

An Assessment Mental Workload and Its Associated Factor among Employees in Budhi Asih Mother and Child Hospital

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ABSTRACT

Budhi Asih Mother and Child Hospital has experienced a high increase in the number of patients in recent years. This study aims to determine the workload of employees at Budhi Asih Mother and Child Hospital and its associated factor as a reference for determining new employee recruitment policies. This research is a descriptive-analytic study with a cross sectional design. The sampling method used in this research is the total sampling method, which included all 55 employees. This study uses the NASA-TLX (National Aeronautics and Space Administration Task Load Index) questionnaire to determine the workload of employees. NASA-TLX consists of six dimensions, namely mental demand, physical demand, temporal demand, effort, and frustration. The collected data were analyzed using descriptive (mean and standard deviation) and inferential (t-test, Kruskal Wallis, One-way Anova, Spearman) statistics. The data analysis was performed with SPSS version 25. The mean NASA-TLX score for mental workload was reported 61.89 ± 21.90 , where effort dimension had the highest score compared to other dimensions (Mean \pm SD weight: 68.69 ± 24.40 ; Mean rate: 3.24 ± 1.20 ; Mean score: 14.97 ± 8.01). Mental workload of employee had a significant relationship with the age of employees, and the work unit ($P < 0.05$). In addition, the delivery room reported the highest mental workload score (82.73 ± 11.20). Based on the results, hospital management needs to make the division of tasks and allocation of employees better so that the workload of employees decreases and is more equitable.

Keywords: Mental workload, NASA-TLX, hospital

1. Introduction

Mother and Child Hospital (RSIA) is a special hospital that only provides one type of health service, namely the field of maternal and child health services. This hospital aims to provide comfortable and safe facilities and services for mothers and children. Budhi Asih Mother and Child Hospital is a private mother and child hospital in Purwokerto. Budhi Asih Hospital has a motto "Serving with all your heart, feels like at home", with this motto this hospital is committed to providing comfortable services so that mothers and children feel like at home. Budhi Asih Hospital was established on February 25, 1997, and until now continues to serve the needs of the community,

especially for maternal and child health. Budhi Asih Hospital had an increase in the number of inpatient and outpatient visits as shown in Figure 1 and Figure 2.

Figure 1. Graph of Number of Inpatient Visits 2016-2020 at Budhi Asih Mother and Child Hospital

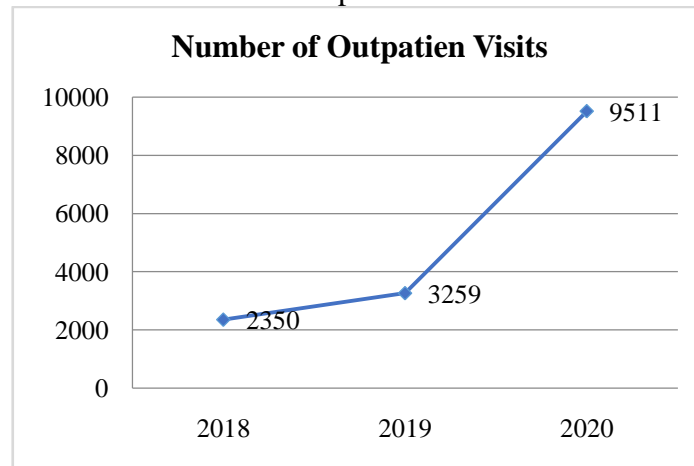


Figure 2. Graph of Number of Outpatient Visits in 2018-2020 at Budhi Asih Mother and Child Hospital

~~From Graph 1, the number of inpatient visits for the last 5 years has increased in 2020. In 2016 the number of inpatient visits was 75 patients, while in 2020 the number of inpatient visits was 2,517 patients, meaning that there was an increase of more than 12x in 5 years. Meanwhile, the number of outpatient visits was also increased from 2350 patients in 2018 to 9511 patients in 2020, meaning that there has been a 4x increase in the last 3 years. This is a business phenomenon that can affect various things, including the workload of the employees of Budhi Asih Hospital. Based on preliminary interviews, this increase in patient visits influences the workload of employees which also increases, although there has been an increase in the number of employees from 25 employees in 2018 to 45 employees in 2020.~~

Workload is a general term that is often used, but often without a precise definition of its meaning. Workload is often defined as the total amount of work done by a person or group of individuals at a certain time (Yusefi et al., 2019). One of the factors that influence employee behavior and performance at work is mental workload, which is the amount of mental effort a person uses in doing his or her job. Mental workload represents the capacity for attention required to fulfill job tasks. When the task exceeds the individual's capacity, they must adapt to these conditions or cause their performance to decline (Zahednezhad et al., 2021). Workload, as one of the important components of service delivery in the health system, has a decisive role in unintended consequences such as emotional exhaustion, depersonalization, and burnout (Mohd Balwi et al., 2021; Portoghese et al., 2014; Rostami et al., 2021). Employees who do not have good mental health will not be able to provide adequate patient care. The mental health of health workers affects the quality of care provided to patients (Rostami et al., 2021). Nurses and medical staff in hospitals are reported to have high workload levels (Yusefi et al., 2019). MacPhee (2017) reported that the perception of a high workload on nurses is related to job satisfaction. However, Bazazan et al. (2019) reported that job satisfaction is significantly related to two dimensions of workload, namely mental needs and frustration, and is not related to the overall workload

2. Literature Review

2.1 Definition of Workload

Workloads are considered to be multidimensional and diverse. Workloads result from the aggregation of many different demands making them difficult to define uniquely. Aspects of workload seem to fall within three broad categories: the amount of work and number of things to do; time and the particular aspect of time one is concerned with; and the subjective psychological experiences of the human operator (Cain, 2007). Some define workload as "the level of processing capacity expended during task performance," and it reflects the relationship between resource supply and task demand (Young et al, 2008). Workloads involve environmental demands and the operator's ability to cope with those demands. The general concept of workload is basically related to individual mental abilities and the way information is received and processed, which ultimately leads to decisions and actions (Yusefi et al., 2019). Workload is defined as the cost incurred by human operators to achieve a specific level of performance (Gawron, 2000). Meanwhile Hoonakker et al., (2012) stated that the workload consists of: (1) there are operators, using their resources to respond (2) some external physical or cognitive components to (3) perform the task.

The workload is not limited to the physical duties of nurses; their cognitive tasks (mental workload) are also a complex part of the overall workload. Although there is no universal definition of mental workload, mental workload can be said to refer to all mental activities such as estimation, decision making, communication, identification, and search, and is defined as the relationship between the mental resources needed to perform tasks and the individual's ability to use them. those resources (Moghadam et al., 2019). In summary, a generally accepted formal definition of workload does not exist. Workload can be characterized as a mental construct that reflects the mental strain that results from performing a task under certain environmental and operational conditions, coupled with the operator's ability to respond to those demands (Cain, 2007).

2.2 Reasons for Measuring Workload

The main reason for measuring workload is to measure the mental cost of performing a task to predict operator and system performance. Thus, this is a temporary measure and one that should provide insight into where increased task demands may lead to unacceptable performance (Cain, 2007). Excessive workload and long working hours are key factors that cause fatigue. Although individuals who experience fatigue can continue to carry out their duties, the quality of their work is likely to decline, this is especially problematic when human lives are at stake (Young et al., 2008). When task difficulty (workload) increases, performance usually decreases, response times and errors increase, control variability increases, fewer tasks can be completed per unit time, and task performance strategies change (Cain, 2007). Health workers who experience fatigue and overwork will have shorter attention spans and are less likely to exercise good judgment and detect and react appropriately to critical events (Young et al., 2008).

2.3 Workload Measurement Technique Categories

Workload measurement techniques are typically organized into three broad categories: self-assessment or subjective Rating scales; Performance measures (including subdivisions of primary and secondary task measures); and Psychophysiological measures (Wierwille & Eggemeier, 1993).

- Subjective Measurement Techniques

Subjective measurement techniques can also be called a rating scale. This technique uses a rating scale to evaluate the participants' perceived workload. Most subjective workload measures imply that mental workload is being measured and the effects of physical work associated with gross motor muscles are not considered. It seems appropriate that mental workload is measured in a subjective way, because it is a psychological construct (Cain, 2007; Wierwille & Eggemeier, 1993). Subjective measures of workload have been reported to be less invasive, easier, and cheaper to obtain, more reproducible, and of higher facial validity. A pilot workload assessment study found subjective measures sensitive enough to produce meaningful data (Young et al., 2008). Some of the techniques that are subjective measure techniques are Instantaneous Self-Assessment of workload (ISA), NASA Task Load Index (NASA TLX), Subjective Workload Assessment Technique (SWAT), and Rating Scale Mental Effort (RSME).

- Performance Measurement Techniques

Workload performance measures can be classified into two main types: main task measures and task measures secondary. In most investigations, the performance of the main task will always be of interest because of its generalization to in-service performance is central to research. In the secondary task method, the performance of the secondary task itself is possible have no practical importance and serve only to load or measure operator loads. Some of the techniques are reaction time (RT), primary task, secondary task, dual task (Cain, 2007; Wierwille & Eggemeier, 1993).

- Psychophysiological measures

The main attraction of psychophysiological measures is the continuous and objective measurement of the operator's state. Psychophysiology attempts to interpret psychological processes through their effects on bodily states, not through task performance or perceptual ratings (Cain, 2007). Some of the common psychophysiological methods include measuring brain activity by electroencephalography (EEG), eye movements, heart rate, and respiratory rate in response to stress such as that caused by physical activity (Wierwille & Eggemeier, 1993; Young et al., 2008).

3. Research Methodology

3.1 Research Design and Setting

In this cross-sectional, descriptive-analytic study, the correlations between mental workload and a few demographic characteristics (age and work experience) were evaluated in all employees. The research setting was the Budhi Asih Mother and Child Hospital (RSIA Budhi Asih). The sampling technique in this study used total sampling, which included all 55 employees at Budhi Asih Hospital as participants.

3.2 Measures

Data were collected using a demographic questionnaire and NASA-task load index (NASA-TLX) for measures mental workload. The demographic questionnaire contained data on age, gender, education, work experience, and work unit. The standardized National Aeronautics and Space Administration- Task Load Index (NASA-TLX) was used to measure the mental workload of employee which provides an overall score of mental workloads based on a weighted average of six subscales, namely mental demand, physical demand, time demand, performance, effort, and frustration. NASA-TLX was originally developed by Hart in 1988 (Hart & Staveland, 1988). The translation of this scale into Indonesian was performed by Nurrianti et al., (2019) with the reliability

coefficient was measured by Cronbach's alpha coefficient ($\alpha = 0.83$). In current study the reliability of the scale was confirmed at the Cronbach's alpha coefficient of 0.879.

The NASA-TLX assessment is carried out in three stages, namely determining the weight of the load (6 items), determining the degree of load (15 items), and determining the final mental workload score. In the first stage called weighting, there are six items that must be assessed on a scale of 0-100 for each item. In the second step, which is presenting the ranking, there are 15 items in pairs, the respondent must choose a factor that plays a more important role. In the third stage is the value assessment, carried out by multiplying the weight by the assessment then divided by 15 for the score of each subscale. The total mental workload score from NASA-TLX is obtained by summing the six subscales (0-100), higher scores indicate higher mental workload. Scoring the mental workload is classified into four level: low (0-25), moderate (26-50), high (51-75), and very high (76-100) ((Karimvand et al., 2019)).

3.3 Statistical Analysis

The data analysis was performed with SPSS version 25. Descriptive statistics (Mean and SD) were used to compare total mental workload, weights, rates, and scores of NASATLX subscales. The Kolmogorov Smirnov test was used to determine the type of distribution of different levels of independent variables for dependent variables (workload). The t-test was used to compare the mental workload by gender, while Kruskal Wallis was used to compare the mental workload in terms of education. To compare mental workload based on work units, one-way ANOVA Welch was employed. The Pearson correlation coefficient was calculated to examine the correlation of mental workload with age and work experience.

4. Results

The results obtained reported that most of the participants were female (81.8%). The mean age of the nurses participating in the study was 28.93 ± 6.94 years, and most of them (70.9%) were categorized in the age group below 30 years. The mean of the history of work experience was 2.83 years, and most of the participants (70.9%) were in the group of 1-5 years of work experience. Most of the respondents had an associate degree (94.3%). Table 1 shows the frequency distribution of employee participating in the present study.

The t-test result showed no statistically significant relationship between gender and mental workload ($p > 0.05$). Similarly, the results of the Kruskal Wallis test showed that there was no significant relationship between education and mental workload ($p > 0.05$). The findings of the Spearman's correlation test also suggested that work experience was not significantly correlated with the mental workload ($p > 0.05$). However, a statistically significant and direct relationship was observed between age and mental workload ($p = 0.05$, $r = 0.266$).

The results of one-way ANOVA Welch showed a significant relationship between mental workload and work unit (< 0.001), where delivery room reported the highest mental workload score (82.73 ± 11.20) while inpatient dept reported the lowest score (31.45 ± 7.26). Post hoc Games-Howell analysis administration dept vs inpatient dept $p = 0.004$ (mean difference = 45.99), doctor vs inpatient dept $p = 0.013$ (mean difference = 35.35), laboratory vs inpatient dept $p = 0.035$ (mean difference = 17.07), medical record dept vs inpatient dept $p < 0.001$ (mean difference = 47.12), medical record dept vs laboratory $p = 0.04$ (mean difference = 30.05), delivery room vs inpatient

dept $p=0.002$ (mean difference = 51.27), delivery room vs laboratory $p=0.03$ (mean difference = 34.19).

Table 1. Frequency distribution of employees at Budhi Asih Mother and Child Hospital

No	Characteristic		Frequency		NASA TLX Score	Sig.
			No	Percent (%)	Mean±SD	
1	Gender	Male	10	18.2	65.83±19.27	0.535*
		Female	45	81.8	61.02±22.55	
2	Age	>30	39	70.9	57.09±22.17	r = 0.266 p = 0.05 ****
		31-40	11	20.0	77.30±17.30	
		>40	5	9.1	65.45±12.87	
3	Education	High School	8	14.5	55.08±20.42	0,226**
		Associate Degree	30	54.5	58.24±24.10	
		Bachelor	13	23.6	69.72±17.14	
		Masters	4	7.4	77.49±4.81	
4	Work Experience	< 1 year	11	20	54.85±25.03	r = 0.188 p = 0.169 ****
		1 – 5 years	39	70.9	62.24±21.62	
		>5 years	5	9.1	74.69±11.25	
5	Unit	Administration dept	3	5.5	77.45±6.33	<0.001***
		CSSD	3	5.5	81.22±19.28	
		Doctor	7	12.7	66.80±15.38	
		Pharmacy	4	7.3	61.78±25.00	
		Security	3	5.5	54.20±15.41	
		Laboratory	2	3.6	48.53±0.37	
		Operating room (OK)	3	5.5	63.04±19.76	
		Perinatology	6	10.9	53.56±21.15	
		Outpatient dept	3	5.5	59.69±23.63	
		Inpatient dept	6	10.9	31.45±7.26	
		Medical record dept	3	5.5	78.58±4.45	
		Emergency room	7	12.7	60.85±28.33	
		Delivery room (VK)	5	9.1	82.73±11.20	

*t-test, ** Kruskal Wallis, *** One-way Anova Weich, ****Spearman

The mean mental workload was 61.89±21.90, where effort dimension had the highest score compared to other mental workload dimension (Mean±SD weight: 68.69±24.40; Mean rate: 3.24±1.20; Mean score: 14.97±8.01), and the lowest score was frustration dimension (Mean±SD weight: 42.43±26.09; Mean rate: 1.15±1.25; Mean score: 4.53±6.92). Table 3 shows the description of mental workload subscale.

Table 2. Description of mental workload subscale of employees at the Budhi Asih Mother and Child Hospital

No.	Workload Subscale	Mean±SD	Minimum	Maximum
	Weight (0-10)			
1	Mental Demand Weight	56.04±24.86	15	100
2	Physical Demand Weight	52.04±25.99	9	100
3	Temporal Demand Weight	53.36±27.37	15	100
4	Performance Weight	68.75±24.29	20	100
5	Frustration Weight	42.43±26.09	9	100

6	Effort Weight	68.69±24.40	20	100
	Rate (0-5)			
1	Mental Demand Rate	2.07±1.09	0	4
2	Physical Demand Rate	2.09±1.32	0	5
3	Temporal Demand Rate	3.40±1.33	0	5
4	Performance Rate	3.05±1.39	0	5
5	Frustration Rate	1.15±1.25	0	5
6	Effort Rate	3.24±1.20	1	5
	Score (0-33.33)			
1	Mental Demand Score	7.70±5.63	0	24.00
2	Physical Demand Score	7.27±6.15	0	21.07
3	Temporal Demand Score	11.75±8.30	0	33.33
4	Performance Score	14.66±8.62	0	30.00
5	Frustration Score	4.53±6.92	0	28.33
6	Effort Score	14.97±8.01	1.93	33.33
	NASA TLX Score (0-100)	61.89±21.90	26.27	98.33

5. Discussion

In this study, the total NASA TLX score was 61.89±21.90, based on Karimvand et al. (2019) included in the high category. Nurrianti et al. (2019) in their study reported that the average NASA TLX score for nurses at Banyumas Hospital was 74.28. A study on midwives in Yogyakarta found that most (75.6%) respondents felt a moderate workload with a NASA-TLX score range of 50-80 (Santi et al., 2016). Jeniawaty et al. (2020) also reported the same result, namely that most respondents felt a high level of workload. A study by Permana et al. (2020), as many as 98.3% of polyclinic nurses at RSUD dr. Slamet has a high workload (score range 50-100). While in the study Widiastuti et al. (2017) the average NASA TLX score for nurses in the emergency department was 76.5. Mental workload on medical personnel is included in the high category (Restuputri et al., 2019). All the studies mentioned used the same study tools as ours. From various studies, it is found that medical personnel have a high level of mental workload.

The results of this study demonstrate that, among the dimensions of workload, the average score is highest with effort, performance, temporal demands, mental demands, physical demands, and frustration. The effort dimension (14.97±8.01) is the mental workload dimension with the highest average score in this study. This is in line with Mohd Balwi et al. (2021) who reported that the effort dimension is the mental workload dimension with the highest score. Yusefi et al. (2019) and Zheng et al. (2012) also reported that the workload dimension with the highest score was effort score, in line with the current study. Study from Achmad & Farihah, (2018) reported that the second highest mental workload subscale for ICU nurses was effort with the highest subscale being performance. This illustrates that employees in hospitals are trying both mentally and physically to obtain the expected performance. The dimension of workload with the lowest score in this study was frustration (4.53±6.92). The same finding in the study Yusefi et al. (2019) and Zheng et al. (2012) that the level of frustration was at the lowest score. Although the total mental workload score is in the high category, the frustration dimension is the lowest. Employees do not feel pressured.

This study shows a significant relationship between age and mental workload. Rostami et al., (2021) reported similarly that age had a correlation with mental workload. Although this study did not find a significant correlation between work experience and mental workload, it was supported

by a study Wihardja et al. (2019) which reported that work experience had no correlation with mental workload. However, employees with 1-5 years of work experience have a higher workload than employees with <1 year of work experience. This is in line with a study conducted (Rasooly et al., 2021) that nurses with 2 to 5 years of experience reported higher levels of subjective workload than nurses with <2 years of work experience. One of the things that might be the cause is that nurses with 1-5 years of work experience get more complex tasks than employees with <1 year of work experience.

According to the results of the current study, the highest mental working was in the delivery room unit (82.73±11.20). There is a significant difference between the mental workload in the delivery room and in the inpatient department. Workload increases during labor with higher acuity, with increased delivery room interventions, and an increase in the number of team members (Zehnder et al., 2020). This explains that the mental workload in the delivery room will be heavier than in the inpatient department because midwives and nurses in the delivery room perform more actions than midwives and nurses in the inpatient department. Understanding the distribution of workload among team members and their effect on each team member's performance will allow us to design targeted interventions to improve role assignment and fair workload management

6. Conclusion

The mental workload of employees at Budhi Asih Mother and Child Hospital was high. The workload dimensions of the highest order are effort, performance, temporal demands, mental demands, physical demands, and frustration. There is a significant relationship between mental workload with age and work unit. One of the significant differences was obtained from the mental workload of the delivery room and the inpatient dept. The delivery room has a higher mental workload than the inpatient dept.

7. Implication

Hospital management needs to make the division of tasks and allocation of employees better so that the workload of employees decreases and is more equitable. The number of employees in each work unit also needs to be adjusted to the workload of each unit. This study analyzes the mental workload of employees, so there is a need for further research on physical workload and its relationship with mental workload.

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