independent of the number of contributions paid by participants and per their medical conditions and needs. The holistic health care system has a comprehensive

service concept, so patients are treated as whole humans, not as objects (Pramanik, 2016). Comprehensive services are through the stages of promotion to rehabilitation. The promotion stage aims to introduce and persuade the public to have a healthy life. The prevention stage is to maintain a healthy life to stay healthy. The curative stage is to change the sick state to be healthy. The rehabilitative stage is to improve the health standards of the sick and incurable and reduces disability and death. All of the above are in an integrated manner in one comprehensive service unit (Kumar, 2017; Setyawan, 2019).

Based on the patient's point of view, satisfaction is the level of feeling that arises from the performance of health services he has received by comparing it with what is expected (Mesfin and Gintamo, 2019). Patient satisfaction is cumulative of all patient experiences while receiving services at health care centers. Patient satisfaction is influenced by service quality. So patient satisfaction will increase if the health services improve their quality (Akbulut, 2017).

In service quality, there are three dimensions: 1) Technical: everything that is material felt by customers when receiving a product or service. This dimension can also be interpreted as hardware. 2) Functional: the skill and reliability of the provider of goods and services perceived by the customer. It can also be interpreted as human ware. 3) Image: this dimension looks at the quality of service based on the image built so far. Customers will judge services based on the image of a provider of goods or services formed so far (Firdous and Farooqi, 2019).

According to Ramez (2012), there are 3 (three) possibilities related to customer satisfaction. Customer satisfaction can be explained as follows: 1) Performance < Expectation: customers are not satisfied with what they have received. It happens when the performance of health services is worse than what the customer expects. Poor performance can occur because it is not following what the customer had expected before receiving health services. 2) Performance = Expectation: in this section, the customer feels that the service received is the same as what the customer had expected. Because the health services' performance is to

be seen as good as expected. 3) Performance > Expectation: customers feel the service received is better than expected. It can cause customers to feel very satisfied with the health services' performance.

Customer value is the overall benefit received by the customer in the form of goods (tangible) and services (intangible) compared to the costs incurred. Satisfaction is obtained from the size of the difference. Meanwhile, emotional benefits are from the intangible factors of the product or service (Kotler and Armstrong, 2013). Based on the above understanding, customer value relates to the benefits and sacrifices, of which the two are then compared. If the benefits obtained are higher than the sacrifices, the customer will take the offer, and vice versa (Kotler and Armstrong, 2013). Value is the customer's reason to choose a product from a provider of goods or services. In the healthcare sector, service providers need to ensure that the business is aligned with the healthcare value proposition and determine which other services can provide the highest value to customers (LaVela and Gallan, 2014).

According to Graf, A. and Maas (2018), there are four main aspects of customer value. Namely: 1) Emotional Value: value that comes from positive feelings or emotions from consuming a product, whether goods or services. 2) Quality/performance value: obtained from the customer's perception of the quality and expected performance of the product. 3) Social Value: obtained from the product's ability to enhance the customer's social self-concept. 4) Price/Value for Money: obtained from the reduction of short-term and long-term costs of the product. According to Kotler and Armstrong (2013), customer loyalty is a situation where customers consistently spend the entire existing budget to buy products or services from the same seller. Hasfar, Militina and Achmad (2020) stated that loyalty is a customer's commitment to persist deeply in repurchasing selected products/services consistently in the future, even though the influence of the situation and marketing efforts have the potential to cause behavioral changes (Hasfar, Militina and Achmad, 2020). According to research conducted by Wang, Y., Lo, H.P., Yang (2014), loyalty is measured

by indicators of service repetition performed by customers and recommendations given by customers to people who need health services.

Method

The approach used in this research is analytic observational. The object is observed directly without providing intervention. The cross-sectional research design is a research design that measures and observes at a certain tempo simultaneously (Setia, 2016). This study examines several variables. They are comprehensive holistic services, customer value, satisfaction, and loyalty. The population in this study was 2,391 BPJS participants at Public Health Centre X in West Surabaya. The samples were BPJS participants at Public Health Centre X who met the inclusion criteria. Inclusion criteria in this study are 18-70 years old, can communicate well, and are willing to be respondents. After calculating with a significance of 80% and an error of 0.06, the number of samples obtained was 232 people. Data sources in this study were obtained from the Surabaya City Health Office and Public Health Centre X, while the primary data was obtained from distributing questionnaires directly to 242 respondents. Before filling out the questionnaire, prospective respondents received a PSP (Pre-Research Explanation) and signed informed consent. This research uses the descriptive analysis method and inferential analysis. The data was then processed through statistical tests using the SEM PLS (Structural Equation Modeling - Partial List Square) application. This research has passed the ethical test of the Health Research Ethics Commission, Faculty of Medicine, University of Ciputra Surabaya No. 085.A/EC/KEPK - FKUC/X/2020.

Result and Discussion

In this study, there were 242 respondents consisting of 46.3% males and 53.7% females. The age of respondents was distributed over 36.4% aged 18-24 years, 36.8% aged 25-40 years, 22.3% 41-55 years, and 4.5% aged 56-74 years. 52.9% of respondents had elementary/junior high school education, 39.3% had high school education, and 7.9% had a college education. Based on occupation, 25.6% were

unemployed, 51.2% were employees, and 23.1% were entrepreneurs. Based on the respondent's assessment of the comprehensive holistic service received at Puskesmas X in Surabaya, 82.2% of respondents feel they are always cared for in the biological aspect. While 76.0% of respondents consider they are always cared for in the psychological one. While 78.9% of respondents feel they cared about the social aspect. Thus, respondents' assessment of comprehensive holistic services at Puskesmas X in Surabaya is considered good.

According to Ali et al. (2018), to respond to the challenges of increasing health development, it is necessary to strengthen basic health services at the public health centre with comprehensive holistic service efforts carried out both in Community Health Efforts (UKM) and Individual Health Efforts (UKP). Public health service is considered the only health service unit that can perform holistic and comprehensive interventions in overcoming health problems or disorders (Ali et al., 2018). In this case, Public health service X has been able to answer the challenges. Respondents' assessment of customer value at Public Health Service X based on emotional value, quality value, social value, and price-for-money can be described as follows: A total of 72.7% of respondents felt that the emotional value provided by Public Health Service X was good. The quality value aspect received a good assessment from 83.5% of respondents. Social value gets a good rating from 77.4% of respondents. The price-for-money also received a good assessment from 71.5% of respondents.

This study observed the patients who used BPJS to get services from the public health service. It causes no problems found in the price-for-money aspect. According to research by Razak, Nirwanto and Triatmanto (2016), primary and basic accredited health centers have an A rating (very good) on the price-for-money aspect (Razak, Nirwanto and Triatmanto, 2016). Another study states that price-for-money has a significant role in realizing maximum quality value (Razak, Nirwanto and Triatmanto, 2016). Thus, the quality value at Public Health Centre X becomes large. Perhaps also due to the good price-for-money. The use of the JKN program at the public health center is free of charge. It

is why most respondents consider the quality value aspect is good.

Based on the assessment of respondents' satisfaction with Public Health Center X, the respondents only felt quite satisfied with the services provided by Public Health Center X in Surabaya. As many as 75.2% of respondents felt the same about the hardware aspect. The human ware aspect was considered quite satisfactory by 59.1% of the respondents. As many as 85.5% of respondents said the image aspect was satisfied. The hardware aspect at Public Health Center X received the most dissatisfied ratings compared to other aspects (21.9%). Respondents considered that the existing hardware in Public Health Center X was not optimal. Research conducted by Mediansyah and Effendi (2019) stated that the hardware aspect in several public health center had varied assessments. It means that the furniture available at the puskesmas is not always the same. It may also be due to a lack of understanding and ignorance of the mechanisms and rules for the use of capitation funds in several public health center so that they do not use capitation funds to carry out procurement and purchases due to (Ali et al., 2018).

Based on the respondent's assessment regarding the human ware aspect, most are quite satisfied with the services of health workers at Public Health Center X, meaning that human ware at the public health center is still unable to provide services that can satisfy patients. The human ware aspect still has significant obstacles due to the presence of health workers who are less friendly in services and have not been able to mingle with the community. If we look at the respondents' loyalty assessment, some feel they will be loyal to Public Health Center X. As many as 99.6% of respondents will reuse it, and 96.3% feel they will recommend Public Health Center X to others to get health services when needed. This figure shows a very good number for Public Health Center X.

Research conducted at the Public Health Center Susoh, Aceh Barat Daya District, showed that only about 51.2% of patients were loyal, while the rest were not (Maulinda, 2014). So the conclusion is that the patients of Puskesmas X in Surabaya have very good loyalty. The effect of comprehensive holistic services, customer

value, satisfaction, and loyalty of National Health Insurance participants on Public Health Center X in Surabaya is known through PLS-SEM analysis and the following figure:

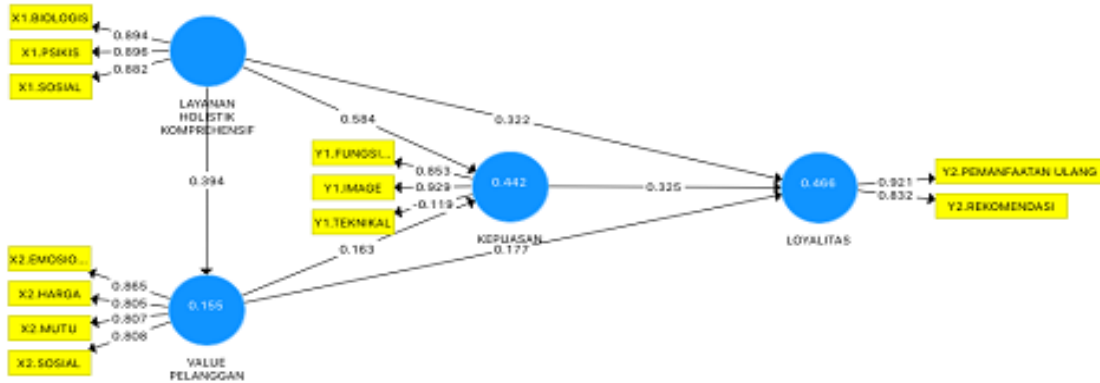


IMAGE 1. Initial Outer Model

Figure 1 above shows 1 (one) invalid indicator of the latent variable, namely technical (-0.119). When it is removed, the next process is to do an SEM analysis with the PLS Algorithm again. So the final outer model is produced below.

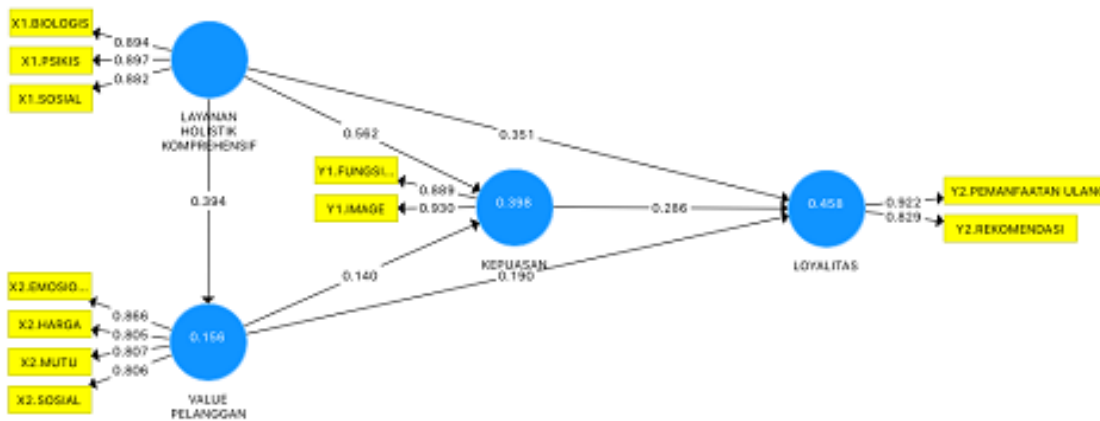


IMAGE 2. Final Outer Model

Figure 2 shows all indicators are valid (>0.7). So we can continue the analysis of the structural (inner) model.

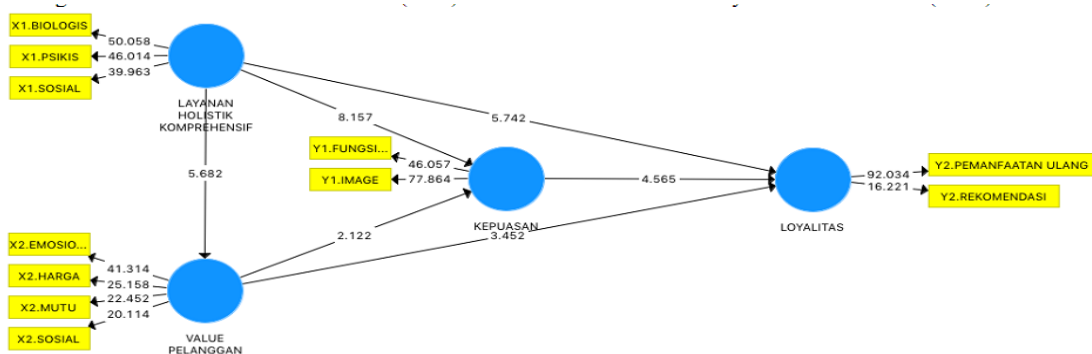


IMAGE 3. Inner Model

The bootstrapping process in the inner model aims to show the relationship between variables. The individual reflective measure is significant if the tcount is greater than the ttable value =1.96 (research with two-way relationship, $\alpha=5\%$). Image 3 shows all the tcount value above the ttable value (1.96), so it can be concluded that Figure 3 is a structural

model (inner model). The final model shows comprehensive holistic service (3 indicators) and customer value (3 indicators). Each affects satisfaction and loyalty. Satisfaction (2 indicators) affects loyalty (2 indicators). The evaluation results of the comprehensive holistic service model of Public Health Center X in Surabaya are presented in the table below:

TABEL 1. Evaluation of Patient Satisfaction Model on Comprehensive Holistic Services at Public Health Center X Surabaya

Variables	Cronbach's Alpha		Composite Reliability		Average Variance Extracted (AVE)	
	Initial	Final	Initial	Final	Initial	Final
Comprehensive Holistic Service	0,870	0,870	0,920	0,920	0,794	0,794
Customer Value	0,841	0,841	0,893	0,892	0,675	0,675
Customer Satisfaction	0,526	0,794	0,664	0,905	0,535	0,827
Customer Loyalty	0,709	0,709	0,870	0,869	0,770	0,769

Source: Primary Data, 2020

The table above shows that at the initial value, the AVE (average variance extracted) is already above the value of 0.5; composite reliability has also passed the value of 0.7;

Cronbach's alpha value is above 0.6. Thus, each construct is valid as a constituent of the variables and between variables has a significant relationship.

TABEL 2. Relationship between Variables in Patient Satisfaction Model on Comprehensive Holistic Services at Puskesmas X Surabaya

No	Relationship between Variables	Coefficient (Original Sample)	T Statistic	p-Value
1	Comprehensive Holistic Service -> Satisfaction	0,562	8,157	0,000
2	Comprehensive Holistic Service -> Loyalty	0,351	5,742	0,000
3	Comprehensive Holistic Service -> Customer Value	0,394	5,682	0,000
4	Customer Value -> Satisfaction	0,140	2,122	0,034
5	Customer Value -> Loyalty	0,190	3,452	0,001
6	Customer Satisfaction -> Customer Loyalty	0,286	4,565	0,000

Source: Primary Data, 2020

Table 2 shows that comprehensive holistic services have the highest effect on patient satisfaction at Puskesmas X, with a t count

of 8.157. In addition, comprehensive holistic services will increase loyalty significantly, with a t count of more than 5.742.

TABEL 3. Direct, Indirect, Total Effects on Patient Satisfaction Model on Comprehensive Holistic Services at Public Health Center X Surabaya

No	Path	Effects		
		Direct	Indirect	Total
1	Comprehensive Holistic Service -> Satisfaction	8,157	1,795	10,570
2	Comprehensive Holistic Service -> Loyalty	5,742	5,004	12,258
3	Comprehensive Holistic Service -> Customer Value	5,682	-	5,682
4	Customer Value -> Customer Satisfaction	2,122	-	2,122
5	Customer Value -> Customer Loyalty	3,452	1,858	3,964
6	Customer Satisfaction -> Customer Loyalty	4,565	-	4,565

Source: Primary Data, 2020

Table 3 shows the path model of patient satisfaction in comprehensive holistic services at Public Health Center X Surabaya. There are

three paths that have an indirect effect with a value smaller than the value of the direct one. The direct effect of comprehensive holistic

services on customer satisfaction has a t-count value greater than the t-table (1.96), which is 8.157. The indirect one of comprehensive holistic services through customer value is only 1.795.

Previous research from Mediansyah and Effendi (2019) at the Puskesmas in Bandar Lampung stated that comprehensive holistic services performed for patients with gestational hypertension increased family knowledge above 50% and lifestyle changes in aspects of eating patterns with healthy menus, regular physical activity and stress management (Mediansyah and Effendi, 2019). H. L. Bloom mentions four factors that influence health status, namely: 1) lifestyle; 2) environment; 3) health services; and 4) genetic factors (Svalastog et al., 2017). In the study by Al-Serhan and Jawazneh (2020) conducted at a hospital in Amman City, Jordan, an increase in health status led to an increase in patient satisfaction (Al-Serhan and Jawazneh, 2020). Furthermore Surydana (2017) mentions that service quality can increase customer value and proves that customer value significantly affects customer satisfaction. (0,543).

The effect of comprehensive holistic services on customer loyalty total t-count value is higher than the t-table (1.96), which is 5.742, while the indirect effects of comprehensive holistic services through customer value and satisfaction is only 5.004. According to Valizadeh and Jasemi (2017) holistic and comprehensive health services are a form of quality health services (Valizadeh and Jasemi, 2017). Research conducted by Arab et al (2012) in Iran Hospital stated that service quality positively affects patient loyalty. Patient experience in relation to hospital services significantly impacts outcome variables such as willingness to return to the same hospital and reuse its services or recommend them to others (Arab et al., 2012).

Research conducted by Fatemifar, Hosseini and Maymand (2016) at healthcare centers in Iran stated that patient satisfaction has a positive effect on patient loyalty. Other by Kessler and Mylod (2011) stated that patient satisfaction is important to determine the quality of hospital services and to increase patient loyalty to use hospital services again. (Kessler and Mylod, 2011). Research conducted

by Herman (2014) shows a linear relationship between customer value and customer satisfaction with $r = 0.596$, significance ($p < 0.001$). These results state that customer value has a relationship with customer satisfaction. This study also produces a scatter plot image that shows a strong linearity pattern between customer value and customer satisfaction.

The effect of comprehensive holistic services on customer value has a higher t-count value than the t-table (1.96), which is 5.682. This study is in line with research conducted by Surydana (2017) found a significant effect of service quality on customer value with a coefficient of 0.199. Service quality affects customer value for patients through products and services and is one of the vital processes in increasing customer value for patients (Lee, W.I., Chen, C.W., Chen, T.H., Chen, 2011)

Quality is determined by uncertain individual factors such as customer perceptions, expectations, and experiences (Khan, 2016). Service quality can be defined as the extent to which services meet customer needs or expectations. Service quality is the delivery of excellent or superior service relative to customer expectations (Lee, W.I., Chen, C.W., Chen, T.H., Chen, 2011). According to Abdelfattah, Rahman and Osman (2015) service quality from technical, functional and image has a significant influence on customer value with $\beta = 0,64$, S.E = 0,10, C.R= 6,23 $p < 0.01$; for TQ: $\beta = 0.23$; S.E=0.066; C.R = 3.49, $p < 0.01$; for FI: $\beta = 0.39$; S.E= .087; C.R = 4.52, $p < 0.01$) (Abdelfattah, Rahman and Osman, 2015).

The influence of customer value on customer satisfaction has a higher t-count value than the t-table (1.96) which is 2.122. This study is per research conducted by Sugiati et al (2013), stating that customer value significantly affect customer satisfaction with a coefficient of 0.556 (Sugiati et al., 2013). Hasil signifikan yang sama terdapat pada hasil studi (Tu, Y.T, Li, M.L, and Chih, 2013), which show that customer value can influence customer satisfaction. Meanwhile, according to Kotler and Armstrong Kotler and Armstrong (2013), high customer value will satisfy customers because they feel the product consumed has higher benefits than the sacrifices that must be made (Kotler

and Armstrong, 2013). It shows that patient satisfaction can build relationships in the long term and can be interpreted that patient satisfaction will be higher if the perceived value and quality exceed the patient's expectations (Lim, H.Y., Hwang, I.K., Suh, 2011; Sharmila, S., & Krishnan, 2013). The results of this study are in line with research conducted by (Cronin, J.J., Brady, M.K., Hult, 2011; Hur, Kim and Park, 2013; Lam, S.Y., Shankar, V., Erramilli, M.K., Murthy, 2014; Wang, Y., Lo, H.P., Yang, 2014).

The effect of customer value on customer loyalty has a total higher t-count value than the t-table (1.96), which is 3.452, while the indirect effects of comprehensive holistic services through customer value and satisfaction is only 1.858. In line with the results of this study, research conducted by Abdelfattah, Rahman, and Osman (2015) also mentions that there is a positive influence on customer value on customer loyalty with $\beta = 0.94$; S.E = 0.107; C.R = 8,796, $p < 0.01$ (Abdelfattah, Rahman and Osman, 2015). Health services from biological, psychological, and social aspects create value that plays a vital role in the process of meeting the patients holistic needs. Customer value is a marketing concept in increasing customer satisfaction. The value possessed by the customer will help the product to be better than competitors so that it can satisfy the customer. Customer satisfaction encourages customers to become loyal customers (loyal) (Al-Serhan and Jawazneh, 2020).

The relationship between customer satisfaction and customer loyalty has a higher t-count value than the t-table (1.96), which is 4.488. This image shows the influence given by customer satisfaction on customer loyalty. Patient satisfaction and loyalty have a strong and positive relationship, indicated by the result of 0.722, which is a strong category. The author concludes that the effect of patient satisfaction on patient loyalty is 52%. It means 52% of service quality variables can be affected by customer satisfaction. The remaining 48% is affected by other factors (Maulinda, 2014). Maulinda (2014) at the Susoh Health Center in Aceh Barat Daya found a significant relationship between patient satisfaction and loyalty with a p-Value of 0.004. Another study by Chiguvu and Guruwo (2015) stated

that customer satisfaction is the variable with the highest influence on loyalty. So customer satisfaction is a vital factor in the realization of customer loyalty (Rsahman, M. R., and Kutubi, 2013; Chiguvu & Guruwo, 2015).

Conclusion

This study concludes: 1) Comprehensive holistic services directly affect satisfaction. 2) The direct effect of holistic comprehensive service on loyalty is greater than the indirect effect. 3) Customer value has a direct effect on satisfaction. 4) Customer value directly affects customer loyalty. Satisfaction directly affects loyalty. Based on the results of the research, suggestions that can be given are that there is a need to refresh comprehensive holistic services consistently and continuously for health workers who serve at puskesmas.

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Effect of Modisco-Cookies Combined with Auriculopuncture therapy on Increment of Body Weight

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Abstract

Being underweight is a common problem in developing countries, including Indonesia, that may cause infections, including viral ones. The solution to this problem is to provide Modisco cookies and auriculopuncture therapy with seed-pressing methods. Auriculopuncture is a traditional Chinese therapy using the seed-pressing method at the auricular point stimulating to relieve other body pathologies. While Modisco cookies have energy-dense, high-calories, digestible cookies that aim to help accelerate weight gain. This study aims to determine the effect of Modisco cookies compared to a combination of Modisco cookies with auriculopuncture on the increase of body weight among male adolescents. This study observed 22 male teenagers with low body weight for three weeks. The subjects are categorized into two treatment groups: (1) the Modisco cookies group and (2) the combination of Modisco cookies and the auriculopuncture treatment group every day for three weeks (26 days). This study compared the mean of the pre-test and posttest of the weight changes using a T-test. Furthermore, the average weight changes between the two groups were compared using Manova repeated measured test. The Modisco cookies have nutrient-dense and easy to digest, while Auriculopuncture may stimulate to a certain point in the ear. The hypothalamus has a role in the production of the ghrelin hormone. The therapy may increase hormone appetite and reduce the use of fat reserves. It may increase the body weight of underweight adolescents significantly ($p=0.00$). A combination of Modisco cookies and auriculopuncture therapy gave a significant increase in adolescent body weight compared to modisco cookies.

Introduction

Indonesia, like other developing countries, faces multiple nutrition problems among the adolescent age group. Underweight, overweight, or obesity problem may affect the growth and development of adolescence. Therefore they are more susceptible to chronic diseases such as cardiovascular disease, cancer, and osteoporosis which may lead to an increase in mortality in adulthood. Based on the research and development data, on the assessment of the nutritional status of early adolescents aged 12-14 years, based on body mass index by the age

of prevalence on underweight are 11.1% (3.3% skinny and 7.8% thin) (Islam & Biswas, 2020)

According to the data on the status of BMI by the age of prevalence on the low nutrition status of adolescents aged 13-15 years old in Pamekasan district during 2013 were 0.7% skinny and 14,7% underweight. Pamekasan has the highest prevalence among other districts in East Java (Dinkes Jawa Timur, 2020). The prevalence of malnutrition in Pamekasan District illustrates that the implementation of the nutrition problem management program is still not as expected because it focuses on

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pregnant women and toddlers while adolescents have not been touched, whereas, in the 12-14 age year group which is adolescence, nutritional needs are much higher because in at this age, there is an increment in body size which causes an increase in the metabolic rate, so the body requires more energy for activities (Christian & Smith, 2018)

In addition, energy is also needed for the synthesis of new tissues, and body development so it is necessary to pay attention to the nutrition problems in the adolescent group. The health effects of being underweight on adolescents are susceptibility to infectious diseases due to a decreased immune system, loss of body muscle mass, hair loss, irregular hormonal regulation (thyroid gland disorders), and fatigue. In the long term, being underweight can cause osteoporosis and anemia. Being underweight also has the potential to cause stunted growth (Kumar et al., 2021). The problem of stunting in adolescence needs to be a concern because it is a reflection of the quality of human resources in the future. Several studies have shown a link between stunting and impaired cognitive function (Andersen et al., 2016; Sokolovic et al., 2014), and stunting may cause a decrease in the body's immune system and increases the risk of developing infectious diseases (Arini & Ike, 2020; Mardiana et al., 2022).

Improving nutrition in the adolescent group is a strategic step to overcoming nutritional problems. The predisposing factors of low body weight are physical health, psychological health, lifestyle, and low nutrient intake. A condition that interferes with the individual's ability to absorb food can cause growth disorders. It may lead to stunting problems (Arini & Ike, 2020; Mardiana et al., 2022). In traditional Chinese medicine, low body weight is caused by the loss of appetite due to the limited energy in the spleen and stomach (Li & Xu, 2011).

One of the solutions to the problem of low body weight is by consuming modisco. "Modisco" is an acronym for modified dried skimmed milk and cotton sheet oil. It is an energy-dense, high-digestible energy drink. Modisco is digestible, easily made, and able to process in a variety of food and beverage recipes. It was first discovered by May and

Whitehead in 1973 (Maryanto et al., 2020). Modisco is a highly nutritious food or drink. Modisco is firstly tried on children with severe nutritional disorders in Uganda (Africa) and showed very satisfying results. Modisco aims to help accelerate weight gain (Maryanto et al., 2020). Researchers modify Modisco in the form of cookies. The purpose of presenting Modisco in the form of cookies is to make it more attractive for teenagers and more practical to consume. Besides, the product is more durable. Therefore, there is no need to make modisco every day.

Another alternative treatment is particular acupuncture, called auriculopuncture. The practice has existed since ancient China. It was also investigated by a French doctor in the 1950s, Dr. Paul Nogier and his team. The result stated that specific areas of the ears could be associated with particular body parts, including the spleen and stomach (Oleson, 2014). Auriculopuncture is a therapy on the outer surface of ears (also called the auricle), which is stimulated to relieve other body pathologies. The mechanism of auriculopuncture therapy is balance. The principle is inhibiting the function of hyperactive organs. Promote the hypoactive function organs while being harmless on healthy tissues and organs. This therapy applies a seed pressing method (pressing using seeds) at the auricular point that is easily applied. It is less expensive, the self-done stimulation, and does not need the insertion of needles, so it is more suitable to overcome the underweight problem among adolescents (Oleson, 2014). Researchers think there is a need for research on the effect of modisco-cookies combined with auriculopuncture therapy on the increment of body weight, because the results of this study allow giving new insight into the method of increasing body weight and it may solve underweight problems.

Methods

This study used statistical comparative analysis with experimental quantitative research design and data collection methods with repeated measurements Pre-test-Post-test Group Design. The study was conducted for three weeks on male adolescents with low BMI enrolled at SMPN 2 (Junior High School)

Pamekasan. Sampling in this study applies a purposive random sample using the Slovin Formula.

BMI is obtained from the comparison between body weight and height or is formulated as (Nuttall, 2015)

$$BMI = \frac{\text{weight (Kg)}}{\text{Height}^2(m)}$$

An adolescent with a BMI of less than 18.5 will be included as sample. Approximately 22 subjects were collected and divided into two treatment groups. The combination of Modisco cookies (two cookies after breakfast and two cookies after dinner) and auriculopuncture (pressed once a day for 1 minute) group and modisco cookies only (two cookies after breakfast and two cookies after dinner). We gave treatment every day for three weeks (21 days). The inclusion criteria in this study were: male adolescent aged 12-14 years old, registered as a student at SMPN 2 Pamekasan, low BMI, and had no history of chronic and acute illnesses. They were willing to work together as research subjects and filled out the informed consent. The subjects' guardians were also willing to work together to support research activities, and filled out informed consent. The procedures, possible discomforts or risks, and possible benefits, were explained fully to the human subjects involved. Their informed consent was obtained before to the investigation. Data analysis was performed by interpreting the treatment results and then comparing the difference between pre (before) and post (After) treatments using the next paired T-test, comparing two treatment groups single treatment of modisco cookies and combination treatment of modisco cookies and auriculopuncture with the Manova repeated the measured test. It is an institutionally approved study by the Universitas Airlangga faculty of dental medicine health research ethical clearance commission.

Result and Discussion

The 22 adolescents male aged 12-14 years with low body mass index are chosen as the sample of SMPN 2 Pamekasan. Male is chosen as the subject because Gender affects body weight because there are differences in the amount of energy needed during adolescence. This is due to differences in body composition and growth rate between men and women (Lauretta et al., 2018). While adolescents are chosen as the subject because the number of nutritional needs of adolescents are relatively large. It is due to higher physical activity than at other ages. In addition, male adolescents aged 12-14 years need more nutrients for growth because at this age growth spurt occurs in males (Pineau & Ramirez-Rozzi, 2021).

Figure 1 illustrates that each treatment group was weighted four times during the study, a pre-test (before treatment), first monitoring a week after treatment, second two week after treatment, and post-test three weeks after the first treatment. From observation, we found that in Modisco-only treatment, there was a decrease in the average weight on first monitoring by 0.02 kilograms. But then we found an increase in body weight of 0.31 kilograms in the second monitoring, then 0.29 kilograms in the post-test. Meanwhile, in combination of cookies Modisco with the auriculopuncture therapy group, we found a stable increase in body weight since the first week of treatment. From the comparison of the pre and post-test, both groups experienced an increase in the percentage increase in the average weight of cookies Modisco only treatment group of 1.91% while the combination of cookies Modisco with auriculopuncture therapy group was 4.71%. The combination of cookies Modisco with auriculopuncture therapy group had 2.79% higher than cookies Modisco only treatment.

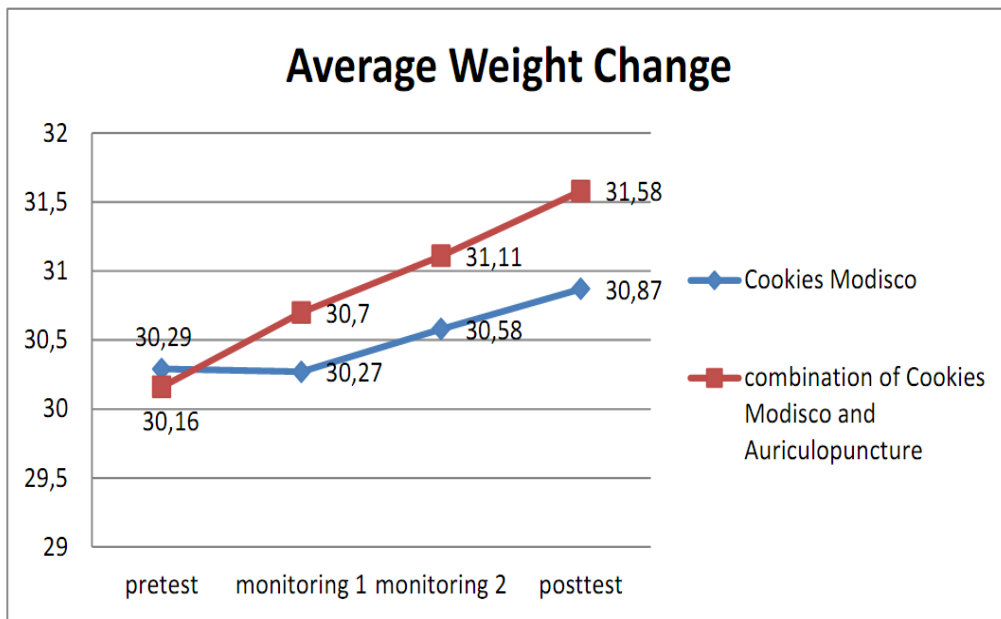


FIGURE 1 Average Weight Change Graphic

According to the t-test of pre and post-weight in a Modisco cookies group was significant ($p = 0.000$) with an average increase in value of 0.58. While the t-test of pre and post weight in the combination treatment group has a significant result ($p=0.000$) with an average increase of 1.41. The results of the statistical tests are presented in Table 1

Table 1 Comparison of Pre and Post Body Weight

variable	Mean	SD	Df	P*
Cookies Modisco	0.58182	0.19400	10	.000
Cookies Modisco & Auriculopuncture	1.41818	0.76134	10	.000

*value of p comes from t pre-post test of the single treatment group

Both groups show that cookies Modisco only and a combination of cookies Modisco with auriculopuncture therapy may increase body weight significantly. But the combination shows better mean results than the cookies Modisco-only group. Statistical tests for weight gain aim to discover the significance of weight change in the Modisco cookies group and the combination of Modisco cookies and Auriculopuncture. The research applies the Manova Repeated Measured Test technique to the Modisco Cookies group and the Modisco

Cookies and Auriculopuncture groups. The calculation result of the Manova Repeated Measured Test shows a significant difference in body weight change between the modisco cookies group and the combination treatment group with P-value = 0.023. Based on the research results for 26 days to increase the body weight of adolescents male aged 12-14 years with low body mass index, we found there were different results between the combination of Modisco cookies with auriculopuncture and the treatment of modisco cookies. However, the treatment group of the combination Modisco cookies and auriculopuncture had a higher significant result. Several things affect weight gain in this study, both conventionally and traditionally.

Conventionally, Modisco Cookies can increase body weight even with small portions because the food is nutrient-dense, has high calories and high protein, and is easy to digest. The main ingredient of Modisco cookies is the Modisco formula which was modified from the Disco 150 formula. Formula 150 consists of milk, sugar, and cottonseed oil. This formula is firstly given to underweight children in Uganda (Africa) and shows excellent results. Cottonseed oil in Indonesia is expensive and contains toxic substances. Because considering it is not practical, hereupon a modification

is required to replace cotton seed oil with margarine. Intake of high energy, protein, fat, and carbohydrates significantly influence changes in anthropometric indicators of body height and height/age and it has a significant effect on body weight, BMR, BMI, and muscle arm of adolescent (Mardiana et al., 2022). Besides, the sweet taste may increase appetite and help to elevate dopamine hormones (Han et al., 2018). Dopamine mediates the rewarding effect of food and may increase eating behavior, while proteins needed to repair and increase body cells so that adolescents may have better growth (Arsenault & Brown, 2017; Han et al., 2018).

The effort to make Modisco more practical and attractive for consumption is processing it into food products such as cookies (Maryanto et al., 2020). Researchers chose the form of cookies as the Modisco modification because cookies are easy to make, and the ingredients are easy to obtain. More, cookies are more durable. Thus, it is not always necessary to make Modisco every time it needs to be consumed.

Auriculopuncture is a specific therapeutic method in which the earlobe becomes the object of therapy to treat other parts of the body. Stimulation given to the ear usually uses a needle. But with the development of the era, it has been able to use seeds (Seed pressing), laser radiation, and magnetic seeds (Oleson, 2014). The main principle of auriculopuncture is balance. The principle inhibits the hyperactive

while promoting the hypoactive. Yet, no effect on healthy organs. For example, a person with complaints of hypertension doing auriculopuncture therapy with stimulation of several points can lower blood pressure. This therapy has no effect when given to healthy people, in contrast to pharmacotherapy, which will have a blood-lowering effect on objects receiving it even though the person is in a normal condition (Oleson, 2014).

The auricles are rich with nerves. The auricular skin contains various neuroreceptors. For example, sensory nerve endings, nerve endings of sensory follicles, and corpuscle lamellose. Within the tendons and muscles of the auricle, there are both simple and complex sensory plexiform nerve endings, Golgi tendon organs, Ruffini nerve endings, and muscle spindles. Therefore, the auricular points are very sensitive to various stimuli (Oleson, 2014).

Auriculopuncture Research by Shiraishi T (1995), proved that there is a sign to the hypothalamus through the vagus nerve when it gives stimulation to a certain point in the ear (Shiraishi et al., 1995). It has a role in the production of the ghrelin hormone. The hormone addition results in increasing appetite and reducing the use of fat reserves. Ito, et al (2015) provides researchers with the results that auriculopuncture can affect the amount of ghrelin in the body. To find out more significant results, further research is necessary. A brief explanation is presented in the picture below (Ito et al., 2015).

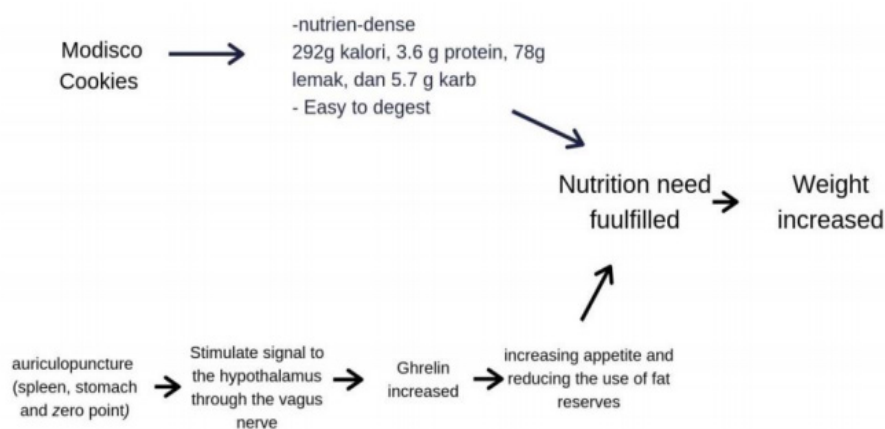


FIGURE 2 Schema of Conventional Factor

According to traditional Chinese medicine (TCM), a person with low body weight correlates with energy weakness in the spleen and stomach (Li & Xu, 2011). The spleen and stomach are organs with earth elements that work together in the processing, accommodating, and transformation of food and drink (Jie, 2008). In the same case, when someone is eating irregularly or under-eating, overeating, being too hungry or consuming too much acidic, fatty and spicy food, these things will weaken or harm the spleen (Jie, 2008). A weak stomach can not digest food properly. And as a consequence, the stomach is not stimulated and replenished. In conclusion, the loss of appetite may appear (Jie, 2008).

The loss of appetite causes the input-energy in is lower than the output one. Adolescents require more energy to do and handle many more activities. Besides, they also need energy for growth. When it is not controlled, it leads to a worse nutritional status. Researchers combine the modification of modisco and auriculopuncture therapy to overcome the underweight problem in adolescents as the previous theories stated.

Following TCM, all ingredients of Modisco cookies are included in the food substance with a sweet taste. The sweet taste is the taste characteristic of the earth element. Consuming

sweet foods influences the function of organs of the earth elements, like the spleen and stomach. Moreover, Modisco cookies are a type of food called Ying. Ying enters the body through the mouth and is then processed in the stomach. From the stomach, the nutrients are transferred by the spleen to the lungs. In the lungs, food nutrient is purified with air into qi (energy). Then the qi is carried out by blood to the heart, and some part is stored in the heart. The heart then spreads qi throughout the body. Sufficient energy is capable to increase body weight (Ito et al., 2015; Li & Xu, 2011; Shiraishi et al., 1995).

Principally, auriculopuncture is to gain body balance. It is achieved by controlling the speed of hyperactivity and promoting hypoactive as long as it is harmless to healthy organs. Hence, it is a very safe therapy (Bradford et al., 2010; Oleson, 2014; Yao et al., 2019). The seed pressing method at the spleen and stomach points as the primary point and zero point as the supporting point are intended to support the therapeutic principle of regulating the qi spleen and stomach. If the qi in the spleen and stomach is normal, the work of the spleen and stomach will also be normal in transforming and transporting food (He et al., 2012). So, the weight will get increase. A brief explanation is described in the picture below.



FIGURE 3 Schema of Traditional Factor

Conclusion

Based on the results of research through data analysis and discussion, the authors conclude that the combination therapy of Modisco cookies with auriculopuncture increases the body weight among male adolescents more significantly compared to the Modisco cookies-only group.

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Community Awareness for Screening Non-Communicable Diseases

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Abstract

Non-Communicable Diseases (NCD), also known as chronic diseases such as hypertension, diabetes, and obesity, are from combined genetic, physiological, environmental, and behavioral factors. The number of NCD screening visits at Ngletih Public Health Center (PHC) Kediri decreased in 2018 was 29% and became 24% in 2019, with a target of 10,718 people. This study aimed to know the factors affecting community awareness for screening NCD. The respondents are people aged 15-59 years who live in the working area of Ngletih PHC and have never been diagnosed with hypertension, diabetes, and obesity. This research used an analytical observational study with a cross-sectional design. The number of samples taken is 1,000 with purposive sampling; then, respondents filled out 27 questionnaires self-administered. The data analysis was implemented univariate, bivariate using chi-square, and multivariate using multiple logistic regression. The chi-square test showed eight variables that increase awareness for screening NCD: age, gender, education level, marital status, family history, source of health information, knowledge, and attitude. The multiple logistic regression tests showed five factors that increase awareness for screening NCD: age, gender, marital status, sources of health information, and knowledge. The dominant factor affecting community awareness for screening NCD is a source of health information ($p=0.023$; $OR=4.353$; $CI=1.220-15.537$).

Introduction

Non-Communicable Disease (NCD), also known as a chronic disease that tends to last longer, results from a combination of genetic, physiological, environmental, and behavioral factors. The main types of NCD are hypertension, diabetes, and obesity (WHO, 2018). Death rates caused by NCD continue to increase worldwide, with a disproportionate number of distributions and an increasing trend compared to 2013 data (Gowshall & Taylor-Robinson, 2018). NCD dominates mortality rates in Indonesia. It is caused by changes in the environment, technology, and lifestyle, resulting in changing disease patterns in Indonesia. Based on Riskesdas in 2018, the prevalence of hypertension among people aged 18 years and over increased from 25.8% to 34.1%. In addition, the obesity prevalence

at 18 years old and over increased from 14.8% to 21.8%. Prevalence of diabetes mellitus aged 15 years and over initially increased by 6.9% to 10.9% (Jenderal Pencegahan dan Pengendalian Penyakit Direktorat Pencegahan dan Pengendalian Penyakit Tidak Menular, 2019).

There is a trend of increasing coverage of early detection of NCD risk factors from 2016 was 14,85% and became 60,79% in 2020 in Indonesia (Soewondo et al., 2021), but the number of visits to screen NCD at Ngletih PHC in 2019 is the fifth rank out of nine PHC in Kediri. The number of visits screen blood pressure, blood sugar, and nutritional status for screening NCD at Ngletih PHC have declined in the last two years, from 3173 people (29% in 2018) to 2595 people (24% in 2019), with the target 10,718 people aged 15 to 59 years. This figure is still far from the achievement target of

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100%, so there is still a 76% gap (Ngletih Public Health Center Performance Assessment, 2019).

The increasing incidence of NCD and the decreasing number of NCD screening visits require essential interventions so that public awareness of carrying out NCD screening increases, especially for at-risk groups. The need for interventions to increase public awareness can begin after identifying the factors that affect public awareness of health screening. Previous research has shown that several factors can encourage patients regularity visiting health facilities. The study used variable age, gender, education level, marital status, and occupation (Chung et al., 2017). Another study on similar factors used the health knowledge variable (Huang et al., 2016). Other studies use family history (Yen et al., 2017) and attitude as variables (Buang et al., 2019). At the same time, another study uses a health information source variable (Amankwah-Poku, 2019). However, in some of these studies, the factors that affect community awareness for screening hypertension, diabetes, and obesity are examined separately, for a prolonged period, and stand-alone. With the diversity of previous studies, the authors took the initiative to research by combining factors that affect community awareness for screening NCD that will be applied according to the health center program that is screening for hypertension, diabetes, and obesity in people with a range of age 15-59 years. It is packaged quickly to help Ngletih PHC determine the following work program that increases NCD screening visits.

Method

This research is an analytical observational study with a cross-sectional design. The study was conducted in the working area of the Ngletih PHC Kediri with an estimated time of one week. The sample is people aged 15-59 years. Who fulfilled the inclusion and exclusion criteria, totaling 1000 samples using the purposive sampling technique. The inclusion criteria were all males or females aged 15-59 years who lived in the working area of Ngletih PHC Kediri, were willing to be respondents in this study and had never been diagnosed with hypertension, diabetes mellitus, and obesity. The exclusion criteria were residents

of the working area of Ngletih PHC who lived unsettled, had psychiatric disorders, and were not willing to become respondents.

The instrument used in this study was a questionnaire. The questionnaire is in the form of closed-ended questions in a dichotomous choice used to obtain data on the independent variables: knowledge and attitudes toward health screening for NCD. Questionnaires were distributed to 30 respondents to test for validity using the "product moment" correlation technique and reliability using the Alfa Cronbach Formula. The questionnaire was completed by the sample data, including age, gender, occupation, recent education, marital status, family history, and sources of health information. The questionnaire used closed questions totaling twenty questions. The first four questions are about awareness, the following eleven questions are about knowledge, and the last five questions are about attitude.

Independent variables assessed by the questionnaire included gender divided into males and females. Age variables, namely 15-29 years, 30-44 years, and 45-59 years. Educational variables, namely elementary, junior high, high school, and undergraduate. Marital status variables, namely married, unmarried, widower, or widow. The family history variable, namely those with a history and no history. Occupation variables are divided into work and not work. Information source variables are divided into newspapers, places of education, the internet, friends, neighbors, family, health facilities, or posters. In addition, another independent variable is the level of knowledge, where knowledge is the result of knowing and understanding hypertension, diabetes, and obesity with limited problems (understanding, etiology, symptoms) (Jongen et al., 2019). This study is divided into good, moderate, and poor knowledge. Then the attitude variable, where attitude is the way respondents think and behave towards illness (Kassahun & Mekonen, 2017) divided into good attitudes and poor attitudes. The dependent variable of this study is the level of awareness. The awareness level is a conscious and awake state. Focuses on health goals by carrying out routine checks (blood pressure, blood sugar, nutritional status). (Direito et al.,

2017). It is divided into good awareness and poor awareness. (Tarkang et al., 2017) (Direito et al., 2017) (J. Lu et al., 2017) (Neelakandan et al., 2018) (Ojo & Review, 2015) (Teo et al., 2016) (Yen et al., 2017)(Qurieshi et al., 2016)(Alsous et al., 2019)(Buang et al., 2019) (Amankwah-Poku, 2019).

In the flow of data collection, respondents filled out questionnaires by researchers from door-to-door to community homes adjusted according to the inclusion and exclusion criteria of the study. Data was analyzed univariately to determine the characteristics of data. Bivariate data analysis used the chi-square test to determine the relationship between variables. Then multivariate data analysis used the multiple logistic regression test to determine the most influential independent variables. Data were analyzed using SPSS for windows version 23. The ethical clearance number is 503/0190/

PENELITIAN419.104/2020, obtained from the Kediri Single Window for Investment.

Result and Discussion

This research took time in March 2020 with several respondents, 1,000 people aged 15 to 59 years and respondents who had never been diagnosed with diabetes mellitus, hypertension, and obesity in the Ngletih PHC Kediri area. Data were obtained from questionnaires filled out by respondents to determine the factors affecting community awareness to check blood pressure, blood sugar, and nutritional status. A total of 1,000 respondents have obtained characteristics based on age, gender, education level, occupation, marital status, family history, source of health information, knowledge, and attitudes. The respondents' characteristics can be seen in univariate analysis.

Table 1. Frequency Distribution of Respondent Variables

Variables	Categories	Total	Percentage
Age	15-29 years	308	30,8%
	30-44 years	403	40,3%
	45-59 years	289	28,9%
Gender	Male	320	32,0%
	Female	680	68,0%
Education	Elementary school	199	19,9%
	Junior high school	280	28,0%
	Senior high school	437	43,7%
	Bachelor	78	7,8%
	Magister	6	0,6%
Occupation	Unemployment	128	12,8%
	Employment	872	87,2%
Marital Status	Married	731	73,1%
	Unmarried	199	19,9%
	Widower	27	2,7%
	Widow	43	4,3%
Family history	Yes	300	30,0%
	No	700	70,0%
Source of Health Information	Newspaper	30	3,0%
	School	39	3,9%
	Internet	270	27,0%
	Friend	43	4,3%
	Neighbor	73	7,3%
	Family	75	7,5%
	Health center	443	44,3%
Knowledge	Poster	27	2,7%
	Good	639	63,9%
	Moderate	309	30,9%
Attitude	Poor	52	5,2%
	Good	932	93,2%
Awareness	Poor	68	6,8%
	Good	814	81,4%
	Poor	186	18,6%

Source: Primary Data, 2020

Based on table 1, the most number in the age variable is 30-44 years, 403 people (40.3%). In the gender variable, there are more female respondents than men, which are 680 people (68.0%). The education level variable is dominated by senior high school, 437 people (43.7%). There are 872 respondents in employment (87.2%) more than unemployed respondents in the occupation variable. The marital status variable is dominated by the married, namely, 731 people (73.1%). In the

family history variable, respondents who did not have a family illness were 700 people (70.0%). Respondents who obtain the source of health information variable indicate that the majority get information from health centers, 443 people (44.3%). The highest number of knowledge variables is respondents with good knowledge, 639 people (63.9%). The attitude variable with a good attitude is 932 people (93.2%), while the highest awareness variable is good awareness is 814 people (81.4%).

Table 2. Bivariate Test Results Factors affecting Awareness of Blood Pressure, Blood Sugar, and Nutrition Status Screening

Variables	Categories	Awareness		Total	P-value ($p < 0,25$)
		Good	Poor		
Age	45-59	263	26	289	0,000
		91,0%	9,0%	100%	
	30-44	331	72	403	
Gender	Female	82,1%	17,9%	100%	0,001
		220	88	308	
	15-29	71,4%	28,6%	100%	
Education Level	Male	573	107	680	0,001
		84,3%	15,7%	100%	
	Elementary school	241	79	320	
Occupation	Junior high school	75,3%	24,7%	100%	0,354
		153	46	199	
	Senior high school	76,9%	23,1%	100%	
		213	67	280	
	Bachelor	76,1%	23,9%	100%	
		371	66	437	
Marital Status	Magister	72	6	78	0,000
		92,3%	7,7%	100%	
	5	1	6		
Family History	Unemployment	83,3%	16,7%	100%	0,014
		108	20	128	
Occupation	Employment	84,4%	15,6%	100%	0,354
		706	166	872	
	81,0%	19,0%	100%		
Marital Status	Married	619	112	731	0,000
		84,7%	15,3%	100%	
	Unmarried	147	52	199	
Family History	Widower	73,9%	26,1%	100%	0,014
		18	9	27	
	Widow	66,7%	33,3%	100%	
Family History	Yes	30	13	43	0,014
		258	42	300	
	No	86,0%	14,0%	100%	
Family History	No	556	144	700	0,014
		79,4%	20,6%	100%	

Source of Health Information	Newspaper	20	10	30	0,000	-
		66,7%	33,3%	100%		-
	School	21	18	39	-	
		53,8%	46,2%	100%	-	
	Internet	198	72	270	-	
		73,3%	26,7%	100%	-	
	Friend	33	10	43	-	
		76,7%	23,3%	100%	-	
	Neighbor	59	14	73	-	
80,8%		19,2%	100%	-		
Family	60	15	75	-		
	80,0%	20,0%	100%	-		
Health center	402	41	443	-		
	90,7%	9,3%	100%	-		
	Poster	21	6	27	-	
Knowledge	Good	77,8%	22,2%	100%	0,000	-
		571	68	639		-
	Moderate	89,4%	10,6%	100%	-	
		216	93	309	-	
Bad	69,9%	30,1%	100%	-		
	27	25	52	-		
Attitude	Good	51,9%	48,1%	100%	0,000	-
		774	158	932		-
	Bad	83,0%	17,0%	100%	-	
40		28	68	-		
		58,8%	41,2%	100%		-

Source: Primary Data, 2020

The results of the correlation data analysis using the Chi-Square test aimed to determine the relationship between respondent's characteristics with awareness in checking blood pressure, blood sugar, and nutritional status at Ngletih PHC Kediri. In table 2 the results of the bivariate chi-square test between independent variables and dependent variable found that age ($\rho = 0,000$), gender ($\rho = 0,001$), education level ($\rho = 0,001$), marital status ($\rho = 0,000$), family history ($\rho = 0,014$), source of health information ($\rho = 0,000$), knowledge ($\rho = 0,000$), and attitude ($\rho = 0,000$) have a significant relationship to awareness to check blood pressure, blood

sugar and nutritional status. The occupation variable ($\rho = 0,354$) does not significantly correlate with the awareness to check blood pressure, blood sugar, and nutritional status. Multivariate analysis in this study is a logistic regression test used to measure how many influencing variables have significant value on the awareness to check blood pressure, blood sugar, and nutritional status in the previous bivariate analysis. The logistic regression test results showed that the most influential variable was the knowledge variable, with the highest Wald value, amounting to 51.861.

Table 3. Results of Multivariate Analysis with Multiple Logistic Regression Test

Variables	B	Wald	Sig.	OR	95% C.I.for EXP(B)	
					Lower	Upper
AGE		20,256	,000			
15-29 years	-1,505	19,220	,000	,222	,113	,435
30-44 years	-,502	3,483	,062	,605	,357	1,026
GENDER						
Female	-,574	7,348	,007	,563	,372	,853
EDUCATION LEVEL		25,497	,000			
Elementary school	-,256	,037	,847	,774	,057	10,422
Junior high school	-,708	,286	,593	,493	,037	6,599
Senior high school	-1,366	1,059	,303	,255	,019	3,440
Bachelor	-2,287	2,655	,103	,102	,006	1,590
MARITAL STATUS		21,193	,000			
Married	-1,356	10,609	,000	,258	,114	,583
Unmarried	-2,227	18,001	,100	,108	,039	,302
Widower	-,553	,774	,379	,575	,168	1,971
SOURCE OF HEALTH INFORMATION		44,377	,000			
Newspaper	,139	,041	,839	1,149	,302	4,364
School	1,471	5,134	,023	4,353	1,220	15,537
Internet	,581	1,133	,287	1,787	,613	5,206
Friend	,213	,102	,749	1,237	,335	4,565
Neighbor	-,649	1,052	,305	,523	,151	1,805
Family	-,057	,009	,926	,944	,283	3,152
Health center	-1,067	3,654	,056	,344	,115	1,027
KNOWLEDGE		51,861	,000			
Good	-1,746	25,876	,000	,174	,089	,342
Bad	-,477	1,940	,164	,621	,317	1,214
Constant	3,109	4,304	,038	22,396		

Based on table 3, there are five variables that have a significance value $p < 0.05$, such as age 15-29 years ($p=0.000$; $OR=0.222$; $CI=0.113-0.435$), female gender ($p=0.007$; $OR=0.563$; $CI=0.372-0.853$), marital status "marriage" ($p=0.001$; $OR=0.258$; $CI=0.114-0.583$), sources of information at place of education ($p=0.023$; $OR=4.353$; $CI=1.220-15.537$), and good knowledge ($p=0.000$; $OR=0.174$; $CI=0.089-0.342$) so that the hypothesis of the influence of these variables on people's awareness to screen blood pressure, blood sugar, and nutritional status are accepted. Based on the formula of the logistic regression equation, is

$$y = \text{constant} + \alpha_1x_1 + \alpha_2x_2 + \dots + \alpha_ix_i$$

$y = 3,109 - 1,505(1)$ (age 15-29 years) - $0,574(1)$ (female gender) - $1,356(1)$ (marital status "married") + $1,471(2)$ (source of health information from school) - $1,746(1)$ (good knowledge)

$$y = 0,87$$

whereas:

a: coefficient value of the variable

x: independent variable value

Probability is counted by the formula:

$$p = \frac{1}{1 + \exp[-(y)]}$$

whereas:

p = probability of awareness to screening blood pressure, blood sugar, and nutritional status

$$y = \text{constant} + \alpha_1x_1 + \alpha_2x_2 + \dots + \alpha_ix_i = 0,87$$

The formula is used to estimate the chance of awareness of screening blood pressure, blood sugar, and nutritional status based on age, gender, marital status, sources of health information, and respondents' knowledge. With the following example, if we want to know the estimated chance

of someone's awareness of screening blood pressure, blood sugar, and nutritional status when they are 29 years old, female, married, the source of health information from school, and good knowledge, then the calculation is:

$$p = \frac{1}{1 + \exp[-(0,87)]}$$

$$p = 0,705$$

So, if the respondent has all the variables above, the probability of screening blood pressure, blood sugar, and nutritional status is 70.5%. The results of data analysis on the age variable and the p-value were significant, which means there is a meaningful relationship between the variables of age with an awareness of the respondents to screen for NCDs such as hypertension, diabetes, and obesity. The research was conducted on three groups of age ranges and obtained results that respondents aged between 15-29 years old had more awareness than the age range of 30-44 years old and 45-59 years old. Due to age 15-29 years old, they had a reflection on the family or the people around the environment that have been diagnosed with hypertension, diabetes, and obesity that are not experiencing the same thing. It has been proven by the previous study that there is a relationship between knowledge, age, and awareness of health screens. Lack of knowledge about the nutritional status of older people results in a lack of awareness to balance the food they want and need (Ahn et al., 2018).

The results of data analysis on gender variables found that the p-value was significant, which means there was a significant relationship between gender and community awareness of screening blood pressure, blood sugar, and nutritional status. The percentage of respondents who were more aware was women than men. It was due to the number of female respondents, more than male respondents. Female is more concerned about issues related to health. Later this concern will build attitudes and awareness about health issues compared to men. It is in line with a previous study that found a statistically significant relationship between knowledge, attitude, and awareness of gender (Afkari, R. et al., 2016).

The results of data analysis on educational variables found that the p-value is significant.

There is a relationship between the respondents' education level and awareness of screening for NCD. The number of respondents have the most awareness of their high school education level. Most of the respondents in this study had a high school education level. At which the high school education level is a high level of education. At this level, think about health and curious that will later raise awareness about health. To be the most effective, the health education factor, trust, mutual respect, and communication become very important (Zhang et al., 2017).

The results of data analysis on the occupation variable found that the p-value was not significant. There was no relationship between occupation and community awareness for screening NCD. The percentage of unoccupied respondents but more aware than occupied ones can be because people prioritize their occupation over a health check if they are still in good health. In addition, it is also possible if a medical examination carried out around their home to take place during the same time during working hours. Another research supported the results that state no relationship between occupation with knowledge about diabetes mellitus (Qurieshi et al., 2016).

Between the marital status variable and the awareness, the p-value was significant. It means a relationship between an individual's marital status to screen NCD. Married respondents have the highest awareness level, and respondents with a widower marital status have the worst level of awareness. It revealed that respondents who already have a partner tend to be aware of routine health screens because they have someone who invites or motivates them to do a health screen compared to those still single or widowed. Married couples get positive family support that influences health screening (Rajati et al., 2019).

The variables of family history with the awareness show a significant association between family history of disease with respondents' awareness of NCD screening. People with a history of the disease in families that include hypertension, diabetes, and obesity predispose to find out whether it was revealed to them. People are screening for NCD as early as possible with an increased sense of curiosity.

It is in line with previous research that people with a family history of hypertension, diabetes mellitus, and obesity are more aware of their condition, so they screen for blood pressure, blood sugar, and nutritional status (Zhang et al., 2017).

The source of information variable with awareness had a significant relationship. The source of information can provide knowledge about an illness to understand it better and be more introspective about their health. Knowledge of hypertension is essential in the level of awareness to do blood pressure screening (Pirasath et al., 2017). To obtain this knowledge, respondents can find sources of information from anywhere, such as doctors from health service providers (health facilities), family or friends, social media, mass media, print, and video material. Educational strategies to help improve the current health situation include audiovisual communication. So video is a way of incorporating educational processes into everyday life, enabling new languages as alternative approaches to conventional education (Daun & Gambardella, 2018).

On the variable resources with awareness obtained, respondents who received information sources on diabetes mellitus from health facilities had the best awareness level, followed by information sources through neighbors and family. In the previous study, when respondents were asked about sources of information from which they gained knowledge about diabetes, participants responded that health workers (health facilities) were the largest source of information (Fallatah, 2018). Cultural adaptation, such as gathering information and the involvement of local communities in raising awareness, may play an essential role because it eliminates the negative relationship between the proportion of ethnic minorities and the effect of education on increasing knowledge (Li et al., 2019).

The knowledge variable has a significant value between respondents' knowledge and awareness to carry out NCD screens. This data analysis shows that most respondents with good knowledge are respondents with good knowledge. The results between knowledge and awareness variables obtained by respondents with good knowledge are directly proportional

to good awareness. These results concluded that knowledge is essential in community awareness to carry out blood pressure, blood sugar, and nutritional status screens. Increasing knowledge about hypertension, diabetes, and obesity increasingly makes people preventive before the disease attacks. Previous studies have shown a significant result in knowledge of hypertension related to blood pressure testing (Pirasath et al., 2017). An increase in knowledge about nutrition effectively raises awareness to carry out health screens, food intake, and a decrease in the number of illnesses due to obesity (Hamulka et al., 2018).

The attitude variable of this study obtained a significant relationship with the level of awareness for NCD screening. Research data shows that respondents with a good attitude toward the disease have a higher awareness level to screen blood pressure, blood sugar, and nutritional status. Previous studies showed a correlation between knowledge, attitudes, and behaviors related to routine health screens (Buang et al., 2019). Another research also states that a positive attitude includes being motivated to keep informed, do screening, or change lifestyles.

Multivariate analysis was performed by multiple logistic regression. The significant variable was age, especially in the group with an age range of 15-29 years, gender, especially women, sources of information, especially from places of education, marital status, and good knowledge. The knowledge variable with a good category is the most influential in this study. Increasing knowledge will increase community awareness of NCD screens. It is in line with other research, which states that knowledge significantly influences community awareness to screen blood pressure, blood sugar, and nutritional status (Gillani et al., 2018). In increasing community knowledge to conduct NCD screening with health promotion methods such as visuals (leaflets and flipcharts) which in research can improve quality of life scores and adherence to treatment (De-Souza et al., 2016; Sekhar et al., 2017); counseling as stated in the study (Murphy et al., 2016), education community-based health (workshops, health exhibitions, health groups for employees; Ozoemena et al., 2019; Dyal & Dolovich, 2016;

Eng et al., 2016; Misra et al., 2016) (Machado et al., 2016) (Proper & van-Oostrom, 2019) (Pearce et al., 2019) (C. H. Lu et al., 2015) audiovisuals such as TVs, computers, tablets, and smartphones with bluetooth that can display videos are very likely to increase patient knowledge about health (Berkhout et al., 2018; Li et al., 2019; Wahyuni et al., 2019; Abu-Abed et al., 2014; Cheung et al., 2017; Ramagiri et al., 2020; Chau et al., 2018; Gupta et al., 2020; Kang & Lee, 2019), Game-Based learning (Belogianni et al., 2019), social media in the form of blogs, facebook, twitter, web and youtube (Nour et al., 2017; Arunasalam & Balasubramanian, 2016; Daun & Gambardella, 2018; Klassen et al., 2018; Williams et al., 2014), etc.

Information sources mainly influence community awareness to screen blood pressure, blood sugar, and nutritional status. The source of information in education has a Wald value of 0.041. Interactive education workshops are an effective strategy in community-based health. Promoting educational programs for hypertensive patients can increase patient knowledge about hypertension and reduce risk factors to prevent hypertension-related complications (C. H. Lu et al., 2015). Although influential, the information source has a negative B (matrix parameter) value which means that every increase in the diversity of information sources will reduce community awareness of NCD screening.

Gender, especially women, is also a variable that influences community awareness in examining blood pressure, blood sugar, and nutritional status. It means that females are more aware of checking blood pressure, blood sugar, and nutritional status. It can also occur because, in this study, some female respondents answered more questions correctly than male respondents. Women are more aware of blood pressure tests because women are more associated with healthcare facilities than men, and psychological differences where women are more worried than men (Everett, 2015).

The age variable, especially in the 15-29 age group, has the most significant influence on community awareness of screening blood pressure, blood sugar, and nutritional status. Age has a wald value of 19,220, meaning that an increase in age does not significantly increase

community awareness to screen blood pressure, blood sugar, and nutritional status. These results are not in line with a previous study that older people are more influenced to participate in routine health screening (Amuta-Jimenez et al., 2018).

Marital status affects community awareness to screen blood pressure, blood sugar, and nutritional status. Every increase in marital status will raise community awareness of NCD screening. Participants who were not married or divorced tended to be less aware than married people. The most likely explanation for this is that married individuals are more likely to receive counseling from health professionals regarding their health problems than unmarried people (Mohammed et al., 2021). The limitation of this research is that there is no questionnaire about previous research, so the researcher must collect some data from previous research and then test the validity and reliability so that the questionnaire can be used.

Conclusion

The study on community awareness of screening blood pressure, blood sugar, and nutritional status for screening NCD at Ngletih PHC Kediri results in five significant factors. The factors are age (15-29 years), female gender, marital status, sources of information at places of education, and good knowledge. It is hoped that the management development of the NCD program at Ngletih PHC Kediri provides routine counseling, invites community leaders to increase the participation of cadres, and expands the coverage of Pobindu-PTM to develop community awareness of NCD screening. Future studies are expected to find effective intervention methods to increase community awareness of NCD screening, such as visual methods (leaflets and flipcharts), focus group discussions, counseling, social media, community-based health education, audiovisuals, and game-based learning.

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Effect of COVID-19 PPKM on BMI, Glucose Levels, and HbA1c in Patients DM Type 2 di Demak Regency

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Abstract

Implementing COVID-19 Community Activity Restrictions (Pemberlakuan Pembatasan Kegiatan Masyarakat/PPKM) affects community activities, including type-2 Diabetes mellitus patients in Demak Regency. BMI and HbA1c are risk factors for increased blood glucose levels of DM type 2. This research aims to determine the impact of COVID-19 PPKM against BMI, Glucose Levels, and HbA1c in Type 2 DM Patients in Demak Regency. This study used secondary data from the Chronic Disease Management Program (PROLANIS) in three health centers (Pusat Kesehatan Masyarakat/Puskesmas) in Demak Regency. Which was grouped into measurements before PPKM (October 2019 and February 2020), the PPKM period (August 2021), and the end of PPKM (March 2022). The complete variables were incorporated into the final analysis. A total of 164 respondents were spread across in Wonosalam 1 (n=64), Bonang 2 (n=49), and Wedung 1 (n=51). The results of the Analysis of Friedman and the Wilcoxon post hoc showed that there was an influence of COVID-19 PPKM on Glucose Levels (p=0.000) and HbA1c (p=0.000). There was no influence on BMI (p=0.108) in Dm Type 2 patients in Demak Regency, meaning on the variable levels of FBS and HbA1c, there are at least two different measurements in October 2019, February 2020, August 2021, and March 2022 measurements. Special attention is needed in DM patients to control changes in BMI, Glucose levels, and HbA1c during the implementation of COVID-19 PPKM.

Introduction

Coronavirus-2019 disease (COVID-19) has become a global pandemic and a world public health emergency (Chu et al., 2020; Haleem & Javaid, 2020; Mills et al., 2020; Salathé et al., 2020; WHO, 2020b). The World Health Organization (WHO) declared the COVID-19 outbreak caused by SARS-CoV-2 as a global pandemic on March 11, 2020. In 2020 there were 21,294,845 confirmed cases globally, with the most cases in the European and American regions and 761,779 deaths (WHO, 2020a). Most deaths occur in old age and chronic diseases such as diabetes mellitus (DM), hypertension, obesity, chronic kidney disease, cardiovascular disease, and cancer (Ojo et al., 2022; Viswanathan et al., 2021). The

number of DM cases in Demak Regency in 2019 reached 18,116, and in 2020 the number of dm people reached 18,529. In addition, Demak Regency is one of the districts with a high level of COVID-19 transmission (Demak Regency Health Office, 2021).

The high rate of transmission of COVID-19 has forced many countries, such as China, Italy, and India, to go into lockdown. However, some countries did not implement lockdowns for several reasons. The Ministry of Health of the Republic of Indonesia implements a policy of Enforcing Restrictions on Community Activities (PPKM) in districts and cities in Indonesia, including the Demak Regency (Ministry of Health of the Republic of Indonesia, 2020). The implementation of

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PPKM impacts community activities, including patients with chronic diseases in the face of limited access to health services, routine medical control checks, and drug procurement (Consonni et al., 2021). Prolonged COVID-19 PPKM resulted in an increase in BMI, waist circumference, and triglyceride levels in diabetic patients in Turkey, as well as an effect on fasting glucose and postprandial levels of type 2 DM patients (Önmez et al., 2020).

It is well known that managing blood glucose and other metabolic parameters is quite challenging for diabetic patients. It can be exacerbated by changes in lifestyle and daily routines, such as diet, exercise, insulin adjustment, emotions, stress, social relationships, and work activities. Lifestyle changes, such as lack of physical activity and increased food intake, can increase BMI, which has implications for insulin sensitivity and glycemic control (Ojo et al., 2022; Viswanathan et al., 2021). In addition to food intake, a parameter that can be trusted as an indicator of successful control of blood glucose levels of DM type 2 is the level of glycosylated hemoglobin (HbA1c). Based on the American Diabetes Association, the glycemic control of diabetic patients is said to be good when the glycated hemoglobin A1c (HbA1c) value is less than 7% (Alakhali & Mohammad, 2014).

Significant changes in daily life due to COVID-19 PPKM can significantly impact the health of BMI and HbA1c (Alakhali & Mohammad, 2014; Farhane et al., 2021; Fernández et al., 2020; Ruissen et al., 2021). In this sense, changes in behavior patterns and daily life, including exercise levels, stress, and anxiety, affect the self-management of diabetes and glycemic control (Farhane et al., 2021). These changes significantly affect clinical outcomes during PPKM (Farhane et al., 2021). This study aims to determine the effect of COVID-19 PPKM on BMI, Glucose Levels, and HbA1c in Type 2 DM Patients in Demak Regency.

Method

This study was an analytical observational study with a cross-sectional retros-effective approach, where this study aims to analyze the effect of COVID-19 PPKM on BMI,

glucose levels, and HbA1c levels of DM type 2 patients in Demak Regency, using primary data obtained from fill sheets, and secondary data from the results of Medical Records in Puskesmas for hyperglycemia markers. The population of this study was Chronic Disease Management Program (Prolanis) patients at the Demak Regency Health Centers (Puskesmas). The study samples were prolanis patients in Puskesmas Wonosalam 1, Bonang 2, and Wedung 1, Demak Regency. The site selection was based on the distribution of a large number of incidences of Type 2 Diabetes mellitus and non-communicable disease (NCD) screening. The inclusion criteria for this study were all patients with normal blood sugar levels > in the three puskesmas areas of Demak Regency. Even the Exclusion Criteria for this study are patients with complications in multiple organs.

The consecutive sampling method was by recording registered patients, and according to the arrival of patients in prolanis activities according to the inclusion and exclusion criteria until they meet the analysis requirements. The variables in this study are the Implementation of Community Activity Restrictions (PPKM); Body Mass Index (BMI); Glucose Levels; and HbA1c Levels. and the variable Stress Level in DM patients, defined as the body's response experienced by Diabetes Mellitus patients due to the disease suffered. Data were collected using questionnaires created based on existing literature. The questionnaire in the form of questions about stress levels based on the DASS (Depression Anxiety Stress Scale) instrument consists of 14 questions related to the incidence of stress, other data using respondent's medical checkup sheets which include: the respondent's identity, anthropometric data including weight measurement, and height and Body Mass Index (BMI), blood pressure examination, triglyceride examination, and blood sugar examination fasting and postprandial. Category data was presented in frequency and percentage based on the area of the public health center (Puskesmas), and numerical data was delivered from the average, minimum, and maximum values. The follow-up analysis used The Friedman-Mann test → Wilcoxon's post hoc. All by SPSS 22.0 (IBM Corporation, NY, USA). This research has received ethical approval from the health

research ethics committee at Semarang State University. Research ethics permit in 2022 number 060/KEPK/EC/2022.

Results and Discussions

Tabel 1. Characteristics of Respondents Based on Puskesmas Region

Characteristics	PUSKESMAS			P-Value
	Wonosalam 1 (n=64)	Bonang 2 (n=49)	Wedung 1 (n=51)	
Age (Years, mean; min-max)	54.05 (34-74)	57.12 (36-74)	58.24 (42-75)	0.059
Gender (n; %)				0.592
Man	12; 18.8	8; 16.3	6; 11.8	
Woman	52; 81.3	41; 83.7	45; 88.2	
Education Level (n; %)				0.315
Not Finished Elementary School	7; 10.9	4; 8.2	7; 13.7	
Elementary School	49; 76.6	34; 69.4	37; 72.5	
Junior high school	7; 10.9	8; 16.3	6; 11.8	
Senior High School	1; 1.6	3; 6.1	1; 2.0	
Employment Status (n; %)				0.128
Not Working	40; 62.5	37; 75.5	40; 78.4	
Work	24; 47.5	12; 24.5	11; 21.6	
Stress Level (n; %)				0.815
Mild Stress	7; 10.4	4; 8.2	4; 7.8	
No Stress	57; 89.1	45; 91.8	47; 92.2	
BMI (mean; min-max)				
October 2019	23.39 (16-38)	22.56 (18-31)	24.20 (17-38)	0.061
February 2020	23.10 (15-39)	22.22 (18-31)	23.53 (17-37)	0.314
August 2021	23.45 (15-39)	22.58 (18-30)	23.59 (17-37)	0.947
March 2022	23.43 (16-39)	22.77 (19-31)	23.45 (16-37)	0.083
FBS (mean; min-max)				
October 2019	210.25 (93-396)	249.65 (93-554)	219.35 (88-431)	0.934
February 2020	238.73 (78-509)	236.78 (94-465)	245.47 (79-551)	0.790
August 2021	214.96 (13-511)	293.94 (79-527)	231.32 (72-472)	0.214
March 2022	249.72 (91-497)	360.45 (108-744)	250.37 (92-527)	0.000
HbA1c (mean; min-max)				
October 2019	11.33 (5-17)	11.23 (6-16)	11.21 (5-15)	0.618
February 2020	10.07 (5-16)	10.27 (6-15)	9.94 (15-39)	0.354
August 2021	10.73 (5-15)	11.09 (6-16)	10.64 (6-15)	0.000
March 2022	10.88 (5-16)	11.12 (6-15)	11.03 (6-15)	0.955

Source: Medical Record of PROLANIS Puskesmas Activities

Based on table 1 of respondents' characteristics based in the puskesmas area, the number of respondents to the Wonosalam 1, Bonang 2, and Wedung 1 health centers is 64, 49, and 51, respectively, with an average age of respondents of 54.05, 57, .12, and 58.24 this shows that the average respondent is elderly, while the majority of respondents are women, namely the Wonosalam health center 1 (81.3%), Bonang 2 (83.7%), and Wedung 1 (88.2%). The majority of respondents have an education level

up to elementary school, namely Wonosalam health center 1 (76.6%), Bonang 2 (69.4%), and Wedung 1 (72.5%). More respondents did not work than respondents who worked, namely puskesmas Wonosalam 1 (62.5%), Bonang 2 (75.5%), and Wedung 1 (78.4%). And most respondents did not show stress. Puskesmas Wedung 1 respondents have a high average BMI compared to other puskesmas respondents in each month of measurement, namely October 2019 (24.20); February 2020 (11:53 p.m.);

August 2021 (11:59 p.m.); March 2022 (11:45 p.m.). The GDP level in each puskesmas varies, but all puskesmas show that the average GDP level in March is a higher average than in other months, namely the Wonosalam 1 health center (249.72), Bonang 2 (360.45), and Wedung 1 (250.37). Meanwhile, the average HbA1c of each health center varies from time to time of measurement.

Table 2. Test differences in BMI, GDP, and HbA1c based on the measurement period

Measurement Period/ Variables	IMT		GDP		HbA1c	
	Median (Min-Max)	p-value	Median (Min-Max)	p-value	Median (Min-Max)	p-value
October 2019 (Before PPKM)	22.98 (16-38)	0.108	211.50 (88-554)	0.000	11.75 (5-17)	0.000
February 2020 (Beginning of PPKM)	22.66 (16-39)		224.50 (78-551)		9.90 (5-16)	
August 2021 (Post PPKM Level 4)	22.85 (15-39)		232.00 (13-527)		10.90 (5-16)	
March 2022 (PPKM Level 1, End of PPKM)	22.90 (16-39)		262.50 (91-744)		11.50 (5-16)	

*Friedman → Wilcoxon's hoc post

Source: Medical Record of PROLANIS Puskesmas Activities

Table 3 shows that the significance value obtained at each measurement period is that only the BMI variable has a significance value of > 0.005 . While other variables have a significance value < 0.005 meaning that

in the variables of GDP and HbA1c levels, there are at least two different measurements. The measurements that show significance differences are as follows:

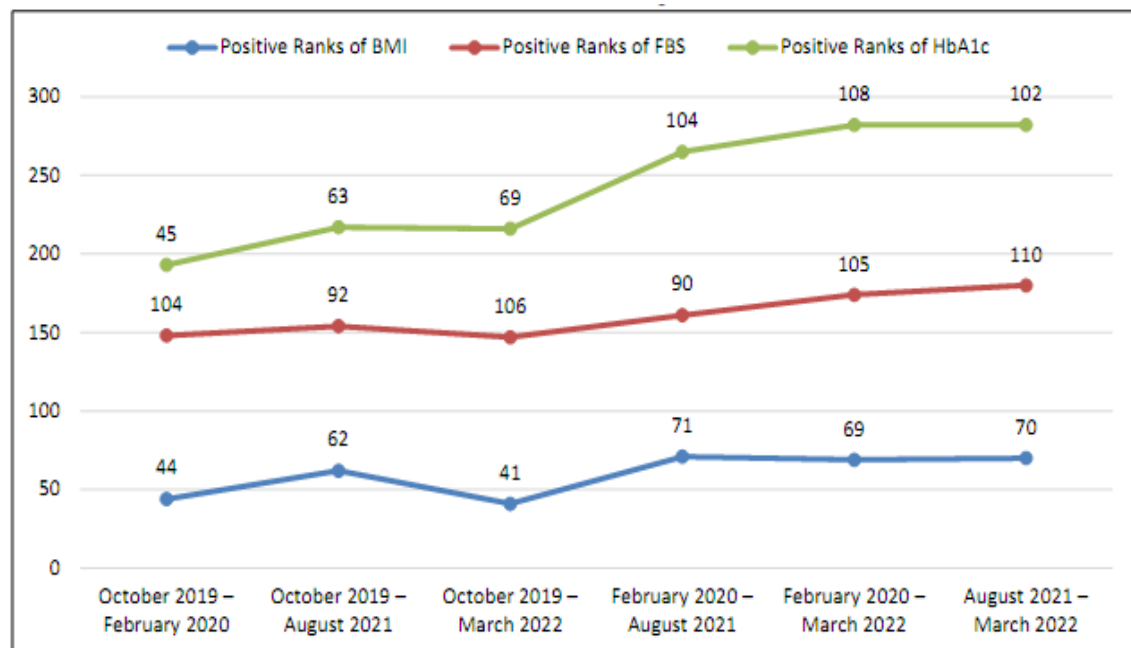


Figure 1. Changes in the value of Positive Ranks BMI, FBS, and HbA1c

The figure above shows the analysis results of the four measurement periods, which show significant differences in BMI measurements in October 2019 and February 2020 with a p-value < 0.005 . Positive Ranks shows February 2020 $>$ October 2019 as many as 44 respondents. Significant differences in all

measures of GDP with p-value < 0.005 only the February 2020 – August 2021 measurements did not have a significant difference. Significant differences in all HbA1c measurements with a p-value < 0.005 , although the measurements from October 2019 to March 2022 showed a p-value of 0.075. The results of all HbA1c

measurements had differences in each measurement period. The graph of the average change for each measurement is in the graphic chart below:

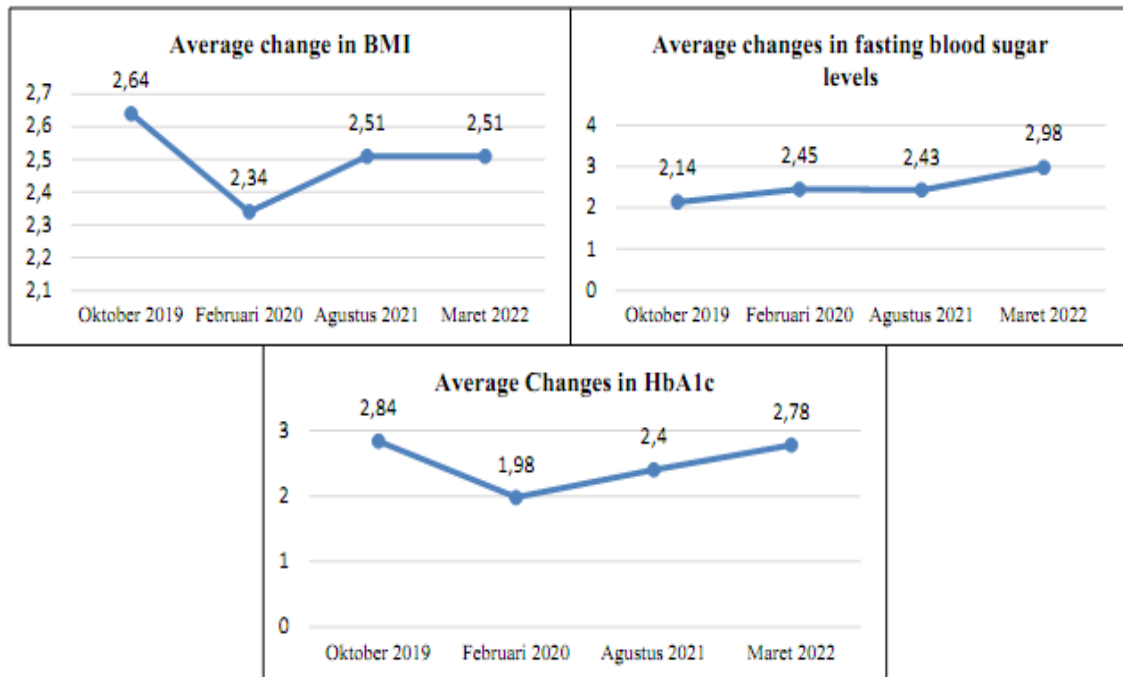


Figure 2. Average Changes in IMI, GDP, and HbA1c During the PPKM Period

The analysis showed that the FBS and HbA1c in patients with DM increased significantly during the COVID-19 PPKM. The average change in FBS levels from the four consecutive measurement periods was 2.14, 2.45, 2.43, and 2.98. The average change in HbA1c is 2.84, 1.98, 2.40, and 2.78. The results of this study are in line with the research report meta-analysis, which shows a difference in the average HbA1c of 0.05% (95% CI 0.31 - 0.21) as a result of BMI; some studies report no significant difference of only + 0.3 kg. PPKM COVID-19 is a change in health care and people's daily lives and impacts the management of patients with DM. Lifestyle changes (e.g., dietary changes, consumption of calorie-dense foods, lack of physical activity, and the addition of BMI (Lippi et al., 2020), are part of the management of DM patients on insulin therapy (Tan et al., 2019).

HbA1c is significantly improved on the reports of several studies. It is a promising finding given the fact that reasonable glycemic control reduces the risk of comorbidities and complications, as well as the development of micro-and macrovascular consequences in DM patients (In-Dalmazi et al., 2020; Kleinwechter,

2020). DM patients may be able to balance diet, exercise, and insulin needs to counteract the consequences of COVID-19 PPKM, such as physical inactivity and psychosocial impacts (Pla et al., 2020). Furthermore, changes in FBS levels during PPKM COVID-19 in this study showed an increase in each measurement period. Still, some studies showed that the FBS level during PPKM COVID-19, which is better or controlled, could lie in a more regular daily lifestyle and strict daily routine, including a meal schedule (Brenner et al., 2020; Capaldo et al., 2020; Longo et al., 2020; Mesa et al., 2020). Several other studies have shown changes in better and controlled FBS levels. Generally, the treatment of DM patients is more intensive during COVID-19 PPKM (Eberle et al., 2021; Eberle & Stichling, 2021), such as better adherence to medicines as well as digital and dietary solutions during COVID-19 PPKM despite reduced exercise. On the contrary, other studies show worsening glycemic values. It could be due to increased stress and decreased physical activity. One study from India (Verma et al., 2020) redirected findings on the unavailability of insulin/glucosuria during the

PPKM-COVID-19 period.

Other studies have shown an emphasis on lifestyle changes during COVID-19 PPKM (Ghosh et al., 2020; Ruiz-Roso et al., 2020), increased consumption of vegetables, sweet foods, and snacks. They found a link between food consumption and snack consumption and the high percentage of physical activity before the covid-19 PPKM that increased. Other causes may be lack of sleep, lack of dietary restrictions, increased sitting time, increased socioeconomic difficulties altering healthy nutrition (Biancalana et al., 2021; Karatas et al., 2021), inability to visit hospitals or pharmacies, and increased anxiety and stress (Ghosh et al., 2020; Lippi et al., 2020).

In addition, local governments' strategies and restrictive measures in overcoming the COVID-19 pandemic differ from region to region (Desvars-Larrive et al., 2020). Some are more, and some are less stringent, as well as having different periods that can cause other effects on the health system and people's lives (Ghosh et al., 2020). Prolonged COVID-19 PPKM increased BMI in the type 2 diabetes group, but the increase in BMI did not differ significantly during the four measurement periods. These results are in line with a survey study of 1,200 participants who self-quarantined. 22% experienced a BMI results from lack of sleep, snacking after dinner, lack of dietary restrictions, eating in reaction to stress, and reduced physical activity (Zachary et al., 2020). Another survey study found an average increase of 1.5 kg after one month of the COVID-19 PPKM period. Self-reported BMI and depression were risk factors for BMI increase (Pellegrini et al., 2020). Also, another recent study reported an increase in BMI after COVID-19 PPKM began among obese people associated with snacking habits (de-Luis Román et al., 2020). An analysis of nutrition and exercise surveys during the pandemic in Spain showed that the consumption of snacks and sweet foods and physical activity increased and aggravated by home confinement in patients with type 2 diabetes (Ghesquière et al., 2021), Limited social interaction and reduced social eating replaced by emotional eating will also cause this (Robinson et al., 2013).

Increasing socioeconomic difficulties al-

ter healthy nutrition and create an obesogenic environment of energy foods that are cheap, easy to prepare, or accessible with less healthy ingredients. An increase in sitting time in a day could lead to a decrease in caloric expenditure in all populations (Ammar et al., 2020; Espeland et al., 2017). The limitation of this study was that it could not compare DM Type 2 and 1 patients or non-DM patients. The study focused on the differences in BMI, FBS, and HbA1c at the four measurement periods and did not observe factors that cause these differences. So subsequent studies can analyze the monitoring data of DM patients during the implementation of PPKM COVID-19.

Conclusion

In conclusion, there is an increase in FBS and HbA1c, and the difference in BMI, although not significant during the COVID-19 lockdown, is noteworthy. In our opinion, worsening glyce-mic parameters during this lockdown are related to the limitations that enter daily life due to an extraordinary phenomenon. Exposure to special situations will inevitably result in the patient experiencing various physical, mental, and mental problems. Considering that the COVID-19 pandemic is continuing, patients need to be supported emotionally, mentally, and physically, in addition to controlling biochemical parameters.

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Provision of Media Booklets on Increase Knowledge of Junior School Children

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Abstract


The Indonesian government has implemented policies to improve the quality of human resources, namely efforts to improve community nutrition. But the implementation has not been optimal, and there are various problems with eating behavior, clean and healthy living behavior, and disease. A Quasi-experimental design with correlational design. The sampling technique was purposive, proportional, and random sampling with 100 samples. This research took time in June-July 2022. Univariate describes the characteristics of the subject. Bivariate on two variables related or correlated. Based on the Spearman correlation test, the p-value of work (0.634) with a value of (ρ) 0.048, education (0.085) with (ρ) -0.173, infrastructure (0.518) with a value of (ρ) 0.065, school support (0.127) with a value of (ρ) 0.062, parental support (0.010) with (ρ) 0.255 and peer support (0.005) with (ρ) -0.034. Predisposing factors on the variables of work and education through booklet media on knowledge of anemia prevention >0.005 . Enabling factors through booklet media on knowledge of anemia prevention were not significantly related to p-value >0.005 . The reinforcing factor on the variables of school support and peer support through booklet media on knowledge of anemia prevention, was not significantly related to a p-value of 0.005, but the parental support variable had a significant relationship p-value of 0.005.

Introduction

Anemia is a deficiency of red blood cells/hemoglobin (Hb) and not having enough oxygen to meet the body's physiological needs (Teshale et al., 2020). Adolescence is a period of growth, reproductive maturation, and developmental transition with increased nutritional intake, which makes adolescents more susceptible to nutritional deficiencies (Zhu et al., 2021). Anemia affects almost 25% of school-age children (5-14 years) of the world's population (Wouters et al., 2019; Yang et al., 2020). Anemia causes 600,000 child deaths in low and middle-income countries each year, with the highest proportion of deaths occurring in South Asia (Phong et al., 2019; Yang et al., 2020). WHO estimates that anemia affects 33% of women of reproductive age globally (about 613 million women between the ages of 15 and

49 years). The highest prevalence of 35% in Africa and Asia and in South Asian countries such as Indonesia 30%, Nepal 46%, and Bhutan 58% (Fentie et al., 2020). The prevalence of anemia in adolescent girls has increased from 37.1% in 2013 to 48.9% in 2018. The anemia prevalence in Central Java Province is 30.90%. The prevalence of the number of iron tablets obtained from health facilities, schools, and self-initiated was 11.20%, 84.30%, and 11.70%, while adolescents who consumed iron tablets <52 items were 97.9%, and >52 items were 2.07%.

The Government of Indonesia has implemented policies to improve the quality of human resources, namely efforts to improve community nutrition through the application of balanced nutrition in the Regulation of the Minister of Health of the Republic of Indonesia

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(Permenkes RI) Number 41 of 2014 concerning Guidelines for Balanced Nutrition (Ministry of Health, 2014). Junior high school students have not entirely received the impact of the policy because its implementation has not been optimal and there are various problems in eating behavior, clean and healthy living behavior, and diseases related to nutrition, so it is necessary to implement balanced nutrition in the form of socialization, counseling, training, counseling, nutrition practices, balanced, and nutrition education (Prime et al., 2017). There are still shortcomings in giving iron tablets to young women, namely the lack of facilities and infrastructure such as promotional media, leaflets, brochures, and iron supplementation cards.

The risk of anemia was very high among adolescent girls (10 to 14 years) (Adjusted Odds Ratio (AOR); 1.98; 95% CI; 1.03, 3.82) and living in food insecure households (AOR 1, 48; 95% CI; 1.05–2.09) (Gebreyesus et al., 2019). Family income has a significant relationship with the incidence of anemia in adolescent girls, p -value <0.001 , with an OR value of 3.307, meaning that in low-income families, it is 3.3 times higher than in high-income families (Rangkuti, 2020). Adolescent girls with low knowledge are 0.784 times more likely to experience anemia than girls with good knowledge. In terms of facilities and infrastructure, it is still not optimal in giving iron tablets to young women, promotional media, leaflets, brochures, and TTD cards. There are differences in students' knowledge before and after counseling with the lecture method and booklet media. The increase in the average value of 66.41 in the pre-test to 94.10 in the post-test. Taking Fe tablets also reduces the chance of anemia by 0.680 times. Adolescent girls whose iron consumption pattern is irregular have 4,250 times the chance of experiencing anemia compared to girls whose iron consumption pattern is regular (Manik & Simamora, 2019).

Changes in individual or community health are influenced by the theory of Lawrence W. Green. It suggests that human behavior is affected by behavioral and non-behavioral causes. The causes of behavior are formed from predisposing factors such as knowledge, education, and parental occupation. Enabling

factors such as facilities and infrastructure as well as health services. Reinforcing factors such as parental support, school support, and peer support. The prevalence of giving iron tablets to adolescent girls in Surakarta City increased from 37.9% to 49.5% in 2018. Health services for school-age children through cross-sectoral activities related to School's Health Clinic (SHC) include the provision of iron tablets for young women by health workers/SHC teachers/school health cadres in 2019 by 90.6%, decreased in 2018 which was 95.9%. The above phenomenon is the basis of the interest of researchers to conduct research following the theory put forward by Lawrence Green which says that individual or community health is influenced by two main factors, namely behavioral causes and factors outside behavior. Therefore, researchers are interested in examining the influence of predisposing, enabling, and reinforcing factors through the provision of booklet educational media on knowledge of anemia prevention in SMP Negeri Surakarta City.

Method

The research design uses quasi-experimental design research, this study examines the effect of two independent variables on the dependent variable by design. Namely, one group pre-test post test, and correlational (correlational research). It aims to determine whether there is an association between two or more variables and how far the correlation exists between the variables studied. The sampling technique was determined by purposive, proportional, and random sampling. The sample inclusion criteria were subjects who were registered as active in class VIII of SMP Negeri 20, SMP Negeri 21, SMP Negeri 14, and SMP Negeri 26 Surakarta, subjects living with their parents, willing to give informed consent, able to communicate well, and cooperative. The sample exclusion criteria were subjects who were not present in health education and did not participate in all series of research activities. The instrument used in this study was a questionnaire sheet using booklet media. In this study, there were validity tests conducted, namely validity and reliability tests, to determine the feasibility of questionnaires and booklets for learning. The booklet in this study contains material on anemia prevention and

control strategies. It is supported by attractive designs such as animated images so that they can play a role in attracting the attention of readers and the words used are straightforward. Univariate to describe the characteristics of the subject. Bivariate analysis was carried out on two related or correlated variables. If the data is normally distributed, it is tested using Pearson correlation. When it is not, then, by Spearman. All analyzes used SPSS 25.0 (IBM Corporation, New York). This research has been accepted by the Health Research Ethics Committee of Semarang State University in 2022 under the number 229/KEPPK/EC/2022.

Result and Discussion

The city of Surakarta consists of 5 sub-districts and has 17 Community Health Centers (CHC), including CHC Pucangsawit and Purwodiningratan. Of the two CHCs, some have a junior high school. This study examines four junior high schools from two CHCs. Namely SMP Negeri 20 Surakarta, SMP Negeri 21 Surakarta, SMP Negeri 14 Surakarta, and SMP Negeri 26 Surakarta. Based on the results of a survey from the Surakarta City Health Office. The results of the study used a univariate test to determine the frequency distribution of each variable studied, and a bivariate to determine the relationship between variables.

Table 1. Characteristics of Respondents

Variables	n	Frequency	%	mean	median	Std. Deviation
Work						
1. Businessman	100	62	62	1.38	1	0.488
2. Public/Private Servants		38	38			
Education						
1. Low (Not school-middle school)	100	42	42	1.58	2	0.496
2. High (high school-university)		58	58			
Infrastructure Support						
1. Less Support	100	44	44	1.56	2	0.499
2. Support		56	56			
School Support						
1. Less Support	100	41	41	1.59	2	0.494
2. Support		59	59			
Parental Support						
1. Less Support	100	42	42	1.52	2	0.502
2. Support		58	58			
Peer Support						
1. Less Support	100	48	48	1.52	2	0.502
2. Support		52	52			
Media Booklet						
1. Bad	100	45	45	1.55	2	0.500
2. Well		55	55			
Knowledge						
1. No changes	100	41	41	1.59	2	0.494
2. There are changes		59	59			

Source = Primary Data, 2022

Data from each variable is displayed in tabular form according to its type, including work, education, infrastructure, school support, parental support, peer support, and booklets. Univariate analysis on the majority of respondents' parents have entrepreneurial jobs such as farmers/fishermen/laborers (62%) and have a high level of education with high school

and college graduates (58%). The infrastructure support variable is in good condition (56%), and 44% is in poor condition. School support responded well in learning at school (59%), supported by a positive response from parents (58%), and assisted by positive peer support (52%), presented in table 1.

Table 2 Characteristics of Adolescent Knowledge of Surakarta State Junior High School

Variables	n	mean	Std. Deviation	Difference	95% CI	p-value
Knowledge before being given a media booklet	100	64.75	12.047	25,600	22.754-28.446	0.000
Knowledge after being given a media booklet	100	90.35	6,600			

Paired T-Test, the difference between before and after, CI = Confidence Interval
 Source = Primary Data, 2022

Table 2 uses paired t-test with the average result of knowledge before being given the implementation of booklet media being 64.75 and the average knowledge after being given the implementation of booklet media being 90.35. The p-value was 0.000 ($p < 0.05$) with a difference of 25.600 (95% CI 17. 22.754-28.446). Because the p-value and CI did not exceed zero, there was a statistically significant difference before and after implementation. Based on the normality test of the data with the Kolmogorov-Smirnov test, the data is not normally distributed, then continued with the

Spearman correlation test to determine the relationship between each variable. Statistically, there is a positive relationship between parental support and the correlation value (ρ) = 0.255 (p-value 0.010). It means that the more parental support, the more knowledge and media booklets increase with the correlation value (ρ) = 0.258 (p-value 0.010) with the strength of the relationship included in the category of moderate relationship (0.26-0.50). The parental support variable can explain the knowledge variance of 6.5%, and 93.5% is explained by other variables not examined.

Table 3 Spearman Correlation

Variable	p-value	rho(ρ)	Coefficient of Determination
Work	0.634	0.048	0.002
Education	0.085	-0.173	0.030
Infrastructure	0.518	0.065	0.004
School Support	0.540	0.062	0.004
Parental Support	0.010	0.255	0.065
Peer Support	0.739	-0.034	0.001
Booklet	0.010	0.258	0.067

Source = Primary Data, 2022

Anemia is a nutritional problem that most often occurs in developed and developing countries, as well as in people with low and high socioeconomic status. This problem is caused by insufficient intake of Fe, menu patterns, and the amount of Fe released during menstruation. Anemia is a condition where Hb levels are lower than 12 g/dl. Clinical manifestations of iron deficiency are anemia, decreased immunity, and low workability, causing symptoms of lethargy, weakness, fatigue, and neglect. Changes in health personally and the community is influenced by Lawrence W. Green's theory. So the behavior is formed from predisposing such as knowledge, education, and parental work. Enabling such as facilities, infrastructure, and medical services. Reinforcing such as parental support, school support, and peer support.

Based on the Spearman correlation test,

the p-value of work was (0.634), and education was (0.085). It means no significant relationship between predisposing factors through the provision of educational booklet media on knowledge. Statistically, work has a positive relationship with a value of (ρ) = 0.048 which means that the strength of the relationship is included in the category of weak ($>0.00-0.25$). Education has a negative relationship with (ρ) = -0.173 meaning the strength of the relationship is weak ($>0.00-0.25$) (Table 3). It may be due to low-income levels, environmental conditions, and lack of interest in continuing education. But education is important for families in raising children and regulating diet. Education is an important asset that supports the family's economy and is very helpful for housewives to prepare family meals, educate and care for their children (Basith et al., 2017, Razmerita et al.,

2016; Havakhor et al., 2018).

These results are in line with the research performed, showing no relationship between the father and mother's occupation with the practice of consuming blood-added tablets for adolescent girls (p-value 1000). A study by Agustina et al. (2021), showed no relationship between maternal education and the prevalence of anemia (p-value 0.37). Other by Jeihooni et al. (2021), showed that there was no relationship between work and anemia in adolescent girls (p-value 0.212). However, in contrast, the research conducted showed a significant relationship between education and eating behavior in preventing anemia (p=0.026). Mulianingsih et al. (2021), showed a significant relationship p-value 0.000 between upper-level maternal education and the incidence of mild anemia in adolescents. Based on the theory, highly educated parents will pay more attention to their children's diet because they know the nutritional intake needed by their children. Predisposing factors cannot be separated from enabling and reinforcing ones. The better the enabling and reinforcing factors will affect the predisposing ones. Carried out the study in India to explore the effect of education on the knowledge, attitude, and practice of pregnant women showed that 93% of the educated women were in favor of including iron-rich foods in their diet as compared to 67% in the group with no education (p < 0.001) (Abdel et al., 2018; Chan et al., 2020).

SHC is responsible for providing health education to students. Health education to monitor the incidence of anemia in school students is not specifically about anemia through the role of SHC. Students' health education must also be improved. Students' ability to play an active role in providing medical services. Efforts to develop students' abilities to play an active role through UKS activities are to train health workers in schools, commonly known as Little Doctors. Based on the Spearman correlation analysis of facilities and infrastructure, the p-value was 0.518, meaning no significant relationship between the enabling factors through the provision of booklet educational media on knowledge of anemia prevention. Statistically, infrastructure has a positive relationship with a value (ρ) = 0.065, which means that the strength

of the relationship is included in the category of weak (>0.00-0.25) (Table 3).

These results are in line with the research conducted. There are still a few who fall into the category of available facilities and infrastructure supporting the implementation of the SHC program. An analysis in Mexico also shows that family structure and access to medical services significantly correlated with school performance. Participation in the labor market is highly associated with a low possibility of going to school on time. This intuitive result is consistent with the reality of Mexican socioeconomics. Many students have to work to make a living for their families, causing late to school, and finally dropping out (Mosiño et al., 2020). This study shows no relationship between Enabling factors through the provision of educational media booklets on knowledge. It is probably due to the lack of infrastructure in schools, so respondents do not really know how to use infrastructure to increase the knowledge about anemia prevention in adolescents. Statistically, the strength of the relationship was 0.065 in the category of very weak (>0.00-0.25).

The booklet is a mediator variable between enabling factors and knowledge. Enabling factors cannot be separated from predisposing and reinforcing ones. If you have good predisposing and reinforcing ones, you will have good enabling factors that will affect the booklet media. Peers are a group of people of the same age and maturity. At this point, teens think that friends can share the same problems and provide emotional relief to see the world from the same perspective, thus interacting with peers outside the home. I spend a lot of time. Friends are not only a positive influence but can also put a lot of pressure on young women to comply with environmental standards. To prevent young women from being accepted, ostracized, ridiculed, or discussed by their peers, young women need to adapt to environmental standards that are consistent with their peers.

Based on Table 3. The results of the Spearman correlation between school support have a p-value of 0.127, meaning no significant relationship. But parental and peer support have a significant relationship with a p-value of 0.005. Statistically, school support has a

positive relationship with the value (ρ) = 0.062, meaning that the strength of the relationship is included in the category of weak ($>0.00-0.25$), and peer support has a negative relationship with (ρ) = -0.034 which means the strength of the relationship is included in the category of weak ($> 0.00-0.25$). However, the parental support variable has a positive relationship with the correlation value (ρ) = 0.255 (p-value 0.010), which means that the more parents support, the more knowledge will increase. The strength of the relationship is included in the category of moderate relationship (0.26-0.50). Young women get information about how to take iron tablets and get iron tablets distributed by schools and parents who do not allow respondents not to take iron tablets. It shows that the importance of information and support from schools, teachers, and, parents to consume Fe tablets. These results are in line with the research conducted and obtained a p-value of 0.000 which means that there is a relationship between school support and consumption of Fe tablets in adolescent girls.

Research shows several factors relating family support, teacher support, and health workers with the level of compliance of adolescent girls in consuming Fe tablets (p-value 0.000). Research shows that there is a relationship between peers and TTD consumption (p-value 0.019). The results of the frequency distribution of school support for adolescent girls in class XI at SMA N 6 Bengkulu City were 36 people (47.4%) stated that they were less supportive and as many as 40 people (52%) supported with a p-value of 0.000). Research Lee et al., (2019), reveals the importance of teachers and mothers as sources of information, and the role of diet and culture of purchased snacks, which occur with school attendance. Family support is one of the most influential factors in the compliance of adolescent girls to consume blood-added tablet. Good parental knowledge about nutrition and its consequences will encourage young women to take it. Apart from parents, other support from the community, religious leaders, and peers. Research (Mohamed et al., 2018), shows that iron deficiency anemia is associated with a poor diet. Such as low consumption of iron-rich foods or foods that increase iron absorption (e.g.

foods rich in vitamin C) and high consumption of foods that inhibit iron absorption (such as tea and whole bread). Therefore, low parental education, rural location, and female students with intestinal-parasitic infections have been identified as predictors of iron deficiency anemia.

Conclusion

The predisposing factors on the variables of work and education through booklet media on knowledge of anemia prevention and the variables of work and education on knowledge of anemia prevention were not significantly related to p-value >0.005 . Enabling factors through booklet media on anemia prevention knowledge and enabling factors on knowledge of anemia prevention were not significantly related with p-value >0.005 . The reinforcing factor, on the variables of school support and peer support through booklet media on knowledge of anemia prevention and the variables of school support and peer support on knowledge of anemia prevention was not significantly related to p-value > 0.005 . But the parental support variable had a significant relationship p -value <0.005 .

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Implementation of Learning from Home as a Determinant of Social Development Problems for Preschool Children

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Abstract

Background: Learning From Home (BDR) policy since 2019 in controlling the transmission of Covid-19 in Indonesia is suspected to be able to cause children to be limited in getting stimulation for partnerships that should be built between parents, the community, and teachers. Forty percent of preschoolers are prone to social development problems. Researchers intend to know the implementation of BDR as a determinant of social development problems of preschool-age children (5-6 years). **Methods:** The study design of this research was analytically observational with a cross-sectional approach. The variables include the implementation of BDR, the mother's education, the child's gender, the child's nutritional status, and the child's social development. The instrument used is Denver II. The sampling method used a simple random sampling technique with as many as 113 samples. Data analysis was performed in a bivariable manner, with a chi-square test. **Results:** This study showed that the implementation of BDR was related to the problem of children's social development (p -value = 0.012, OR = 1.639, 95% CI = 1.16-2.31). Mother's education is related to children's social development problems (p -value = 0.045, OR = 2.227, 95% CI = 1.93-5.3). **Conclusion:** Online BDR is a determinant of social development problems aged 5-6 years. The community and government need to anticipate problems that can occur through early detection of developments so that they can be overcome as early as possible. Parents should be involved in online BDR assistance to manage screen duration following safety standards for health.

Introduction

The Covid-19 pandemic has created an unprecedented health, employment, economic and social crisis. This condition has a profound impact on developing countries (Fegert et al., 2020; Howard-Jones et al., 2022; Palacio-ortiz et al., 2020). Research in Australia suggests there are indirect effects of COVID-19 that will have long-term impacts beyond the immediate pandemic period, including mental health and well-being risks, disruptions to family income, and stressors that produce social impacts affecting families and children (Howard-Jones et al., 2022; Palacio-ortiz et al., 2020). Schools are one of the public areas suspected of increasing the number of Covid-19 cases if their activities are not restricted. Public health organizations

have advocated preventive policies to limit the virus, including stay-at-home orders closing businesses, daycares, schools, playgrounds, and children's learning (Williams et al., 2021). Indonesia controls the transmission of Covid-19 with the Study From Home (Belajar Dari Rumah/BDR) policy for students. Through the Circular Letter of the Minister of Education and Culture Number 4 of 2020 and strengthened by Circular Letter Number 15 of 2020, the BDR policy applies to all levels of education, Pre-school (PAUD), Kindergarten (TK), Elementary (SD), Junior High School (SMP), Senior High School (SMA), and Higher Education. The implementation of the policy aims to ensure the fulfillment of the rights of students to obtain educational services, protect

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education unit residents from the adverse effects of the spread and transmission of Covid-19 in education units and ensure the fulfillment of psychosocial support for educators, students, and parents. It forces a process of adaptation to the whole world of learning life. Studying and working from home should pay attention to a good level of productivity, achieve the right level of activity balance, and maintain a good level of physical and mental health (Birimoglu Okuyan & Begen, 2022).

The pandemic has changed the lives of homes and preschool programs, making it more challenging for parents and communities to provide an optimal learning experience for children. These changes are likely to have significant consequences for children's learning and development (Barnett & Jung, 2021; Stites et al., 2021). This phenomenon has created fear and anxiety worldwide, which has short-term and long-term implications for the psychosocial and mental health of children and adolescents (Singh et al., 2020). Fear of infection and possible job loss has stressed parents. Parents who can work from home face challenges at work and in providing caring child care (Deoni et al., 2021). Mother's anxiety during the Covid-19 pandemic is a vital determinant of early childhood development. It affects speech-language, sensory-motor, and socio-emotional development (Jeličić et al., 2021). They are required to regulate themselves socially and in their daily routines. They are also severely affected by sudden withdrawal from school, social life, and outdoor activities (de Figueiredo et al., 2021). Learning policies during the COVID-19 pandemic require educators, students, and parents to adapt quickly to the online learning environment and to develop innovative ways to exchange information and provide remote support (Sim et al., 2021). This condition can increase the learning gap between children from wealthy families who can continue distance learning and children from the poor who will be left behind (UNICEF, 2020).

Even though the Covid-19 epidemic demands a policy of limiting learning activities, the government must still pay attention to health development goals to achieve optimal health degrees for all residents in Indonesia.

One of the target population groups for the health development program is children aged 5-6 years, the preschool category. Childhood is a unique and special period in the life of every human being. This period is the foundation for forming health and personality. Failure at the level of the child period will have an impact on the success of his life in the future (Matluba, 2021). Social development is one of the most valuable aspects of this period. It should be noted that the psychological readiness of a school child depends in many ways on the situation. The number of preschool children (5-6 years) is 3.57% of the total population of Indonesia. Provinces with the highest number of preschool children are West Java 0.65%, East Java 0.43%, and Central Java 0.04% (Kemenkes RI, 2020). Indicators of the success of fostering child growth and development are not only increasing the growth and nutritional status of children but also aspects of development. Proper stimulation will stimulate the development of movement, speech/language, social and independence skills so that they take place optimally according to the child's age (Kemenkes RI, 2020)

Preschool children aged 5-6 years who are at the kindergarten education level need attention because they are considered a critical age that cannot be ignored by parents and teachers regarding their social development (Ölçer & Aytar, 2014). Policies at the beginning of the pandemic resulted in reduced children's physical activity, increased screen time, sleep duration, and decreased sleep quality. Any significant impact on preschool children should be noted (Aguilar-Farias et al., 2021). The BDR policy is suspected to make children get limited stimulation from the teacher. The method of implementing online BDR is distance learning in a network by gadgets or laptops through several portals and online learning applications. When offline BDR is distance learning outside the network using television, radio, self-study modules, worksheets, printed teaching materials, teaching aids, and learning media from various objects around the environment. Stimulation of partnership should be built between parents, community, and teachers. Research shows that 40% of preschool children in kindergarten are vulnerable to social develop-

ment problems (McDonald et al., 2018). The inhibition of aspects of preschool children's social development must be considered because it is a vital predictor of school readiness and subsequent success (Biermann et al., 2020; Mayar, 2013). The delay in aspects of social development of preschool children harms behavior when entering school age which is indicated by poor social function abilities and academic difficulties, and also affects language delay disorders. Thus requires appropriate intervention through family support and the surrounding environment (Mayar, 2013; McDonald et al., 2018).

Based on the description above, the researcher intends to know the implementation of BDR as a determinant of social development problems for preschoolers (5-6 years), which need to be anticipated as early as possible through early detection of social development using the Denver Development Screening Test (DDST) II. This research is expected to identify and anticipate the phenomenon of child development problems that are suspected to occur in the future so that prevention and solutions can be carried out earlier.

Method

This study used observational analysis with a cross-sectional design. The type of data collected in this study is primary data directly taken or obtained from respondents by using a questionnaire. The sampling technique used consecutive sampling in several areas in Central Java Province. Namely Semarang City, Kendal, Grobogan, and Blora Regency. In consecutive sampling, subjects who met the criteria were included in the study to meet the minimum sample size. The criteria are parents who have preschool children (5-6 years). Determination of sample size using the formula based on identical research on child development, with a P1 value of 0.66 and a P2 value of 0.38. The sample size obtained in this study amounted to 113 respondents. The data collection instrument in this study was a structured questionnaire for the variables of BDR implementation and questions on the Denver Development Screening Test (DDST) II questionnaire for the variables of children's social development. DDST II was developed as an assessment tool

widely used as a screening test for delays in four developmental aspects. Namely social, fine motor skills, gross motor skills, and language. The examination produced by Denver II is not a substitute for a diagnostic evaluation but is more about comparing a child's developmental abilities with other children of the same age. Denver II is used to detect children at risk of developmental disorders and assess their age-appropriate developmental level for signs of developmental delays and healthy children (Ga & Kwon, 2011; Shahshahani et al., 2011; Srinithiwat & Ularntinon, 2014). Data analysis in this study is non-parametric. It uses the chi-square test to see the relationship between two categorical variables. The significance level in the study was 95%, which was accompanied by the calculation of the Prevalence Rate (PR) 95% CI value to assess the magnitude of the influence of the determinant on the incidence of children's social development. This research has complied with the ethical principles of the Health Research Ethics Commission (KEPK) Semarang State University, number 118/KEPK/EC/2021.

Result and Discussion

The respondents of this study were 113 children aged 5-6 years who live in Semarang City, Blora Regency, Kendal Regency, and Grobogan Regency. The statistical test results are presented in bivariable and multivariable analysis. The variables of interest include the implementation of BDR, the Mother's Education, the Child's Gender, and the Child's Nutritional Status. The results of the bivariable analysis with a categorical scale showed that maternal education and gender were not related to the social development of children, with p-values of 0.071 (> 0.05) and 0.812 (> 0.05). However, the p-value of the BDR implementation variable is 0.012 (< 0.05), and the p-value of the child's nutritional status variable is 0.044 (< 0.05). So there is a relationship between the implementation of BDR and the social development of children. And between the nutritional status and the child's social development. BDR related to children's social development shows that during the implementation of BDR, parents have not been able to build positive, responsible

relationships with children, so the children are disturbed emotionally and socially. This condition is in line with research in India that social and emotional learning between children and parents requires a sense of understanding and can manage emotions, with the hope that it will have a positive impact that is full of empathy and responsibility (Nagaraj & Rajaraman, 2021). Parents who can control emotions affect interactions in children's cognitive, motor, and

language development (Thomasgard & Metz, 2004). The nutritional status of children related to social development can be interpreted as an indirect impact of changes in the main sectors in the family economy, income, food system, and care services which are indirectly related to access and fulfillment of nutritious food, access to clean water, and sanitation (Ntambara & Chu, 2021).

Table 1. Characteristics of Research Respondents

Variables	Suspects		Normal		Total		P-value	PR (CI 95%)
	n	%	n	%	n	%		
Implementation of BDR								
- Online	54	93,1	43	78,2	97	85,8	0,012	1,639 (1,16-2,31)
- Offline	4	6,9	12	21,8	16	14,2		
Mother's Education								
- Low	51	87,9	40	72,7	91	80,5	0,071	1,761 (0,93-3,3)
- High	7	12,1	15	27,3	22	19,5		
Gender								
- Male	35	60,3	31	56,4	66	58,4	0,812	1,084 (0,75-1,57)
- Female	23	39,7	24	43,6	47	41,6		
Child's Nutritional Status								
- Abnormal	28	48,3	13	23,6	41	36,3	0,045	2,227 (1,93-5,3)
- Normal	30	51,7	42	76,4	72	63,7		
Total	58	51,3	55	48,7	113	100		

Source: Primary Data, 2021

Multivariable analysis in this study was performed using a logistic regression test. Variables included in the multivariable analysis are those with a p-value <0.25 in the bivariable analysis. Those having a p-value <0.25 include the implementation of BDR, Child Nutrition Status, and Mother's Education. The results showed that the BDR implementation variable was not related to the social development of

children, with a p-value of 0.052 (> 0.05). Meanwhile, the nutritional status variable remained related to the social development of children after considering other variables, with a p-value of 0.017 (<0.05). The mother's education variable is related to the child's social development after considering other variables, with a p-value of 0.044 (<0.05).

Table 2. Multivariable Analysis Results between BDR Implementation With social development

Variables	B	Wald	P value	PR (CI 95%)
Implementation of BDR	1,243	3,791	0,052	3,4 (0,992 – 12,110)
Child's Nutritional Status	1,018	5,678	0,017	2,77 (1,198 – 6,393)
Mother's Education	1,068	4,046	0,044	2,9 (1,028 – 8,235)

Source: Primary Data, 2021

The results obtained from the bivariable analysis showed that the implementation of BDR was related to the social development of children 5-6 years old with a p-value of 0.012 (<0.05). Children who carry out online BDR have a risk of 1.63 times experiencing suspected social development compared to children who

have offline BDR. The implementation of online BDR will increase the duration of screen time (time spent watching screens) more than the international recommendation limit, where preschoolers are only allowed to watch screens and spend no more than 1 hour per day accompanied by parental supervision. Children

who watch screens for 2-3 hours per day are more likely to experience behavioral problems, developmental delays, and low vocabulary mastery. Especially if not accompanied by their parents. (John et al., 2021; McArthur et al., 2021).

The pandemic has transformed preschool learning programs and family life into a more challenging learning experience for children. These changes have significant consequences for children's learning and development (Barnett & Jung, 2021). The BDR policy resulted in a significant loss of important school learning opportunities for children (Barnett & Jung, 2021; Blanuša Trošelj et al., 2020). Children's participation in preschool programs has fallen sharply. Social interaction between teachers and students also seems to have decreased (Blanuša Trošelj et al., 2020). The situation shows that the BDR implementation does not only depend on preschool teachers but requires parental support and commitment in assisting the child's learning process (Barnett & Jung, 2021). A partnership between parents and schools in education programs is needed. The partnership is a strategy for dealing with social and education-based health problems (Sim et al., 2021). Even though in its implementation, online BDR is riskier for child development problems, the two choices of online and offline BDR require the role of parents in the following: 1) agree on a way to communicate with the school, 2) discuss inclusive learning plans with teachers according to conditions, 3) Prepare learning tools, 4) Ensure that students are ready to take part in learning, 5) Setting up a time to support the online learning process, 6) Encourage children to be active during the learning process, 7) Parents/guardians ensure that children fill out activity sheets as material for daily learning monitoring, 8) Collect photos of activity sheets and assignments every day, 9) Actively discuss with teachers regarding the challenges and obstacles faced, 10) during the online learning process, and 11) Ensure comfortable learning places and facilities. The results are in line with a similar study in Canada which stated that children who did not participate in informal play groups showed more tendencies to delay in socio-emotional competence than children who attended infor-

mal play groups (McDonald et al., 2018).

In addition to the BDR implementation, nutritional status is an aspect related to children's social development based on bivariable analysis with a p-value of 0.045 (<0.05). Children with abnormal nutrition status have a 2.22 times greater risk of experiencing suspected social development than children with normal nutritional status. Abnormal nutritional status is indicated by the measurement results in undernutrition or overnutrition. Food consumption patterns of preschoolers that do not meet their macro or micronutrient needs will affect their nutritional status. The existence of external factors in ensuring the consumption of diverse food sources to improve nutritional status, one of which is influenced by the mother's education and care (Modjadji et al., 2020). The problem of inappropriate sources of food in a pandemic situation has also occurred in the UK, where parents report that their children eat more snacks when less activity and screen time increases (Clarke et al., 2021).

Mothers as parents have a vital role in the development of children. Mothers must understand how to do early detection in children. The mother's educational history will determine how the pattern of parenting given. The comparison the percentage of respondents who experienced suspected social development from mothers with low education was 87.9%, while those from mothers with higher education were 12.1%. It shows a significant difference in the number of children who develop suspicion from mothers with low education compared to children from mothers with high education. In line with research in Chile, children of uneducated mothers are thought to be exposed to harsh forms of parenting associated with the cognitive and social-emotional development of early childhood in Chile. The firmer the parenting pattern, the stronger the association with child development problems, especially at the age of 5 years. Children's exposure to parental aggression at home is associated with less verbal skills and more behavioral problems (Berthelon et al., 2020).

Especially in the situation of implementing learning policies during the pandemic. When parents have a big challenge in assisting the implementation of BDR, resulting in

mental pressure on mothers. Parenting patterns of depressed mothers can also affect children's social-emotional development, as research conducted in Canada on children <5 years (McDonald et al., 2018). By looking at the results of the multivariable analysis after considering the variables of maternal education and the implementation of BDR, it is not surprising that children with abnormal nutritional status have a 2.77 times greater risk of experiencing suspected social development compared to children with normal nutritional status. And children of mothers with low education have an increased risk of up to 2.9 times higher experiencing suspect social development compared to children of mothers with higher education. Mothers as parents have a vital role in the development of children. The mother's educational history will determine how the parenting will be. This condition must be considered through several programs to address parenting problems and nutritional needs that are not being met properly (DiGirolamo et al., 2020).

Developmental problems in children can be reduced by early detection and intervention through periodic screening for developmental delays during preschool age (Wijedasa, 2012). Countermeasures needed in tackling the problem of child development after the BDR implementation is through early detection of suspect development of all aspects in early childhood. The implementation of a comprehensive BDR policy in the territory of Indonesia certainly requires thorough detection as well. The involvement of health influencers is very much needed starting from the basic line of the community accompanied by health-trained cadres (health volunteers). Trained health volunteers have been shown to increase the detection rate of children with delayed child development (Fauzi et al., 2018). If the detection can be earlier, then the treatment can be done earlier, considering that developmental delays at an early age will be difficult to pursue at a later age level (Anggorowati et al., 2021).

Conclusion

Based on the analysis of the results and discussion, online BDR is a determinant of social development problems aged 5-6 years.

The community and the government need to anticipate the expected impacts through a series of countermeasures. Early detection of child development problems must be carried out by the government by involving trained people in the health sector. Parents must be fully involved in assisting the implementation of online BDR. Screen time management needs to be implemented by parents so that the duration of screen exposure does not exceed safety standards that can affect children's health.

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Receiving COVID-19 Messages on Social Media to the People of Semarang City

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Abstract

During the COVID-19 pandemic, social media has become one of the ways to convey information quickly with internet technology. Of the many uses of social media in obtaining information about COVID-19. Of course, not all are accurate. There are many hoaxes or fake news, while on the other hand, the news happened according to the facts. Confirmed cases found in Semarang City were 88,014 cases with a death toll of 4,460 people. This study aims to find out how to receive information about COVID-19 on social media in the community of Semarang City. This study uses an analytic observational study with a cross-sectional design conducted in June-July 2021. The research sample is Semarang residents who have social media with an age range of 15-65 years. The results showed that 68% of respondents believed in information related to COVID-19 on social media. 80% can distinguish hoaxes from true information related to COVID-19 from social media. 71% of respondents confirmed the truth of the news obtained about COVID-19 from Social media. Some respondents believe in the information on social media WhatsApp, Instagram, Facebook, Youtube, Twitter, and Telegram. So growing digital literacy skills are expected to help the government overcome the issue of corona hoaxes and vaccines that are still emerging. The improved critical way of thinking is expected to be the countermeasure.

Introduction

Social media has become one of the ways to convey information quickly with internet technology. The use of social media has been shown to increase significantly in the case of natural disasters and crises (Gottlieb & Dyer, 2020). This rapid deployment overcomes traditional media barriers to stakeholders, including communities, healthcare systems, and healthcare providers (HCPs) to assist in making important decisions. Formal websites, scientific journals, and e-mail have infirmity, which is slow communication to share knowledge quickly. As a result, social media channels are becoming the most common source about COVID-19 for scientists and the public (Gupta et al., 2020).

One of the news discussed by the public was the COVID-19 pandemic hitting the world, including Indonesia. The National Disaster Management Agency (BNPB) reported that

the total cases of COVID-19, as of October 5, 2021, reached 4,221,610 confirmed people, and 142,338 people died (Gugus Tugas COVID-19, 2021). Central Java was a province that ranks third at the national level, with a total of 482,444 confirmed cases (Provinsi JawaTengah, 2021). The city of Semarang was in first place, with the largest in Central Java Province. According to the Semarang City Health Office, confirmed cases found in Semarang City until October 5, 2021, amounted to 88,014 cases with a death toll of 4,460 people (Semarang, 2020).

Social media can also be a threat in responding to the COVID-19 pandemic. Easy access brings inaccuracies and conspiracies. They can be repeated and propagated through social media. There is no way to prevent the spread of the global COVID-19 pandemic, but verified information is the most effective prevention against public panic and misinformation (Lancet, 2020). Since the onset

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of the pandemic, a large amount of information about viruses, diseases, risks of infection, and precautions, produced and disseminated. Not only is the need for information increasing, but also the availability of the information itself. Lack of knowledge about this new virus, threats to health, and other areas of society (e.g., the economy) result in many pieces of information constantly changing and sometimes contradictory (Zarocostas, 2020). Kouzy et al. investigated the extent to which unverifiable misinformation or information about the COVID-19 pandemic spread on Twitter by analyzing 673 English-language tweets. The results show that misinformation accounts for 24.8% (153 of 617) of all serious tweets (i.e., not humor-related posts) (Kouzy et al., 2020). As a result, the particular challenge of distinguishing reliable health information from misinformation and misinformation, which can be defined as “written material that is false, unreliable, or not scientifically validated regardless of its intentional authorship” has increased considerably. (Shams et al., 2021).

Based on research conducted by Song et al., the level of individual trust in Health Information shared on social media is: 51.5% of Americans, 76.9% of Koreans, and 81.4% of Hong Kong residents reported using SNS for health information, while 66.2% American, 94.6% Korean (Song et al., 2016). The COVID-19 infodemic is full of claims of fake news, conspiracy theories, and pseudoscientific therapies, regarding the diagnosis, treatment, prevention, origin, and spread of the virus. Fake news spread on social media can endanger public health (Naeem et al., 2021). In this case, social media has great potential to influence public opinion and perception. Finally, perhaps the worst impact of social media is its potential to spread misinformation, worry, and overblown, which can cause fear, stress, depression, and anxiety in people with or without an underlying psychiatric illness (González-Padilla & Tortolero-Blanco, 2020). The purpose of this study is to find out how to receive information on COVID-19 on social media in the community in Semarang City so that stakeholders involved in dealing with COVID-19 must provide clear and easy-to-understand information for the public.

Method

This study used an analytical observational study with a cross-sectional design. The research took place in Semarang City, which was the most COVID-19 sufferers in Central Java. Based on a survey conducted by Marketeers, Semarang City residents have a percentage of 32.49% accessing the internet every day, and their involvement in social media is 50.14%. This research took time in June-July 2021. The population in this study was all residents of the city of Semarang. The research sample was Semarang residents who have social media with an age range of 15-65 years. The sample calculation used the minimum sample formula for quantitative research, namely the Taro Yamane formula because the population is known. So with this calculation, a sample of 100 people is obtained.

The sampling method is accidental sampling by removing respondents who are not actively using social media as an exclusion criterion. Data collection was carried out by direct interviews, while still adhering to health protocols, to respondents using a questionnaire. The instrument used is a questionnaire that has been tested and is valid and reliable, with a value of 0.789. The questionnaire contains open and closed questions that are used to obtain information related to sociodemography, respondents' activities in using social media, COVID-19 information accessed by respondents, respondents' acceptance of messages related to COVID-19, respondent's level of trust in COVID-19 information on social media.

Respondent's activities in using social media include when accessing social media, duration of reading messages related to COVID-19 on social media, types of social media owned, and types of social media that are often used. Information on COVID-19 accessed and the social media most preferred by respondents. Respondent's acceptance of COVID-19 information on social media was assessed using eight closed-ended questions. Each question has several answer options consisting of yes and no answers. The answer yes is given a value of 1, while not given a value of 0. In this study the acceptance of messages assessed included the activity of respondents

in seeking information, respondents could understand information, respondents paid attention to information, respondents trusted information, respondents were able to distinguish hoax news correctly, respondents confirmed the truth information, respondents are motivated to follow information related to COVID-19 on social media.

The level of trust of respondents by giving closed questions to respondents. Each question has five answer options consisting of very sure, sure, less sure, not sure, and very unsure. Very sure answers were given a score of 4, sure were given a score of 3, less sure were given a score of 2, unsure were given a score of 1, and very unsure were given a score of 0. In this study, the level of confidence assessed included the level of trust in the types of social media such as WhatsApp, Instagram, Facebook, Twitter, Youtube, and Telegram. The data then goes through the coding process, recapitulation, tabulation, and statistical analysis. Statistical analysis used is univariate and bivariate analysis, with the help of the SPSS Version 24 application program. Univariate analysis displays the frequency distribution in tabulated form. Each presentation on the question is categorized according to Koentjaningrat (2008) into; none (0%), some (1-25%), almost half (26-49%), half (50%), more than half (51-75%), almost all (76-99%), and entirely (100%).

Result and Discussion

Based on Table 1, the characteristics of respondents in this study include age, gender, marital status, education level, and occupation. The respondents' age in this study ranged from 15-65 years. The results showed that half of the respondents were 50 (50%) aged 26-35. Of the 100 respondents studied, more than half namely 63 people (63%), were female. Almost half of the respondents 46 people (46%), have a Bachelor's degree, while a small proportion of respondents have a junior high school education, as many as two people (2%). Most of the respondents' jobs are as private employees, namely 23 people (23%).

Table.1 Respondents Characteristic

Characteristic	Frequency	%
Age		
15-25 years	36	36
26-35 years	50	50
36-45 years	12	12
46-65 years	2	2
Gender		
Female	63	63
Male	37	37
Education Level		
Junior High	2	2
Senior High	19	19
Diploma	10	10
Graduate	46	46
Post Graduate	23	23
Occupation		
Not yet/ Unemployment	20	20
Private Worker	23	23
Entrepreneur	7	7
State Worker	19	19
Teacher/Lecturer	16	16
Freelance	4	4
Others	11	11

Source: Primary Data, 2021

The results of this study are per the characteristics of a survey conducted by the Association of Indonesian Internet Service Providers (APJII) in 2018. The highest number of internet users in the 15-19 year age range reached 91%, 20-24 years old at 88.5%, 25-24 years old at 82.7%, and age 30-34 years by 76.5% (APJII, 2019). It is in line with the age of the majority of respondents in this study, namely in the age range of 15-25 years and 26-35 years. The age difference is a significant predictor of a person's acceptance of health.

Based on Table 2, the activities of respondents in using social media in this study are more than half (52%) of respondents access social media for 4-6 hours per day, where as many as 18 people (48.6%) are male respondents while 34 people (54%) female respondents. The duration of respondents in reading information about COVID-19 on social media was at most < 10 minutes, namely 37 people (37%), while

respondents who read information about COVID-19 for > 1 hour were 11 people (11%). There are various types of social media owned by respondents, all respondents have WhatsApp application accounts, 96% Instagram, 69% Facebook, 69% Youtube, 58% Telegram, and 44% Twitter, while the applications that respondents have the least are Tik Tok and Line respectively. -by 1% each. The most frequently used social media by respondents is WhatsApp at 98%, while the least used by respondents are Line and Tik Tok each at 1%.

Table. 2 Respondents' Activities in Using Social Media

No	Respondents' Activities in Socmed	Frequency	%
1	Time to access socmed per day		
	< 3 hours	30	30
	4-6 hours	52	52
	7-12 hours	12	12
	13-16 hours	5	5
2	Duration of reading Covid messages		
	<10 minutes	37	37
	10-15 minutes	35	35
	15-30 minutes	9	9
	30 minutes -1 hour	8	8
	>1 hour	11	11
3	Owned Social Media		
	WhatsApp	100	100
	Instagram	96	96
	Facebook	69	69
	Youtube	69	69
	Telegram	58	58
	Twitter	44	44
	Tik tok	1	1
	Line	1	1
4	Frequently used social media		
	WhatsApp	98	98
	Instagram	80	80
	Facebook	38	38
	Youtube	42	42
	Telegram	19	19
	Twitter	26	26
	Tik tok	1	1
	Line	1	1

Source: Primary Data, 2021

Gender differences in respondents

make different activities in using social media. Women (54%) spend more time accessing social media for 4-6 hours per day compared to men. Women access Instagram more often, as much as 46%, compared to 24.3% of men who access Whatsapp. The respondents in this study are mostly female. In a study by Gani et al., women tend to have slightly higher levels of specific health literacy about corona than men (62.9% vs. 57.6%) (De Gani et al., 2022).

Table.3 Respondents accessed COVID-19 information on social media

COVID Information	Frequency	%
Types of Information often accessed on social media		
Poster of Leaflet	57	57
Health Information Video	70	70
Broadcasted Messages	36	36
Twitter thread	14	14
Most popular social media		
WhatsApp	17	17
Instagram	43	43
Facebook	8	8
Youtube	19	19
Twitter	13	13

Source: Primary Data, 2021

Based on Table.3 Information on COVID-19 accessed by Respondents on Social Media, more than half of respondents (70%) most frequently access videos or health information on social media. The results of another study showed that analysis of TikTok videos revealed a similar distribution of videos related to the pandemic that could encourage/inhibit COVID-19 immunization (Basch et al., 2021), and similar results were obtained for YouTube (Hernández-García et al., 2021). The most preferred social media by respondents in accessing information about COVID-19 in this study is Instagram at 43%, where the proportion of women who access Instagram is 46% more than men at 40%.

Based on Bloom's Taxonomy, educational objectives are divided into three important domains, including the Cognitive Domain, Affective Domain, and Psychomotor Domain. Based on this division, Bloom and Krathwol classify acceptance (Receiving/Attending) into the category of Affective Domain. The

definition of acceptance itself is the willingness to be aware of a phenomenon in its environment which includes passively accepting problems, situations, symptoms, values, and beliefs.

Acceptance can also be interpreted as sensitivity in receiving stimuli or simulations from outside. (Bloom, 1956) This study uses an instrument in the form of a questionnaire with eight kinds of

Table. 4 Acceptance of Respondents on Messages related to COVID-19

Questions	Yes	%	No	%
Do you get any information regarding COVID-19 from social media?	92	92	8	8
Are you actively looking for information related to COVID-19 on social media?	66	66	34	34
Are you able to understand information related to COVID-19 on social media?	87	87	13	13
Are you paying attention to information related to COVID-19 on social media?	89	89	11	11
Do you trust information regarding COVID-19 on social media?	68	68	32	32
Can you distinguish Hoax news from true news regarding COVID-19 from social media?	80	80	20	20
Do you confirm the truth of the news you get about COVID-19 from Social media?	71	71	29	29
Can you be motivated to follow COVID-19 related information on social media?	60	60	20	20

Source: Primary Data, 2021

Acceptance of Respondents in Receiving Messages related to COVID-19 is to ask about what respondents have obtained and done regarding information about COVID-19 from social media. More than half of respondents (66%) actively seek COVID-19 information on social media. Almost all respondents (87%) can understand information about COVID-19 read on social media. Nearly all respondents (89%) pay attention to COVID-19 information on social media. More than half (68%) of respondents trust COVID-19 information on social media. Most respondents (80%) can distinguish hoaxes from true news related to COVID-19 from social media. More than half (71%) of respondents confirmed the truth of the news obtained about COVID-19 from Social media. More than half (60%) are motivated to follow information related to COVID-19 on social media.

Online social media tracking program TalkWalker TM (New York City, NY, USA) reports that COVID-19 information was referenced on social media 40.2 million times from May 12, 2020, to May 18, 2020, resulting in a decreased signal-to-noise ratio which could

cause people to it becomes difficult to identify related factual information (Gottlieb & Dyer, 2020). Hoax news is undeniably the cause of many people who still ignore the importance of preventing COVID-19. Two important things that are considered capable of making a person ward off and anticipate coronavirus hoaxes are cognitive and critical. Knowledge must be translated into actionable behavior change messages, presented in a way that is understood by and accessible to all individuals in all sections of all societies. (Tangcharoensathien et al., 2020).

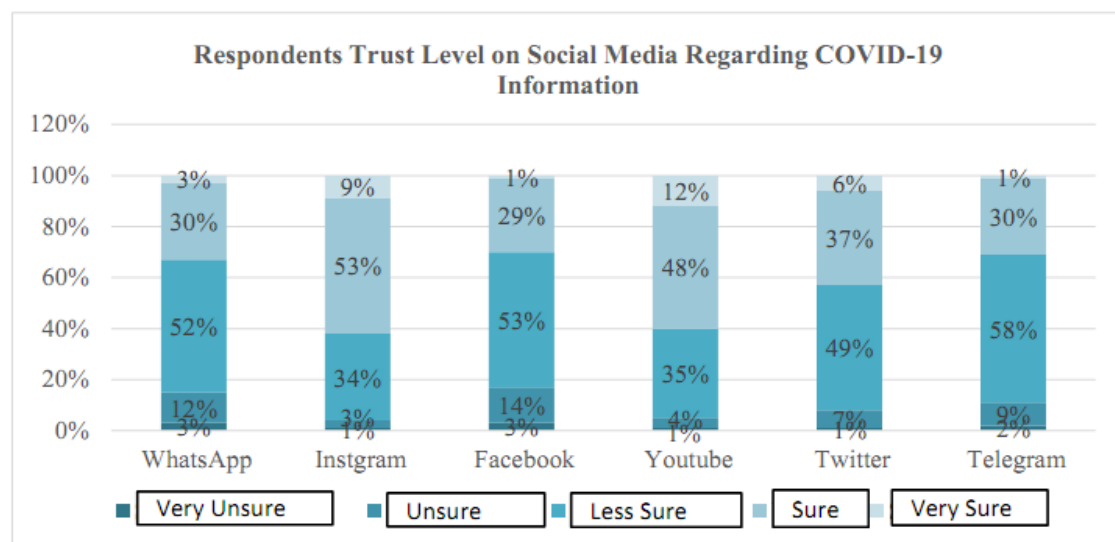
In this study, respondents have expanded their thinking horizons by actively seeking information about COVID-19 and activating critical thinking power by confirming hoax news obtained on social media by searching for COVID-19 information on official government websites, accompanied by seeking references from trusted sources. In connection with this and the increasing importance of health information on online media, it should be remembered that accessing valid and reliable health information on the internet is a big challenge, especially for people with low health

literacy (Lachlan et al., 2021). Previous research has shown that people with lower health literacy are less likely to trust health professionals (Peterson et al., 2020).

Governments should reach out to key communities to ensure their concerns and information needs are understood, tailoring suggestions and messages to address the audience they represent (Tangcharoensathien et al., 2020). The government, through the Ministry of Health, has made efforts to overcome content containing hoax news about the COVID-19 vaccine during the pandemic. Another effort was made by the COVID-19 Task Force through the covid.19.go.id page to launch a confirmation service for news related to COVID-19 by adding the “Hoax Buster” column on the website.

An illustration of the respondents’

level of trust in social media regarding COVID-19 information, more than half (52%) of respondents are less sure of COVID-19 information circulating on the WhatsApp application. More than half (53%) of respondents believe in COVID-19 information circulating on the Instagram application. More than half (53%) of respondents are less sure of the COVID-19 information circulating on the Facebook application. Almost half (48%) of respondents believe in the COVID-19 information circulating on the Youtube application. Nearly half (49%) of respondents are less sure of the COVID-19 information circulating on the Twitter application. More than half (58%) of respondents are less sure of the COVID-19 information circulating on the Telegram application.



Graphic. 1 Respondents Trust Level on Social Media Regarding COVID-19 Information

In the context of the COVID-19 pandemic, health information-seeking behavior also plays an important role. In general, it describes the active and directed behavior carried out by an individual to find information about health problems (Zimmerman & Shaw, 2020). Along with the sources of information used, trust in these different sources and their consequences must also be considered. When information is inconsistent, trust tends to decrease. (Ipsen et al., 2020). Some respondents believe in information on social media, 30% believe in WhatsApp, 53% believe in Instagram, 29% believe in Facebook, 48% in Youtube, 37%

on Twitter, and 30% in Telegram. In general, the highest level of trust is on Youtube, which is 48%. Female respondents have a higher trust level in COVID-19 information on Youtube, which is 54% compared to men. Social media can allow celebrities and virtual influencers (both medical and non-medical) to have a significant influence on the spread of information due to the number of their followers, regardless of the accuracy of their information. It can lead to the rapid spread of misinformation and significant potential harm. One study found that doctors were unable to reliably assess the quality of online resources using their gestalt (Thoma et

al., 2017).

A previous study found that people with lower health literacy were more likely to distrust information from specialists and dentists and report more negative perceptions of their healthcare experience. They are also more likely to choose health information from social media, blogs, or celebrity web pages (Chen et al., 2016). Most of the respondents in this study were unsure about the COVID-19 information on social media because the information disseminated through social media was hoax information, the source was unclear, and the news was inaccurate. They also look for the truth of the information through the internet (search engines) and ask directly to reliable sources. It is due to their experience. Namely that much of the information they receive is doubtful. Therefore, health literacy can help people to access, navigate and understand information about COVID-19, distinguish between reliable and misinformation, and empower people to make health decisions based on that information (Okan et al., 2020).

Conclusion

Based on the results of research carried out, most of the respondents actively seek information about COVID-19 on social media. They can distinguish hoax news from true news on social media by confirming hoax news obtained on social media by seeking information on official websites from the government, along with looking for references from reliable sources. Most of the respondents are less sure about COVID-19 information on social media. It is because the information disseminated through social media is hoax information, the source is unclear, and the news is inaccurate.

So it is hoped that social media can build a positive image in dealing with COVID-19 information through more constructive reports in disseminating information on COVID-19 prevention. The Semarang City Government is expected to be able to utilize and develop accurate and comprehensive information facilities to meet the information needs of the local community, as well as provide education to the public not to easily believe in hoax news related to COVID-19. For social media users,

you should not easily believe or even spread information obtained on social media without knowing the truth. For the public, it is better not to be immediately provoked by information in any media because it could be information that can affect trust in someone.

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To Love Yourself: Psychological Approach to Predict Healthy Lifestyle Behaviour in Adolescents

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Abstract

Adolescents were susceptible to problems and negativity during the pandemic times. There was an increase in adolescents' consumption of unhealthy foods by 36%, an increase in body weight by 48%, and a decrease in physical activity and exercise by 43% globally. To function optimally in this situation, adolescents needed to do healthy lifestyle behaviour. Adolescents tended to do this when they could love themselves, which was carried out by applying self-compassion and participating in activities that benefit health. This study was conducted in 2021 and aimed to determine the relationship between self-compassion and adolescent participation in healthy lifestyle behaviour. This study used a cross-sectional design. The population was adolescents in Kediri, aged 15-19. The sample was obtained by cluster sampling, totaling 111 respondents. Independent variables were self-compassion and adolescent participation. The dependent variable was healthy lifestyle behaviour. Data were collected by questionnaires and analyzed by regression. Results showed that variables related to healthy lifestyle behaviour were self-compassion and adolescent participation ($p < 0.001$). There was a significant relationship between self-compassion ($p = 0.02$) and participation ($p < 0.001$) with healthy lifestyle behaviour. Self-compassion and participation were predictors of healthy lifestyle behaviour, simultaneously and individually. Based on the results, adolescents needed to increase their understanding and practice of self-love in performing healthy lifestyle behaviour.

Introduction

During the current pandemic due to coronavirus disease, health is an important issue that is the focus of various levels of society in several countries in the world, including Indonesia (Atmadja et al., 2020). The pandemic has been going on since March 2020 in Indonesia and has caused disruptions in the health sector (Singh et al., 2020). Being healthy is the goal of the majority of each person so that they can continue to perform their life functions optimally in this situation. Various efforts to improve, maintain, and improve health status are carried out by elements of society in many sectors and with various approaches. The health promotion sector has an important role in health efforts, especially

promotive and preventive health efforts. One of the efforts in the health promotion sector can be studied using various approaches, including a psychological (Taylor, 2018).

Various health-related challenges and changes during the pandemic among groups of people, including the youth (Oral and Cetinkaya, 2020; Phillipou et al., 2020). Adolescents are a group that is vulnerable to experiencing difficult conditions and health-related negativity in these conditions (Zvolensky et al., 2020). Adolescents are becoming increasingly vulnerable to health problems because, at this age, they are searching for self-identity and experiencing several conditions of self-instability and various conflicts related to their developmental tasks (Taylor, 2018). The current global situation also

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triggers teenagers to become digital natives, who are exposed to several unhealthy lifestyle behaviors, especially during the pandemic, for example carrying out excessive passive behavior (sedentary behavior), which harms adolescent health (Park et al., 2020). However, even though adolescents are vulnerable and experience several health-related problems and disorders, they need to survive in these negative situations to maintain or improve their health status during this pandemic.

As a form of adolescent efforts to maintain and protect their health, adolescents need to apply healthy lifestyle behaviors in their daily lives (Kirkgulthorn et al., 2021). Healthy lifestyle behaviors are behaviors displayed by individuals to improve or protect their health by regulating their behavior related to health promotion and disease prevention (Park, 2020). In implementing healthy lifestyle behaviors in everyday life during a pandemic, adolescents can experience several difficulties and challenges. In this condition, adolescents can experience failure in implementing healthy lifestyle behaviors. It is stated by research on unhealthy lifestyle behaviors carried out by adolescents, namely an increase in appetite by 34%, an increase in consumption of unhealthy foods by 36%, an increase in body weight by 48%, and a decrease in physical activity and exercise by 43% (Robertson et al., 2021).

To make health efforts, in this case, implementing healthy lifestyle behaviors in their daily lives, adolescents need to love themselves first (Holden, Rollins and Gonzalez, 2020). Adolescents who have self-compassion or the ability to love and love themselves tend to seek positive things for their good, including in terms of health. Adolescents who love themselves tend to have the initiative and are proactive in carrying out behaviors that bring positive benefits to themselves and their health, namely healthy lifestyle behaviors (Reyes-Olavarría et al., 2020). Adolescents who can perform healthy lifestyle behaviors in everyday life are predicted and facilitated by several things. In this study, it is assumed that self-compassion (Mantzios and Egan, 2017; Horan and Taylor, 2018) and participation in youth group activities related to health (Pyas and Satlita, 2017).

Self-compassion is a tendency to care for, care for, and accept oneself, and not to judge and criticize oneself too harshly regarding one's shortcomings and weaknesses in the face of a life experience (Elices et al., 2017; Khumas et al., 2019). Self-compassion is also a positive or healthy attitude that individuals do toward themselves, which is useful for maintaining their health (Sugianto, Sutanto and Suwartono, 2020). Self-compassion plays a role in facilitating and helping adolescents in seeking goodness in terms of health and healthy living behavior in themselves (Gedik, 2019). In addition to self-compassion, in this study, it is assumed that the participation of adolescents in a group of health-related activities can facilitate adolescents in implementing healthy lifestyle behaviors in everyday life. The youth activity group related to health is a forum for seeking protection and resilience for adolescent health, carried out in promotive and preventive efforts (Pyas and Satlita, 2017; BKKBN, 2020). One of the state institutions that facilitates group activities for youth in terms of health is the National Population and Family Planning Agency (BKKBN) (BKKBN, 2020). Through the Generation Planning (GenRe) program, BKKBN facilitates youth resilience in various regions with youth activity groups, namely the Youth Family Development group (BKR) and the Youth Information and Counseling Center (PIK-R) (Pyas and Satlita, 2017). The youth activity group aims to seek the health status of adolescents through various promotive and preventive efforts, namely by facilitating and assisting adolescents through the provision of support, education, motivation, coaching, communication, socialization, and skills training related to the application of healthy lifestyle behaviors in adolescents (Astuti, 2020).

Several previous studies have similar topics to this study (Alzahrani et al., 2019). But this research is vital because it uses a new and different approach to some of these studies. This study focuses on healthy lifestyle behavior from a psychological point of view. Namely personal psychological factors for adolescents. While in other previous studies, healthy lifestyle behavior was studied with a physical health-based approach or based on the social environment in adolescents. This study aims

to predict the factors associated with healthy lifestyle behavior carried out by adolescents, both simultaneously and individually, and to determine the contribution of these factors to the application of healthy lifestyle behavior in adolescents. Through this research, a comprehensive understanding and study can be obtained regarding healthy lifestyle behavior in adolescents by a different approach, namely a psychological approach.

Method

This research is a descriptive-analytic study conducted with a cross-sectional design. The research population was 300 adolescents in Kediri aged 15-19 years. Determination of the research sample size of 111 respondents was carried out using the guideline for determining the number of samples developed by Isaac and Michael (Neff, 2020). Sampling used a double-stage cluster random sampling technique, which was carried out by dividing the research area, namely the City of Kediri, into three sub-districts and randomly selecting several sub-districts. The selected sub-districts were divided into villages, and several villages were randomly selected. Respondents were then selected from each selected village according to the research sample size, namely 111 respondents. This study aims to determine the relationship between self-compassion and adolescent participation in healthy lifestyle behaviors simultaneously and individually. The independent variables were self-compassion and youth participation in youth activity groups. The dependent variable of the study is the behavior of a healthy lifestyle.

The instrument used in this research is a questionnaire. Resilience was measured using a questionnaire adopted from the questionnaire in Hedo and Simarmata's research (Hedo and Simarmata, 2021), with the validity of the item scale moving from 0.25 to 0.67, while the reliability was 0.82. Self-compassion is measured using a questionnaire adopted from

the questionnaire in the research of Sugianto, Suwartono, and Sutanto (Sugianto, Suwartono and Sutanto, 2020) with the validity of the item scale moving from 0.26 to 0.60, while the reliability is 0.87. Youth participation in youth activity groups was identified through a questionnaire about youth participation in youth activity groups, namely the Youth Family Development Group (BKR) and the Youth Counseling Information Center (PIK-R). Healthy lifestyle behavior was measured using a questionnaire adopted from the questionnaire in Damayanti, Dino, and Donnelly's research (Damayanti, Dino and Donnelly, 2020).

Data were collected using research instruments in questionnaires distributed to research respondents from December 2021 to January 2022. Respondents filled out the questionnaires in accordance with research ethics related to the confidentiality of respondents' identities, not harming respondents, and the availability of respondents' consent forms. This research has been ethically approved by the ethics committee of the Faculty of Public Health, Indonesian Strada Institute of Health Sciences with Ethics Certificate number 2485/KEPK/VIII/2021. This study carried out several analyzes of the resulting data. Univariate analysis was conducted to describe the characteristics of research respondents. In addition, bivariate and multivariate analyzes were also carried out using regression at the significance level <0.05 to determine the relationship between the independent and the dependent variables, both individually and simultaneously.

Results and Discussions

Table 1 shows the analysis results related to the characteristics of the research respondents by age, gender, and education. In addition, it also includes information about the respondent's condition related to the state of self-compassion in him and his participation in youth activity groups.

Table 1. Respondents' Characteristics

Characteristics	N	Percentage
Age		
15	64	57.7%
16	11	9.9%
17	13	11.7%
18	12	10.8%
19	11	9.9%
Gender		
Male	49	44.1%
Female	62	55.9%
Education		
Junior High	64	57.7%
Senior High	36	32.4%
Graduate	11	9.9%
<i>Self-compassion</i>		
Low	29	26.1%
Medium	53	47.7%
High	29	26.1%
Participation in Youth Activity Groups		
Participate	50	45%
Does not Participate	61	55%
Healthy Life Style Behavior		
Low	12	10.8%
Medium	85	76.6%
High	14	12.6%

Source: Primary Data, 2021

Based on education, most research respondents were junior high school students, as many as 64 people (57.7%). Most research respondents were 15 years old, as many as 64 people (57.7%). Based on gender, most research respondents were female, as many as 62 people (55.9%). Most research respondents have self-

compassion in the moderate category, as many as 53 people (47.7%). The data also shows that 14 respondents (12.6%) have implemented a high level of healthy lifestyle behavior, and 61 respondents (55%) did not participate in the youth activity group..

Table 2. Cross Tabulation Result

	Healthy Life Style Behavior					
	Low		Medium		High	
	N	%	n	%	n	%
<i>Self-compassion</i>						
Low	9	31	20	69	0	0
Medium	3	6	43	81	7	13
High	0	0	22	76	7	24
Participation In Youth Activity Groups						
Participate	0	0	36	72	14	28
Does not Participate	12	20	49	80	0	0
Education						
Junior High	3	5	51	80	10	16
Senior High	6	17	26	72	4	11
Graduate	3	27	8	73	0	0
Age						
15	3	5	51	80	10	16
16	1	9	8	73	2	18
17	3	23	9	69	1	8
18	2	17	9	75	1	8
19	3	27	8	73	0	0
Gender						
Male	5	10	38	78	6	12
Female	7	11	47	76	8	13

Source: Primary Data, 2021

In table 2, there is an explanation that the majority of respondents have moderate self-compassion and perform healthy lifestyle behaviors, which are also in the medium category (81%). Most respondents with low self-compassion also perform healthy lifestyle behaviors in the moderate category (69%). But no respondents with low self-compassion who have healthy lifestyle behaviors in the high category (0%). Likewise, no respondents with high self-compassion have low healthy lifestyle behaviors (0%). The results described in table 2 show new results compared to Dunne et al., which revealed that individuals who have high self-compassion tend to adopt moderate to high health behaviors (Dunne, Sheffield and Chilcot, 2018). While the results of this study stated that individuals who have low self-compassion also apply moderate healthy lifestyle behaviors. Although, there are no individuals who have low self-compassion apply high healthy lifestyle behaviors.

The data in table 2 also states that the respondents who participated in the youth activity group performed healthy lifestyle behaviors in the medium (72%) and high (28%). No respondents who did not participate

in the group of activities for teenagers to carry out healthy lifestyle behaviors in the high category (0%). If viewed based on the education of the respondents, the majority of respondents who perform healthy lifestyle behaviors in the high category are respondents at the junior high school education level (16%). Meanwhile, respondents who do not perform high healthy lifestyle behaviors are those having a graduate education level (0%). When viewed by age, respondents who apply healthy lifestyle behaviors in the high category are respondents aged 15 years (16%). While respondents who did not perform high healthy lifestyle behaviors were aged 19 years (0%). In terms of gender, male and female respondents applied healthy lifestyle behaviors in the moderate category. The results described in table 2 show new results compared to Lawrence et al., which revealed that younger individuals were less likely to adopt healthy lifestyle behaviors than older individuals (Lawrence, Mollborn and Hummer, 2017). The results of this study stated that adolescents applying medium and high healthy lifestyle behaviors were younger (15 years) than other ages (16, 17, 18, and 19 years).

From the results of hypothesis testing in

this study, simultaneously there is a significant relationship between self-compassion and adolescent participation in group activities with healthy lifestyle behavior ($p < 0.001$). There is a significantly strong relationship between self-compassion and adolescents' participation in group activities. Simultaneously with healthy lifestyle behaviors of 69.2%. While the contribution of self-compassion and youth participation in group activities simultaneously on healthy lifestyle behavior is 47.8%, and the remaining 52.2% is influenced by other variables not examined in this study. Data analysis predicts healthy lifestyle behavior in adolescents can be based on self-compassion and youth participation in activity groups. Prediction through the regression equation is $Y = 113.271 + 0.207 (X1 \text{ self-compassion}) + 11.074 (X2 \text{ youth participation in activity groups})$. It means that if the variables of self-compassion and youth participation in group activities are considered constant, then the amount of healthy lifestyle behavior in adolescents is 113,271.

If viewed from a theoretical approach, the results of this study which show that self-compassion and adolescent participation in group activities simultaneously have a significant relationship with healthy lifestyle behavior can be explained in the following discussion. Self-compassion and youth participation in group activities can both work or process within adolescents by enabling adolescents to have positive attitudes and reduce negativity related to their health, in this context, namely healthy lifestyle behavior. Adolescents who have self-compassion in themselves and participate in a group of youth activities tend to have a protective-buffering effect that helps them implement healthy lifestyle behaviors both in normal situations or in difficult and problematic situations (Biber and Ellis, 2017). These adolescents also tend to be able to accept and respond to conditions related to their health in a calm and balanced manner and can realize and understand the efforts to maintain and improve their health by implementing healthy lifestyle behaviors in everyday life. (Taylor, 2018; Astuti et al., 2020).

Table 3 also shows that each variable of self-compassion and youth participation in

the activity group has a significant relationship with healthy lifestyle behavior ($p < 0.05$). From the resulting regression equation, predictions of healthy lifestyle behavior based on self-compassion can be made. Namely, every increase in the self-compassion variable by 1 unit will increase healthy lifestyle behavior in adolescents by 0.207. While predictions can be made on healthy lifestyle behavior based on adolescent participation in activity groups. A change in the participation status in youth activity groups from not participating (0) to participating (1) will produce a difference of 11,074 in teenagers' healthy lifestyle behavior.

If viewed from a theoretical approach, the results of this study which show that self-compassion has a significant relationship with healthy lifestyle behavior can be explained in the following discussion. Self-compassion in adolescents can bring up the experience of self-acceptance and self-warmth when addressing and displaying attitudes or behaviors in everyday life (Gill et al., 2018; Khumas et al., 2019). This self-acceptance and warmth facilitate adolescents to do something good or positive for themselves, which in the context of health is doing healthy lifestyle behaviors. Adolescents who have self-compassion in themselves are also less likely to behave harshly and judge themselves and the circumstances associated with them. These teenagers tend to be able to accept their failures and shortcomings as a life-learning process that is common to all humans (Cleare et al., 2018; Neff et al., 2020). Concerning healthy lifestyle behavior, adolescents who have self-compassion tend to be able to face failures or difficulties they experience related to the application of positive healthy lifestyle behaviors, namely calm and balance, and make this a learning process for their good (Elices et al., 2017; Konaszewski, Niesiołędzka and Surzykiewicz, 2021). Self-compassion can act as a buffer for adolescents in dealing with difficult situations related to the application of healthy lifestyle behaviors (Marsh, Chan and Macbeth, 2018). They become not focused only on their shortcomings or mistakes and blame themselves continuously, but can still treat themselves well. Adolescents who have self-compassion in themselves will also receive positive benefits in the form of healthy emotions in implementing

healthy lifestyle behaviors daily. So that they can help adolescents to start, maintain, or improve their healthy lifestyle behaviors (Taylor, 2018; Romero-Blanco et al., 2020). Self-compassion in adolescents also supports them to do good to themselves, enabling them to act proactively in making themselves healthy or maintaining and improving their health by engaging in healthy lifestyle behaviors (Dunne, Sheffield and Chilcot, 2018).

The results show that the adolescents' participation in the activity group has a significant relationship with healthy lifestyle behavior. It can be explained in the following discussion. Various groups of youth activities related to health have the primary goal of improving, maintaining, and developing the overall health status of adolescents (Astuti, 2020). Adolescents who participate in a health-related youth activity group receive several positive benefits that help and facilitate them in carrying out healthy lifestyle behaviors with the existence of several activities in the health-related youth activity group. It helps adolescents understand health issues that are useful to make health efforts for themselves (Pyas and Satlita, 2017). Youth activity groups provide alternative solutions to health-related problems, form support groups related to healthy living behavior in adolescents and their peers (Astuti, 2020), provide socialization, education, and assistance related to adolescent health (Astuti et al., 2020). In this group of activities, youth are fostered and educated regarding several health issues. Such as healthy life skills, adolescent reproductive health, adolescent mental health, adolescent nutrition improvement, prevention of the use of narcotics and alcoholic beverages, the need for adolescents to do physical activity, how to do early detection and prevention of non-communicable diseases (NCD), psychosocial support related to adolescent health, and other knowledge and information related to adolescent health (Astuti et al., 2020). It is useful to help adolescents realize and understand information or knowledge related to their health, as well as master health-related life skills, such as healthy lifestyle behaviors applied in everyday life (Astuti et al., 2020).

Conclusions

This study states that several variables relate to and contribute to predicting healthy lifestyle behavior in adolescents. The results show a significant relationship between self-compassion and adolescent participation in youth activity groups simultaneously with healthy lifestyle behavior in adolescents. In addition, each independent variable, namely self-compassion, and participation in youth activity groups have a significant relationship with healthy lifestyle behavior in adolescents. Self-compassion and youth participation in youth activity groups are predictors of healthy lifestyle behaviors carried out by adolescents. It can happen because self-compassion and adolescent participation in group activities are both processes within adolescents by making adolescents able to have a positive attitude and reduce negativity related to their health, namely by adopting healthy lifestyle behaviors. In addition, adolescents who have self-compassion and participate in a group of adolescent activities tend to have a protective effect that serves to help adolescents carry out healthy lifestyle behaviors in everyday life.

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Effect of Population Density and Altitude on COVID-19 : A Spatial Pattern

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Abstract

The Covid-19 pandemic that has been going on since March 2020 has spread rapidly, with high mortality In Indonesia. Central Java, Covid-19 remains a disease with a Case Fatality Rate (CFR) of 4.4% and is above Indonesia's CFR of 3.0%. In Magelang itself, positive cases of Covid-19 in 2020 reached 4418 and were among the top 3 cases in Central Java Province. This study's purpose was to spatially describe the distribution of new cases of Covid-19 in terms of population density and elevation of the sub-district area in Magelang. The type of research is descriptive quantitative with ecological studies using a spatial approach. The results showed that the distribution of new cases of Covid-19 has a unique pattern in mapping based on population density and altitude. Some of the new distribution cases showed a distribution pattern following the regional elevation and almost entirely following the pattern of population density. The increase of Covid-19 tends to be higher in areas with high-density populations and low-altitude regions. This study concludes that the distribution pattern of new Covid-19 cases is influenced by population density and the area's height during the peak period of new Covid-19 cases in 2020 at Magelang.

Introduction

The Corona Virus Disease 2019 (Covid-19) pandemic established by the World Health Organization (WHO) at the end of January 2020 is still a significant health problem today (WHO, 2021). Covid-19 is an infectious disease from the Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) (Yuliana, 2020). The virus initially infects animals and infects each other between animals, but in its development, it can infect humans (Munster et al., 2020). WHO released data until June 2021; it was noted that the virus had spread to 216 countries and infected 175,306,598 people worldwide, with 3,792,777 deaths (2,16)(WHO, 2021).

Indonesia recorded 743,198 cases of Covid-19 from March 2, 2020, to December 31, 2020, with 109,963 active cases. Of these cases,

Central Java Province has a Case Fatality Rate (CFR) of 4.4% and is above the national CFR(3,0 %) (Kemenkes RI, 2021). Covid-19 cases in Central Java are spread across regencies and cities, with the number of positive confirmed cases as of the end of December 2020 being 93,030 cases, with a cure rate of 77,136 and a death rate of 5,729 people. Magelang Regency is the Regency with the second-highest number of cases in Central Java, which is 4,418 cases in 2020, below the number in Semarang City (Dinkesprov Jawa Tengah, 2021). In less than a year since the initial declaration of the Covid-19 pandemic, the addition of cases in Magelang Regency and the death rate is high.

The fast transmission speed of Covid-19 requires strenuous efforts from local governments to prevent more comprehensive transmission (Merlin & Vanchapo, 2021). The

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acceleration of regional development triggers the emergence of urbanization and global population movements (Nugroho et al., 2021). This situation risks increasing population concentration, along with high economic growth. Increasing population concentration in certain areas will ultimately increase the potential for interaction between residents. On the other hand, the low number of medical personnel will create obstacles to handling Covid-19 and controlling it (Yang et al., 2021). The location of Magelang Regency is in an area directly adjacent to the Capital of Central Java Province, namely Semarang and Sleman Regency, DI Yogyakarta Province. The existence of two large cities flanking Magelang Regency has the potential to have a high level of population mobility and is very at risk for spreading the Covid-19 infectious disease (Desai, 2020).

Location-based information systems or spatial data can be used to assist the government in preventing the spread of Covid-19. Dissemination of information that utilizes map visualization utilizing Geographic Information Systems (GIS) is important because it can help map the risk of disease distribution in a location, determine disease distribution patterns, and predict the speed of disease spread (Sulistiyawati et al., 2016; Pourghasemi et al., 2020). Many factors can trigger an increase in the spread of Covid-19 in the community (He et al., 2021); one of the factors that are suspected to be the causative factor is the indirect factor which is closely correlated with the geographical conditions of a region (Franch-Pardo et al., 2020). Geographical conditions with a spatial approach are recommended to be used as one of the epidemiological observations that support the prevention of Covid-19 (Andersen et al., 2021).

One of the spatial variables that need to be considered is the area's height. The region's altitude that affects air condition is related to the genomic or non-genomic adaptation pattern of the virus (Pun et al., 2020). The area's altitude is also related to the work function of

the lungs in breathing (Huang et al., 2020). Considering that the lungs are currently the main focus of Covid-19 treatment, the regional altitude variable needs more attention in handling and preventing Covid-19 (Breevoort et al., 2020). In addition to geographic factors, population demographics also affect the rate of disease spread, where one indicator is the population density level of an area. People who live in dense areas, such as big cities or regional economic centres, have a higher probability of interacting with residents because of economic motivation (Yusrina et al., 2018). This condition can potentially increase the risk of transmitting infectious diseases, because the transmission of Covid-19 occurs between humans (Chan et al., 2020; Li et al., 2020; Hu et al., 2013).

Many studies related to the incidence of Covid-19 took place in Magelang Regency, but not many have used a spatial approach and compared between sub-districts. A spatial approach can help see the distribution pattern of the spread of infectious diseases, including Covid-19. The spatial approach can help to see the distribution pattern with specific characteristics, such as population density, public service locations, stations, places of worship, health services, and others (Sembiring et al., 2022). The spatial approach can detect clusters of disease cases and analyze patterns of disease spread that has the potential to become extraordinary events (KLB) or pandemics in the community (Saran et al., 2020). So that by studying the pattern of disease spread based on regional characteristics, the increase in repeated cases will be prevented. In addition, if an outbreak or pandemic of a similar disease occurs, the pattern can be used as a guide for area-based prevention and control measures.

Research with a spatial approach is essential to be able to see the differences in problems between sub-districts related to population health because each sub-district has different characteristics, thus requiring alternate handling and interventions (Siqueira et al., 2021). This study spatially analyzes new Covid-19 cases in Magelang Regency based

on cases at the sub-district level to describe the distribution of Covid-19 events in each sub-district related to space and region. In this study, spatial analysis is used to see the correlation between space/region and cases of Covid-19 and the factors that influence it, such as population density and altitude.

The purpose of this study is to describe the distribution of new cases of Covid-19 spatially in terms of population density and altitude of the sub-district in Magelang Regency in November and December 2020, which is the peak period of Covid-19 transmission by utilizing the Geographic Information System.

Methods

The data used in this study are regional elevation data and population density data from the Central Statistics Agency (BPS) of Magelang Regency in 2020 (BPS Kabupaten Magelang, 2021). Daily Covid-19 case data per sub-district was obtained from the official source of the Magelang Regency Government. Regional administration digital data in the form of maps obtained from the official website of the Geospatial Information Board (BIG). The research took place in Magelang Regency, Central Java Province, which has 21 sub-districts, and took time from April to May 2021. The analysis and mapping process was carried out with the help of QGIS software version 3.10. This research is quantitative descriptive research with an ecological study. An ecological analysis is useful for seeing the population health level in an area or location (Breevoort et al., 2020). The data collection method in this study was based on secondary data sourced from the official website of the Magelang Regency Government regarding Covid-19 and data from the Magelang Regency BPS. Data for all residents who have been confirmed positive for Covid-19 are data that have passed the polymerase chain reaction (PCR Test) in November-December 2020. The sample is the total population. The unit of analysis in this study is 21 sub-districts included in the administrative area of Magelang Regency.

Results and Discussion

Data on the distribution of Covid-19 cases in Central Java Province in 2020 can be

seen in table 1 below:

Table 1. Covid-19 cases at the Regency/City level in Central Java Province.

Location City	n	%
Semarang	11038	12%
Surakarta	1998	2%
Pekalongan	1394	2%
Magelang	1008	1%
Tegal	972	1%
Salatiga	908	1%
Regency		
Magelang	4418	5%
Kebumen	4116	4%
Wonosobo	3999	4%
Kendal	3985	4%
Banyumas	3793	4%
Jepara	3719	4%
Kudus	3542	4%
Demak	3181	3%
Cilacap	2948	3%
Blora	2786	3%
Sragen	2720	3%
Tegal	2656	3%
Temanggung	2631	3%
Sukoharjo	2545	3%
Pemalang	2529	3%
Semarang	2487	3%
Klaten	2327	3%
Karanganyar	2313	3%
Boyolali	2198	2%
Batang	2139	2%
Purbalingga	1865	2%
Purworejo	1798	2%
Pati	1712	2%
Pekalongan	1545	2%
Rembang	1463	2%
Brebes	1415	2%
Banjarnegara	1334	1%
Wonogiri	1182	1%
Grobogan	1081	1%
Total	91745	100%

Sources : Report of Central Java Health Office in 2020

In table 1, it can be seen that the area with the second-highest Covid-19 in Central Java Province, with 4418 cases (5%), is Magelang Regency and is under Semarang City, with 11038 cases (12%). Furthermore, the spatial-temporal analysis of Covid-19 events in Magelang Regency per sub-district in November 2021, and December 2021 is displayed in a bar chart

on the map in Figure 1.

Figure 1 shows that the distribution of cases from November to December 2020 varies and is spread over 21 sub-districts. Mertoyudan District is the sub-district with the highest total cases, namely 702 cases (14%), followed by Mungkid District with 413 (8.3%) and Borobudur District with 386 (7.8%). Meanwhile, Pakis Sub-district is the sub-district with the lowest addition of cases, namely 88 cases in 2 months (1.8%). Almost all sub-districts experienced increasing cases from November 2020 to December 2020. However, one sub-district experienced a decrease, namely Salaman District, which fell from 153 to 122.

The distribution of Covid-19 events in the Magelang Regency area in 2020 reached its

peak in November and December 2020. The increase in cases occurred in all sub-districts in Magelang Regency. Although several sub-districts experienced a decrease in cases, overall, Magelang Regency was designated as a red zone at the end of 2020. The pattern of spreading highest Covid-19 occurred in the south-central zone of the Magelang Regency, where Mertoyudan, Mungkid, and Borobudur sub-districts were the three highest sub-districts with the incidence of Covid-19. Mertoyudan District is located on a transportation route between two provinces, namely Central Java Province and Yogyakarta D.I Province, where the incidence of new Covid-19 cases is the highest compared to the surrounding areas in November-December 2020.

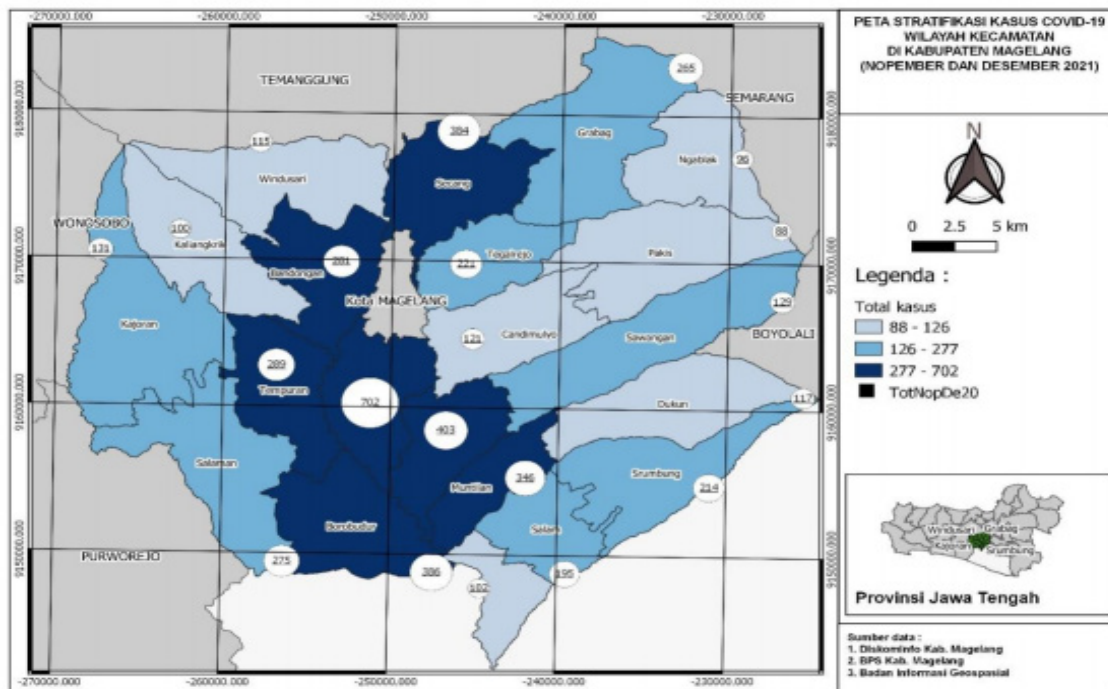


Figure 1. Stratification map of Covid-19 cases in the District of Magelang in November 2020 and December 2020

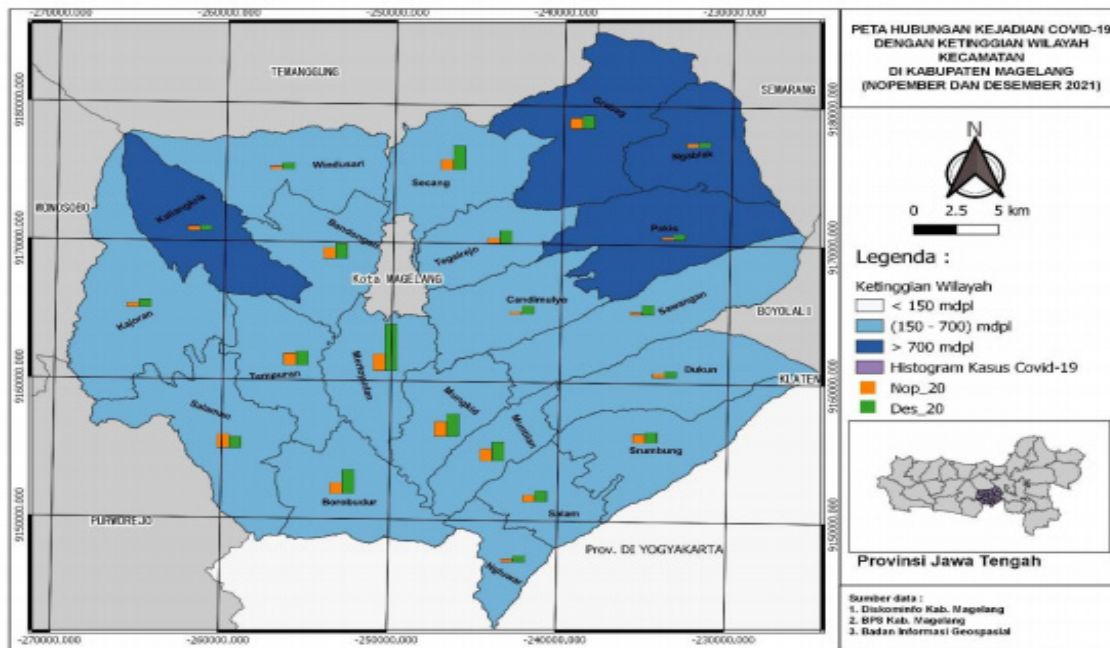


Figure 2. Map of the Relationship between Covid-19 Incidence and the Altitude of the Sub-District in Magelang Regency in November 2020 and December 2020.

The sub-districts around the Mertoyudan are sub-districts with a high average number of cases compared to other sub-districts in Magelang Regency. But the distribution of cases also occurs evenly in the western and eastern zones. In other words, the distribution of cases, although concentrated in the middle zone for the highest, occurs evenly in all sub-districts in Magelang Regency. It can be interpreted that several factors causing the even and widespread distribution of Covid-19 cases in this district.

Based on Figure 2 above, the distribution of Covid-19 cases occurred in all sub-districts in Magelang Regency. The first to third highest cases occurred in sub-districts located in the central and southern parts of Magelang Regency with an altitude of 150–700 meters above sea level. The highest was in Mertoyudan District with a total of 702 cases (14%), with an increase in cases from 185 to 517 in December 2020 or an additional 179%. Next in second and third place are Mungkid and Borobudur

Subdistricts, with 413 (8.3%) and 386 cases (7.8%). Meanwhile, areas with elevations above 700-meters above sea level are in the northeastern part of Magelang Regency and generally have a total number of cases between 28 and 60.

Four sub-districts in Magelang Regency have an average altitude of above 700 meters above sea level. Namely, Ngablak Districts (1378 meters above sea level), Pakis (841 meters above sea level), Kaliangkrik (823 meters above sea level), and Grabag (702 meters above sea level) are the sub-districts with the lowest additions of Covid-19 cases in Magelang District, Pakis District (88), Ngablak (96), and Kaliangkrik (100). Meanwhile, the sub-districts, which are located at an average altitude of 202 to 347 masl, are the sub-districts with the addition of medium to high cases, the Mertoyudan sub-district, which is at an altitude of 347 masl, is the sub-district with the highest new cases addition (702).

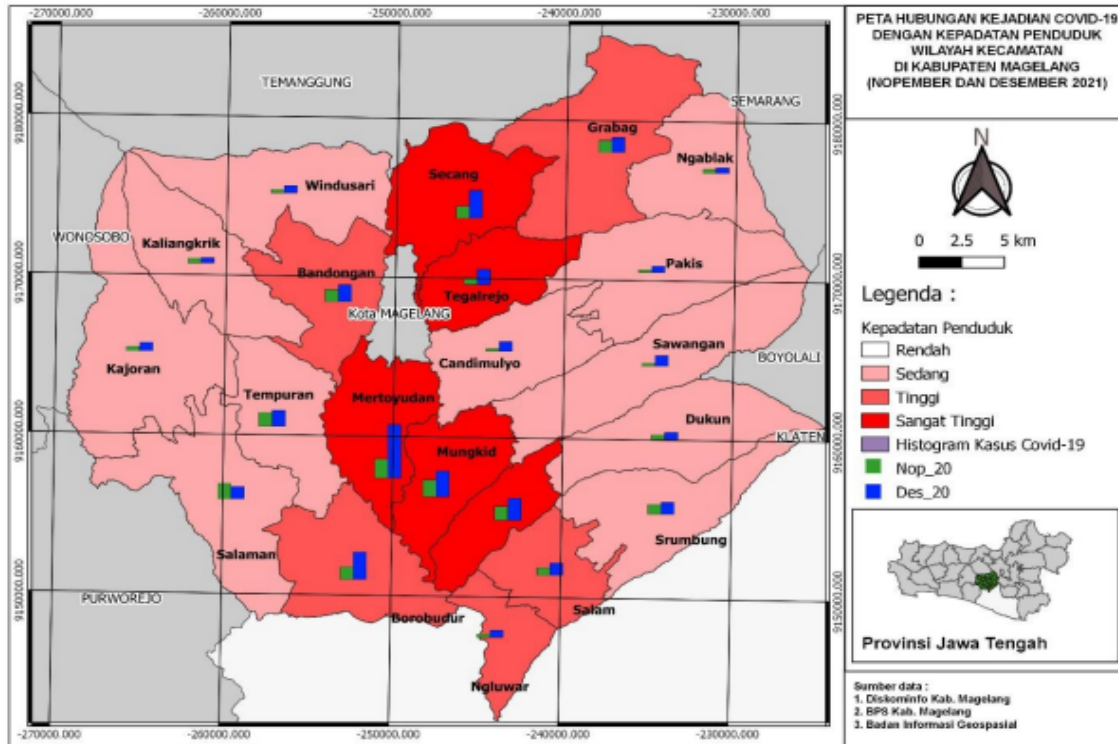


Figure 3. Map of the Relationship between Covid-19 Incidence and Population Density per District in Magelang Regency in November 2020 and December 2020

Based on population density, there are five sub-districts with a very high density between 1520 - 2794 people/km², one of which is Mertoyudan District, which is the sub-district with the highest addition of cases; the other sub-districts are Secang, Mungkid, Muntilan, and Tegalrejo Districts. The sub-districts with a high population density between 1074 - 1519 people/km² are the Districts of Grabag, Bandongan, Borobudur, Salam and, Ngluwar. Of the five sub-districts, Borobudur Sub-district is included in the category of adding high cases, namely 386 cases (7.8%). Meanwhile, other sub-districts are categorized as sub-districts with moderate population density, between 600 - 1073 people/km² (Figure 3).

The interaction between the infectious agent causing the disease (agent) and the host (host) has long been known to be influenced by environmental factors (environment) (WHO, 2021). The area's altitude is an environmental condition that needs attention in the event of Covid-19, considering that air conditions have a close relationship with the pattern of genomic and non-genomic virus adaptation (Pun et al., 2020). The results of previous studies also

showed similar results. A literature review explains the relationship between regional altitude and the incidence of Covid-19, where high areas have a smaller transmission rate than lower areas (Millet et al., 2021). Research in the United States by matching population density between areas with an altitude of <914meters above sea level(MASL) and > 2133 MASL showed similar results. Higher altitude can reduce infection rates and lower the risk of death (Stephens et al., 2021). Research in Colombia involving 70 cities at an altitude of 1-3,180 MASL shows that living in a highland location can reduce the risk of transmitting Covid-19, especially by reducing mortality rates (Cano-Pérez et al., 2020).

The ability of the virus, which may be weakened due to drastic changes in air and temperature in high areas, is supposed to help the air around the highlands become cleaner during the Covid-19 pandemic (Semple & Moore, 2020). Another study conducted in the highlands of Tibet, Bolivia, and Ecuador found that the adaptive capacity of the lung function of the inhabitants of these regions could protect them from the severe effects of COVID-19

exposure compared to lower areas (Arias-Reyes et al., 2020). Lifestyle and social factors, such as more physical activity carried out by residents in the highlands, can explain why in highland areas, the fatality rate due to Covid-19 tends to be lower. Residents at high altitudes are also less likely to be obese, which can increase the severity of COVID-19. Therefore, the symptoms of COVID-19 at high altitudes tend to be mild or asymptomatic. It could also be the reason for the low level of Covid-19 in the highlands because people with mild or no symptoms tend not to get tested and recover independently (Stephens et al., 2021).

The results of other studies show different things. Research in Peru shows that altitude does not affect the fatality rate but can reduce the risk of transmitting Covid-19 cases (Segovia-Juarez et al., 2020). Research conducted in Manado City explains the opposite. It found regional altitude does not affect on Covid-19 cases in sub-districts within the city of Manado (Nelwan, 2020).

The increase in population is directly proportional to an area's population density. In addition, economic growth in urban areas will encourage rural residents to live around urban areas because there is hope for life improvement (Ren et al., 2020). Given that the incidence of Covid-19 can be transmitted between humans (Chan et al., 2020; Li et al., 2020). It can be interpreted that the higher the pattern of interaction between residents due to economic reasons and regional growth will have the potential to increase the transmission of infectious diseases between residents such as Covid-19 (Ranscombe, 2020).

Very high population density is one of the variables that can facilitate disease transmission between residents and the spread of disease in areas with high population density. Research conducted in Algeria links population density with high patterns of interaction between residents. The transmission of the SARS-CoV-2 virus only requires a distance of about 1 meter. The droplets are in the form of an aerosol that spreads through the air from the nose and mouth of the patient, so the risk of transmission due to high interaction patterns between residents will be higher (Kadi & Khelfaoui, 2020; Setti et al., 2020).

Other research explains that increasing population density can be used as a predictor of the spread of Covid-19 in the United States (Wong & Li, 2020). In addition, this study also explains the close correlation between population density and disease distribution in the smallest area in an area at the district level. Population density is closely related to the movement and mobilization of people in an area; the fulfillment of basic needs and economic motivation is one of the factors that can increase the movement and interaction of the population in areas with high density and dense inter-provincial crossroads. The sub-districts on the main crossing have a high rate of economic growth and movement between residents (Kemenkes RI, 2021). This situation can surely increase the risk of transmission between residents if no efforts are made to limit the movement of people.

Conclusions

Based on the spatial pattern analysis conducted, the distribution pattern of Covid-19 in Magelang Regency spreads evenly across all sub-districts in November-December 2020, which is the highest month of cases. The high average addition of new cases occurred in the middle zone, an area with a relatively high population density compared to other regions. Almost all sub-districts with high population density are areas with high average cases, but this does not apply to all sub-districts with high population density. Meanwhile, areas with elevations below 700 meters above sea level are also the sub-districts with the highest additions of Covid-19 cases. On the other hand, for sub-districts with an altitude above 700 masl, there was low new cases addition in November and December 2020, except for sub-districts located in the middle zone of Magelang Regency. The results of this study can be the basis for the Magelang Regency Government to increase stricter prevention efforts for the middle zone area so that the current sloping Covid-19 case does not increase again. In addition, the results of this study can also be the basis for prevention and control efforts if one day there is an outbreak of the disease with transmission patterns and virus characteristics similar to Covid-19.

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Effectiveness of Human Capital on Employee Performance in the Era of Disruption in the Health Sector

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Abstract

The era of disruption has affected the mentality and human resources way of working in public health. In this era, human resources in the health sector play a crucial role in public health digitalization. It aims to determine the effectiveness of human capital on employee performance in the era of disruption in the health sector. The research method applied in this study is quantitative with a cross-sectional approach. This research was conducted at the Tawangrejo Health Center from January to March 2022. The population of this study is the entire employee, with the amount of 70 people. To determine the sample, the researcher used Slovin Formula with an accuracy of 0,1. As result, 42 respondents were obtained. Data collection was carried out using a questionnaire distributed to all respondents. Furthermore, data analysis in this research is applying ordinal regression tests. The result of the study shows that there is no effect of human capital on employee performance, where the value of sig $\geq 0,720$ provides the meaning of no influence for two variables. Moreover, the discovered value of Nagelkerke in this research is 0,025 showing between the two variables have no effect by 2,5%. Based on that finding, the public health should about its employees' performance by optimizing the existing human capital, so this will not affect the organization's sustainability in the future.

Introduction

Industry 4.0 Revolution has encouraged Public Health Centers to enter and follow the digital era, such as the development of telemedicine distributed in several public health in Indonesia. Recorded in 2013 until 2018, at least there are 35 public health with served Teleradiology, Teleekg, Teleusg, also Telecommunication (Rahim, 2019). The entries of digitalization within health services in Indonesia have assisted and reached all over the country, which alleviates people, especially those who live in remote spots, to able to use health services easily. According to (Newmann, 2019), recorded in 2015, there are more than 1 million inhabitants have used telemedicine services. It keeps increasing until reaching 7 million cellular clients in 2018.

Furthermore, the development of arti-

cial intelligence also helps to diagnose patients, treatment decision making, and development of medicine. Based on Economic Cooperation and Development Organization (OECD), about 20% of world health outcome has come to waste for the reason of unneeded treatment to the inaccurate system. The existence of artificial intelligence can minimalize the reasons by maximizing existing data (Mammadov et al., 2020). The disruption era is an abrupt complex changing process marked by digitalization, internet to Artificial Intelligence (Sujudi & Komariah, 2020). In the era of all sudden changes in the field of public health digitalization, public health organizations must keep innovating, increasing their role, creativity, and performance towards human resources for better advancement. As a form of participation to face the era of disruption, public health has to

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build and increase its employees' performance to compete and not affect the organization's achievement of objectives.

Service Technical Implementation Unit of Tawangrejo Public Health is one of 6 public health centers spread in Madiun City, recorded. Until 2021 the number of people living in the working area of the health center reached 53.698 people. Based on the data of SKP from 2016-2020 experiencing instability from year to year. For instance, from 2016 to 2017, have decreased by an average of 83.8 and became 83.0. In 2018 it increased to 85.3, while in 2019, it became 82.9, with a percentage reaching 2.68%. There are several reasons for the decline in the value of SKP; one of them is that the UKP target is not achieved. Viewing from that problem, efforts to improve employee performance in the Tawangrejo Health Center environment are needed.

As a form to increase the credibility of the organization, we need to increase employee performance by giving training to improve competence and expertise in the use of technology in the health sector. Other than training, public health centers are expected to be able to manage existing human capital optimally. Human Capital is one of the predominances in an organization to compete in the disruption era. If utilized optimally, it will affect individuals and the organization.

Based on the report released by the World Economic Forum (WEF) related to the competitiveness ranking of 141 countries in the world, Indonesia is on rank 50, dropping 5 ranks from last year. One of the causes of the decline is Indonesia has lack of staff capacity (human resources). The case can be seen in the indicators in the health sector, the number of human resources also the ability to employ workers in the industry (Abdurochim et al., 2019). According to Abazeed (2017), in the research (Renggani & Kasmir, 2020), human capital is a set of employee characterization and capabilities embodied in knowledge, experience, skill, and motivation until innovation.

Human capital is a substantial element to create competitiveness in an organization or company. Consequently, human capital is vital in influencing the high and low performance

of employees in an organization. Based on the explanation of the problems above, the researcher is interested to conduct research with the title "Effectiveness of Human Capital on Employee Performance in the Era of Disruption in the Health Sector". The purpose is to determine the effectiveness of human capital on employee performance in the era of disruption in the health sector.

Method

The research method conducted in this study is qualitative with a cross-sectional research design. Quantitative research was applied to find the relation between variables and then drew a causal conclusion. The population in this study is the entire employee of Tawangrejo Public Health Center, as many as 73 people. For determining a sample, the researcher used the Slovin formula with a trust rate of 0.1 and gained a total of respondents 42 people.

The sampling technique applied in this study is simple random sampling, taken from population members randomly. In this research, variable measurement was done by distributing the questionnaire to respondents, employees of Tawangrejo Public Health Madiun. Meanwhile, the human capital and performance variable questionnaire was conducted with the Likert Scale. The study took time from March to April 2022. Data sources were obtained in two ways. Primary and secondary. Primary data was gained by distributing the questionnaire to 42 respondents. On the other side, secondary data was obtained from the report related to the number of employees and the objective of employee performance in 2016-2022.

The analysis data technique used in this study had two phases. They are univariate and bivariate analysis. In this research, the univariate analysis describes the respondents' characteristics such as gender, age, educational level, etc. Afterward, the bivariate analysis was applied to examine the relation between the two variables. In this research, bivariate analysis was used to measure the influence of human capital on employee performance. The statistical test used is the Ordinal Regression Test to gauge the relation between two variables.

Result and Discussion

In the following data, the researcher shows the results of respondents' characteristics based on gender, age, last education, job status,

work period, also the division or unit where respondents work. Furthermore, the researcher also describes SPSS data processing results with an ordinal regression test.

Table 1 .Frequency Distribution of Respondents

Respondent's characteristics	Frequency	Percentage (%)
Gender		
Male	8	19.0
Female	34	81.0
Age		
20-29 years	11	26.2
30-39 years	15	35.7
40-49 years	12	28.6
50-59 years	4	9.5
Latest Education		
SMA (High School)	3	7.1
D3	26	61.9
S1	13	31.0
Job Status		
PNS	35	83.3
Contract Worker	4	9.5
Freelance	2	4.8
Internship	1	2.4
Length of Work		
1-3 years	11	26.2
4-6 years	5	11.9
>6 years	26	61.9
Division or Unit		
Administration	5	11.9
Quality Management Team	1	2.4
Internal Audit Team	1	2.4
Essential Public Health Efforts and Public Health Care (UKM Esensial dan Perkesmas)	5	11.9
Developmental Public Health Efforts (UKM Pengembangan)	4	9.5
Individual Health Effort (UKP)	9	21.4
Other	17	40.5

Source: Data that has been processed by researchers, 2022

Based on the first table above, the highest percentage of gender characteristics is female (81.0%). Hereinafter, the highest age percentage of respondents is between the age of 30-39 years (36.7%), while the lowest age of respondents is 50-59 years (9.5%). For respondents who filled out the questionnaire, the majority of the latest education is D3 (61.9%). The highest job

status is PNS (civic servant), with the amount percentage of 83.3%. Based on the frequency distribution above also known that respondents mostly had a job period of more than six years. Further, the highest percentage of respondents' division or unit is other (40.5%), and the lowest is in Quality Management Team and Internal Audit Team respectively (2.4%)

Table 2. Cross Tabulation of Human Capital Variables and Employee Performance

		Employee Performance						Total	%
		Very Good		Good		Not Good			
		F	%	F	%	F	%		
Human Capital	Very Good	0	0	3	7.1	1	2.4	4	9.5
	Good	3	7.1	29	69.1	1	2.4	33	78.6
	Not Good	0	0	4	9.5	1	2.4	5	11.9
Total		5	11.9	36	85.7	1	2.4	42	100

Source: Data that has been processed by researchers, 2022

According to the table above, it is known that the percentage of respondents who have poor human capital is (11.9%) with the percentage of good employee performance ranging from (9.5%). As for the respondents who have good human capital is (78.6%) with good performance of (69.1%). Besides, respondents with very good human capital have percentage of (9.5%) respondents with good performance are (7.1%). Moreover, in this research, the researcher has processed the data with the Ordinal Regression Test which obtained the result of a sig value of 0.720. Based on the Ordinal Regression Test conducted by the researcher, if the score of $\text{sig} \geq 0,05$ then H_0 received has no effect on human capital towards employee's performance in UPTD Tawangrejo Public Health Madiun. Furthermore, this study gained a score of Nagelkerke 0,025. It indicates no relationship between two variables by 2,5%.

Following the result gained from the questionnaire distribution towards 42 respondents, the Service Technical Implementation Unit of Tawangrejo Public Health Madiun can be claimed that most respondents own good human capital with a percentage of 78.6% or about 33 people. Then respondents who have poor human capital with five people in total (11.9%) and very good with four people in total (9.5%). From that mentioned data, can be implied that human capital in Tawangrejo Public Health belongs to the good category. Based on the theory of (Hidayah, 2018), in this era full of digitalization advances, human resources in the field of health must continuously adapt, innovate, effectivity and performance of related human resources to bring innovative advances for public health. The disruption era has influenced thinking patterns and human resource procedures in public health. Human capital is one of the excellent sources inside the

organization to face challenges, where human capital can create the best solution based on the employee's knowledge. Based on the theory, human capital will increase if it is being well-managed by its organization (Ulum & Fitri Wijayanti, 2019).

Human capital is an accumulation between knowledge, skill, ability, and other attributes which can produce output in the form of innovation in work. In the organization or company, human capital is the most significant source and is the center of intellectual capital to bring a goal (Daniel, 2019). Factors supporting the success of Human Capital include the existence of a reliable leader role who has the ability of leadership that can run the whole human capital inside the organization. Furthermore, company investment in the form of training and development, improving the quality of work also providing welfare for employees can produce innovative and good-quality human resources (Peprah, 2020). Proper management of human capital will affect decision-making to improve quality, boost company competitiveness also predispose the success of an organization or company. It is in line with the theory of human capital based on the macro economy, where humans considered as the most valuable component for the growth of an organization (Peprah & Ganu, 2018). Even though in this research most respondents' answers were considered as good, it will be better if public health leaders keep concerned about the knowledge, expertise, skill, and ability of its employee by providing training, seminars, and employee skill to adapt to the advance of service technology in public health.

Based on the research results gained from distributing questionnaires in the Service Technical Implementation Unit of Tawangrejo Public Health Madiun, the employee perfor-

mance in the very good showed one respondent (2.4%). Next, followed by good performance respondents, namely 29 people (69.1%) and not good three people (7.1%). Viewing from that data, the Service Technical Implementation Unit of Tawangrejo Public Health Madiun belongs to the good category. Employee performance is one of the most vital components of an organization, considering well and poor employee performance will affect the profitability of the company. The performance also points to the work achievement of the employee and the performance is the result of work both in quality and quantity (Jain & Ahuja, 2018). Several factors affect employee performance. The ability factor is where employees must possess high abilities such as potential (IQ) as well as reality expertise (skill) to improve workers' quantity and quality, respectively. The motivation factor is an action within oneself that aims to move individuals in achieving these work goals (Maryudanto, 2020). It is in the same way as the research conducted by (Hartono et al., 2021), where the role of leadership coaching affects the performance of an employee, pointed by the result of a p-value of 0,033 can be concluded that the influence between leadership role towards employee's performance in Cempaka Putih Jakarta Islamic Hospital. Hereinafter, to improve the employee's performance, an organization should invest in its human resources by giving training, empowerment for the worker up to give salary also appropriate rewards based on the workload (Nderitu et al., 2019).

Based on the results of research data analysis in the Service Technical Implementation Unit of Tawangrejo Public Health Madiun by using an ordinal regression test, the discovered value of sig is 0.720. It shows that $0.720 > 0.05$. Then H_0 is accepted there is no effect of the variable on the human capital of employee performance. Whereas, based on the Nagelkerke score discovered as 0.025. It indicates that no effect of the two variables by 2.5%. Although the value is not that great, it shows no influence of the two variables. The absence of the influence of the human capital variable on employee performance is proven in the cross-tabulation table. The human capital variable with the not good category has good

performance (9.5%), followed by the not good performance (2.4%). It proved that human capital in the not good category does not affect employee performance in the Service Technical Implementation Unit of Tawangrejo Public Health Madiun. It indicates that even though employees have good performance, yet public health still lack training access for its employee, especially in this disrupted era in the health field.

Next, the human capital variable with the good category with good performance (69.1%) and followed by the not good performance (7.1%) also very good (2.4%). It gives evidence that human capital with good category directly affects employee performance with good results as well. Although there are poor employee performances, it does not give much effect since it has few amounts. Good human capital yet followed by bad performance can be affected by the lack of human resource quality itself. But, good human capital, followed by good performance, can be indicated because the level of knowledge is supported by the provision of facilities from the public health center.

Last, the human capital variable with the very good category with good performance (7.1%) and not good performance (2.4%). It verifies that human capital with very good performance does not affect the performance of employees in the very good category. Indirectly, it indicates that employees in carrying out their work is still not done optimally. Even with very good human capital, it has not been able to improve employee performance to be very good. Perchance, several factors can influence such as employee psychology, family, as well as internal public health. Good human capital management will affect decision-making in improving quality. In line with (Perera & Weerakkody, 2018), showing positive relation between human capital with employee performance and marked by the value of R square 0,434, means that the positive influence of the human capital is only 43, 4% when the rest is affected by other variables, that matter can improve company competitiveness.

The poor performance of workers will affect customer satisfaction and the organization's performance. Furthermore, poor employee performance also can indicate a decline

in work spirit and passion. The performance of employees can affect the quantity, quality, and timeliness of achieving organizational goals. Based on the research (Shivangi, 2020), one of the reasons for poor worker performance, either in quality or quantity, is the heavy feeling of pressure experienced by employees in an organization towards their work. The results indicate no human capital influence towards workers' performance in the Service Technical Implementation Unit of Tawangrejo Public Health Madiun in 2022. There are factors that affects it. The tendency of respondents to fill the questionnaire positively due to direct pressure and lack of honesty in filling out the questionnaire according to the facts on the ground. It is contrary to filling out the employee performance questionnaire filled out by the Head of the Administrative Section, which assesses the performance of employees according to the level of performance of each individual, such as if there are still unprofessional employees in doing their jobs.

The previous study that is not in line with the results is one conducted on Bank Syariah DIY employees. It showed significant influence marked by the coefficient value 0.406 and t statistic 5.636. It means human capital gives a great contribution to employee performance (Muafi et al., 2017). Research on the workers in Perusahaan Jasa Minyak Nigeria pointed out a positive relation between human capital development in form of education, training, also experiences to employee's performance. It showed by the value of Chi-Square 59.303 in the training independent variable, the score of chi-square 70.862 in the education variable, and 130.862 in the variable of experience (Philip & Ikechukwu, 2018). Besides, another study that is not in line with the researcher is (Jeki & Sulastri, 2019), who studied several literatures related to the influence of human capital towards employee performance showing positive and significant result. Another notion from (Rakhmalina et al., 2017), also disclose the different and convenient management of human resources will generate good output for the company. Hereafter, another research conducted on 377 government employees also showed a positive significant effect between human capital and employee performance

(Erten & Türkmen, 2022).

Conclusion

According to the research in the Service Technical Implementation Unit of Tawangrejo Public Health Madiun, deliver a fact that it is still necessary to increase knowledge, expertise, abilities, and skills through the provision of training, comparative studies, and seminars. The employees should easily adapt to changes in the digitalization era in the health sector. Even though this research has not proven that caused by several factors, it will be better if the public health center improves human capital for its employees in order to upgrade their performance.

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The Extraction of *Zingiber Officinale Rosc* as a Natural Insecticide for *Aedes Aegypti* Larvae

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Abstract

Dengue fever is a health problem in Indonesia, including in Gorontalo Province, with an incidence rate of 101.53 per 100,000 population. One of the efforts to prevent the incidence of dengue fever is the use of natural insecticides, including red ginger. This study aims to assess the effectiveness of red ginger juice on the mortality of *Aedes aegypti* mosquito larvae. This research took place at the Laboratory of the Department of Public Health, the State University of Gorontalo, in 2021 using a True Experiment design. The mosquito larvae samples used were 500 larvae of *Aedes aegypti* instar IV mosquitoes taken from endemic areas of dengue fever in Gorontalo. Data were analyzed using the One Way ANOVA statistical test. Red ginger extract was given in five concentrations, namely 60%, 70%, 80%, 90%, and 100%. The results showed an effect of red ginger extract on the mortality of *Aedes aegypti* mosquito larvae at each treatment concentration given (p -Value = 0.000). The higher the concentration level given, the higher the larval mortality rate will also be. Red ginger is expected to be used by the community to prevent dengue fever.

Introduction

Dengue fever is an infectious disease caused by the Dengue virus, which belongs to the group B Arthropod-Borne Virus (Arboviroses) known as the genus flavivirus, family flaviviridae, and is transmitted through the *Aedes Aegypti* and *Aedes Albopictus* mosquitoes (Kemenkes, 2019). In 1960 this disease spread to many countries, including the World Health Organization South-East Asia and the Western Pacific region including Indonesia (WHO, 2011) (Gubler, 1998). It is because the ecological disturbances during and after World War II created ideal conditions for increasing the transmission of mosquito-borne diseases (Gubler, 1998). WHO noted that the region in Southeast Asia with the highest number of DHF cases was Indonesia in the DHF stratification by WHO, which indicated a large number of hospitalizations and deaths from DHF, especially in children (WHO, 2011).

Dengue fever is a serious global threat

to humanity, especially in endemic areas in the tropics and subtropics, where about 40% of the world's population now lives in countries with a high risk of dengue transmission (Dehghani and Kassiri, 2021) (Sanyaolu et al., 2017). WHO describes cases of dengue fever worldwide annually, reaching 50-100 million, of which there are 250,000-500,000 cases of DHF with a mortality rate of about 24,000 people per year (WHO, 2011). Overall mortality from dengue fever worldwide is 0.5-2.0% which can reach 20% if the case has entered the dengue shock syndrome phase in the ICU/hospital (Guo et al., 2017). Dengue Hemorrhagic Fever (DHF) is still one of Indonesia's main public health problems (Kemenkes, 2019). Along with increasing mobility and population density, the number of sufferers, and the increasing area distribution. In Indonesia, dengue fever was first discovered in Surabaya in 1968. At that time, 58 were infected, and 24 of them died. The mortality rate (CFR) reached 41.3%. Nowadays,

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it has spread widely throughout Indonesia (Kemenkes, 2016).

DHF cases were established with a diagnosis consisting of clinical symptoms and laboratory results indicating a decrease in platelets $<100,000/\text{mm}^3$ and plasma leakage characterized by an increase in hematocrit $>20\%$. DHF cases in Indonesia from 1968 to 2015 tend to continue to increase (Kemenkes, 2016). DHF reported in 2019 were 138,127 cases. This number increased compared to 2018, which were 65,602 cases. Deaths due to DHF in 2019 also increased compared to 2018, from 467 to 919 deaths (Kemenkes, 2019). Based on data from the Ministry of Health in 2019, the Provinces of North Kalimantan, East Kalimantan, and Bali had the highest IRs among 34 other provinces, which were 239, 180.66, and 114.8 per 100,000 population, respectively. Gorontalo province ranks fourth with an incidence rate of 101.53 per 100,000 population. However, if you assess the Case Fatality Rate (CFR) of each region, it has a CFR of DHF of 1.88%, ranks second highest in Indonesia after Maluku Province, which has the highest CFR of 2.12% (Kemenkes, 2019).

Based on data from the Early Alert and Response System (SKDR) of the Gorontalo Provincial Health Office, the incidence of DHF ranks highest for diseases that often experience Extraordinary Events (KLB), which is 14 times in 2016. from 2017 to 2019. There were 151 cases with three people died in 2017, and in 2018 it increased to 244 cases with four people died. Data from the Gorontalo District Health Office as of February 2019, there were 217 cases, and one died from dengue fever (Dinkes Gorontalo, 2020). This vector-borne viral disease spreads very quickly and poses public health and economic challenges requiring various prevention and control techniques (Sabir et.al., 2021). In general, an epidemic of dengue fever can occur if there are mosquito vectors (usually *Aedes aegypti*), dengue virus, and a group of susceptible human hosts (CDC, 2009). Environmental factors such as rainfall, air temperature, and humidity also affect the spread of DHF (Widyorini et al., 2017). In addition, human mobility also brings the dengue virus into motion, allowing it to spread to a larger area. The distribution is more found in

urban areas than in rural areas, including areas with quite a lot of standing water (Zhang et al., 2020). The spread of dengue fever is expected to increase due to factors such as the modern dynamics of climate change, globalization, socio-economics, as well as the evolution of the virus (Murray et al., 2013).

Nowadays, the dengue fever vaccine is still under development (Sanyaolu et al., 2017; Murray et.al, 2013). Some of the efforts by pursuing the habit of eradicating mosquito nests through the 3 M Plus movement. It is early detection of dengue cases, immediate handling, and the implementation of *Aedes Aegypti* vector surveillance and control. As well as promotional efforts involving all sectors through lectures and digital media (Muchukota et al., 2019; Murray et.al, 2013; Ahmad et al., 2021). Increasing public awareness of dengue fever must also continue to be improved. People who are indifferent to efforts to prevent dengue will have a more significant impact (Indawati dkk., 2021).

The use of insecticides in controlling disease vectors is one of the government's efforts to overcome vector-based diseases (Rivero et al., 2010). The use of insecticides in the health sector, especially those from chemicals, is still widely used in Indonesia. The various active ingredients of insecticides that are currently on the market will indirectly have an impact on health. Although in some cases, insecticides tend to cause a decrease in the number of vectors, a decrease in infectiousness, or a change in behavior, all of which will reduce the capacity of insect vectors, on the other hand, insecticides will also increase the resistance of disease vectors, so that vectors are increasingly resistant to the use of insecticides in eradicating mosquitoes larvae (Rivero et al., 2010; Nauen, 2007). Therefore, another approach is needed in efforts to reduce dengue vectors.

Some efforts that can be used as alternative efforts in controlling dengue vectors are natural ingredients, such as insecticides. Apart from being cheap, they are also friendly to the environment (Sharma et al., 2021). Some that are often used as mosquito repellent *Aedes aegypti* include basil (*Ocimum Sanctum* L), Zodia leaves (*Evodia suaveolens* Scheff), Bintaro leaves (*Cerbera manghas*), Lemongrass

stalks (*Cymbopogon citratus*), *Chenopodium ambrosioides*, *Conyza sumatrensis*, *Eucalyptus camaldulensis*, *Mentha spicata* and others (Mathew, 2017; Kumar et al., 2017; Sasmitasari, 2022; Soonwera and Phasomkusolsil, 2016; Azeem et al., 2019). Another natural ingredient found to have an insecticidal effect on mosquitoes is red ginger (Hamada et al., 2018). The study only examined red ginger in the form of oil combined with Garlic Cloves (*Allium sativum*), but so far no research has been found on the repellent effect of red ginger in the form of extract. Red ginger is a natural ingredient that is easy to grow and found in Gorontalo. The squeeze method is also interesting to assess its effectiveness because it is so easy to apply in the community. So this study aims to assess how the insecticidal activity of red ginger juice as a repellent for *Aedes aegypti* mosquito larvae.

Method

This research is an experimental study using a True Experiment approach, where *Aedes aegypti* larvae are given direct treatment by inserting red ginger leaf juice. The treatment followed a Completely Randomized Design (CRD) approach because the experimental unit was homogeneous. The treatments were given in five different concentrations, namely 60%, 70%, 80%, 90%, and 100%. This research took time in February 2021. Mosquito larvae samples

were collected in West Limboto District, Gorontalo Regency, a dengue fever endemic area. The larval selected was the fourth instar *Aedes aegypti* mosquito larvae, so the larvae used were homogeneous. The selection of the fourth instar larvae is due to the larger size, and the defense system is considered stronger. The experiment took place at the Laboratory of the Department of Public Health, State University of Gorontalo, and with a laboratory assistant's help.

The test was carried out by providing five containers as a place to put the red ginger extract. Each was labeled with a concentration, namely 60%, 70%, 80%, 90%, and 100%. The extract addition is adjusted to the concentration. Then, in each container were added in 20 fourth instar *Aedes aegypti* larvae. The containers were then covered with gauze, labeled, and observed for 24 hours. After 24 hours, the concentration of some mosquito larvae can die effectively. To get more accurate results, the experiment is repeated the next day. It was repeated five times for each concentration, so 500 *Aedes aegypti* mosquito larvae were needed. The experiment flow is shown in Image 1. The observations obtained were then recorded by the laboratory assistant through the observation sheet. Data were analyzed using One Way ANOVA with the help of the SPSS 26 computer application.

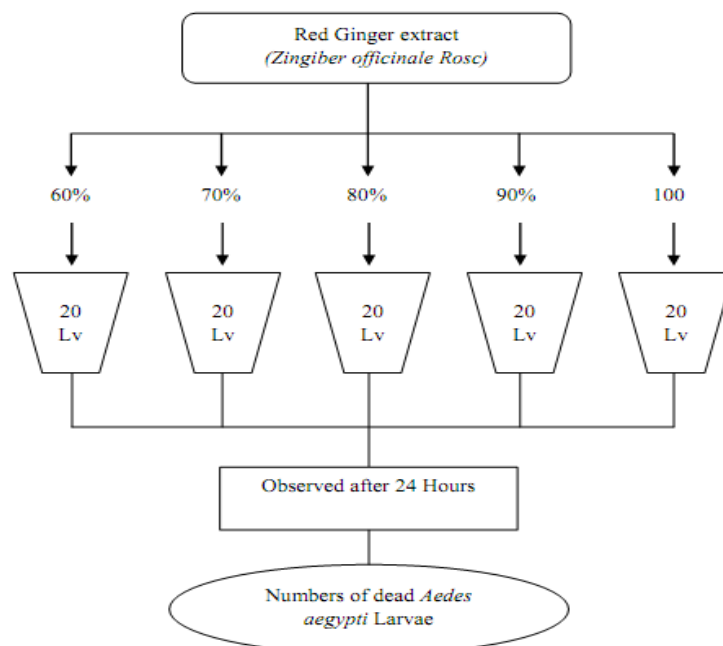


Image 1. Experiment Flow

Results And Discussions

The experimental data were analyzed using the Test of Normality to assess the distribution of the data. The analysis results obtained indicate that the data is normally

distributed with p-value = 0.814 ($> = 0.05$). Since the data were normally distributed, the One-Way ANOVA test was then carried out. The results of the analysis are shown in table 1.

Table 1. Differences in Number of Larvae between Concentration Groups

Concentration	Mean	F	p-Value
60%	8.60	84.500	.000
70%	11.20		
80%	13.60		
90%	16.60		
100%	19.40		

Source: Primary Data, 2021

The analysis results showed a significant difference in the mortality of Aedes aegypti mosquito larvae between the five concentration groups with p-value = 0.000 $< = 0.05$ (95% CI).

Then a follow-up test (Post hoc Games-Howell) was conducted to assess which groups had a different number of deaths in each group (Table 2).

Table 2. Comparison of Each Group

Concentration		p-Value	95% Confidence Interval	
		Lower	Upper	
60%	70%	.024	-4.83	-.37
	80%	.001	-7.49	-2.51
	90%	.000	-10.49	-5.51
	100%	.000	-13.07	-8.53
70%	60%	.024	.37	4.83
	80%	.036	-4.63	-.17
	90%	.000	-7.63	-3.17
	100%	.000	-10.09	-6.31
80%	60%	.001	2.51	7.49
	70%	.036	.17	4.63
	90%	.020	-5.49	-.51
	100%	.000	-8.07	-3.53
90%	60%	.000	5.51	10.49
	70%	.000	3.17	7.63
	80%	.020	.51	5.49
	100%	.018	-5.07	-.53
100%	60%	.000	8.53	13.07
	70%	.000	6.31	10.09
	80%	.000	3.53	8.07
	90%	.018	.53	5.07

Source: Primary Data, 2021

The results of further test analysis showed that all groups had a significant difference in the number of Aedes aegypti larvae mortality

compared to other groups with p-value $< = 0.05$. The average difference in larval mortality is shown in Image 2.

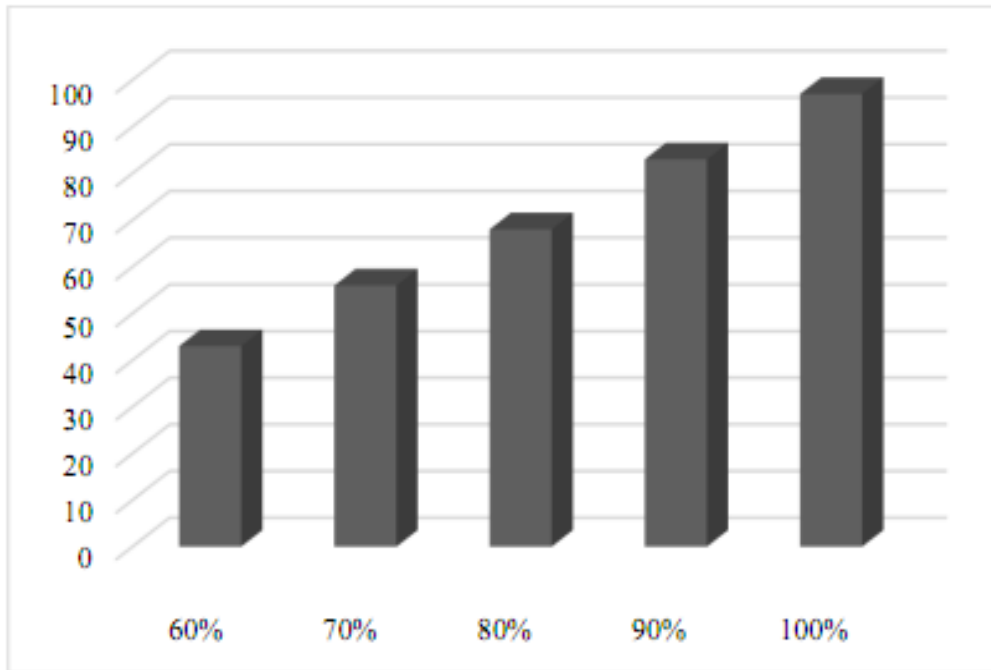


Image 2. Percentage Average Mortality Rate of *Aedes Aegypti* Larvae

At a concentration of 60%, the average larval mortality reached 43% after 24 hours. At 70%, it reached 56% after 24 hours. At 80%, it reached 68%. At the ginger concentration of 90%, it reached 83%. At 100% concentration, it reached 97%. The results showed that the higher the concentration of red ginger extract, the higher the mortality rate of the *Aedes aegypti* mosquito larvae. The *Aedes aegypti* mosquito larvae's highest mortality was found at a concentration of 100% and the lowest at 60%. The same results after five repetitions, with the 24 hours duration for each repetition.

The results showed that red ginger has repellent activity against the larvae of the *Aedes aegypti* mosquito at various concentrations. The highest larval mortality rate was found at 100% concentration. The results obtained are in line with the results of research on the insecticidal activity of oil from garlic clove (*Allium sativum*) and ginger rhizome (*Zingiber officinale*), which have an insecticidal activity that can significantly lengthen larva and pupa duration. In addition, it also reduces the percentage of hatchability of deposited eggs (Hamada et al., 2018). Other studies have also shown that ginger can also be used as a repellent against vectors of a disease, such as cockroaches

(Azhari et al., 2017).

Ginger (genus *Zingiber*) is widely used as a spice and medicinal herb worldwide and is the main ingredient in traditional local beverages such as herbs drink in Southeast Asia (Yanagawa et al., 2021). Ginger has many benefits in everyday life, including antibacterial, antiviral, and antifungal activities. The content of ginger can suppress the growth of phytopathogenic growth. So it can be used as a new alternative to synthetic fungicides and bactericides (Abdullahi et al., 2020; Yanagawa et al., 2021). Other studies have shown that red ginger has an anti-inflammatory effect by preventing changes in levels of several inflammatory cytokines/biomarkers and inhibiting hippocampus and prefrontal cortex acetylcholinesterase (AChE) and adenosine deaminase (ADA) activity (an important enzyme relevant in the management/prevention of neurodegenerative diseases) (Akinoyemi and Adeniyi, 2018).

Red Ginger (*Zingiber officinale* Rosc) leaf juice contains active compounds which are toxic or toxic to insects so that it can cause death in *Aedes aegypti* larvae. The active compounds in red ginger will react with the larval cell membrane and damage it, causing lysis and disrupting the permeability of the

plasma membrane. This results in leakage of the cytoplasmic membrane due to the breakdown of phospholipid molecules due to H⁺ ions from ginger compounds, one of which is gingerol (Anwar et al., 2018).

Active compounds such as essential oils in red ginger leaf juice are toxic or toxic to the larvae of the *Aedes aegypti* mosquito. In terms of nutrition, ginger contains calories, carbohydrates, fiber, protein, sodium, iron, potassium, magnesium, phosphorus, zinc, folate, vitamin C, vitamin B6, vitamin A, riboflavin, and niacin (Shahrajabian et al., 2019). Some of the active chemical compounds in ginger have pharmacological effects on health, including essential oils containing the active substances zingiberene, kamfena, lemonin, borneol, shogaol, cineol, fellandren, zingiberol, gingerol, zingeron, and kaemferol (Munda et al., 2018) (Ghasemzadeh et al., 2010). Red ginger contains 47.95% essential oil and 25.20% atsiri oil (dos-Santos Reis et al., 2020).

The kaempferol content in ginger can enter the respiratory system of the larvae and damage the mitochondria. Mitochondrial damage inhibits the electron transport process so that the energy metabolism process is disrupted and the formation of adenosine triphosphate (ATP) is reduced. Decreased ATP production in the larval body results in a weak larval body. Another active compound contained in red ginger is zingiberene. This compound results in the release of material in the cell and interferes with the nutrient transport process by the cell, damage to the cytoplasmic membrane will result in other compounds contained in red ginger more freely penetrating the larva's body. The entry of other compounds into the larval body freely as a result of damage to the membrane tissue will result in the disruption of physiological functions in the larval body (Srikandi dkk., 2020).

Conclusion

Red ginger has repellent activity against *Aedes aegypti* mosquito larvae. The higher the concentration of red ginger juice used, the higher the larval mortality rate for 24 hours. Red ginger can be used as a natural insecticide to prevent the spread of DHF, and it is hoped that

it can be applied in the community, especially in DHF-endemic areas. Red ginger is very easy to obtain, besides it is so cheap and is not toxic to the surrounding environment.

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Sociodemographic Factors Related To The Use Of Modern Contraception In Sleman Yogyakarta

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Abstract

The coverage of the use of modern contraception in Sleman exceeded Indonesia's achievements in 2017-2019. It's vital to research sociodemographic factors that influence the use of modern contraception in Sleman as an example for other areas. The purpose of this research is to determine the relationship between sociodemographic factors with the recent contraception use. This study is an observational descriptive model using secondary data from HDSS Sleman. Bivariable analysis was carried out using the chi-square test and followed by multivariable analysis using logistic regression. The result showed that the proportion of modern contraceptive use is 54.1%. Sociodemographic factors that significantly related to the use of modern contraception were the husband's education and the number of children. Husbands with a high level of education (AOR = 0.56; 95% CI: 0.34-0.90) had a 44% lower chance of using modern contraception than husbands with low levels of education. Couples with ≥ 2 children (AOR = 4.29; 95% CI: 3.41-5.39) were 4.29 times more likely to use modern contraception than couples with 0-1 children. The conclusion is sociodemographic factors significantly related to the use of modern contraceptive methods are the husband's education and the number of children.

Introduction

Indonesia is ranked fourth as the country with the highest population in the world after China, India, and the United States (WHO, 2020). In addition to the problem of high population density, the Maternal Mortality Rate (MMR) in Indonesia is still high. In 2015, MMR in Indonesia reached 305 per 100,000 live births (Kementerian Kesehatan Republik Indonesia, 2019). By 2030, this value must be reduced to less than 70 per 100,000 live births referring to the target of the Sustainable Development Goals (SDGs) (WHO, 2020). One of the efforts to overcome this problem, the Government of Indonesia, through the National Population and Family Planning Agency (BKKBN), launched a family planning (KB) program using the contraceptive method. Modern contraception, including sterilization,

pills, intrauterine devices (IUD), injections, implants, condoms, intravaginal/diaphragm, emergency contraception, and the lactation amenorrhoea method (MAL) are more desirable. They are considered more effective in preventing pregnancy (WHO, 2020). The use of modern contraception can reduce population density by decreasing birth rates. The use of contraception has also been shown to be significant in suppressing maternal and infant mortality by preventing unplanned pregnancies and spacing pregnancies at least two years after the previous birth (Gejo et al., 2019).

Sleman Regency is one of the regencies in the Special Region of Yogyakarta and is the district that contributes the highest number of couples of childbearing age in Yogyakarta (BKKBN, 2020). The high number of childbearing-age in Sleman, is followed by

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the advanced coverage of current contraceptive use. In 2017, 2018, and 2019, it was higher than the national coverage (Dinkes Sleman, 2020; Ministry of Health of the Republic of Indonesia, 2018, 2019, 2020). Based on the contraceptive use model compiled by Hall (2012), sociodemographic factors are among those that affect contraceptive use behavior. The existence of an appropriate approach to modifying sociodemographic factors to increase contraceptive use. Therefore, research on the factors affecting the use of modern contraception in couples of childbearing age in Sleman is vital. What factors affect the use of modern contraception by childbearing-age couples in Sleman. Later, the results obtained from this study can be used as a guide in designing programs to increase coverage of modern contraceptive use in other areas.

Method

This research is an analysis of secondary data from survey results conducted by the Health Demographic Surveillance System (HDSS) Sleman cycle four in 2018 and cycle five in 2019. It used an observational descriptive study with a cross-sectional research design to determine sociodemographic factors associated with behavior use of modern contraception

among couples of childbearing age and the proportion of modern contraceptive use among couples of childbearing age in Sleman Regency. The population of this study was couples of childbearing age (15-49 years) from HDSS Sleman data cycle 5, totaling 1981 couples. However, due to missing data (n=1), respondents answered “don’t know” to questions regarding contraceptive use (n=149), wife’s education (n=8), husband’s education (n=9), and husband’s occupation (n=8). = 1), then the subjects of this study were 1813 couples of childbearing age (15-49 years) whose data were recorded in the Sleman HDSS data cycle 5 and had data regarding socioeconomic status taken in the Sleman HDSS survey cycle 4. The flow of sample selection used in this study is depicted in Image 1. Data analysis carried out, was to find the proportion of modern contraceptive methods used by couples of childbearing age, univariable analysis to present data in the form of frequency tables to determine the frequency/ amount and percentage of data from each code for each dependent and independent variable, bivariable analysis performed is the chi-square test method. Independent variables with p <0.25 in the bivariable analysis were then included in the multivariable analysis using the logistic regression method.

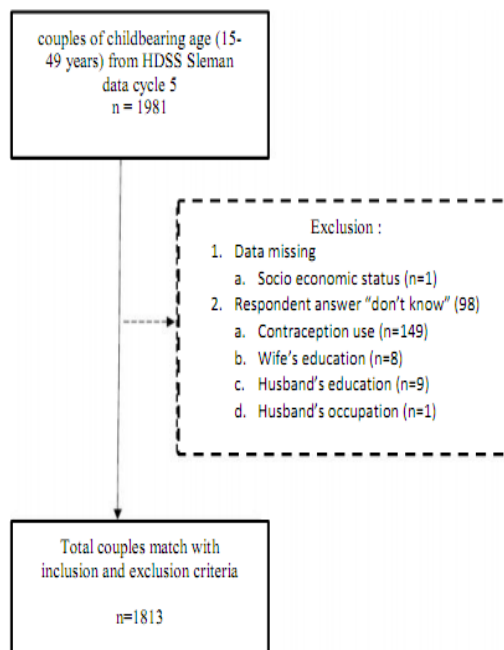


Image 1. Sample Selection Flow

Result And Discussion

Most of the husband subjects were in the age group of 35-49 years (76.6%), had a secondary education level (SLTP/MTS, and SLTA/SMK/MA) of 72.3% and were in employment status (98.2%) (Table 1). While most of the wife subjects were in the age group of 35-49 years (65.3%), had a secondary

education level (SLTP/MTS, and SLTA/SMK/MA) of 70.5% and were in employment status (50.6%) (Table 1). The results of the analysis also showed that the majority of respondents embraced Islam (94.9%), lived in urban areas (84.2%), were in upper-middle socioeconomic status (42.4%), and most of them had ≥ 2 children (62.4%) (Table 1).

Table 1. Sociodemographic Characteristics of Research Subject

Variables	Total	%
Husband's Age		
15-24	46	2,5%
25-34	379	20,9%
35-49	1,388	76,6%
Wife's Age		
15-24	112	6,2%
25-34	517	28,5%
35-49	1,184	65,3%
Religion		
Non Moslem	79	4,3%
Moslem	1,720	94,9%
Cross religion	14	0,8%
Husband's Education		
Elementary	167	9,2%
Middle	1311	72,3%
High	335	18,5%
Wife's Education		
Elementary	164	9,1%
Middle	1,279	70,5%
High	370	20,4%
Husband's Occupation		
Unemployment	32	1,8%
Working	1,781	98,2%
Wife's Occupation		
Unemployment	895	49,4%
Working	918	50,6%
Residential Location		
Rural	286	15,8%
Urban	1,527	84,2%
Socioeconomic Status		
Middle Low	643	35,5%
Middle	402	22,2%
Middle High	768	42,4%
Number of Children		
0-1 Child	681	37,6%
≥ 2 Children	1,132	62,4%
Total (n)	1,813	

Source : HDSS Sleman Data Cycle 4 in 2018 and Cycle 5 in 2019, processed

The description of contraceptive use by the 1813 couples of childbearing age who were

respondents to this study is described in Table 2 below.

Table 2. Description of Contraception Use by Couples of Childbearing Age

Variables	Total	%
a. Using Modern Contraception	980	54,1%
a. Do Not Use Modern Contraception	833	45,9%
- Do not use modern or traditional contraception	748	41,2%
- Use traditional contraception	85	4,7%
Total (n)	1,813	

Source : HDSS Sleman Data Cycle 4 in 2018 and Cycle 5 in 2019, processed

Table 3. Bivariable and Multivariable Analysis of Independent Variables on the Use of Modern Contraception

Variables	Bivariable Analysis		Multivariable Analysis	
	COR (95% CI)	P-value	AOR (95% CI)	P-value
Husband's Age				
15-24 years	1		1	
25-34 years	0,89 (0,48-1,64)	0,707	0,80 (0,38-1,68)	0,553
35-49 years	1,61 (0,89-2,90)	0,116	0,98 (0,44-2,15)	0,954
Wife's Age				
15-24 years	1		1	
25-34 years	1,43 (0,94-2,16)	0,091	0,92 (0,54-1,56)	0,745
35-49 years	1,91 (1,29-2,83)	0,001**	0,73 (0,41-1,30)	0,283
Religion				
Non Moslem	1		1	
Moslem	1,60 (1,02-2,53)	0,042*	1,42 (0,87-2,32)	0,162
Cross Religion	0,53 (0,15-1,83)	0,316	0,49 (0,13-1,89)	0,303
Husband's Education				
Elementary	1		1	
Middle	0,85 (0,61-1,18)	0,331	0,91 (0,62-1,32)	0,604
High	0,46 (0,31-0,67)	0,000***	0,56 (0,34-0,90)	0,018*
Wife's Education				
Elementary	1		1	
Middle	0,90 (0,65-1,25)	0,524	1,12 (0,77-1,63)	0,546
High	0,53 (0,36-0,76)	0,001**	0,88 (0,55-1,41)	0,597
Husband's Occupation				
Unemployment	1		1	
Working	1,18 (0,59-2,37)	0,643		
Wife's Occupation				
Unemployment	1		1	
Working	0,84 (0,69-1,01)	0,057	1,01 (0,83-1,24)	0,910
Location				
Rural	1		1	
Urban	0,93 (0,72-1,20)	0,569		
Economic Status				
Middle Low	1		1	
Middle	0,86 (0,67-1,10)	0,227	0,81 (0,62-1,06)	0,130
Middle High	0,78 (0,63-0,96)	0,019*	0,88 (0,68-1,14)	0,322
Number of Children				
0-1 Child	1		1	
≥2 Children	3,97 (3,25-4,86)	0,000***	4,29 (3,41-5,39)	0,000***

Source : HDSS Sleman Data Cycle 4 in 2018 and Cycle 5 in 2019, processed

Of the 1,813 couples of childbearing age who met the inclusion and exclusion criteria to become respondents in this study, only 980 (54.1%) used modern contraception. A total of 833 couples (45.9%) did not use modern contraception. Of the 833 couples who did not use modern contraception, 748 did not use either modern or traditional contraception (41.2%), and 85 only used traditional contraception (4.7%).

The results of the analysis in this study showed that the husband's education level was high (AOR=0.56, 95% CI=0.34-0.90, $p=0.018$) and the number of children ≥ 2 (AOR=4.29, 95% CI =3.41-5.39, $p=0.000$) was proven to significantly influence the use of modern contraception among couples of childbearing age in Sleman Regency (Table 3). The analysis shows evidence that the number of children has a very significant relationship with modern contraception use. The group of couples with ≥ 2 children has the possibility of using modern contraception 4.29 times higher than the group with 0-1 child. Research by Kogay & Itua (2017) also proves that the number of children has a significant relationship with the use of modern contraception, and groups with children 2, 3, and ≥ 4 have the possibility of using modern contraception are 1.93, 3.53, and 2.95 times higher than the group with 0-1 child. The same result was in a study by Irawaty (2021), which showed couples with many children have a greater tendency to use modern contraception. Research by Wilopo et al. (2017) using data from the 2001-2012 Indonesia Demographic and Health Surveys (IDHS) and the 2015 PMA-2020 survey found that the use of contraception as a means of limiting the number of births tends to be used more widely than the use of contraception. as a means to regulate the spacing of births (spacing). Thus, Indonesian people with children ≥ 2 have a greater tendency to use modern contraception.

The analysis shows that the husband's education has a significant relationship with the use of modern contraception. Of the 3 existing education groups, the group of husbands with low levels of education (never attended school or SD/MI) is the group with the highest probability of using modern contraception. These results were also obtained

in a study conducted by Seidu et al. (2020). While on the wife's education variable, the analysis shows that the wife's education has no significant relationship with the use of modern contraception. Of the 3 existing education groups, the group of wives with a secondary level of education is the group with the highest probability of using modern contraception. This result is in line with the results of a study conducted by Seidu et al. (2020) and Sserwanja et al. (2021). The results show that the husband group with a low education and the wife group with a secondary education level have a higher chance of using modern contraception. It is due to the husband group with a low education and the wife group with a secondary education level are the groups with a proportion of the number of children ≥ 2 . As much as 65.9% of the husband group with a low education level and 61.7% of the wife group with a secondary education level already have children totaling ≥ 2 .

The results show that the age of the husband and wife has no significant relationship with modern contraception use. Based on multivariable analysis, husbands and wives in the age group of 15-24 years have the highest opportunity to use modern contraception compared to the other two age groups. These results are in line with research conducted by Kogay & Itua (2017), Çalikoğlu et al. (2018), Seidu et al. (2020), and Mahande et al. (2020). The tendency to use modern contraception, which decreases with age, can be attributed to the belief of married couples that with increasing age, fertility rates will decrease because women will enter menopause. Not only in Sleman, Indonesia, this trend is also found in other countries such as Australia (Harris Id et al., 2021).

In the variable of religious beliefs held by couples of childbearing age, the analysis shows that this variable has no significant relationship with modern contraception use. Couples who adhere to Islamic religious beliefs have a 1.42 times greater chance of using modern contraception than those who adhere to non-Islamic religious beliefs. The results are in line with research by Mahande et al. (2020) and Namasivayam et al. (2020). This result can occur because 94.9% of the subjects in this study

adhere to Islamic religious beliefs, and 62% of subjects who adhere to Islam already have ≥ 2 children. As is known from the analysis results, the number of children, especially the number of children ≥ 2 , is a variable that positively and significantly influences modern contraception use. In addition, there is evidence showing that Indonesians have a higher tendency to use contraception as a means of limiting the number of births.

The results show that the employment status of husband and wife has no significant relationship with modern contraception use. The working husband group has a 1.18 times greater chance of using modern contraception than the non-working husband group. Wife's employment status variable found that working wives are 1.01 times more likely to use modern contraception than non-working wives. These results are in line with research conducted by Khan et al. (2018), Bolarinwa et al. (2021), and Hailegebreal et al. (2021). Couples who work will tend to use modern contraception. It can happen because, with modern contraception use, they will have control over when to have children. So, pregnancy will not interfere with the careers of married couples (McDougal et al., 2021).

Location of residence has no significant relationship with the use of modern contraception. Couples who live in villages have a higher tendency to use modern contraception than those who live in cities. Research by Kogay & Itua (2017) and Hailegebreal et al. (2021) also found similar results. Socioeconomic status also has no significant relationship with the use of modern contraception. Groups with lower middle socioeconomic status have a greater tendency to use modern contraception than middle and upper middle socioeconomic status. Same with the research conducted by Kogay & Itua (2017). The results show that groups living in villages and those with middle-low economic status have a greater chance of using modern contraception because most subjects living in villages and those with lower-middle economic status have a low education level than their husbands. As previously explained, the husband's education level is an independent variable with a significant effect on the use of modern contraception. Most groups with low

levels of husband's education already had ≥ 2 children. There is a fact that Indonesian people tend to use contraception to limit or reduce the number of children to be born so that more contraceptive use will be found in couples who have had children before (≥ 2 children) (Wilopo et al., 2017). Thus, the tendency to use modern contraception is more common among people living in villages and those with low socioeconomic status.

A family planning program called Family Advancement for Life and Health (FALAH) in Pakistan shows that setting birth spacing as the primary goal of family planning programs can provide better results. It increases maternal and child health better than limiting family size (limiting birth control) (Naz & Acharya, 2021). This study indicates that contraceptive use is still dominated by couples with ≥ 2 children. The results of a study by Wilopo et al. (2017) and another one by Naz & Acharya (2021) can be used as a basis for starting to design and improve education and promotion programs regarding the use of modern contraception as a means of spacing births (spacing) starting with couples who still have 0-1 child.

Conclusion

The factor of the number of children, especially the group with children ≥ 2 (AOR=4.29, 95% CI=3.41-5.39) and husband's education, especially the group with a low level of education (AOR=0.56, 95% CI=0.34-0.90), which is the group with the highest proportion of children ≥ 2 compared to the other two groups with the husband's education level, is a sociodemographic factor with a significant relationship with modern contraception use in Sleman Regency. Meanwhile, the factors of husband's and wife's age, religion, wife's education, husband's and wife's occupation, location of residence, and socioeconomic status have no significant relationship with the use of modern contraception by couples of childbearing age in Sleman.

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Determinants of Diabetes Mellitus Prevalence in Indonesia

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Abstract

The number of people with diabetes mellitus (DM) worldwide continues to increase. In 2019, Indonesia was the seventh country with the largest number of people with DM worldwide. The people with DM in Indonesia were dominated by the productive age population. This study aims to determine the variables affecting the prevalence of DM in Indonesia in 2018. The analysis unit used is 34 provinces in Indonesia, where the data comes from the Health Ministry of the Republic of Indonesia and Statistics Indonesia. Graph analysis and multiple linear regression are the methods used in this study. DKI Jakarta has the highest DM prevalence in Indonesia, reaching 3.4 percent. The prevalences of obesity and hypertension have a positive effect on the prevalence of DM. The result shows that every one percent increase in the prevalence of obesity will increase the prevalence of DM by 0.049 percent. While, every one percent increase will increase the prevalence of DM by 0.168 percent. The percentage of the population smoking, not exercising, the unemployment rate, and the average length of schooling does not affect the prevalence of DM in Indonesia.

Introduction

According to the International Diabetes Federation (IDF), diabetes mellitus (DM) is a condition that occurs when the body cannot produce enough insulin for a long time. It is also a condition where the body cannot use the insulin hormone in the body effectively, causing glucose levels in the blood to rise. DM can cause various complications, such as nerve damage, kidney damage, etc. World Health Organization (WHO) claims DM is one of the top ten most common causes of death.

DM contributes in increase morbidity and mortality worldwide. DM can cause serious health problems such as neuropathy, nephropathy, and retinopathy when not treated and managed wisely (Alanazi, 2021). In 2019, the number of people with DM globally is estimated at 463 million in the 20-79 year age group. For ten years, these cases continue to increase by about 6.24 percent annually. Based on IDF data, the increase in the number of

people with DM is expected to continue until 2045 and will reach 700 million people. The number of deaths from diabetes is estimated at 4.2 million. This number increased from 2017, which was 4 million people.

Indonesia is in the seventh position, with the number of diabetes mellitus cases reaching 10.7 million people. Based on the projections made by the IDF, the increase in the number of DM sufferers will continue until 2045, when the number of DM sufferers in Indonesia is estimated to reach 16.6 million people. Diabetes mellitus is the third highest cause of death in Indonesia for non-communicable diseases, where heart disease is the highest cause, followed by cancer. However, diabetes mellitus is one of the non-communicable diseases that is the target to be achieved in the Sustainable Development Goals, namely reducing complications caused by these non-communicable diseases.

Besides having an impact on early death

and lower quality of life, DM can also have a significant economic impact on countries, health systems, and individuals, especially when DM treatment needs to be self-funded by the sufferer for the healing process. Based on IDF data, the total expenditure devoted to DM is estimated at 760.3 billion dollars. This condition is expected to continue to increase. Then DM patients who experience complications can also increase spending on care and treatment to overcome the complications. People with DM incurred higher inpatient costs (averaging US\$1,912 per episode of admission (Malone et al., 2014).

According to data from the Health Ministry of the Republic of Indonesia, the prevalence of DM patients aged 15 years and over in Indonesia is 2 percent, where the productive age group population has the highest prevalence of DM when compared to other age groups. One of the human capital to increase productivity is health (Todaro & Smith, 2011). With more DM sufferers in the productive age population, this can affect the quality of the productive age population in Indonesia. The social determinants in which people are born, grow, work, and age has a powerful influence on health problem (Brady et al., 2021; Cummings et al., 2018; Kolak et al., 2019). To date, social determinants of health associated with DM include health literacy and related to individual education (Quartuccio et al., 2018). Many of the social determinants contribute to DM, including structural determinants (such as race and ethnicity) and individual-level determinants (such as smoking) (Fenelon, Chinn, & Anderson, 2017; Lariscy, Hummer, & Hayward, 2015; Marquez, Calman, & Crump, 2019; Rodríguez & Campbell, 2017; Sáenz & Garcia, 2021). Cartwright (2021) uses education level as demographic control to the diabetes disparity.

A way to prevent diabetes is to do physical activity such as exercise. According to Boden, Chen, and Stein (2001), moderate-intensity exercise programs provide beneficial effects, including increased insulin sensitivity and improved glycemic control. However, the awareness of the Indonesian people to exercise is still relatively low. The percentage of the population who do sports during the past

week is 35.7 percent. DM can cause so many complications, from disability to death. Based on the results of RISKESDAS data in 2018, only 9.3 percent of DM patients in Indonesia can recover without treatment, and 90.7 percent need drugs to treat DM, starting with insulin injections and consuming specific medicines. It shows that most people with DM require special treatment. Family history, unhealthy eating patterns, age, education, and obesity are variables that influence the occurrence of diabetes mellitus (Stetson, Minges, & Richardson, 2017). In addition, research conducted by Nainggolan, Kristanto, and Edison (2013) states that age, body mass index, hypertension, high LDL cholesterol, high triglycerides, and a family history of DM are variables affecting the occurrence of diabetes.

Physical inactivity is estimated to cause almost 6-10% of non-communicable diseases like DM (Lee et al., 2012). The research was conducted by Śliwińska-Mossoń and Milnerowicz (2017) to determine the effect of smoking on diabetes mellitus. Nicotine content in cigarettes can cause a decrease in plasma aminopterin levels so that it can cause insulin resistance which can lead to diabetes mellitus. Shang et al. (2013) conducted a study to see the effect of education level and age on the incidence of diabetes mellitus among Chinese adult men and women. The results show that people aged 18-59 years with low levels of education are more at risk of developing diabetes than people with high levels of education. Previous studies have focused more on research on diabetes mellitus that occurs from the individual side. Biradar and Singh (2020) also found that education had a positive influence on DM. Thus, this study aims to analyze the prevalence of diabetes mellitus in an area and the factors that determine it.

Method

This study uses cross-section data from the Ministry of Health of the Republic of Indonesia and Statistics Indonesia (BPS). The diabetes mellitus prevalence data, obesity prevalence, hypertension prevalence, smoking population percentage, non-exercise population percentage, unemployment rate, and the average length of schooling for each province

in Indonesia in 2018. The method used is the multiple linear regression method. Multiple linear regression is an analytical method that aims to find the effect of the independent variable on the dependent variable.

The prevalence of diabetes mellitus based on a doctor's diagnosis in the population aged more than 15 years is the percentage of the population aged more than 15 years who suffer from diabetes mellitus to the population aged more than 15 years. The prevalence of central obesity in the population aged more than 15 years is the percentage of the population aged more than 15 years who suffer from central obesity to the total population aged more than 15 years. The prevalence of hypertension based on a doctor's diagnosis in the population aged over 18 years is the percentage of the population aged more than 18 years who suffer from hypertension based on a doctor's diagnosis of the population with an age of more than 18 years. The percentage of smoking is the percentage of the population who do smoking activities of the total population. The unemployment rate is the percentage of the number of unemployed in the labor force. The percentage of the population who did not

exercise in the last week is the percentage of the population who did not exercise during the past week to the total population. The average length of schooling is the average number of years taken by residents aged 15 years and over to take all levels of education that have been undertaken.

Result And Discussion

Based on data from the Health Ministry of the Republic of Indonesia in 2018, the prevalence of DM patients aged 15 years and over in Indonesia is 2 percent. By gender, the prevalence of the male population aged 15 years and over who suffers from diabetes mellitus is 1.7 percent. This number is smaller than the prevalence of women aged 15 years and over who suffer from diabetes mellitus, reaching 2.4 percent. Based on the level of education, the prevalence of people with diabetes aged more than 15 years, and the population with educational status not completing elementary school is the highest with 2.9 percent. Then, followed by the population with education status who never went to school (2.8 percent) and the population with graduated education status (2.8 percent).

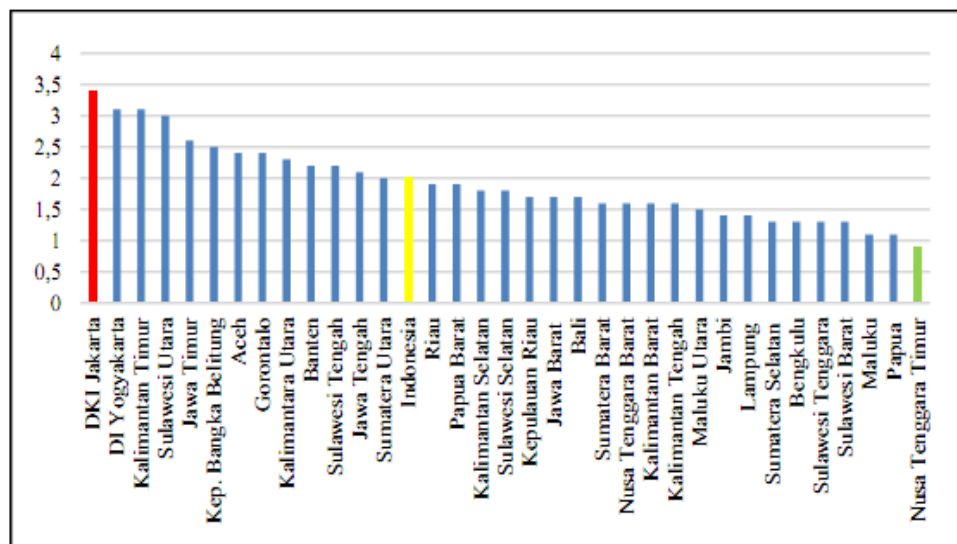


Figure 1. Diabetes Mellitus Prevalence Based on Doctor's Diagnosis in the Population Age 15 Years and Over by Province in Indonesia 2018

Based on Fig. 1, 13 provinces have a higher prevalence of diabetes in Indonesia. DKI Jakarta is the highest, with 3.4 percent, followed by DI Yogyakarta (3.1 percent) and East Kalimantan (3.1 percent). Meanwhile, the

province with the lowest prevalence of diabetes is the province of East Nusa Tenggara. Residents who live in urban areas tend to be more at risk for developing diabetes due to unhealthy lifestyles such as consuming excessive carbohydrates,

lack of physical activity, smoking, alcohol, etc. For example, in 2018, DKI Jakarta is the province with the highest percentage of the population who exercised during the past week in Indonesia (44.93 percent). Based on the number of days to exercise, as many as 71.24 percent of the population who exercised do it only one day in the past week. Gothankar and Patil (2011) found that obesity was associated with DM. In 2018, the prevalence of obesity in Indonesia in the population aged more than 15 years was 31 percent. The province with the highest prevalence of obesity was North Sulawesi, with 42.5 percent, followed by DKI Jakarta (41.9 percent) and East Kalimantan (37.3 percent). The province with the lowest prevalence of obesity is East Nusa Tenggara, with 19.3 percent.

According to Hruby et al. (2016), the factors affecting the incidence of obesity are sugar-sweetened beverages, poor diet quality, physical inactivity, prolonged screen time, short sleep duration or shift work, and built environment characteristics. Physical activity can be in the form of sports or activities carried out daily. The number of residents who do sports in North Sulawesi is 28.43 percent. This number is below the national average for people who do sports. Then based on this number, as many as 73.54 percent of the population who exercised only did it for one day in the past week. It means the exercise will be less effective. As the province with the lowest obesity percentage, East Nusa Tenggara has a relatively small percentage of the population who exercise, 26.19 percent. However, based on the activities carried out, most in this province work in fields that require high physical activity, such as agriculture, fisheries, plantations, and industry.

The prevalence of hypertension in the population aged over 18 years in Indonesia in 2018 was 8.36 percent. North Sulawesi Province, with 13.21 percent, is the highest in Indonesia, followed by DI Yogyakarta and East Kalimantan. Papua Province has the lowest prevalence of hypertension in Indonesia, with a hypertension prevalence of 4.39 percent. Several factors can cause hypertension, such as age, sex, marital status, education, wealth index, working status, ecological zone, province of residence,

place of residence, body mass index, drinking alcohol, and caffeine (Hasan et al., 2018). The percentage of the population aged 15 years and over who smokes in North Sulawesi is 32.8 percent, with the average number consumed per week being 82.19 cigarettes. In contrast, the province of Papua, with the lowest prevalence of hypertension in Indonesia, has a smoking percentage of 28.97 percent, which is smaller than the national smoking percentage. As one of the factors that can affect hypertension, the percentage of smokers in each province will certainly make a difference in the prevalence of existing hypertension.

The percentage of the smoking population in Indonesia is 32.2 percent. The province in Indonesia with the highest rate of smoking population is Gorontalo province, which is 36.56 percent. Meanwhile, the province with the lowest percentage of the smoking population is DI Yogyakarta, which is 25.8 percent. One factor influencing cigarette consumption is excise duty, where every increase in excise tax will reduce the population's interest in consuming cigarettes. In 2018, the cigarette excise tax increased by 10.04 percent, but a decrease did not follow the increase in the percentage of smokers. The number of people who did not exercise in Indonesia in 2018 was 64.3 percent. By gender, the male population in Indonesia has a lower percentage of not exercising than the female population, which is 61.77 percent. Papua has the highest percentage of the population who does not exercise in Indonesia, and the lowest is DKI Jakarta at 55.07 percent. Based on the place of residence, urban residents have a percentage of residents who do not exercise at 59.27 percent, lower than rural areas (70.57 percent).

The factor that influences people to exercise is the availability of time each individual has. In urban areas in Indonesia, 83.17 percent of the population worked 20-74 hours during the past week. While in rural areas, 78.39 percent of the population has a working hour of 20-74 hours. It shows that in Indonesia, the availability of time does not affect the desire of the population to do sports. The type of work in rural areas, which tends to demand higher physical activity when compared to

work in urban areas, can be one of the causes of the lack of interest of rural residents to do sports. Feldman et al. (2020) showed evidence of a positive association between DM and unemployment. In 2018, the unemployment rate in Indonesia was 5.13. The province with the highest unemployment rate in Indonesia is West Java, with an unemployment rate of 8.16, followed by Banten (7.77) and Maluku (7.38).

One of the factors that influence the unemployment rate is the level of education. The average length of schooling in the province of West Java is 8.61 years, while Bali, with the lowest unemployment rate, has an average length of schooling of 9 years. The population in Bali who graduated from the graduate program is 12.3. This number is higher than West Java, which is only 7.87 percent. In addition to the level of education, population density is also one factor affecting an area's unemployment rate. The higher the population density of an area, the more people in the region, which can cause competition in the world of work to be tough and increase the number of unemployed.

Feldman et al. (2020) found that prevalence decreased with increasing educational attainment. The average length of schooling in Indonesia in 2018 was 8.58 years. It shows that the average Indonesian population only has an elementary school certificate. It is

because, on average, the Indonesian population only attends up to the second grade of junior high school. DKI Jakarta has the highest average number of years of schooling, which is 11.06 years (high school level). Meanwhile, the province with the lowest is Papua province, with an average length of schooling of 6.66 years (elementary school). The average length of schooling in Papua can be reflected in the literacy rate of the province of Papua, which is 76.79 percent, where this percentage is the smallest in Indonesia. In addition, only 7.86 percent of the total population of 15 years and over had a graduate level.

Based on Table 1, the prevalence of obesity and the prevalence of hypertension significantly affect diabetes mellitus prevalence. While the variables of the percentage of the population smoking, the percentage of the population not exercising, the unemployment rate, and the average length of schooling are insignificant. The coefficient of determination is 0.627. It means that the prevalence of obesity, the prevalence of hypertension, the percentage of the population smoking, the percentage of the population not exercising, the unemployment rate, and the average length of schooling can explain the diabetes mellitus prevalence by 62.7 percent.

Table 1. Summary of the Results of Multiple Linear Regression

Variables	B	t-test		VIF	Homoscedasticity	
		T	Sig.		t	Sig.
Obesity Prevalence (PO)*	0.049	2.626	0.014	1.842	1.206	0.238
Hypertension Prevalence (PH)*	0.168	3.713	0.001	1.618	0.116	0.908
Smoking Percentage (PM)	-0.025	-0.981	0.335	1.185	-1.515	0.141
Non-exercising Percentage (PT)	-0.008	-0.512	0.613	1.497	-1.894	0.069
Unemployment Rate (PTB)	0.03	0.626	0.537	1.496	-0.563	0.578
Length of Schooling (RLS)	-0.007	-0.06	0.953	2.067	0.145	0.886

*)Significant at $\alpha = 5\%$

$R^2 = 0,627$

Based on Table 1, the model formed is as follows:

$$PD_t = 0,194 + 0,049PO_t + 0,168PH_t - 0,025PM_t - 0,008PT_t + 0,03PTB_t - 0,007RLS_t$$

Using the Kolmogorov-Smirnov test, the p-value obtained is 0.200. It is higher than $\alpha = 0.05$, so the error is normally distributed. Using the Glejser test, the p-value obtained for each independent variable is more than 0.05, so the error variance is constant. To check non-

multicollinearity, the VIF (Variance Inflation Factor) value can be used. Based on Table 1, the VIF value of the six independent variables is lower than 10, so there is a non-multicollinearity. Based on the model, it shows that every one percent increase in the prevalence of obesity

will increase the prevalence of diabetes mellitus by 0.049 percent. The following research conducted by Stetson et al. (2017) shows that obesity affects diabetes mellitus. Excessive consumption patterns can cause fatty acids or Free Fatty Acids (FFA) in cells. The increase in FFA that occurs can cause a decrease in glucose uptake into the plasma membrane and will cause insulin resistance in muscle and adipose tissue. This event can cause fatigue in the pancreas until the pancreas does not produce insulin as needed. It causes an increase in blood sugar levels, and diabetes occurs. Biradar and Singh (2020) also found that overweight people showed the strongest association with DM.

Parsa, Aghamohammadi, and Abazari (2019) found that 54.1% of DM patients suffered from comorbidities. The prevalence of hypertension affects the prevalence of diabetes mellitus with a positive effect. Research by Pham and Eggleston (2016) also found that hypertension was associated with a higher prevalence of DM. Based on the model, it shows that for every one percent increase in the prevalence of hypertension, it will increase the prevalence of diabetes mellitus by 0.168 percent. These results follow the research conducted by Nainggolan et al. (2013), which states that hypertension is one of the variables that significantly affect diabetes mellitus. In addition, according to Cheung and Li (2012), if your blood pressure is above 120/90 mmHg, you will have a double risk of diabetes than people with normal blood pressure. The thickening of the blood vessels will cause the process of transporting glucose from the blood to be disrupted.

The percentage of the smoking population has no significant effect on the prevalence of diabetes mellitus. This result is in line with research conducted by Nainggolan et al. (2013), which states that smoking behavior does not affect the occurrence of diabetes mellitus. According to research conducted by Śliwińska-Mossoń and Milnerowicz (2017), cigarettes contain 7357 chemical compounds and 1015 to 1017 free radicals and can lead to diabetes mellitus. In Indonesia, 2.08 percent of the population in urban areas and 2.14 percent in rural areas smoke but do not do it daily. The number of cigarettes consumed

by the Indonesian population every week is 81.23 cigarettes, which means that, on average, the Indonesian population consumes 11-12 cigarettes. In addition, as many as 12.75 percent of the population who smoke consumes 1-29 cigarettes per week.

The percentage of the population who do not exercise has no significant effect on the prevalence of diabetes mellitus. Physical activity is categorized as less if the activity is carried out continuously for less than 10 minutes in one non-stop activity and cumulatively does not reach 150 minutes five days a week. Based on the population who do sports, the number of people who exercise in Indonesia is 35.7 percent. Almost 68.31 percent of the population who exercise do sports only one day a week. When viewed based on the length of exercise, the highest percentage is at 30-60 minutes, which is 48.67 percent. Furthermore, based on the purpose of doing sports, residents who do sports during the past week do more sports to fulfill the curriculum at school. Based on these things, the average exercise performed by the Indonesian population is considered less effective. The unemployment rate has no significant effect on the prevalence of diabetes mellitus. Based on data from the Health Ministry of the Republic of Indonesia in 2018, the unemployed population has the second-highest diabetes prevalence in Indonesia, 3.2 percent. The highest prevalence of diabetes mellitus by type of activity in Indonesia is owned by population groups who work as civil servants. People who have worked can also affect the existing level of diabetes mellitus.

The average length of the school has no significant effect on the prevalence of diabetes mellitus. According to Stetson et al. (2017), people with higher education levels will have behavior change concepts and theories and have more health knowledge. They have an awareness of maintaining their health. Less educated people may lack resources and have difficulties accessing information, especially nutrition, which can cause DM (Vasconcelos et al., 2020). More years of education people also prevent DM complications (Rovner, Haller, Casten, Murchison, & Hark, 2015). People with low levels of education (never attended school, did not finish elementary school, and finished

elementary school) tend to have jobs that require high physical activity. Like agriculture, plantation, forestry, hunting, fisheries, production workers, and manual labor. High activity can prevent insulin resistance which can lead to diabetes mellitus.

Conclusion

Obesity and hypertension prevalence have a positive and significant effect on the prevalence of diabetes mellitus, while the percentage of the smoking population, the percentage of the population not exercising, the unemployment rate, and the average length of schooling has no significant effect. Poor diet and lack of physical activity are some of the factors that can cause obesity. The local government can improve various existing programs to assist the community in maintaining its health. The Healthy Living Community Movement (Germas) is one of the programs to remind the public to maintain their health that the Indonesian Ministry of Health created. This program needs to be improved to reach various groups of people. People are also expected to pay more attention to their lifestyles to reduce obesity. The local government also should provide health services regularly, for example, two times a month. It will create public awareness to maintain their level of blood pressure.

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Analysis of Basic Environmental Health Facilities Associated with Risk Factors of Diarrhea Among Toddlers

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Abstract

Diarrheal disease in young children (toddlers) seems increasingly common in tropical countries, especially in dirty and dense urban areas. Diarrhea can last several days and cause the body to lose the fluids needed for survival. This study aimed to determine the sanitation factors that influence the incidence of diarrhea. Methods: This study used a case-control design involving 100 respondents. All respondents were divided into two groups: the case class (toddlers who had diarrhea) and the control class (toddlers who did not experience diarrhea). Results and Discussion: This showed that four sub-variables of sanitation (waste, drainage conditions, domestic wastewater management, and water source safety) had a significant relationship with the incidence of diarrhea (p -value < 0.05). Domestic wastewater was the most influencing factor and securing clean water and drinking water sources, with a Nagelkerke R Square value of 0.952. There was an indication that the independent variable (sanitation) affected the dependent variable (diarrhea incidence) by 95.2%. Conclusion: The sub-variable of domestic wastewater management and the sub-variable of the safety of clean water and drinking water sources were the most affecting the incidence of diarrhea. The clean water source factor was 12 times riskier. It means children who did not get it will have 12 times the risk of getting diarrhea. Meanwhile, in the aspect of domestic wastewater management, children who did not meet the requirements for domestic wastewater have a risk of 8.13 times the incidence of diarrhea.

Introduction

Diarrhea is an environmental-based disease caused by poor sanitation, a dirty environment, and poor community behavior towards healthy living. The disease potentially leads to extraordinary events (KLB) and death when not properly managed (Profile of the Sumbawa District Health Office, 2020). Furthermore, it is the second most common disease in the world after acute respiratory infections (ARI). Approximately 1 billion cases of diarrhea are recorded annually, and it is a significant cause of morbidity and mortality among toddlers in Asia, Africa, and Latin America (Asep dan Delima, 2018).

The spread of the disease is closely related to environmental factors, along with the two most dominant factors being clean water facilities and excreta disposal. An unhealthy environment is prone to diarrheal germs contamination, and its combination with unhygienic intake of food and drink leads to diarrhea. These factors are the second leading cause of death among toddlers under the age of 5 years, and in 2010, there were 2.5 million cases globally. The prevalence of the disease in Asia and Africa is due to inadequate nutrition in toddlers as well as the lack of clean water sanitation (World Health Organization, 2013). The number of cases recorded annually

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fluctuates, and the increased prevalence is closely related to poor environmental sanitation. Meanwhile, unhealthy sanitation is due to the lack of awareness and knowledge, specifically in rural communities about healthy lifestyles, which help to prevent the spread of diarrheal diseases in Indonesia (Rasyidah, 2019).

Population growth and urbanization lead to an increased population density as well as the complexity of people's needs, specifically housing and settlements. The Decree of the Minister of Health, the Republic of Indonesia, with reference Number 829/Menkes/SK/VII/1999 concerning housing health requirements stating that a house is one of the basic human needs, which functions as a dwelling place or shelter. It shields people from climate disturbances and other living things and serves as a place for family development. Therefore, a healthy, safe, harmonious, and orderly home is essential to fully fulfill the functions and uses of a house (Jinping, 2017). Basic sanitation is defined as the minimum cleanliness level needed to create a healthy environment and control various environmental factors causing health problems. The scope of basic sanitation includes the availability of healthy latrines, clean water, waste management facilities, and wastewater disposal channels. People who live in areas with poor sanitation are prone to several health problems, such as diarrhea (Cronk & Bartram, 2018).

Lack of access to clean water and good sanitation facilities increases the incidence of infectious diseases, which divert the body's growth energy to resistance against infections. It leads to difficulty in the uptake of nutrients by the body, thereby causing stunted growth. Approximately 72.04% of households in Indonesia had access to safe drinking water sources in 2017. The province with the highest percentage was Bali, accounting for 90.85% of the households, while the lowest percentage was Bengkulu which had 43.83%. However, there are still 20 provinces that are below the national standard percentage. Therefore, sources of drinking water, such as taps, public faucets, public hydrants, water terminals, rainwater reservoirs (PAH), springs, drilled wells, or pumps should be built at least 10 meters away from sewage, waste collection, and

garbage disposal. The consequences of lacking access to good drinking water and sanitation go beyond the health implication, whereby the vulnerability of these children would have a long-run economic effect on the future working population (Waziri et al., 2018).

Diarrhea coverage in Sumbawa District decreased in 2019 compared to 2018 due to the increased prevalence in each sub-district. The number of targets for finding cases of the disease at all ages in 2019 was 24,636, with a 20% morbidity rate per 100,000 people, while for toddlers, it was 10,966, with a 30% morbidity rate per 100,000 population. Based on data from the Sumbawa District Health Office in 2019, Moyo Hilir Sub-district was classified as an area with a high prevalence of the disease following the discovery of 539 cases in children. The basic sanitation facilities investigated include the condition of the clean water supply, family latrine, family wastewater disposal, and waste disposal. Therefore, this study aims to determine the relationship between basic environmental health facilities and the risk factors for diarrhea in toddlers in Moyo Hilir Sub-district, Sumbawa District.

Method

It is a case-control study using an analytical survey method, and a retrospective approach. The case samples used were households with a toddler aged 1 - <5 years who had diarrhea in the last 2 months, while controls were households with a toddler aged 1 - <5 years who is free from the disease in the last 2 months. This study took place in Moyo Hilir Sub-district, Sumbawa District, West Nusa Tenggara, between November and December 2021. The sample population consists of households with a toddler serving as the analysis unit. The sample size consisted of 100 units of analysis divided into 2 classes, namely case and control, with 50 units each.

Meanwhile, the sampling process was carried out using the purposive sampling technique. The data collected were then analyzed univariately, which involves explaining each variable's characteristics. The variable groups were presented in a frequency distribution table for basic environmental health facilities, including clean water provision, fecal disposal,

wastewater disposal, and waste disposal facilities. Bivariate analysis using chi-square was also carried out to describe the relationship between basic facilities for environmental health and the dependent variable, namely the incidence of diarrhea. Furthermore, a multivariate analysis using logistic regression was performed to determine the most dominant health facilities related to the incidence of the disease in toddlers. The toddlers used as a sampling unit fulfilled the following criteria.

They are aged 1 – 5 years, not suffering from infectious diseases, and toddlers whose parents are willing to be respondents.

Result And Discussion

Based on the results of data processing obtained in the field, the following results were obtained, covering the characteristics of respondents, cross-tabulation data, and bivariate analysis data for each sub-variable.

Table 1. Frequency Distribution of Respondents Characteristics

Gender	Frequency	Percentage (%)
Male	36	36
Female	64	64
Age Range (Years)		
0-2	25	25
2-3	27	27
3-4	26	26
4- 5	22	22
Last education		
Elementary school	27	27
Junior High School	13	13
Senior High School	34	34
University	16	16
Mother's work		
Housewife	45	45
Farmer	27	27
Indonesian workers	15	15
Trader	13	13
Total	100	100.0

Source: Primary Data, 2021

Table 2. Cross Tabulation of Sanitation Sub-Variabes with Diarrhea.

Environmental Sanitation Variable	Category	Diarrhea				Total	Percentage (%)
		Diarrhea (person)	Percentage (%)	No Diarrhea (person)	Percentage (%)		
Garbage	Good	6	6	47	47	5	53
	Bad	44	44	3	3	47	47
Drainage Condition	Good	1	1	48	48	49	49
	Bad	49	49	2	2	51	51
Domestic Wastewater Management	Good	23	23	14	14	37	37
	Bad	27	27	36	36	63	63
Safe water sources and drinking water	Good	8	8	30	30	38	38
	Bad	42	42	20	20	62	62
Implementation of PHBS	Good	22	22	21	21	43	43
	Enough	17	17	21	21	38	38
	Bad	11	11	8	8	19	19

Source: Primary Data, 2021

Table 3. Bivariate Analysis of the Relationship between Sanitation Facilities and the Incidence of Diarrhea in Toddlers under Five in Moyo Hilir Sub-district

Sanitation Facilities item		Diarrhea (person)	Percentage (%)	No Diarrhea (person)	Percentage (%)	Total (Person)	Percentage (%)	P value	OR
Garbage	Good	6	6	47	47	53	53	< 0,001	0,009
	Bad	44	44	3	3	47	47		
Total		50	50	50	50	100	100		
Drainage Condition	Good	1	1	48	48	49	49	< 0,001	0,001
	Bad	49	49	2	2	51	51		
Total		50	50	50	50	100	100		
Domestic Wastewater Management	Good	23	23	14	14	37	37	0,062	2,2
	Bad	27	27	36	36	63	63		
Total		50	50	50	50	100	100		
Water sources	Safe	8	8	30	30	38	38	<0,000	0,127
	Not safe	42	42	20	20	62	62		
Total		50	50	50	50	100	100		
PHBS	Good	22	22	21	21	43	43	0,632	0,127
	Enough	17	17	21	21	38	38		
	Deficient	11	11	8	8	19	19		
Total		50	50	50	50	100	100		
latrine facilities	Worthy	27	27	23	23	50	50	0,424	1,378
	Not feasible	23	23	27	27	50	50		
Total		50	50	50	50	100	100		

Source: Primary Data, 2021

Logistics Regression Test

Table 4. Significance Value per Item Sub-Variation Sanitation

No	Sanitary Items	Significance value
1	Garbage	0.000
2	Drainage	0.000
3	Water_Waste_Domestic	0.062
4	Source_Clean_Water	0.000
5	PHBS	0.632
6	latrine facilities	0.424

Source: Primary Data, 2021

Table 5. Sub Variable Elimination Matrix

Step 6	Significance	OR Value	Value of Nagelkerke R Square
Domestic wastewater	0,004	8,127	0.952
Safety of clean water sources and drinking water	0,001	12	
PHBS (1)	1,000	0.000	
PHBS (2)	0,673	0.178	

Source: Primary Data, 2021

Table 1 shows that the respondents' children are female (64%). The age range of respondents is in the age category of 3-4 years, as much as 26%. The respondent's latest education is dominated by high school graduates (34%) who consider the mother's occupation a housewife (IRT) as much as 45%. Based on Table 2, only in implementing PHBS that the respondents have a good category. In contrast, in solid waste, drainage, domestic wastewater treatment, and the safety of clean water sources are still poor. The incidence of diarrhea was dominated by respondents who had poor sanitation and vice versa. Respondents who did not experience diarrhea in the last two months during the study period had good sanitation. Toddlers suffer from diarrhea, who have unqualified landfill conditions (44%), and toddlers suffer from diarrhea who have eligible landfill conditions (6%).

Meanwhile, for respondents who did not experience diarrhea, their waste was in a good category (47%). The bivariate analysis results with the chi-square statistical test showed a relationship between the condition of the trash can and the incidence of diarrhea in children under five in Moyo Hilir District with a p-value < 0.001. Table 3 shows that in the cases that experienced diarrhea, the drainage condition was still in the bad category (49%). The p-value indicates a relationship between drainage conditions and the incidence of diarrhea. Table 3 shows no relationship between domestic wastewater management and the incidence of diarrhea. By cross-tabulation, the domestic wastewater management of respondents who experienced the major incident was in a bad category (27%).

Table 3 shows that the safety of clean water sources has a relationship with diarrhea incidence in children under five in Moyo Hilir District. Most respondents have clean water sources from PDAM, dug wells, and drilled wells. Most respondents buy gallons of bottled water and store it in closed containers regarding drinking water needs. However, some have a source of drinking water directly from the well. It was especially the case in the case class where the source of water used for drinking and household needs came from well water which was not well located at a safe distance from

the septic tank. Table 3 shows that the case group of toddlers who experienced diarrhea in the last two months had unsafe drinking and clean water sources (42%), while in the class of toddlers who did not experience diarrhea, as many as 30% of toddlers had safe water sources. Based on Table 3, there is no relationship between the implementation of PHBS and the incidence of diarrhea. In the case class, the application of PHBS to the respondents is in the good and sufficient category. Likewise, in the toddler class, who did not experience diarrhea. Based on Table 3, there is no relationship between latrine conditions and the incidence of diarrhea.

In the case class, most latrines used are in the proper and healthy category. Meanwhile, the latrine facilities used in the control class were not included in the proper category. Findings in the field indicate that although the latrine facilities are following the criteria, the depth of the septic tank and the location of the existing dug holes do not meet the requirements. The process of logistic regression analysis was carried out after bivariate analysis of each sub-variable, with the incidence of diarrhea obtaining a significant value in Table 3. Based on the p-value in Table 3, 3 variables met the requirements for further analysis. They are the solid waste sub-variable, drainage, and clean water sources. However, the domestic wastewater variable is still included in the test criteria because the tolerance limit in logistic regression in determining the variable matrix is 0.1. So that only PHBS variables are not included in the modeling.

SPSS software version 16.0 tested the four sub-variables with a binary logistic regression test, using a backward method. Meanwhile, the test was carried out to determine the most influential sub-variables in the incidence of diarrhea in toddlers. Table 5 shows the test results, which revealed the two most influential sub-variables. They are domestic wastewater and the safety of clean water and drinking water sources with a Nagelkerke R Square value of 0.952. This finding indicates that sanitation has a 95.2% effect on the incidence of diarrhea, and 4.8% of other factors that also influence it. The factor value shows that the source_air_clean factor has a 12-fold risk, which indicates that toddlers that do not fulfill the criteria for clean

water have a 12-fold risk of developing the disease. Meanwhile, in the aspect of domestic wastewater management, a toddler that does not fulfill the criteria has an 8.13 times risk of having the disease.

Diarrheal disease in young children (toddlers) seems increasingly common in many tropical countries, especially in dirty and dense urban areas (Herawanto et al., 2020). Diarrhea can last several days and can cause the body to lose the fluids needed for survival. The community's awareness and willingness are needed to change people's behavior to care more about their environment. Behavioral changes only occur when the community is educated on the importance of environmental sanitation. Therefore, it is necessary to increase public knowledge about clean and healthy living behavior, specifically environment sanitation, which decreases diarrhea morbidity (Rasyidah, 2019). Other factors that increase the risk of the disease include lack of clean water for personal and household hygiene, improper disposal of feces, contamination of water with feces, and improper preparation and storage of food, specifically breast milk complements.

Efforts to prevent diarrhea in toddlers include maintaining environmental and personal hygiene, continuous breastfeeding, balanced nutrition, and immunization (Kue et al., 2022). The correlation between diarrhea-associated deaths of children and UISF in rural areas was weaker than in urban areas, which shows the importance of sanitation facilities in urban areas. Meanwhile, UIDWS had a stronger correlation with children's death in rural areas compared to urban areas, which can be possibly due to the availability of clean, piped water in urban areas and also the use of surface water in rural areas (Bidkhorri et al., 2019).

This study showed that landfills had a relationship with the incidence of diarrhea but had no effect on it. Improper garbage disposal in an upper-middle-income city increases hospitalization rates for diarrhea, specifically due to the Rotavirus (Ahmed et al., 2020). The features of a good waste container include a solid body, does not leak easily, is easy to open, clean, and carry (Nemat et al., 2020). Meanwhile, safe household waste management consists of waste collection using closed containers,

transporting it to a temporary place outside the house, recycling inorganic waste, and harmless waste disposal (Nemat et al., 2020). Organic waste can be disposed of through a composting process, which involves digging a hole in the yard to store of the wastes.

Drainage conditions also have a relationship with the incidence of the disease but do not affect it. A settlement drainage system that does not fulfill the standard requirements is a potential breeding ground for diseases (Corburn et al., 2020). Poor drainage has become a new problem for the public because it causes environmental-based diseases, such as diarrhea. Meanwhile, the closed channel drainage system is safe for domestic wastewater flow. The system is generally used for the dirty water or drains in the city center (Antwi et al., 2021). Several surveys showed domestic wastewater was left in an open stream, causing water puddles behind the respondent's house.

This study also shows that domestic wastewater management has a strong relationship and effect on the incidence of diarrhea. Environmental health is part of the fundamentals of modern public health, including all aspects of human beings concerning the environment, which is bound to various ecosystems. The scope of environmental health includes water sources. Cleanliness of latrines, garbage disposal, housing conditions, and wastewater management. The environment is anything surrounding and the conditions outside of humans or animals that cause disease transmission (Hakim et al., 2018). Based on observations, most respondents had poor wastewater management because the water was not properly treated and is directly discharged into rivers. Several respondents also stated that they use water from the laundry to wet the yard. Generally, there are two categories of wastewater. Namely black and grey water. Facilities are needed at the domestic level in the form of infiltration wells and wastewater disposal channels to properly get rid of greywater. Sewage in the form of feces and urine (blackwater) should be channeled into septic tanks equipped with infiltration wells because it helps to prevent the proliferation of vectors, such as flies. Rural populations obtain water on an individual or household basis from

the closest surface and groundwater sources where the microbial quality is often unknown (Potgieter et al., 2020).

Conventional urban wastewater treatment plants are not designed to remove micropollutants, which may have more long-term effects than previously thought (Pesqueira et al., 2020). Dirty water pollutes clean water sources that are within its vicinity. Hence, it is advisable to build wastewater reservoirs in the form of infiltration wells or public sewers. Meanwhile, most respondents did not have a proper wastewater disposal system, consequently, the toddlers in the house are prone to diarrhea. It is because the wastewater logs around, which leads to various public problems, such as the increased transmission of diseases, the proliferation of mosquitoes larvae as well as unpleasant odors and appearance (El-Hefni et al., 2020).

The results also showed that clean water sources have a relationship and influence on the incidence of diarrhea. Sources of water used for various activities need to fulfill the appropriate requirements, namely construction of processing facilities, maintenance, and quality control. Furthermore, clean water sources can be obtained from regional drinking water companies, such as groundwater, rainwater, drilled wells, pumps, and artesian wells (Corburn et al., 2020). Improving the quality and quantity of water sources as well as individuals' efforts can reduce the possibility of contracting pathogenic bacteria that cause diarrheal disease. The overall prevalence of under-five diarrhea among individuals is high. Child immunization, latrine presence, water shortage in the household, solid waste disposal, and per capita water consumption/water access at the individual level, water shortage in households, child immunization, and solid waste disposal had a statistically significant association with diarrhea occurrence (Ayalew et al., 2018). However, the ideal distance of 10 meters between the water source and the septic tank seems difficult to apply in areas with high population density due to insufficient land. Several attempts can be made to overcome land limitations. One of them is by knowing the direction of groundwater flow to put the septic tank so that the flow direction does not lead to

wells or water sources (Wijayanti et al., 2020).

This study shows that the PHBS category does not have a relationship and influence on the incidence of diarrhea. The categories studied include washing with soap (CTPS) as well as processing, and serving toddler food. The observations revealed that the people in the study location practiced open defecation because they had proper latrines. They were also obedient in implementing CTPS and paid attention to sanitation and hygiene in serving food. In Indonesia, diarrhea is one of the general public fitness problems, specifically in teenagers

under five. Diarrhea is averted if the community can follow The Clean and Healthy Lifestyle (PHBS) (Alamsyah & Marianthi, 2020). One of the causes of diarrhea in toddlers is due to their parents' unhealthy hygiene behavior because they do not understand the benefits of washing hands properly after activities outside or inside the house (Bennion et al., 2021). According to the Water and Sanitation Program (WSP) in 2008, the criteria for healthy latrines include the presence of fecal disposal facilities that fulfill the requirements, namely unharmed to water bodies, prevent contact between humans and feces, safe feces disposal to prevent disease vector, keeps the discharge odorless as well as being safe for the user. In the current study in Ethiopia in 2018, type of roof material, hand washing facility, presence of latrine facility, presence of feces around the pit hole, presence of feces around the house compound, and risk of contamination of household storage had significant associations with diarrheal morbidity (Getachew et al., 2018).

Conclusion

Conclusively, this study shows a relationship between basic sanitation facilities and the incidence of diarrhea in toddlers in the Moyo Hilir Sub-district. The most influential factors that cause the disease are domestic wastewater facilities and clean water sources. Therefore, the community needs to pay attention to the condition of sanitation facilities, such as solid waste and domestic wastewater facilities as well as drainages, latrines, healthy lifestyles, and clean water sources to avoid diarrheal diseases. Health services are also advised to place more

emphasis on field observation-based education than theoretical counseling to make the process more effective.

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Working Period and CO Exposure Relationship with Changes Levels COHb of Bus Station Officer

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Abstract

Carbon monoxide inhaled into the lungs will enter the blood circulation and inhibit the entry of oxygen needed by the body. This gas combines with hemoglobin to form carboxyhemoglobin (COHb). The increase in COHb in the blood will inhibit the function of oxygen transportation and will affect the health of workers. This study aims to determine the risk factors for increasing COHb in Tirtonadi Bus Station Surakarta officers. The research method used analytic observational with a cross-sectional design. The research population was 110 respondents with a purposive sampling technique to get a research sample of 43 respondents. CO levels in the environment were measured by a CO meter, while COHb levels were measured by a spectrophotometer. The research data were analyzed using Spearman rank. Statistical correlation test showed a significant relationship between CO levels in the environment and COHb levels, p -value = 0.000 and r -value = 0.897, and no significant relationship between length of work and COHb levels with p -value = 0.285 and r -value = - 0.167. CO in the environment is related to the COHb level of traffic security officers at Tirtonadi Bus Station Surakarta, and the length of work is not related to the COHb level of traffic security officers at Tirtonadi Bus Station Surakarta.

Background

World Health Organization reported that 7 million people die annually due to air pollution. In Southeast Asia, more than 2 million people die from air pollution. Indonesia ranks number 8 out of 15 countries with the deadliest level of air pollution in the world, with a death rate of 50 thousand people annually (WHO, 2016). After inhalation, CO binds to hemoglobin in erythrocytes, due to its increased affinity, to form carboxyhemoglobin (COHb), which is responsible for cellular anoxia (Roderique et al., 2015; Weaver, 2020)

Carbon monoxide is a tasteless, odorless, colorless, and non-irritating gas formed from the combustion of hydrocarbons (fossil fuels). Binds to hemoglobin with a much greater affinity than oxygen to form carboxyhemoglobin. It causes hypoxia, cerebrovascular ischemia, and myocardial infarction. Carboxyhemoglobin interferes with cellular processes that inhibit aerobic metabolism, Acute toxicity can be fatal, and carbon monoxide toxicity causes many deaths due to accidental exposure. Common sources include motor vehicles, ships, faulty heaters, gas-powered generators, propane

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stoves, and charcoal grills, and toxicity is a concern when these machines are operated in unventilated or semi-enclosed spaces (Owens, 2006).

Approximately 60% of carbon monoxide levels are produced from human activities, one of which is motor fuel engines that use fossil fuels (Hampson and Hauff, 2008). WHO states that people with heart and lung disease should not be exposed to carbon monoxide gas, increasing COHb levels above 2.5% because people with heart and lung disease are more sensitive to CO exposure. CO exposure of 35mg/m³ for 1 hour and 20 mg/m³ for 8 hours is equivalent to the formation of COHb in the blood. CO exposure causes poisoning and increases occult complaints (Koyuncu et al., 2020). Lorensia, dkk (2019) explained that exposure to air pollution significantly contributes to health, mainly to decreased lung function.

CO gas with hemoglobin (Hb) in the blood can form carboxyhemoglobin (COHb), which can no longer bind oxygen for the needs of cell and tissue metabolism (Kusumah, 2014). Contact between CO gas and humans at high concentrations at 1300 ppm can cause death within half an hour. The ability of hemoglobin in the blood to bind CO gas is 240 times stronger than oxygen. Poisoning due to exposure to CO gas causes workers to experience health problems such as headaches, fainting, and there is a significant difference between police officers working more than two years at busy traffic intersections having blood CO levels 2.5% higher than police officers who work in the office (Nair et al., 2017)

Tirtonadi Bus Station, Surakarta City, is one of the largest and busiest in Central Java. The Tirtonadi Bus Station Traffic Security Officer has duties such as licensing and supervising bus parking facilities, regulating the entry and exit of buses in the Tirtonadi Bus Station area and inspecting public transport buses according to their authority. From the job description and the workplace, the Traffic safety officer at Tirtonadi Bus Station is one of the workplaces at risk of being exposed to carbon monoxide from motor vehicle exhaust emissions.

The initial survey for measuring environmental CO levels found that environmental CO levels at several bus station

points were 39 ppm for the east, 10 ppm for the middle, and 27 ppm for the west post. The measurement results have exceeded the required ambient air quality standards. From this description, this study aims to determine the relationship between environmental CO levels and duration of work with CO levels in the blood of Traffic Safety Officers at Tirtonadi Bus Station, Surakarta.

Method

This research uses analytical observational methods that seek out and explain relationships between variables through hypothesis testing. The Cross-Sectional approach method is the study of the dynamics of correlation between risk factors and their effects, by way of approach, observation or collection of data at a time. The population in this study was security and traffic officers at Tirtonadi Bus Station, Surakarta, which numbered 110 people. From the total population, 43 respondents were sampled using the purposive sampling technique. The variable in this study was the level of carbon monoxide in the blood (COHb). The independent variables in this study were the service period of traffic safety officers and the level of environmental CO. The research instrument used a CO meter to measure environmental CO levels, and a questionnaire to determine the characteristics and tenure of the respondent. The data was then analyzed using SPSS version 23.0 with the Spearman correlation bivariate test. Multivariate analysis in this study used multiple linear regression analysis.

Results and Discussions

The position of Surakarta City is quite strategic. The Tirtonadi Bus Station is a transit station from west to east or vice versa so that bus departure lines in all directions, such as Inter-Provincial Intercity (AKAP) and Inter-Provincial City Bus Departure (AKDP). From this strategic position, many public vehicles, especially buses and private vehicles pass through and enter Tirtonadi Terminal. Tirtonadi Terminal is the lifeblood of land transportation in Surakarta City, with an average of 100-112 buses per hour in and out of the terminal. So the CO donated to the environment is quite large. The carbon

monoxide (CO) gas level was calculated by the CO Meter instrument. Based on table 1, the average value of carbon monoxide levels is 29.6 ppm, a maximum of 43.6 ppm, and a minimum of 18.05 ppm. COHb level was assessed using a spectrophotometer. Based on table 2, 86% of respondents have COHb levels of more than

2%, and 14% of respondents have COHb levels of less than 2%. The number of subjects who followed the study at the start of the study was 43. Of the 43 subjects interviewed, they were included in the nonsykerlying category, male, and maximum age of 54. While the length of work of respondents in table 1 is 29 years.

Table 1. Distribution of Carbon Monoxide Gas Levels and COHb Levels

Variables	Mean	Std Deviation	Min	Max
CO Gas	29.6	9.98	18.05	43.60
COHb	2.65	0,66	1.3	3.8
Length of Work	10.54	9.35	0,50	29

Source: Primary Data, 2020

Table 2. Characteristics of Ordinal Scale COHb Respondent Data

No	Characteristics	Frequency	Percentage
1	<=2	7	14%
2	>2	36	86%

Source: Primary Data, 2020

The Spearman test in table 3 shows a significant relationship between CO and COHb with a p-value = 0.000 or $p < 0.05$ and an aid coefficient (r) of 0.897. It indicates a variable relationship level that increases positively in the direction of environment and COHb compared to straight. When CO levels increase, COHb levels will also increase. Spearman's correlation

test table showed no relationship between working life and COHb with a value of >0.05 with a correlation coefficient of -0.167. The correlation coefficient is a negative value (-) that provides information about working time and COHb rates are inversely proportional, if the working time increases the COHb rate will decrease.

Table 3. CO Correlation Results in The Environment and Long Work Against CO Levels in the Blood (COHb)

Variables	P-value	Correlation coefficient (r)
CO Gas Environment	0,000	0,897
Length of Work	0.285	-0.167

Source: Primary Data, 2020

The test uses multiple linear regression statistical tests to determine whether there is a relationship between environmental carbon monoxide (CO) levels and working life with COHb levels, provided that the results of bivariate analysis have a value of p-value < 0.25 . In this study, multivariate tests could not be performed. Because its requirements were not met. Data collection of environmental CO levels was carried out using a CO Meter placed for 10 minutes in each respondent's work area. From the results of research conducted from the measurement of Environmental CO levels, the average environmental CO in the Tirtonadi Bus Station area is 29.6 ppm. The result exceeds

the National Ambient Air Quality Standard according to the Government Regulation of the Republic of Indonesia Number 41 of 1999, which is 30,000 g / Nm³, equivalent to 24 ppm. It is due to the increasing inflow and outflow of buses, and a large number of road users due to their activities. Such as the start of school hours for students and working hours by workers. It is also following Annisa, Budiyo and Sulistiyani (2021) stated a relationship between the number of vehicles and the concentration of CO. Where the results of many vehicle tests stop waiting for passengers and start the vehicle engine affect the concentration of CO. Similar research where there is a denser

number of buses operating in the bus station area, the higher the level of carbon monoxide gas pollution in the air (Mourali, Mohan and Meerasa, 2018). Raub, et al. (2000) revealed that the CO content released by vehicle fumes, both cars, and motorized vehicles, contained up to 100,000 ppm during heavy traffic.

Based on data from 43 respondents, obtained p-value between Environmental CO levels, and COHb levels is 0.000 and r is 0.897**. The p-value of 0.000 indicates that there is a significant association between environmental CO levels, with COHb levels in the blood and with r of 0.897. It shows a strong association with a positive direction (+). COHb levels in the blood are affected by the concentration of CO in the air and will reach a certain equilibrium. There is a relationship between CO levels in the air and COHb levels in the blood. In the research results obtained the average level of environmental CO is 29.6 ppm, and COHb levels are 2.63%. Research by Herminia et al. (2014) and Veronesi et al. (2017) strengthens these results where there is a relationship between environmental CO and COHb levels where there is a 20% increase in COHb levels from exposure to environmental CO.

Several health complaints such as headaches and fatigue experienced by Tirtonadi Bus Station Surakarta officers have the potential consequences of exposure to CO Gas in the area in the long term. When carbon dioxide gas enters the blood circulation, it will bind to hemoglobin in the same way as oxygen. However, the carbon monoxide bond to hemoglobin is 250 times stronger than the binding of oxygen to hemoglobin. An increase of 1 ppm of carbon monoxide gas is at risk of health problems and resulting in changes in the atmosphere. This result is also reinforced by where workers exposed to CO have various health risks such as increased COHb, risk of coronary arteries, and neurological complications (Bol, Koyuncu and Günay, 2018).

CO gas enters the body and binds to hemoglobin, which acts as an oxygen carrier, causing the cells to be deprived of oxygen, called hypoxia (Gorman, et al., 2003). Signs of CO poisoning are mainly related to the brain and heart, the two organs most sensitive to hypoxia. Some of the symptoms of hypoxia are

headache, shortness of breath, increased heart rate, decreased mental ability and sharpness of thinking, weakness, feeling lazy, insomnia (Whincup et al., 2006; R.J. Levy, 2015; Nurullita dan Mifbakhuddin, 2016).

The effect of hemoglobin in red blood cells causes the appearance of a red color in the blood because it can transport oxygen. If hemoglobin binds to carbon monoxide, this reaction is a reaction that cannot return to cause red blood cells to be unable to return to their original state. It results in the ability of hemoglobin to reduce oxygen binding. States that the concentration of carbon monoxide (CO) gas in the air will directly affect the concentration of carboxyhemoglobin (COHb). If the concentration of CO gas in the air remains constant, the concentration of COHb in the blood will reach a certain balance and will remain as long as there is no change in the concentration of CO in the air. After inhalation, CO binds to hemoglobin in erythrocytes, due to its increased affinity, to form carboxyhemoglobin (COHb), which is responsible for cellular anoxia (Roderique et al., 2015; Weaver, 2020).

Data collection of COHb levels by taking blood samples from each respondent. 43 respondents who were willing to take blood samples to be tested using Spectrophotometers. Based on the measurement of COHb levels in the Tirtonadi Bus Station Surakarta Traffic Safety Officer showed that of 43 respondents, 36 had abnormal levels of COHb in the blood (2%) in the range of the results of an examination of COHb levels in the blood was 2.1-3.8%, and seven respondents had normal COHb levels (<2%). The highest COHb rate received by respondents was 3.8%, and the lowest COHb rate was 1.3%, with the average respondent's COHb rate at 2.63%. COHb levels in the blood of 0.5% and 2.01% have no impact on the human body, while COHb concentrations of 3.2% impact the central nervous system in humans (Roth et al., 2011) . L. Zhang et al. (2022) in his research explained that workers who work outdoors or in the field have a greater potential for exposure to air pollution caused by traffic.

Based on research conducted, the average length of work of workers is 10.5 years. With a minimum working period of 0.5 years and a

maximum of 29 years. With an average working life of 10.5 years, co-entering the respondent's body will also affect the level of COHb in the blood because the COHb in the blood is acute. The amount of COHb formed depends on the length of exposure to CO Gas. The longer the working life, the more COHb content in the blood, and the more CO is inhaled. But the results obtained from respondents with a working period of 22 years have a COHb level of 1.6%. It is below the standard limit of <2%. While those with a working period of 2 years have a COHb level of 3.8% which means exceeding the normal limit of > 2% (Ekpenyong et al., 2012; Liu et al., 2018) .

Based on research from 43 respondents, obtained p-value between working time with COHb levels is 0.220 and $r = - 0.191$ which means there is no relationship between years of service and COHb levels in the blood. It can be influenced by other uncontrolled factors in this study such as the use of masks, exercise habits, and food nutrients consumed by respondents at the time of the COHb examination. It is in line with the research conducted that there is no relationship between working life and COHb levels in the blood (Rizaldi, Ma'rufi and Ellyke, 2021). But there is an opinion that the duration of CO exposure affects COHb levels, based on the developed model that exposure between 70 and 120 ppm CO for approximately 4 hours produces COHb levels between 10 and 20% with no symptoms (Raub and Benignus, 2002; Winter and Miller, 1976).

Conclusion

There is a relationship between Environmental CO levels and COHb levels in Tirtonadi Bus Station Traffic Safety officers and no relationship between working time and COHb levels in Tirtonadi Bus Station Traffic Safety officers. The COHb level of the Tirtonadi Bus Station Traffic Safety Officer is 14% of the total number of respondents. They have normal COHb levels.

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Constructing Instrument of Fathers Support during Pregnancy

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Abstract

During pregnancy and breastfeeding, first-time mothers experience significant physical and psychological transitions. In these maternal terms, a mother demands a supportive environment to achieve a healthy pregnancy outcome. The perspective of the support recipient, in this case, the mother cannot be quantified quantitatively. It is open to multiple interpretations and is even highly subjective. So there is no appropriate level of consistency as a universal measuring tool. This study is to develop and validate an instrument for assessing Father Support During Pregnancy (FSDP) as seen by the mother by descriptive exploratory design to explore what mothers need from their husbands during pregnancy and breastfeeding. The subjective answer of 616 pregnant mothers in the second and third trimesters in June – December 2020 of four primary health care in Makassar, South Sulawesi, Indonesia. The four factors dimension include; emotional support; instrumental support; informational support; and appraisal support are considered as the model to achieve in this test and then validated using Confirmatory Factor Analysis (CFA). Data were obtained via an online survey several times. This study succeeded in constructing an instrument to measure the function of a husband's social support for his wife during pregnancy. This instrument is considered valid after going through the description and verification stages. However, because this is the first time, it requires a further maturation process, especially for participants with different sociodemographic characteristics, such as the upper-middle class. Several indicators with a loading factor value below 50% need to be considered again to be tested simultaneously on different target participants.

Introduction

The father's attitude plays a vital role in the mother's behaviors during pregnancy and breastfeeding. Additionally, paternal involvement in child care and development is thought to be associated with healthy and violence-free relationships, particularly among adolescents (Ayu & Triyani, 2020; Opondo et al., 2016). In recent years, there has been increasing study focus on the father's involvement in parenting, childcare, and role equality. During pregnancy and breastfeeding, first-time mothers experience significant physical and psychological transitions. In these maternal terms, a mother demands a supportive environment to achieve a healthy outcome of

pregnancy. A supportive environment derived from the origin of social support theory are having multiple dimensions. The social support theory laid the groundwork for understanding fathers' support in pregnancy. Social support is defined as assistance supplied through social relationships and interactions (Berkman et al., 2000). An earlier study has demonstrated how social support networks, including spouses, friends, and family members, can benefit individuals' health and well-being in a variety of circumstances (Cobo-Rendón et al., 2020; Ozbay et al., 2007; Reblin & Uchino, 2008; Wu et al., 2020). The common phrase for social support refers to one of these three dimensions; (i) social integration, which refers to the

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presence, type, or quantity of social relationships such as marriage; (ii) social network, which refers to the structure of social relationships, including population and density; (iii) social support functions, which include emotional, instrumental, and appraisal functions. Rather than focusing on the two elements of integration and network, we shall concentrate on the social support function. The functional dimension makes a significant contribution to enhancing life quality. Eldredge et.al and earlier scientist has classified social support into four broad categories: emotional support (providing empathy, love, trust, and care), instrumental support (providing practical aid and services), informational support (advice, recommendations), and appraisal (provision of feedback useful for self-re-evaluation and affirmation) (Bartholomew Eldredge LK et al., 2016; Schonfeld, 1991). A mother's husband is one of her closest environments. In addition to supplying basic household necessities, husbands or future fathers are expected to contribute to the parenting effort. This father's responsibility begins with his marriage and intensifies significantly during their wife's first pregnancy (Onyeze-Joe & Godin, 2020).

According to the idea of social support, this concept serves four functions. Support is provided on an emotional, instrumental, informational, and appraisal degree. Emotional support is associated with the promotion of favorable attitudes that give partners a sense of security, comfort, and enjoyment. Studies demonstrate that spouses who provide enough emotional support have a higher rate of marital satisfaction (Jiang et al., 2015). The social support function is commonly utilized in the research of health problems, particularly in investigations of diseases with prolonged incubation and curation periods. Social support theory is also frequently used to examine mental health illnesses such as post-traumatic stress disorder, depression, and suicide (Drysdale et al., 2021; Göbel et al., 2020; Ozbay et al., 2007; Phoosuwan et al., 2020; Wu et al., 2020). A long pregnancy period is also regarded as suitable for the application of this concept. Pregnancy alters women's roles, demanding extremely successful coping mechanisms that are ineffective

when experienced alone. Numerous studies demonstrate that insufficient social support, particularly from partners/husbands, adversely affects pregnancy and childbirth (Anglely et al., 2015; da Costa et al., 2017; Drysdale et al., 2021; Göbel et al., 2020; Greenhill & Vollmer, 2019; Neri Mini et al., 2020; Onyeze-Joe & Godin, 2020; Phoosuwan et al., 2020).

Instrumental support is the provision of concrete requirements, particularly increased needs during pregnancy, such as routine antenatal care, nutrition and supplements, additional maternity clothing, childbirth preparations, and so on. As a provider and protector of the family territory, a husband will perform this duty. The traditional perspective of gender roles in the family sees men as the primary provider of the family, and achieving this role is considered a source of pride compared to other forms of emotional or domestic assistance (John et al., 2017). First-time father typically strive to give the best facilities to be perceived as the responsible one. Emotional support is a verbal and nonverbal process involving husband and wife. It includes showing care and concern for others, delivering reassurance, empathy, comfort, and acceptance. During the first pregnancy, role-switching occurs between the mother and the father (Vismara et al., 2016). Both endure internal changes to become parents. But the woman benefits from neuroendocrine changes that biologically prepare her for the growth and care of the baby (Augustine et al., 2017; Larsen & Grattan, 2012), while the father may experience these sensations after the baby is born (Onyeze-Joe & Godin, 2020). Occasionally, mood swings occur during pregnancy as a result of hormonal changes. Without the ability to articulate their concerns, both sides become more vulnerable. It is admirable that a prospective parent is ready to expand his understanding of pregnancy and infant care. This involvement entails cognitive learning and evolution together, rather than just abdicating responsibility for prenatal care to the mother. As a result, mothers will no longer feel alone in their struggles. Pregnancy classes, prenatal yoga, and parenting classes are options for fathers who are concerned with their spouses (Entsieh & Hallström, 2016).

Additionally, appraisal support is frequently associated with decision-making and role equality within the family. As a result, women have few options when it comes to addressing important subjects with their husbands. Even pregnant women's behaviors are strongly influenced by the persuasive decisions of their spouses. Women-only families are more honest about their plans to have children and their strategies for reversing roles (Duvander et al., 2020).

According to the dimensions of social support theory, particularly the perspective of the support recipient, in this case, the mother, it cannot be quantified quantitatively because it is open to multiple interpretations and is even highly subjective. So there is no appropriate level of consistency as a universal measuring tool. Additionally, social situations are inextricably linked to indigenous culture. Legal marriage and marital success are considered measures of family success in Indonesia. Thus, to minimize measurement bias, it is thought significant to develop measuring equipment capable of determining the degree to which a husband supports his wife during pregnancy and nursing. As such, this study intends to investigate and quantify the husband's social support for the mother and to validate the resultant model of measuring instrument creation based on the consistency of indicators across the four dimensions defined by the social support theory's function approach. Additionally, appraisal support is frequently connected with decision-making and the quality of family roles. Historically, the father or guy in the family has been regarded as the absolute leader and decision-maker, leaving little room for dialogue for women. Even pregnant women's behavior is heavily influenced by their husband's persuasive decisions. Gender-equal households demonstrate more explicit objectives around childbearing and how they approach changing roles collaboratively (Duvander et al., 2020). Therefore, the purpose of this study is to develop and validate an instrument for assessing Father Support During Pregnancy (FSDP) as seen and felt by the mother.

Method

This research used a descriptive exploratory design to explore what mothers need from their husbands during pregnancy and breastfeeding. The subjective answer from 616 pregnant mothers in the second and third trimesters in June – December 2020 from four primary health care in Makassar, South Sulawesi, Indonesia. The subject enrollment using the cluster method, in addition, to gather more respondents in their trimester period. All of the answers from the open question about what they need from their husband during pregnancy are coded into similar meanings and classified into the dimension targeted instrument. We concluded ten most popular answers represented the four factors dimension, then formed into rating scale questionnaire with options always (5) to never (1) and tested again with the same participant. The four factors dimension include; emotional support; instrumental support; informational support; and appraisal support are considered as the model to achieve in this test. The models are derived from the ideas of the functional dimension of social support proposed by Cohen and Wills in 1985 re-written by (Schonfeld, 1991). The model dimension is tested and validated with Confirmatory Factor Analysis (CFA), and 50 percent (n=308) of participants randomly selected using SPSS 25. The entire research and data-gathering process were supervised by six professionals with an experience in maternity nursing. Data were obtained through an online survey for several times contact if needed. All study procedures were approved by The Makassar Health Polytechnic ethical commission number 00737/KEPK-PTKMKS/X/2020.

Result And Discussion

After several time participants were contacted by telephone and followed in one online WhatsApp group, there are seven data we excluded due to incomplete information and lost contact (primarily changed phone number), remaining 301 participants as shown in the characteristics below.

Table 1. Study Participants Characteristics

Characteristics	Total (%) n=301
Age (years)	
< 20 / > 35	86 (28,6)
20 – 35	215 (71,4)
Marital Age (years)	
Below 20	269 (89,4)
Above 20	32 (10,6)
Educational Background	
Undergraduates	189 (62,8)
Graduates	112 (37,2)
Occupations	
Household mothers	159 (52,8)
Working mothers	142 (47,2)

According to table 1, among 301 participants, predominantly in the low-risk demographic state, unless the educational background, which is more than half, was undergraduate. It may be a result of early marriage years where still 89,4 percent are

teens couple. The primary healthcare study site is mostly used by the commonly deprived population in the city. While the upper-middle society usually prefers more private clinics or hospitals. This characteristic was found similar in the earlier study (Syam et al., 2020, 2021).

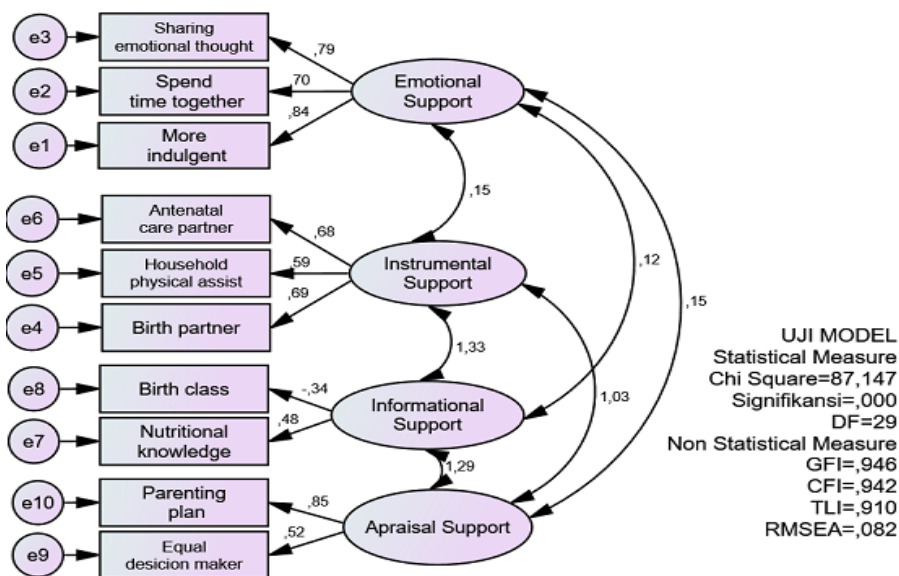


Figure 1. Model CFA of Father Support During Pregnancy

As illustrated in the figure above, the model of father support during pregnancy has a limited statistical measure, with a probability value of 0.001, less than 0.05, and a Chi-Square value of 87.147, which is greater than the table's (17.708). It indicates that the model is still not adequately confirmed by field data, where there is a significant difference between the theory developed in the study and the observed

data. According to the non-statistical measure test, the GFI, CFI, and TLI values are all more than the cut-off of 0.9, and the RMSEA value of 0.08 is within the range of 0.03-0.08. The loading factors for each variable in the model are dominantly greater than 0.7, indicating that this indicator is capable of explaining the observed variable. In other words, the model's convergent validity has been established. Thus,

while statistical measures do not satisfy the assumption of fit, all non-statistical measures do, indicating that this instrument is suitable for use in certain population studies.

Model of Father Support During Pregnancy (FSDP) managed to measure ten indicators with four dimensions of social support function. The first dimension is emotional support, consisting of three items, which include; sharing emotional thoughts, spending more time together, and more indulgent husband. These three items have similar loading values, which are above 70%, meaning that the three positions are very equal in determining the dimensions of emotional support. A pregnant woman, for the first time, needs a lot of attention, especially concerning the abstract dimensions of feelings. A mother hopes that because of her pregnancy, she will be more loved by her husband, will be listened to more, and given more time together because of her success in becoming pregnant. The first experience gave mothers the excessive excitement they hoped their husbands would feel. However, in the context of a role function in a marital relationship (Anglely et al., 2015; Greenhill & Vollmer, 2019; Jiang et al., 2015; John et al., 2017), the emotional role is considered the secondary role of a man. Because the primary role provides for the basic tangible family needs. Such as food, housing, and other physical needs. The second dimension is instrumental support. In the FSDP model, this dimension is made up of three items, namely; antenatal care partner; household physical assistance; and birth partners. These three items have a factor loading value above 50%, meaning that these three items are strong enough to form the dimensions of instrumental support. The most desired by the first pregnant woman is the physical presence of her husband in every moment of pregnancy. Like during antenatal care. At this moment, the father will learn and see the development of the fetus in his wife's womb. It will bring up the sensation of fatherhood as well as the increasingly severe conditions of pregnancy, physically limiting the mother to carry out her obligations as a housewife. So physical assistance from husbands in lightening housework or providing household assistants is considered real instrumental support.

Furthermore, in the upcoming delivery period, the husband is expected to accompany his wife to witness the moment of the struggle to give birth to a baby and see the baby cry for the first time.

The third dimension of the social support function is informational support. Informational support was formed by two items, namely attending the birth preparation course, and understanding the nutritional needs of pregnant women. Although the loading factor values for these two items are quite low, namely 34% and 48%, the results of non-statistical measures indicate that this dimension is important in the model. Both of these informational support mothers expect to come from their husbands as a form of concern for the future of the baby and the health of the mother during her first pregnancy. The husband's involvement in health education has various obstacles from the father's point of view, especially how they are treated in antenatal classes. Most of those who attended the class felt marginalized because the main topic of discussion during the session was practical matters regarding childbirth, so they as men felt that they had no role in the learning effort (Rowe et al., 2013). Mothers also feel that their husbands' non-involvement in pregnancy education classes is the reason for their husbands' reluctance to attend this activity (Murphy Tighe, 2010). Several alternatives have been developed in a holistic approach to childbirth, such as a gentle birth preparation course. This class offers a more comprehensive approach by involving the husband as a birth partner (Doherty et al., 2006). However, the weakness is that this class is carried out by a paid private provider at a cost that is not cheap, so its accessibility is limited to upper-middle class pairs and is also segmented into the highly educated group. However, childbirth education that involves both parents can increase the coping transition in first-time parents and reduce anxiety in the early childhood period (Chhabra et al., 2020; Philpott et al., 2017, 2019; Recto & Champion, 2020; Rominov et al., 2016; Suto et al., 2017). The fourth dimension is the appraisal function. This function is related to the equality of roles in the household, especially decision-making. Two items that make up

the appraisal. They are parenting plans and the equal decision maker with factor loading values of 85% and 52%, respectively. Parenting plans are related to future planning in child care, including how mothers expect fathers to participate in caring for babies, planning parenting patterns, breastfeeding, health care, and child development. Preparation for first-time parents regarding the reality of parenthood is very vital. The information needed is not just positive information, for example, the benefits of breastfeeding, but the difficulties and pains that may be experienced while breastfeeding are tangible. Having a child for the first time is great fun, but the consequences of an untidy night's sleep, increased tension, handling a crying baby, and other harsh realities are realities that can foster empathy from fathers (Gao et al., 2012). An understanding of the realities that will come at the beginning of having a baby will facilitate the transition of brand roles to provide complete support to the mother (Entsieh & Hallström, 2016).

This study succeeded in constructing an instrument to measure the function of a husband's social support for his wife during pregnancy. This instrument is considered valid after going through the description and verification stages. However, because this is the first time, it requires a further maturation process, especially for participants with different sociodemographic characteristics, such as the upper-middle class. Several indicators with a loading factor value below 50% need to be considered again to be tested simultaneously on different target participants.

Conclusion

Given the critical role and engagement of fathers in child care, mothers' demands must first be met. It is particularly necessary during pregnancy and childbirth to ensure that this is not the mother's only challenge. The father support during pregnancy (FSDP) measurement instrument is highly valid and reliable across all four aspects of the social support function. However, it requires more improvement, particularly in terms of its usefulness for measuring the mutual dimensions across diverse sociodemographic characteristics.

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Spatial Distribution of Drug-Resistant Tuberculosis in Makassar City, South Sulawesi Province, Indonesia

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Abstract

This study aims to determine the domicile distribution, find out the high-risk areas, and determine the risk of drug-resistant tuberculosis patients based on patient location in 15 districts of Makassar City from Tuberculosis register data of South Sulawesi Provincial Health Office in December 2017 – April 2019 period. Gen Xpert rapid or drug sensitivity examinations were used to define drug-resistant tuberculosis. The domicile location of patients was geocoded by maps in Google Earth and aggregated per area by using Kernel Density analysis using ArcView GIS 10.3 software. We found that drug-resistant tuberculosis cases tended to be clustered in the western part of Makassar City, an area with a fairly high population density. There were areas with the highest concentration of predicted cases as a high risk of transmission of drug-resistant TB, around the Bontoala District, Makassar District, and Mamajang District. Healthcare facilities located in hot spots area need to be equipped with molecular rapid test facilities and conduct drug sensitivity tests for all suspected tuberculosis patients. Further research needs to be carried out to determine the distribution of tuberculosis patients who are sensitive and resistant to drugs.

Introduction

Currently, drug-resistant tuberculosis affects half a million people worldwide in 2018. This problem requires a longer treatment time with higher medical costs. Globally, 3.5% of new TB cases and 18% of previously treated cases had drug-resistant tuberculosis (WHO, 2019b). In Indonesia, it is estimated that there are 8.8 patients with drug-resistant tuberculosis per 100,000 population. The success rate for drug-resistant tuberculosis treatment is also very low in Indonesia, with only 45% of patients experiencing the successful treatment of all treated patients (WHO, 2019a). Diagnosis and treatment need to be supported by efforts to prevent the transmission of drug-resistant tuberculosis. Most incidence of drug-resistant

tuberculosis is caused by the transmission of drug-resistant *Mycobacterium tuberculosis* from other patients (Kendall et al., 2015)

Tuberculosis transmission often occurs in communities with a high prevalence of untreated tuberculosis patients (Kompala et al., 2013). Based on these considerations, active case finding in areas at risk is a prompt implementation strategy (Yuen et al., 2015). Synergy in halting tuberculosis transmission may be attainable by combining interventions that prevent tuberculosis progression, shorten the period between disease onset and treatment initiation (case finding and diagnosis), and prevent transmission in key settings, such as the built environment (infection control) (Dowdy et al., 2017).

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We hypothesized that information about the location of patients with drug-resistant tuberculosis can be used to assess the risk of transmission to predict drug-resistant tuberculosis. We analyzed programmatic data collected in Makassar City, South Sulawesi Province, Indonesia by geographic mapping to see incidence spatially and to detect clusters of areas that are at high risk (hot spots) for the transmission of drug-resistant tuberculosis. In the health sector, geospatial is often used to identify geographical areas and communities with a higher risk of sickness or premature mortality and which therefore require higher preventive care or health information and disease monitoring in time and space (Banerjee, 2016)

Methods

This research was conducted based on Tuberculosis register data from December 2017 - April 2019 (unpublished data, South Sulawesi Provincial Health Office). We selected data from 15 districts of Makassar City. The selection of the location of this study was based on the drug-resistant tuberculosis location. Data collection at the District Health Office and South Sulawesi Provincial Health Office. Data processing conducted at the Department of Community Medicine and Preventive Medicine, the Faculty of Medicine, Hasanuddin

University. The study protocol was approved by the ethics committee of Faculty of Medicine Hasanuddin University (Makassar, Indonesia), with number 401/UN4.6.4.5.31/PP36/2020.

The research will be divided into 2 phases: 1) Making a spatial-based related to drug-resistant tuberculosis, 2) Data analysis and mapping based on patient domicile for drug-resistant tuberculosis patients. The first phase was the development of spatial-based related to drug-resistant tuberculosis with the aim of producing direct information about symptoms experienced by the community quickly and efficiently. The data obtained will later reflect the real condition of the community by using ArcGIS from Esri.

The rest phase was data analysis and mapping to assess drug-resistant tuberculosis patients' distribution. The spatial analysis carried out is kernel density analysis, which aims to see the density index indications of drug-resistant tuberculosis patient distribution based on data validation results. Kernel Density analysis is one of the tools in Arc GIS spatial analysis, which calculates the force area per unit of a feature point or polyline using the kernel function to adjust the smooth surface tapered to each point whose output value represents the predicted density value (Seaman and Powell 1996).

Kernel Density analysis is determined by the following formula:

$$Density = \frac{1}{(radius)^2} \sum_{i=1}^n \left[\frac{3}{n} \cdot pop_i \left(1 - \left(\frac{dist_i}{radius} \right)^2 \right)^2 \right]$$

For $dist_i < radius$ (1)

information:

- $i = 1, \dots, n$ is a point. Only include points in the number if they are within a radius of a (x, y) location.
- pop_i is the field value resident of point I, which is an additional parameter.
- $dist_i$ is the distance between point i and location (x, y).

The spatial analysis of drug-resistant tuberculosis patients aims to see the distribution of TB transmission throughout Makassar City, so it can be used as a reference in making immediate break-up decisions, such as whether

or not a place is needed for a quick preventative. The spatial analysis carried out is kernel density analysis which aims to see the density index of the distribution based on drug-resistant tuberculosis incidence data, which data is

sourced from the South Sulawesi Provincial Health Office. The study protocol was approved by the ethics committee of Faculty of Medicine Hasanuddin University (Makassar, Indonesia) with number 401/UN4.6.4.5.31/PP36/2020.

Results And Discussion

We selected 68 drug-resistant tuberculosis patients in 15 districts of Makassar City from TB program data from

December 2017 – April 2019. Gen Xpert rapid examination or drug sensitivity examinations were used to define drug-resistant tuberculosis. The domicile of patients was geocoded by using maps on Google Earth. The geospatial coding aggregated per area and used Kernel Density analysis using ArcView GIS 10.3 software. This analysis shows an area with the highest concentration of predicted cases can be used as the basis for planning TB control management.

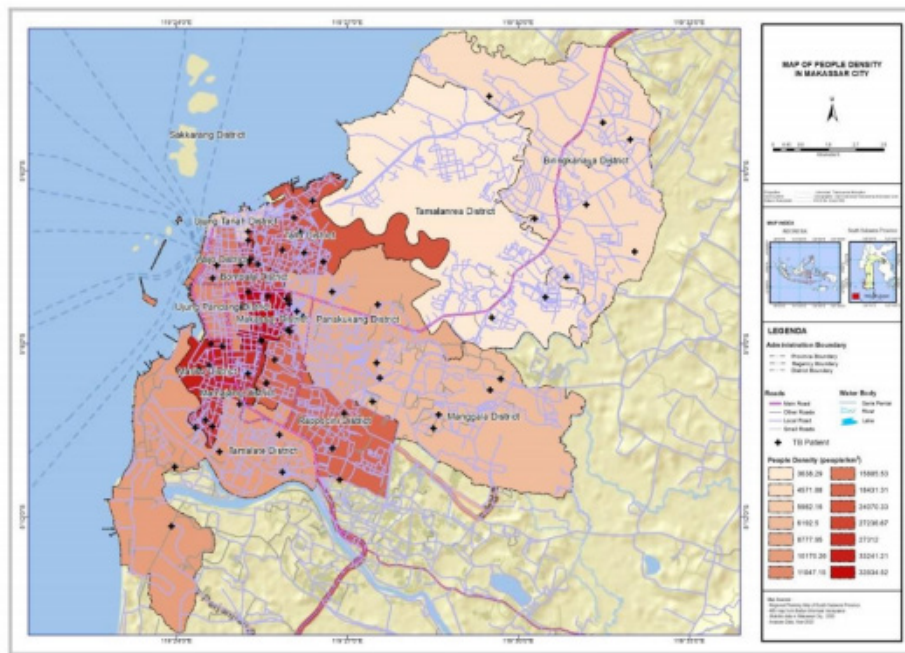


Figure 1. Map of People Density in Makassar City

The highest number of drug-resistant tuberculosis was found in Biringkanaya and Rappocini Districts, with 9 cases. Meanwhile, no finding in Sangkarrang Island and Ujung Pandang Districts. We found that drug-resistant tuberculosis cases tended to be clustered in the western part of Makassar City, an area with a fairly high population density

(Figure 1). However, the ratio of drug-resistant tuberculosis cases per 1,000 population differs from the number of cases. The highest case ratio per 1,000 population was found in Bontoala District, Makassar District, and Mariso District with 0.087 cases per 1,000 population, 0.082 cases per 1,000 population, and 0.066 cases per 1,000 population, respectively.

Table 1. Number of Drug-resistant Tuberculosis Cases and Ratio of Drug-resistant Tuberculosis Cases Per 1.000 population

Districts	Cases	Population	Cases per 1.000 population
Biringkanaya	9	220,456	0.041
Bontoala	5	57,197	0.087
Makassar	7	85,515	0.082
Mamajang	4	61,452	0.065
Manggala	6	149,487	0.040
Mariso	4	60,499	0.066
Panakukang	5	149,664	0.033
Rappocini	9	170,121	0.053
Sangkarrang Island	0	14,531	0.000
Tallo	7	140,330	0.050
Tamalanrea	2	115,843	0.017
Tamalate	7	205,541	0.034
Ujung Pandang	0	29,054	0.000
Ujung Tanah	1	35,534	0.028
Wajo	2	31,453	0.064

The highest ratio of cases per 1,000 population was in areas directly adjacent and tended to be clustered, such as Bontoala District, Makassar District, Mariso District, Mamajang District, and Wajo District. The Kernel Density map of drug-resistant tuberculosis cases (Figure 2) showed that there were areas with the highest concentration of predicted cases (marked with

red hot spots) around the Bontoala District, Makassar District, and Mamajang District. As previously known, this area was densely populated area, so there was a high risk of transmission of drug-resistant TB. This finding shows risk of transmission of drug-resistant tuberculosis based on domicile in Makassar City.

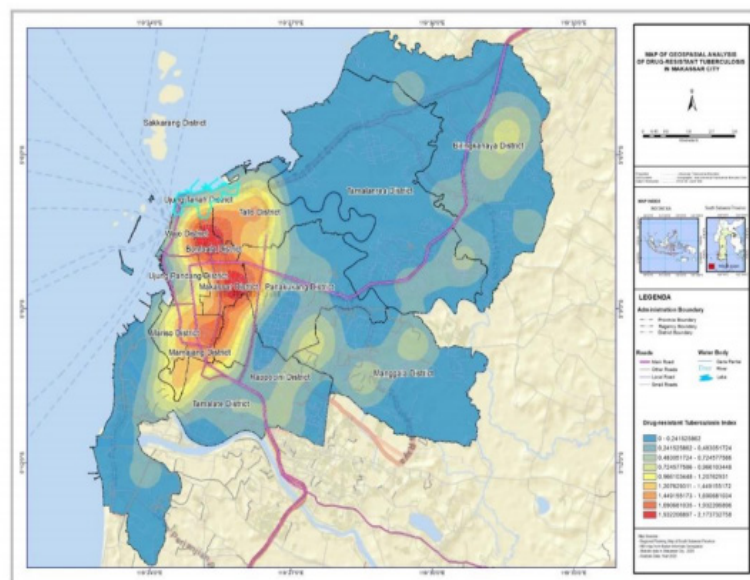


Figure 2. Map of Geospatial Analysis Drug-Resistant Tuberculosis in Makassar

We found that transmission of drug-resistant TB was geographically clustered in the western part of Makassar City. We also found several characteristics of the districts that were

associated with a higher transmission rate of drug-resistant TB, including urbanization and population density. However, it does not obtain details on the baseline characteristics

of patients, such as gender and age, since the information was mainly collected based on the domicile and the spread of TB.

There are studies supporting those results, Bastida et al. reported that the distribution pattern of TB patients was spatially clustered in the State of Mexico, Mexico and identified by using two types of analysis: spatial and spatial-temporal (Zaragoza-Bastida et al., 2012). Similar research by Alene KA, in Norwest Ethiopia (Alene et al., 2017). Yang S, et al in Nanchang, China, and MaO Q, et al. used a wide population in China to find clustered distribution patterns for TB cases (Mao et al., 2019). Locations with a higher percentage of TB cases also have a greater risk of becoming an MDR-TB hotspot (Jenkins et al., 2013).

The clustering of drug-resistant TB in the community is due to the transmission of drug-resistant strains (i.e. primary resistance) and was not a new case or responsiveness of first-line treatment. Further studies are needed to explore whether the spatial clustering of drug-resistant TB in the districts is due to the primary transmission of drug-resistant strains as a result of urbanization and high population density or due to poor first-line TB treatment, lack of health care services or behavioral and environmental factors (Alene et al., 2017).

The dominant causes of drug resistance are the patient's low motivation, inadequate treatment history, and sociodemographic factors so comprehensive management and the application of a Directly Observed Treatment Shortcourse (DOTS) are needed. ((Lima et al., 2020; Nugrahaeni, 2015; SR et al., 2012) In addition, both MTB ethnicity and lineage differed significantly in distribution by patient location. The lineage diversity of MTB and the detection of new sublineages suggest that this small area is already inhabited by a heterogeneous population group that is actively transmitting disease (Maung et al., 2020).

WHO recommends the test of rifampicin and/or isoniazid resistance in the following groups at the start of all patients with a history of anti-tuberculosis drugs. Drug-resistant TB is commonly found in patients with a history of treatment failure. Assessments of drug resistance conducted with criteria: all patients with Human Immunodeficiency Virus

(HIV)) diagnosed with active TB, especially those who live in the area with a moderate or high prevalence of drug-resistant TB, patients with active TB after getting exposed to drug-resistant TB patients, and all new patients in the area with >3% primary drug-resistant TB cases (Kemenkes, 2013).

Conducting an assessment of drug resistance possibility based on medical history, exposure sources, and prevalence in the community should be performed on all patients. Drug resistance testing should be conducted at the initial treatment for previously treated patients. Furthermore, patients whose sputum smears gave positive results after completing three months of treatment, patients who have failed treatment, dropped out, or relapsed after treatment should always be assessed for drug resistance (Kemenkes, 2013).

For patients with possible drug resistance, drug sensitivity/resistance tests at least to isoniazid and rifampicin should be carried out immediately to minimize the possibility of transmission. Adequate infection control measures should be in place (Kemenkes, 2013). However, research conducted in Surakarta City, Central Java, Indonesia found the effect of Streptomycin, Isoniazid, and ethambutol treatment types on TB isolate resistance in patients with suspected TB (Sutanto et al., 2021). By using the spatial mapping of multidrug-resistant TB (MDR-TB), it can expand information on the prevalence of drug resistance in the community, establish specific TB management in the high-density area of MDR-TB by conducting drug resistance tests, and the efficiency of drug distribution and diagnostic tools related to TB. In the meantime, it will strengthen the preparedness of the health authorities to reduce the number of TB cases.

The transmission of drug-resistant Mycobacterium tuberculosis needs to be assessed so that patients can be early diagnosed and given prompt treatment. One of the methods is to identify clusters or locations of high-density drug-resistant tuberculosis cases. MDR-TB incidence and transmission are site-specific and often different from those in non-MDR-TB settings. (Alene et al., 2017; Lin et al., 2012) Therefore, the need for specific control and prevention planning for MDR-TB and

non-MDR-TB is a top priority and includes geographic criteria in the control of MDR-TB (Oliveira et al., 2022; Oliveira et al., 2020).

We could include only drug-resistant tuberculosis patients and could not detect primary or acquisition of drug resistance. Further research needs to be carried out to determine the distribution of tuberculosis patients who are sensitive and resistant to drugs and should be carried out temporally. It can be a prior reference for the evaluation of case management and treatment in an area

Conclusion

Based on these findings, we assume there was a risk of transmission of drug-resistant tuberculosis in that area. These results suggest modification of guidelines, especially in hot spot areas. Healthcare facilities located in hot spots area need to be equipped with molecular rapid test facilities and conduct drug sensitivity tests for all suspected tuberculosis patients.

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