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Risks of Daily Living Activities on Related Disability

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ABSTRACT
Indonesian lost 6 days productive time in average because the disability of daily activities, that must be dealt with seriously because the effect of this problem is the declining quality of life of a person and will also cause a burden for country. This research is expected to be the key to understand and overcome the problems of disability in daily activities. The research used cross sectional design with a secondary data based of Indonesian Family Life Survey (IFLS) 5. The analysis in this study was logistic regression with samples aged >40 years who participated in data collection conducted by RAND with a total of 8185 respondents. Almost all variables examined in this study were statistically significant with disabilities, there were age (p = 0.000, OR = 2.996, 95%CI = 2.726 – 3.294), gender (p = 0.000, OR = 1.858, 95%CI = 1.693 – 2.039), marital status (p = 0.000, OR = 2.211, 95%CI = 1.997 – 2.448), employment status (p = 0.000, OR = 2.540, 95%CI = 2.321 – 2.780), arthritis status (p = 0.000, OR = 1.687, 95%CI = 1.482 – 1.919) and obesity (p = 0.000, OR = 1.345, 95%CI = 1.177 – 1.538). Only variable educational level that is not significant with disability (p=0,198). The target of disability management is prioritized at an older age by providing health education and assistance so that they can withstand the threat of daily disability and lead to an improvement in their quality of life.

INTRODUCTION

One of the consequences for people with disabilities is a decrease in the quality of life. It happens in developed and developing countries.[1] Disability is a big term used for situations such as having limited physical activity, impaired physical function, and limited social participation. More than billions of people are estimated to suffer various types of disabilities or around 15% of the world's population.[2] In developing countries, disability needs to be one of the concerns because it has the effect of poverty and the decline in the quality of life of a person which will also cause burden for country.[3]

Disability related to chronic disease conditions and age.[2] Several studies have linked limitation or disabilities related to activities of daily living with several diseases such as diabetes and heart failure, stroke, arthritis, and disorders such as cognitive and visual impairment.[4] A study in United States was conducted and showed results of arthritis as the main cause of disability activities of daily living.[4] It has been known, arthritis is a major cause of limitation for physical movement, because arthritis causes pain, stiffness and joint deformity, these all lead to limited mobility and cause person for not being able to carry out daily activities (daily living activities).[5]

More than one billion people or about 15% of the world's population are estimated to live with some form disabilities. Between one hundred and ten million (2.2%) to one hundred and ninety million (3.8%) people aged 15 years and over have difficulty in in terms of functioning. Arthritis is a non-communicable disease condition that becomes a major cause of disability in several countries.[2]

Based on the Republic of Indonesia's basic health research in 2018, the age of 40 years and over dominated the disability proportion of 73.7%, this needs to be a serious concern considering the effect of disability of daily activities is its impact on the Indonesian economic sector and lost an average of 6 days of productive time.[6,7] This proves that as a developing country, Indonesia also feels the problem due to disability. Many factors cause disability or limitations, such as age, sex, marital status, education level, employment status, smoking habits and health conditions such as arthritis and obesity.[8]

IFLS 5 or The Indonesian Family Life Survey 5 which was initiated by RAND [RAND is a research organization engaged in the development of solutions and public policies], is a longitudinal study since 1993 at individual and household level.[9] Longitudinal studies conducted by RAND Corporation are individual observation methods from time to time that have been conducted from 1993 to 2014 with a total of 5 surveys namely (IFLS 1, IFLS 2, IFLS 3, IFLS 4 and IFLS 5). The focus of data collection by IFLS is not only limited to health such as infectious and non-communicable diseases but also look at the economic side such as family income and others. This has made all the risk factors discussed in this study have been successfully identified through the IFLS 5 survey in 2014.[8,10] This study aimed to find out what factors are associated with daily disability events.

MATERIAL AND METHOD

This study used secondary data collected by RAND as the Indonesian Family Life Survey (IFLS). IFLS is a collaboration of RAND and Survey Meter which conducted a longitudinal survey in Indonesia with Sampling frame research based on 1993 National Socioeconomic Survey/ *Survei Sosial Ekonomi Nasional (SUSENAS)*. The survey did not only collect data on individuals, their families, members of their household, the environment where they live and the health as well as education facilities they used, but also data on the economic condition of family. IFLS has conducted 5 surveys from 1993 to 2014.[10]

The secondary data obtained was adjusted according to inclusion criteria such as respondents aged > 40 years old, free from diabetes, COPD, hypertension, stroke, heart disease, then data cleaning was carried out to exclude incomplete data so that samples that were further analyzed in this study were 8185 respondents. This study consisted of independent Variables such as age, sex, marital status, education level, employment status, smoking habit and health condition such as arthritis and obesity and the dependent variable was disability of daily activities. This research analysis used SPSS software application. Multivariate analysis in the form of logical regression with standard association values is Odds Ratio used to analyze data by considering variables that affect the dependent variable so that it will display the adjusted value.[11]

The collection of data on human subjects in the IFLS study has passed an ethical test from RAND's Human Subjects Protection Committee (RAND's Institutional Review Boards) with protocol approval number s0064-06-01-CR01.[12]

RESULTS

Total of 8185 respondents above 40 years old were included in the criteria of this study, as explained in Table 1 that around 41.90% of respondents experienced limitations in carrying out daily activities. The average age of respondents in this study was 55.90 years old with the highest age category in the age group 40-59 years old. In the Table 1, it also found information that the respondents in this study were mostly female (62.20%) and more were those who were married (75.10%), low education (91.10%), employed (55.40%), did not smoke (73.10%). Based on the measurement of health status, respondents who did not experience arthritis were (86.90%) and not obese were (88%).

Table 1. Frequency Distribution of Research Variables

Variables	n = 8185	%
Disability Status		
Experiencing disability	3432	41.90
Not Experiencing disability	4753	58.10
Age (Mean = 55.90)		
Age (Year)		
≥ 60	2774	33.90
40 – 59	5411	66.10
Gender		
Female	5092	62.20
Male	3093	37.80
Marital Status		
Unmarried/divorced	2036	24.90
Married	6149	75.10
Educational Level		
Low education	7458	91.10
Higher education	727	8.90
Employment Status		
Unemployed	3654	44.60
Employed	4531	55.40
Smoking Habits		
Smoking	2199	26.90
Not smoking	5986	73.10
Arthritis Status		
Suffering from arthritis	1070	13.10
Not suffering from arthritis	7115	86.90
Obesity		
Obesity (IMT ≥ 30)	980	12
Not Obese (IMT < 30)	7205	88

Source: IFLS 5, 2014

Table 2 shows the results of the chi-square analysis on the correlation between age, gender, marital status, education level, employment status, smoking habits, health conditions such as arthritis, obesity and the disability events of daily living activities. From the statistical results it can be seen that there are several variables that have a significant correlation such as the age variable (*p* value = 0.000, OR 2.996; 95% CI 2.726 – 3.294), gender (*p* value = 0.000, OR 1.858; 95% CI 1.693 – 2.039), marital status (*p* value = 0.000, OR 2.211; 95% CI 1.997– 2.448), employment status (*p* value = 0.000, OR 2.540; 95% CI 2.321 – 2.780), arthritis (*p* value = 0.000, OR 1.687; 95% CI 1.482 – 1.919) and obesity (*p* value = 0.000, OR 1.345; 95% CI 1.177 – 1.538).

Table 3 shows the results of logistic regression multivariate analysis show that age is the most influential variable on the disability events of daily living activities based on data from the Indonesian Family Life Survey 5 with the OR for 2.499. The OR values obtained are adjusted.

DISCUSSION

The problem of disability of daily living activities must be one of concerns of the Indonesian government, Considering that the disability events of daily living activities in Indonesia have made the average Indonesian population lost 6-7 productive days and the disability prevalence in addition based on Basic Health Research data in Indonesia of 11%.[13] From the results of multivariate logistic regression analysis, it was found that age, gender, marital status, education level, employment status, arthritis, and obesity were related to disability events of daily living activities.

The age variable influences the incidence of disabilities in daily activities. This is in line with Li's research which says that the incidence of disability is also related to age.[14] This becomes possible because the increase in age is directly proportional to the decline in physical, sensory and cognitive functions, it makes them more difficult to be independent because of decrease in physical function in carrying out daily activities.[1] Apart from age, several other variables are significantly related to disability of daily living activities such as gender. In general, women have a longer life expectancy so that women become very familiar with health condition such as non-

communicable diseases. Things like this that make women have more risks to experience disability of activities daily living than men.[15,16]

Table 2. The Correlation Among Age, Gender, Marital Status, Educational Level, Employment Status, Smoking Habits, Arthritis and Obesity

Variable	Disability Status				*p-value*	OR value (95%CI)
	Experiencing Disability		Not Experiencing Disability			
	n	%	n	%		
Age (Year)						
≥ 60	1651	59.50	1123	40.50	0.000	2.996
40 – 59	1781	32.90	3630	67.10		(2.726 – 3.294)
Gender						
Female	2419	47.50	2673	52.50	0.000	1.858
Male	1013	32.80	2080	67.20		(1.693 – 2.039)
Marital Status						
Unmarried/Divorced	1152	56.60	884	43.4	0.000	2.211
Married	2280	37.10	3869	62.90		(1.997 – 2.448)
Educational Level						
Low Education	3144	42.20	4314	57.80	0.198	1.111
Higher Education	288	39.60	439	60.40		(0.951 – 1.298)
Employment Status						
Unemployed	1986	54.40	1668	45.60	0.000	2.540
Employed	1446	31.90	3085	68.10		(2.321 – 2.780)
Smoking Habit						
Smoking	720	32.70	1479	67.30	0.000	0.588
Not smoking	2712	45.30	3274	54.70		(0.530 – 0.651)
Arthritis Status						
Suffering from Arthritis	569	53.20	501	46.8	0.000	1.687
Not Suffering Arthritis	2863	40.20	4252	59.8		(1.482 – 1.919)
Obesity						
Obesity (IMT ≥ 30)	474	48.40	506	51.60	0.000	1.345
Not Obese (IMT < 30)	2958	41.10	4247	58.90		(1.177 – 1.538)

Source: IFLS 5, 2014

Table 3. Gold Model Binary Logistic Regression Analysis on Age, Gender, Marital Status, Educational Level, Employment Status, Arthritis and Obesity to Disability of Daily Living Activities

Variable	AOR	95% CI	*p-value*
Age (Year)			
≥ 60	2.499	2.245 – 2.782	0.000
40 – 59	Reference		
Gender			
Female	1.505	1.352 – 1.677	0.000
Male	Reference		
Marital Status			
Unmarried/Divorced	1.294	1.152 – 1.455	0.000
Married	Reference		
Educational Level			
Low Education	1.180	1.001 – 1.391	0.049
Higher Education	Reference		
Employment Status			
Unemployed	1.734	1.568 – 1.918	0.000
Employed	Reference		
Arthritis Status			
Suffering from Arthritis	1.439	1.256 – 1.650	0.000
Not Suffering Arthritis	Reference		
Obesity			
Obesity (IMT ≥ 30)	1.289	1.118 – 1.487	0.000
Not Obese (IMT < 30)	Reference		

Source: IFLS 5, 2014

Marital status is significantly related to disability events of daily living activities. This is in line with Loukine's research which found that a person has a greater chance to experience disability in those who are divorced or not married.[17] This event is possible because happy marriage can help someone through difficult times because of the effects of pain and also the presence of a partner who accompanies life can provide moral and social support in dealing with stress and chronic conditions.[18,19]

Other variables related to daily living disability events are the level of education and employment status. Education and employment status are important for health. Those who are highly educated are more likely to meet their needs in improving their health because higher education is generally correlated with high personal income/economic income.[20]

Variables that contribute to the association of events with daily living activities is arthritis. Arthritis is one of the main causes on the incidence of limitations in one's movements which causes a person to experience disability of daily living activities.[21] Arthritis is a disease that attacks joints, soft tissue with extreme pain is progressive and causes a person to be unable to carry out daily activities as usual.[22] The Indonesian Ministry of Health has found that arthritis is related to the incidence of disability in the age group > 15 years old.[23]

Obesity was also related to disability events in daily living activities. Obesity was found to be related to the incidence of someone unable to carry out daily activities.[24] This relation was due to obesity that related to many diseases, one of them is joint disease or arthritis, where arthritis is one of the main causes of limited mobility on person.[24,25]

This study certainly cannot be separated from limitations such as data retrieval on arthritis variables which allow for the usual information because arthritis variable is only diagnosed based on questions that are at risk of recall bias or provide invalid information due to respondents subjectivity which ultimately influences the outcome of association.[26,27] The unavail-ability of data on diseases such as diabetes, stroke, hypertension, heart disease, in this study is one of the limitations because as we know that arthritis and obesity are the presence of these diseases. One of the weaknesses in this study is the measurement of disability is categorized into a single unit, so it is not possible to see daily living activities per each day.

CONCLUSION AND RECOMMENDATION

Disability of daily living activities is generally caused by the limitations of one's movements that can occur due to chronic disease condition that is suffered by someone where the risk to experience chronic disease is greater because of the process of increasing age in each individual. It is time for the government and other health institutions to prevent this kind of disability. Prevention can be done by starting a health campaign to those who are at risk to start carrying out healthy living activities to be able to reduce the risk of non-communicable diseases which results in preventing disability for daily living activities.

AUTHOR CONTRIBUTIONS

ANP developed the theory and performed the computation; WZQ, PSN, AF verified the analytical methods; EES, RMD supervised the project. All authors discussed the results and contributed to the final manuscript. ANP = Ashar Nuzulul Putra; WZQ = Witri Zuama Qomarania; PSN = Purwo Setiyo Nugroho; AF = Adelina Fitri; EES = Erny Elviany Sabaruddin; RMD = Ridho Muhammad Dhani.

CONFLICTS OF INTEREST

The authors declare no conflict of interest or personal relationships that could have appeared the work reported in this paper.

REFERENCES

1. Rudnicka E, Napiera P, Pod A, Smolarczyk R, Grymowicz M. The World Health Organization (WHO) Approach to Healthy Ageing. *Maturitas*. 2020;139(January):6–11. 10.1016/j.maturitas.2020.05.018
2. WHO. WHO | Disability and Health [Internet]. WHO. World Health Organization; 2016 [cited 2017 Apr 21]. Available from: http://www.who.int/mediacentre/factsheets/fs352/en/
3. Emerson E, Llewellyn G. The Association between Household Wealth and the Prevalence of Child Disability and Specific Functional Limitations: Analysis of Nationally Representative Cross-Sectional Surveys in 40 Low- and Middle-Income Countries. *Disabil Health*

J. 2022 Jul 20. 101364. 10.1016/J.Dhjo.2022.101364

4. Maresova P, Javanmardi E, Barakovic S, Barakovic Husic J, Tomsone S, Krejcar O, Et Al. Consequences of Chronic Diseases and Other Limitations Associated with Old Age - A Scoping Review. *BMC Public Health*. 2019 Nov 1;19(1):1–17. 10.1186/S12889-019-7762-5
5. Pendergrast CB, Monnat SM. Perceived Impacts Of COVID-19 on Wellbeing Among US Working-Age Adults With ADL Difficulty. *Disabil Health J*. 2022;101337. Https://Doi.Org/10.1016/J.Dhjo.2022.101337
6. National Institute for Health Research & Development. *Riset Kesehatan Dasar* (National Health Survey). Jakarta: Minist Heal Repub Indones. 2013;(1):1–303.
7. National Institute for Health Research & Development. *Hasil Utama Riset Kesehata Dasar (RISKESDAS)*. Jakarta: Minist Heal Repub Indones. 2018;Vol. 44.
8. WHO. World Report on Disability 2011. A*m J Phys Med Rehabil Assoc Acad Physiatr*. 2011;91:549. Http://Www.Ncbi.Nlm.Nih.Gov/Pubmed/22726850
9. The RAND. About The RAND Corporation | RAND [Internet]. 2020 [Cited 2020 May 2].
10. Strauss J, Sikoki B, Witoelar F. The Fifth Wave of the Indonesia Family Life Survey (IFLS): Overview and Field Report. *RAND Labor Popul Work Pap Ser*. 2016;1.
11. Zocchetti C, Consonni D, Bertazzi PA. Relationship Between Prevalence Rate Ratios and Odds Ratios in Cross-Sectional Studies. Oxford Academic. 1997;26(1):220–223. https://doi.org/10.1093/ije/26.1.220
12. Data Updates, Tips and Faqs for Indonesian Family Life Survey (IFLS) | RAND [Internet]. [Cited 2022 Dec 1].
13. Kemenkes RI. Riset Kesehatan Dasar (RISKESDAS) 2013. Lap Nas 2013. Jakarta: Kementerian Kesehatan RI. 2013;1–384.
14. Li X, Wang J, Dong S, Fu J, Liu J. The Influence of Disabilities in Activities of Daily Living on Successful Aging: The Role of Well-Being and Residence Location. *Front Public Heal*. 2020;7(January):10–13. Https://Doi.Org/10.3389/Fpubh.2019.00417
15. Gwinnutt J, Norton S, Hyrich K, Lunt M, Combe B, Rincheval N, Et Al. Low Social Support, Worse Financial Status and Limited Physical Activity at Rheumatoid Arthritis Onset Predicts Excess Disability Over 10 Years. *Ann Rheum Dis*. 2022;81(Suppl 1):506–507.
16. Chiu CJ, Yang MC, Huang CC, Chang CM. From Disability to Death: A 20-Year Follow-Up from the Taiwan Longitudinal Study on Aging. *Clin Interv Aging*. 2021. 16:1813. 10.2147/CIA.S321640
17. Loukine L, Donnell SO, Goldner EM, Mcrae L, Allen H. Health Status, Activity Limitations, Work-Related Restrictions and Level of Disability Among Canadians with Mood and/or Anxiety Disorders. *Health Promot Chronic Dis Prev Can*. 2016;36(12). 10.24095/Hpcdp.36.12.03
18. Skleroz M, Doyumu Y, İlişkisi D. The Relationship Between Life Satisfaction and Spouse Support in Women with Multiple Sclerosis. *Bezmialem Science* 2022;10(4):500–506.
19. Cao R, Jia C, Ma Z, Niu L, Zhou L. Disability in Daily Living Activities, Family Dysfunction, and Late-Life Suicide in Rural China: A Case–Control Psychological Autopsy Study. *Front Psychiatry*. 2019. https://doi.org/10.3389/fpsyt.2019.00827
20. The National Bureau of Economic Research. The Effects of Education on Health. 2017. Available From: Http://Www.Nber.Org/Digest/Mar07/W12352.Html
21. Oliveira S, Andrade R, Valente C, Espregueira-Mendes J, Silva F, Hinckel BB, Et Al. Mechanical-Based Therapies May Reduce Pain and Disability in Some Patients with Knee Osteoarthritis: A Systematic Review with Meta-Analysis. *The Knee*. 2022;37:28–46. https://doi.org/10.1016/j.knee.2022.05.005
22. Hawker GA, King LK. The Burden of Osteoarthritis in Older Adults. *Clin Geriatr Med*. 2022; 38(2):181–192. 10.1016/J.Cger.2021.11.005

23. Kemenkes RI. Situasi Penyandang Disabilitas. *Bul Jendela Data Inf Kesehat*. 2014;Semester 2(1):1–5.
24. Lee DH, Kim SY, Park JE, Jeon HJ, Park JH, Kawachi I. Nationwide Trends in Prevalence of Underweight, Overweight, and Obesity Among People with Disabilities in South Korea from 2008 to 2017. *Int J Obes 2021 463*. 2021;46(3):613–622. 10.1038/S41366-021-01030-X
25. Gaulton TG, Fleisher LA, Neuman MD. The Association Between Obesity and Disability in Survivors of Joint Surgery: Analysis of the Health and Retirement Study. *Br J Anaesth*. 2018;120(1):109–116. 10.1016/J.Bja.2017.11.011
26. Woodward M. Epidemiology Study Design and Data Analysis. 3rd Ed. Florida: CRC Press, Inc.; 2014.
27. Gerstman BB. Epidemiology Kept Simple: An Introduction to Traditional and Modern Epidemiology. 3rd Ed. San Jose, California: Wiley-Blackwell; 2013.

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Determinants of Hypertension Incidence in the Work Areas of the Bone and Barru District Health Centers in 2022

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ABSTRACT
Hypertension is often called the silent killer because it does not show any symptoms. Hence, not all people with hypertension are aware that they suffer from a chronic condition that can cause degenerative diseases, to death. Hypertension is a problem that is often found in society, both in developed and developing countries, especially in Indonesia. The purpose of this study was to determine the factors associated with the incidence of hypertension in the work area of Dua BoccoeHealth Center and Blue Health Center of Bone Regency and Padongko Health Center and PalakkaHealth Center of Barru Regency, with a high prevalence of hypertension cases in Bone Regency (29.33%) and Barru Regency (33.59%). The type of research used is observational with cross-sectional design with a total of 356 respondents. Data were processed using the SPSS program with chi-square analysis and logistic regression. The results of the study based on the chi-square test showed that there was a relationship between the variables of age, education level, family history of hypertension, smoking, and stress with the incidence of hypertension (p<0.05) and there was no relationship between the variables of sex and physical activity with the incidence of hypertension (p>0.05). Furthermore, based on the logistic regression test, respondents were at a 6.5 times greater risk of developing hypertension if they had stress risk factors. Therefore,respondents are expected to carry out regular health checks and maintain a healthy lifestyle to control risk factors for hypertension.

INTRODUCTION

Hypertension or high blood pressure is a chronic condition characterized by increased blood pressure on the walls of the arteries, which cause the heart to work harder to circulate blood throughout the body through the blood vessels. This can interfere with blood flow, damage blood vessels, cause degenerative diseases, to death.[1] Hypertension is often known as the silent killer because it does not show any symptoms for a long time so not all hypertension sufferers are aware of the disease they are suffering from.[2] Hypertension becomes a problem that is often found in society, both in developed and developing countries, especially in Indonesia. Data from the World Health Organization (WHO) in 2019 estimates that the prevalence of hypertension globally is 22%, with Africa having the highest prevalence of 27%, Southeast Asia is in the third position with a prevalence of 25% and the lowest is America with a prevalence of 18% of the total population. WHO estimates that 1 in 4 men and 1 in 5 men experience hypertension which can be the main cause of premature death worldwide.[3] Hypertension or high blood pressure is estimated at 1.28 billion adults aged 30-79 years worldwide suffer from hypertension. and it is estimated that 46% of adults are not aware they have hypertension.[4]

Hypertension is still a big challenge in Indonesia, which is the most common occurrence in primary health services in Indonesia. Based on the results of the *Riset Kesehatan Dasar (Riskesdas)* in 2018, the national prevalence of hypertension in the population aged 18 years was 34.11% which made hypertension a health problem with a high prevalence.[5] The incidence of hypertension occupies the top position as a Non-Communicable Disease (NCD). In 2018, there were 185,857 cases, followed by type 2 DM and followed by obesity. The estimated number of hypertension cases in Indonesia was 63,309,620, while the death rate in Indonesia due to hypertension was 427,218 deaths.[6]

Based on Health Report of South Sulawesi Province 2018 year found prevalence hypertension based on results measurement in South Sulawesi Province, namely by 31.68%,[5] whereas Bone Regency has prevalence hypertension by 29.33% while in Barru Regency shows that the prevalence hypertension by 33.59%.[7] Amount case hypertension in the district Barru 2018 to 2019 is happening enhancement cases, it is known that in 2018 it was 7,699 per 100,000 population and in 2019 it was 15,764 cases per 100,000, while in 2020 the prevalence case hypertension of 3,199 per 100,000 population and is case highest third incident disease no infectious disease in Barru district.[8]

Blood pressure can easily change in seconds, this is characterized by dizziness, headache, neck stiffness, and dizzy eyes. Factors that influence the occurrence of hypertension are divided into two major groups, namely factors unmodified/cannot be changed such as gender, age, and genetics, and modifiable factors such as diet (junk food, sodium intake, fat intake, coffee intake), exercise habits, smoking, sleeping patterns, being overweight and persistent stress.[9] Age affects the occurrence of hypertension because diastolic pressure increases with age (natural changes in hormones), so blood vessels and the heart become stiffer and weaker. In terms of gender, the risks are similar between the ages of 55-74 years, after the age of 74 women areat greater risk, and also women will also enter menopause, so women suffers more from hypertension more however women are at a greater risk after the age of 74 and suffers more from hypertension due to menopause.[10]

In general, education is any planned effort to influence other people, either individuals, groups, or communities so that they do what is expected by education actors, so that education canaffect health, the higher a person's level of education, the level of awareness of health increases. Education is any planned effort to influence people, either individuals, groups or communities to implement what is expected by educator. Education is closely related to health, as the health awareness increases the higher one's education level is. [11] The level of education affects the incidence of hypertension; education is a basic need in life and the dominant factor in the formation of quality human resources. Knowledge of aspects that play an important role in the incidence of hypertension will affect efforts to help detect patients early so that they

can prevent complications.[12]

Hypertension tends to be a hereditary disease, if both of our parents have hypertension, there is a 60% chance that we will get the disease.[13] The development and changing times also affects changes in lifestyle such as smoking behavior, lack of physical activity and stress levels, these factors can trigger the occurrence of hypertension. Smoking is a modifiable factor, the nicotine content in cigarettes can cause an increase in heart rate and blood pressure.[14] A person with light to moderate physical activity can cause an increase in blood pressure. Furthermore, the release of the hormone adrenaline as a result of severe stress can cause an increase in blood pressure and blood clots which can lead to a heart attack.[15]

This research was conducted at four health centers, namely Dua Boccoe Health Center and Blue Health Center in Bone Regency as well as Padongko Health Center and Palakka Health Center in Barru Regency. Considering the various risk factors associated with the occurrence of hypertension along with the diversity of characters in the population in the working area of the health center, as well as the fact no previous studies were conducted in this area, it will certainly be an attraction if further research is carried out. The purpose ofthis study was to determine the determinants of the incidence of hypertension, namely age, gender, education level, family history of hypertension, smoking, physical activity and stress in the work area where the study was located.

MATERIAL AND METHOD

The type of research used is observational with a cross-sectional design. This research was carried out in the working area of Dua Boccoe Health Center and Blue Health Center of Bone Regency as well as at Padongko Health Center and Palakka Health Center Barru Regency in 2022. The population in this study were general poly visitors at the research location from February to April 2022. The sampling technique used was used is simple random sampling, with a total sample of 356 respondents. Data were obtained by conducting interviews with respondents based on patient medical record data in fourth public health center. Data were analyzed using SPSS with bivariate analysis using chi square test and multivariate analysis using logistic regression test. Thevariables measured in this study were age, education level, family history of hypertension, smoking, and stress. The research was approved by the Ethics Committee of the Public Health Faculty at Hasanuddin University. The ethical approval number was 15643/UN4.14.1/TP.01.02/2022.

RESULTS

Respondents in this study were 356 people who were visitors to the general poly at the Dua Boccoe Health Center and the Blue Health Center in Bone Regency as well as at the Padongko Health Center and Palakka Health Center in Barru Regency in 2022. Based on Table 1, bivariate analysis showed that there was a relationship between age groups and the incidence of hypertension, obtained a value (p= 0.000 < 0.05) and shows that most respondents who suffer from hypertension are in the age group > 45 years, which is 67.40%. Most of the respondents who suffer from hypertension are male, namely 56.70%, and from the results of the chi square test analysis, it is known that there is no relationship between gender and the incidence of hypertension (p > 0.05). Most hypertension sufferers at the low education level (No School, SD/MI/Equivalent and SMP/MTS/Equivalent) that is equal to 72.2% and it is known that the results of the chi square test analysis that the value (p = 0.000) which means there is the relationship between education and the incidence of hypertension (Table 1).

The number of respondents who suffer from hypertension is the highest in respondents who have a family history of hypertension, which is 74.1% and it is known that there is a relationship between a family history of hypertension and the incidence of hypertension based on the results of the chi square test analysis, with (p = 0.000 < 0.05), then the number of respondents who suffer from hypertension is the most in respondents who smoke, which is 65% and there is a relationshipbetween smoking behavior and the incidence of hypertension with p = 0.000 <0.05 (Table 1).

Based on the results of the analysis, it was found that there was no relationship between

physical activity and the incidence of hypertension with a value ($p = 0.062 > 0.05$) and it was known thatthe number of respondents who suffered from hypertension was the most in respondents whose percentage of physical activity was in the high category, namely 54.5%. While the analysis of the relationship between stress levels and the incidence of hypertension shows that the number of respondents who suffer from hypertension is the most in respondents with high stress levels, namely 54.7% and there is a relationship between stress levels and the incidence of hypertension with a value ($p = 0.000 < 0.05$).

Based on the results of the chi square test analysis, there were five variables included in the multivariate analysis including age, education, family history of hypertension, smoking behavior, and stress levels (Table 1). The multivariate results of the five variables showed that all of these variables had an effect on the incidence of hypertension. However, the stress variable hasthe greatest influence with the value of Exp (B) = 6.507, meaning that respondents are 6.5 times at risk of experiencing hypertension if they have stress risk factors (Table 2).

Table 1. Analysis Results Bivariate Variable Independent to Variable Dependent

Variable	Incidence of Hypertension				Total		*p-value*
	Hypertension		Not Hypertension				
	n = 356	%	n	%	n	%	
Age (Years)							
> 45	130	67.40	63	32.60	193	100	0.000
≤ 45	59	36.20	104	63.80	163	100	
Gender							
Man	72	56.70	55	43.30	127	100	0.310
Woman	17	51.10	112	48.90	229	100	
Level of Educaion							
Low Education	57	72.20	22	27.80	79	100	0.000
Higher Education	132	47.70	145	52.30	277	100	
History of Hypertension Family							
Yes	123	74.10	43	25.90	166	100	0.000
Not	66	34.70	124	65.30	190	100	
Behavior Smoke							
Smoke	67	65.00	36	35.00	103	100	0.000
Not Smoke	122	48.00	31	51.80	253	100	
Activity Physique							
Low	98	51.90	91	48.10	189	100	0.062
High	91	54.50	76	45.50	167	100	
Stress Level							
High Stress	185	54.70	153	45.30	338	100	0.000
Low Stress	4	22.20	14	77.80	18	100	

Source: Primary Data, 2022

Table 2. Final Model of Analysis Results Multivariate

Variable	Exp (B)	95% CI	*p-value*
Age	1.793	1.059 - 3.034	0.030
Level of education	3.174	1.849 – 5.447	0.000
History of Hypertension Family	4.235	2.561 – 7.002	0.000
Behavior Smoke	1.938	1.113 - 3.376	0.019
Stress Level	6.507	1.810 – 23.400	0.004

Source: Primary Data, 2022

DISCUSSION

Research results show that respondents aged > 45 years (67.40%) experienced hypertension. Based on analysis bivariate, there are connection among age with incident hypertension, and based on analysis multivariate is known that age have influence 1.7 times over incident hypertension. This finding is in line with previous study showing that after reaching the age 45 years old wall arteries will thicken due to accumulation substance collagen on layer muscle so that vessels blood will narrows and becomes stiff, apart that because wall vessels blood are not capable to return to beginning position with same flexibility moment occur drop pressure cause pressure diastolic also increases.[16] Hypertension often occurs at age 40 years or older, due to the seldomness people within productive age groups to check their health and less notice pattern healthy life.[17]

Based on the results of the study, it was known that the respondents who suffered from hypertension were mostly male (56.7%) and bivariate analysis showed that there was no relationship between gender and the incidence of hypertension. Research conducted by Garwahusada E & Wirjatmadi B states that hypertension more many suffered by women with age > 45 years because hormonal factors, namely decrease the hormone estrogen in women who have had going through menopause trigger increase pressure blood and is influenced by factors psychology and existence change in self woman that. Low estrogen levels cause blood becomes more viscous that enhances risk clumping blood.[18]

Based on results it is known that respondents who suffer hypertension more belong at low level education group with category respondent Not School, Elementary SD/Equivalent and Middle School SMP/MTS/Equivalent) of 72.2%. Bivariate Analysis results showed no connection among education with hypertension incident, and based on analysis multivariate it is known that low level education have influence 3.1 times experienced incident hypertension. This result is in line with previous study previously showing that prevalence hypertension tend to be higher more high in low education group group education more low consequence ignorance about diet pattern pattern eat well, education in this aspect include knowledge, attitude, and action related hypertension have influence with hypertension incidence.[19]

Respondents who have family with history most hypertension suffer from hypertension (74.1%) and from bivariate analysis bivariate, there are connection among history hypertension family with incident hypertension and based on analysis multivariate is known that respondents who have history hypertension in the family have influence 4.2 times risk experience hypertension. That thing This finding is in line with previous study previously which stated that if second both parent suffered from hypertension, then number incident hypertension in offspring increased 4 to 15 times compared to when second parent is normotensive. When second parent suffer hypertension essential, then 44.8% of his children will suffer hypertension if only one parent hypertension then 12.8% of the offspring will have hypertension.[20]

Result of the study showed that respondents who smokes suffer more from hypertension compared to those not smoking (65%). The results study that respondents who suffer most hypertension have behavior smoking (65%). Based on analysis bivariate, there are connection Among smoking behavior smoke with incident hypertension, and outcomes analysis multivariate is known that respondents who smoke have risk of 1.9 times experiencing hypertension. Pressure blood smoker soar many times throughout day during respondents smoke.[21] Enhancement this occur because the constricting nicotine vessels blood so that compel heart work hard and cause pressure blood increases.[22]

Based on results obtained more respondents with low physical activity experienced hypertension, while analysis bivariate show that no connection among physical activity physique with incident hypertension incident. When doing physical activity such as sports, heart will become stronger and will not need to work harder in pumping blood. For hypertension sufferer this will make Genre blood becomes smoother and will keep blood pressure controlled. Moment to do activity physical, such as sports, heart will becomes more strong, so no need work more hard in pump blood, with

condition this, including for sufferer hypertension, make Genre blood becomes smooth and blood pressure becomes more under controlled. On the other hand, from study previously found that people who do not exercise regularly are more at risk at catching hypertension by 13.47 times higher compared to those with regular exercise habit.[23]

Research results show that respondents who suffer hypertension also has stress complaints with high stress level 54.70%. Based on analysis bivariate, there are connection stress with incident hypertension, and based on analysis multivariate it is known that someone who experiences stress 6.5 times is more at risk of experiencing hypertension, from results study between all variable, stress Becomes variable with biggest influence on incident hypertension. This result is in line with previous study previously that strong emotions and great stress will becomes something a somatic reaction that direct about system circulation blood so that can influence beat heart and system blood circulation.[24] Release adrenaline hormone as consequence stress heavy could trigger rise pressure blood and freeze blood that so cause attack heart, adrenaline can also speed up pulse heart and constrict vessels coronary blood.[25]

CONCLUSION AND RECOMMENDATION

Relevant factors with incident hypertension in the work area Public Health Center Dua Boccoe and Public Health Center Biru Bone Regency as well as Padongko Health Center and Palakka Health Center Regency Barru the year 2022 is age, education, history hypertension family, behavior smoke and level stress. Not there is connection among type gender and activity physique with incident hypertension. To do inspection health by routine to Health Center, Hospital related inspection and control pressure blood for complications hypertension can prevented as early as possible and keep pattern life healthy like no smoking, doing activity physical enough, take care pattern sleep and avoid stress to control factors risk hypertension.

AUTHOR CONTRIBUTIONS

ILM and ASY designed the research design; ATAA and SM conducted data collection; CL analyzed the data; ILM write the manuscript. ILM = Ida Leida Maria; ASY = Andi Selvi Yusnitasari; ATAA = A. Tiara Aurelia Annisa; SM = Sri Mulyani; CL = Clement Lifoia.

CONFLICTS OF INTEREST

The authors declare no conflict of interest.

REFERENCES

1. Sari YNI. Make Peace with Hypertension Pe mold. Jakarta: Earth Medicine; 2022.
2. Kemenkes RI. Pusat Data dan Informasi Kementerian Kesehatan RI "Hipertensi Si Pembunuh Senyap. Pusat Data dan Informasi Kementerian Kesehatan RI. Jakarta Selatan; 2019.
3. WHO. World Hypertension Day 2019 [Internet]. World Health Organization. 2019 [cited 2022 Jul 26]. Available from: https://www.who.int/news-room/events/world-hypertension-day-2019/hypertension#:~:text=World Hypertension Day 2019,- 19 May 2019&text=Of the estimated 1.13 billion, consumption of alcohol and tobacco.
4. WHO. Hypertension [Internet]. World Health Organization. 2021 [cited 2022 Jul 26]. Available from: https://www.who.int/news-room/fact-sheets/detail/hypertension
5. Kemenkes RI. Laporan Nasional Riskesdas 2018. Badan Penelitian dan Pengembangan Kesehatan. Jakarta; 2019.
6. Kemenkes RI. Profil Kesehatan Indonesia Tahun 2018. Kementerian Kesehatan Republik Indonesia. Jakarta; 2019.
7. Kemenkes RI. Laporan Provinsi Sulawesi Selatan Riskesdas 2018. Badan Penelitian dan Pengembangan Kesehatan. Jakarta; 2019.
8. Dinkes Kab. Barru. Jumlah Kasus Hipertensi 2018-2020. Kabupaten Barru: Dinas Kesehatan; 2020.
9. Kario K. Management of Hypertension in the Digital Era: Small Wearable Monitoring Devices for Remote Blood Pressure Monitoring. *Hypertension*. 2020;76(3):640–650. 10.1161/HYPERTENSIONAHA.120.14742

10. Amanda D, Martini S. Hubungan Karakteristik dan Obesitas Sentral dengan Kejadian Hipertensi. *Jurnal Berkala Epidemiologi*. 2018;6(1):43.
11. Podungge Y. Hubungan Umur dan Pendidikan dengan Hipertensi pada Menopause. *Gorontalo Journal of Public Health.* 2020;3(2):154–161. https://doi.org/10.32662/gjph.v3i2.1115
12. Burnett MSN CN. A Telehealth Blood Pressure Education Program on Hypertension A Telehealth Blood Pressure Education Program on Hypertension Knowledge, Selfcare, and Behavior Knowledge, Selfcare, and Behavior. *Journal of Telemedicine and Telecare*. 2020;18(4):211–220.
13. Angesti AN, Triyanti T, Sartika RAD. Riwayat Hipertensi Keluarga Sebagai Faktor Dominan Hipertensi pada Remaja Kelas XI SMA Sejahtera 1 Depok Tahun 2017. *Buletin Penelitian Kesehatan*. 2018;46(1):1–10. https://doi.org/10.22435/bpk.v46i1.41
14. Umbas IM, Tuda J, Numansyah M. Hubungan Antara Merokok dengan Hipertensi di Puskesmas Kawangkoan. *e-Journal Keperawatan*. 2019;7(1–8). https://doi.org/10.35790/jkp.v7i1.24334
15. Irawan D, Sekar Siwi A, Susanto A. Analisis Faktor-Faktor yang Memengaruhi Kejadian Hipertensi. *Journal of Bionursing*. 2020;3(2):164-166. https://doi.org/10.20884/1.bion.2020.2.3.70
16. Rambing DR, Haksama S, Lusno MFD, Wulandari A. Hubungan Umur dan Riwayat pada Keluarga Sebagai Faktor Non-Modifeable dengan Kejadian Hipertensi. *Media Bina Ilmiah*. 2021;15(10):5497–504. https://doi.org/10.33758/mbi.v15i10.1077
17. Zhang W li, Cai J. STEP to Blood Pressure Management of Elderly Hypertension: Evidence from Asia. *Hypertension Research*. 2022;45:576–582. 10.1038/s41440-022-00875-7
18. Garwahusada E, Wirjatmadi B. Hubungan Jenis Kelamin, Perilaku Merokok, Aktivitas Fisik dengan Hipertensi Pada Pegawai Kantor. *Media Gizi Indonesia*. 2020;15(1):60-65. https://doi.org/10.20473/mgi.v15i1.60-65
19. Alaydrus S, Puspita Dewi N, Wirawan W, Wulandari A. Education on Handling Hypertension and Blood Pressure Checks at Petobo Huntara Central Sulawesi. *Mattawang: Jurnal Pengabdian Masyarakat*. 2022;3(1):42-46. https://doi.org/10.35877/454RI.mattawang823
20. Adam AGA, Nelwan JE, Wariki WMV. Kejadian Hipertensi dan Riwayat Keluarga Menderita Hipertensi di Puskesmas Paceda Kota Bitung. *Jurnal KESMAS: Jurnal Kesehatan Masyarakat Sam Ratulangi*. 2018;7(5):1–5.
21. Ojji DB, Baldridge AS, Orji IA, Shedul GL, Ojo TM, Ye J, et al. Characteristics, treatment, and control of hypertension in public primary healthcare centers in Nigeria: baseline results from the Hypertension Treatment in Nigeria Program. *Journal of Hypertension*. 2022;40(5):888–896.
22. Rahmatika AF. The relationship of smoking habits with the incidence of hypertension. *J Med Hutama*. 2021;2(2):706–710. https://doi.org/10.25311/keskom.Vol8.Iss2.1169
23. Suryadi Y. Hubungan Aktivitas Olahraga dengan Kejadian Hipertensi pada Kelompok Usia 20-40 Tahun di Desa Wilanagara Tahun 2019. *Jurnal Ilmiah Dozen Globalindo*. 2021. 16;1(3):1-10.
24. Istiana M, Yeni Y. The effect of psychosocial stress on the incidence of hypertension in rural and urban communities. *Media Kesehat Masy Indones*. 2019;15(4):408–417. https://doi.org/10.30597/mkmi.v15i4.7988
25. Putri DUP, Prasetyo MI, Djamil A. Hubungan obesitas, stres dengan kejadian hipertensi pada usia dewasa muda di wilayah Puskesmas Sumbersari Kota Metro. *Manuju Malahayati Nurs J*. 2020;2(4):758–769. 10.33024/mnj.v2i4.3071

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The Correlation between Vitamin D Intake and Quality of Life in the 17-35 Age Group

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ABSTRACT
Vitamin D testing increased significantly during the Coronavirus Disease-19 (COVID-19) pandemics due to its role in regulating the immune system. Therefore, vitamin D deficiency is associated with susceptibility to various diseases that may affect the quality of life regarding physical health, psychological well-being, social and environmental aspects. The study aimed to determine whether there is an association between vitamin D intake and quality of life in the 17 to 35-year-old age group. A cross-sectional study was conducted from April to November 2021. The sample consisted of students from the School of Medicine and Health Sciences Atma Jaya Catholic University of Indonesia, and their relatives in the same age group, who were selected using a consecutive sampling. Vitamin D intake was measured using Vitamin D Estimation Only - Food Frequency Questionnaire (VIDEO-FFQ). At the same time, the quality of life was assessed using the World Health Organization Quality of Life (WHOQOL)-BREF questionnaire. Data analysis was performed using the *Chi-square* test. Of the 127 respondents, the results showed that most of respondents had inadequate vitamin D intake and good quality of life (68.50%;59.10%). The highest mean of the four quality of life domains belongs to the environmental domain (3.94) with a standard deviation (SD) of ± 0.83. Data analysis showed no significant correlation between vitamin D intake and quality of life (p>0.05). The conclusion shows that there was no correlation between vitamin D intake and quality of life in the 17–35-year age group.

INTRODUCTION

Vitamin D test has increased exponentially in recent years.[1] The role of vitamin D in preventing and treating various diseases, especially during the Coronavirus Disease-19 (COVID-19) pandemic, has caused many discussions so that vitamin D's benefits are increasingly popular among public.[2] Vitamin D deficiency affects nearly half of the population worldwide.[3,4] According to a Canadian study, 30.00%-50.00% of children and adults have vitamin D deficiency.[5] The 2001-2006 National Health and Nutrition Examination Survey also showed a prevalence of vitamin D deficiency by 33.00%.[5] Research in Indonesia has had few reports on vitamin D status. *Persatuan Ahli Gizi Indonesia (PERSAGI)* research shows that vitamin D status is insufficient and inadequate, especially in children aged 2.0-12.9.[5] In addition, a study in Indonesia in 2013 with samples aged 18-40 years also showed that the prevalence of vitamin D deficiency was 63.00%.[6]

Vitamin D reduces the risk of developing cardiovascular disease, bone health, infections, autoimmunity, type 2 diabetes, cancer, and depression.[3,7] It is lesser-known, but the essential roles of vitamin D include its effects in modulating the innate and adaptive immune system.[3,4] Vitamin D enhances innate cellular immunity by inducing antimicrobial peptides, human cathelicidin (LL-37) by 1,25-dihydroxy vitamin D and defensins.[7] These host-derived peptides kill invading pathogens by disrupting their cell membranes and can neutralize the biological activity of endotoxins. In adaptive immunity, vitamin D suppresses the response mediated by type 1 helper T cells (Th1) and promotes cytokine production by type 2 helper T cells (Th2), thereby suppressing the production of inflammatory cytokines as well as promoting the induction of regulatory T cells that can inhibit the inflammatory process.[7] Therefore, lack of Vitamin D is related to increased susceptibility to various diseases, which absolutely can affect the quality of life in terms of physical health, psychological well-being, social and environmental aspects.[3,4,8]

Vitamin D is a fat-soluble vitamin and contains a steroidal molecular structure that needed for various metabolic processes in the body.[8,9,10] The primary source of vitamin D comes from sunlight.[10,11] There are two general forms of vitamin D, namely D-2 (ergocalciferol) and D-3 (cholecalciferol) which can be obtained from foods such as fish oil, eggs, butter, liver, fish such as mackerel, salmon, sardines and tuna. Vitamin D deficiency can be caused by several things, such as decreased intake or absorption of foods containing vitamin D and reduced exposure to sunlight.[12] As the correlation between vitamin D and various diseases or health conditions have been recognized, interest in the contribution of vitamin D to overall health-related quality of life has increased.[13]

This age group of 17–35 years was chosen because there are still very few studies on vitamin D intake in this age group. The researcher also wants to use it as a medium to show the prevalence of vitamin D nutrition in Indonesia and hope that the results of this study can be useful to improve the quality of life on 17-35-year-old age of group, thereby increasing the standard of living until elderly with a better quality of life.

MATERIAL AND METHOD

This research is a cross-sectional study design. Sampling was done by consecutive sampling. The research subjects were the students of the School of Medicine and Health Sciences Atma Jaya Catholic University of Indonesia and their relatives in the age group of 17-35 years who met the inclusion criteria. The inclusion criteria for this study were FKIK UAJ students and their relatives who live in Indonesia in the age group of 17-35 years and willing to sign an informed consent. The exclusion criteria for this study were FKIK UAJ students and their relatives who did not fill out the questionnaire completely, were exposed to direct sunlight for 10-30 minutes between 09.00-15.00, at least three times a week in the last year and who were in conditions of fat malabsorption and obesity. The implementation of this research was carried out in April – November 2021 via online due to COVID-19 pandemic that was hitting when this research was carried out and has received approval from the Ethics Commission of FKIK UAJ with an Ethics Approval Letter No. 13/05/KEP-FKIKUAJ/2021.

The measuring instrument used to assess vitamin D intake is the VItamin D Estimation Only - Food Frequency Questionnaire (VIDEO - FFQ).[14] This questionnaire asked respondents to remember the number of servings on several

types of food in the frequency of months, weeks or days within the last one year; the calculation on the amount of vitamin D supplements consumed was also taken into account in this questionnaire. Vitamin D intake is considered adequate if the respondent's daily vitamin D intake is ≥ 15 mcg/day or inadequate if the respondent's daily vitamin D intake is < 15 mcg/day.[14] Quality of life was assessed through filling out The World Health Organization Quality of Life (WHOQOL)-BREF questionnaire which has been adapted into the Indonesian version to determine the respondent's quality of life.[15] This questionnaire consisted of 26 questions.[16] Two of them measure the overall quality of life and general health while the other 24 questions were divided into four domains, namely physical health (7 items), psychological well-being (6 items), social correlations (3 items) and environmental health (8 items).[16] Each item is scored on a scale from 1 to 5; the score was then converted into a linear scale between 0 and 100.[15] Determination of the measurement results was determined by calculating the score from the questionnaire that the respondents have filled out. Quality of life is considered poor if the WHOQOL-BREF score is < 60 and quality of life is considered good if the WHOQOL-BREF score is ≥ 60.[17] The data were analyzed by *Chi-square* test using SPSS version 22.0 program to determine whether there was a significant correlation between vitamin D intake and quality of life in 17–35-year age group.

RESULTS

The total participants who filled out the questionnaire were 153 people, but 26 people did not meet the inclusion criteria or meet the research exclusion criteria, so the number of respondents involved in this study was 127 people. Most of the respondents were in their late teens (17-24 years) and were female (Table 1).

The distribution of vitamin D intake was divided into two categories, namely adequate (≥15 mcg/day) and inadequate (<15 mcg/day). This categorization is based on the calculation of the estimated daily vitamin D intake from the VItamin D Estimation Only - Food Frequency Questionnaire (VIDEO - FFQ) which was measured by remembering various types of vitamin D - rich foods and supplements in the last 1 year, then calculating the estimated daily vitamin D . In the research data, it was found that most of respondents had an estimated intake of vitamin D in the inadequate category (Table 1).

The distribution of people's perception regarding their quality of life in general, it is divided into two categories, namely bad (0-60) and good (61-100). This categorization is based on the results of calculating the quality of life from The World Health Organization Quality of Life (WHOQOL)-BREF, which has been adapted in Indonesia. This questionnaire is a valid and reliable instrument. Respondents were asked to fill out a questionnaire by remembering their feeling in the last 4 weeks related to 4 domains of quality of life, namely physical health, psychological, social relations, and the environment. The description of the data from this study shows that most of the respondents had good quality of life category (Table 1).

Quality of life has several domains. The domain is divided into 4 categories, namely physical, psychological, social and environmental health. This categorization is based on the division of the quality of life domain from The World Health Organization Quality of Life (WHOQOL)-BREF. The highest mean of the 4 quality of life domains is owned by domain 4 or the environmental health domain (3.94) with a standard deviation (SD) of ± 0.83.

Based on the results of the *Chi-squared* test of vitamin D intake and quality of life, it was shown that there was no significant correlation between vitamin D intake and quality of life in the 17-35 year age group.

Table 1. Characteristics of Respondents

Characteristics	n = 127	%
Age (Year)		
17-24	119	93.70
25-35	8	6.30
Sex		
Male	37	29.20
Female	90	70.80
Vitamin D intake		
Adequate (≥ 15 mcg/day)	40	31.50
Inadequate (<15 mcg/day)	87	68.50
Perception on Quality of Life		
Bad (<60)	52	40.90
Good (≥60)	75	59.10

Source: Primary Data, 2021

Table 2. Overview of 4 Domains of Quality of Life Among 17–35-year Age Group

Dependent Variable	Score				
	Mean	Median	SD	Min	Max
Domain					
Physical Health	2.91	3	0.73	1	5
Psychological	3.43	3	0.67	2	5
Social Relations	3.59	4	0.69	2	5
Environmental	3.94	4	0.83	2	5

Source: Primary Data, 2021

DISCUSSION

Based on research data, it was found that as many as 87 respondents (68.50%) had inadequate vitamin D intake while the number of respondents in the adequate category was 40 people (31.50%). This percentage is quite in accordance with research conducted by Suryadinata in 2020, the results obtained 93.18% of the respondents had inadequate vitamin D intake.[18] However, this percentage is still relatively low when compared to research conducted by Desrida in 2018 with the results that 100.00% of the respondents had inadequate vitamin D intake.[19]

This can happen because the main source of vitamin D is sun exposure, while the food consumed daily except for food products fortified with vitamin D contains less vitamin D. In addition, vitamin D intake may be influenced by socioeconomic and lifestyle factors which with low intake of vitamin D in research samples due to a lack of variety in daily food consumption. This study describes most of the subjects consuming foods such as eggs, egg yolks and ice cream. This is because eggs, egg yolks and ice cream are quite easy to obtain and economically affordable. In addition, sources of vitamin D from fish are consumed mostly by salmon and tuna which are easier to find in restaurants. Other food sources of vitamin D can be classified as difficult to obtain and reach because they are economically expensive which becomes one of the causes of lack of vitamin D intake in research samples.

The results of this study describe the number of respondents in the category of adequate vitamin D intake for 40 people (31.50%) who are all known to take vitamin D supplements. Many Indonesians who take vitamin D supplements can be caused by a lot of information about the effect of vitamin D on its role in preventing and curing COVID-19 infection. According to a survey conducted by Neurosensum in 2021 which stated that 73.00% of Indonesian consumed supplements during the COVID-19 pandemic, and there were 47.00% of respondents took vitamin D supplements.[20] In addition, vitamin D has been known to modulate the immune system, so it is recommended for consumption to reduce the transmission of *SARS-CoV-2* by enhancing antiviral immunity as well as reducing mortality by reducing the likelihood on the occurrence of a cytokine storm that related to severe COVID-19.[21,22,23]

Based on the research data, it was found that 52 people (40.90%) had a poor quality of life category and 75 people (59.10%) with a good quality of life category. The data from this research can be concluded that of 127 people who become respondents 59.10% had good perception on quality of life. The results of this study are similar to the research conducted by Antoni Hezkia in 2018 which found 56.10% of respondents had a good perception on quality of life as well.[24] Research on evaluating the quality of life among Dental Professionals conducted by Nabras Alrayes in 2020 also showed that most of respondents had good quality of life for 75.00%.[25]

Table 3. The Correlation between Vitamin D Intake and Quality of Life Among 17–35-year Age Group

Variable	Quality of Life				Total		*p-value*
	Bad		Good				
	n	%	n	%	n	%	
Vitamin D intake							
Adequate (≥15 mcg/day)	15	37.50	25	62.50	40	100	
Inadequate (<15 mcg/day)	37	42.50	50	57.50	87	100	0.592
Total	52	40.90	75	59.10	127	100	

Source: Primary Data, 2021

This can be due to several factors that can affect the quality of life that includes 4 domains on quality of life which are physical health, psychological, social relations, and the environment. Aspects of physical health and functional ability are factors that come from the internal condition of the biological health of the individual's body. Good physical health will help individuals in carrying out their daily functions and activities as well as the ability to interact with the surrounding community so that they can improve the quality of life in the individual.[26] Psychological health, personal well-being, and life satisfaction are internal human factors that are subjective and emphasize psychological factors. Good psychological health will bring individuals into positive thoughts which in the end, they have an impact on the assessment that they have a good quality of life.[26] Social networks, activities, and participation are external factors that come from individual interactions with the surrounding community. Individuals who have good quality and quantity of interaction with the people around them will experience satisfaction in their life.[26,27]

Environmental conditions and socio-economic conditions are external factors that come from the general state of the surrounding environment. Individual with good life and environmental condition will support their activities in them and create positive feelings and will have an impact in improving the quality of life.[26]

The data of this study show that most of samples are still in their productive age, so they may have a minimal chronic disease and still have good health. This is one of the important factors directly related to the quality of life.[28] The calculation of the total score for each domain was checked using the Kolmogorov-Smirnov normality test. Based on the data found in this study that was not normally distributed ($p<0.05$), the results were presented in the form of mean, median, standard deviation, minimum score, and maximum score.[17] In addition, the highest mean of the 4 quality of life domains was owned by domain 4 (3.94) with a standard deviation of ± 0.83 indicates that the environmental dimension in the form of infrastructure and residence of the subject strongly supports the quality of life of the research samples.[29]

Based on the data obtained, the group of respondents who had adequate vitamin D intake showed that there were more people had a good quality of life with a total of 25 people (62.50%). Then, the group of respondents who had inadequate vitamin D intake also showed more people who had a good quality of life with a total of 50 people (57.50%).

The correlation between vitamin D intake and quality of life in this study was not significant. This result is similar to a study by Edith Fitriyana Girsang in 2018, which also stated that there was no significant correlation between serum vitamin D levels and quality of life in epilepsy patients (*p-value* = 0.342).[30] This is reinforced by research conducted by Ji Sun Kim in 2016 also stated that vitamin D status was not significantly related to the dimensions on quality of life in Korean adults (p=0.42).[31] This insignificant result may be due to the complex range of clinical and social factors that related to quality of life, making it difficult to conclude a clear correlation based on measurements of both intake and vitamin D level. The fact that vitamin D intake was measured only once by considering the amount of dietary intake in a year, sun exposure, and the amount of exposure which was not considered may have influenced the study results. In addition, the arrangement of places in low-income countries can be a factor because the level of quality of life is also influenced by factors related to the culture, physical and social environment of the community in society.[32] The limitation during COVID-19 pandemic is a major factor affecting the level of quality of life.[33] The impact of the limitations given by this pandemic such as difficulty in carrying out religious activities outside the home, the risk of stress and anxiety due to poor health, loss of work and lack of direct social activities with other people.[33,34]

However, this is different from the research conducted by Ivan Panji Teguh in 2021 which stated that adequate protein and vitamin D intake had a significant correlation with quality of life (*p-value* = 0.001).[35] Vitamin D is related to better muscle strength, if it is known that the vitamin in the body is reduced, it can be related to weakened muscle strength and performance.[36] Increasing a person's need for vitamin D can be done by fortifying food, giving vita-

min D capsules, calcium and regular exposure to sunlight.[37] People with good nutritional needs will have good nutritional and health status so that their quality of life will also increase.[38]

CONCLUSION AND RECOMMENDATION

Vitamin D intake and quality of life in the 17–35-year age group are generally adequate and good. It can be concluded that there was no significant correlation between vitamin D intake and quality of life in the 17-35 year age group. In this study, the researcher suggests that future researchers use other research design so that it is possible to measure vitamin D intake and the factors that influence it more continuously and reduce bias when filling out online questionnaires. In addition, further research can use wider population scope and collect important information related to research needs.

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AUTHOR CONTRIBUTIONS

SP, VMS, and KAW conceived and designed the experiments; SP wrote the paper, analyzed the data, and prepared figures and/or tables. YA and ISH analyzed the data and improve the discussion. All authors read, reviewed drafts of the paper, and approved the final manuscript. SP = Suci Prasetyo; VMS = Veronika M. Sidharta; KAW = Komang A. Wahyuningsih; YA = Yunisa Astiarani; In Sil Huh

CONFLICTS OF INTEREST

The authors declare no conflict of interest. The funding sponsors had no role in the design of the study; in the collection, analyses, or interpretation of data; in the writing of the manuscript, and in the decision to publish the results.

REFERENCES

1. Amrein K, Scherkl M, Hoffmann M, Neuwersch-Sommeregger S, Köstenberger M Tmava Berisha A et al. Vitamin D Deficiency 2.0: an Update on the Current Status Worldwide. *European Journal of Clinical Nutrition*. 2020;74(11):1498-1513. 10.1038/s41430-020-0558-y
2. Pereira M, Dantas Damascena A, Galvão Azevedo LM, de Almeida Oliveira T, da Mota Santana J. Vitamin D Deficiency Aggravates COVID-19: Systematic Review and Meta-Analysis. *Critical reviews in food science and nutrition*. 2020 Nov 3:1-9. 10.1080/10408398.2020.1841090
3. Santaolalla A, Beckmann K, Kibaru J, Josephs D, Van Hemelrijck M, Irshad S. Association Between Vitamin D and Novel SARS-CoV-2 Respiratory Dysfunction – A Scoping Review of Current Evidence and Its Implication for COVID-19 Pandemic. *Frontiers in Physiology*. 2020;11. 10.3389/fphys.2020.564387
4. Sikaroudi MK, Mokhtare M, Shidfar F, Janani L, Kashani AF, Masoodi M, Agah S, Dehnad A, Shidfar S. Effects of Vitamin D3 Supplementation on Clinical Symptoms, Quality of Life, Serum Serotonin (5-Hydroxytryptamine), 5-Hydroxy-Indole Acetic Acid, and Ratio of 5-HIAA/5-HT in Patients with Diarrhea-Predominant Irritable Bowel Syndrome: A Randomized Clinical Trial. *EXCLI journal*. 2020; 19:652. 10.17179/excli2020-2247
5. Louisa M. Berbagai Manfaat Vitamin D. Cermin Dunia Kedokteran. 2017;44(10):736-740.
6. Polzonetti V, Pucciarelli S, Vincenzetti S, Polidori P. Dietary Intake of Vitamin D from Dairy Products Reduces the Risk of Osteoporosis. *Nutrients*. 2020;12(6):1743. 10.3390/nu12061743
7. Grant WB, Lahore H, McDonnell SL, Baggerly CA, French CB, Aliano JL, Bhattoa HP. Evidence that Vitamin D Supplementation Could Reduce Risk of Influenza and COVID-19 Infections and Deaths. *Nutrients.* 2020 Apr;12(4):988. 10.3390/nu12040988
8. Rejnmark L, Bislev LS, Cashman KD, Eiríksdottir G, Gaksch M, Grübler M, Grimnes G, Gudnason V, Lips P, Pilz S, Van Schoor NM. Non-Skeletal Health Effects of Vitamin D Supplementation: A Systematic Review on Findings from Meta-Analyses Summarizing

Trial Data. *PloS one*. 2017;12(7):e0180512. 10.1371/journal.pone.0180512

9. Martino G, Catalano A, Bellone F, Langher V, Lasco C, Penna A, Nicocia G, Morabito N. Quality of Life in Postmenopausal Women: Which Role for Vitamin D?. *Mediterranean Journal of Clinical Psychology*. 2018;6(2). https://doi.org/10.6092/2282-1619/2018.6.1875.
10. Fullard M, Duda J. A Review of the correlation Between Vitamin D and Parkinson Disease Symptoms. *Frontiers in Neurology.* 2020;11. 10.3389/fneur.2020.00454
11. V, Stankovich J, O'Brien T, Butzkueven H, Monif M. Vitamin D Status in an Australian Patient Population: A Large Retrospective Case Series Focusing on Factors Related to Variations in Serum 25(OH)D. *BMJ Open*. 2020;10(3):e032567. 10.1136/bmjopen-2019-032567
12. Sizar O, Khare S, Goyal A, Bansal P, Givler A. Vitamin D Deficiency. *StatPearls*. [Internet]. 2020. 30335299
13. Huiberts LM, Smolders KC. Effects of Vitamin D on Mood and Sleep in the Healthy Population: Interpretations from the Serotonergic Pathway. *Sleep Medicine Reviews*. 2021 Feb 1;55:101379. 10.1016/j.smrv.2020.101379
14. Głąbska D, Guzek D, Sidor P, Włodarek D. Vitamin D Dietary Intake Questionnaire Validation Conducted Among Young Polish Women. *Nutrients.* 2016 Jan;8(1):36. 10.3390/nu8010036
15. Purba F, Hunfeld J, Iskandarsyah A, Fitriana T, Sadarjoen S, Passchier J et al. Quality of Life of the Indonesian General Population: Test-Retest Reliability and Population Norms of the EQ-5D-5L and WHOQOL-BREF. *PLOS ONE*. 2018;13(5):e0197098. 10.1371/journal.pone.0197098
16. Abbasi-Ghahramanloo A, Soltani-Kermanshahi M, Mansori K, Khazaei-Pool M, Sohrabi M, Baradaran H et al. Comparison of SF-36 and WHOQoL-BREF in Measuring Quality of Life in Patients with Type 2 Diabetes. *International Journal of General Medicine*. 2020;Volume 13:497-506. 10.2147/IJGM.S258953
17. Hidayati AR, Gondodiputro S, Rahmiati L. Elderly Profile of Quality of Life Using Whoqol-Bref Indonesian Version: A Community-Dwelling. *Althea Medical Journal*. 2018 Jun 30;5(2):105-110. https://doi.org/10.15850/amj.v5n2.1417
18. Suryadinata RV, Lorensia A. Frekuensi Asupan Makanan, Pengetahuan Vitamin D dan Obesitas pada Kelompok Usia Lanjut = Food Frequency, Knowledge about Vitamin D and Obesity among Elderly. *Amerta Nutrition.*2020;4(1):43-48. https://doi.org/10.20473/amnt.v4i1.2020.43-48
19. Desrida D, Afriwardi A, Kadri H. Hubungan Tingkat Aktivitas Fisik, Jumlah Asupan Vitamin D dan Kalsium Terhadap Tingkat Densitas Tulang Remaja Putri di SMA Negeri Kecamatan Tilatang Kamang Kabupaten Agam. *Jurnal Kesehatan Andalas*. 2018 Feb 20;6(3):572-580. 10.25077/jka.v6.i3.p572-580.2017
20. Dihni V. Masyarakat Indonesia Paling Banyak Konsumsi Vitamin C saat Pandemi Covid-19 [Internet]. databoks.katadata.co.id. 2021 [cited 21 November 2021]. Available from: https://databoks.katadata.co.id/datapublish/2021/09/22/masyarakat-Indonesia-paling-banyak-konsumsi-vitamin-c-saat-pandemi-covid-19.
21. Annweiler C, Hanotte B, de l'Eprevier CG, Sabatier JM, Lafaie L, Célarier T. Vitamin D and Survival in COVID-19 Patients: A Quasi-Experimental Study. *The Journal of steroid biochemistry and molecular biology*. 2020;204:105771. 10.1016/j.jsbmb.2020.105771
22. Setyoningsih H, Pratiwi Y, Rahmawaty A, Wijaya HM, Lina RN. Penggunaan Vitamin untuk Meningkatkan Imunitas Tubuh di Masa Pandemi. *Jurnal Pengabdian Kesehatan*. 2021 Jul 31;4(2):136-150. https://doi.org/10.31596/jpk.v4i2.131
23. Adijaya O, Bakti AP. Peningkatan Sistem Imunitas Tubuh dalam Menghadapi Pandemi Covid-19. *Jurnal Kesehatan Olahraga.* 2021 Sep;9(03):51-60.
24. Antoni H. Kualitas Hidup Pekerja Pengelasan

Menurut World Health Organization Quality of Life Bref Version (Whoqol-Bref) di Bengkel Las Jalan Mahkamah Medan Tahun 2018.

25. Alrayes N, Alshammary H, Alamoudi M, Alfardan B, Alhareky M, Nazir M. Evaluation of Quality of Life among Dental Professionals by Using the WHOQOL-BREF Instrument in Eastern Province of Saudi Arabia. *The Scientific World Journal.* 2020;2020. 10.1155/2020/5654627
26. Kiling IY, Kiling-Bunga BN. Pengukuran dan Faktor Kualitas Hidup pada Orang Usia Lanjut. *Journal of Health and Behavioral Science*. 2019 Sep 18;1(3):149-165. https://doi.org/10.35508/jhbs.v1i3.2095
27. Oktowaty S, Setiawati EP, Arisanti N. Hubungan Fungsi Keluarga dengan Kualitas Hidup Pasien Penyakit Kronis Degeneratif di Fasilitas Kesehatan Tingkat Pertama. *Jurnal Sistem Kesehatan*. 2018 Nov 1;4(1). https://doi.org/10.24198/jsk.v4i1.19180
28. Clark C, Crumpler C, Notley H. Evidence for Environmental Noise Effects on Health for the United Kingdom Policy Context: A Systematic Review of the Effects of Environmental Noise on Mental Health, Wellbeing, Quality of Life, Cancer, Dementia, Birth, Reproductive Outcomes, and Cognition. *International Journal of Environmental Research and public health*. 2020 Jan;17(2):393. 10.3390/ijerph17020393
29. Almeida-Brasil CC, Silveira MR, Silva KR, Lima MG, Faria CD, Cardoso CL, Menzel HJ, Ceccato MD. Quality of Life and Associated Characteristics: Application of WHOQOL-BREF in the Context of Primary Health Care. *Ciência & Saúde Coletiva.* 2017;22:1705-1716. 10.1590/1413-81232017225.20362015
30. Girsang EF, Bintoro AC, Pudjonarko D. Hubungan Kadar Vitamin D Serum dengan Kualitas Hidup pada Pasien Epilepsi. N*eurona (Majalah Kedokteran Neuro Sains Perhimpunan Dokter Spesialis Saraf Indonesia)*. 2018 Sep 1;35(4). https://doi.org/10.52386/neurona.v35i4.27
31. Kim JS, Choi YE, Baek JK, Cho HJ, Kim YS. The Association between Vitamin D and Health-Related Quality of Life in Korean Adults. *Korean Journal of Family Medicine*. 2016 Jul;37(4):221. 10.4082/kjfm.2016.37.4.221
32. Wong FY, Yang L, Yuen JW, Chang KK, Wong FK. Assessing Quality of Life Using WHOQOL-BREF: A Cross-Sectional Study on the Association between Quality of Life and Neighborhood Environmental Satisfaction, and the Mediating Effect of Health-Related Behaviors. *BMC public health*. 2018 Dec;18(1):1-4. 10.1186/s12889-018-5942-3
33. Choi EP, Hui BP, Wan EY, Kwok JY, Tam TH, Wu C. Covid-19 and Health-Related Quality of Life: A Community-Based Online Survey in Hong Kong. *International Journal of Environmental Research and Public Health*. 2021 Jan;18(6):3228. 10.3390/ijerph18063228
34. Algahtani FD, Hassan SU, Alsaif B, Zrieq R. Assessment of the Quality of Life during COVID-19 Pandemic: A Cross-Sectional Survey from the Kingdom of Saudi Arabia. *International Journal of Environmental Research and Public Health*. 2021 Jan;18(3):847. 10.3390/ijerph18030847
35. Teguh IP, Hanim D, Suminah S. The Correlation Between Protein Intake and Vitamin D With the Quality of Life of the Elderly. *Malaysian Journal of Health Medicine and Health Science.* 2021.17:61-64.
36. Gunton JE, Girgis CM. Vitamin D and Muscle. *Bone Reports*. 2018 Jun 1;8:163-167. 10.1016/j.bonr.2018.04.004
37. Ismail TST, Wong SH, Din MH, Mustapha Z, Haron J, Zun BA Bin. Correlation of Vitamin D With Bone Mineral Density by Dual Energy X-ray Absorptiometry (DXA) Scan Among Healthy Malay Adult. *Malaysian Journal of Health Medicine and Health Science.* 2020;25:16–22.
38. Tatt CH, Adznam siti NA, Ibrahim Z, Norazman CW. Nutritional Status in Relation to Depressive Symptoms among Chinese Elderly in Malaysia. *Malaysian Journal of Health Medicine and Health Science.* 2019;15:53–60.

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Perceived Barriers and Needs of Dietary Macro Nutrient Intake in Adolescent Schoolgirls in Small Island

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ABSTRACT
Adolescence is an important period of rapid change in biological, psychosocial and cognitive growth and development marked by significant increases in nutrition and energy needs. The study aimed to explore perceived barriers and needs regarding dietary macronutrient intake in adolescent girls in Barrang Lompo Island in Makassar City, South Sulawesi Province, Indonesia. The qualitative design drew on constructs from social cognitive theory. The sample consisted of 18 adolescent girls and their mothers from grades 8 to 11 whose dietary macronutrient intake was less than the recommended dietary allowance. A semi-structured interview protocol was used to explore perceived barriers and needs regarding dietary macronutrient intake, and the data were subjected tothematic analysis and analytic generalization. To ensure adequate dietary intake, adolescent girls need support from family and friends and access to preferred foods. Barriers include laziness about eating key foods, feelings of fullness due to snacking, addiction to cellphones, and lack of raw foodstuffs for making their favorite dishes. Social cognitive theory used toidentify needs and barriers showed environmental and individual factors from adolescents play important role in appropriate food consumption in teenage girls. The findings may help to improve future interventions to enhance dietary patterns in adolescent girls who live in small island.

INTRODUCTION

Thinness, defined with BMI Z-score value is -2.01 and -3.00,[1] still becomes a problem in adolescent of school age girls in low and middle income country. A study by Candler et al., showed that there were 7.64% thin girls from 40 countries which Asia has the higher rate than other continents.[2] In Indonesia, adolescent's thinness also remains a problem. Approximately 9% of adolescents aged 13–15 years are thin, and approximately 6% were girls.[3] Adolescents underweight contribute to increase risk of morbidity.[4] It has important impact for healthy development and the economic productivity.[5] in adolescent girls, thinness is a consequence of acute malnutrition that indicate a lackof food intake during a certain period that can have negative implications both for themselves and for their future children if they become mother.[6]

Adolescence is an important period of rapid change in biological, psychosocial, and cognitive growth and development marked by significant increase in nutrition and energy needs.[7] Adolescent psychosocial development often shapes the development of health-related food and lifestyle habit. Globally, school age adolescents do not regularly consume fruits andvegetables and often consume carbonated drinks.[8,9] In Indonesian adolescents, there is evidence of poor dietary habits in both rural and urban areas, and about 53% of those aged 13–18 years old consume less than 70% of theirrecommended dietary allowance.[10] One study in Barrang Lompo, a small island in Makassar City, reported that more than 80% of adolescents consume macronutrients for less than 80% of their recommended dietary allowance.[11]

Adequate consumption of macronutrients such as carbohydrate, protein and fat have positive impact to health status in adolescents. Consuming healthy fat adequately may reduce systemic inflammation.[12] Higher intake of total protein has positive correlation with lowerrisk of all causes of mortality.[13] In addition, adequate macronutrients intake particularly in women in reproductive age have implication not only on their health such as undernutrition and potentially impact on chronic dis-eases, but also in the future may negatively influence pregnancy and child outcomes.[14]

In general, poor dietary patterns on macronutrients intake have direct effects on nutritional status,[15] and understanding the factors that influence adolescent's eating behavior is a critical precursor for effective intervention to prevent malnutrition in this age group. In Bandura's social cognitive theory, change of health behavior is influenced by environmental factors, personal factors, and behavior itself.[16] Perceived barriers and facilitators are hypothesized to influence health behavior indirectly through the process of self-regulation. Exploration of perceived barriers and needs lead adolescents to understand the determinants of themselves better in practicing healthy eating behaviors and physical activity.[17,18]

To the author's knowledge, no previous published study has explored these issues in relation to adolescents' food consumption, especially in those who live in small island. This study explores the determinants of eating behavior in these adolescents. To gain a deeper insight into the factors that influence eating behavior, the present study draws on the Social Cognitive Theory (SCT) of behavior change,[16] to capture the personal factors that influence these behaviors in adolescent girls. Specifically, the study aimed to explore perceived barriers and needs regarding dietary macronutrient intake in adolescent girls in Barrang Lompo Island, Makassar City, South Sulawesi Province, Indonesia.

MATERIAL AND METHOD

The study's qualitative design involved semi-structured in-depth interview through face-to-face. The study was conducted in two high schools in Barrang Lompo Island, a sub district of Makassar City which is the capital of Indonesia's South Sulawesi Province. Barrang Lompo Island has a population of about four thousand and covers an area of approximately 19 hectares.[19] A regular one-hour boat service links the island to the capital. There is only one private senior high school and one public junior high school in this island.

The informants in this study consisted of adolescent school age girls and their mother.We involved adolescent girls from grade 7 to 12purposively. Several inclusion criteria were used in

selecting informants. Participants attend school in Barrang Lompo Island and they had lived on this Island for at least 5 years, the girls school principal and their parents gave permission for their participation and signed a consentform before they were interviewed, using 24-hour recall questionnaire, the researcher interviewed the girls to assess the adequacy of their food intake, those with a macronutrient intake of less than 80% RDA (recommended daily allowance) for Indonesian adolescents,[20] and agreed to participate in this study were identified by a trained research assistant as target informants. Furthermore, adolescents' mother who agree to participate in this study were invited to be interviewed.

The study was conducted within two months from April to May 2021. Social Cognitive Theory (SCT) was used to explore the personal factors as well as environmental factors that influence the girls' eating behavior and energy intake. Previous study on implementing SCT which involved mother, has positive impact on outcome of intervention.[21] However, the previous study focused to address overweight issue in adolescents. Therefore, in this study we involved mothers in representing the environmental factors in addressing under nutrition issues in adolescents. During the interview,we explored pattern of food consumption for breakfast, lunch, and dinner in terms of frequency and amount of them, to guide informant in expressing their dietary macronutrients intake.

Using interview guideline for data collection, the key questions explored adolescents' perceived needs and barriers in relation to adequate food intake pattern. After interviewing adolescents, we also interviewed their mother with a similar theme that we asked to their children separately. All interviews were conducted at a private location approved by the informant and lasted 40 minutes on average. COVID-19 health protocols were maintained during the interviews. At the beginning of each interview, the researcher welcomed the participants, explained the aim of the study, and assured them that their anonymity and confidentiality would be protected. All interviews were recorded and subsequently transcribed verbally. SCT constructs were used to code the transcribed material to capture energy intake barriers and needs in terms of personal and environmental factors. Data management and thematic analysis were manually performed by researcher with relevant qualitative expertise. To enhance the validity of the findings, both data sources (adolescents and mothers) and data collection methods (observation, group discussion and in-depth interview) were triangulated. Exploration of information from mother aimed to enrich information from adolescents on perceived needs and barriers of adolescents in consuming macronutrients adequately. The study was approved by the Research and Ethics Committee of the Public Health Faculty at Hasanuddin University. The ethical approval number was 7262/UN4.14.1/TP.02.02/2020.

RESULTS

Socio-Demographic Characteristics of Informants

The mean age of the 18 adolescent girls who participated was 15.33±1.7 years, and the mean age of the 6 interviewed mothers was 40.17±2.9 years. Initially, we aimed to interview all mothers of adolescents, however, only 6 of 18 mothers agreed to participate in this study. Most of parents were educated to elementary school level and Most of informants came from fishery families (Table 1).

Perceived Barriers to Adequate Food Intake

Most adolescents agree that barriers toadequate food consumption relate to both internal and external factors. For these adolescentgirls in Barrang Lompo, internal factors related mostly to personal reasons, including laziness about eating main foods, lack of appetite, unavailability of served favorite foods, lack of variety of served food, feeling full as a result of snacking and addiction to playing with cell phones to the extent of forgetting to eat. External factors seen as barriers to adequate foodconsumption included unavailability of raw food stuff to make their own favorite dishes and low purchasing power. These issues are summarized in the following thematic (domain)analysis chart (Figure 1).

The interview results identify laziness about eating main foods as a barrier to adequate food consumption in adolescents. This was confirmed by a mother in the group discussion.

I usually skip my lunch. I am lazy abouteating, and I feel full. Having breakfast leaves, me feeling full in the

evening. Every night I eat one plate; if I eat more, I get a stomachache. (Adolescent 1)

She will not eat. She is lazy about eating. She says she has no appetite. I have forced her to eat regularly, but she does not want to eat. (Mother 1)

Participants' portion sizes was also smaller than the daily recommended intake for their age.

I think, my portion sizes is inadequate and inappropriate for my needs. I only have a main meal once or twice per day-usually breakfast and dinner, very rarelyfor lunch. I have no appetite. (Adolescent 2)

I eat less because I feel full even though I have not eaten anything. I think it is because I drink water. (Adolescent 3)

Her father (my husband) told her to increase her meal portion, but she still ate insignificant portion of food, and she did not want to eat. (Mother 2)

Adolescents said they have lack of appetite because the served meal was not their favorite food. According to mothers, the reason forthis lack of appetite was the lack of variety in thefood served.

I do not have any appetite. I lost my appetite because of the dishes were served. Almost every day, it was egg, and I do not like it anymore. I like fried fish with soy sauce. (Adolescent 3)

The amount is sometimes enough and sometimes not. I do not like vegetables and fish. I do not eat too much; I eat when I want to eat. (Adolescent 4)

The daily menu is not adequate sometimes it is the same from day to day: rice with vegetables like water spinach, no side dishes. That's it. I know she does not have any appetite, but what can I do? I pre-served what we have in the house like that. (Mother 2)

Table 1. Socio Demographic Characteristics of Informants (Adolescents and Mothers)

Characteristics	Adolescents (n = 18)	Mothers (n = 6)
Age (Years) (Mean± SD)	15.33±1.7	40.17±2.9
Mother Education		
Elementary	12	6
Junior High	4	0
Senior High	2	0
Mother Occupation		
Housewife	16	6
Small Business	2	0
Father Education		
Elementary	15	0
Junior High	1	0
Senior High	2	0
Father Occupation		
Fisherman	16	0
Small Business	2	0

Source: Primary Data, 2020

Street foods is alternative that the adolescents like. When they arrive home from school, they seldom eat because they have felt full, therefore, they choose sleeping over lunch.

I eat one plate of rice per day. For dinner, I eat meat balls or instant noodles, it's delicious. For my breakfast, I buy fried snacks or yellow rice. I do not like lunch, I prefer sleeping to having lunch. (Adolescent 4)

Another perceived barrier for these adolescents was cellphone usage. According to both mother and their daughter, the girls forgot to eat when playing with their cellphones which they perceived as more important than having ameal.

I play with my cellphone all day. It is interesting for playing games, social media and watching YouTube, and I forget to eat. My mother frequently reminds me about having a meal. (Adolescent 2)

I asked her to buy milk, but because of the cellphone and YouTube, she used the money to buy an internet quota. (Mother 2)

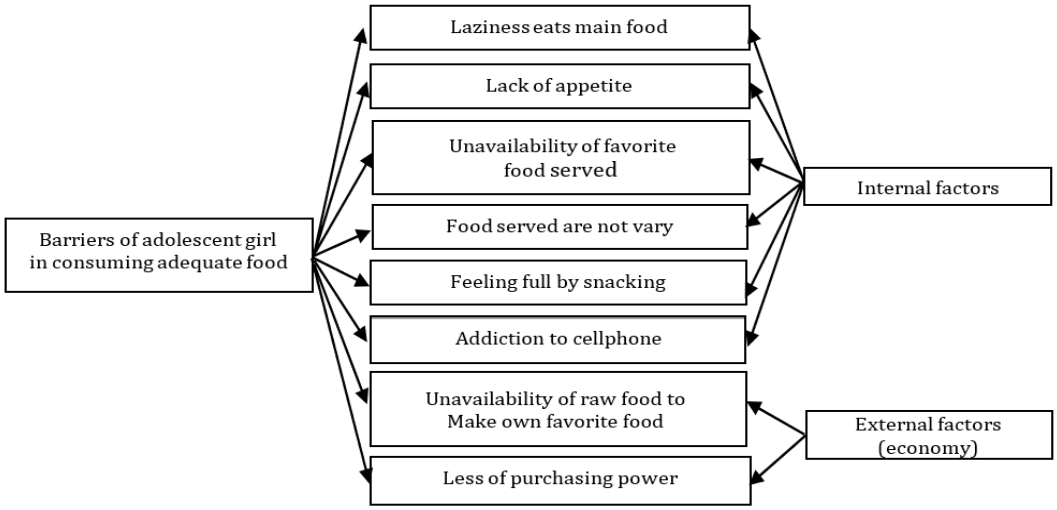
The external factors identified by adolescents as barriers to adequate food consumption were economic. According to the informants, lower purchasing power to access raw food can be a barrier to a balanced diet.

I think the lack of money means there isless availability of food. The food at home isnot balanced. (Adolescent 1)

My husband is a fisherman, so he only earns money when the weather is good for catching fish. However, it is for the modality of the next activity. In termsof food, all we can provide is the preserved food that we can buy. (Mother 3)

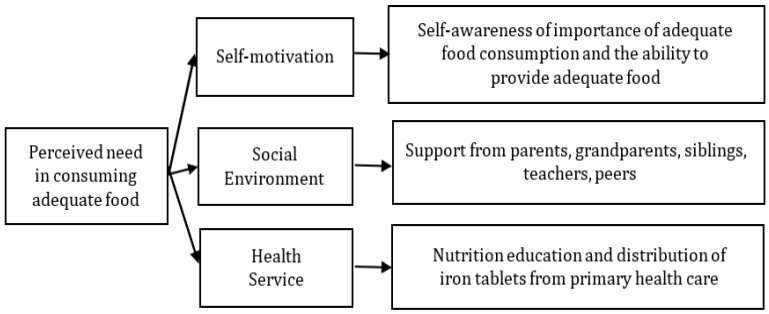
Perceived Needs for Adequate Food Intake

Adolescent girls need personal, environmental, and health service support for adequatefood consumption. They need self-awareness and the ability to access preferred foods based on their needs. In terms of environment, adolescents need support from family members, including parents, grandparents, and siblings, and at school from their teachers and peers. Informants identified a balanced diet as a priority, and the family income was used to ensure food availability. Support from health services was also considered necessary including education about healthy food and monitoring of iron tablet supplements for adolescent girls. These needs are summarized in the following thematic analysis chart (Figure 2).



Source: Primary Data, 2020

Figure 1. Thematic Analysis of Perceived Barriers to Adequate Food Consumption



Source: Primary Data, 2020

Figure 2. Thematic Analysis of Perceived Needs to Adequate Food Consumption

At a personal level, adolescents need an awareness and belief in the importance of adequate food intake. Teenagers also need cooking skill to be able to provide nutritious food that meets their need and desire.

The desire to eat a lot comes from myself; I am sure I can eat whatever portion I want. So, I can eat a lot-it all depends on myself. (Adolescent 1)

I cook raw fish, vegetables, and rice. If there is nothing at home, I go shopping alone and then cook for myself. (*Adolescent 1)*

Young people need strong support from family members who live at home with them, including mother, father, grandparents and older siblings. The school social environment is no less important, and wholehearted support from both friends and teachers is critical for adolescents. Teens will eat or eat together when asked or ordered to, supported, or given polite advice or praise.

My father asked me to eat a lot. He told me it was because he wanted me to look bigger. My mother did the same. I ate more when they told me so. My brother bought me milk. (Adolescent 1)

Sometimes my mother or my grandmother will stay with me when I have my meal to make sure that I eat properly. (Adolescent 2)

My teacher said that eating balanced food is healthy. My friend encourages me to increase the size of my meals. She said that right now I am beautiful when I eat more, I will look more beautiful. I like having a meal with my friends; I eat more when I am with them. (Adolescent 3)

Primary health care health workers also play an important role in supporting adolescent girls' efforts to improve nutritional practices. For example, the distribution of iron tablet supplements needs to be supported by additional explanations because adolescents have lack of clear understanding on the program despite its introduction at school. Most informants said they did not consume the supplement because of its odor.

A medical doctor and some primary health care workers came to my school and gave us iron supplements one tablet per week, they said. I do not understand why we musttake this tablet. I do not like its smell, and the color and shape look like red stone, so I threw it out. (*Adolescent 4)*

I asked my friends, and none of them took the supplement, so neither did I. I give supplements to the boys. (Adolescent 1)

DISCUSSION

The study aimed to explore perceived barriers and needs regarding dietary macronutrient intake in adolescent girls in Barrang Lompo Island in Makassar City, the capital of Indonesia's South Sulawesi Province. This study confirmed that adolescent girls who live in Barrang Lompo Island experience barriers to adequate food consumption due to internal and external factors. The girls referred to personal problems that include laziness about eating and preferring snacks to main meals, and this aligns with evidence from previous studies.[22] The participating adolescents reported that they feel full after eating snacks and therefore skip their main meal. Street snacks such as meatballs, instant noodles, *tela-tela* (made from mashed wheat flour, mixed with a bit of green onion, formed into small balls, and then fried) are sold in several places in the island as alternatives that are preferred by teenagers. They get snack for two to three times per day. Eating snackfood frequently makes them feel full, and these snacks replace the main food. Snack consumption of 4.3 per day is a known risk factor for poor dietary quality in adolescents,[23] the worldwide recommendation for snacking frequency is two nutrient-dense snacks per day.[24]

For adolescents, barriers to adequate eating include lack of appetite, no appetite because their preferred foods are unavailable, lack of variety in food at home and dislike of fish and vegetables. The present findings also align with earlier evidence that picky adolescents aremore likely to eat only their favorite foods and eat less than the relevant recommendation.[25] Technology also creates barriers to adequate food consumption in teenagers, including forgetting to eat because of addiction to cell-phone usage and preferring to buy internet quotas rather than nutritious food. This island is limited in terms of places to hangout for young people such as mall or other crowded places tospend free time with friends. To fill their spare time, they are active on social media using smartphones. This is supported by the availability of transmitter providers in this island. The findings align with existing evidence that teen age usage of smartphone, iPad, computers, and Internet is significantly higher in female (35.5%; $p = 0.00$). It is also clear that problematic use of cellular phones can be addictive which affect 20.5% of cell phone users.[26]

Informants also identified a lack of purchasing power and the unavailability of raw foodstuffs for making their own favorite dishes as external factors. There is a correlation between the location of the island and the availability of fresh food sources for processing. Studyfrom Mustafa, et al (2020) in Barrang Caddi Island, an island that has distance 15 km from Makassar City, showed that 64% of the households on Barrang Caddi Island have direct access to food.[27] Based on food quality indicators, most of household food quality come from animal protein. Only 10% of households have access to food from animal and vegetable sources. This shows that the food sources that can be reached by the people in the small island are less varied.

It is related to economic condition, and most of the participants in the present study came from fishery family which can be categorized as low-income households. This can be correlated with family purchasing power and food availability. For example, one study in Bangladesh showed that membership of the poorest households was related with inadequate dietary diversity.[28] Insufficient purchasing power to acquire food for cooking can also hinder access to nutritious food.

Personal factors are also relevant in this context including awareness and belief in the importance of nutritious food which depends on the adolescent's personality. Additionally, teenagers need essential cooking skills to be able to provide nutritious food that meet their needs and desires. Most available food sources in the island come from animal protein sources such as fish. Fish preparations made by parents are always monotonous and this is what makes teenagers' appetites decrease. Adolescents want to eat fish if it is processed in a different way. Other studies have shown that to help adolescents to

eat healthier foods, it is important to make healthy food tasteand look better, to limit the availability of unhealthy choices, to make healthy food more readily available, and to teach children about good cooking and eating habits from an early age.[29]

Adolescents also need effective support from family members who live at home withthem, including mother, father, grandparents, and older siblings. They eat properly when theyeat with their family or get attention by getting their favorite food from other family members. Previous studies have shown that parental control affects food choices in adolescents who live in rural areas,[30] and the school social environment is also no less important. In this regard, thefull support of both friends and teachers is crucial for adolescents.[31] When they are asked, facilitated, or ordered or when given polite advice or praise, teens will eat or eat together. More generally, adolescents need support for healthy physical, mental, and social development, and other studies confirm that positive relationship with family, friends and teachers are consistently related to health and well-being during adolescence.

Support from health services is essential for adolescents. They need education on healthy food. A review of the relevant literature indicates that health services can be expected toplay a key role in this context as nutrition education provided by schools, families and health services have been shown to contribute to significant improvements in adolescent nutrition.[32]

CONCLUSION AND RECOMMENDATION

The present findings confirm that social cognitive theory used to identify needs and barriers showed environmental and individual factors from adolescents play important role in appropriate food consumption in teenage girls. Support from family and friends may help adolescent girls in practicing appropriate food consumption. The findings may help to improvefuture interventions to enhance dietary pattern in adolescent girls who live in small island.

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AUTHOR CONTRIBUTIONS

The contributions of each authors are described as follows. HH, ART, and SM conceived and designedthe study; HH and SM conducted data collection, cleaning data and analyzed quantitative data; MR contributed to qualitative data Analysis; HH, RI wrote the paper; DV and LHF contributed in reviewing the entire manuscript and provided input from a nutritional perspective to enrich the manuscript. HH = Healthy Hidayanty; ART = Abdul Razak Thaha; SM = Samsuar Manyullei; MR = Mesra Rahayu; RI = Rahayu Indriasari; DV = Devintha Virani; LHF = Leng Huat Foo.

CONFLICTS OF INTEREST

The authors declare no conflict of interest. The funding sponsors had no role in the design of the study; in the collection, analysis or interpretation of data; in the writing of the manuscript and in the decision to publish the results.

REFERENCES

1. World Health Organization, Growth reference 15-19 years: BMI-for-age (5-19 years). World Health Organization, Genewa. 2007. http://www.who.int/growthref/who2007_bmi_for_age/en/. Accessed October 11, 2021.
2. Candler T, Costa S, Heys M, et al. Prevalence of Thinness in Adolescent Girls in Low and Middle Income Countries and related to Wealth, Food Security, and Inequality. *Journal of Adolescent Health.* 2017;60:447-454. 10.1016/j.jadohealth.2016.11.003
3. National Institute of Health Research and Development (Ministry of Health). Basic Health Research Survey; 2018.
4. Dobner J, Kaser S. Body Mass Index and the Risk of Infection from Underweight to Obesity. *Clinical Microbiology and Infection*. 2018;24:24-28.

10.1016/j.cmi.2017.02.013

5. Min J, Zhao Y, Slivka L, et al. Double Burden of Diseases Worldwide: Coexistence of Undernutrition and Over Nutrition Related Non-Communicable Chronic Diseases. *Department of Health and Human Services.* 2019;19(1): 49-61.10.1111/obr.12605
6. Patton GC, Sawyer SM, Santelli JS, et al. Our future: A Lancet Commission on Adolescent Health and Wellbeing. *Lancet*. 2016;387(10036):2423–2478. 10.1016/S0140-6736(16)00579-1
7. Stang J, Feldman S, Story M. *Nutrition Through the Life Cycle.* USA: Thomson Wadsworth; 2008.
8. Beal T, Morris S, Tumilowicz A. Global Patterns of Adolescent Fruit, Vegetable, Carbonated Soft Drink, and Fast-Food Consumption: A Meta Analysis of Global School-Based Student Health Surveys. *Food and Nutrition Bulletin*. 2019;40(4):444-459. 10.1177/0379572119848287
9. Yang L, Bovet P, Liu Y, et al. Consumption of Carbonated Soft Drinks in Young Adolescents Aged 12 to 15 Years in 53 Low- and Middle-Income Countries. *AJPH Research*. 2017;107(7):1095-1100. 10.2105/AJPH.2017.303762
10. Ministry of Health Republic of Indonesia. Total Diet Study: A Portrait of the Diet of Today's Indonesians. Jakarta: Ministry of Health Republic of Indonesia; 2015.
11. Hidayanty H, Virani D, Manti S, et al. Inadequate Nutrients Intake and Wasting Status in Adolescent Students in Small Island of Indonesia. *Enfermería Clínica*. 2020;30(S4):210-213. 10.1016/j.enfcli.2019.10.070
12. Bujfor M, Turner AI, Torres SJ, et al. Correlation between Dietary Intake on Biological Markers of Inflammation in Children and Adolescents: A Systematic Review. *Nutrients.* 2021;13:356. 10.3390/nu13020356
13. Naghshi S, Sadeghi O, Willet WC, et al. Dietary Intake of Total, Animal, and Plant Protein and Risk of All Cause, Cardiovascular, and Cancer Mortality: Systematic Review and Dose-Response Meta-Analysis of Prospective Cohort Studies. *BMJ.*2022;370:2412. 10.1136/bmj.m2412
14. Young MF, Ramakrishnan, U. Maternal Under Nutrition Before and During Pregnancy and Offspring Health and Development. *Annals of Nutrition and Metabolism.* 2021; 76(suppl 3): 41-53. https://doi.org/10.1159/000510595
15. Agofure O, Odjimogho S, Barry OO, et al.Dietary Pattern and Nutritional Status of Female Adolescents in Amai Secondary School, Delta State, Nigeria. *Pan African Medical Journal.* 2021; 38(32). 10.11604/pamj.2021.38.32.15824
16. Glanz K, Rimer B, Viswanath K. Health Behavior and Health Education: Theory, Research, and Practice. 4th ed. San Francisco: Jossey-Bass; 2008.
17. Kumar J, Adhikari K, Li Y, et al. Identifying Barriers, Perceptions and Motivations Related to Healthy Eating and Physical Activity in 6th and 8th Grade, Rural, Limited- Resource Adolescents. *Health Education*. 2016;116(2):123-137. https://doi.org/10.1108/HE-03-2014-0035
18. Velde L, Schuilenburg L, Thrivikraman J, et al. Needs and Perceptions Regarding Healthy Eating in People at Risk of Food in-Security: a Qualitative Analysis. *International Journal for Equity in Health.* 2019;18:184. 10.1186/s12939-019-1077-0
19. Statistic Bureau. Population on City of Makassar. Makassar: Statistic Bureau; 2020.
20. AKG (Angka Kecukupan Gizi). 2019. Angka Kecukupan Gizi yang Dianjurkan untuk Masyarakat Indonesia. Lampiran Peraturan Menteri Kesehatan Republik Indonesia Nomor 28 Tahun 2019.
21. Hidayanty H, Bardosono S, Khusun H, et al. A Social Cognitive Theory-Based Programme for Eating Patterns and Sedentary Activity in Overweight Adolescents in Makassar, South Sulawesi: A Cluster Randomised Controlled Trial. *Asia Pac J Clin Nutr.* 2016;25(Suppl 1): S83-S92. 10.6133/apjcn.122016.s7
22. Abdelghaffar EA, Hicham EK, Siham B, et al. Social - Ecological Influences on Unhealthy

Dietary Behaviors in Moroccan Adolescents: A Mixed-Methods Study. *Department of Health and Human Services*. 2020;23(6): 996-1008. 10.1017/S1368980019003641

23. Larson NI, Miller JM, Watts AW, et al. Adolescent Snacking Behaviors are Associated with Dietary Intake and Weight Status. *J Nutr*. 2016;146:1348–1355. 10.3945/jn.116.230334
24. Potter M, Vlassopoulos A, Lehmann U. Snacking Recommendations Worldwide: A Scoping Review. *Adv Nutr*. 2018;(33):86–98. 10.1093/advances/nmx003
25. Kutbi HA. Picky Eating in School-Aged Children: Socio demographic Determinants and the Associations with Dietary Intake. *Nutrients.* 2021;13. 10.3390/nu13082518
26. De-Sola J, Talledo H, Fonseca RD. Prevalence of Problematic Cell Phone Use in An Adult Population in Spain as Assessed by the Mobile Phone Problem Use Scale (MPPUS). *PLoS One.* 2017;12(8):1–17. https://doi.org/10.1371/journal.pone.0181184
27. Mustafa M, Arief A, Amiluddin, et al. Analisis Kerentanan dan Ketahanan Pangan Rumah Tangga Nelayan Pemancing di Pulau-Pulau Kecil (Studi Kasus Pulau Barrang Caddi Kota Makassar). *Jurnal IPTEKS PSP.* 2020;7(14):151-162. https://doi.org/10.20956/jipsp.v7i14.11656
28. Redwanul MI, Moshfiqur SR, Tarafder C, et al. Exploring Rural Adolescents Dietary Diversity and Its Socioeconomic Corelates: A Cross-Sectional Study From Matlab, Bangladesh. *Nutrients.* 2020;12(2230). https://doi.org/10.3390/nu12082230
29. Scaglioni S, Cosmi VD, Ciappolino V, et al. Factor Influencing Children's Eating Behaviors. *Nutrients.* 2018;10(706). 10.3390/nu10060706
30. Liu KSN, Chen JY, Ng MYC, et al. How Does the Family Influence Adolescent Eating Habits in Terms of Knowledge, Attitudes and Practices? A Global Systematic Review of Qualitative Studies. *Nutrients.* 2021;13. 10.3390/nu13113717
31. Rageliene T, Gronhoj A. The Influence of Peers and Siblings on Children's and Adolescents' Healthy Eating Behaviour: A Systematic Review. *Appetite*. 2020. 10.1016/j.appet.2020.104592
32. Meiklejohn S, Ryan L PC. A Systematic Review of the Impact of Multi-Strategy Nutrition Education Programs on Health and Nutrition of Adolescents. *J Nutr Educ Behav.* 2016;48(9):631-646. 10.1016/j.jneb.2016.07.015

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Health Belief Model Analysis with Perception and Behavior of Mothers of Children Under Five Years Old with Diarrhea

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ABSTRACT
Diarrhea is still a public health problem in Indonesia. Many children are victim of diarrheal diseases which are easily preventable and treatable. This study aimed to determine the perception and behavior of mothers of children under five years old with diarrhea based on the Health Belief Model (HBM). This research used qualitative with a phenomenological approach and analyzed based on the theory of the Health Belief Model (vulnerabilities, severity, benefits, barriers, cues to action). Collecting data from 12 informants through in-depth interview, observation, and documentation. The results showed that, based on the results of the HBM analysis with 5 indicators, the informants agreed on the susceptibility to diarrhea in children in the area. This is due to unqualified drinking water sources, poor waste management systems, and poor environmental and personal hygiene for each child. The main obstacle for informants is the absence of a strong will and the nature of not caring about the mother's and her children's living condition and personal hygiene. In conclusion, the informant's perception of diarrheal disease is a harmless disease. The behavior of the informants did not care about living conditions which could cause repeated diarrhea for their children.

INTRODUCTION

Diarrhea still becomes a health problem in the world. According to WHO data (2019), diarrhea is the cause of low life expectancy of 1.97 years in sufferers. In 2016, availability of drinking water that met the requirements and poor environmental sanitation were the main factors in infant mortality caused by diarrhea for 0,9 million people or 470.000. therefore, diarrhea is a problem that must be considered to overcome by government and also world organizations.[1]

Globally the main cause of diarrhea in Children is malnutrition. Every year 1.7 billion cases of diarrhea disease occur in children. Those who experience diarrhea and can be life-threatening are children who are malnourished or have compromised immune systems such as children infected with HIV. Diarrhea is a symptom of infection in the intestinal track which can be caused by various bacterial, viral, parasitic infections spread through contaminated food and beverage or from person to person to as a result of poor sanitation. [2]

Diarrhea in Indonesia becomes the second leading cause of death in children under 5 years old.[3] The mortality rate of Children under five years old is one of health indicators which is considered as the most sensitive and has been agreed upon nationally as Parameter of health status of a region. Nationally, the SDGs target is to reduce the mortality rate of children under five years old in Indonesia in the 2015-2030 period to 25 per 1000 live births, in 2016, the under-five mortality rate in Indonesia was recorded at 26 per 1000 live births.[4]

Melvani et al (2019) the results of multivariate data analysis, the variable hygiene, sanitation, food, and beverage become the most dominant variable that affects diarrhea in Children. It shows that mothers of Children who do not pay attention on food and beverage sanitation as well as cooking utensils and also kitchen hygiene cause diarrhea for 95.2%.[5]

Based on data obtained from the Diskominfo Sectoral Statistics of Samarinda City (2020), the number of diarrhea cases in the last three years which the number of sufferers of diarrhea was 12,036 cases started in 2017, there were 8,427 cases in 2018, there were 11,105 cases in 2019, while there were 2666 cases in june 2020.[6]

Sempaja Samarinda Public Health Center is one of the health centers with Quite high diarrhea cases and increase every year, the number of cases of diarrhea in children under five years old in 2016 was 75 cases, it increased to 87 cases in 2017, while it was 99 cases in 2018 and about 53 cases on January until September in 2019.[7]

The purpose of the study was to determine the perceptions and behavior of mothers of children under five with diarrhea based on Health Belief Model (HBM) indicators.

MATERIAL AND METHOD

This study used a qualitative method with a phenomenological approach, to be able to dig deeper into the perceptions and behaviors of mothers of children with diarrhea and are analyzed based on the theory of Health Belief Model (perceptions of vulnerability, severity, benefits, barriers, cues to action, and clean and healthy living behavior). The total of informants were 12 people which consisted of 8 mothers with diarrhea (it is the mother who is more intense in taking care of her child), the the village head (policy makers on environmental hygiene and waste management systems in the society), 1 public shop (which knows more about the sociocultural and public habits in maintaining the cleanness of the living environment and individual hygiene), 1 health care worker of the Health promotion program (knows what programs have been carried out, how many times and what the results are), and the head of Semapaja Public Health Center (as policy makers in program priorities).[8]

Collecting data from 12 informants through; a) In-depth interview,[9] b) Observation,[10] c) Documentation.[11] The data that has been collected through in-depth interview, observation, and documentation were then categorized, reduced, and compiled based on the research objectives and coded based on the data source, then displayed and verified, if the data is considered as lack or can be triangulated if the data obtained is saturated and according to the research objectives, a conclusion was drawn.[12]

The research site is in the working area of Sempaja Health Center, Samarinda City. This research has received permission from the Ethics Committee of Widyagama Mahakam Sa-

marinda University Number 132/LPPM-UWGM/B/2020.

RESULTS

The total of informants in this study were 12 people, 9 main informants, and 3 supporting informants. Characteristics of informants based on age, occupation, education, and gender. Based on the results of in-depth interview and documentation, the characteristics of the informants are presented in Table 1.

Perception of Mothers of Children under five years old with Diarrhea is an important factor in the first response of mothers with diarrhea to support the process of handling diarrhea. The mother's perception that was observed was based on the components of Health Belief Model which are perceptions of vulnerability, severity, benefits, barriers, and cues to action. Based on the results of in-depth interview with 7 key informants regarding the perception of vulnerability as follows;

"The children of the informants are vulnerable to get diarrhea repeatedly when many children have diarrhea." (W.A1.NY.12)

"The cause of recurrent diarrhea in children is due to the transmission process from children who suffer from diarrhea to healthy children, and this is due to the misunderstanding of the child's parents." (W.A2.YU.12)

Mothers of children under five years old who suffer from diarrhea got severe diarrhea, it was still safe for the condition of diarrhea which often suffered by their children, the informants considered that diarrhea was an ordinary disease that was not too dangerous, as quoted from the interview as follows;

"Diarrhea is a serious disease, but for us, diarrhea is a common disease because we have had diarrhea repeatedly and it always heals on its own." (W.A3.M.11)

"Diarrhea is not a very serious disease if it is experienced by children because there has been no experience of children dying from diarrhea." (W.A4.AL.13)

The belief of mothers who have children suffering from diarrhea to look for treatment at health services only exists when their children suffer from diarrhea. As the following interview excerpt;

"I visited the Public health center when there were signs that my child was going to be dehydrated, if at the beginning of diarrhea, I often gave guava leaves, crushed and squeezed, then the water was drunk to the child, with traditional medicine like this, my child would recover quickly." (W.A5.SP.10)

Mothers' perception on the importance of keeping their environment clean and healthy so that their children do not get recurrent diarrhea is very low. Based on the results of observation and documentation carried out by the author, the condition of residence and sources of clean water for mothers with diarrhea are quite alarming, as documented in Figure 1.

Table 1. Characteristics of Informant

Informan	Age (Years)	Job	Education	Sex
W.A1.NY	29	House Wife	Junior High School	Women
W.A2. YU	31	House Wife and Entrepreneur	Junior High School	Women
W.A3.M	40	House Wife and Entrepreneur	Primary School	Women
W.A4.AL	30	House Wife and Entrepreneur	Senior High School	Women
W.A5.SP	26	House Wife	Junior High School	Women
W.A6.YA	35	House Wife	Senior High School	Women
W. A7.YS	35	House Wife and Entrepreneur	Junior High School	Women
W.A8.SM	26	Entrepreneur	Junior High School	Women
W.A9.RA	30	House Wife	Junior High School	Women
W.A10.IR	26	Health Promotion Officer	First Degree Education	Women
W.A11.IK	46	Head of Public Health Center	Second Degree Education	Women
W.A12.HI	51	Neighborhood Association	First Degree Education	Male

Source: Primary Data, 2021

Source: Primary Data, 2021

Figure 1. Sources of Clean Water Informants A6

Hygiene conditions in the house where the mother of Children with diarrhea lives, such as family latrines, trash cans in the house, and other hygiene conditions are not well taken care of, so they are dirty and messy which create a breeding ground for bacteria, viruses, and even disease vectors and other rodents. As the results of the author's observations and documentation are as follows in Figure 2, Figure 3, and Figure 4.

Source: Primary Data, 2021

Figure 2. Informant Family Latrine A3

Source: Primary Data, 2021

Figure 3. Informant Family Latrine A5

Source: Primary Data, 2021

Figure 4. Trash Condition

Mothers of Children with diarrhea have never tried how to try to live a clean and healthy life for themselves, their children, and their place to reside. The perception of obstacles or discomfort is never felt because there is no effort to change the habits so far that can cause recurrent diarrhea events that are often experienced by their children. as the following interview excerpt;

"Keep the house and the environment clean is very important, in this case, they are indeed still less, this is because they are very busy to make meatball and then they are brought to be sold. Go home from selling just to clean up, bathe the kids and tidy up the house if you have time." (W.A7.YS.14)

The perception of Cues to Action for mothers of Children with diarrhea is very low, mothers do not feel the need to immediately take concrete actions in clean and healthy living behavior so that their children avoid diarrheal diseases. In addition to the lack of knowledge and awareness of clean and healthy living behavior, support or encouragement from the health workers and the living environment is also lack, be its local government policies or advice from public shops, as quoted from the following interview;

"The parents of children with diarrhea are often given counseling during visits to the public health center, whether it is the treatment for diarrhea with ORS or prevention by maintaining personal hygiene and the environment, especially the management of clean water sources." (W.A10.IR.15)

"It is quite difficult to remind residents, especially those who live behind the stadium, if they are told, they will

listen to it but they never do it, that is why the environment where they live is quite apprehensive and that is the limit of our ability as health care workers." (W.A12.HI.15)

"The work area of East Sempaja Public Health Center is quite wide and located in the middle of Samarinda City which is automatically densely populated. The implementation of programs such as counseling to residents has been carried out, but it is not specific to the problem of diarrhea, because the residents' problems are not only diarrhea but also ARI and DHF because the rainy season is happening now. Conditioned the problem of what happen is the program that will runs". (W.A11.IK.16)

Behavior on Mothers of Children with diarrhea did not experience a significant change after receiving counseling during a visit to public health center when taking their child for treatment. For mothers, diarrheal disease is a harmless disease because there is no experience of their child dying from diarrhea, so when their child has diarrhea, it is enough for their child to be brought to the public health center, as quoted from the following interview;

"We are very grateful because there has been no experience of our children dying from diarrheal diseases so far. If anyone has diarrhea, I immediately take them to the public health center. Because my first child had diarrhea in the morning, diarrhea started in the afternoon and I was already weak and dehydrated. At that time, I got panicked and immediately rushed to Midwife Indri's house. I took it to the public health center, not brave to think that diarrhea was trivial anymore." (W.A8.SM.9)

"It often happens that the messages that have been conveyed by the health care workers at public health center are forgotten when they are at home and see that the children also start to get healthy. What we as parents think about is that the child will get healthy and we can start working again to earn a living." (W.A6.YA.17)

Table 2 below displays four HBM indicators that can influence informants' perception, including vulnerability, severity, benefits and barriers. All of the main informants did not agree that doing *Perilaku Hidup Bersih dan Sehat (PHBS)* would get a lot of obstacles if they did *PHBS*, although four of nine informants agreed that they were prone to diarrhea because they did not do clean and healthy lifestyle *PHBS*, and one of nine informants who agreed that not practicing *PHBS* could exacerbate the incidence of diarrhea in their children. Shows in Table 2 that there are two informants who have sufficient knowledge on the incidence of diarrhea, but they cannot do *PHBS* to prevent diarrhea.

Table 2. Health Belief Model and *Perilaku Hidup Bersih dan Sehat (PHBS)*

Perceptions	Key Informant						
	W.A1	**W.A2**	**W.A3**	**W.A4**	**W.A5**	**W.A6**	**W.A7**
Vulnerability	Agree vulnerable to diarrhea	Disagree prone to diarrhea	Disagree prone to diarrhea	Agree vulnerable to diarrhea	Agree vulnerable to diarrhea	Disagree prone to diarrhea	Disagree prone to diarrhea
Severity	Disagree that if you don't use *PHBS* it can make diarrhea worse	Disagree that if you don't use *PHBS* it can make diarrhea worse	Disagree that if you don't use *PHBS* it can make diarrhea worse	Disagree that if you don't use *PHBS* it can make diarrhea worse	Disagree that if you don't use *PHBS* it can make diarrhea worse	Agree that not using *PHBS* can make diarrhea worse	Disagree that if you don't use *PHBS* it can make diarrhea worse
Benefits	Disagree that There are many benefits if you use	Disagree that There are many benefits if you use	Disagree that There are many benefits if you use	Disagree that There are many benefits if you use	Disagree that There are many benefits if you use	Disagree that There are many benefits if you use	Disagree that There are many benefits if you use
Barriers	Agree there are obstacles when doing *PHBS*	Agree there are obstacles when doing *PHBS*	Agree there are obstacles when doing *PHBS*	Agree there are obstacles when doing *PHBS*	Agree there are obstacles when doing *PHBS*	Agree there are obstacles when doing *PHBS*	Agree there are obstacles when doing *PHBS*
Cues to Action (CTA)	No CTA	No CTA	No CTA	No CTA	No CTA	No CTA	No CTA
Clean and Healthy Living Behavior	No action	No action	No action	No action	No action	No action	No action

Source: Primary Data, 2021

DISCUSSION

As a mother, she has a role to take care of the house and take care of her child. Mother's parenting pattern is giving love, attention to the needs and development of children and a sense of security and warmth.

As for the characteristics of the main informants, the age is distributed starting from the youngest at the age of 26 years old and the oldest at the age of 40 years old. While other jobs than taking care of the household most of them are self-employed, such as selling necessities, selling snacks and drinks, meatballs and others. The double role played by housewives makes time-limited in taking care of children, cleaning the house, and preparing healthy food according to the nutritional needs of their children.

Education 8 out of 9 informants' graduation from junior high school and one graduated from elementary school. The level of education is quite influential on a person in dealing with and solving problems as well as in understanding the message received.[13] It is supported by Yunitasari AR et al (2020), the factors that are significantly related to the incidence of underweight in urban and rural areas in children, one of them is the level of education of parents.[14]

The perceptions of mothers of children under five years old with diarrhea on susceptibility, severity, benefits, obstacles, cues to action, and clean and healthy living behavior are as follows. Perception of vulnerability**,** 4 of 7 mothers of children under five years old with diarrhea agree on vulnerability. The 4 informants realized that the condition of their children was susceptible to diarrhea, this was because their children often had diarrhea repeatedly. The informants realized that the cause of the diarrhea susceptibility experienced by their children was caused by drinking water sources that did not meet the requirements such as dug wells where the water was colored, spiky, and slightly smelly. Based on the results of observation and data triangulation, the informants had tried to manage water before it was consumed by depositing it in a column with a width of 1 meter, length 4 meters and height of 2 meters for 24 hours, after that it is transferred to another reservoir (drum) for water that is consumed or used for cooking and drinking, the result is clear, odorless but still has a slight taste. While the need for water for bathing and washing toilets is immediately used after being accommodated for a while in the pool, the results are a little clear and have a taste.

In addition, the houses where they live are also not clean such as available trash cans using plastic bags with the condition that they are hung above the stove which the trash can fall at any time and contaminate the food on the stove and the food ingredients under the trash hanger. Meanwhile, other informants also used the same trash can using a plastic bag, some were hung in the corner of the kitchen and some were hung on the wall, the reason was that the trash was hung so that the cat will not reach it and scatter it. In addition, the schedule for waste disposal at garbage dumps is not regular; waste collected in plastic bags is not immediately disposed of even though it is full, while wet waste and dry waste are mixed and cause unpleasant odor. The cleanness of the floor in the house is not clean because there is a lot of dust and garbage from food wrappers which scattered on the floor with children's toys, furniture, and cooking/kitchen utensils are also not clean. After all, there is still a lot of dust attached and consumable traces that are stored before being washed clean. It is supported by Kurniawan RN et al (2018) that the incidence of diarrhea that occurred in residents after the implementation of the traditional *sapu kiki* party was caused by unhygienic food and drink ingredients, personal hygiene of food managers, and unclean cooking utensils.[15]

Most of the informants knew the causes of diarrhea experienced by their children because every visit to the public health center for treatment was given counseling by health care workers about the causes of diarrhea, but 7 mothers of children under five years old did not apply clean and healthy living behaviors as taught by the health care workers In contrast to the results of research by Aristi et al (2020), respondents' beliefs about threats are low so personal hygiene parameter is also low, this is due to lack of knowledge and motivation of respondents to take personal hygiene actions. It is supported by Asitua E et al (2019) who said that the correlation between knowledge of mothers about *Perilaku Hidup Bersih dan Sehat (PHBS)* with the incidence of diarrhea, where

there is a significant correlation between lack of knowledge and the incidence of diarrhea in the work area of Pancur Health Center. [16,17]

Perceptions of severity, most mothers of children with diarrhea perception to disapprove that doing clean living in the environment where they live can help their children avoid diarrheal disease. This is due to the experience in the daily life of mothers with diarrhea who have never practiced clean living in their living environment, but their children have not been exposed to diarrhea for a long time. Because mothers of Children with diarrhea have very low perception of severity to effect on clean living behavior in their living environment is also very low, such as; the floor is dirty with dust and children's toys are scattered on the floor, the cleanness of the children is lack because sometimes they do not take a bath twice a day, the source of drinking water does not meet the requirements for consumption and the cleanness of the kitchen and the way of managing food ingredients is also not clean.

Based on the results of observation and in-depth interview, 6 out of 7 mothers with diarrhea have low perception, because they have assumption that their child has diarrhea because of the transmission system from children with diarrhea to other children. If a child in their neighborhood gets diarrhea, it will become an epidemic for other children, so parents need to be vigilant or keep their children away from children suffering from diarrhea. For this reason, mothers of Children with diarrhea do not care about clean living behavior in their living environment. This is not in line with the results of research conducted by Wartiningsih M et al. As mothers who stated that they agreed that childern under five years old being cared could be prone to diarrhea related to the mother's perception. Likewise, the results of research conducted by Irnawati P et al. Stated that the mother's choice to take her child to a pediatrician during diarrhea was influenced by perceptions of perceived vulnerability and seriousness.[18,19]

Benefit perception, all mothers of children under five years old with diarrhea do not agree with the benefits they have if they carry out clean living behavior in their living environment. This is in line with the results of a study conducted by Debby D which shows that there is no significant correlation between hand washing with soap, clean water facilities, the condition of the trash can with the incidence of diarrhea during the last three months using analytical and observational methods. data analysis by test *chi-square*.[20]

The perception of mothers with children regarding clean living behavior in their living environment require time and money, while most mothers of children with diarrhea have additional jobs besides their function as housewives, such as selling *pentol*, necessities, and ice drinks, meatballs, etc. Many activities make mothers do not have time to clean the environment where they live, such as sweeping the floor in the house at least once a day, maintaining the cleanness of the bathroom, cleaning wet and dry garbage, and taking out the trash every day, paying attention to the cleanness of cooking utensils and food hygiene. as well as good and correct management methods so that the nutrients contained in these food stuff persist, pay attention to a good and correct water management system, so that the water consumed by children meets the requirements, pay attention to personal hygiene of children and mothers, take a bath twice a day, wash hands before eating using soap and running water.

Mothers of children with diarrhea also think about the high cost of carrying out clean living behaviors in the environment where they live such as buying a good broom, a good mat, a trash can that meets the criteria requires hand soap, bath soap, detergent, and dish soap and a lot of cooking utensils. As well as the high cost of managing clean water supplies properly and correctly so that water that meets health requirement is available for family consumption. The perception that it requires more time and money makes mothers not feel that there are many benefits when carrying out clean living behaviors in their living environment. Based on the results of in-depth interview with informants, the benefits felt when carrying out clean living behavior in the environment where they live are only temporary which is the house looks beautiful, beautiful to view, comfortable to rest, and has not been paid for with a lot of time wasted in making pentol snacks, meatballs, iced

drinks and maintaining a basic food stall, as well as feeling a loss in expenses and little income for family finances.

Perception of barriers to informants in carrying out their functions as housewife which are taking care of children, cleaning the place to reside and the surrounding environment as well as providing food according to the nutritional needs of children in daily life related to willingness, if there is a will, the informants can perform clean living behavior in the environment where they stay. It is not because of the lack of facilities and infrastructure, but in fact, there is no will from mothers of children with diarrhea. This is in line with research conducted by Shao C, et al (2018).[21] While, it is very different from the results of research conducted by Khani JA et al, if the mother perceives that the obstacles faced are easy to overcome, then the mother is easily motivated to carry out clean living behaviors in the environment where she lives, maintain the personal hygiene of the mother and her child and able to get clean water suitable for consumption by their children. Mothers of children with diarrhea agreed that there will be obstacles in carrying out their duties as housewife.[22] Due to tired conditions when returning home after selling, so they are not motivated to carry out a clean lifestyle such as throwing out garbage, cleaning the floor of house, cleaning the kitchen and throwing out stale food leftovers, and washing the kitchen utensils that have been used. In line with the results of research conducted by RK Sari et al, with the logistic regression method, it was significantly proven that family poverty, as well as education and the status of working mothers, had a significant effect on the utilization of health services, especially outpatients.[23]

Cues to action, the understanding of mothers with children under five with diarrhea about the diarrheal disease itself is very simple because they do not think that diarrheal disease is dangerous for their children. Diarrhea has often been experienced by their children and will eventually recover as usual and this diarrheal disease is a seasonal disease for them, so if the diarrheal disease season arrives and the child is infected, then they just have to be treated and will recover. From this understanding, no action makes mothers of children feel the need to take real action or as soon as possible to carry out healthy living behaviors for all members of their family and the environment in which they live.

Strengthened by the low support from health care workers and support from local public figure. From the public health center, they only provide counseling when people who are susceptible to diarrhea come to visit for treatment at public health center because the condition of children is affected by diarrhea so the counseling time is also limited with perfunctory methods. Not in line with the results of research conducted by Indar et al, health care workers at Tamangapa Public Health Center provide services at auxiliary Public Health Center that close to the landfill so that it is affordable to serve residents who live close to the landfill and susceptible to disease. [23,24]

While the local public shops do not care about the condition of the residents behind the stadium, this is because they have been reminded to improve their living environment and maintain cleanness, but these residents do not pay attention to the advice given by the public shop.

The behavior of mothers with children under five years old with diarrhea who do not practice clean living in their environment to prevent recurrent diarrhea in their children, such as cleaning their home and surrounding environment, maintaining personal hygiene of mothers and children, and the behavior of mothers in getting clean water sources that are suitable for consumption. This is due to the obstacles that are felt when carrying out a clean and healthy lifestyle, such as feeling awkward because doing something out of the ordinary is also related to the lack of time available for mothers of children with diarrhea. Most mothers of children with diarrhea are busy outside their function as housewife. When you are at home and you are busy with preparing your merchandise, for example, managing basic ingredients into products that are ready to be sold. The results of this study are not in line with the results of research conducted by B Putra, where there is no significant correlation between the work of mothers with Children and the prevention of diarrhea in their children (p= 0.686). [25]

In Bandura learning model, the person factor (cognitive) plays an important role which is self-efficacy will be very easy to face challenges, do not feel doubt because they have full confidence in their abilities. The process of observing, and imitating the behavior and attitudes of others as a model is an act of learning.[26]

Mothers of children with diarrhea have low self-efficacy, this is due to the absence of other people's attitudes and behaviors that can be observed, imitated as a model in learning actions, so that it has no effect and forms conditions for social learning patterns in the environment around the place where mothers stay.[27]

CONCLUSION AND RECOMMENDATION

Mothers' perceptions of children with diarrhea according to HBM analysis, mothers of children with diarrhea agree and realize that their children often experience recurrent diarrhea due to poor environmental sanitation and clean water sources from dug wells which do not find the requirements. Besides that, the transmission system from children with diarrhea often occurs in their environment. Even though, mothers of children with diarrhea still disagree if carrying out clean living behaviors in their living environment can prevent diarrhea in their children because they think that carrying out routine clean-living behaviors need more time and costs which are quite crucial for their family.

There is no clean and healthy living behavior towards all members of their family and the environment where they live.

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AUTHOR CONTRIBUTIONS

All authors have a role in the research process as well as the creation of this article. R designed and compiled the research; SEN took care of research permits and determined informants and made research results, the research was conducted in threes; DY analyzed the data. R = Rosdiana; SEN = Sri Evi Newyearsi; DY = Dewi Yuniar.

CONFLICTS OF INTEREST

The authors declare no conflict of interest.

REFERENCES

1. WHO. World Health Statistics Monitoring Health for The SDGs.; 2020.
2. Iryanto AA, Joko T, Raharjo M. Literature Review: Faktor Risiko Kejadian Diare pada Balita di Indonesia. *J Kesehat Lingkung*. 2021;11(1):17. https://doi.org/10.47718/jkl.v11i1.1337
3. Kemenkes RI. Profil Kesehatan Indonesia 2019. Jakarta: Kementerian Kesehatan Republik Indonesia. 2019.
4. Firmansyah YW dkk. Faktor-Faktor yang Mempengaruhi Kejadian Diare pada Balita. *Bul Kesling Mas*. 2020;40(1).
5. Melvani RP, Zulkifli H, Faizal M. Analisis Faktor yang Berhubungan dengan Kejadian Diare Balita di Kelurahan Karyajaya Kota Palembang. *JUMANTIK (Jurnal Ilm Penelit Kesehatan)*.2019;4(1):57. http://dx.doi.org/10.30829/jumantik.v4i1.4052
6. Diskominfo. Buku Induk Statistik Sektoral Kota Samarinda. Vol 5. 2020.
7. Puskesmas Sempaja. Profil Public Health Center Sempaja. Published online; 2019.
8. Sugiyono. Metode Penelitian Kuantitatif Kualitatif Dan R&D. Bandung: Alfabeta; 2010.
9. A S. Metodologi Penelitian Kuantitatif & Kualitatif Dalam Psikologi. 2015.
10. Raco J. Metode Penelitian Kualitatif Jenis, Karakteristik dan Keunggulannya. Grasindo; 2010.
11. Afiyanti Y, I Nur Rachmawati. Metodologi Penelitian Kualitatif dalam Riset Keperawatan; 2014.
12. Bazeley PAT. Qualitative Data Analysis;

2013.

13. Priyo P, Priyanto S. Efektifitas Penerapan Health Belief Modelterhadap Perilaku Hidup Bersih dan Sehat (PHBS). *J Holist Nurs Sci*. 2018;5(2):88-105. https://doi.org/10.31603/nursing.v5i2.2447
14. Yunitasari AR, Dewi Sartika RA, Setiarini A. Household Factors Associated with Underweight in Children 24-59 Month in Urban and Rural in Indonesia. *Media Kesehat Masy Indones*. 2020;16(1):140. https://doi.org/10.30597/mkmi.v16i1.9105
15. Kurniawan. K RN, Yani A. Persepsi Masyarakat Terhadap Kerentanan Penyakit Diare Pasca Pelaksanaan Pesta Adat Kiki Sapu dan Hambatan Terhadap Pencegahannya. *MPPKI (Media Publ Promosi Kesehat Indones Indones J Heal Promot*. 2018;1(2):58-62. https://doi.org/10.56338/mppki.v1i2.219
16. Aristi I, Sulistyowati M. Analisis Teori Health Belief Model Terhadap Tindakan Personal Hygiene Siswa Sekolah Dasar. *Heal Sci Prev*. Published online 2020.
17. Eiko asitua D indrawati. Hubungan Tentang Pengetahuan Ibu Perilaku Hidup Bersih dan Sehat (PHBS) Dengan Kejadian Penyakit Diare pada Anak di Wilayah Kerja Public Health Center Pancur Batu Tahun 2019 EIKO. *J Ilmu Kesehat Masyarakat vol 53 1-10*. 2019;53(9):1689-1699.
18. Wartiningsih M, Soesanto D, Tabita H, Silitonga H. Analisis Pengaruh Persepsi Ibu Terhadap Perilaku Gaya Hidup Bersih dan Sehat Berdasarkan Health Belief Model di Surabaya Analysis on the Effect of Mother's Perception Towards the Clean and Healthy Life Behavior Based on the 'Health Belief Model' in Su. *Manaj Kesehat Yayasan RS Dr Soetomo*. 2020;6(1):94-109. 10.29241/jmk.v6i1.310
19. Irnawati PY, Salimo H. Health Belief Model on the Choice of Medical Doctor Among Mothers of Children with Diarrhea. *J Heal Promot Behav*. 2018;03(02):100-108. https://doi.org/10.26911/thejhpb.2018.03.02.03
20. Prawati DD. Faktor yang Mempengaruhi Kejadian Diare di Tambak Sari, Kota Surabaya. *J PROMKES*. 2019;7(1):34. https://doi.org/10.20473/jpk.V7.I1.2019.34-45
21. Shao C, Wang J, Liu J, Tian F, Li H. Effect of A Health Belief Model-Based Education Program on Patients' Belief, Physical Activity, and Serum Uric Acid: A Randomized Controlled Trial. *Patient Prefer Adherence*. 2018;12:1239-1245. 10.2147/PPA.S166523
22. Jeihooni AK, Kashfi SH, Bahmandost M, Harsini PA. Promoting Preventive Behaviors of Nosocomial Infections in Nurses: The Effect of An Educational Program Based on Health Belief Model. *Investig y Educ en Enferm*. 2018;36(1). 10.17533/udea.iee.v36n1e09
23. Sari RK, Handayani D. Pemanfaatan Pelayanan Kesehatan pada Anak Indonesia: Pengaruh Kemiskinan dan Karakteristik Ibu. *Media Kesehat Masy Indones*. 2020;16(3):305-316. https://doi.org/10.30597/mkmi.v16i3.9709
24. Indar, Mas'ud NA, Sampurno S. Analisis Perlindungan Hukum Bagi Kesehatan Warga di Kawasan Pemukiman Tempat Pembuangan Akhir Tamangapa Analysis of Legal Protection for Citizens Health in the Tamangapa Final Disposal Area. *J MKMI*. 2019;15(2):204-211. https://doi.org/10.30597/mkmi.v15i2.5755
25. Putra BAP, Utami TA. Pengetahuan Ibu Berhubungan Dengan Perilaku Pencegahan Diare Pada Anak Usia Preschool. *J Surya Muda*. 2020;2(1):27-38. https://doi.org/10.38102/jsm.v2i1.54
26. Bandura A. Self-Efficacy in Changing Societies. (Bandura A, ed.). Standford: University Press; 1999.
27. Bandura A. Social Learning Theory. 1st ed. (Bandura A, ed.). Prentice Hall Englewood Cliffs, New Jersey 07632; 1977.