The Influence of Individual Factors and Work Conditions with Nurse's Mental Workload Using Method Nasa-TLX Banggai District Health Center

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Abstract

Workload is the interaction between individuals and things that can burden someone in completing work. The workload is divided into physical and mental, where the workload is influenced by individual characteristics and external factors, task demands, and work environment. The prevalence of workload in the province of Central Sulawesi (50.9%) experienced work stress caused by excessive workload. *Banggai* Regency is one of the regions in the province of Central Sulawesi. The purpose of this study was to find out how individual characteristics and working conditions can affect the mental workload of nurses at the *Banggai* District Health Center. this study uses the chi-square method. The sample used in this study is a nurse who is actively working at the B*anggai* District Health Center. The number of samples used is 225 nurses. The sampling technique is the Slovin technique. The measuring tool used is a research questionnaire from NASA TLX. This questionnaire is used to measure the mental workload of nurses at the *Banggai* District Health Center. Data were analyzed by univariate and bivariate. The results of this study indicate that the mental workload of nurses in *Banggai* Regency is in the high category (70.2%). The results of the bivariate analysis found that there was a relationship between age, task demands, work environment and the mental workload of nurses at the *Banggai* District Health Center (p-value 0.000). There is no relationship between gender and the mental workload of nurses at the *Banggai* District Health Center. The results of the multivariate analysis of age and task demands have a positive effect on workload, while the work environment has a negative effect on workload. The work environment is the most dominant factor affecting the mental workload of nurses at the B*anggai* District Health Center

Keywords: *Banggai*, Mental Workload; Individual Characteristics; Working Conditions; NASA TLX

Introduction

Based on Word Health Organization (WHO) data in 2011 there were 19.3 million nurses. A total of 147,264 nurses work in Indonesia (45.65%) based on the amount of health energy in hospitals. The total number of national nurses is 87.65 per 100,000 population, this is still short based on the 2019 target of 180 per 100,000 population, if not balanced with an adequate workforce it can cause the workload to increase. Meshkati (Widyanti, 2010) the difference between the ability of workers and the demands of work can cause workload. Nurses are a profession that has a great role in maintaining patient safety. Therefore, nurses must be able to ensure that nursing services provided prioritize safety through nursing care provided to patients and also have enlightenment on the importance of recognizing potential hazards in the patient's environment to prevent injury Kamil (2010), in research (Ananta & Dirdjo, 2021)

The workload is something that arises from the interaction between the demands of tasks, the work environment in which it is used as a workplace, skills, behavior, and perceptions of workers. The nurse's physical workload includes lifting patients, bathing patients, helping patients to the bathroom, pushing health equipment, making patient beds, and pushing patient brankart. The mental workload experienced by nurses, including working shifts or shifts, preparing mentally for patients and families, especially for those who will carry out surgery or in critical conditions, work with special skills in caring for patients and must establish communication with patients (Ananta, G. P., & Dirdjo, M. M. 2021).

Internal workload originates within the body itself as a result of external workload reactions influenced by age, sex, body size, and health conditions Task demands include job extrinsic factors such as working conditions (e.g. noise, temperature, lighting, and ventilation), shift

work, long or inhospitable working hours, and workload (Mahawati et al., 2021). Nursalam (2002) said, the workload that is often carried out by nurses is physical such as lifting patients, pushing health equipment, making patient beds, and pushing backpacks, and mental ones are the complexity of work such as skills, responsibility for recovery, taking care of the family and having to establish communication with patients (Mallapiang et al., 2017)

Healthcare access issues are largely related to persistent problems of health worker shortages and maldistribution. In remote areas of Australia, the primary care workforce consists largely of community-based remote area nurses (RANs) and Aboriginal health practitioners (AHPs), supported by visiting allied medical and health staff (Wakerman et al., 2019)

In the study at Hospital X, the results of measuring mental workload with factors of mental needs, physical needs, time needs, performance, level of effort, and frustration/stress, in nurses who worked as many as 13 people with a percentage value (86.67%). This shows that mental workload can be categorized as high (Achmad & Farihah, 2018)

In workload measurement activities, it can be divided into two, namely physical workload measurement and mental workload. In measuring the physical workload, the output produced can be seen from the results of a worker's work. One example of a method that can be used is the NASA-TLX method. The NASA-TLX method is a method of measuring mental workload by considering six dimensions to assess mental load. Of the six dimensions, the weighting of the dimension that most affects work will be determined and continued with the calculation of scores from 0 – 100 on each scale (Arasyandi & Bakhtiar, 2018)

Based on a survey conducted in one of the health service units in Bualemo District, *Banggai* Regency on January 4, 2022, it is a 24-hour health service and has 3 work shifts, namely morning, afternoon, and night. As for Bed Ocuppacy Rate (BOR) per day 82%. For the service schedule distribution system for nurses, namely morning as many as one person, afternoon as many as one person, and night as many as one person, while for off-guard time is given 4 days after service. Based on the results of interviews and distribution of open questionnaires to 13 nurses in one of the health service units, UPTD Bualemo Health Center, Bualemo District on January 4, 2021, *Banggai* Regency, 12/13 (92.3%) nurses suffer from mental burden, which is seen from many nurses making mistakes in providing therapy to patients, experiencing stress or depression, feeling uncomfortable in carrying out their duties, Lack of time with family, and less time in rest. Nurses also said they often felt prolonged dizziness, and lack of sleep when getting so much workload. Based on the description

above, it can be concluded that nurses who work in health care units get a workload. From this workload, nurses can experience psychological or mental disorders, in this case, namely stress. In addition, so far there has been no actual measurement action to find out how the mental workload of nurses feels while working. Therefore researchers decided to influence individual factors consisting of age and gender. Also the factors of working conditions namely task demands and work environment can affect the mental workload of *Banggai* Regency nurses

Methods

This study used a cross-sectional method, the purpose of this study was to find out how individual characteristics and working conditions can affect the mental workload of nurses at the *Banggai* Regency Health Center. The location of the study was carried out at the Puskesmas which is included in the *Banggai* Regency area. The respondents in this study were nurses who actively worked at the Puskesmas, as for the number of respondents in this study was 225 nurses.

The instrument used in this study is NASA-TLX (National Aeronautics and Space Administration Task Load Index). There are 6 components that will be looked at, namely mental needs, physical needs, time needs, performance, level of effort, and frustration. All these components are used as a reference to see the quality of the nurse's mental workload. The analysis used in this study is univariate and bivariate analysis.

Results

Tabel 1. Characteristic of Respondent

Characteristics	f	%
Aged		
25-30 y.o	81	36
31-35 y.o	74	32,8
36-45 y.o	70	31,1
Gender		
Male	84	36,9
Female	142	63,1
Works Demand		
Light	99	44
Heavy	126	56
Works Invair-onment		
Good	85	37,8
Not Good	140	62,2
Mental		
Low	46	20,4
Moderate	158	70,2
Medium	21	9,4

Tabel 4. Test the Relationship of Individual Factors and Working Conditions With the Nurse's Mental Workload

X/Y	Mental Workload Nilai Sig (<0,05)
Age	0.000
Gender	0,612
Work Demand	0.000
Work Environment	0.000

Based on Table 4, the mental workload of nurses over the age of 25-30 years tends to experience a workload with a high category, namely out of the total number of nurses, 81 at this age of 60 are in the high category. The age between 31-35 of 74 at this age of 50 is in the high category. The age between 36 and 45 years out of a total of 70 nurses at this age 48 are in the category of high mental workload. Based on continuity correction analysis, a p-value of 0.00 was obtained, meaning that there is a relationship between age and the mental workload of nurses at the *Banggai* Regency Health Center.

The relationship between gender and the mental workload of nurses out of a total of 225 nurses, nurses with a moderate mental workload of 16 (7.1%), high category 58 (25.8%), and very high category 10 (4.4%). Based on continuity correction analysis, a P-value of 0.612 was obtained, meaning that there was no relationship between gender and the mental workload of nurses at the *Banggai* Regency Health Center.

Out of a total of 225 nurses, 126 (56%) felt heavy task demands, and of the 126 nurses who had heavy task demands, 87 (69%) were in the high mental workload category. Based on the continuity correction analysis, a p-value of 0.00 was obtained, meaning that there is a relationship between task demands and the mental workload of nurses at the *Banggai* Regency Health Center.

Of the relationship between the work environment and the mental workload of nurses out of a total of 225 nurses, 140 (62.2%) felt the work environment was in the poor category. Of the 140 nurses who felt the work environment was poor, 96 nurses (68.6%) were in the high mental workload category. Based on continuity correction analysis, a P-value of 0.00 was obtained, meaning that there is a relationship between the work environment and the mental workload of nurses at the *Banggai* Regency Health Center.

Discussion
The Relationship between Age and Mental Workload of Nurses at the *Banggai* Regency Health Center

Regarding the relationship between age and the mental workload of nurses at the *Banggai* Regency

Health Center, it can be obtained from the results of the relationship test with a significant value or p-value (0.000) meaning that age is closely related to the increase in the mental workload of nurses at the *Banggai* Regency Health Center. The researcher's assumption about the relationship between age and the mental workload of nurses at the *Banggai* Regency Health Center, where the average nurse who works the majority is in the elderly adult age group, namely 36-45 years. Where with increasing age a person will affect the body system in receiving tasks given in fulfilling health services for the community.

Research conducted in China in 2015, where health workers, especially doctors, with an average age of 38 years out of 58 respondents, experienced work fatigue with more than 60 hours of work a week. This can be seen from the income money obtained is not satisfactory. It can be seen from 58 respondents that around 74% feel lack in receiving salary wages (Liang et al., 2015)

Research conducted in Greece in 2020, stated that the addition of COVID-19 cases caused nurses as health workers who played an important role in confectioning this case to experience symptoms of stress, fatigue, and death. In some cases of nurses around 15% feel uncomfortable at work, and 35% experience work fatigue due to excessive workload in this pandemic case. Of about 18,533 nurses with an average age of 36-56 years 30% experienced burnout in carrying out their duties as nurses(Galanis et al., 2021).

WHO has explained in Perwitasari (2015) that 450 million people in the world experience work stress. Work stress is strongly related to mental workload, and also with age, this is explained in the results of previous studies, namely age and workload related to work stress with a p-value of 0.031 which indicates a significant relationship (Zulkifli et al., 2019).

The research in line with(Ardiyanti et al., 2017)i, The results of a study that explains the relationship between age and work fatigue that can trigger the mental workload of nurses at the MLATI II Sleman Health Center Yogyakarta. The p-value result (0.039) means that there is a relationship between age and the mental workload of nurses. Researchers explain that as people get older >40 a person can reduce VO2 which from this deficiency can result in less work focus, and easily feel fatigue at work.

In another study, it was explained that age is closely related to the mental workload of nurses. The researchers' assumption explains that age does not guarantee the quality of a person's work. Through empowerment, training, and experience a person can understand the work process undertaken as a health worker (Ermi Girsang & Chiuman, 2022)

Gender Relationship with Nurse's Mental Workload at *Banggai* Regency Health Center

Regarding the relationship between sex and the mental workload of nurses at the *Banggai* Regency Health Center, this study shows that gender has a p-value of 0.612, so it can be explained that there is no relationship between sex and the mental workload of nurses at the *Banggai* Regency Health Center. The assumption of the researchers that caused the results in this study was that there was no relationship between gender and the mental workload of nurses at the *Banggai* Regency Health Center was that the distribution of data on the questionnaire was not balanced between men and also female sex at work, where from a total of 225 nurses 84 (36.9%) male and 142 (63.1%) female Research conducted in Turkey in 2015 explains that there is a significant relationship between sex and the development of a person's workload. Where women feel a lighter workload compared to men (Erus & Tuncay, 2022) The survey conducted in America in 2016 explained that women have a large percentage of fatigue at work compared to the male sex, with a p-value of 0.031 (Elmore et al., 2016). However, some studies show there is a relationship between sex and increased workload. Previous research has suggested that women have pressures in work that can increase workload (Galaiya et al., 2020).

As for one of the previous studies that was the same as this study conducted on spring roll skin manufacturing workers in Semarang, it was found that gender did not significantly affect the workload, it can be seen from the p-value of 0.25. Researchers admit that the number of respondents studied is more likely to be men than women with a proportion of 75% and 25%[i](Kusgiyanto et al., 2017).

The Relationship of Task Demands with the Mental Workload of Nurses at the *Banggai* Regency Health Center

Regarding the relationship between task demands and the workload of nurses at the *Banggai* Regency Health Center, from the results of the study it can be seen that the p-value is 0.000, meaning that there is a significant relationship between task demands and the mental workload of nurses at the *Banggai* Regency Health Center. According to the researchers' assumptions, the increasing duties of nurses, not only as health care providers in the community will worsen the mental workload on working nurses. According to the American National Association for Occupational Health (ANAOH), the incidence of workload in nurses ranks at the top of the forty-first independent cases in workers (Fuada et al., 2017). This research is as explained in other studies that explain that there is a

significant influence on negligence while working. Although this study does not place workload as a research variable, this study states that the indicator to see negligence is workload with the measuring instrument used by NASA TLX. The p-value is 0.01[i](Mazur et al., 2016)

Another study that can describe in accordance with this study is research on the correlation of task demands with mental load. In this study preferring the demands of cognitive tasks, the results illustrate that there is a significant correlation value between task demands and mental workload, namely with a p-value of 0.057. However, in this study, the selected object was not the same object as the research, in this case, namely the object of workers in mining(Mohammadian et al., 2022)

The research in line with (Kurnia Kasmarani, 2012) Explaining mental workload measured by task demands has a p-value of 0.035, meaning that there is a relationship between task demands and nurses' mental workload. The assumption of researchers every year there is a paradigm shift in nurses in carrying out their duties. In this case, nurses do not only provide health services to the community.

The Relationship between Work Environment and Nurse's Mental Workload at *Banggai* Regency Health Center

Regarding the relationship between the work environment and the mental workload of nurses at the *Banggai* Regency Health Center. From the results of the study, the results of p-value value of 0.00 means that there is a significant relationship between the work environment and the mental workload of nurses at the *Banggai* Regency Health Center. The researcher's assumption is that this happens, because the average nurse who works at the Puskesmas in *Banggai* Regency performs tasks or shifts individually, meaning that in one shift the nurses take care of themselves, especially in Puskesmas that implement 24-hour services. Nurses must serve patients in the Emergency Department (ER) and also in the inpatient room. Not to mention having to serve accident and critical patients by yourself. This makes the nurse feel the workload occurs not only from the physically but also the impact on the mental workload.

According to the U.S. Department of Health and Human Services' 2018 National Sample Survey of Registered Nurses (NSSRN), the average nurse who works in hospitals or in health services leaves their jobs because of fatigue and workload. Of the 50,829 nurse respondents, about 46.6% complained about the poor work environment (Shah et al., 2021)

This research explained in previous research that

the work environment affects the fatigue felt by nurses while working. In this study, it was explained that the condition of the room in the ICU is very influential on the mentality with the task of nurses who must be ready to take action on patients with decreased levels of consciousness, meeting all patient needs for 4 hours can affect the workload and perceived work stress. In addition, nurses feel uncomfortable with the sound of equipment in the room so that nurses are less comfortable at work. Where from 161 respondents complained about shif time (29%), room conditions (35%), rest hours (36%) (Larsson et al., 2022).

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Conclusion

It is crucial for the Banggai Regency Health Office to take several important steps, particularly in implementing a work ergonomic system comprising engineering, administration, and behavior. This is essential to reduce the physical and mental workload of working nurses. When nurses operate with a minimal workload, it automatically leads to optimal achievement in delivering the best health services to the community.

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Author Contribution and Competing Interest

Contributing authors for this research are interested in cellecting and analyzing data and compiling the manuscript.

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